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Story Date: Friday, September 23, 2005
Mussels have plenty to say about state of environment

By Aldemaro Romero
and Alan D. Christian

Special to The Sun

Mussels are not at the top of anybody's list as charismatic animals.

After all, all that we can see of mussels are their shells. What they eat is what they filter out of the water, and generally you need a time-lapse camera to capture their movements, which can be measured in terms of a few inches per hour. Yet there is much they can tell us about the state of the environment.

That is the case of the fat pocketbook mussels. It is small (about 4.5 inches) and is characterized by an extremely thin and inflated shell, from which it derives its name. It continuously pumps water through its siphon in order to filter out food -- microscopic bacteria, plants and animals suspended in the water as well as organic matter from stream bottoms.

Unlike most species of mussels, the fat pocketbook is found in sediments that are made of very fine grains. That means that they are quite liable to any environmental disturbance, particularly those caused by humans.

Historically, the species ranged from Minnesota to Missouri and from New York to Texas. But now its distribution is almost entirely restricted to shallow, slow-moving streams and sloughs in Northeast Arkansas. Museum records show that the species used to extensively occupy the St. Francis River. Yet it was likely never abundant in the central United States, which is what biologists call an excellent ecological indicator of environmental health.

No wonder this species is classified as endangered by the federal government.

Mussels are particularly vulnerable to dredging, channeling and damming, all processes that end up altering water flow, quality and temperature. To make things worse, the fat pocketbook cannot recover after its habitat has been disturbed. In 1989, 2,301 individuals were introduced at two locations in the Mississippi River, none of which remain today.

At Arkansas State University, Alan Christian and collaborator Jerry Farris have been funded to determine the relative impacts of



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highway constructions on the fat pocketbook and other freshwater mussels in terms of mortality and health and to determine the success of current highway mitigation practices of relocation and captive breeding efforts.

Researchers will compare pre- and post-construction abundance and composition, sediment deposition downstream of the construction and individual mussel survival.

Relocation of freshwater mussels prior to large-scale bridge construction, repair or replacement has been broadly utilized as conventional ecological management. The success of that practice related to long-term survivability of relocated individuals has yet to be fully understood.

The U.S. Fish and Wildlife Service will use this information to determine the best management practices for this species while streamlining the decision process from the current 210 days to 30 days and ultimately saving taxpayers' dollars.

This research was jointly funded by the Federal Highway Works Administration and the Arkansas Highway and Transportation Department in 2003 as an Environmental Streamlining Initiative to provide more information regarding the likelihood of specific impacts to mussels attributed to sediment deposition downstream of highway construction activities.

Research is being conducted at the State Line Ditch site located near Big Lake National Wildlife Refuge and Mallard Lake Wildlife Management area. So far the resident fat pocketbooks and other species of mussels have been surveyed at that site.

A population of fat pocketbooks has been relocated from another ditch to State Line ditch, and 1,200 captive breed young have been released.

Monitoring of the survivability of these individuals will begin later this fall and continue for several years.

Other collaborators on this project include ASU graduate student Andrew J. Peck and researchers from Missouri State University, the U.S. Army Corps of Engineers-Memphis District, U.S. Fish and Wildlife, Arkansas Game and Fish Commission and Ecological Specialists Inc.

For more information contact the ASU Department of Biological Sciences at biology@astate.edu.

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