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Life in the Rocks

Rarity Runs in the Family

by Brian Wagner

The family *Amblyopsidae* is one of the rarest and least diverse families of fishes in the world. The family only contains six species and is only found in the southeastern United States. Five of the species are restricted to caves and springs, while the sixth is found in swamps.

Four of the species lack eyes, and all have reduced or absent pelvic fins (the pair of fins usually found on a fish's belly). They have very tiny imbedded scales and many sensory receptors on their heads and bodies. Many of these traits reflect adaptation to life with little or no light.

A very unusual characteristic of these fish is that their anus is located far forward on their throat. In the few other fishes where this is the case, the fish incubate their eggs in their gill chambers or mouth. This is likely to be the case in the Ambyopsids also.

The most common member of the family is the swampfish. Found in coastal plain swamps from Virginia to Georgia, the swampfish is abundant in some places. However, it is rarely seen because it is nocturnal. This fish is quite interesting, even attractive, with its small eyes, dark stripes, and even some red coloration. They reproduce in early spring and rarely live over 2 years.

The swampfish, *Cologaster cornuta.*

The Ozark cavefish, *Amblyopsis rosae.*

The spring cavefish is the only other Amblyopsid that has eyes. In spite of having eyes, it is only found in caves and springs. It is found in western Tennessee and Kentucky and a few locations in adjacent states. It has less dark coloration, and the stripes found on swampfish are lacking. It probably spawns in the spring and lives up to three years.

The remaining 4 Amblyopsids lack eyes and dark pigment, being what we typically think of as cavefish. The most common species, the southern cavefish, is found in eight states. The other three are much less common: Ozark cavefish (4 states), northern cavefish (2 states), and Alabama cavefish (1 cave). In fact, the US Fish & Wildlife Service lists the Alabama cavefish as an endangered species and the Ozark cavefish as a threatened species.

In Arkansas, two Amblyopsid species have been found – Ozark cavefish and southern cavefish. AGFC is currently sponsoring research by the University of Arkansas on the status of these fishes, along with cave crayfish and the isopods, amphipods, and other critters found in the underground of Arkansas.

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Conservation Status of Freshwater Mussels in Arkansas

By Bill Posey

During the past 35 years, numbers of individuals and species diversity of native mussels have declined throughout the United States and Canada. In 1993, The Nature Conservancy recognized 55% of North America's mussels as extinct or imperiled compared to only 7% of the continent's bird and mammal species. By 1997, that number had risen to 68% for mussels in the United States.

Winged mapleleaf (*Quadrula fragosa*)

In 1987, a publication printed in the Proceedings of the Arkansas Academy of Science listed the current conservation status of 18 species of mussels thought to occur within Arkansas. At the time, 69 species of mussels were thought to occur within the State and the results were that 26% of these mussels were considered rare and/or endangered. Since that time, one species has been removed from the state list of species, which would in reality make the number 17 (25%). The U.S. Fish and Wildlife Service (USFWS) listed only four of those species as endangered or threatened.

Arkansas is now home to seven species that are listed as endangered by the USFWS, including the Ouachita rock pocketbook, Curtis' pearly mussel, turgid blossom, pink mucket, fat pocketbook, speckled pocketbook, and winged mapleleaf, as well as the threatened Arkansas fat mucket. Two other species, the Neosho mucket and scaleshell are in the listing process to be listed by the USFWS in the future. Unfortunately, the Curtis' pearly mussel and the turgid blossom, two of the federally listed species, have probably been extirpated from Arkansas. Both of these species were at the southern edge of their range within northern Arkansas.

In 1997, a follow up publication in the Journal of the Arkansas Academy of Science revealed 12 species not listed by the USFWS within Arkansas that might need additional protection, bringing the species in need of conservation total to 21. Only one species from the 1987 report, the pyramid pigtoe, was removed from the list of species in need of conservation that currently exists in Arkansas. Surveys of the lower Ouachita, Little Missouri and Saline rivers completed before the 1997 publication revealed abundant populations of this species.

Since the publication of the 1987 paper, five new species have been added to the species list for Arkansas. This resulted in a total number of species in Arkansas of 74, of which, 28% are considered endangered, threatened or of special concern by the USFWS or malacologists within the state.

Scaleshell (*Leptodea leptodon*)

Arkansas is below the national average for species that may soon be extirpated but we don't need to pat ourselves on the back too soon. The percentage of imperiled species has risen over the last 13 years from 25% to 28%. Additionally, research utilizing DNA analysis is going to help elucidate some problems with morphologically similar species, which may in turn become endangered or threatened species or species of special concern. Stream surveys may reveal populations of species that may or may not have been recorded for the state and could influence the number found on this list. However, it is also hoped that through these surveys, species thought extirpated will be rediscovered.

The regions of greatest concern within Arkansas are found in the Ouachita and Ozark highlands according to the Nature Conservancy. Several endemic species are located within these unique regions and if they are lost, there are no replacements. On a national scale, mussels and snails found in the southeast portion of the United States are becoming more rare and many are likely to become extinct within the next 20 years.

The Ozark Hellbender: A Brief Biology and Conservation Status

By Kelly Irwin

The Ozark Hellbender, *Cryptobranchus bishopi*, is a large, strictly aquatic salamander found only in the streams of the Ozark Plateau of southern Missouri and north central Arkansas. Hellbenders are members of the Family Cryptobranchidae, an ancient lineage of salamanders going back over 65 million years with descendants found only in China, Japan, and the United States.

The body can be grayish-black, reddish-brown, or olive green in color, with heavy dorsal blotching. The head and body are flattened and the tail is rudder-like. A series of fleshy folds along the sides of the body provide a surface area to absorb dissolved oxygen from the water. Adults can range in size from 12 – 22 inches (300 – 570 mm) in total length. This species was described in 1943 and is distinguished from the larger, more widely distributed, Eastern Hellbender *Cryptobranchus alleganiensis* by its smaller body size, dorsal blotches, heavily pigmented lower lips and chins, subtle anatomical differences, and genetic uniqueness.

The Ozark Hellbender inhabits clear, cool water streams such as the Eleven Point, Spring, and White River systems in Fulton, Marion, Sharp, and Randolph counties in Arkansas. Preferred habitat consists of fast flowing, gravelly or rocky-bottomed streams with an abundance of cover objects such as large, flat rocks and logs. By day Ozark Hellbenders hide under cover, they become active at night when they prowl the stream bottom in search of food. Crayfish and small fish comprise 90% of the diet, but other food items include lampreys, worms, insects, snails, mollusks, and tadpoles. Large fish, aquatic turtles, and water snakes prey upon Ozark Hellbenders. They will also scavenge on fish entrails thrown in the stream by fishermen. Fishermen often catch Hellbenders on hook and line and, unfortunately, it often results in the demise of the captured animal. Humans have also been known to prey on Hellbenders, archaeological excavations have shown that Native Americans used the Eastern Hellbender as a food source in Pennsylvania.

Breeding normally takes place in the fall, in September and October. However, the population in the Spring River is unique by having a delayed breeding season in January and February. The male takes up residence under a large, flat rock and excavates a shallow depression, with the mouth of the cavity positioned on the downstream side. The male then waits, with head protruding from the entrance, for the approach of a female. When a gravid female approaches the male will vigorously guide or drive the female into the nesting cavity, preventing her escape until she deposits from 150 - 300 eggs. As the eggs are laid the male fertilizes them via external fertilization. The male remains with the eggs for 45 – 50 days until the eggs hatch. The hatchlings and gilled larvae remain hidden beneath small rocks and in spaces between rocks in gravel beds. The larvae loose their gills at 1.5 – 2 years of age and individuals become sexually mature at 5 – 8 years of age.

Over the past decade a mounting body of evidence has produced data that suggests that populations of the Ozark Hellbender are declining, in both Missouri and Arkansas. Recent surveys have shown that the average size of captured animals has increased and the total number of individuals captured per survey site has dramatically decreased. This indicates that there is no recruitment of younger individuals into the population. A variety of human activities has resulted in the alteration or loss of habitat or has been suggested as a contributing cause for population declines: dams, gravel mining, siltation, den site disturbance by recreationists, commercial collecting, and non-point source pollutants.

The Arkansas Game & Fish Commission is currently funding researchers at Arkansas State University on two projects for Ozark Hellbender conservation. The first project is to conduct an extensive survey of the White and Black River basins in Arkansas in an attempt to locate new populations and assess population demographics. The second is a captive propagation study. If a successful captive propagation program can be developed this species could be captive reared for restocking in previously know sites or maintained until larger, landscape level issues can be addressed for maintaining healthy habitat suitable for the long-term survival of the species.

The U.S. Fish and Wildlife Service is currently in the process of a status review of the Ozark Hellbender. This will dictate whether the Ozark Hellbender qualifies as a candidate for listing as a Threatened and Endangered species. The Arkansas Game and Fish Commission prohibits the capture, killing, or collecting of Ozark Hellbenders without appropriate permits. It is uncertain at this time as to whether the Ozark Hellbender is on its way out or if we can regain population increases in previously existing localities. Only time and the efforts of the Arkansas Game and Fish Commission and other state and federal agencies will tell.

Pebbles…

- Bill assisted a graduate student in a preliminary mussel survey for the endangered Broken-ray mussel found only in the Middle Fork of the Little Red River.
- Brian gave a presentation on the Nongame Aquatics Program to the Biological Society at Hendrix College in Conway.
- Kelly spent two days with a National Geographic Explorer film crew completing the story on the "Giant Snake of southwest Arkansas". The program is tentatively scheduled to air on CNBC on January 21.
- Brian represented AGFC at a meeting of Wildlife Diversity Program Managers in Georgia. Discussions centered around the two one-time appropriations passed by Congress in lieu of CARA.
- Kelly spent a day in the Ouachita National Forest near Lake Sylvia looking for Ouachita Dusky Salamanders as part of the Dusky Salamander research project.
- Bill attended a meeting of the Arkansas Freshwater Mussel Council in Conway to discuss mussel species that may be in need of conservation.
- Kelly visited St. Francis National Forest to search for the elusive Crowley's Ridge Dusky Salamander *Desmognathus "conanti"*. During the course of fieldwork he found a new county record for the Mississippi Ringneck Snake. The specimen represents only the second record from the Mississippi Delta region. This will be published in the near future in Herpetological Review Geographic Distribution Notes.
- Brian attended a presentation on a status survey of the yellowcheek darter at the USFWS office in Conway.
- Kelly visited White Oak State Forest and collected some specimens of Dusky Salamanders for a collaborative research project with researchers from the University of Texas at Arlington. This work will be assessing the genetic relationships of Dusky Salamanders in Arkansas. It is possible that this work could result in the description of one or more new species of Dusky Salamanders in Arkansas.
- Brian attended the annual coordination meeting between AGFC and the Missouri Department of Conservation. During the meeting he gave a presentation on the KaRST Initiative, a multi-state, voulutaty cave conservation effort.

- Kelly visited Pinnacle Mountain State Park as part of the familiarization with the park and personnel for future herp surveys of Arkansas State parks. He will be preparing species lists for each of the parks with standard common and current scientific names.
- Brian assisted University of Arkansas researchers with cave surveys at Cave Springs Cave, caves on Madison County Wildlife Management Area, and caves on private lands near Batesville.
- Bill assisted the Stream Team in their first Shock-O-Rama on the Little Red River. Next year a follow-up Shock-O-Rama will be conducted to test the effectiveness of habitat improvements in a stretch of this river.
- Kelly received the loan of a reported specimen of the Dusky Hognose Snake from the University of Florida's Museum of Natural History. This specimen had initially been reported from Arkansas as a Geographic Distribution Note in 1976, extending the known range to the east by over 240 miles. Examination revealed that the specimen had been misidentified and was in fact an Eastern Hognose Snake, which is found statewide.

Request for Research Project Proposals for Fiscal Year 2001

The Arkansas Game and Fish Commission announces Requests for Proposals for competitive funding of agency research projects for Fiscal Year 2001. Detailed information is available on the AGFC website, www.agfc.com under “What’s New.”

The agency's Research Coordinating Committee (RCC) will review all project proposals prior to the agency budget cycle. In order to meet that objective, all proposals must be submitted to the RCC no later than 15 February 2001. The RCC will evaluate and score proposals and notify the applicants of results by early April. Acceptance of a proposal by the RCC does not constitute approval for funding by the Arkansas Game and Fish Commission, and final funding is the discretion of the Commission.

Proposals are requested on the following topics:

- Population survey for the American Alligator
- Avian Collisions with Communications Towers
- Evaluation of post-release tournament mortality of largemouth bass caught during nightly "shotgun" tournaments
- Assessment of Bull Shoals Dam Discharges on Brown Trout Emergence
- Effects of commercial fishing on catfish populations in the Arkansas and Red Rivers
- Status survey of Fallicambarus gilpini (an endemic crayfish)
- Status survey of the Desert Shrew (Notiosorex crawfordii) in Arkansas
- Status Survey and Specific Determination of Dusky Salamanders
- Effects of mowing on grassland birds
- Survey of freshwater mussel resources of the Arkansas River from Dardenelle Lock and Dam to the Mississippi River
- Survey of freshwater mussel resources of the Red River and major tributaries within Arkansas
- Measurement of habitat changes in Arkansas and White Rivers
- Characterization and classification of oxbow lake fish assemblages in the White River, Arkansas
- Distribution, abundance, habitat use, movements, and life history of the endangered pallid sturgeon in the Mississippi River, Arkansas
- Status survey of the Plains Harvest Mouse in Arkansas
- Genetic analysis of the rayed Lampsilis complex within Arkansas
- Population Dynamics and Food Habits of Major Canids and Felids on the Saint Francis National Forest

News Bites...

BUSH NOMINATES NORTON TO BE INTERIOR SECRETARY: Today, 29 December, Texas Governor George W. Bush nominated former Colorado Attorney General Gale Norton to be his Secretary of Interior when he assumes the U.S. Presidency on 20 January. Norton, who worked at the Department of the Interior during the Reagan Administration, is a 46-year-old lawyer hired by James Watt at the Denver-based Mountain States Legal Foundation before Watt's tenure as President Ronald Reagan's Interior Secretary. Norton then went to Washington, where she served as an assistant to the Deputy Secretary of Agriculture from 1984 to 1985, then as associate solicitor for conservation and wildlife at Interior from 1985 to 1987. She returned to Colorado and was elected Attorney General in 1990 and won reelection in 1994. After leaving her job as attorney general in 1999, she took a job with one of Denver's most politically connected law firms, Brownstein, Hyatt & Farber. Under Interior is the U.S. Fish & Wildlife Service (USFWS), the Bureau of Reclamation (BOR), the Bureau of Indian Affairs (BIA), the U.S. Geological Survey (USGS), and the Minerals Management Service (MMS); the policy directions coming out of that agency thus can have a profound affect on fish stocks and U.S. fisheries. Norton's nomination, along with that of oil man Donald Evans as Commerce Secretary and New Jersey Governor Christine Todd-Whitman as Administrator of the U.S. Environmental Protection Agency (EPA), will bear the closest watching by fishing interests.

ORGANIC SALMON STANDARDS UNDER REVIEW: The U.S. Department of Agriculture announced final adoption of the first standards that the federal government has ever imposed for the labeling and processing of organic. A congressional subcommittee has yet to determine whether wild or farmed salmon products can be called "organic" under new organic food-labeling standards announced in Washington, D.C., 19 December. The U.S. Agriculture Secretary Dan Glickman announced the nation's first organic standards for food producers and farmers -- marking the first time such standards have been issued to govern what foods can be called "organic" at production and marketing stages.The new standards, which were ordered by Congress and then took the department more than a decade to produce, ban the use of irradiation, biotechnology and sewer-sludge fertilizer for any food labeled organic.The department planned to allow the use of all three methods when it introduced proposed regulations in 1997. But after comment from almost 300,000 people protesting their inclusion, the agency withdrew that proposal and started over. Other major provisions of the rules issued today ban synthetic pesticides and fertilizers in the growing of organic food, and antibiotics in meat labeled organic. These bans were a part of the earlier proposal. The Subcommittee of the National Organic Standards Board is addressing such issues as whether wild, farmed or both products could be approved as "organic" under the new rules. The new standards will take effect in 60 days. After that date, farmers and producers have 18 months to comply with the rules if they intend to sell their products with an "organic" label. The new standards are the most comprehensive in the world, adding that he believes they will promote expansion in the $6 billion organic food industry. Among the standards' stipulations: For more information see www.WorldCatch.com.

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