2013 Arkansas State Wildlife Grant Pre-proposal

THE LUCKY SUBTERRANEAN 13: CONSERVATION EFFORTS TO PROTECT POPULATIONS OF THIRTEEN ARKANSAS KARST SPECIES OF GREATEST CONSERVATION NEED.

Project Summary

This project will develop conservation actions to protect populations of 13 Arkansas karst species of greatest conservation need that occur in the 10 top priority cave sites identified by the 2013 Arkansas Wildlife Action Plan Steering committee. The project will update the status of these populations, identify site-specific conservation actions, determine or delineate contributing surface lands, identify landowners and tracts associated with sites, and prioritize and begin implementation activities. Implementation of conservation activities during this project will serve as demonstrations of available techniques and will facilitate the development of future proposals to fund high priority actions.

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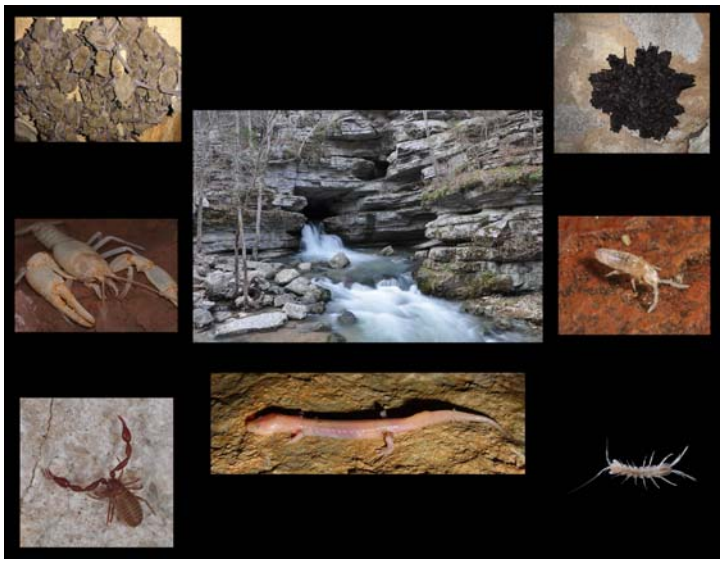

SWG Funding Requested: $54,600 (65%) or $42,000 (50%)

Amount and Source of Matching Funds: $29,400 (35%) or $42,000 (50%) of non-federal match will be provided from The Nature Conservancy and Arkansas Natural Heritage Commission

Total Project Costs: $84,000

FUNDING PRIORITY: This project addresses the 2013 State Wildlife Grant Funding priority "Protect karst openings and recharge zones and maintain groundwater quality for priority caves" by initiating protection efforts at the 10 top priority karst sites chosen by the Steering committee. These high priority karst sites provide habitat for populations of 13 karst species which are identified in the Arkansas Wildlife Action Plan as species of greatest conservation need.

NEED: Karst is a terrain, generally underlain by limestone or dolomite, in which the topography is chiefly formed by the dissolving of rock, and which may be characterized by sinkholes, sinking streams, closed depressions, subterranean drainage, and caves. Often, species living in karst are specially adapted to rigorous environmental conditions that occur there. Because light is absent and food limited, many species exhibit morphological, physiological, and behavioral characteristics that make them well suited for existence in subterranean habitats. These organisms are often among the rarest and most unique species inhabiting karst, and they are important components of species conservation planning efforts outlined in the Arkansas Wildlife Action Plan (AWAP).

Many Arkansas karst species of greatest conservation need (SGCN) are rare, occurring in less than 5 locations, while others appear to be more common. However, for all species at least some populations are experiencing visitation and/or groundwater pollution threats. Therefore, all of these species are in need of additional conservation action and focus. The 2013 AWAP Steering committee identified a set of top priority karst sites where conservation actions could be implemented that would benefit karst SGCN. These caves support populations of 13 karst SGCN (Table 1) and provide habitat for more than 75 additional species (Graening et al 2012).

Populations of the grotto salamander, *Eurycea* (=*Typhlotriton*) *spelaea*, are known to occur in Dozen's Den Cave, Diamond Cave, and Lafferty Spring Cave. The bristly cave crayfish, *Cambarus setosus*, is known from several sites in Arkansas, including Dozen's Den Cave. The beetle, *Rhadine ozarkensis*, is a single site endemic, and it is only known from a series of specimens collected in Fincher Cave. The springtails, *Pygmarrhopalites* (=*Arrhopalites*) *clarus*, *Pseudosinella dubia*, and *Pseudosinella testa*, are small, insect-like organisms, and populations of these cave animals are found in Fincher Cave, Granny Dean Cave, and Diamond Cave. Populations of the isopods, *Caecidotea ancyla*, *Caecidotea macropropoda*, and *Lirceus bicuspidatus*, are known to occur in Fincher Cave, Denny Horsethief Cave, and Diamond Cave. The pseudoscorpion, *Hesperochernes occidentalis*, occurs in Fincher Cave, Granny Dean Cave, and Dodd Cave. The millipede, *Trigenotyla parca*, was originally described from specimens collected at Blue Spring, Carroll County, and populations were subsequently identified from a few caves including Granny Dean Cave. In addition, these top priority sites provide habitat for 2 species of endangered bats, the gray bat (*Myotis griscesens*) and Indiana bat (*Myotis sodalis*).

The caves identified by the 2013 AWAP Steering committee are distributed across northern Arkansas and they are a good representation of karst habitat that is present in the state. Several of the sites are developed in the Pitkin Formation, and sections of these caves are very maze-like with multiple intersecting passages. Other sites are developed in Ordovician or older limestones, and passages in these caves tend to be more dendritic in nature. Sites such as Saltpeter Cave and Bone Cave have drier rooms suitable for bat use, while caves such as Diamond Cave and Dozen's Den Cave have perennial streams that provide habitat for groundwater species.

A previous Arkansas State Wildlife Grant (T20-9) assessed threats associated with these caves, and identified that all sites were threatened with human disturbance and habitat degradation. All of these caves and the surrounding landscape are in private ownership, and in some instances, efforts to conserve these sites were initiated previously. For example, the entrance to Bone Cave is gated, and a management agreement exists between the landowner and Arkansas Game and Fish Commission. However, at most sites, conservation efforts are unknown, and the status of SGCN populations at these locations has not

been assessed. The purpose of this project is to protect these sites, the contributing landscape (i.e. groundwater recharge area and bat foraging area), and SCGN populations by determining site-level conservation need at the 10 locations, prioritizing conservation efforts, and implementing protection activities.

OBJECTIVES:

1. Increase protection of 13 Arkansas karst species of greatest conservation need.
2. Increase protection of bat hibernacula and maternity sites.
3. Begin implementing conservation actions at top priority karst sites.

EXPECTED RESULTS AND BENEFITS: This project will lay the groundwork for providing ecosystem level protection at 10 top priority karst sites in Arkansas. Assessing the status of SGCN populations will assist in determining how likely conservation at individual sites is expected to benefit species and will generate a baseline for comparison. Determining site-level conservation need will facilitate the scale of action needed initially (e.g. installation of entrance gate vs. recharge delineation vs. immediate acquisition). Identification of landowners, tracts, and landowner interest in conservation activities will assist with developing a prioritized list of implementation sites. The outcome for this project will be a plan that sets priorities for habitat protection and restoration and will provide a solid foundation for implementing voluntary conservation actions, targeting funds available through other avenues, and highlighting future funding priorities for these species at these sites. Thirteen karst SGCN will benefit from this project including a single-site endemic and several endangered bat species (Table 1).

Table 1. Arkansas Karst SPGN. AWAP priority score is in parenthesis.

Class	Common Name	Scientific Name
Amphibians	Grotto Salamander (19)	*Eurycea spelaea*
Crayfish	Bristly Cave Crayfish (27)	*Cambarus setosus*
Insects	ground beetle (80)	*Rhadine ozarkensis*
Invertebrates Other	cave obligate millipede (65)	*Trigenotyla parca*
	isopod (57)	*Caecidotea macropropoda*
	springtail (50)	*Pseudosinella dubia*
	Shelled Cave Springtail (42)	*Pseudosinella testa*
	isopod (30)	*Caecidotea ancyla*
	isopod (27)	*Lirceus bicuspidatus*
	springtail (25)	*Arrhopalites clarus*
	pseudoscorpion (23)	*Hesperochernes occidentalis*
Mammals	Indiana Bat (46)	*Myotis sodalis*
	Gray Bat (23)	*Myotis grisescens*

DELIVERABLES:

1. Status updates of the 13 SPGN at the 10 caves.
2. Identification of site-specific conservation issues and actions needed at each cave.
3. Determination or delineation of contributing surface lands associated with each cave.
4. Identification of landowners and tracts associated with each cave.
5. Prioritized list of sites and implementation activities.
6. Initial implementation activities.

APPROACH:

Populations of the 13 karst SGCN will be assessed at sites where recent information is unavailable. Methodology will be species dependent (e.g. bait stations, quadrats, timed area searches, or visual surveys) and will only be used to establish a baseline and provide a status update. Each site will be assessed for localized impact (e.g. trash, vandalism, timing and frequency of illegal visitation), and a preliminary estimate of contributing surface lands (subsurface watershed estimate and bat foraging area) will be determined. Recharge delineations will likely not be necessary or feasible at all sites. For

instance, Bone Cave does not have a perennial stream and groundwater contribution to the system is minimal. At sites with perennial streams, such as Dozen's Den Cave and Diamond Cave, recharge delineations will be necessary; however, delineating groundwater basins for each site as part of this project is prohibitively expensive. Therefore, recharge delineations will only be conducted at the top two sites. Delineations will be conducted using standard dye tracing techniques as outlined in Arkansas State Wildlife Grant (T30-8) which delineated the recharge area for Foushee Cave. Based on the contributing surface area, land parcel information from recent plat books will be georeferenced, using ArcGIS 9.3. These digitized land parcels will be used to identify all landowners with property within the contributing areas for these caves. Landowners will then be contacted to promote protection, restoration, and determine willingness to participate in conservation efforts. Based on this information, a prioritized list of sites and recommended actions will be developed and implementation of conservation actions will begin at several of the sites. Implementation of conservation activities during this project will serve as demonstrations of available techniques and will facilitate the development of future proposals to fund high priority actions.

LOCATION OF WORK: This project will be conducted within portions of the Ozark Highlands ecoregion, within the Ozark Highlands - Arkansas River eco-basin.

BUDGET: The total cost of this project is $84,000.

65% Award – 35% Match	**Requested SWG Funds**	**TNC Match**	**ANHC Match**	**Total**
Personnel & Fringe:	$ 17,271.00	$ 17,815.00	$2,100.00	$ 37,186.00
Operating Expenses				
Travel	$ 3,500.00	$ 500.00		$ 4,000.00
Supplies	$ 500.00	$ 4,500.00		$ 5,000.00
Recharge delineation contract	$ 25,000.00			$ 25,000.00
Overhead	$ 8,329.00	$ 4,485.00		$ 12,814.00
Subtotal	$ 54,600.00	$ 27,300.00	$2,100.00	$ 84,000.00
TOTAL	**$ 84,000.00**			

50% Award– 50% Match	**Requested SWG Funds**	**TNC Match**	**ANHC Match**	**Total**
Personnel & Fringe:	$ 6,593.00	$ 28,493.00	$2,100.00	$ 37,186.00
Operating Expenses				
Travel	$ 3,500.00	$ 500.00		$ 4,000.00
Supplies	$ 500.00	$ 4,500.00		$ 5,000.00
Recharge delineation contract	$ 25,000.00			$ 25,000.00
Overhead	$ 6,407.00	$ 6,407.00		$ 12,814.00
Subtotal	$ 42,000.00	$ 39,900.00	$2,100.00	$ 84,000.00
TOTAL	**$ 84,000.00**			

ORGANIZATION AND STAFF QUALIFICATIONS

The Nature Conservancy has helped conserve more than 250,000 acres of natural lands and waters in Arkansas. The Arkansas program currently owns or manages 36 nature preserves encompassing more than 20,000 acres and has ongoing cooperative projects with public and private landowners on more than 200,000 acres. These sanctuaries are found in every corner of the state.

The Arkansas Natural Heritage Commission is charged with the responsibility of establishing and maintaining a System of Natural Areas. The research section of the ANHC conducts field investigations to identify potential natural areas and to monitor the state's rare animals, plants, and natural communities. Natural areas are those lands specifically managed to preserve, and sometimes restore, natural communities and the rare species they support. The commission owns and manages 71 areas within the state's System of Natural Areas encompassing more than 59,000 acres.

ANHC and TNC have worked together for several decades to address habitat conservation, species protection, and water quality protection in the Ozark Karst Ecosystem. Both agencies have worked together at a landscape scale to aid in the recovery of karst-dependent animal species and their habitats spanning across state boundaries into Oklahoma and Missouri.

Project Leader: Michael Slay has been working in karst conservation for ten years in the five states that contain the caves and springs of the Ozark Highlands Ecoregion. Before joining The Nature Conservancy as the Ozark Karst Program Director, Mike coordinated karst research during positions held at the University of Arkansas, Buffalo National River NPS, Illinois Natural History Survey, and Missouri Department of Conservation. Since joining The Nature Conservancy, Mike has worked with multiple partners such as US Fish and Wildlife Service, US Forest Service, Arkansas Game and Fish Commission, Missouri Department of Conservation, Oklahoma Biological Survey, and Illinois Natural History Survey to conserve and protect karst species and habitats, including species found in spring habitats. Mike has coordinated the exploration, species monitoring, and habitat analysis in several hundred caves and springs, and he has assisted with the discovery of over 15 karst species new to science. Mike received his undergraduate degree and M.S. in Biology at the University of Arkansas. In addition to conducting karst research and implementing karst conservation actions, Mike has authored and co-authored 15 peer-reviewed journal articles related to the discovery and conservation of karst species.

Bryan Rupar is the Chief of Land Acquisition and Stewardship for the Arkansas Natural Heritage Commission. Bryan received a B.S. in natural resource management from Grand Valley State University and a M.S. in forest resource management from the University of Arkansas at Monticello. Bryan previously worked for the US Forest Service in Michigan and as a consulting forester in southern Arkansas. Bryan oversees all acquisition projects for the commission, and has closed on 31 properties, adding over 11,000 acres to the System of Natural Areas.