

## 2013 State Wildlife Grant Proposal

### **Project Title:**

A quantitative baseline aquatic macroinvertebrate and mussel survey of the Big Maumelle River

### **Project Summary:**

The Big Maumelle River is the major inflowing tributary to Lake Maumelle, the primary drinking water source that provides high quality drinking water for over 400,000 people in central Arkansas. Records do not indicate a quantitative survey of the aquatic macroinvertebrate or mussel populations inhabiting the river has been performed to date. Additionally, the watershed surrounding the Big Maumelle River is facing land use changes including increased timber harvesting and unpaved road building; activities which have the potential to increase river sedimentation and impair water quality. Macroinvertebrates and mussels both serve as excellent biological indicators of water quality and overall stream health; therefore, performing a quantitative baseline survey to document the community composition and population density of macroinvertebrate and mussel species residing in the Big Maumelle River is an essential first step in developing a future water quality monitoring program and corresponding land management plan to support protection of riparian zones and aquatic habitat.

### **Project Leader:**

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### **Project Partners:**

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Steve Filipek, Asst. Chief, Fisheries Division and Arkansas Statewide Stream Team Coordinator,  
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### **Project Budget:**

	<b>50% Match Scenario</b>	<b>35% Match Scenario</b>
<b>SWG Grant Funds Requested:</b>	<b>\$18,000.00</b>	<b>\$23,400.00</b>
<b>Match Provided:</b>	<b>\$18,040.00</b>	<b>\$12,640.00</b>
<b>Total Project Cost:</b>	<b>\$36,040.00</b>	<b>\$36,040.00</b>

## **Project Need:**

### **2013 State Wildlife Grant Priority Actions Addressed:**

Performing a quantitative baseline survey to document the community composition and population density of aquatic macroinvertebrate and mussel species residing in the Big Maumelle River is an essential first step in developing a future water quality monitoring program and corresponding land management plan to support conservation of riparian zones and aquatic habitat. Once populations are identified, the species present will serve as future indicators of water quality and overall stream health including such factors as: adequacy and condition of in-stream habitat, nutrient and sediment loading, and the identification of sites for stream bank stabilization or restoration. The following State Wildlife Grant Priorities will be addressed through performance of this baseline survey:

**Mussels:** Species addressed: *Lampsilis rafinesqueanna*, *Quadrula cylindrica*, *Villosa lienosa*, *Toxolasma lividum*, and *Venustaconcha ellipsiformis*. “The mussel community is rapidly declining and has been declining for 15 + years. *L. rafinesqueanna* is a candidate for listing (listing priority number was recently elevated). Also, *Q. cylindrica* is a candidate for listing.” The baseline aquatic macroinvertebrate and mussel survey will indicate the presence or absence of these species of concern, particularly *Toxolasma lividum*, *Quadrula cylindrica*, and *Villosa lienosa* which are known to inhabit Ouachita Mountain ecoregion streams.

**Aquatic Habitat:** “Determine and validate environmental flows for one or more of the water regions within Arkansas.” Knowledge of the aquatic macroinvertebrate assemblage will provide insight into the adequacy of flow within the Big Maumelle River.

**Invasive Species:** “Identify and develop conservation actions.” A baseline aquatic macroinvertebrate and mussel survey will indicate the presence of native as well as invasive species in the Big Maumelle River.

## **Purpose and Objectives:**

**Purpose:** Develop a baseline listing of aquatic macroinvertebrate and mussel species present in the Big Maumelle River in order to develop a water quality and stream health monitoring plan that will guide land use planning to protect riparian zones and aquatic habitat.

### **Objectives:**

1. Generate a baseline listing of all aquatic macroinvertebrate and mussel species located and identified in the Big Maumelle River.
2. Verify the presence/absence of invasive species and SGCN from populated species listing.
3. Quantify the population density of identified species.
4. Identify and catalog areas of stream bank erosion.

**Location:**

**Ecoregion:** Ouachita Mountains Ecoregion, Arkansas River watershed

**Counties:** Surveying and sample collection will occur at various sites along the Big Maumelle River in Perry and Pulaski counties.



**Figure 1: General location of the Big Maumelle River in Perry and Pulaski Counties.**

**Approach:**

A preliminary walking survey of the Big Maumelle River upstream of Lake Maumelle will allow the project partners to identify and select suitable sampling locations. Sample sites will be selected using a targeted methodology to allow for assessment of particular stream reaches. At least five sample sites will be located upstream from Lake Maumelle, one sampling area will be located downstream of the Lake Maumelle dam and one sample site will be located in Lake Maumelle west of the Arkansas State Highway 10 bridge. Each sampling location will be recorded using GPS coordinates. Once adequate sample sites are identified, quantitative sampling of both the aquatic macroinvertebrate and mussel communities will occur on a quarterly basis with a representative sample collected during each season of the year. Water flow measurements will be taken at each sampling location during each sampling session. Water quality data including conductivity, dissolved oxygen, pH, temperature and turbidity will be collected at each site using a multi-parameter data sonde.

Sampling for aquatic macroinvertebrates as well as in-stream habitat assessment will follow the EPA’s Rapid Bioassessment protocol in which kick nets are used to collect organisms for identification and enumeration. Additionally, in-situ stream bottom samplers and the use of artificial substrates such as the Hester Dendy round multiple plate samplers will be employed as passive means of sampling. Each sample site will be sampled on a seasonal basis, for a total of 4 visits per site per study year. All organisms collected will be transferred to sample containers and returned to the laboratory for identification, preservation and enumeration. Identification will be facilitated through the use of reference identification keys.

Qualitative sampling for mussels will involve scouting the stream bank adjacent to selected in-stream sampling sites for the telltale presence of mussel shells. Quantitative mussel sampling of the river bottom will involve observing the river bottom side to side in a zigzag pattern. When possible, rocks temporarily will be lifted out of the stream bed and the area underneath will be searched for mussels or mussel shells. All organisms collected will be identified using reference identification keys, counted, and returned to the stream at the site of collection.

**Expected Results and Benefits:**

The following mussel species listed as species in greatest need of conservation (SGCN) known to be present in Ouachita Mountain streams may be present in the Big Maumelle River: *Toxolasma lividus* (Purple Lilliput), *Quadrula cylindrical* ( Rabbitsfoot), and *Villosa lienosa* (Little Spectaclecase). This survey will verify their presence or absence.

In addition to identifying the presence or absence of any mussel species in greatest need of conservation, the baseline survey of the Big Maumelle River will provide data regarding the population assemblage and dynamics for all aquatic macroinvertebrates and mussels identified in this waterway, including the presence of any known invasive species. This baseline knowledge will provide insight and will assist planning for future water quality and stream health monitoring that will guide land use planning and protect riparian zones and aquatic habitat.

**Budget:**

Budget Item	50% Match Scenario		35% Match Scenario	
	Request	Match	Request	Match
Labor, Forrest Payne	\$8,000.00		\$8,000.00	
Student Intern Labor-CAW	\$3,600.00		\$3,600.00	
Staff time - CAW		\$10,640.00	\$5,400.00	\$5,240.00
Staff time - AGFC		\$7,400.00		\$7,400.00
Equipment and Supplies	\$5,000.00		\$5,000.00	
Travel	\$1,400.00		\$1,400.00	
<b>Total (\$36,000.00)</b>	<b>\$18,000.00</b>	<b>\$18,040.00</b>	<b>23,400.00</b>	<b>\$12,640.00</b>

## **Qualifications:**

**Sharon Sweeney** is a water quality specialist for Central Arkansas Water. Sharon received a BS in Biology and a MS in Integrated Sciences and Mathematics from the University of Arkansas at Little Rock and a Master of Public Health with an emphasis in environmental health from the University of Arkansas for Medical Sciences. Sharon has fifteen years' experience performing field studies, analyzing data and compiling scientific reports. Her interests include studying the biological component of water quality including the contribution of aquatic macrophytes and phytoplankton to aqueous systems and the correlation of biological water quality indicators such as macroinvertebrates to chemical and physical water quality data.

**Dr. Forrest Payne** is an instructor in the Biology Department at the University of Arkansas at Little Rock. Dr. Payne received a BA from Hendrix College, a MS from the University of Arkansas at Fayetteville, and a PhD from the University of Wyoming. He has been teaching biology and aquatic related courses for the last decade. Prior to taking the instructor position at UALR, Dr. Payne has held positions with the Department of Water and Natural Resources in South Dakota, as an environmental consultant with FTN Associates in Little Rock, Arkansas and as an environmental scientist/environmental, health and safety manager with ALCOA. His research interests include phytoplankton and zooplankton dynamics, water quality, and energy flow in aquatic systems. Dr. Payne's participation in this project will primarily be during the summer months to avoid conflict with his teaching responsibilities.

**Steve Filipek** is the statewide Stream Team coordinator for the Arkansas Game and Fish Commission, a role held since 1996 and is also the Assistant Chief of the Fisheries Division. Steve has a B.S. in Fisheries Biology from Colorado State, University. As the Stream Team coordinator Steve works to engage community stakeholders and gain their assistance in protecting and promoting awareness, collection and identification of aquatic species. Steve has extensive knowledge of macroinvertebrate collection and identification procedures. Steve has had 3 full time university courses on identification of aquatic insects, stream biology, and ecology under noted entomologist Dr. J.V. Ward at Colorado State University and has kept his benthic macroinvertebrates identification skills at a high level by conducting hundreds of rapid bioassessment samples over the last 16 years. Steve has worked for the Arkansas Game and Fish Commission in some level of fisheries biology (entry level biologist, district biologist, statewide research biologist, stream team coordinator, and assistant chief) for over 34 years.