

Title: Identification of dams that block migration and status of American eel in the Ouachita River basin and the lower Arkansas River.

Project Summary: The American eel *Anguilla rostrata* (Lesueur) has been proposed on two separate occasions (2005, 2010) as a candidate species for listing under the endangered species act. On April 30, 2010, the Council for Endangered Species Act Reliability petitioned to U.S. Fish and Wildlife Service to list the American eel as threatened under the Endangered Species Act. This most recent petition admits that the distribution and abundance of American eel is less well understood in the Mississippi River watershed. Goodwin and Angermeier (2003) and Machut et al. (2007) both provided evidence that dams (natural and artificial) impact American eel migration in streams of the eastern United States. However, dams that are currently blocking large upstream migration of eels in Arkansas have not been identified, and these dams would be candidates for eel ladders. This study would use eel ladder traps to identify dams that block eel migrations, with emphasis on the Ouachita and lower Arkansas rivers. A secondary objective of the project is to assess status of eel in the Ouachita River basin and the Arkansas River below Dam 2. Numerous reasons exist why American eels may be in decline, including overharvest, changes in ocean current patterns and climate, blockage of upstream migrations by dams, harvest of algae in the Sargasso seas spawning grounds, and introduction of the exotic Asian swim bladder nematodes *Anguillicoloides crassus* into the waters of North America.

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Project Partners:

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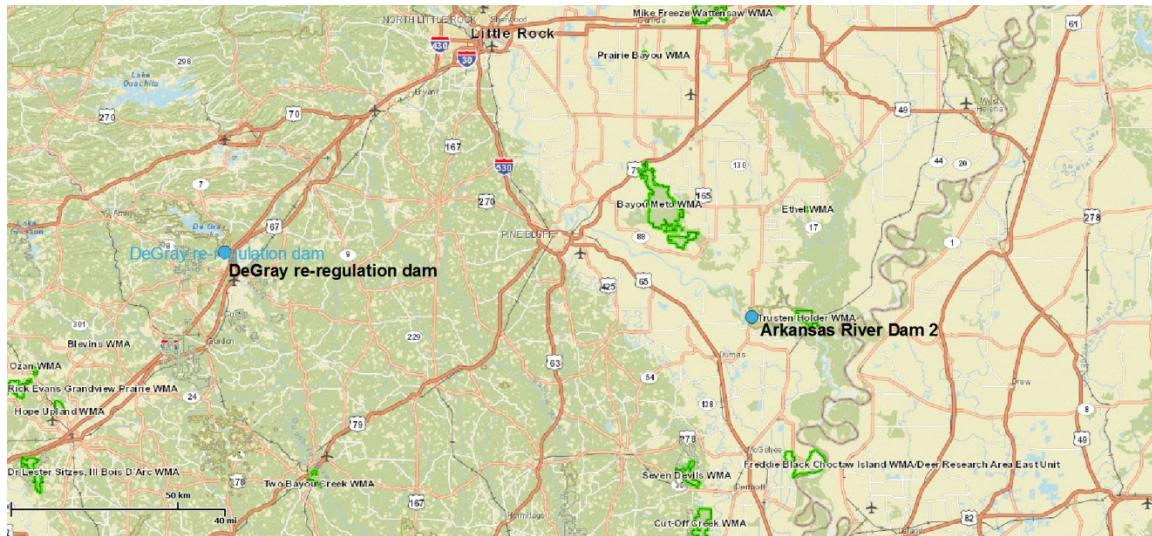
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Project Budget	50% match scenario	35% match scenario
SWG Grant Funds Requested:	\$25,000	\$35,200
Match Provided:	\$26,450	\$22,500
Total Project:	\$51,450	\$57,700

Project Statement

Need: This project directly addresses the priority actions to “Identify and mitigate barriers to connectivity.” The SWG Fisheries Technical Committee has submitted to the Steering Committee that American eel is an emerging issue.

Locations: We will use eel ladder traps at the Caddo River below the DeGray re-regulation dam during 2012. Three small eels ~305 mm were captured at this site last fall by Jeff Quinn. If the trap appears to work okay, we will deploy them at multiple sites during spring 2013. We will set these traps up at 4 select dams where access and river conditions permit, including the lower Arkansas River below Dam 2. Electrofishing will be done at multiple sites in the Ouachita River basin and at the Arkansas River below Dam 2. Ecoregions that may be assessed include the Ouachita Mountains, South Central Gulf Coastal Plains, and Mississippi Alluvial Plain. Counties to be sampled may include Clark, Ouachita, Union, Hot Spring, Calhoun, Bradley, Saline, Dallas, Cleveland, Bradley, Drew, and Ashley in the Ouachita River Basin, and Arkansas, Desha, Faulkner, and Lee counties in other basins. Habitats targeted will include tailwater habitat below dams for ladder traps and all habitat types identified for electrofishing sampling.



Above: Map of the DeGray re-regulation dam and the Arkansas River below Dam 2 sites.

Goal: The overall goal of this project is to determine if large migratory runs of American eels exist and are being blocked by dams. A secondary goal is to examine trends over time for American eel in the Ouachita River Basin and the Arkansas River below Dam 2.

Objectives:

1. The objective of this study is to identify dams that need permanent eel ladders by using temporary ladder traps to assess upstream migration of young eels. If large runs of young eels are detected by the traps, then funding for expensive eel ladders may be warranted.

2. Survey the Ouachita River basin and the Arkansas River below Dam 2 for American eels with electrofishing. Sampling will occur at 10 sites using standard Arkansas Game and Fish Commission procedures.

Approach: Objective 1. We propose to use inexpensive ladder traps (~\$500; see photos below) to determine if large upstream migrations of eels are being blocked by dams where feasible and permissions can be obtained. We would like to try this as a pilot project at the Caddo River below the DeGray re-regulation dam. Other sites that will be screened to determine project feasibility will include the Ouachita River below Felsenthal and Remmel dams, the Arkansas River below Dam 2, the White River at Montgomery Point Dam, and the Huxtable pumping plant on the St. Francis River. Other potential sites will be screened as they are identified. Ladder traps will be run during the spring and early summer.



Photo of the experimental eel lift at Conowingo

Eels swim into the pipe...

...and get 'lifted' over the dam.

Photos from <http://www.lowersusquehannariverkeeper.org/ongoing-issues/hydroelectric-relicensing-fish-passages/american-eel/>

Objective 2. American eels have been collected in the streams of the Ouachita River watershed and the Arkansas River below Dam 2. We are interested in qualitatively comparing electrofishing catch rates from the 1970-80's with those from 2011-2013. We plan to sample 10 sites with electrofishing known to have eels in the past, including: (1) Remmel Dam (2) Hwy 270 below Cove Creek, (3) Grigsby Ford, (4) Hwy 67 bridge, (5) Hwy 7 bridge, (6) DeRoche Creek to Caddo River, (7) Caddo River confluence, (8) Sparkman, (9) Narrows Dam (Little Missouri), and (10) the Saline River low-head dam at Benton. We will also sample the Arkansas River below Dam 2. We will compare catches with previous studies to understand trends over time. Preliminary sampling has been done during 2011, and we observed a total 18 eels and captured 9 eels at seven sites in the Ouachita, Saline, and Caddo rivers. We failed to find adults of the exotic Asian swim bladder nematodes *Anguillilicola crassus* in the gas bladder from 6 eels observed from the Ouachita River and 6 eels from the Saline River. Life history information (e.g., age and size structure, growth) will be generated for the Ouachita River basin population of American eel. All historical sampling has been community-oriented, so we will likely collect data on several other species of greatest conservation. Additional population data for the White River may be collected if time permits and depending on the success of eel traps.

Expected Results and Deliverables:

Expected results will be to determine if large runs of eels are attempting to migrate upstream of dams. We will also determine long-term trends for eels populations in the Ouachita River basin. A final report will be generated by May 31, 2014. This report will assist USFWS in

determining if listing is justified for the species. Also, the results may justify assistance with construction of eel ladders if large runs of eels are identified.

Other species of greatest conservation collected by electrofishing in the Ouachita Basin and at the Arkansas River below Dam 2 may include paddlefish, lake sturgeon, pallid sturgeon, alligator gar, shorthead redhorse, blue sucker, goldeye, stargazing darter, caddo madtom, Ouachita darter, Alabama shad, and crystal darter. Therefore, there is great potential to gain information concerning several SGCN for this project.

Budget:

Budget Item	<u>50% match scenario</u>		<u>35% match scenario</u>	
	SWG Request	Match	SWG Request	Match
Research Assistantship Year 1 (UCA: Casey Cox)		\$17,000		\$17,000
Research Assistantship Year 2 (UCA: Casey Cox)	\$17,000 ¹		\$17,000	
Jeff Quinn Time (AGFC)		\$6,400 ³		\$3,200
Professor Time (UCA) Drs. Ginny and Reid Adams		\$TBD ²		\$TBD*
Student help (UCA)	\$3,000		\$6,000	
AGFC Extra Help (Carl Perrin)		\$300		\$1000
Ladder Traps, supplies (UCA)	\$2,000	\$500	\$4,000	\$500
Electrofishing boat maintenance (AGFC)		\$250		\$250
Travel (UCA)	\$3,000		\$5,000	
Travel (AGFC)		\$550		\$550
Sub-total	\$22,500	\$25,000	\$32,000	\$22,500
Overhead (UCA – 10%)	\$2,250		\$3,200	
Totals:	\$25,000	\$26,450	\$35,200	\$22,500
Project Cost:	\$51,450		\$57,700	

¹ Casey will be funding his own RA for the first year of the project

² Drs. Ginny and Reid Adams will supervise the master's research of Casey Cox. The match amount is to be determined (TBD) by UCA upon request to submit a full proposal.

³ In-kind Services, 160 h @ \$40/hr = \$6,200

Qualifications:

Jeff Quinn is the statewide Stream Fisheries Biologist with the Arkansas Game and Fish Commission, and has worked in that position since 1998. He has a Master's Degree (Zoology) from the University of Arkansas. Jeff has authored or coauthored eight peer-reviewed publications on nongame, commercial, and sport fisheries. Jeff leads the Fish Taxa Team for revisions of the Arkansas Wildlife Action Plan and the State Wildlife grants program. Jeff is a Certified Fisheries Professional by the American Fisheries Society.

Dr. Ginny Adams is an Assistant Professor and Environmental Science Program Coordinator at the University of Central Arkansas. She has a Ph.D. from the Southern Illinois University, and is an expert in conservation of sensitive and endangered species. She will serve as co-advisor for Casey Cox.

Dr. Reid Adams is an Assistant Professor at the University of Central Arkansas. He has a Ph.D. from the Southern Illinois University, and is an expert in stream fisheries ecology. Reid will serve as co-advisor for Casey Cox.

Casey Cox is a student at the University of Central Arkansas and works as an intern at the U.S. Fish and Wildlife Service in Conway. This project will be his Master's thesis research.

Lindsey Lewis is a biologist with the U.S. Fish and Wildlife Service in Conway. He has a Master of Science degree from the University of Central Arkansas. Lindsey will serve in an advisory role and will help set up and run the eel ladders.

Literature Cited

- Dewey, M. R., and T. E. Moen. 1978. Fishes of the Caddo River, Arkansas after impoundment of DeGray Lake. Arkansas Academy of Science 32:39-42.
- Goodwin, K. R., and P. L. Angermeier. 2003. Demographic characteristics of American eel in the Potomac River drainage, Virginia. Transactions of the American Fisheries Society 132:524-535.
- Machut, L. S., K. E. Limburg, R. E. Schmidt, and D. Dittman. 2007. Anthropogenic impacts on American eel demographics in Hudson River Tributaries, New York. Transactions of the American Fisheries Society 136:1699-1713.