

**A Proposal for Ecological Research to Support a
Habitat Restoration Plan and Programmatic Biological Opinion
For *Potamilus capax* in Arkansas**



Photo: U.S. Fish & Wildlife Service, Ecological Services, Conway, AR

**Submitted to Federal Highway Administration, Office of Project Development and
Environmental Review**

To Be Considered for Environmental Streamlining Funding, FY 03

**Federal Highway Administration, Arkansas Division Office and Arkansas State Highway
and Transportation Department**

June 2003

Problem Statement

Potamilus capax is commonly known as the Fat Pocketbook mussel (Figure 1 below). The mussel was added to the Federal Endangered species list June 14, 1976 and its status in Arkansas is listed as “improving”. The known range of *P. capax* occurs primarily within the northeastern quarter of Arkansas in the St. Francis River drainage (Ahlfstedt and Jenkinson 1991, Harris *et al.* 1997)(Figure 2).

The greatest impact on this mussel's habitat has been from activities related to navigation and flood control. Channel maintenance dredging has been particularly destructive of its habitat. Siltation and pollution also have adverse effects.

Figure 1. *Potamilus capax* (photo: Arkansas Game & Fish Commission)



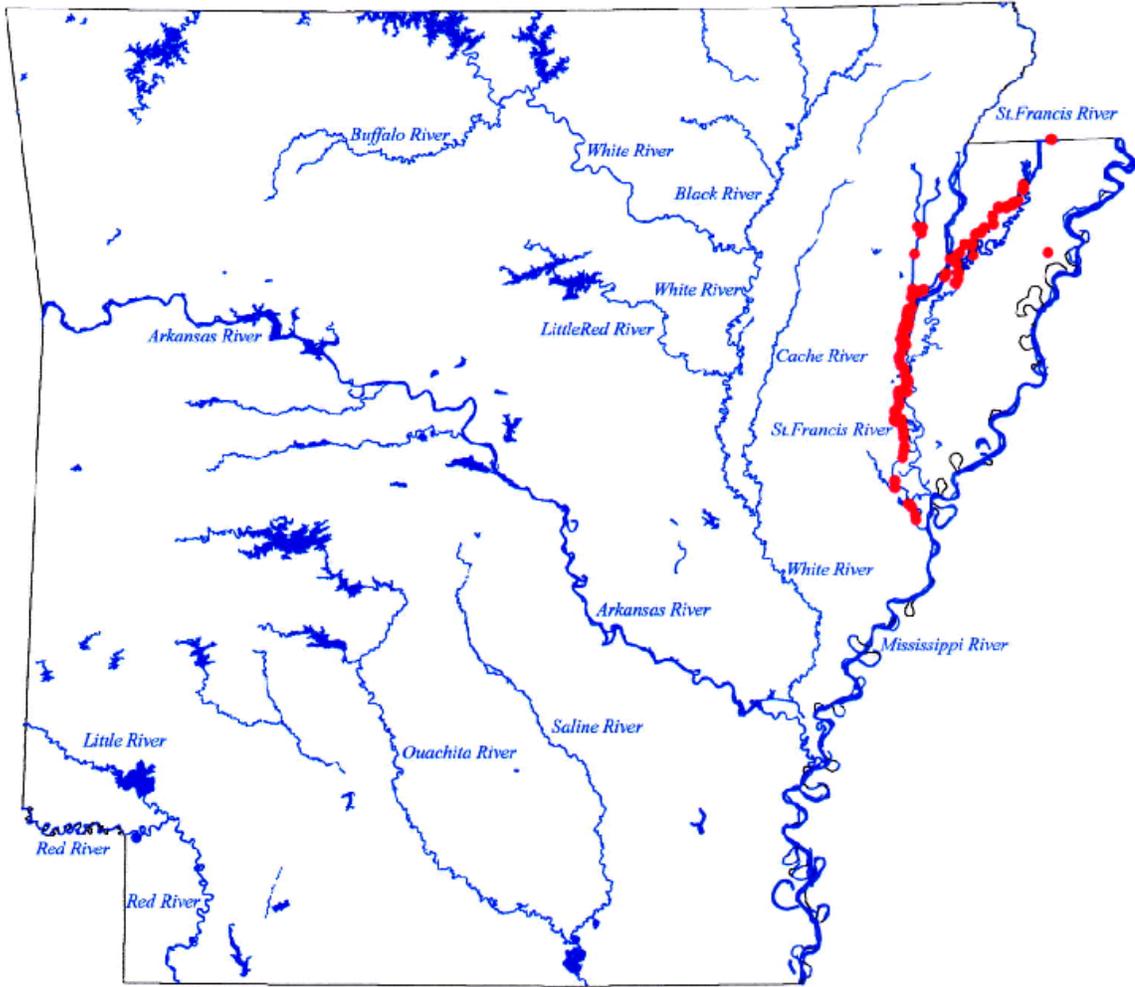
Previous Work

The Arkansas State Highway and Transportation Department (AHTD) has performed five surveys within the past five years that resulted in two biological opinions requiring relocation efforts for *P. capax*. Additionally, the Memphis District Corps of Engineers performs numerous surveys in conjunction with ditch maintenance activities that result in multiple relocations of *P. capax* each year. Lack of knowledge regarding specific impacts to mussels downstream of construction activities due to sediment plumes results in mussel relocations from areas a considerable distance (300-400 meters) downstream of the actual construction “footprint”. Also, the “success” of mussel relocations within Arkansas and around the United States has been variable (Cope and Waller 1995).

Research Objectives and Environmental Streamlining Initiative

The research proposes to provide knowledge on the species that will allow stakeholders to make better-informed and expedited decisions concerning impacts of AHTD projects to *P. capax* in Arkansas. A discussion of the anticipated research products is provided below.

Figure 2. *Potamilus capax* range in Arkansas.



0 10 20 30 mi

Location of *Potamilus capax*

● Site Locations

Arkansas Highway and Transportation Dept.
Environmental Division - Reed
05/30/2003

1. Habitat Restoration Plan

One important product of the research proposed is a habitat restoration plan (HRP) for *P. capax* in the Tyronza River drainage basin, located in Eastern Arkansas (Figure 3). The Tyronza River is identified as a least altered reference stream for the Delta Ecoregion of Arkansas (Arkansas Pollution Control and Ecology Commission, 2002). The HRP to be developed will include measures that the FHWA and AHTD are currently undertaking to minimize impacts to *P. capax*, as well as additional measures that will be undertaken to mitigate for impacts to the species. This plan will be submitted to the United States Fish and Wildlife Service (USFWS) for formal consultation.

2. Programmatic Biological Opinion

This consultation will result in a programmatic biological opinion, which will provide a protocol for highway projects that may impact the fat pocketbook. After the biological opinion has been completed, FHWA and AHTD will only have to notify USFWS of the project, so long as it falls within the project type specified in the opinion. USFWS will attach an addendum to the opinion that will cover FHWA and AHTD for any take of the endangered species that occurs, so long as the protocols are followed. **This process, although it will take considerable time and effort on the front end, will convert what is now a 210-day process (once FWS receives the request for consultation) to a 30-day process.**

Lead Agency: Federal Highway Administration, Arkansas Division Office

Managing Agency: Arkansas State Highway and Transportation Department. Project Manager: John L. Harris, Ph. D., Section Head – Special Studies (Qualifications listed in Appendix I).

Cooperating Agencies: United States Fish & Wildlife Service, Arkansas Ecological Services Field Office, Arkansas Game and Fish Commission, U. S. Army Corps of Engineers, Memphis District.

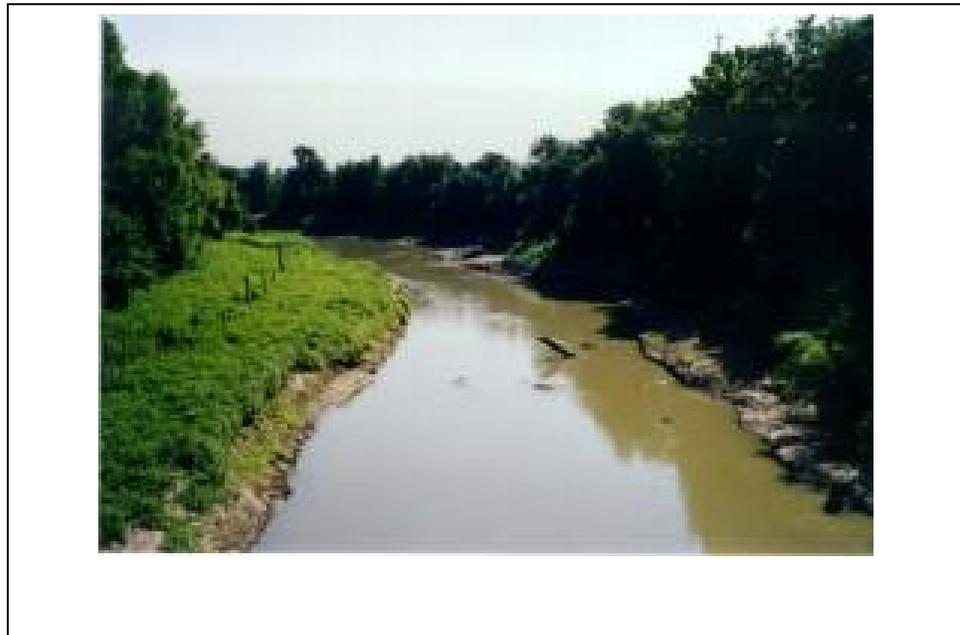
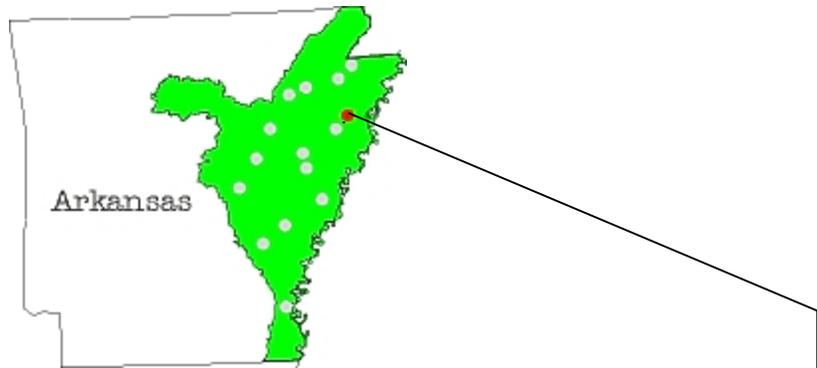
Outline of Research Activities

The following outline briefly describes the research needed to accomplish the programmatic biological opinion. The research is divided into two tasks, one to address specific impacts due to construction and endangered mussel relocation efforts, and the second to address ecosystem recovery of a portion of the former range of *P. capax*.

Task I – *P. capax* research – Effects of Construction and Mitigation Efforts

- A. Determine success of relocation efforts for *P. capax* associated with highway construction projects.
 1. Survivorship of relocated adults and sub-adults.
 2. Movements and/or mortality of relocated adults and sub-adults.

Figure 3. Tyronza River (map and photo U.S. Geological Survey)



3. Condition factor of relocated adults and sub-adults.
 4. Fecundity of relocated adults compared with non-relocated adults.
- B. Determine success of propagation efforts resulting from highway construction projects.
1. Survivorship of juveniles after return to field
 2. Population enhancement (recruitment)
- C. Determine impacts to *P. capax* and associated mussel community at highway construction sites
1. Pre and post construction community composition.
 2. Sediment deposition downstream of construction site.
 3. Condition factor pre and post construction.

Cost Estimate & Schedule, Task I: **\$60,000, 3-4 years to complete research**

Potential Sources:

1. Universities
2. Corps of Engineers Waterways Experiment Station, Vicksburg, MS
<http://www.wes.army.mil/>
3. USDA National Sedimentation Laboratory, Oxford, MS
<http://www.sedlab.olemiss.edu/wqe.html>

Task II – *P. capax* research – Tyronza River Drainage Restoration

- A. Determine the status of freshwater mussel community of Tyronza River.
1. Survey for mussels.
 2. Summarize existing physical and chemical data for Tyronza River.
 3. Summarize existing land use patterns in Tyronza River drainage.
- B. Determine suitability of Tyronza River for reestablishment of *P. capax*.
1. Toxicity to juveniles.
 2. Sediment deposition rates vs. survivorship of juveniles and survivorship of translocated adults
 3. Stream restoration and sediment reduction techniques to benefit mussels.
 4. Availability of host fish for natural reproduction and recruitment.
 5. Locate "preferred" sites for *P. capax* reestablishment
- C. Prepare an Ecosystem Recovery Plan for Tyronza River Drainage.
1. Target mussel community restoration
 2. Target *P. capax* restoration.
 3. Target fish community restoration.

Cost Estimate & Schedule, Task I: **\$40,000, 2 years to complete research**

Potential Sources:

1. Universities(graduate student thesis project)
2. Corps of Engineers Waterways Experiment Station, Vicksburg, MS
<http://www.wes.army.mil/>
3. USDA National Sedimentation Laboratory, Oxford, MS
<http://www.sedlab.olemiss.edu/wqe.html>

Agency Support for Research and Environmental Streamlining for Transportation Projects

On September 18, 2002, President Bush signed Executive Order 13274, titled Environmental Stewardship and Transportation Infrastructure Project Reviews, which emphasizes the importance of expedited transportation project delivery while being good stewards of the environment.

FHWA policy supports research on measures in highway planning, design, and construction which reduce environmental impacts due to highway construction, use, and maintenance. The FHWA and State Highway Agency research programs has evaluated the effects of highway construction on animal movement, fish and wildlife habitat use and mortality, wetlands, species diversity, plant distribution and community composition (Garrett and Bank, 1995).

As part of the Federal Agency Action Plan for Environmental Streamlining, FHWA encourages the use of flexible mitigation approaches, such as wetland banking or compensation strategies that promote investment in environmentally sensitive geographic regions, in lieu of project site-specific mitigation only; and is committed to the testing of watershed-based approaches, environmental stewardship implementation/oversight, innovative mitigation pilots and to identify environmental research priorities that support flexible mitigation (FHWA, 2002). The USFWS (2000) stated that USFWS field offices and State DOTs can work together to effectively develop partnerships that meet transportation needs while protecting and enhancing fish and wildlife resources. The proposed research project provides an excellent opportunity to accomplish an interagency goal of protection and conservation of *P. capax*.

Garrett and Bank (1995) outlined an approach for ecosystem approach for transportation development and recommended that agencies develop specific ways to incorporate several principles into their specific missions. Among these were:

1. Develop a shared vision of the desired ecosystem condition that takes into account existing social and economic conditions, and identify ways in which all parties can contribute to and benefit from, achieving ecosystem management goals.
2. Develop coordinated approaches among federal agencies to accomplish ecosystem objectives, collaborate on a continuous basis with state, local, and tribal governments, and other stakeholders to address mutual concerns.
3. Use ecological approaches that restore or maintain the biological diversity, productivity, and sustainability of the ecosystem.
4. Integrate the best science available into the decision-making process, while continuing research to improve scientific knowledge and understanding.
5. Establish baseline conditions for ecosystem functioning and sustainability against which change can be measured; monitor and evaluate actions to determine if goals and objectives are being achieved.

Summary

The proposed research presents an interagency opportunity to collect scientific information concerning the success of relocation and propagation efforts of *P. capax*, and impacts to the species associated with highway construction projects in Arkansas. The research will also provide required habitat information to determine the suitability of the Tyronza River for re-establishment of *P. capax*, and provide an Ecosystem Recovery Plan for the Tyronza River drainage. These efforts and their associated products will lead to a programmatic biological opinion for the species concerning highway projects that will reduce the Section 7 consultation timeframe by approximately 86%. The results of the research should also prove helpful to other State Departments of Transportation that are faced with similar issues concerning endangered mussels.

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Appendix I

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EMPLOYMENT:

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PUBLICATIONS:

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PROFESSIONAL ORGANIZATIONS:

American Society of Ichthyologists and Herpetologists
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Freshwater Mollusk Conservation Society
Southeastern Fishes Council
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