

Project Title: Constructing a distributional map for winter stoneflies of greatest conservation need in Arkansas

Project Summary: The *overall project goal* is to construct a distributional map for winter stoneflies of greatest conservation need (SGCN). *Objective 1* aims to sample larvae and adults from river basins in regions with previous records of SGCN stonefly species (Ozark Highlands, Boston Mountains, Ouachita Mountains, Arkansas Valley, South Central Plains, and the Mississippi Alluvial Plain) from November 2015 to September 2017. We will then provide presence and abundance data for each species. We will quantitatively sample larvae and qualitatively sample adults from ten streams within each region over the duration of the study (N=60). Sampling sites will be chosen based on proximity to historical records. *Objective 2* aims to measure reach habitat characteristics (substrate composition, flow characteristics, water temperature), watershed land use data, and water quality to examine relationships between landscape and local environmental conditions and species presence or abundance in these basins.

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Project Budget:

SWG amount requested: \$82,074

Match amount provided: \$44,194 in faculty salaries and unrecovered indirect costs.

Total amount of project: \$126,268

Project Statement

Need: The proposed project addresses the need to obtain a baseline distribution and population status for winter stonefly species that can lead to conservation action recommendations. Specifically, we will sample stoneflies in focal regions and locations of previous records for Capniidae genera and species (priority score) [*Allocaenia jaenae* (50), *Allocaenia malverna* (11), *Allocaenia oribata* (80), *Allocaenia ozarkana* (50), and *Allocaenia warren* (80)]. Areas where Chloroperlidae [*Alloperla caddo* (50)] and Isoperlidae [*Isoperla szczytkoi* (80)] have been observed will also be sampled. We will document findings of any other SGCN in samples including: Trichopteran genera and species of concern (priority score) [*Agapetus medicus* (8), *Orchrotrichia contorta* (80) and *robinsoni* (23) and Odonata (*Gomphus ozarkensis* (27) and *Ophiogomphus wetfalli* (32)]. The ecobasins sampled include State Wildlife Action plan high priority basins, such as the Ozark Highlands White River and the Boston Mountains White River.

Purpose and Objectives: The *overall project goal* is to construct a distributional map for winter stoneflies of greatest conservation need (SGCN). *Objective 1* aims to sample larvae and adults from river basins in regions with previous records of SGCN stonefly species (Ozark Highlands, Boston Mountains, Ouachita Mountains, Arkansas Valley, South Central Plains, and the Mississippi Alluvial Plain; Figure 1) from November 2015 to September 2017. Ten streams will be sampled within each region over the duration of the study (N=60) and will be chosen based on proximity to historical records. Quantitative larval insect samples will be taken from riffle habitat units within a 200-400 m reach in each study stream using a Surber sampler. Adults will be sampled using emergence traps. *Objective 2* aims to measure reach habitat characteristics (substrate composition, flow characteristics, water temperature), watershed land use data, and water quality (total nitrogen, total phosphorus, dissolved oxygen, pH, conductivity, temperature) to examine relationships between landscape and local environmental conditions and winter stonefly species presence and abundance in these basins.

Location: River basins in regions with previous records of SGCN stonefly species (Ozark Highlands, Boston Mountains, Ouachita Mountains, Arkansas Valley, South Central Plains, and the Mississippi Alluvial Plain; Figure 1A) will be sampled. Study streams within each region will be chosen based on proximity to historical records. For example, sampling in the Ouachita Mountains will focus on streams within Garland, Perry, Scott, Arkansas counties where *Alloperla caddo* has been previously sampled (Figure 1B). Samples in the South Central Plains will focus on Columbia and Dallas counties where *Leuctra paleo* has been found (Figure 1B).

Approach: Our research team will sample winter stonefly larvae and adults from 10 streams within each of the following ecobasins: Ozark Highlands, Boston Mountains, Ouachita Mountains, Arkansas Valley, South Central Plains, and the Mississippi Alluvial Plain. Study sites

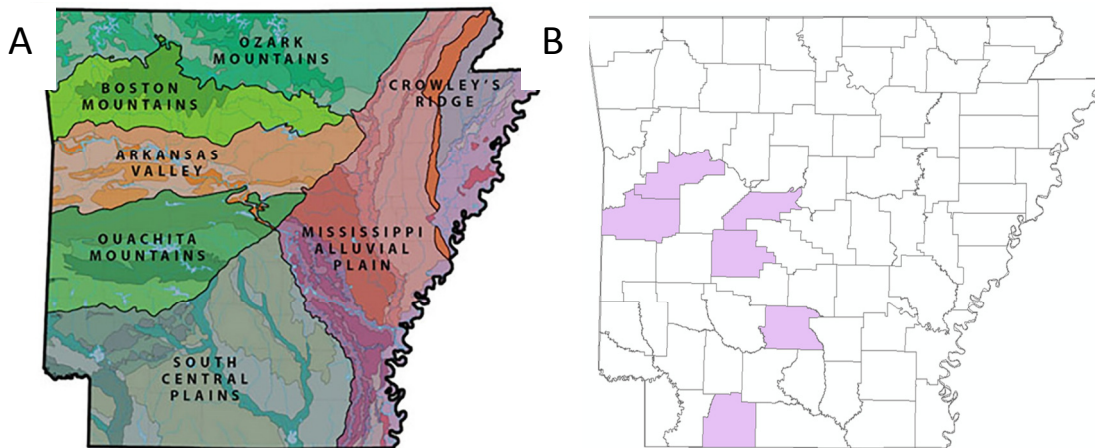


Figure 1 A. Arkansas level III ecoregions from <http://www.uaex.edu/environment-nature/water/quality/>. B. Focal counties (purple) for sampling of winter stoneflies within the Ouachita Mountains and South Central Plains.

will be chosen based on proximity to historical records (Ross 1964; Poulton and Stewart 1987; Robison and Allen 1995; Stark 1998).

Quantitative larval insect samples will be taken from riffle habitat units within a 200-400 m reach in each study stream using a modified Surber sampler. Samples will be sieved and preserved in alcohol and transported back to the laboratory for sorting, counting, and taxonomic identification. For each benthic sample, habitat measurements based on visual estimates within the sample frame will include percent embeddedness, periphyton, filamentous green algae, sedimentation, and organic material will be taken first (Bowles et al. 2007). Velocity and depth will then be measured directly in front of the net. Samples of substrate will be taken from within the sampling frame and measured using a Wentworth scale to determine size composition. Water samples will be collected for total nitrogen and total phosphorus at the base of the sampling reach prior to macroinvertebrate sampling. Water samples will be placed on ice and transported back to the laboratory for persulfate digestion and spectrophotometric nitrate and soluble reactive phosphorus analysis. Dissolved oxygen, pH, conductivity, temperature will be taken using portable probes. Average stream width, depth will be

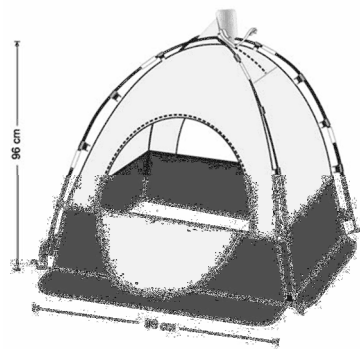


Figure 2. Approximate design of adult emergence traps.

estimated from measures from several transects within each major habitat unit within the reach. Adult emergence traps (Figure 2) will be placed in the riparian zone at each site for several days and collected Plecopteran adults will be counted and identified to the lowest taxonomic level. Relationships between watershed land use, local environmental conditions, and presence and abundance data will be examined using regression and multivariate techniques.

Timeline of activities									
	2015		2016				2017		
	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Sample site selection and permission									
Stream sampling									
Laboratory sample analysis									
Data analysis									
Final report									

Expected Results and Benefits: The proposed project addresses the need to obtain a baseline distribution and population status for winter stonefly species that can lead to conservation action recommendations. Further, the proposed project can provide information on landscape- and local-scale variables associated with presence and abundance of the stonefly species sampled.

Budget:

	State Wildlife Grant Funds (Federal)	Match (Non-Federal)	Total Project Cost
Budget Category			
Salaries	62913	13668	76581
Travel	5700		5700
Supplies and Materials	6000		6000
Equipment			0
Indirect Costs	7461	30526	37987
TOTAL	82074	44194	126268

Qualifications

Michelle Evans-White has degrees in Fisheries Biology and Biology from Kansas State University and the University of Notre Dame. She is a stream ecologist focusing on benthic algal and macroinvertebrate population and community responses to anthropogenic change. She has over 20 years of experience collecting and identifying benthic macroinvertebrates and analyzing water chemistry samples.

Sally Entrekin has degrees in Entomology and Biology where her research focused on community structure and production of aquatic insects. She also has experience collecting and identifying larval and adult forms.

Literature cited

Bowles, D.E., J.A. Luraas, L.W. Morrison, H.R. Dodd, M.H. Williams, G.A. Rowell, M.D. DeBacker, J.A. Hinsey, F.D. Usrey, and J.L. Haack. 2007. Protocol for monitoring aquatic invertebrates at the Ozark National Scenic Riverways, Missouri and Buffalo National River, Arkansas. Natural Resource Report NPS/HTLN/NRR—2007/009.

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