



**Augmentation Proposal for the plicate rocksnail, *Leptoxis plicata*, in the
Locust Fork of the Black Warrior River, Jefferson County, Alabama**

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Background: In 1999 the Tennessee Aquarium Research Institute (TNARI) began developing techniques for the captive propagation of imperiled freshwater pleurocerids. This project was undertaken with the support and advisement of the U.S. Fish and Wildlife Service (FWS) Jackson, MS Field Office {Contract # 1448-40181-98-G-057}, and the Alabama Department of Conservation and Natural Resources (AL-DCNR). The focus of this initial research effort was the plicate rocksnail, *Leptoxis plicata*, an endangered species. Because these animals reproduce only a few weeks each year, the project required a number of years to develop mass culture techniques. In 2001 modest propagation success for *L. plicata* was achieved, and mass culture efforts began in 2002. Culture efforts have produced over 4,000 gastropods that are now available to augment existing populations in the Locust Fork of the Black Warrior River in Jefferson County, AL. This release will comply with FWS Mobile River Basin - Freshwater Mollusk Propagation Policy, and is believed the first release of an endangered snail produced by artificial culture techniques.

Species recovery through artificial propagation has been designated a viable recovery strategy by the FWS Mobile Basin Recovery Plan (1999). Alabama DNRC, FWS, and TNARI, are the project partners for this recovery activity. Propagated animals for this effort were produced from wild and egg stock collected from the Locust Fork of the Black Warrior River, shoal 13.19 km down river of the Mount Olive Road Bridge crossing (CR 77), 0.76 km southeast of Good Hope Church on River Road, E of Sayre (CR134), Jefferson County, Alabama (N 33° 43.460' - W 86° 58.948'). A hundred live *Leptoxis plicata* collected from this locality were used for the 2002 culture efforts. During the culture period (April - August), 3 individual *L. plicata* died in holding, and the remaining snails (n = 97) were returned to the river on August 7, 2002.

All propagation and recovery efforts are conducted under United States Fish and Wildlife Service permit SA 98-12 - Amendment 3, and Alabama Department of Conservation and Natural Resources permit 1871.

Augmentation strategy:

Live animals

This release will target the ends of the current *L. plicata* distribution in the Locust Fork of the Black Warrior River, Jefferson, Co., AL. The range of *L. plicata* in the Locust Fork has apparently diminished over 50% in the last 8 years. In November 2001, a TNARI / AL-DCNR survey determined the distribution was restricted to 15 shoals in a 34-km section of river (see attached figure). The remaining populations are fragmented, and because of heavy sedimentation in the river, it is likely that no interbreeding occurs among populations on isolated shoals. Because the upcoming release is experimental, no shoals with healthy *L. plicata* populations will be the targets for augmentation efforts.

The augmentation strategy will release cultured snails at the uppermost range of *L. plicata*. Examination of this channel in November 2001 located 1 *L. plicata* in 1.5 hours. This locality appears to contain the lowest concentration of *L. plicata* in the Locust Fork, hence the need for augmentation. The planned augmentation locality for live animals is:

Locust Fork of the Black Warrior River, Sharit Shoals, 5.3-km downriver of the Interstate 65 Bridge crossing, Jefferson Co., AL. N 33° 42.816' - W 86° 58.813'.

The habitat conditions at this site appear suitable, and the near total loss of species from the area is puzzling, although sediment toxicity problems could have been the cause (sewage treatment plant release is several miles up-river). However, this site is a very large shoal (> 25 m wide) that should provide adequate physical habitat for *L. plicata*, provided potential toxicity issues have been improved (recent upgrades Gardendale sewage facilities). This shoal is a high gradient locality that does not appear to be inundated by excess sedimentation.

Egg translocation

Additionally, TNARI investigators have developed a method for collecting and moving the eggs of *L. plicata*. The collection technique involves the placement of colonization plates in *L. plicata* habitat. Earlier this year, TNARI and AL-DCNR personnel placed 40 of these 30 x 30 cm plates into the river. The plates will be collected and transported down river to a shoal near Sayre. Problems with this strategy may occur if the plates were lost during recent flooding events, or the eggs already hatched (recovery efforts have been delayed because of the flooding). During November 2001 survey, over 3 hours of sampling failed to locate any live *L. plicata* on this shoal. The planned location for egg transfer is:

Locust Fork of the Black Warrior River, 490 m above the Old Jasper Road Bridge crossing at Sayre, Jefferson Co., AL. N 33° 42.816' - W 86° 58.813'

Habitat conditions at this site also appear suitable, as this shoal is very large (> 30 m in width) with areas of suitable habitat. Other pleurocerids (*Pleurocera annuliferum* and *Elimia hydei*), occur in low densities at this location. Because colonization tiles are not selective, transfer of egg cases to this shoal will move all 3 species simultaneously. Future monitoring efforts will examine densities of all 3 snails at this location.

Site preparation: Snail densities at both the augmentation and egg translocation site will be estimated prior to any augmentation activity through quadrat sampling (n = 30). Quadrat sampling will be completed at each location prior to direct augmentation or egg translocation. Calculation of initial snail densities will assist future monitoring efforts, and help determine which augmentation method (egg or juvenile) produces more rapid and recovery. This will help recovery partners develop more specific methods for gastropod recovery.

Two similar large shoals have selected for these augmentation efforts (egg translocation and live release), in an attempt to minimize any habitat differences on recovery progress. These very similar shoals should offer equal microhabitat choices for the snails.

Scheduled release date:

The release will be conducted as soon as the augmentation proposal has been approved by project partners, and the river levels drop to sufficient discharge for release (< 500 cfs). The augmentation will hopefully occur by July 2003.

Future monitoring:

After release, visual monitoring will occur annually with quantitative monitoring every 2 years post-release (planned for the fall, during low-water levels). Annual augmentations (eggs and 1-year-old snails) will be planned at the same localities for the next 4 years (pending future FWS support), to monitor recovery success. Recent reintroduction efforts with another North America pleurocerid snail (spiny river snail - *Io fluvialis*) through translocation, took 1000's of translocated individuals and 10 years to complete successful re-introductions.

Disease risk:

Although unknown, it is believed disease risk to any indigenous pleurocerids is minimal. The most likely "disease" risk potential would be the introduction of a digenean. These animals often infect pleurocerids,

and large infections can render an individual sterile. However, the snail is usually only one of 3 obligate hosts required to complete the life cycle. Because snails are mono-cultured, interactions with other pleurocerids cannot occur. Additionally, since no vertebrates are present under culture conditions, no transmission of any digenean larvae is likely. Finally, cultured animals appear to be in excellent condition and are quite hardy.

Augmentation locality and recovery problems:

Augmentation efforts alone will not improve the poor habitat conditions that originally caused the snail's rapid decline. Sedimentation, possible sediment toxicity, eutrophication and hydrologic instability may be responsible for the contemporaneous decline of *L. plicata* in the Locust Fork. Any of these factors alone or in combination could eliminate the species from its remaining range, even with augmentation efforts. Sediment toxicity from coal fines, metals / minerals liberated from strip-mining activities, or insufficient sewage treatment from Warrior and/or Gardendale may have impacted the snail. It is recommended that sediments be sampled and monitored for any residual toxicity. Fine sediments at the release sites should be collected and monitored for potential toxicity problems.

Unfortunately, the only suitable remaining habitat for *L. plicata* appears to occur only within its current range. Habitat loss for the snail appears to be driven in large part by excessive sedimentation, which impedes the snail's ability to feed and respire. Excess sediments are especially a problem on the channel margins that serve as nursery localities for young of the year snails. Also, it is possible some of these sediments may still be toxic to the snails. Finally, excess nutrients appear to be a problem throughout the river given the turbidity, dense filamentous algae, and low water clarity. Examination of similar habitats within the species historic range by TNARI and AL-DCNR personnel, have yet to locate a suitable alternative release sites for cultured individuals. Habitat availability is so problematic, even if a re-introduction was a legal option the factors causing the disappearance of *L. plicata* from 99% of its historic range still remain. The remaining small and highly fragmented populations, occurring within a small range of river place the plicate rocksnail at eminent risk of extinction.