



Life in the Rocks



The Newsletter of the Arkansas Game and Fish Commission Nongame Aquatics Program

Exploring the Mysteries of Arkansas Crawdads

By Brian Wagner, Nongame Aquatics Biologist

Few people realize that Arkansas is the state with the most crayfish, crawfish, or crawdad diversity west of the Mississippi River. The *Natural State* is home to approximately 60 different species of crayfish! I say 'approximately' because our knowledge is incomplete – we do know of several species unknown to scientists that are currently under investigation, and there are likely more.

One of the key components to AGFC's (Arkansas Game & Fish Commission) Nongame Aquatics Program is to work from a science-based inventory as to the species we have, where they are located, and the health of their populations. We are still working to acquire this information for crayfish.

Recently, I have been involved in completing inventories for two Ozark crayfish that were thought to be rare – Williams' Crayfish and Gapped Ringed Crayfish.

Williams' Crayfish is a stream-dwelling crayfish found only in the upper White River basin of Arkansas and Missouri. My study surveyed stream sites in the northwest Arkansas portion of its range in order to characterize the crayfish communities and evaluate its status in Arkansas. I collected 2,372 individual crayfish at 68 sites, including 197 Williams' Crayfish from 23 sites. Meeks Crayfish was the crayfish most commonly associated with Williams' Crayfish, occurring at 87% of sites occupied by Williams' Crayfish. Williams' Crayfish was found in the smallest streams sampled, with coarse rock bottoms and no aquatic

plants. It showed a strong preference for riffles. It is our opinion that the species is somewhat imperiled in Arkansas, and should be considered rare and vulnerable range-wide.

The Gapped Ringed Crayfish is an uncommon and poorly-known stream-dwelling crayfish found in the central White River basin of Arkansas and Missouri. I surveyed streams in north-central Arkansas to find this crayfish. I captured 1,811 crayfish at 82 sites, including 497 Gapped Ringed Crayfish from 21 sites. Spothanded Crayfish was the crayfish most commonly associated with Gapped Ringed Crayfish, occurring at 71% of sites it occupied. The Gapped Ringed Crayfish is of moderate concern due to its limited distribution in Arkansas, and should be considered uncommon. However, where it is found it is usually abundant, so it is considered to be in fairly good shape today.



Figure 1: The Gapped Ringed Crayfish

We have made good progress in our knowledge of these two crayfish, and many others. There remains some crayfish for which the search continues. Crayfish are one of the most declining groups of animals in the U.S., and we are lucky here in Arkansas we're in better shape than many states. In other parts of the country crayfish species are declining rapidly due to invasions of introduced crayfish, such as the Rusty Crayfish.

We have not totally dodged this threat – the same Gapped Ringed Crayfish that I have been studying in its home range has been introduced into the South Fork Spring River in Missouri. It is spreading downstream into Arkansas and replacing two crayfish species that naturally occur in the Spring River system. So, we need to be aware of these risks also, and avoid moving crayfish around into different streams.

There is still a long way to go and an important step along the way is to increase awareness among Arkansans of the wonderful crayfish resource we have. I give presentations and set up displays each year at AGFC Nature Centers, *Earth Day* events, and in schools in order to bring these interesting animals to the attention of more people. AGFC has also produced an outstanding crayfish poster and activity book for educational use which is available from our Communications Division in Little Rock.



Figure 2: Crayfish display at Little Rock Zoo on *Earth Day*.



Figure 2b: Arkansas' crayfish poster

Herpetological Program 2008 Highlights

By Kelly Irwin, Herpetologist

In 2008, the AGFC Herpetological Program continued its mission of nongame conservation research, commercial species management, alligator management, and public education. The following is a brief summary of highlights.

Ozark Hellbender Research – A final report on the Ozark Hellbender Long-term Monitoring Program was submitted in March 2008. This State Wildlife Grant (SWG) funded project established a program for conducting biennial surveys to monitor demographics in the sole remaining hellbender population in Arkansas. The next survey will be conducted in the summer of 2009.

In October 2008, I worked with Missouri Department of Conservation (MDC) herpetologist, Jeff Briggler, to search for hellbender eggs in the Eleven Point River in Missouri and Arkansas. Had our search been successful, the eggs would have been collected and placed in the hellbender captive propagation facility at the St. Louis Zoo (SLZ). The AGFC has partnered with the MDC and SLZ in an Ozark Hellbender conservation program, in an effort to maintain populations of this declining aquatic salamander.

Chytridiomycosis is a fatal infectious fungal disease affecting amphibians — spread by the fungus *Batrachochytrium dendrobatidis* (*Bd*) — which is responsible for amphibian population declines and extinctions on a global scale. In December 2008, Jeff Briggler and I co-authored a paper in *Herpetological Review* reporting the presence of *Bd* in Arkansas and Missouri hellbenders, based on samples taken during the long-term monitoring project in 2007.

In an effort to improve water quality and habitat conditions in the Eleven Point River, AGFC Region II Stream Team coordinator, Stephen O'Neal, and I were awarded SWG funds in July 2008 for a stream bank stabilization and remediation project. Preliminary faunal survey work was completed in 2008, while the physical earth work and rock vane installation is scheduled for completion in 2009.



Figure 3: In October 2008 AGFC Herpetologist Kelly Irwin searches for Ozark Hellbender nests in the Eleven Point River, Randolph County, Arkansas. Photo courtesy of Jeff Briggler.

Woodland Salamander Research – The ongoing SWG funded research project to assess the diversity and species boundaries within the woodland salamander *Plethodon ouachitae* complex (Rich Mountain *P. ouachitae*, Fourche Mountain *P. fourchensis*, and Caddo Mountain *P. caddoensis* salamanders) continued in 2008. Critical collections of the Fourche Mountain Salamander were completed and collecting of Caddo Mountain Salamander samples continued. In December 2008, my collaborators on this project, Don Shepard and Frank Burbrink, published the first in a series of papers resulting from this work in the journal

Molecular Ecology, wherein they described the diversification of genetic lineages in the Rich Mountain Salamander. Field work on this project has produced new records of the most easterly known populations for the Fourche Mountain and Caddo Mountain salamanders. The information obtained from this project can ultimately be used by the AGFC and other state, federal, and private land managers in conserving these salamanders which occur no where else on earth, except in Arkansas.



Figure 4: An adult Fourche Mountain Salamander from Montgomery County, Arkansas collected in November 2008. Photo courtesy of Don Shepard.

Alligator Management – In September 2007 the first AGFC sanctioned alligator sport hunt was initiated. As part of the U.S. Fish and Wildlife Service (USFWS) approval for this hunt, AGFC is required to produce an annual Alligator Management Report, containing information on harvest results, post-harvest population surveys, and the number of nuisance alligator reports for the preceding year. As co-chair of the Alligator Management Team, I co-wrote and edited the 2007 Alligator Management Report, which was submitted to the USFWS in June 2008. The USFWS approved the AGFC 2008 alligator sport

hunt in mid-August and the hunt was held during the last two weekends in September, with a total harvest of 19 alligators. Just prior to the 2008 alligator hunt, I was the featured guest on the “Talkin’ Outdoors” television program with AGFC’s ‘Wildman’ Steve Wilson to talk about alligators and the upcoming alligator hunt. To supplement the biological information obtained from the alligators harvested in the 2007 hunt, I took the initiative to gather the leg bones from the harvested alligators and sent them to a specialist at Florida State University for age analysis. The information obtained from this analysis will be valuable in managing our alligator populations.

Public Education/Outreach – The public’s fascination with reptiles and amphibians provides more opportunities for public education programs than I have time to fulfill. In fact, I could have enough requests to do nothing but give public programs year-round if I did not have other work duties. As a means to accommodate the need for more public education programs in 2008, I gave presentations at the AGFC nature centers in Pine Bluff, Jonesboro, and Fort Smith. Other public education programs included: AGFC Youth Expo at Lake Sylvia, where I manned a booth for two days and spoke to hundreds of school children about the importance of amphibians and reptiles in our natural environment; speaker at an Environmental Science class at Ouachita Technical College; speaker at a symposium at the Geological Society of America southern division meeting in Hot Springs; presentation at a local rotary club meeting in Malvern.

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Mussel and Commercial Fishing Program 2008 Highlights

By Bill Posey, Malacologist/Commercial Fisheries Biologist

The year 2008 was filled with unusual weather and was wetter and cooler than the previous years. This led to high river stages, making mussel surveys difficult. Even with two major hurricanes releasing a deluge of rainfall on Arkansas, I was still able to conduct studies of the Winged Mapleleaf and Ouachita Rock Pocketbook, two endangered mussel species that occur in Arkansas.

Winged Mapleleaf (*Quadrula fragosa*) -

The Winged Mapleleaf mussel is an endangered species that once probably existed throughout much of the Mississippi River Basin. It was listed as an endangered species by the US Fish and Wildlife Service because it had disappeared from all of its known range, except the St. Croix River in Minnesota and Wisconsin. Fortunately, it was discovered in 1995 in Arkansas' Ouachita River and further studies within the Ouachita River Basin resulted in discoveries in the Little Missouri and the Saline rivers. It is also known to occur in Missouri and probably in Oklahoma. Of all rivers where this species lives, the largest populations appear to be in the Saline River.

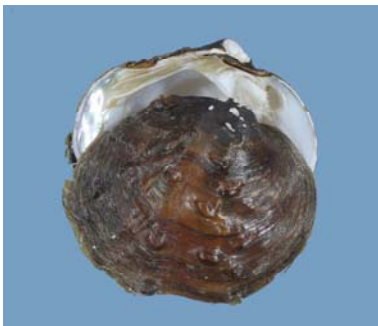


Figure 5: Winged Mapleleaf (*Quadrula fragosa*)

As part of the recovery of this endangered species, an attempt to reintroduce it to the Duck River in Tennessee is underway. The Saline River populations have been determined to be optimal for translocation of adults and brood stock for

Juveniles, since they have large numbers and occur in habitat with similar climate. The St. Croix River populations have not been considered suitable since populations are smaller and the climate is different.

To facilitate the reintroduction, studies have been and are being conducted on the Saline River populations to determine the host fish, since the Winged Mapleleaf, like all other native freshwater mussels, has larvae that must attach to an intermediate host, usually a fish, before they can transform to a juvenile. These studies are being conducted by various entities including the Arkansas Game and Fish Commission, US Fish and Wildlife Service and Missouri State University.

Larval Winged Mapleleaf mussels were placed on fish in the fall of 2006 and juveniles were collected and grown in the laboratory until May 2007. Some of these juveniles were taken to the Saline River where they were placed in cages to grow in their natural environment. The cages were checked monthly until November 2007 when the river stage was too high to allow the recovery of the cages. The cages were checked again in May of 2008 and all but one of the juveniles had died, probably due to the large amount of sediment that had accumulated within the cage, smothering the mussels. The growth of these individuals was tracked over this time frame.



Figure 6: Juvenile Winged Mapleleaf, 6-21-07. Screen opening is 1.0 mm.

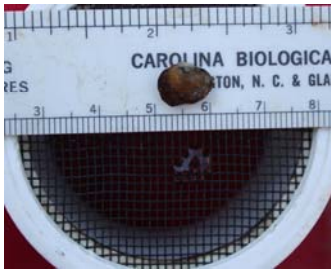


Figure 7: Juvenile Winged Mapleleaf, 6-17-2008. Screen opening is 3.0 mm.

In addition to the juvenile work, two mussel beds in the Saline River were sampled to determine the population size of the Winged Mapleleaf within those beds. Winged Mapleleaf mussels were known to occur in those beds, but an accurate estimate of their numbers was unknown. To determine the population numbers, US Fish and Wildlife Service biologists, and I, randomly sampled a portion of the aggregates using weighted PVC pipe grids to delimit the subsample. We were successful at determining the population size of Winged Mapleleaf in both beds.

Ouachita Rock Pocketbook (*Arkansia wheeleri*) -

A collaborative effort to survey the Little River from the Oklahoma state-line to the last shoal above Millwood Reservoir was conducted in 2008 in an attempt to locate new populations of the Ouachita Rock Pocketbook mussel. The initial search of likely habitats revealed a bed where one dead Ouachita Rock Pocketbook was found. After locating the dead mussel, it was determined that the bed should be quantified, since it was very large and numerically dense.

A total of 37 square meter quadrats were collected from the bed resulting in the find of one live Ouachita Rock Pocketbook. The overall community estimate for the bed was over 447,000. I was also able to estimate approximately 490 Ouachita Rock Pocketbook at this site.

Another project for this species is an attempt to augment the populations in the Little River above Millwood Lake. To accomplish this task, searches for Ouachita Rock Pocketbook were conducted in the Little River below Millwood at sites known to harbor this species. In two days of searching, two

gravid females (with larvae) were collected and sent to Missouri State University for host fish identification trials and to grow the propagates (juveniles) to a size large enough to place in cages, similar to the Winged Mapleleaf project described earlier. At this point, additional host fish species have been determined and juveniles have been collected for introduction into cages in the Little River.



Figure 8: Ouachita Rock Pocketbook (*Arkansia wheeleri*)

Commercial Fishing -

Commercial fishing for paddlefish and shovelnose sturgeon for their roe (eggs) continues in Arkansas. Harvest from the 2007-08 Harvest Season was reduced from the previous year by 36%, but was still 82% of the five-year average for caviar harvest. The reduced harvest can likely be attributed to several factors: high river flows; reduced effort through lower license sales; more stringent regulations imposed in January 2008.

The trade in caviar continued to be high during the first part of 2008, with the greatest profit potential in the international export. In 2008, 13 applications for international export were reviewed by AGFC consisting of over 9,600 pounds of caviar with a value over \$1.2 million. The latter part of 2008 saw a reduced market for caviar both domestically and abroad, possibly due to the downturn in the global economy or an infusion of caviar from the states of Kentucky and Tennessee. Only time will tell if the profitability of the caviar industry will improve in 2009.