

A photograph of a quail standing in a field of green grass and tall, thin stalks. The quail is the central focus, facing left. The background is a soft-focus field of similar vegetation.

**OKLAHOMA
COOPERATIVE
FISH AND WILDLIFE
RESEARCH UNIT**

**BIENNIAL
REPORT 2012 | 13**

Celebrating Our 7th Decade

IN COOPERATION WITH
Oklahoma State University
Oklahoma Department of Wildlife Conservation
Wildlife Management Institute
U.S. Geological Survey
U.S. Fish and Wildlife Service

welcome

OPPORTUNITIES FOR GRADUATE STUDY

NATURAL RESOURCE ECOLOGY AND MANAGEMENT AND BEYOND!



COVER

The northern bobwhite (*Colinus virginianus*) is one of the most important wildlife resources in Oklahoma. Bobwhite populations in western Oklahoma are at the western edge of the species' distribution and are of particular concern to hunters, birdwatchers, and the Oklahoma Department of Wildlife Conservation, who is investing significant research support to understand, among other things, aspects of nesting and brooding rearing. Photograph by A. Unger.

Biennial Report designed by the Marketing Services at Oklahoma State University.

It is our great pleasure to circulate the **Biennial Report of the Oklahoma Cooperative Fish and Wildlife Research Unit**, which highlights graduate research and scholarship for 2012–2013.

The Oklahoma Unit of the U.S. Geological Survey's Cooperative Research Units Program has been an integral part of graduate-level research and post-graduate training in natural resources, particularly fisheries and wildlife conservation, at Oklahoma State University since 1948.

With direction from our Coordinating Committee, research is conducted on a wide variety of natural resource conservation topics in cooperation with federal and state agencies, the University, the Oklahoma Department of Wildlife Conservation, the U.S. Fish and Wildlife Service, the Wildlife Management Institute, and various private entities. Most of our research projects are problem oriented and designed to provide cooperators with useful information on time-sensitive natural resource issues.

From its establishment in 1948 to 2006, the Unit was affiliated most closely with OSU's Department of Zoology in the College of Arts and Sciences. In 2006, the Unit's primary affiliation moved to the new Department of Natural Resource Ecology and Management in the Division of Agricultural Sciences and Natural Resources. Such changes have expanded cooperative research and enhanced the Unit's ability to assist faculties and students of both colleges and departments and beyond.

Research through the Oklahoma Unit is conducted mainly by M.S. and Ph.D. candidates. Over 400 theses and dissertations have resulted from their persistence and scholarship. Unit students have conducted research on fisheries management in reservoirs, ponds, and rivers; stream

ecology; species of special concern including the Arkansas river shiner and Ozark big-eared bat; toxicology; and management of bobwhite quail, black bears, and spotted bass. While many of our research projects occur in Oklahoma, the Unit's reach includes activities in Texas, New Mexico, Nebraska, and beyond. As we continue in our 7th decade, future projects will continue to emphasize applied research on the natural resources of Oklahoma and the nation.

The Oklahoma Unit and its Cooperators would be pleased to share additional information on any project summarized herein. You are welcome to contact any of the investigators listed by project through the Unit Office.

Additional information about our cooperators can be found at www.coopunits.org, www.okstate.edu, www.wildlifedepartment.com, www.wildlifemanagementinstitute.org, and www.fws.gov.

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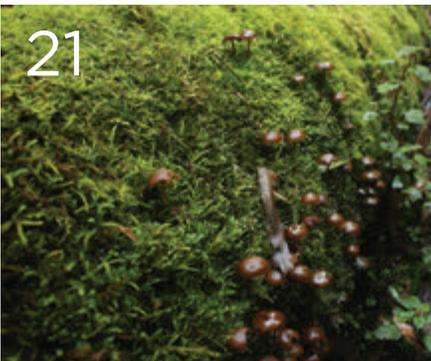
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Cooperators and Research Personnel

Cooperating faculty from the University, resource professionals from many agencies and affiliated universities, post-doctoral researchers, graduate students, research specialists and technicians, and volunteers are the lifeblood of Unit operations and opportunity.

Aquatic Resources

From mussels to spotted bass and with clear applications of Geographic Information System technologies, completed and ongoing Unit projects in aquatic resources explore complex resource issues focusing on conservation, recreation, recovery, and human dimensions.

Terrestrial Resources

From bobwhite to other avian assessments in prairies and forest and from conservation genetics of bears and turtles to a variety of management issues, completed and ongoing Unit projects in terrestrial resources encompass most topics in contemporary wildlife conservation.

Scholarship

The spirit of scientific contribution and scholarship of Unit participants in 2012–2013 is clear: 17 student/faculty awards, 9 theses/dissertations, 48 peer-reviewed and technical publications, and 106 presentations at professional state, regional, national, and international meetings.

**2012
2013**

The **UNIT BIENNIAL REPORT** is a publication of the Oklahoma Cooperative Fish and Wildlife Research Unit to disseminate information about Unit research and scholarly activities at Oklahoma State University. It is intended to encourage communications among interested parties. Please contact the Unit for further information and dialog.

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Biennial Report

2012
2013

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R. MOLLENHAUER PHOTO



SHANNON AND NICOLE GILL NET

* Unit-based project

Aquatic Resources

COMPLETED PROJECTS

4



Characteristics of two self-sustaining reservoir populations of paddlefish in northeastern Oklahoma

American paddlefish were historically abundant in the large rivers of Oklahoma, but reservoir construction, over-exploitation, and pollution have limited their abundance. Two reservoirs in Oklahoma, Grand and Keystone, have maintained self-sustaining populations of paddlefish, but several differences exist. More anglers targeted and harvested paddlefish at Grand than Keystone, but no significant differences in effort or catch per angler were found. Gillnetting data showed no significant difference in relative abundance between populations although paddlefish from Keystone were significantly longer, heavier and fatter than those from Grand. Conversely, paddlefish from Grand had higher gonadosomatic index values.

FUNDING
Oklahoma Department of Wildlife Conservation

INVESTIGATOR
Ashley Nealis, M.S. Candidate

FACULTY SUPPORT
James M. Long

COMPLETED
May 2013

Genetic analysis of demographics dynamics of paddlefish in Grand Lake O' the Cherokees

The American paddlefish is a species of significant recreational, economic and biological importance, and as such, maintaining levels of genetic variation is one component of long-term management. The Grand Lake population in northeastern Oklahoma is presently abundant; however, aging data revealed a strong bias for fish from a single recruitment class from 1999. Dominance of a single year-class in such a long-lived species raises the question of whether the 1999 cohort represents the genetic diversity present across all cohorts. Results from our study indicated only moderate levels of variation, with patterns consistent with fluctuations in census size. Remarkably, levels of genetic diversity were uniform across cohorts. These results provide valuable contributions to understanding how life-history traits can mediate patterns of genetic diversity and provide a valuable perspective to manage genetic resources in this species.

FUNDING
Oklahoma Department of Wildlife Conservation

INVESTIGATOR
Mike Schwemm, Ph.D. Candidate

FACULTY SUPPORT
Anthony A. Echelle, Ron Van Den Bussche, and James M. Long

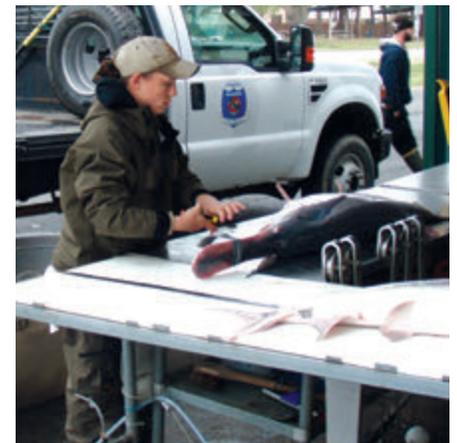
COMPLETED
August 2013

J. LONG PHOTO



EVAN WITH PADDLEFISH FROM AR RIVER

J. LONG PHOTO



ASHLEY AT PRC

Channel catfish stocking in Oklahoma reservoirs

This study examined the effect of stocking advanced size channel catfish (178 mm TL) on fish populations and angler use and satisfaction in six medium-size Oklahoma reservoirs. Fish stocking showed variable responses, but was generally habitat and density dependent. When resident fish were numerous, stocked fish grew slowly and reservoirs with high amounts of woody habitat contained more robust populations of channel catfish. Generally, angling declined over the study, coincident with drought and high temperatures, and angling activity did not correspond well with manipulated channel catfish populations. A discrete-choice survey indicated that anglers would prefer better management in the reservoir such as larger size of the channel catfish and more fish stocked.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Randy Stewart, Ph.D. Candidate; Monika Ghimire, M.S. Candidate; Jeremy Duck, Nate Gonsoulin, and Brandon Melton, Field Technicians

FACULTY SUPPORT

James M. Long and Tracy A. Boyer

COMPLETED

December 2013

J. LONG PHOTO



RANDY WITH HOOP NET

Mortality of blue catfish caught by jug fishing

Angling for blue catfish is becoming increasingly popular. Given their slow growth, harvest restrictions on large fish have been implemented to avoid overharvest of rare, large fish. We assessed delayed mortality rates of blue catfish caught by jug fishing to ensure that fish released under this new regulation survive, thus making the regulation effective. In field trials, overall mortality was low (8.5%), and fish >76 cm experienced lower post-hooking mortality (2.5%) than smaller fish. No mortality was observed for any size class in water temperatures < 14°C. These results suggest the new regulation should be effective at protecting large blue catfish.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATOR

Joe Schmitt, M.S. Candidate

FACULTY SUPPORT

Daniel Shoup

COMPLETED

June 2012

D. SHOUP PHOTO



JOEY WITH BCF

Economic impact of the cold-water fishery in the lower Mountain Fork River

The Lower Mountain Fork River below Broken Bow Lake has been managed by the Oklahoma Department of Wildlife Conservation as a put-and-take trout fishery since 1988. Studies conducted recently after the establishment of this fishery indicated that additional license sales more than paid for the cost of stocking fish; however, in recent years, management of the tailwater trout fishery has evolved, giving anglers more options regarding the type of fishing they want to experience. We completed an on-site creel and conjoint choice survey as well as follow-up telephone surveys to estimate the use-value of the site to anglers. The travel cost expenditure information was also used to estimate the economic impact of the trout fishery to the local area at roughly \$25 million in 2011. This research shows that the fishery functions as a significant contributor to the local economy.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATOR

Mike Reilley, M.S. Candidate

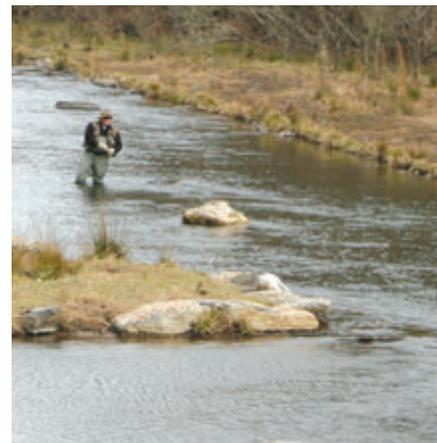
FACULTY SUPPORT

Tracy A. Boyer, David Shideler, and James M. Long

COMPLETED

June 2012

J. LONG PHOTO



FLY FISHING THE LOWER MOUNTAIN FORK

Fish use of shallow-water habitats to develop instream flow guidelines in scenic rivers

Environmental flows are important for the conservation of stream biota. Although a range of flows are necessary for the persistence of aquatic species, minimum-flow standards are often the most basic component. It is well recognized that stream drying disproportionately affects the shallow-water habitat availability in streams. The two objectives of this study were: 1) determine diel habitat use by fishes using shallow-water habitats during baseflow conditions in three scenic rivers in Oklahoma and 2) assess movement of a subset of stream fishes in relation to environmental parameters. Results provided managers with a range of flows where areas of particular habitats declined and fish movements became restricted.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Chris Musselman, M.S. Candidate; Daniel Beatie, Bryce Burkhead, Jahna Hill, Christopher Kemp, Shelby Parker, and Nicole Farless, Field Technicians

FACULTY SUPPORT

Shannon K. Brewer

COMPLETED

December 2013

Effects of hydrologic alteration on species of greatest conservation need in Lee Creek, Oklahoma

The ecology of Lee Creek was examined to determine the relationships to damming and climate change. Fish were sampled during summer 2011, spring 2012, and summer 2012, and relationships between fish and their environments were assessed using canonical correspondence analysis. The fish community was moderately impacted since damming and lacked large-river migrants from the Arkansas River due to the physical barrier of the dam. Lee Creek's hydrology since damming has become flashier and flood events occurring earlier in the year, but this was driven by long-term changes in precipitation (i.e., increased rain-event magnitude coupled with decreased rain-event frequency) rather than by land cover or direct effects of the impoundment.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Michael Gatlin, M.S. Candidate; Steven Maichak, Field Technician

FACULTY SUPPORT

James M. Long and Don Turton

COMPLETED

June 2013

Early life-history stage dispersal and survival of Arkansas River shiners at a landscape level

For fishes dependent on specific flows for successful reproduction, quality and quantity of available water are likely primary determinants of habitat quality. In many cases, minimum requirements of water quantity and quality needed to support self-sustaining fish populations are unknown and thus there is no way for resource managers to effectively assess habitat quality and its ability to support fish populations under current or future conditions. This project had two main goals: 1) build a predictive model at the landscape scale to assess the probability of Arkansas River shiner occurrence given a suite of landscape metrics and 2) assess effects and interactions of environmental factors (e.g., temperature, suspended solids, channel geometry, and flow) on egg buoyancy and early life-history stage survival.

FUNDING

Great Plains Landscape Conservation Cooperative

INVESTIGATORS

Tom Worthington, Postdoctoral Fellow; Steven Maichak, Field Technician

FACULTY SUPPORT

Shannon K. Brewer

COMPLETED

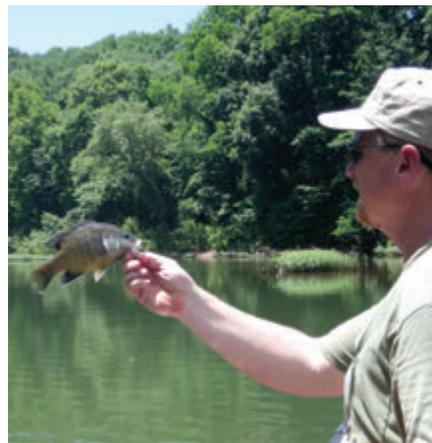
September 2012

STAFF PHOTO



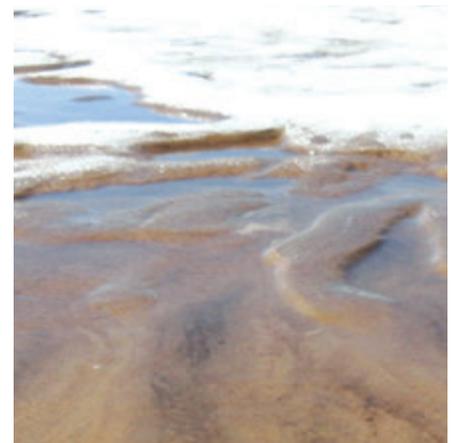
SHANNON WITH SMB

D. LYNCH PHOTO



JIMMY WITH GREEN SUNFISH FROM LEE CREEK

S. BREWER PHOTO



SANDBED STREAM

Ecohydrology models as tools for landscape conservation under climate change

Our objective was to synthesize and evaluate prevailing hydrological and ecological instream flow models. We identified data requirements and suitability of each model to simulate flow regimes while addressing associated changes in the ecology of stream systems. We focused on models with relevant application to the southern Great Plains region. This synthesis directly addressed existing needs of the region by providing information on existing modelling approaches that could be readily used to help understand effects of climate change and land management on hydrology and associated fish assemblages.

FUNDING

Great Plains Landscape Conservation Cooperative

INVESTIGATOR

Xin Jin, Postdoctoral Fellow

FACULTY SUPPORT

Shannon K. Brewer

COMPLETED

September 2013

Microbial water-quality impacts of migratory birds in the Central Platte River Basin

In 2009 and 2010, the U.S. Geological Survey in Nebraska completed sampling for a study to investigate the impacts of migratory birds, such as sandhill cranes and geese, on the microbial water quality of the Platte River during the spring migration period. Sampling was completed from a period starting before the spring migration (January) until after the spring migration (May). Several types of bacteria that are indicators of fecal contamination were present in the excreta of sandhill cranes, and these were more abundant in water and sediment samples from the Platte River when sandhill cranes were present.

FUNDING

U.S. Geological Survey, Nebraska Water Science Center

INVESTIGATORS

Hayat Azawi, Ph.D. Candidate; Jessica Lay, M.S. Candidate; Katie Beitz, Field Technician

FACULTY SUPPORT

Jason R. Vogel

COMPLETED

September 2012

Survey of freshwater turtles in eastern Oklahoma

We used a marked, confined population of red-eared sliders to evaluate the capture metrics of hoop traps, using a short-range antenna inside a hoop trap to monitor entrances, exits and residence time of turtles implanted with PIT tags. Surprisingly, turtles did not remain inside the trap for long; mean residency time was 40.5 minutes (range from 3.5 to 143.4 minutes) for 30 turtles who remained in the trap for at least 1 minute. We concluded that turtles are not really “trapped” by hoop traps; individuals can rather freely enter and exit the trap at will. Although females remained in the trap slightly longer than males, this was not significantly different. Turtles entered the trap significantly more than expected during daylight hours compared with nighttime hours.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Cameron Hodges, Tell Judkins, and Ariel Richter, Technicians

FACULTY SUPPORT

Stanley Fox and David M. Leslie, Jr.

COMPLETED

June 2013

D. LOGUE PHOTO



PLAINS KILLIFISH

A. RICHTER PHOTO



SNAPPING TURTLE CLOSEUP

Aquatic Resources

ONGOING PROJECTS

8



Predicting distribution of freshwater mussel assemblages in small rivers of southeastern Oklahoma

The small rivers in the Ouachita Mountains, Arkansas Valley, Western Gulf Mid-Coastal Plain Region and the Southern Cross Timbers Region are listed in the Oklahoma Comprehensive Wildlife Conservation Strategy as very high priority conservation landscapes. Among the organisms found in these rivers are native unionid mussels that are highly imperiled as a group throughout the world. A lack of basic data on location and composition of mussel assemblages in many Oklahoma rivers represent a significant impediment for conservation planning and implementation. Our efforts are focused on the Muddy and Clear Boggy rivers where there are limited data about freshwater mussels. We are extensively sampling these rivers to identify bed locations and species composition, and build models to predict landscape and in-channel habitat and geomorphic features that relate to bed locations and species abundance.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Jarrold Powers, M.S. Candidate; Bryce Burkhead, Thomas Campbell, and Mark Jensen, Field Technicians

FACULTY SUPPORT

Shannon K. Brewer and Timothy J. O'Connell

EXPECTED COMPLETION

December 2014

J. POWERS PHOTO



MUSSEL

Impacts of flow alterations on crayfishes in southeastern Oklahoma

Narrow-range endemics are considered particularly vulnerable to extirpation because they often use specific habitats that are highly susceptible to human disturbance. We are investigating several crayfish species endemic to the Ouachita Mountains in Oklahoma and Arkansas. We established spatial distributions (i.e., range) using Maximum Entropy modeling. We then investigated crayfish habitat use with quantitative sampling and a paired movement study. Finally, we evaluated the ability of crayfish to burrow under different environmental conditions in a controlled laboratory setting. Our results suggest climate change and sedimentation resulting from land-use practices, combined with increased water withdrawals have the potential to alter crayfish distributions and affect persistence of some crayfish populations.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Joey Dyer, M.S. Candidate; Blayne Housh, Kortney Kowal, Julia Mueller, Jarrod Powers, and Justin Rolan, Field Technicians

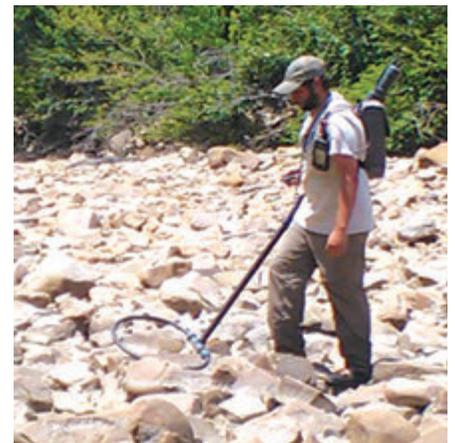
FACULTY SUPPORT

Shannon K. Brewer and Michael Tobler

EXPECTED COMPLETION

May 2014

S. BREWER PHOTO



JOEY WITH PIT TAG READER

Factors affecting distribution of endangered fish and crayfish species in northeastern Oklahoma

The Oklahoma Comprehensive Wildlife Conservation Strategy indicates that small rivers (Spring and Illinois rivers), gravel bottom streams (Spavinaw Creek), and large rivers (Grand-Neosho River) in the Ozark Region represent priority conservation landscapes. These habitats support a number of fish and crayfish species of concern. We are evaluating population biology and conservation status of state-listed fish and crayfish in the northeastern portion of Oklahoma through field surveys to assess distribution and habitat requirements. We are also evaluating current and historical distributions of the listed species using ecological niche modeling to identify landscape-level environmental factors shaping species distributions.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Reid Morehouse, Ph.D. Candidate; Garrett Hopper, and Drew Miller, Field Technicians

FACULTY SUPPORT

Michael Tobler

EXPECTED COMPLETION

May 2014

Effects of water quality and drought on fish community composition and foraging in an aging Great Plains reservoir

Beginning in 2011, a severe and persistent drought occurred throughout most of north-central Oklahoma. At Salt Plains National Wildlife Refuge, Great Salt Plains Reservoir nearly dried up; with reservoir storage reaching essentially zero. Streams, reservoirs, and wetlands at the refuge are habitat for a variety of fishes, which, in turn, are forage for nesting colonies of the endangered migratory least tern. As a result of drought, two large fish kills of >10,000 individuals occurred and the fishery has yet to recover. We are studying how the fish community is structured with regard to available habitats to examine how it might recuperate. We are also examining how turbidity, which has become chronic in the lake, might impact foraging by fish, affecting their ability to persist in this harsh system.

FUNDING

Oklahoma Cooperative Fish and Wildlife Research Unit

INVESTIGATORS

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FACULTY SUPPORT

James M. Long

EXPECTED COMPLETION

December 2014

Effects of water quantity on water quality and fish community composition in the upper Cimarron River

The Cimarron River in Oklahoma is largely undammed except for a 23-km long irrigation canal (Old Settler's Irrigation Canal) built between 1893 and 1905. Water from the Cimarron River is diverted into the canal by a sand dam, which is destroyed periodically by high flows and then re-built. We are examining how fish communities respond to the altered habitat by surveying above, below and within the altered reach and within the canal. A persistent drought kept many stretches of river devoid of water, but in general, water quantity and fish diversity were positively correlated. The fish community in the canal was also different from that in the river suggesting habitat influences.

FUNDING

U.S. Fish and Wildlife Service, Oklahoma Cooperative Fish and Wildlife Research Unit

INVESTIGATOR

Christopher Tanner, M.S. Candidate

FACULTY SUPPORT

James M. Long

EXPECTED COMPLETION

December 2014

J. DYER PHOTO



CRAYFISH WITH PIT TAG

J. LONG PHOTO



JUVENILE COMMON CARP AT GSPL

C. TANNER PHOTO



UPPER CIMARRON RIVER

Ecosystem stress response function of climate change in the Arkansas-Red River basin

Maintaining appropriate flows to support biological integrity of larger riverine ecosystems is difficult. Understanding interactions among climate, streamflow, water quality, and stream ecology for watersheds in the Arkansas-Red River Basin can be achieved using currently existing science and technology. A physics-based hydrologic model that simulates streamflow using high-resolution radar data will be used to more accurately capture spatial and temporal patterns in precipitation variability. Existing fish-community data will be collected and compiled into a database and biotic responses will be assessed to evaluate the influence of modeled streamflows. The outcome of this work can be used to develop adaptive-management strategies for conservation and sustainability of fish and wildlife.

FUNDING

U.S. Department of the Interior, South-Central Climate Science Center

INVESTIGATOR

Thomas Worthington,
Postdoctoral Fellow

FACULTY SUPPORT

Shannon K. Brewer

EXPECTED COMPLETION

January 2015

Competitive interactions between invasive Red River shiners and federally threatened Arkansas River shiners

Prairie streams host a variety of endemic species and control downstream water quality. Historically, the Arkansas River Shiner has been a characteristic species in the Cimarron and South Canadian rivers, but it is currently listed as threatened by the U.S. Fish and Wildlife Service due to major anthropogenic alterations to the stream landscape. It has been speculated that the establishment of Red River Shiner in the Cimarron River reduces the chance of recovery of the Arkansas River Shiner. This study will examine the habitat occupancy of both species in the Arkansas River Basin to determine if the invasive Red River shiner uses the same ecological niche as the native Arkansas River shiner.

FUNDING

U.S. Department of the Interior, South-Central Climate Science Center

INVESTIGATOR

Daniel Logue, M.S. Candidate

FACULTY SUPPORT

Shannon K. Brewer

EXPECTED COMPLETION

May 2016

Processing samples to monitor at-risk fish species in large prairie rivers of Oklahoma

The Oklahoma Ecological Services Field Office of the U.S. Fish and Wildlife Service conducts annual monitoring for Arkansas River shiner, a threatened species, in the Cimarron and Canadian Rivers and for the prairie speckled chub, an endemic species, in the Red River. However, a backlog of samples has prevented a rigorous analysis of those samples. We are processing these and future samples to develop a reference collection of fishes inhabiting these systems. Moreover, we are actively searching these samples for listed species to provide current data on their status.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Jake Holliday, Dakota McNeill,
Dawson McNeill, and Joshua Mouser, Lab Technicians

FACULTY SUPPORT

Shannon K. Brewer and James M. Long

EXPECTED COMPLETION

April 2016

10

S. BREWER PHOTO



CANOE ON STREAM

USFWS PHOTO



ARKANSAS RIVER SHINER

Standardized fish-sampling methods for Oklahoma streams

The combination of climate change and increased anthropogenic disturbance creates daunting challenges for stream managers. A lack of standardized approaches to regional stream-fish surveys severely limits the ability to make sound management decisions. Additionally, the failure to adjust catch data for differences in capture efficiency across species can lead to erroneous conclusions regarding structure of stream-fish assemblages. This study links capture-efficiency estimates to morphological and behavioral fish traits. Stream-fish assemblages of the Ozarks of Oklahoma are being sampled with a variety of methods across a wide range of environmental conditions. These data will be used to standardize stream-fish sampling and develop ecoregion-level capture-efficiency models. The models will allow fish surveys to be adjusted for differences in capture efficiency across species and under variable sampling conditions.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Robert Mollenhauer, Ph.D. Candidate; Joshua Mouser, Field Technician

FACULTY SUPPORT

Shannon K. Brewer

EXPECTED COMPLETION

December 2016

S. BREWER PHOTO



BARGE SHOCKING

Effectiveness of gears used to sample fish populations

Accurate population surveys are influenced by using gears demonstrating the greatest capture-efficiency. Because a multitude of options exist, offering a comparison of gear types and fish species will help reduce uncertainty in gear selection. The objective of the study is to document our current understanding of the effectiveness of different gear types for sampling fishes in various ecosystems. Results will provide an extensive review of studies assessing the effectiveness of gear types on capture-efficiency and synthesize the current state of our understanding in this area.

FUNDING

Oklahoma Cooperative Fish and Wildlife Research Unit

INVESTIGATOR

Jahna Hill, M.S. Candidate

FACULTY SUPPORT

Shannon K. Brewer

EXPECTED COMPLETION

December 2015

Flow-ecology relationships of fishes in the Arbuckle Mountains and Ozark Highlands

Natural flow and thermal regime of streams can be altered by anthropogenic activities. Environmental flow standards developed based on the relationship between stream temperature and flow alteration would help to maintain the natural thermal regime and native fish assemblage. Changes to the fish assemblage in 15 streams of the Arbuckle Mountains and Ozark Highlands will be determined to understand the influence of flow alteration. A temperature model will be developed for Arbuckle Mountain streams, and temperature tolerances of 15 fish species from Arbuckle streams will be determined to predict how the fish assemblage will be influenced by increases in temperature. This study will provide a foundation to better understand interactions between flow alteration and temperature change, allowing improved predictions of likely fish-community changes associated with environmental alteration.

FUNDING

The Nature Conservancy

INVESTIGATORS

Nicole Farless, M.S. Candidate; Jake Holliday, Field Technician

FACULTY SUPPORT

Shannon K. Brewer

EXPECTED COMPLETION

December 2015

S. BREWER PHOTO



NICOLE WITH GAR

Effects of surface-groundwater interactions on stream fishes under altered base-flow conditions

We have a limited understanding of temperature tolerances of stream fishes and how surface-groundwater interactions via hyporheic flow mediate stream temperatures at multiple spatial scales. This is particularly significant to populations that reside below dams and are subject to flow and temperature modifications, coupled with a significant loss of stream habitat. This study aims to determine effects of human-induced changes on stream-habitat complexity and fitness of stream-fish populations. Specific objectives are to determine 1) how changes in base flow levels in the Kiamichi River influence hyporheic exchange, which correspondingly influences temperature at the reach scale, and 2) temperature tolerances of stream fishes as a means to predict how habitat complexity influences fitness of stream-fish populations.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATOR

Yan Zhou, Ph.D. Candidate

FACULTY SUPPORT

Shannon K. Brewer and Garey A. Fox

EXPECTED COMPLETION

May 2018

Zooplankton composition and prey-use of juvenile fishes in constructed shallow-water habitats

The Missouri River has experienced significant anthropogenic alterations over the past 100 years, particularly loss of shallow-water habitat (SWH). In response, the U.S. Army Corps of Engineers created 1,390 ha of SWH on the lower Missouri River from Sioux City, Iowa downstream to the confluence with the Mississippi River. It is currently unknown if created-SWH provides beneficial habitat for native juvenile fish. This study is assessing fish community composition, zooplankton prey availability, and prey use from main stem, chute, and backwater sites to see if prey availability and selectivity varies by habitat type. To date, we found created-SWH had significantly higher alpha and gamma fish diversity and increased abundances of invasive Asian carp larvae compared to mainstem shallow-water habitat.

FUNDING

U.S. Army Corps of Engineers

INVESTIGATORS

William Mausbach, Ph.D. Candidate;
Trevor Starks, M.S. Candidate

FACULTY SUPPORT

James M. Long and Andrew R. Dzialowski

EXPECTED COMPLETION

December 2014

Habitat use and movements of shovelnose sturgeon in the Arkansas River

The shovelnose sturgeon is a potamodromous species native to the Arkansas, Little, and Red rivers and major tributaries of Oklahoma. Habitat fragmentation by dams is thought to limit distribution and overall success of this species in Oklahoma; however, targeted sampling efforts have been limited. Drought conditions and additional dam proposals have highlighted the necessity of increasing our understanding of Oklahoma's shovelnose sturgeon populations. We are using ultrasonic telemetry to determine home ranges and habitat use in a large segment of the Arkansas River to better understand the ecology of populations residing in a highly fragmented system at the southwestern edge of their distribution.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATOR

Josh Johnston, M.S. Candidate

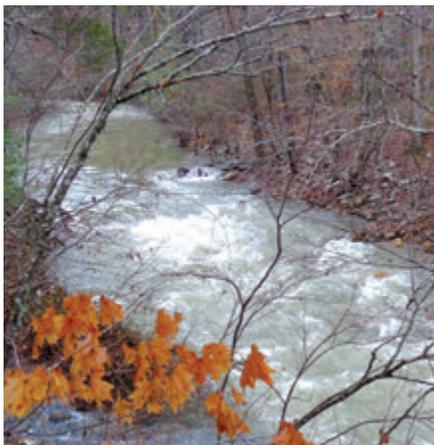
FACULTY SUPPORT

Shannon K. Brewer

EXPECTED COMPLETION

May 2016

S. BREWER PHOTO



OZARK STREAM

T. STARKS PHOTO



ANTHONY ON BOW TRAWLER

S. BREWER PHOTO



JOSH AND STURGEON

Validation of daily ring formation in otoliths of alligator gar

Artificially-spawned alligator gar fry with a known spawn date, hatch date, and swim-up date were stocked into hatchery ponds sampled each week through 91 days post-hatch. Age in days from each of the three otoliths (sagittae, lapilli, and astericsi) was estimated and compared. Mean daily ring count and known age were closely related to swim-up date for all otolith types, indicating daily ring deposition, but lapilli were the most accurate and precise. The resulting regression model of ring counts against known age was applied to wild-caught alligator gar collected from Lake Texoma, Oklahoma, to estimate spawn dates, which were coincident with rising pool elevations and tributary water pulses.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATOR

Richard Snow, M.S. Candidate

FACULTY SUPPORT

James M. Long

EXPECTED COMPLETION

May 2014

Genetic integrity and population status of shoal bass in the upper Chattahoochee River, Georgia

The shoal bass is an endemic species of black bass native to the Apalachicola-Chattahoochee-Flint river system of Georgia, Alabama, and Florida. It is considered vulnerable to extinction because of competition and genetic hybridization with invasive species and habitat loss. Within the upper Chattahoochee River basin, shoal bass are isolated in Big Creek below Lake Lanier and in the Chestatee and Chattahoochee rivers above Lake Lanier. We are comparing population status and genetic integrity among these three sites. Based on one year of sampling, population sizes and mortality rates appear lower than populations further south in the shoal bass distribution. Comparative measures of genetic integrity will be evaluated.

FUNDING

U.S. National Park Service

INVESTIGATOR

Andrew Taylor, Ph.D. Candidate

FACULTY SUPPORT

James M. Long

EXPECTED COMPLETION

December 2017

USDA programs effects on High Plains playa wetlands

This research is assessing the influence of USDA conservation practices on playa wetland ecosystems in the High Plains. We are evaluating ecosystem services for playa wetlands in three land treatment groups: cropland, lands enrolled in USDA conservation programs (e.g., CRP and WRP), and grassland. Results include the development of predictive functional condition indicator models that include multiple-scale factors that contribute to differences in ecosystem service estimates. The work has received additional USDA funding to develop models for a USGS Integrated Landscape Modeling effort.

FUNDING

USDA Natural Resources Conservation Service

INVESTIGATOR

Bart Kensinger, Ph.D. Candidate

FACULTY SUPPORT

Loren Smith and Scott McMurry

EXPECTED COMPLETION

December 2015

J. LONG PHOTO



JUVENILE ALLIGATOR GAR

A. TAYLOR PHOTO



CREW SAMPLING BIG CREEK

Terrestrial Resources

COMPLETED PROJECTS



Fire frequency and vegetation change in the cross-timbers

The Cross Timbers is a mosaic of tallgrass prairie, oak woodland, and oak forest covering almost 5 million hectares from southeastern Kansas to north-central Texas. Fire played a dominant role in determining vegetation composition and structure prior to Euro-American settlement, but its suppression over many decades led to vegetation changes. We conducted a study of fire effects on vegetation to satisfy renewed interest in prescribed fire as a management tool to improve wildlife habitat. Prescribed fire effects on wildlife habitat were evaluated on three Wildlife Management Areas in Oklahoma where it had been used over the past 25 years. Prescribed fire enhanced herbaceous plant abundance and richness, reduced understory woody plants, and increased availability of nutrients to white-tailed deer, but it had no effect on coarse woody debris, snags, litter decomposition, or soil carbon.

FUNDING
Oklahoma Department of Wildlife Conservation

INVESTIGATORS
Dustin Logan, John Polo, Scott Orr, and Devin Bendixsen, M.S. Candidates

FACULTY SUPPORT
Steve Hallgren and David M. Leslie, Jr.

COMPLETED
June 2012

S. HALLGREN PHOTO



STACY CLARK AND CORER

Oklahoma bats and climate change

At least 22 bat species are known to reside in Oklahoma. Three species/subspecies are federally listed as endangered: Ozark big-eared bat, gray bat, and the less common Indiana bat. Some climate models predict that parts of eastern Oklahoma where these endangered taxa occur will become drier and warmer, which could cause significant change to the ecology of the area. The Ozark big-eared bat, in particular, could experience negative effects from such a change in their habitat because they are nonmigratory and nearly exclusively dependent on forest moths for food. We conducted a review of the literature to assess effects of such climate-induced habitat change on the Ozark-big-eared bat and the gray bat. Scenarios of warming vs. cooling and/or drying vs. wetting were discussed relative to these bats in eastern Oklahoma.

FUNDING
Oklahoma Cooperative Fish and Wildlife Research Unit

U.S. Fish and Wildlife Service

INVESTIGATOR
Rhonda Spinks, M.S. Candidate

FACULTY SUPPORT
David M. Leslie, Jr., Karen Hickman, and James H. Shaw

COMPLETED
December 2013

Unobtrusive population monitoring of Ozark big-eared bats

Historically, Ozark big-eared bats occurred in eastern Oklahoma, southeastern Missouri, and northeastern Arkansas. Due to a variety of reasons, this subspecies has been reduced to ~1,900 individuals, and its distribution is now restricted to eastern Oklahoma and northwestern Arkansas. We sought to develop an unobtrusive genetic monitoring protocol with guano from Ozark Big-eared bats that will provide an estimate of individuals at a particular cave and an evaluation of the genetic "health" of the population. We used nuclear loci specifically developed from Ozark big-eared bats and mitochondrial loci and were able to establish the initial protocols that will eventually permit an unobtrusive estimate of the number of individuals and overall genetic status of the population. There were low levels of population structure between colonies of Ozark big-eared bats, and our data suggested that genetic mixing of individuals from closely located caves occurred at nearby swarming sites.

FUNDING

U.S. Fish and Wildlife

INVESTIGATOR

Dana Lee, Ph.D. Candidate

FACULTY SUPPORT

Ronald A. Van Den Bussche, Meredith J. Hamilton, and David M. Leslie, Jr.

COMPLETED

November 2013

USFWS PHOTO



MATERNITY COLONY OZARK BIG EARED BATS

Reptile stressors induced by habitat degradation and climate change

We conducted a collaborative research project with researchers from the U.S. Army Public Health Command and Preventive Medicine and the U.S. Army Corps of Engineers using the western fence lizard as a reptile model to characterize effects of multiple-stressors. Contamination of the soil with the explosive 2, 4, 6-trinitrotoluene (TNT) has been found at military munitions ranges and industrial waste sites where valued reptile species occur. In addition, malarial parasites (*Plasmodium* spp.) are common in most lizard families and can cause anemia. Diet restriction can exacerbate this condition. Experiments with TNT exposure demonstrated changes in most of the measured endpoints. Malaria infection affected cricket consumption, spleen and testes weight, and total white blood cell (WBC) counts. Limited cricket intake was associated with a loss in body weight, testes and inguinal fat organ weights, albumin and cholesterol blood levels, and total WBC counts.

FUNDING

U.S. Army Corps of Engineers

INVESTIGATORS

Anissa Delecki, Ph.D. Candidate; Sean Ball and Troy Talent, Lab Technicians

FACULTY SUPPORT

Larry Talent

COMPLETED

September 2012

OKCFWRU PHOTO



BEARS, DEN WORK 3-3-2014 166

Developing biological data layers for Great Plains species of concern using predictive models

We generated predictions of potential distributions for five species of conservation concern: interior least tern, burrowing owl, whooping crane, black-tailed prairie dog, and swift fox. The models identified parts of western Oklahoma and eastern New Mexico as suitable for all species. The potential suitability maps generated in this study illustrate the extent of available suitable habitat and can be further refined in relation to current land use, roads, and other anthropogenic pressures. Our results are informative for identifying key areas for protection or mitigation, as well as corridors for future dispersal for the five priority species.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATOR

Erika Capps, M.S. Candidate

FACULTY SUPPORT

Monica Papes and Jianjun Ge

COMPLETED

September 2012

Terrestrial Resources

ONGOING PROJECTS



Bobwhite quail population and habitat studies

Range-wide, bobwhite quail populations have experienced a general decline of ~3% per year in the last ~50 years. Our objectives are to determine factors driving long-term changes production and survival of bobwhite in western Oklahoma. We are focusing on changes in nesting and brood-rearing habitat. Experimental design involves application of fire and grazing over a 6-year period at one of two study sites. We are assessing the relationship between weather and bobwhite quail population change; using radio-telemetry to assess nesting and brood-rearing; modeling thermal landscape relative to nest initiation, nest success, and brood and adult survival; monitoring vegetation change relative to habitat manipulations; and establishing repeatable standardized methods for measuring abundance.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Eric Thacker, Postdoctoral Fellow; Kent Andersson, Senior Research Specialist; Matt Carroll and Evan Tanner, Ph.D. Candidates; Jeremy Orange, M.S. Candidate; Andrea King, and William Lutz, Jr., Field Technicians

FACULTY SUPPORT

Craig Davis, Dwayne Elmore, Sam Fuhlendorf, and David M. Leslie, Jr.

EXPECTED COMPLETION

July 2017

Arthropod availability and bobwhite quail nesting success

Bobwhite quail feed increasingly on arthropods beginning in early spring, and chicks rely almost exclusively on insects and other terrestrial invertebrates until at least 4 weeks of age. Hens may use available arthropod prey in assessing potential nesting sites, because arthropod prey of appropriate type and size near nesting sites is critical to survival of chicks in their vulnerable first weeks of life. Vegetation and landscape structure associated with nesting, brooding, and chick foraging may relate to preferred arthropod abundance as a determinate of brood habitat quality. Spring and summer arthropod sampling is being coordinated with habitat manipulation and radio telemetry studies. To date, 14 species of ants and 43 species of grasshoppers have been documented and their abundances are associated with differences in vegetation gradients in study areas.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Valerie O'Brien, Postdoctoral Fellow; Alli Giguere, Kenneth Masloski, and Shane Foye, M.S. Candidates; John Baggerly, Colby Gregg, Cassie Hamilton, and Ariel Richter, Field Technicians

FACULTY SUPPORT

Carmen Greenwood and David M. Leslie, Jr.

EXPECTED COMPLETION

July 2015

A. UNGER PHOTO



BOBWHITE QUAIL ON PRAIRIE

P. OWSLEY LONG PHOTO



GRASSHOPPER

Influence of spatial distribution of predators on northern bobwhite quail

Northern bobwhite quail are susceptible to predation from multiple avian and mammalian predators. In addition to direct losses, the recurring presence of predators in certain areas might cause quail to avoid those areas, rendering otherwise suitable habitat to be unsuitable. We are modeling the annual spatial distribution of carnivores and raptors to create overlays that can be compared with the spatial distribution of quail from companion research. Preliminary results suggest that high-use areas of mammalian predators might be avoided by nesting quail, but raptors overlap more broadly with quail occurrence, especially in winter.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Fidelis Atuo, Ph.D. Candidate; Jonathan Harris, M.S. Candidate; Cody Griffin, Nathan Hillis, and Emily Sinnott, Field Technicians

FACULTY SUPPORT

Timothy J. O'Connell and David M. Leslie, Jr.

EXPECTED COMPLETION

July 2016

V. CAVALIERI PHOTO



HAWK IN TREE

Wildlife exposure to aflatoxins in supplemental feed

Wildlife may be exposed to aflatoxins in contaminated grains during supplemental feeding. Aflatoxin formation was assessed to identify contributing factors. Greenhouse trials were conducted in 2013 to compare the environmental factors that contribute to aflatoxin formation. Results suggest that aflatoxin formation in wildlife feed can be reduced by selecting milo instead of corn, broadcasting grain instead of distributing in piles, and limiting the length of time that grain persists before ingestion. Feeding should be avoided during wet conditions when daily temperatures exceed 18°C. Those involved in wildlife feeding/baiting are urged to weigh the possible benefits with the known risks that supplemental feeding may pose to wildlife species.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATOR

Leah Dale, M.S. Candidate

FACULTY SUPPORT

Timothy J. O'Connell, Dwayne Elmore, and Jason Belden

EXPECTED COMPLETION

July 2014

L. DALE PHOTO



QUAIL EATING FEED CORN

Impact of fragmentation and habitat heterogeneity on lesser prairie-chickens

The lesser prairie-chicken (LPC) threatened under the Endangered Species Act—alters its behavior in relation to structures such as power lines, roads, and oil/gas wells. Mechanisms of this avoidance and potential impacts on fitness are poorly understood. To determine relationships between fragmentation and LPC populations, GPS satellite transmitters are being attached to male and female LPCs. We are examining home ranges, habitat use, and potential avoidance data on three study sites in Beaver County, Oklahoma, for three years. In 2013, we attached 37 transmitters to 13 female and 24 male LPCs. In 2014, we attached 32 transmitters to 5 females and 27 male LPCs. GIS layers are currently being constructed that will contain LPC telemetry locations, land cover, land use, anthropogenic structures, elevation, view-shed, and sound-shed.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Ashley Unger, Ph.D. Candidate; Matthew Broadway and Adam Kauth, Field Technicians

FACULTY SUPPORT

Dwayne Elmore, Sam Fuhlendorf, Craig Davis, and Mark Gregory

EXPECTED COMPLETION

December 2015

A. UNGER PHOTO



LPC WITH TRANSMITTER

Range-wide Lesser Prairie Chicken Spatial Targeting Tool

This project will further the development of a cooperative 5-state Lesser Prairie Chicken (LPC) Spatial Model and Western Governors' Association Crucial Habitat Assessment Tools (CHAT) Project. We are expanding on the first version of the Southern Great Plains (SGP) CHAT and helping to create a more robust spatial planning tool (SPT) for directing conservation of the lesser prairie-chicken. This tool is a critical component for agency conservation planning, and it is a necessity that agencies delivering conservation for lesser prairie-chicken work from the same source data for maximum benefit of the species and its surrounding ecosystem. The five state wildlife conservation agencies in the lesser prairie-chicken distribution (Colorado, New Mexico, Kansas, Oklahoma, and Texas), the Natural Resources Conservation Service, and the U.S. Fish and Wildlife Service have already adopted the first version of the SGP-CHAT as their primary planning tool for LPC conservation.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Brian Cunningham and Cara Caricato-Michalke, Senior Research Specialists

FACULTY SUPPORT

David M. Leslie, Jr.

EXPECTED COMPLETION

March 2014

A. UNGER PHOTO



EVAN TANNER WITH LPC

Range expansion of black bears in eastern Oklahoma

Populations of black bears are expanding in eastern Oklahoma, but the extent of this expansion is unknown. Working closely with private landowners, we are assessing status and distribution of black bears in east-central and northeastern Oklahoma with satellite radio-tracking technology. Since 2011, more than 15,000 locations of 11 female and 12 male bears have been obtained. Den site visits have been used to collect important reproductive data on the population; litter size of newborns has averaged 2.0 cubs per female, and captured bears have ranged in age from one to eight years, suggesting a healthy, expanding population. Hair-snare surveys are being conducted to collect DNA from hair follicles to allow identification of individual bears and a subsequent estimate of population size. To establish the geographical distribution of the population, camera traps are being deployed over a broad area with assistance from private landowners who often use cameras in association with their bait stations for other game species.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Sara Lyda, Senior Research Specialist, and Emily Artz, M.S. Candidate; Connie Teschner, Field Technician

FACULTY SUPPORT

David M. Leslie, Jr. and Sue Fairbanks

EXPECTED COMPLETION

June 2016

S. LYDA PHOTO



EMILY ARTZ, MORGAN PFANDER AND DANI TECHENTIN

Reassessing black bear status in southeastern Oklahoma

Black bears have been hunted in southeastern Oklahoma since 2009, following extensive research by the Oklahoma Unit that began in 2001 demonstrating an expanding, harvestable population. Since the hunting season began, >170 bears have been harvested, but no research has been conducted to assess the impact of that harvest. The same study area used in 2001-2007 (primarily in LeFlore and Pushmataha counties) is being revisited for this study, and many of the same study protocols are being repeated (except that satellite telemetry is being used now) to assess basic ecology and reproductive parameters of black bears. Habitat assessments, relative to fire and food availability (including mast), are also being conducted and will be evaluated relative to habitat use of collared bears.

FUNDING

Oklahoma Department of Wildlife Conservation

INVESTIGATORS

Sara Lyda, Senior Research Specialist; Dani Techentin, Ph.D. Candidate; Morgan Pfander M.S. Candidate; Connie Teschner, Field Technician

FACULTY SUPPORT

Sue Fairbanks and David M. Leslie, Jr.

EXPECTED COMPLETION

June 2018

Biases of collision mortality data from wind energy development on U.S. wildlife

Wind energy has emerged as a promising alternative to fossil fuels; however, the collision of wildlife with turbines is a well-documented side effect of this energy source. We have compiled a national database on bird and bat collisions with wind turbines that will be used to identify characteristics of wind facilities and individual turbines associated with elevated collision risk. We are also assessing which bird and bat species are most vulnerable to collisions and how different approaches to collecting data influence mortality estimates. Our findings will inform placement of energy infrastructure, policies on incidental take of wildlife, and development of protocols for estimating collision mortality.

FUNDING

U.S. Geological Survey

INVESTIGATOR

Maureen Thompson, M.S. Candidate

FACULTY SUPPORT

Scott Loss

EXPECTED COMPLETION

December 2015

Influence of land use and the Conservation Reserve Program on native pollinator communities

The intent of this study is to determine how land use affects native invertebrate pollinator diversity in the Southern High Plains of Texas. The targeted land uses are playas and their associated uplands in cropland, Conservation Reserve Program, and native grasslands/rangeland. We are collecting pollinators using blue vane traps set out for 24h in playas and uplands immediately surrounding wetlands. Pollinator diversity is being measured and compared among land uses, and then between playas and uplands to determine playa contribution to pollination service. We also are collecting vegetation data every six weeks including vegetation species present, ground cover composition, plant height, and canopy gap. An additional component of the project is to determine the plant species on which pollinators are feeding. Through targeted hunting techniques, we will capture pollinators feeding on flowers and document these visits over the six-month field period.

FUNDING

USDA, Farm Services Administration

INVESTIGATOR

Angela Begosh, Ph.D. Candidate

FACULTY SUPPORT

Loren Smith and Scott McMurry

EXPECTED COMPLETION

December 2015

Fragmentation and small mammals in the Lower Rio Grande Valley, Texas

The Lower Rio Grande Valley National Wildlife Refuge (LRGVNWR) includes >138 tracts with a combined area of 31,697 ha, many of them in the Rio Grande's threatened riparian corridor. Our objectives are to (1) determine responses of small mammals to habitat fragmentation, (2) measure functional connectivity among small mammal use of the native-agricultural matrix surrounding refuge tracts, and (3) use landscape genetic methods to determine the potential for long-term persistence of small mammal species in tracts of varying size and quality. Small mammals were sampled over 4 seasons on 15 tracts of varying size and extant riparian vegetation for 8,250 trap-nights with an overall 62% trapping success. These data will be used to determine correlations between habitat characteristics, landscape structures, and species data. The small mammal community was dominated by 5 species, including Coues' rice rat, a species considered threatened in Texas.

FUNDING

U.S. Fish and Wildlife Service

Oklahoma Cooperative Fish and Wildlife Research Unit

INVESTIGATOR

Richard Dolman, Ph.D. Candidate

FACULTY SUPPORT

David M. Leslie, Jr., Monica Papeş, Timothy J. O'Connell, and Ron A. Van Den Bussche

EXPECTED COMPLETION

December 2014

D. ELMORE PHOTO



WINDMILL ON PRAIRIE

L. SMITH PHOTOS



BUTTERFLY, BEE ON FLOWER AND WASP ON FLOWER

Conservation status of the Lower Rio Grande Valley, Texas

In 1988, Jahrsdoerfer and Leslie synthesized existing data and literature for the Lower Rio Grande Valley (LRGV) of extreme southern Texas, providing natural-history descriptions of plant and animal communities with a focus on human impacts and management options. The U.S. Fish and Wildlife Service maintains 3 national wildlife refuges in the LRGV, and conservation of critical habitats and species has been an ongoing challenge in the past 28 years relative to the greatly expanded human population and resulting urbanization, homeland security, escalating land prices, etc. Nearly 500 peer-reviewed publications, published since 1988, with specific focus on some aspect of the ecology, management, and conservation of the LRGV have been identified. The original report is being rewritten with scientific and managerial insights gained in the past 28 years to enhance understanding and highlight conservation needs of the LRGV.

FUNDING

U.S. Fish and Wildlife Service

INVESTIGATOR

David M. Leslie, Jr.

EXPECTED COMPLETION

December 2014

B. HUFFMAN PHOTO



RED RIVER HOG

Conservation status of Old World large mammals

Populations of many Asian and African large mammals are declining at alarming rates. We are publishing comprehensive syntheses on large ungulates in Asia, particularly in Tibet (to date, nilgai, Tibetan antelope, yak, four-horned antelope, white-lipped deer, tufted deer, Tibetan gazelle, Przewalski's gazelle, sambar, and Javan rhino) and Africa (to date, fringe-eared oryx and soon, red river hog). Syntheses of 6 species of musk deer that range from the Indian Himalayas and western Asia to Siberia are in progress. Each synthesis is an encyclopedic summary of the species, starting with thorough nomenclatural synonymies, representing original research, and ending with conservation needs and directives. Such focused attention on these high-profile species, and in most cases imperiled, has drawn critical attention to ongoing and still needed international conservation efforts.

FUNDING

Oklahoma Cooperative Fish and Wildlife Research Unit

INVESTIGATORS

David M. Leslie, Jr. and Zachery Roehrs, Postdoctoral Fellow

EXPECTED COMPLETION

December 2015

L. TALENT PHOTO



WESTERN FENCE LIZARDS

Western fence lizards as a reptile model to assess ingestion of depleted uranium

Many wildlife species, including reptiles, may be exposed to compounds found on military bases, including depleted uranium (DU). Reptiles have been largely neglected in ecological risk assessment analyses primarily due to the lack of a laboratory reptile model. The western fence lizard is being evaluated as a possible reptile model for estimating the potential for trophic transfer of DU from terrestrial invertebrates to terrestrial vertebrates. Understanding how DU travels through the food web and where burdens are likely to be found within the subject's body is ultimately critical for assessing environmental risks. Mealworms are being exposed to DU contaminated food, allowed to bioaccumulate, and fed to the fence lizard via forced ingestion. The propensity for trophic transfer of DU to lizards is then assessed.

FUNDING

U.S. Army Corps of Engineers

INVESTIGATORS

Anissa Delecki, Ph.D. Candidate; Scott Talent, Lab Technician

FACULTY SUPPORT

Larry Talent

EXPECTED COMPLETION

September 2014

Scholarly Output

01 JAN 2012
31 DEC 2013



Honors And Awards

Shannon K. Brewer (Assistant Unit Leader) received the Rising Star Honoree by Equal Opportunity Section and Student Subunit, American Fisheries Society (August 2013).

Leah Dale (Unit M.S. student; advisor, O'Connell) received the Best Graduate Paper Award at the Oklahoma Ornithological Society Annual Meeting, Oklahoma City (October 2012).

Joey Dyer (Unit M.S. student; advisor, Brewer) received the Robert L. Lochmiller II Endowed Scholarship in Wildlife Ecology, Department of Natural Resource Ecology and Management (April 2013); and the Louis Stokes Alliance for Minority Participation Bridge to Doctorate Fellowship, Oklahoma State University (April 2013).

Stanley Fox (OSU Cooperating Faculty, Regents Professor) received the Donald W. Tinkle Research Excellence Award from the Southwestern Association of Naturalists (April 2012).

Michael R. Gatlin (Unit M.S. student; advisor, Long) received the Robert L. Lochmiller II Endowed Scholarship in Wildlife Ecology and the Williams Distinguished Graduate Fellowship, Department of Natural Resource Ecology and Management (April 2012); the Dr. James K. Schooley Award, Oklahoma Chapter American Fisheries Society (February 2012); and the Chief's Scholar Finalist, U.S. Forest Service (January 2012).

Sheryl L. Lyon (Unit Senior Administrative Support Specialist) received the Murray-Gray Unit Service Award, Oklahoma Cooperative Fish and Wildlife Research Unit (April 2012).

Reid Morehouse (OSU Cooperating Faculty Ph.D. student; advisor, Tobler) received the best presentation award at the Annual meeting of the Oklahoma Chapter of the American Fisheries Society (October 2012).

Jarrod Powers (Unit M.S. student; advisor, Brewer) received the Outstanding Graduate Student Poster Presentation, Oklahoma State University Student Water Conference (April 2013).

David R. Stewart (Unit Ph.D. student; advisor, Long) received the John E. Skinner Memorial Fund Award, American Fisheries Society (June 2013); the Williams Distinguished Graduate Fellowship, Department of Natural Resources Ecology and Management, Oklahoma State University (May 2013); the Murray-Gray Unit Service Award, Oklahoma Cooperative Fish and Wildlife Research Unit (April 2013); the Outstanding Fisheries Graduate Student, Department of Natural Resources Ecology and Management, Oklahoma State University (April 2013); and the Robert M. Jenkins Memorial Scholarship, American Fisheries Society Southern Division Reservoir Committee (February 2013).

Ashley Unger (OSU Cooperating Faculty Ph.D. student; advisor, Fuhlendorf) received the best student presentation award in wildlife at the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies (October 2013).

Theses and Dissertations

Andrew D. Crosby. 2012. Northern bobwhite and bird community response to habitat restoration in Oklahoma. M.S. Thesis, Oklahoma State University, Stillwater. (Advisor, Elmore)

Michael R. Gatlin. 2013. The effects of hydrologic alteration on stream fish community structure in Lee Creek, Oklahoma. M.S. Thesis, Oklahoma State University, Stillwater. (Advisor, Long)

Dana N. Lee. 2013. Dietary analysis and conservation genetics of the endangered Ozark big-eared bat *Corynorhinus townsendii ingens*. Ph.D. Dissertation, Oklahoma State University, Stillwater. (Advisor, Van Den Bussche)

Ashley Nealis. 2013. Characteristics of two self-sustaining populations of paddlefish in northeast Oklahoma. M.S. Thesis, Oklahoma State University, Stillwater. (Advisor, Long)

Scott Orr. 2013. Long-term prescribed fire does not alter litter decomposition and bioavailable nitrogen in xeric oak forests. M.S. Thesis, Oklahoma State University, Stillwater. (Advisor Hallgren)

Joseph D. Schmitt. 2012. Delayed-hooking mortality of blue catfish *Ictalurus furcatus* caught on juglines in Oklahoma reservoirs. M.S. Thesis, Oklahoma State University, Stillwater. (Advisor, Shoup)

Michael R. Schwemm. 2013. Zoogeography of Ouachita Highland fishes. Ph.D. Dissertation, Oklahoma State University, Stillwater. (Advisor, Echelle and Van Den Bussche)

Rhonda L. Spinks. 2013. Potential effects of climate changes on Ozark big-eared bats and gray bats in Oklahoma. M.S. Thesis, Oklahoma State University, Stillwater. (Advisor, Leslie)

David R. Stewart. 2013. Factors related to stocking success of 178-mm channel catfish in medium size Oklahoma reservoirs. Ph.D. Dissertation, Oklahoma State University, Stillwater. (Advisor, Long)

Publications SCIENTIFIC

Albanese, G., and C.A. Davis. 2012. Broad-scale relationships between shorebirds and landscapes in the southern Great Plains. *Auk* 130:88–97.

Albanese, G., C.A. Davis, and B.W. Compton. 2012. Spatiotemporal scaling of North American continental interior wetlands: implications for shorebird conservation. *Landscape Ecology*, doi:10.1007/s10980-012-9803-7.

Barrett, D.A., and D.M. Leslie, Jr. 2012. Spatio-temporal variations in age structures of a partially re-established population of northern river otters (*Lontra canadensis*). *American Midland Naturalist* 168:302–314.

Barstow, A. and D.M. Leslie, Jr. 2012. *Leopardus braccatus* (Carnivora: Felidae). *Mammalian Species* 44(891):16–25.

Brewer, S.K. 2013. Channel unit use by smallmouth bass: do land-use constraints or quantity of habitat matter? *North American Journal of Fisheries Management* 33:351–358.

Brewer, S.K. 2013. Groundwater influences on the distribution and abundance of riverine smallmouth bass, *Micropterus dolomieu*, in pasture landscapes of the midwestern United States. *River Research and Applications* 29: 269–278.

Crosby, A.D., and R.D. Elmore. 2012. Effect of abundance and survey protocol on estimates of occupancy and detection probability for northern bobwhites. *Proceedings of the National Quail Symposium* 7:127–133.

Crosby, A.D., R.D. Elmore, and D.M. Leslie, Jr. 2013. Northern bobwhite response to habitat restoration in eastern Oklahoma. *Wildlife Society Bulletin* 37:733-740.

Dyer, J.J., S.K. Brewer, T.A. Worthington, and E.A. Bergey. 2013. The influence of coarse-scale environmental features on current and future distributions of narrow-range endemic crayfish populations. *Freshwater Biology* doi:10.1111/fwb.12109.

Gatlin, M.R., D.E. Shoup, and J.M. Long. 2012. Invasive zebra mussels (*Dreissena polymorpha*) and Asian clams (*Corbicula fluminea*) survive gut passage of migratory fish species: implications for dispersal. *Biological Invasions* 15:1195-1200.

George, A.D., T.J. O'Connell, K.R. Hickman, and D.M. Leslie, Jr. 2013. Use of seeded exotic grasslands by wintering birds in mixed-grass prairie. *Prairie Naturalist* 45:77-85.

George, A.D., T.J. O'Connell, K.R. Hickman, and D.M. Leslie, Jr. 2013. Food availability in exotic grasslands: a potential mechanism for depauperate breeding assemblages. *Wilson Journal of Ornithology* 125:526-533.

Lee, D.N., J. Howell, and R.A. Van Den Bussche. 2012. Development and characterization of 15 polymorphic tetranucleotide microsatellite loci for Townsend's big-eared bats (*Corynorhinus townsendii*) and cross amplification in Rafinesque's big-eared bat (*Corynorhinus rafinesquii*). *Conservation Genetics Research* 4:429-433.

Lee, D.N., R.W. Dolman, and D.M. Leslie, Jr. 2013. *Oryx callotis* (Artiodactyla: Bovidae). *Mammalian Species* 45(897):1-11.

Leslie, D.M., Jr. 2013. Adventures on the Roof of the World (Review of Tibet wild. A naturalist's journeys on the Roof of the World). *BioScience* 63:684-685.

Leslie, D.M., Jr., R.W. Dolman, and D.N. Lee. 2013. *Elaphodus cephalophus* (Artiodactyla: Bovidae). *Mammalian Species* 45:80-91.

Long, J.M. 2013. Book review: Conservation, ecology, and management of catfish: the second international symposium. *Fisheries* 38:462.

Long, J.M., N.P. Nibbelink, K.T. McAbee, and J.W. Stahl. 2012. Assessment of freshwater fish assemblages and their habitats in the National Park Service system of the southeastern United States. *Fisheries* 37:212-225.

Long, J.M., R.G. Hyler, and W.L. Fisher. 2012. Response by anglers to a differential harvest regulation on three black bass species at Skiatook Lake, Oklahoma. *Proceedings of the Oklahoma Academy of Science* 92:9-20.

Long, J.M. and J.J. Schaffler. 2013. Documenting utility of paddlefish otoliths for quantification of metals using inductively coupled plasma mass spectrometry. *Rapid Communications in Mass Spectrometry* 27:2188-2194.

Marsh P.C., G. Mueller, and M. Schwemm. 2013. Diel cover use and local site fidelity of a large southwestern cyprinid, bonytail *Gila elegans*, in a lower Colorado River backwater. *Western North American Naturalist* 73:211-218.

Masloski, K.E., and C. Greenwood. 2013. First record of *Myrmecophilus nebrascensis* Luggar 1898 (Othoptera: Myrmecophilidae) in Beaver County, Oklahoma. *Journal of Orthoptera Research* 22:69-71.

McFarland, C.A., L.G. Talent, M.J. Quinn Jr., M.A. Bazar, M.S. Wilbanks, M. Nisanian, R.M. Gogal, Jr., M.S. Johnson, E. J. Perkins, and K.A. Gust. 2012. Multiple environmental stressors elicit complex interactive effects in the western fence lizard (*Sceloporus occidentalis*). *Ecotoxicology* 21:2372-2390.

Morehouse, R.L., M. Papes, and M. Tobler. 2013. Predicting and mapping the potential distribution of the painted devil crayfish, *Cambarus ludovicianus* Faxon (Decapoda: Cambaridae). *Southwestern Naturalist* 58:435-439.

Morehouse, R.L., and M. Tobler. 2013. Crayfishes (Decapoda: Cambaridae) of Oklahoma: identification, distributions, and natural history. *Zootaxa* 3717:101-157.

Morehouse, R.L., and M. Tobler. 2013. Invasion of rusty crayfish (*Orconectes rusticus*) in the United States: niche shifts and potential future distribution. *Journal of Crustacean Biology* 33:293-300.

Mueller, J.S., B.D. Cheek, Q. Chen, J. Groeschel, S.K. Brewer, and T.B. Grabowski. 2013. A simple device for measuring the minimum current velocity to maintain semi-buoyant fish eggs in suspension. *The Prairie Naturalist* 45:84-89.

O'Connell, J., L. Johnson, L.M. Smith, S.T. McMurry, and D.A. Haukos. 2012. Influence of land-use and conservation programs on wetland plant communities of the semi-arid United States Great Plains. *Biological Conservation* 146:108-115.

O'Connell, J., L.A. Johnson, B.J. Beas, L.M. Smith, S.T. McMurry, and D.A. Haukos. 2013. Predicting dispersal-limitation in plants: optimizing planting decisions for isolated wetland restoration in agricultural landscapes. *Biological Conservation* 159:343-354.

O'Connell, J., L.A. Johnson, D.W. Daniel, S.T. McMurry, L.M. Smith, and D.A. Haukos. 2013. Effects of agricultural tillage and sediment accumulation on emergent plant communities in playa wetlands of the U.S. High Plains. *Journal of Environmental Management* 120:10-17.

Polo, J.A., S.W. Hallgren, and D.M. Leslie, Jr. 2013. Effect of long-term understory prescribed burning on standing and down dead woody material in dry upland oak forests. *Forest Ecology and Management* 291:128-135.

Robertson, S., K.R. Hickman, K.R. Harmony, and D.M. Leslie, Jr. 2013. Combining glyphosate or mowing improves control of yellow bluestem (*Bothriochloa ischaemum*). *Rangeland Ecology and Management* 66:376-381.

Roehrs, Z.P., J.B. Lack, C.E. Stanley, Jr., C.J. Seiden, R. Bastarache, W.D. Arbour, M.J. Hamilton, D.M. Leslie, Jr., and R.A. Van Den Bussche. 2012. Mammals of Red Slough Wildlife Management Area, with comments on McCurtain County, Oklahoma. *Occasional Papers of the Museum of Texas Tech University* 309:1-24.

Schmitt, J.D., and D.E. Shoup. 2013. Delayed hooking mortality of blue catfish caught on juglines. *North American Journal of Fisheries Management* 33:245-252.

Schwemm M.R., and A.A. Echelle. 2013. Development and characterization of eight polymorphic tetranucleotide microsatellite markers for the threatened leopard darter (*Percina pantherina*). *Conservation Genetics Resources* 5:73-75.

Stewart, D.R., and J.M. Long. 2012. Precision of channel catfish catch estimates using hoop nets in larger Oklahoma reservoirs. *North American Journal of Fisheries Management* 32:1108-1112.

Stewart, D.R., G.D. Scholten, T.N. Churchill, and J.M. Fly. 2012. Angler opinions regarding catfish management in Tennessee. *Proceedings of the Southeastern Association of Fish and Wildlife Agencies* 66:88-93.

Vogele, J.R., D.W. Griffin, H.S. Ip, N.J. Ashbolt, M.T. Moser, J. Lu, M.K. Beitz, H. Ryu, and J.W. Santo Domingo. 2013. Impacts of migratory sandhill cranes (*Grus canadensis*) on microbial water quality in the central Platte River, Nebraska, USA. *Water, Air, and Soil Pollution* 224:1576 DOI 10.1007/s11270-013-1576-3.

Williams, R.J., S.W. Hallgren, and G.W.T. Wilson. 2012. Frequency of prescribed burning in an upland oak forest determines soil and litter properties and alters the soil microbial community. *Forest Ecology and Management* 265:241-247.

Winter, S.L. S.D. Fuhlendorf, C.L. Goad, C.A. Davis, K.R. Hickman, and D.M. Leslie, Jr. 2012. Restoration of the fire-grazing interaction in *Artemisia filifolia* shrubland. *Journal of Applied Ecology* 49:242-250.

Winter, S.L., K.R. Hickman, C.L. Goad, S.D. Fuhlendorf, and M.S. Gregory. 2013. Seasonal fires, bison grazing, and the tallgrass prairie forb *Arnoglossum plantagineum* Raf. *Natural Areas Journal* 33:327-338.

Worthington, T.A., S.K. Brewer, T.B. Grabowski, and J. Mueller. 2013. Evaluating the sampling efficiency of the Moore egg collector. *North American Journal of Fisheries Management* 33:79-88.

Worthington, T.A., S.K. Brewer and N. Farless. 2013. Spatial and temporal variation in efficiency of the Moore Egg Collector. *North American Journal of Fisheries Management* 33:1113-1118.

TECHNICAL AND SEMI-TECHNICAL

Brewer, S.K., and T.B. Grabowski. 2013. Evaluating the reproductive success of Arkansas River shiner by assessing early life-history stage dispersal and survival at the landscape level. U.S. Department of Interior, Fish and Wildlife Service, Cooperator Science Series FWS/CSS-103, Washington, D.C.

Hallgren, S.W., R.D. DeSantis, and J.A. Burton. 2012. Fire and vegetation dynamics in the Cross Timbers forests of south-central North America. pp. 52-66 in D.C. Dey, M.C. Stambaugh, S.L. Clark, and C.J. Schweitzer, eds. *Proceedings of the 4th Fire in Eastern Oak Forests Conference*. General Technical Report NRS-P-102. U.S. Department of Agriculture, Forest Service, Northern Research Station. Newtown Square, PA.

Fox, S. F., and A. E. Richter. 2013. A Survey of the freshwater turtles of eastern Oklahoma. Final Report (Part 2), State Wildlife Grant T-51-1, Oklahoma Department of Wildlife Conservation, Oklahoma City, OK.

Gatlin, M.R., J.M. Long, and D.J. Turton. 2013. Effects of hydrologic alteration on species of greatest conservation need in Lee Creek, Oklahoma. Final Report F10AF00172, Oklahoma Department of Wildlife Conservation, Oklahoma City, OK.

Johansen, E., and S. F. Fox. 2012. A survey of the freshwater turtles of eastern Oklahoma. Final Report (Part 1), State Wildlife Grant T-51-1, Oklahoma Department of Wildlife Conservation, Oklahoma City, OK.

SCIENTIFIC PAPERS PRESENTED

- Atuo, F., and T. O'Connell.** 2013. Abundance and spatial distribution of raptors in a mixed-grass prairie landscape. Oklahoma Ornithological Society Annual Technical Meeting, Broken Arrow, OK.
- Atuo, F., J. Harris, and T. O'Connell.** 2013. Spatial habitat use of raptors and ground-based predators in two western Oklahoma landscapes. Oklahoma State University and Oklahoma Department of Wildlife Conservation Workshop on the Conservation of Northern Bobwhite and Lesser Prairie-Chicken, Stillwater, OK.
- Atuo, F., J. Harris, and T. O'Connell.** 2013. Spatial habitat use of raptors and ground-based predators in two western Oklahoma landscapes. Oklahoma State University and Oklahoma Department of Wildlife Conservation Workshop on the Conservation of Northern Bobwhite and Lesser Prairie-Chicken, Stillwater, OK.
- Birdsong, T., D. Krause, J. Leitner, J.M. Long, S. Sammons, and J. Slaughter.** 2013. Native black bass initiative: implementing watershed-scale conservation of native fish populations in southern US rivers and streams. Black Bass Diversity Symposium, Southern Division American Fisheries Society Annual Meeting, Nashville, TN.
- Brewer, S.K.** 2013. Assessing stream ecosystem threats: what are the factors and scales where management activities are most effective? Spring Creek Coalition, Tulsa, OK.
- Brewer, S.K., and J.M. Long.** 2013. Biology and ecology of genetically distinct Neosho and Ouachita smallmouth bass. Southern Division American Fisheries Society Annual Meeting, Nashville, TN.
- Brewer, S.K., and D.J. Orth.** 2013. Smallmouth bass. Black Bass Diversity Symposium, Southern Division American Fisheries Society Annual Meeting, Nashville, TN.
- Brewer, S.K., T.A. Worthington, T.B. Grabowski, and J. Mueller.** 2013. Evaluating the reproductive success of Arkansas River shiner by assessing early life-history stage dispersal and survival at the landscape level. Great Plains Conservation Cooperative Steering Committee Meeting, Edmond, OK.
- Brewer, S.K., T.A. Worthington, T.B. Grabowski, and J. Mueller.** 2012. Evaluating the efficiency of a quantitative egg-sampling gear. American Fisheries Society Annual Meeting, Minneapolis, MN.
- Brewer, S.K., T.A. Worthington, T.B. Grabowski, and J. Mueller.** 2012. Evaluating the efficiency of the Moore egg-sampler. Oklahoma Chapter American Fisheries Society Annual Meeting, Stillwater, OK.
- Brown, B., S.K. Brewer, J. Burroughs, and J. Johnston.** 2013. Investigating the relationship between smallmouth bass recruitment and flow characteristics in Ozark streams. Southern Division American Fisheries Society Annual Meeting, Nashville, TN.
- Burroughs, J., X. Jin, and S.K. Brewer.** 2013. New life for a tailwater trout fishery: Case study of water-quality conditions below Tenkiller Ferry Reservoir. Southern Division American Fisheries Society Annual Meeting, Nashville, TN.
- Burroughs, J., X. Jin, J. Johnston, B. Brown, and S.K. Brewer.** 2013. The interrelated conditions of water quality and quantity: An example from the lower Illinois River. Oklahoma Clean Lakes and Watersheds Association, Stillwater, OK.
- Burroughs, J., X. Jin, S.K. Brewer, J. Johnston, and B. Brown.** 2013. Interactions between water quantity and quality and the impacts to an economically-important fishery. Oklahoma Governor's Water Conference and Research Symposium, Midwest City, OK.
- Carroll, M.J., C.A. Davis, R.D. Elmore, S.D. Fuhlendorf, and E.T. Thacker.** 2013. Spring dispersal movements of Northern bobwhites in western Oklahoma. Annual Conference of the Southeastern Association of Fish and Wildlife Agencies, Oklahoma City, OK.
- Cartabiano, E.C., and J.M. Long.** 2013. Fish community response to drought at a shallow Great Plains reservoir. Annual Conference of the Southeastern Association of Fish and Wildlife Agencies, Oklahoma City, OK.
- Crosby, A.D. and R.D. Elmore.** 2012. Effect of abundance and survey protocol on estimates of occupancy and detection probability for northern bobwhites. Seventh National Quail Symposium, Tucson, AZ.
- Crosby, A., D. Elmore, R. Will, and D.M. Leslie, Jr.** 2013. Game species as umbrella species: can habitat restoration for northern bobwhites help slow the decline of grassland birds? The Wildlife Society Conference, Milwaukee, WI.
- Dakin, B., B. Porter, B. Freeman, and J.M. Long.** 2013. Hybridization threatens shoal bass populations in the upper Chattahoochee River basin. Black Bass Diversity Symposium, Southern Division American Fisheries Society Annual Meeting, Nashville, TN.
- Dale, L., A. Gourley, and T. O'Connell.** 2012. Non-target birds attracted to bait stations for deer. Oklahoma Ornithological Society Annual Meeting, Oklahoma City, OK.
- Dale, L., and T. O'Connell.** 2013. Potential routes of exposure to aflatoxins in northern bobwhite. Oklahoma State University and Oklahoma Department of Wildlife Conservation Workshop on the Conservation of Northern Bobwhite and Lesser Prairie-Chicken, Stillwater, OK.
- Dale, L., A. Gourley, and T. O'Connell.** 2013. Non-target birds attracted to bait stations for deer. Kansas Natural Resource Conference, Wichita, KS.
- Dale, L., and T. O'Connell.** 2013. Potential routes of exposure to aflatoxins in northern bobwhite. Oklahoma State University and Oklahoma Department of Wildlife Conservation Workshop on the Conservation of Northern Bobwhite and Lesser Prairie-Chicken, Stillwater, OK.
- Dale, L., A. Gourley, and R.D. Elmore.** 2013. Bias in population estimates of white-tailed deer from camera survey. Annual Conference of the Southeastern Association of Fish and Wildlife Agencies, Oklahoma City, OK.
- Dolman, R.W., and D.M. Leslie, Jr.** 2012. Habitat fragmentation and corridors in the Lower Rio Grande Valley refuges: a landscape perspective. American Society of Mammalogists Annual Meeting, Reno, NV.
- Dolman, R.W., and D.M. Leslie, Jr.** 2012. Habitat fragmentation and corridors in the Lower Rio Grande Valley refuges: a landscape perspective. Texas Society of Mammalogists Annual Meeting, Junction, TX.
- Duck, J.L., D.R. Stewart, D.E. Shoup, and J.M. Long.** 2012. White crappie population characteristics at Lake McMurtry: "a tale of two sides." Oklahoma Chapter American Fisheries Society Annual Meeting, Stillwater, OK.
- Dyer, J., and S.K. Brewer.** 2012. Potential impacts of global climate change on endemic crayfish species. Oklahoma Chapter American Fisheries Society Annual Meeting, Stillwater, OK.
- Dyer, J., and S.K. Brewer.** 2012. Predicting the distribution of endemic crayfish at multiple spatial scales. Oklahoma Chapter American Fisheries Society Annual Meeting, Stillwater, OK.
- Dyer, J., and S.K. Brewer.** 2012. Predicting the impacts of climate change on the distribution of endemic crayfish. Society for Freshwater Science, Louisville, KY.
- Dyer, J., and S.K. Brewer.** 2012. Using Maxent to predict the distribution of an endemic crayfish (*Orconectes menae*). Student Water Research Conference, Oklahoma State University, Stillwater, OK.
- Dyer, J., and S.K. Brewer.** 2013. Determining the distribution of endemic crayfish species at multiple spatial scales. Southern Division American Fisheries Society Annual Meeting, Nashville, TN.
- Dyer, J., and S.K. Brewer.** 2013. Mudbug digging performance: effects of increased deposited sediment and water withdrawals. Oklahoma Clean Lakes and Watersheds Association, Stillwater, OK.
- Dyer, J., and S.K. Brewer.** 2013. Seasonal responses of crayfish to stream drying. American Fisheries Society Annual Meeting, Little Rock, AR.
- Dyer, J., and S.K. Brewer.** 2013. Interactions among burrowing ability, sedimentation and water withdrawals on crayfishes. Second Annual Student Water Conference, Oklahoma State University, Stillwater, OK.
- Farless, N., and S.K. Brewer.** 2012. Influence of hydraulic channel units and substrate composition on benthic community metabolism. Oklahoma Chapter American Fisheries Society Annual Meeting, Stillwater, OK.
- Farless, N., and S.K. Brewer.** 2013. Changes in benthic community metabolism as related to characteristics of hydraulic channel units in an Ozark stream. Oklahoma Clean Lakes and Watersheds Association, Stillwater, OK.
- Farless, N., and S.K. Brewer.** 2013. Does habitat heterogeneity or substrate composition influence benthic community metabolism? Second Annual Student Water Conference, Oklahoma State University, Stillwater, OK.
- Fox, S.F., A. Richter, and D.M. Leslie, Jr.** 2013. Using remote query PIT-tagged *Trachemys scripta* to determine trapping dynamics via conventional hoop traps. American Society of Ichthyologists and Herpetologists Annual Meeting, Albuquerque, NM.
- Foye, S.** 2013. Influence of habitat gradients on arthropod forage taxa and their natural enemies. Oklahoma State University and Oklahoma Department of Wildlife Conservation Workshop on the Conservation of Northern Bobwhite and Lesser Prairie-Chicken, Stillwater, OK.
- Foye, S., K.E. Masloski, and C. Greenwood.** 2013. Ground-dwelling arthropod assemblages across a habitat gradient occupied by northern bobwhite quail (*Colinus virginianus*) in western Oklahoma. Entomological Society of America Annual Meeting, Austin, TX.
- Foye, S., K.E. Masloski, and C. Greenwood.** 2013. Community composition of Bobwhite quail arthropod forage taxa in western Oklahoma. Entomological Society of America Southwestern Branch Meeting, Las Cruces, NM.

- Foye, S., K.E. Masloski, and C. Greenwood.** 2013. Ground-dwelling arthropod assemblages across vegetation gradients occupied by northern bobwhite quail (*Colinus virginianus*) in western Oklahoma. Annual Conference of the Southeastern Association of Fish and Wildlife Agencies, Oklahoma City, OK.
- Gatlin, M.R., and J.M. Long.** 2012. Analysis of Lee Creek's substrate using side scan sonar technology. Oklahoma Chapter American Fisheries Society Annual Meeting, Stillwater, OK.
- Giguere, A., and C. Greenwood.** 2012. Community composition and niche partitioning behaviors of ants (Hymenoptera: Formicidae) in arid grasslands of western Oklahoma. Entomological Society of America Annual Meeting, Knoxville, TN.
- Giguere, A., and C. Greenwood.** 2013. Niche-partitioning and community composition of ants in Oklahoma grasslands. Entomological Society of America Annual Meeting, Austin, TX.
- Giguere, A., and C. Greenwood.** 2013. Ant community composition in Oklahoma grasslands as an evaluation of food availability for northern bobwhites. Annual Conference of the Southeastern Association of Fish and Wildlife Agencies, Oklahoma City, OK.
- Giguere, A., and C. Greenwood.** 2013. Niche-partitioning and community composition of ants (Hymenoptera: Formicidae) in western Oklahoma grasslands. Entomological Society of America Southwestern Branch Meeting, Las Cruces, NM.
- Giguere, A., K.E. Masloski, S. Foye, S. Evans, and C. Greenwood.** 2013. Arthropod forage taxa of northern bobwhite: resource partitioning, community composition and impacts of habitat type and natural enemies in western Oklahoma grasslands. Oklahoma State University and Oklahoma Department of Wildlife Conservation Workshop on the Conservation of Northern Bobwhite and Lesser Prairie-Chicken, Stillwater, OK.
- Greenwood, C., K.E. Masloski, A. Giguere, K. Risser, T. Ferrari, A. Robideau, and M. Jochim.** 2012. Wildlife conservation sans vertebrae. Invited Seminar, Department of Biology, California Polytechnic Institute, San Luis Obispo, CA.
- Gust, K.A, V. Chaitankar, P. Ghosh, M. Wilbanks, X. Chen, C. McFarland, L. Talent, and E. Perkins.** 2012. Use of mutual information theory to decipher the impacts of multiple stressors from molecular through whole-organism level effects. Society of Environmental Toxicology and Chemistry Annual Meeting, Long Beach, CA.
- Hallgren, S.W., D. Bendixsen, and J. Burton.** 2013. Ecological succession following sudden forest canopy mortality in upland oak forest in south-central North America. North American Forest Ecology Workshop, Bloomington, IN.
- Hallgren, S.W., J.A. Polo, and D.M. Leslie, Jr.** 2012. Consumption of oak forest litter by low intensity forment season prescribed fire. 5th International Fire Ecology and Management Congress, Portland, OR.
- Jin, X., T. Worthington, and S.K. Brewer.** 2013. Ecohydrological model synthesis for landscape conservation under climate change. Oklahoma Clean Lakes and Watersheds Association, Stillwater, OK.
- Johnston, J., S.K. Brewer, B. Brown, and J. Burroughs.** 2013. Identifying the current distribution of shovelnose sturgeon in eastern Oklahoma: the first assessment at the southwestern extent of the species range. Southern Division American Fisheries Society Annual Meeting, Nashville TN.
- Logan, D., S.W. Hallgren, D.S. Wilson, and D.M. Leslie, Jr.** 2012. Prescribed burning effects on soil carbon in upland oak forest. 5th International Fire Ecology and Management Congress, Portland, OR.
- Long, J.M., and C. Tanner.** 2013. Effects of water quantity on fish communities in the upper Cimarron River. Oklahoma Water Research Symposium, Midwest City, OK.
- Long, J.M., and J.J. Schaffler.** 2012. Potential for determining origin of paddlefish using otolith geochemistry. Oklahoma Chapter American Fisheries Society Annual Meeting, Stillwater, OK.
- Long, J.M., D.E. Shoup, Y. Liang, A.R. Dzialowski, and J.R. Bidwell.** 2013. Geospatial assessment of invasive bighead carp establishment in Oklahoma reservoirs. Oklahoma Clean Lakes and Watersheds Association, Stillwater, OK.
- Long, J.M., M. Allen, W. Porak, and C. Suski.** 2013. History of black bass management in the United States. Black Bass Diversity Symposium, Southern Division Society American Fisheries Society Annual Meeting, Nashville, TN.
- Loss, S.R.** 2013. Expansion and assessment of a collision mortality database to evaluate data biases and direct impacts of wind energy on U.S. Wildlife. U.S. Geological Survey Wind Energy Impacts and Assessment Methodology Meeting, Denver, CO.
- Loss, S.R., T. Will, and P.P. Marra.** 2013. An overview of anthropogenic bird mortality in the United States: systematic quantification and identification of research needs. 5th International Partners in Flight Conference and Conservation, Salt Lake City, UT
- Lyda, S.B., C. Endicott, C. Allen, C. Farquhar, C. Teschner, S. Fairbanks, V. Jackson, and D.M. Leslie, Jr.** 2013 Status and distribution of black bears in east-central and northeastern Oklahoma. Annual Conference of the Southeastern Association of Fish and Wildlife Agencies, Oklahoma City, OK
- Masloski, K.E.** 2012. Influence of vegetative gradients on arthropod community composition and sampling methodology comparisons in arid grasslands of western Oklahoma. Departmental seminar, Entomology and Plant Pathology, Oklahoma State University, Stillwater, Oklahoma
- Masloski, K.E., and C. Greenwood.** 2012. The relationship between total grasshopper (Orthoptera: Acrididae) density and rate of grasshoppers caught per minute across a habitat gradient in a western Oklahoma grassland. Biochemistry and Molecular Biology Annual Symposium, Stillwater, OK.
- Masloski, K.E., S. Foye, A. Giguere, S. Evans, and C. Greenwood.** 2013. Arthropod forage taxa of northern bobwhite quail (*Colinus virginianus*): resource partitioning, community composition and impacts of natural enemies. Oklahoma State University and Oklahoma Department of Wildlife Conservation Workshop on the Conservation of Northern Bobwhite and Lesser Prairie-Chicken, Stillwater, OK.
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- Morehouse, R.L., and M. Tobler.** 2013. Crayfishes of Oklahoma: Identification, distribution, and ecology. Southwestern Association of Naturalists Annual Meeting, Lake Charles, LA.
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- Mueller J.S., T.B. Grabowski, S.K. Brewer, and T.A. Worthington.** 2013. Effects of temperature, salinity, and suspended solids on the development and buoyancy of Arkansas River shiner eggs. Southern Division American Fisheries Society Annual Meeting, Nashville TN.
- Mueller, J.S., T.B. Grabowski, S.K. Brewer, and T.A. Worthington.** 2013. Effects of temperature, salinity, and suspended solids on the development and buoyancy of Arkansas River shiner eggs. Southern Division American Fisheries Society Annual Meeting, Nashville TN.

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Powers, J., and S.K. Brewer. 2013. Use of side-scan sonar to detect mussel beds in turbid prairie rivers. Second Annual Student Water Conference, Oklahoma State University, Stillwater, OK.

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Unger, A. S.D. Fuhlendorf, R.D. Elmore, and C.A. Davis. 2013. Impacts of anthropogenic disturbance on lesser prairie-chicken resource selection and survival in Oklahoma. Annual Conference of the Southeastern Association of Fish and Wildlife Agencies. Oklahoma City, OK.

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