

Monitoring Illinois Chorus Frog (*Pseudacris illinoensis*) in Northeast Arkansas

PROJECT SUMMARY

The Illinois Chorus Frog (ICF; *Pseudacris illinoensis*) is found only in the extreme northeast corner of Arkansas. Since the last surveys, over a decade ago, the frog has been elevated to a new species and will likely be under consideration by the Environmental Protection Agency in the near future. The last surveys revealed a dim prospect for population survival in Arkansas due to increased agricultural pressures. This survey will provide a clear picture of the remaining population in Arkansas by completing three objectives: 1) Map distribution of existing breeding sites of ICF in Arkansas, 2) Evaluate the size and status of individuals to create recruitment and survival models 3) Assess environmental properties of breeding habitat to target areas for conservation. We will complete these objectives by conducting call surveys during the breeding period, then returning to focal sites to conduct more detailed surveys of the area, including mark-recapture measurements. This will also allow us to assess females in the population. These three objectives will allow us to determine the population size and structure to understand the population health and add to the sparse data about ICF biology. This will allow us to make recommendations for conservation.

PROJECT LEADER

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Total Project Cost = \$91,671

Total Arkansas SWG request = \$52,187

Total Matching Funds* provided = \$39,484 (43.1%)

*these are non-federal dollars supplied by Arkansas State University

Monitoring the Illinois Chorus Frog (*Pseudacris illinoensis*) in Northeast Arkansas

NEED

Identifying and conserving populations of rare species in Arkansas is of utmost importance as suitable habitats rapidly decrease across the state. One of the rarest amphibians in Arkansas, the Illinois Chorus Frog (ICF; *Pseudacris illinoensis*) has not been evaluated in over a decade¹, at which time the population was seen to be in extreme decline^{1,2}. The populations evaluated were in highly agricultural areas with multiple stressors likely impacting the remaining individuals, such as destruction of suitable habitat and exposure to contaminants². Since the last surveys of these remnant populations, the species has been elevated to a full species³, and will soon be evaluated for inclusion on the U.S. Endangered Species Act. Therefore, it is a critical need to assess the current population status and identify key locations for conservation efforts.

PURPOSE AND OBJECTIVES AND LOCATION

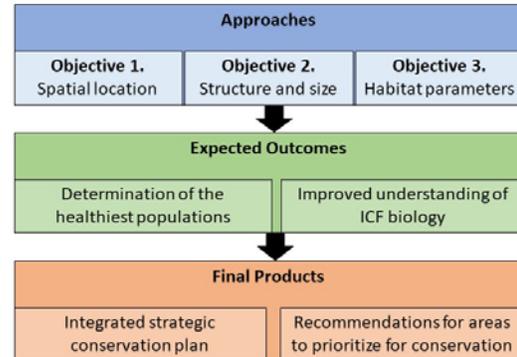
The overall purpose of this study is to locate and quantify populations of the Illinois Chorus Frog in Northeast Arkansas to identify and establish the best locations and methods for conservation. This study will be completed with three main objectives:

1. Map distribution of existing breeding sites of ICF in Arkansas.
2. Evaluate the size and status of individuals to create recruitment and survival models.
3. Assess environmental properties of breeding habitat to target areas for conservation.

This work will be conducted in Clay County in Northeast Arkansas.

APPROACH

The integration of the information from these three objectives (Figure 1) will allow us to determine the healthiest populations in NE AR as well as better understand the biology of the elusive ICF. These outcomes will allow us to provide concrete final products to the Arkansas Game and Fish Commission as well as the scientific community and conservation agencies.



Approach Objective 1: Determine location of existing populations to map distribution of the ICF in Arkansas. At the end of January, when the frogs are starting to breed⁴. Given that this species breeds explosively after heavy rains, we will be able to predict breeding periods⁴. We will follow the North American Amphibian Monitoring Programs (NAAMP)⁵⁻⁷. Briefly, NAAMP states that researchers will drive through habitat and repeatedly stop and listen for calling. We will return to all sites where the ICF has been recorded and utilize the method of searching for calling through areas that are adjacent to previously recorded locations. We will survey suitable habitats by listening for the ICF in one mile increments moving radially from sites that have actively calling individuals, up to five miles⁷. We will also survey at the Dave Donaldson Wildlife Management Area (DDWMA; Letter of Support from director Zack Yancey

available). This site is approximately 20 miles from the last known call site and has habitat that may be favorable for ICF. Given its protected status, conserving a breeding population at DDWMA would be of utmost importance. To improve our ability to predict and model detectability and occupancy, we will also record air temperature, time, and moon illumination⁶. Each location will be recorded and a map of habitat use and likelihood of use in other locations will be created using Geographic Information Systems (GIS).

*Expected Results and Benefits Objective 1: **Completing this objective will allow us to determine accurately the range of ICF in northeastern Arkansas.*** Specifically, we will evaluate whether or not the ICF has remained at locations where it was recorded over a decade ago to determine if the ICF has moved to new locations and/or disappeared from locations.

*Approach Objective 2: **Evaluate the size and status of individuals to create recruitment and survival models.*** We will quantify the number of calling males during call surveys. The following morning, we will return to three of the locations where frogs were heard. We will capture a subset of individuals for capture-mark-recapture studies to determine survival and recruitment over the two year period. Both male and frogs will be captured using dipnets and will be carefully measured (snout-vent length, hind limb length, mass). Individuals will be sexed and given a unique mark using visible implant elastomer, which has minimal impact on survival in frogs^{8,9}. The individual will be released. The following year, we will return and determine survival and whether there is movement between the pools using program MARK¹⁰.

*Expected Results and Benefits Objective 2: **This objective will allow us to better model population health and prognosis through survival estimates.*** Additionally, it will allow us to determine the number and survival of females, which is not possible during call surveys alone.

*Approach Objective 3: **To assess the environmental properties that determine a suitable breeding habitat, we will measure physical, chemical, and biological characteristics.*** The ICF seems to prefer sand prairie habitats, which are no longer available in northeastern Arkansas. Therefore, it is critical to understand what environmental properties are important for a maintaining a population of ICF in an altered habitat. To achieve this objective, we will sample areas of active breeding, areas that had historical populations that are no longer detected, and random areas that are geographically near to active breeding populations to determine what the key characteristics are for maintaining a population of ICF. The morning after each call survey, we will return to ten pool with calling frogs and ten randomly selected pools with no calling frogs. For physical characteristics, we will measure pool depth, pool diameter. For chemical characteristics, we will measure dissolved oxygen, hardness, pH, temperature, and conductivity. Finally, to assess the biological characteristics, we will catalog all vegetation species and record other organisms found at the breeding pool.

*Expected Results and Benefits Objective 3: **Completing this objective will have direct benefits to conserving the ICF in Arkansas and throughout its range.*** The data generated from this research will allow us to determine what specific microhabitat characteristics are critical for ICF breeding, so we can target conservation efforts to the most suitable habitats.

EXPECTED RESULTS AND BENEFITS

Our results from the three objectives will be combined and interpreted using integrative statistical models that can analyze detectability and the influence of abiotic and biotic factors ¹¹. This will allow us to make the most informed recommendations about target populations for future study and conservation to the AGFC, which we will provide to the AGFC with our findings. We also anticipate at least one publication in a peer-reviewed journal with these findings. Finally, this work will support students in conservation research.

Timeline of activities						
Activity	Spr 2019	Sum 2019	Fall 2019	Spr 2020	Fall 2020	Spr 2021
Initial Call Surveys, Habitat Surveys	X					
Analysis of Initial Data		X	X			
Initial report to AGFC			X			
Secondary Call Surveys, Habitat Surveys				X		
Analysis of Data					X	
Secondary Report to AGFC					X	
Publication of Data						X

BUDGET

Budget	Justification	SWG	Match	Total
Personnel				
Project Leader (L. Neuman-Lee)	1 weeks sum salary	1,583	-	1,583
Graduate Student	2 spring semesters	15,000		15,000
	2 fall semesters		15,000	15,000
	2 summers	7,200		7,200
Field Technician	2 sampling periods	7,200	-	7,200
Fringes				
Project Leader (L. Neuman-Lee)	17.75% (9 mo sum)	281	-	281
Graduate Student	0.20%	14	30	44
Undergraduate (Field Tech)	0.20%	14	-	14
Supplies & Services				
Visible Implant Elastomer Tags (VIE) from BioWeb	1 60ml kit per year	2,500		2,500
Travel				
Travel to Clay County (10 trips)	150 miles RT ea trip	795		795
Lodging (10 nights/year= 20)	\$120 per night	2,400		2,400
Per diem (3 people, 10 days/year= 20)	\$50 day/person	3,000		3,000
Travel to International Conference		2,000		2,000
				-
Total Direct Cost		41,988	15,030	57,018
Indirect Cost (10% MTDC)				
Tuition (not IDC applicable)	2 spring semesters	6,000		6,000
Tuition (not IDC applicable)	2 fall semesters		6,000	6,000
Match Indirect Cost (39.73% MTDC)			5,971	5,971
Waived Indirect Cost (29.73% MTDC)			12,483	12,483
Total Cost		52,187	39,484	91,671

QUALIFICATIONS

Key Personnel.

Dr. Lori Neuman-Lee is an assistant professor of herpetology at Arkansas State University. She completed her training at Utah State University. Dr. Neuman-Lee has worked with a wide variety of reptiles and amphibians during the past fifteen years of her research career. She also has experience working with sensitive species (CITES listed Marine Iguanas in the Galapagos Islands, Ecuador). Dr. Neuman-Lee has published over 20 peer-reviewed articles in the field of herpetology. She is currently working on building her research program at ASU, which will focus on conservation of reptiles and amphibians in Arkansas by understanding populations, physiology, and reproduction.

Permits.

Dr. Neuman-Lee currently holds a permit for reptiles and amphibians in Arkansas through the Arkansas Game and Fish Commission, including approval for all work with the ICF. All proposed procedures have already been approved by the Arkansas State University Institutional Animal Care and Use Committee (IACUC).

Equipment and Facilities.

Dr. Neuman-Lee and the students will have access to field vehicles, which will be crucial in this project. These vehicles are maintained by the Department of Biological Sciences. Other necessary equipment, such as dip-nets, scales, measuring tapes, and plastic holding containers, are already available at ASU. Sterilizing gear and equipment (to reduce the chance of spreading pathogens) are also available.

LITERATURE CITED

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