State Wildlife Grant Pre-Proposal

Project Title:

Ichthyofaunal surveys of main stem and major tributaries of lowland streams in south Arkansas

Project Summary:

The goal of this project is to conduct distribution and status surveys of ichthyofauna in the main stems and major tributaries of three stream systems in southern Arkansas. The Red River, including the lower portions of the Little, Cossatot, and Saline (in Howard County) Rivers represent the western most lowland stream system in the South Central Plains ecoregion. The Ouachita River, including the Little Missouri and Caddo (below DeGray Lake) Rivers and Moro Creek represent a second important lowland stream system in the South Central Plains ecoregion. The Saline River and its tributary Hurricane Creek is the third important lowland stream system in the South Central Plains. For the purposes of this proposal we are considering only portions of these stream systems below the fall line as "lowland streams." Since lowland streams have characteristics that differ from upland streams, methods for sampling fishes in lowland and upland streams differ accordingly. We propose to survey ichthyofauna with two types of active sampling gears appropriate for lowland streams. At all sites that are shallow enough and impediment free, minnow seines will be used to sample small bodied fishes. Electrofishing will be the second method of active sampling. At wadeable sites, barge electrofishing will be employed. At non-wadeable sites, boat electrofishing will be employed. The objectives of this study include: (a) ichthyofaunal surveys in the main stems and major tributaries of three lowland streams; (b) comparisons of current ichthyofauna data to historical data to determine temporal trends, and (c) determination of life history characteristics of Western Sand Darter, Crystal Darter, and Bluehead Shiner.

Project Leader:

Steve Lochmann, Professor, Aquaculture and Fisheries Department, University of Arkansas at Pine Bluff, 1200 N. Univ. Dr., Mail Slot 4912, Pine Bluff, AR 71601, lochmanns@uapb.edu, (870) 575-8165

Co-Project Leaders:

Eric Brinkman, Fisheries Supervisor, District 7, Arkansas Game and Fish Commission, 7004 Hwy. 67 East, Perrytown, AR 71801, eric.brinkman@agfc.ar.gov, (877) 777-5580

Andrew Yung, Fisheries Supervisor, District 6, Arkansas Game and Fish Commission, 500 Ben Lane, Camden, AR 71701, Andrew.yung@agfc.ar.gov, (877) 836-4612

Project Partner:

Steve Spicer, Operations Project Manager, Millwood Tri-Lakes Project Office, Little Rock District Corps of Engineers, P.O. Box 867, Little Rock, AR 72203, (501) 340-1455

Mr. Lindsey Lewis, Arkansas Ecological Services Field Office, U.S. Fish and Wildlife Service, 110 S. Amity Road, Suite 300, Conway, AR 72032, Lindsey_Lewis@fws.gov, (501) 513-4489

General Project Budget:

Budget Category	Year 1	Year 2	Total
Total Project Request	57907	57907	115814
Total Match	42282	42282	84564
Match (%)	42.2		

Project Statement:

a. Need –

There are 66 fish species of greatest conservation need listed in the 2015 Arkansas Wildlife Action Plan (AGFC 2015). Many of these fishes are endemic to limited drainages in headwater and upland streams (e.g. Beaded Darter *Etheostoma clinton*; Arkansas Darter *E. cragini*). However, a large number of these fishes are lowland stream species. Thirty two of the sixty six species of greatest conservation need occur in lowland streams of the South Central Plains ecoregion (Table 1). Many of these lowland stream fishes have identified research needs that include status and distribution surveys, habitat requirements, and life history studies. Three species explicitly mentioned in the 2016 State Wildlife Grants Request for Proposals are found in the Ouachita River ecobasin, the Red River ecobasin, or both ecobasins of the South Central Plains ecoregion. Those species are the Bluehead Shiner *Pteronotropis hubbsi*, the Western Sand Darter *Ammocrypta clara*, and the Crystal Darter *Crystallaria asprella*. Research needs specifically identified for these three species include distribution, status, and abundance surveys. Lowland streams have received less attention than upland streams, because they are typically more challenging to sample and less aesthetic to visit. The need for ichthyofauna work in these lowland stream systems is well documented.

b. Purpose and Objectives –

The major outcome of this project will be current ichthyofauna surveys of three important south Arkansas lowland stream systems. Our results will be compared to previous records, theses, and published literature to determine trends in distribution, abundance, and ichthyofauna biodiversity. Particular attention will be given to Bluehead Shiner, Western Sand Darter, and Crystal Darter. When these species are encountered at a site, additional sampling will be conducted such that size and age structure, growth, and sex ratios of those populations can be determined. We will attempt to determine population characteristics, such as L-W relationship, Von Bertalanffy or Gompertz growth parameters, size at maturity, age at maturity, GSI, and longevity.

The objectives of this project include:

- Objective 1. During the late summer of 2016, spring and summer of 2017, and spring of 2018 comprehensive ichthyofauna surveys will be conducted in the Red, Ouachita, and Saline Rivers and their major tributaries using a combination of seine and electrofishing gear appropriate for respective habitats;

- Objective 2. Supplemental sampling will occur whenever Bluehead Shiner, Western Sand Darter or Crystal Darter are encountered to determine life history characteristics; and
- Objective 3. Current distribution and abundance data will be compared with historical data to determine temporal trends of dominant fish species and species of greatest conservation need.

c. Location-

The Little, Cossatot, and Saline Rivers (Western) are tributaries of the Red River above Millwood Reservoir. The Red River itself begins in Oklahoma but flows through the southwest corner of Arkansas before flowing into Louisiana (Figure 1). The Little Missouri River and Moro Creek are tributaries of the Ouachita River. The Saline River (Eastern) is technically a tributary of the Ouachita River, for the purposes of this study we consider it a separate stream system. The Saline River (Eastern), and its tributary Hurricane Creek comprise the third lowland stream system in the South Central Plains ecoregion of southern Arkansas. For the purposes of this proposal, we are limiting sampling of these lowland streams to the portions of each occurring below the fall line. This allows us to use a consistent approach to sampling, particularly with respect to the sampling gears employed throughout the three systems.

Figure 1. Lowland streams in the South Central Plains ecoregion (shaded area).

d. Approach –

The Project Leader, Co-Project Leaders, Project Partner, a graduate student, and an undergraduate student will be responsible for the ichthyofauna surveys. A subsample of previously occupied sites will be included so that adequate comparisons can be drawn between historical and current data. Sampling gear appropriate for respective macrohabitats will be employed. Sampling techniques will follow the protocols outlined for warmwater fish in wadeable streams and rivers as outlined in Standard Methods for Sampling North American Freshwater Fishes (Bonar et al. 2009). Identification of species will occur in the field when possible. Specimens that cannot be identified in the field and voucher specimens will be preserved in 10% buffered formalin and identified later in a laboratory. Specimens returned to UAPB will be housed in the UAPB Ichthyology Teaching Collection. Subsamples of Bluehead Shiner, Western Sand Darter, and Crystal Darter will be preserved in the field and returned to the lab for necropsies. Length, weight, age, sex, and maturity state will be determined for these species, so that population characteristics (L-W relationship, Von Bertalanffy growth parameters, size at maturity, age at maturity, GSI, and longevity) can be determined.

e. Expected Results and Benefits –

The expected results of this study will include updated status and trend data for ichthyofauna in the Red, Ouachita, and Saline Rivers. The trend data will inform management, conservation, and land use decisions in the watershed. The current state of ichthyofauna biodiversity in these lowland streams will also be forthcoming from this study. This study will provide current life history and population characteristics data for three species of greatest conservation need explicitly mentioned in the 2016 State Wildlife Grants Request for Proposals.

f. Detailed Project Budget

Budget Category	Year 1	Year 2	Total
a. Salaries & Benefits			
Graduate Research Assistant	23000	23000	46000
Technician (summer salary)	6880	6880	13760
Benefits	9263	9263	18526
Total Salary and Benefits	39143	39143	78286
Budget category			
c. Travel	8000	8000	16000
d. Equipment (seines, buckets, jars)	3500	3500	7000
e. Supplies (preservative, office supplies)	2000	2000	4000
Project Cost	52643	52643	105286
Recovered Overhead (10% of Project Cost)	5264	5264	10529
Total Project Request	57907	57907	115814
Match			
a. State Regional Fisheries Supervisor Match (120 h/yr x $25/h x 2 biolotists)	6000	6000	12000
b. UAPB Unrecovered Indirect Cost (59.6% of Salaries - 10% of Project Cost)	12544	12544	25088
c. UAPB Out of state tuition remission ($243/credit hour x 16 credit hours/year)	3888	3888	7776
d. USFWS Camper Match ($125/d x 4.3 weeks/month x 7 d/week x 4 months)	15050	15050	30100
e. AGFC Technician (120 h/yr x $15/h)	1800	1800	3600
f. State Equipment Match	3000	3000	6000
Total Match	42282	42282	84564
Match (%)	42.2		

Steve Lochmann is a Professor in the Aquaculture and Fisheries Department at the University of Arkansas at Pine Bluff. Dr. Lochmann teaches Ichthyology and is responsible for the UAPB teaching collection. Dr. Lochmann has been conducting fisheries research for more than 25 years. He has collected larval and adult fish in marine, estuarine and freshwater habitats. He has worked with darters for more than five years, including captive spawning of Yellowcheek Darter (*E. moorei*), culture of larval and juvenile Yellowcheek Darter, and has been part of one effort to restock Yellowcheek Darter into a portion of the Middle Fork of the Little Red River from which it was extirpated. Dr. Lochmann has a permit from the USFWS to work with Threatened and Endangered Species. He has supervised the research of more than a dozen master's students during his 20+ years at the University of Arkansas at Pine Bluff.

Eric Brinkman is a District Fisheries Supervisor for the Arkansas Game and Fish Commission in southwest Arkansas (District 7). Mr. Brinkman is directly responsible for managing the fisheries of this region, including portions of the Red and Ouachita Rivers. Mr. Brinkman has over 15 years of experience sampling and identifying freshwater fishes in streams, rivers, and reservoirs of the Southeastern U.S.

Andrew Yung is a District Fisheries Supervisor for the Arkansas Game and Fish Commission in south Arkansas (District 6). Mr. Yung is responsible for managing the fisheries of south central Arkansas, including portions of the Ouachita and Saline (Western) Rivers. Mr. Yung has 2 years of experience sampling and managing freshwater fishes of the southern United States and over 6 additional years sampling in the Midwestern portion of the U.S.

Literature Cited:

Arkansas Game and Fish Commission. 2015. Arkansas Wildlife Action Plan. http://www.wildlifearkansas.com/strategy_2015.html (viewed on 2/3/2016)

Bonner, S.A., W.A. Hubert, and D.W. Willis, editors. 2009. Standard methods for sampling North American freshwater fishes. American Fisheries Society, Bethesda, Maryland.

Table 1. Fishes of greatest conservation need listed in the 2015 Arkansas Wildlife Action Plan existing in the Ouachita River or Red River ecobasins of the South Central Plains ecoregion. Species in **bold** are explicitly referenced in the 2016 State Wildlife Grants Request for Proposals.

Family	Common Name	Scientific Name	South Central Plains - Ouachita River	South Central Plains - Red River
Petromyzontidae	American Brook Lamprey	Lethenteron appendix	X	
Polyodontidae	Paddlefish	Polyodon spathula	X	X
Lepisosteidae	Alligator Gar	Atractosteus spatula	X	X
Hiodontidae	Goldeye	Hiodon alosoides	X	X
	Mooneye	Hiodon tergisus	X	
Anguillidae	American Eel	Anguilla rostrata	X	X
Clupeidae	Alabama Shad	Alosa alabamae	X	
Cyprinidae	Plains Minnow	Hybognathus placitus		X
	Ouachita Shiner	Lythrurus snelsoni		X
	Shoal Chub	Macrhybopsis hyostoma	X	X
	Blackspot Shiner	Notropis atrocaudalis		X
	Red River Shiner	Notropis bairdi		X
	Peppered Shiner	Notropis perpallidus	X	
	Chub Shiner	Notropis potteri		X
	Rocky Shiner	Notropis suttkusi		X
	Bluehead Shiner	**Pteronotropis hubbsi**	**X**	**X**
Catostomidae	Highfin Carpsucker	Carpiodes velifer	X	X
	Blue Sucker	Cycleptus elongatus	X	
	Lake Chubsucker	Erimyzon sucetta	X	X
Ictaluridae	Brown Bullhead	Ameiurus nebulosus	X	X
	Brown Madtom	Noturus phaeus		X
Mugilidae	Striped Mullet	Mugil cephalus	X	
Fundulidae	Lowland Topminnow	Fundulus blairae		X
Percidae	**Wester Sand Darter**	**Ammocrypta clara**	**X**	**X**
	Crystal Darter	**Crystallaria asprella**	**X**	**X**
	Swamp Darter	Etheostoma fusiforme	X	X
	Goldstripe Darter	Etheostoma parvipinne	X	X
	Ouachita Darter	Percina brucethompsoni	X	
	Leopard Darter	Percina pantherina		X
	Slenderhead Darter	Percina phoxocephala		X
	Stargazing Darter	Percina uranidea	X	
	Saddleback Darter	Percina vigil	X	

Mike Knoedl
Director

Jeff Crow
Chief of Staff and
Deputy Director

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Arkansas Game and Fish Commission

Andrew Bass
Assistant Deputy Director

Ricky Chastain
Assistant Deputy Director

February 16, 2016

Dr. Steve Lochmann Aquaculture/Fisheries Department
University of Arkansas at Pine Bluff
1200 N. Univ. Dr., Mail Slot 4912
Pine Bluff, AR 71601

SUBJECT: ICHTHYOFAUNAL SURVEY OF LOWLAND STREAMS SWG PROPOSAL

Dr. Lochmann:

I am writing to confirm the commitment of Arkansas Game and Fish Commission's Fisheries Division as a project partner on this proposal. I am willing to assist with field sampling and review results of this study as described in the proposal. I intend to be a partner in this project, committing staff time, travel expenses, transportation, and equipment use to execute this important study. I acknowledge that the value of my time (160 hours throughout the 2-year project) and the District 7 technicians' time (160 hours, as available) have been included as in-kind, non-federal match on this project.

I look forward to collaborating on this project.

Sincerely,

Eric Brinkman
District Fisheries Supervisor

Copies: Fisheries File

Mike Knoedl
Director

Jeff Crow
Chief of Staff and
Deputy Director

1915-2015 Arkansas Game & Fish Commission 100
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Andrew Bass
Assistant Deputy Director

Ricky Chastain
Assistant Deputy Director

February 16, 2016

Dr. Steve Lochmann Aquaculture/Fisheries Department
University of Arkansas at Pine Bluff
1200 N. University Dr., Mail Slot 4912
Pine Bluff, Ar 71601

SUBJECT: ICTHYOFAUNAL SURVEY OF LOWLAND STREAMS SWG PROPOSAL

Dr. Lochmann,

I am writing to confirm the commitment of the Arkansas Game and Fish Commission's Fisheries Division as a project partner on this proposal. I am willing to assist with field sampling and review results of this study as described in the proposal. I intend to be a partner in this project, committing staff time, travel expenses, transportation, and equipment use to execute this important study. I acknowledge that the value of my time (120 hours throughout the 2-year project) has been included as in-kind, non-federal match on this project.

I look forward to collaborating with you on this project.

Sincerely,

Andrew Yung
District 6 Fisheries Supervisor

Copies: Fisheries File

United States Department of the Interior
FISH AND WILDLIFE SERVICE
110 South Amity Road, Suite 300
Conway, Arkansas 72032
Tel.: 501/513-4470 Fax: 501/513-4480

IN REPLY REFER TO:

February 18, 2016

Steve Lochmann, Professor
Aquaculture and Fisheries Department
University of Arkansas at Pine Bluff
1200 N. Univ. Dr., Mail Slot 4912
Pine Bluff, AR 71601

Dear Dr. Lochmann:

The Service has reviewed your State Wildlife Grant Pre-proposal for a project to perform ichthyofaunal surveys of main stem and major tributaries of lowland streams in south Arkansas. The stated goal of this project, in part, is to "conduct distribution and status surveys of ichthyofauna in the main stems and major tributaries of three stream systems in southern Arkansas. The Red River, including the lower portions of the Little, Cossatot, and Saline (in Howard County) Rivers represent the western most lowland stream system in the South Central Plains ecoregion. The Ouachita River, including the Little Missouri and Caddo (below DeGray Lake) Rivers and Moro Creek represent a second important lowland stream system in the South Central Plains ecoregion." As part of this pre-proposal toward accomplishing this goal you have requested my assistance as a project partner. We have considered this request and offer the following response.

The Service will provide non-monetary technical assistance and support in the form of providing equipment and field assistance. Our office has a variety of equipment that may be requested for use and will be provided, if appropriate and available. Specifically, we would like to offer the use of one or more of our campers for your field crews to use as a field station and for overnight accommodations. Additionally, our office will assist with relocation of the campers, maintenance, and basic stocking of utensils.

We pledge to support your efforts to conduct these important surveys and assessments as much as possible. Please let us know if you have any questions about what we have to offer and if there is any way we can assist you further. Contact me at (501) 513-4489 or Lindsey_Lewis@fws.gov for direct assistance and coordination.

Sincerely,

Lindsey Lewis
U.S. Fish and Wildlife Service
Arkansas Field Office