

Cylindrical Lioplax (*Lioplax cyclostomaformis*)
Flat Pebblesnail (*Lepyrium showalteri*)
Plicate Rocksnail (*Leptoxis plicata*)
Painted Rocksnail (*Leptoxis taeniata*)
Round Rocksnail (*Leptoxis ampla*)
Lacy Elimia (*Elima crenatella*)

**5-Year Review:
Summary and Evaluation**

**U.S. Fish and Wildlife Service
Southeast Region
Ecological Services
Jackson, Mississippi**

5-YEAR REVIEW

Cylindrical Lioplax/*Lioplax cyclostomaformis*
Flat Pebblesnail/*Lepyrium showalteri*
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I. GENERAL INFORMATION

A. Methodology used to complete the review: In conducting this 5-year review, we relied on available information pertaining to historic and current distributions, life histories, and habitats of these species. We also published an announcement in the *Federal Register* requesting information on these six snail species. Specific requests for information were also solicited from malacologists or other knowledgeable individuals with the Alabama Department of Natural Resources (ADCNR), Alabama Geological Survey, and the Nature Conservancy. Our sources for this 5-year review include the final rule listing these species under the Act; the Recovery Plan; peer reviewed scientific publications; unpublished field observations by Service, State and other experienced biologists; unpublished survey reports; and notes and communications from other qualified biologists or experts. The draft of this 5-year review document was distributed to State and University scientists familiar with these species for review (see Peer Reviewers, below), and comments received were incorporated.

B. Reviewers

Lead Region – Southeast Region: Kelly Bibb, 404-679-7132

Lead Field Office – Jackson, MS, Ecological Services: Paul Hartfield, 601-321-1125

Cooperating Field Office – Daphne, Alabama, Ecological Services: Jeff Powell, 251-441-5858

C. Background

1. FR Notice citation announcing initiation of this review: June 14, 2005: 70 FR 113

2. Species status: 2005 Recovery Data Call

Flat pebblesnail: Improved. New shoal populations discovered, and range extended.

Plicate rocksnail: Stable. Populations persisting over the past year.

**Cylindrical lioplax, painted rocksnail, round rocksnail, lacy elimia:
Unknown. No recent rangewide information available.**

3. Recovery achieved:

Cylindrical lioplax: 1*
Flat pebblesnail: 1
Plicate rocksnail: 1
Painted rocksnail: 1
Round rocksnail: 1
Lacy elimia: 1
(*1 = 0-25% recovery objectives completed)

4. Listing history

Original Listing

FR notice: 63 FR 57619,

Date listed: October 28, 1998

Entities listed (*species, subspecies, DPS*): all listed as Species

Classification (*threatened or endangered*):

Cylindrical lioplax: endangered
Flat pebblesnail: endangered
Plicate rocksnail: endangered
Painted rocksnail: threatened
Round rocksnail: threatened
Lacy elimia: threatened

5. Associated actions: NA

6. Review History:

Final Recovery Plan, 2005

Recovery Data Call 2005, 2004, 2003, 2002, 2001, 2000, 1999

7. Species' Recovery Priority Number at start of review (48 FR 43098):

Cylindrical lioplax: 8
Flat pebblesnail: 5
Plicate rocksnail: 5C
Painted rocksnail: 8
Round rocksnail: 8
Lacy elimia: 8

8. Recovery Plan or Outline

Name of plan: Recovery Plan for 6 Mobile River Basin Aquatic Snails.

U.S. Fish and Wildlife Service, Jackson, MS.46 pp.

Date issued: November 7, 2005

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) policy

1. Are any species under review listed as a DPS? **No** The Act defines species to include any distinct population segment of any species of vertebrate wildlife. This definition limits listings as distinct population segments (DPS) only to vertebrate species of fish and wildlife. Because the DPS policy is not applicable to these invertebrate species, it is not addressed further in this review.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan? Yes
2. Does the recovery plan contain recovery (i.e., downlisting or delisting) criteria? Yes
3. Adequacy of recovery criteria.
 - a. Do the recovery criteria reflect the best available (i.e., most up-to-date) information on the biology of the species and its habitat? Yes, the plan was completed November 2005
 - b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and there is no new information to consider regarding existing or new threats)?
Yes
4. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing supporting information. For threats-related recovery criteria, please note which of the 5 listing factors are addressed by that criterion. If any of the 5-listing factors are not relevant to this species, please note that here. *Upon completion, go to section II.D., Synthesis.*

Population Criteria for Recovery

Population criteria address, in part, threats under listing factor E, natural or manmade random catastrophic events, by increasing the number of populations and by extending the ranges/sizes of individual populations. Also, achieving the population criteria will indicate whether management actions to remove or ameliorate threats under the remaining factors have been effective and have had the expected effect on the species and populations.

A population is defined as all snails occurring within a contiguous river or stream reach extending a minimum of 30 km (18 mi). Snails in a recovered population should be easily found in appropriate habitat throughout the occupied reach.

Criteria for reclassification to threatened status (Cylindrical Lioplax, Flat Pebblesnail, Plicate Rocksnail)

1. The existing population has been shown to be stable or increasing over a period of 10 years (2 to 5 generations). This may be measured by numbers/area, catch per unit/effort, or other methods developed through population monitoring, and must be demonstrated through annual monitoring.

No formal monitoring plans have been established for any of these species. However, the U.S. Fish and Wildlife Service(Service), Alabama Department of Conservation and Natural Resources (ADCNR), Tennessee Aquarium Research Institute (TNARI), Cahaba River Society, The Nature Conservancy, Alabama Natural Heritage Program, and others periodically conduct or assist in surveys of imperiled aquatic mollusks in the Mobile River Basin. These efforts result in the occasional visitation of some populations and their assessment for continued persistence of the species. However, none of the populations are being measured or monitored annually. Therefore, this criterion has not been met.

2. There are no apparent or immediate threats to the listed population (**refer to Listing/Recovery Criteria discussion, below**).
3. A captive population has been established at an appropriate facility, and the species has been successfully propagated.

In recent years, the Service has worked with TNARI, ADCNR and other partners to design and construct mollusk holding and propagation facilities, and to develop and test holding and propagation protocols for aquatic snails. TNARI has now propagated plicate rocksnails and flat pebblesnails. Hatchery produced offspring of plicate rocksnails were released into the Locust Fork in 2003 and 2004; hatchery produced flat pebblesnails were released into the Cahaba River in 2004. In 2006, ADCNR opened a hatchery facility for research and management of imperiled aquatic species, and TNARI has transferred imperiled snail hatchery stock to the State. Therefore, this criterion has been met for plicate rocksnail and flat pebblesnail, and propagation efforts are planned for cylindrical lioplax.

4. A minimum of two additional populations have been established (or discovered) within historic range.

The ranges of cylindrical lioplax and flat pebblesnail have been extended in the Cahaba River above the Fall Line by the location of previously unknown shoal populations (Freeman *in litt.* 2004a, b; Johnson *in litt.* 2006). However, the ranges of both species are currently limited to shoals in less than a 30 km reach of the Cahaba River, and are considered as single populations. A second population of flat pebblesnail was recently discovered on a shoal in the Little Cahaba River, Bibb County, Alabama (Powell, *in litt.* 2006). Although hatchery reared plicate rocksnail juveniles have been reintroduced into two sites in the Locust Fork River, survival rates have been extremely low (Johnson *in litt.* 2004a, b), and natural reproduction has been limited (Garner *in litt.* 2006). The range of plicate rocksnail in the Locust Fork River has been reduced since the species was listed. In summary, the ranges of existing populations of the cylindrical lioplax and flat pebblesnail in the Cahaba River have been extended, a second population of flat pebblesnail has been located in the Little Cahaba River, and the range of the plicate rocksnail has been reduced.

Criteria for delisting the lacy elimia, round rocksnail, painted rocksnail, cylindrical lioplax, flat pebblesnail, and plicate rocksnail:

1. A minimum of 3 natural or re-established populations have been shown to be persistent (i.e., stable or increasing) for a period of 10 years (2 to 5 generations).

A second population of flat pebblesnail was recently discovered in the Little Cahaba River, Bibb County, Alabama (Powell, *in litt.* 2006). There is no information available, however, to determine population persistence for any of these species, as there is no established routine monitoring program for any of these populations.

2. There are no apparent or immediate threats to the populations (**see Listing/Recovery Factor Criteria, below**).

Listing/Recovery Factor Criteria

The following criteria (Factors A through E) apply equally to downlisting or delisting objectives identified above.

Factor A: The present or threatened destruction, modification, or curtailment of its habitat or range.

To provide assurance of population stability when any of the six species increase to the levels specified under the population criteria, threats to their habitat must be reduced as specified under this factor. Populations of the six species have declined in response to a wide variety of impacts upon streams and their watersheds (see Endangered Status for Three Aquatic Snails and Threatened Status for Three Aquatic Snails in the Mobile River Basin (63 FR 57610) and Mobile River Basin Aquatic Ecosystem Recovery Plan: Aquatic Ecosystem Impacts and Their Effects on Biota, and Current and Future Threats to the Basin's Imperiled Species (U.S. Fish and Wildlife Service, 2000)). Therefore, reducing threats to their habitat must be accomplished through a broad application of measures that focus on protecting stable natural stream channels and riparian zones, and protecting or improving water quality and quantity. Effective watershed conservation will not only reduce habitat threats to the listed snails, but it will also benefit more common aquatic species.

The following criteria shall serve to indicate a reduction in habitat threats:

- 1) Streams supporting populations of the six snails are not subject to impoundment. Habitat loss and fragmentation due to impoundment was the major cause of decline of these six snails. There should be no pending permits, applications, or known future projects considering impoundment of recovery habitats.

There are no pending permits or applications for constructing impoundments within areas considered to be important for the recovery of any of these six snail species. However, there continues to be discussion of impounding the Locust Fork River, part of the historical range of the plicate rocksnail, for a water supply reservoir.

A culvert crossing that minimally impounded water on the Cahaba River was removed in 2004. Round rocksnails have become established in portions of some of the restored shoals (P. Freeman, The Nature Conservancy, pers. comm., 2006). This action also benefited flat pebblesnail and cylindrical lioplax.

- 2) Stream channels at all sites occupied by the snails are stable (not actively aggrading or degrading or undergoing excessive bank erosion) and adjacent riparian zones are adequately vegetated.

Most sites inhabited by these six species are relatively stable, however, no rigorous analysis has been conducted on channel condition at any site. Therefore, channel stability and geomorphic trends cannot be evaluated.

- 3) Water quality and quantity are fully supporting a minimum designated use of fishing or fish and wildlife habitat (as reported by the states under Section 305(b) of the Clean Water Act) in all stream reaches where the snails occur. Water pollution is believed to have been a significant factor in the disappearance of snail populations from unimpounded portions of their historic habitat. Degraded water quality, particularly due

to sedimentation and eutrophication, currently prevents these species from expanding into portions of historical habitat.

Attempts to reintroduce plicate rocksnail into the Locust Fork have been affected by eutrophic conditions (nutrient loading and heavy filamentous algal growth) that developed following release of hatchery snails (Johnson *in litt.* 2004b), indicating that water quality conditions have not improved sufficiently to provide suitable habitat. An approximately 80 mile reach of the Locust Fork above the area occupied by plicate rocksnail has been placed on Alabama's Draft 2006 303(d) List of impaired water bodies, due to excessive nutrients, siltation, and other habitat alterations.

Two of the three Coosa River tributaries where the painted rocksnail persists are on the Alabama Draft 2006 303(d) List: Choccolocco Creek for organic pollution, and Buxahatchee Creek for nutrients.

A Total Maximum Daily Load (TMDL) for nutrients has been established for the Cahaba River above the Fall Line (Alabama Department of Environmental Management (ADEM) 2004). Reducing nutrients in the Cahaba will benefit the cylindrical lioplax, flat pebblesnail, and round rocksnail.

Identification of stream segments on the 303(d) list brings attention to water quality problems affecting these listed species and their habitats. In addition, the Clean Water Act requires the development of a total maximum daily load (TMDL) for the pollutants identified by the 303(d) list that will bring water quality into the applicable standard.

Factor B. Overutilization for commercial, recreational, scientific, or educational purposes.

Overutilization has not been implicated in the decline of these species. The potential of overutilization, however, should be assessed prior to reclassification.

Factor C: Disease or predation.

Disease is not known to be a factor in the status of these species. Drainages supporting the snails should be free of the exotic, mollusk feeding black carp.

Regulations have been implemented by the State of Alabama prohibiting the possession, importation or release of black carp into waters of the State (Alabama Division of Wildlife and Freshwater Fisheries Regulation 220-2-.26). Black carp are not currently known to occur in the areas occupied by these snails.

Factor D: The inadequacy of existing regulatory mechanisms.

A lack of adequate research and data regarding sensitivities of these snails to certain pollutants may prevent agencies from exercising their existing regulatory authorities. Establishing and monitoring multiple populations of each species and their habitats will provide a measure of protection from unknown pollutants.

No action has been taken on this criterion, however, the recent advances in ability to propagate these mollusk species are critical to research on toxicity of pollutants to the species, and necessary to propagate sufficient numbers to reintroduce the species into historical portions of their ranges. General water quality problems in the Locust Fork, Cahaba River, and two Coosa River tributaries are being addressed under the State's 303(d) program.

Factor E: Other natural or manmade factors affecting its continued existence.

Vulnerability to natural or manmade random catastrophic events will be reduced by increasing the number of populations of each species and by extending the range of individual populations, as outlined under the Criteria, above.

The ranges of the existing populations of cylindrical lioplax and flat pebblesnail have been extended in the Cahaba River (R. Haddock *in litt.* 2004; Paul Freeman *in litt.* 2004a, b; U.S. Fish and Wildlife Service 2005). A second population of flat pebblesnail has been discovered in the Little Cahaba River, RM 2.9, Bibb County, Alabama (Powell, *in litt.* 2006). Attempts to extend the range of plicate rocksnail in the Locust Fork using hatchery propagated juveniles have been made, but have only met limited success to date (Johnson *in litt.* 2004a, b).

Vulnerability of cylindrical lioplax has been reduced by extending its range within the Cahaba River. Flat pebblesnail vulnerability has been reduced by extending the range of the known population, and discovery of a second population. Vulnerability of the other four species remains the same.

C. Updated Information and Current Species Status

- 1. Biology and Habitat** – Current Information on biology and habitat of the lacy elimia, round rocksnail, painted rocksnail, cylindrical lioplax, flat pebblesnail, and plicate rocksnail is summarized in the Recovery Plan for Six Mobile River Basin Aquatic Snails (U.S. Fish and Wildlife Service 2005). A second population of flat pebblesnail has been discovered in the Little Cahaba River since the recovery plan was developed (Powell, *in litt.* 2006).
- 2. Five Factor Analysis (threats, conservation measures and regulatory mechanisms)**

a. Present or threatened destruction, modification or curtailment of its habitat or range: All six species have experienced severe curtailment of habitat and range due to impoundment and water and habitat quality deterioration. Although the ranges of the flat pebblesnail and cylindrical lioplax have been extended beyond a single shoal, in the Cahaba River, the total known current ranges encompass only about 20 and 30 river miles, respectively. A second population of the flat pebblesnail discovered in the Little Cahaba River is known from less than a one mile reach. Range of the plicate rocksnail declined in the Locust Fork following listing, but this has been offset in part by reintroduction efforts by the State. Ranges of the other three species remain the same.

Nonpoint source pollution continues to affect populations of the six species. However, some problems have been recognized and are being addressed. Alabama Department of Environmental Management has implemented a TMDL for nutrients, and is developing a TMDL for sediments in the Cahaba River above the Fall Line (ADEM 2004). This will benefit the round rocksnail, flat pebblesnail, and cylindrical lioplax.

Two of the three Coosa River tributaries where the painted rocksnail persists have been identified on the Alabama Draft 2006 303(d) List of impaired water bodies: Choccolocco Creek for organic pollution, and Buxahatchee Creek for nutrients. An extensive reach of the Locust Fork draining into the area occupied by plicate rocksnail has been placed on Alabama's Draft 2006 303(d) List, due to excessive nutrients, siltation, and other habitat alterations. TMDLs will be developed for these pollutants in the affected stream segments.

Attempts to reintroduce plicate rocksnail into the Locust Fork have been affected by eutrophic conditions (nutrient loading and heavy filamentous algal growth) that developed following release of hatchery snails (Johnson *in litt.* 2004b). Hatchery reared plicate rocksnails have been reintroduced into two sites of the Locust Fork, however, survival has been low. Natural reproduction has not been documented at one site, and has been very limited at the other site.

Threats under Factor A have been reduced for cylindrical lioplax and flat pebblesnail. Threats to plicate rocksnail have increased due to nonpoint source pollution. Threats to the other three species remain the same.

b. Overutilization for commercial, recreational, scientific, or educational purposes: Not currently a factor in the status of these six snail species.

c. Disease or predation: Disease or predation are not currently known to be a threat to the status of these species. ADCNR has adopted

regulations prohibiting introduction of black carp into waters of Alabama.

d. Inadequacy of existing regulatory mechanisms: The recent development of technology and facilities to propagate these snail species is critical to conducting research on toxicity of pollutants to the species. Regulatory mechanisms are being applied to nonpoint source pollution problems in several streams occupied by one or more of these snails, however, threats continue to persist.

e. Other natural or manmade factors affecting its continued existence: The ranges of the flat pebblesnail and cylindrical lioplax have been extended beyond a single shoal, in the Cahaba River, increasing the total known current range of these species by 20 and 30 river miles, respectively. A second population of the flat pebblesnail discovered in the Little Cahaba River is known from less than a one mile reach. Range of the plicate rocksnail declined in the Locust Fork following listing, but this has been offset in part by State propagation and reintroduction efforts. Ranges of the other three species remain the same. All populations of these six species remain vulnerable to natural or human-induced threats.

D. Synthesis – All six species have experienced significant curtailment of range and habitat. Deterioration of water and habitat quality through non-point source pollution continue to affect the surviving populations. Their limited distributions and small populations render the species vulnerable to random natural or human-induced events such as droughts or spills.

The ranges of the cylindrical lioplax and flat pebblesnail have been extended several miles in the Cahaba River. A small, new population of flat pebblesnail has been discovered surviving in the Little Cahaba River. The flat pebblesnail and plicate rocksnail have been successfully reared in a hatchery situation, and limited attempts have been made to reintroduce both species into historically occupied shoal habitats.

Although there has been some progress in recovery efforts for the cylindrical lioplax, flat pebblesnail, and plicate rocksnail, these species remain vulnerable to habitat and water quality deterioration, and continue to meet the definition of endangered species under the Act.

The lacy elimia, round rocksnail, and painted rocksnail, each continue to be known from three distinct drainage populations, however, each is limited in extent and vulnerable to habitat and water quality deterioration. Therefore, they continue to meet the definition of threatened species under the Act.

III. RESULTS

- A. **Recommended Classification:** *Given your responses to previous sections, particularly Section II.D, Synthesis, do you recommend a change in the listing classification of the species (briefly summarize the reasons for this recommendation)?*

No, no change is needed

- B. **New Recovery Priority Number** N/A – no change to RPNs

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

- a. Develop and implement a monitoring plan for all six species.
- b. Assess, prioritize and monitor occupied and potential habitats for these six species.
- c. Develop and implement habitat plans for the streams where these species occur, or where they can be reintroduced.
- d. Continue assisting the State's propagation studies and efforts.
- e. Work with State agencies, local groups, and individuals to protect and improve water quality in the drainages supporting the six snail species.
- f. Implement all other recovery tasks..

V. REFERENCES

Alabama Department of Environmental Management. 2004. Nutrient target development in support of nutrient TMDLs for the Cahaba River Watershed. Prepared by ADEM Water Quality Branch and Tetra Tech., Inc. 23pp.

Freeman, Paul. 2004a. Lepyrium from Cahaba River NWR. The Nature Conservancy of Alabama. 05/19/2004 email, announcing discovery of one flat pebblesnail on Hargrove Shoal in Cahaba R. NWR.

Freeman, Paul. 2004b. Lepyrium from another spot. The Nature Conservancy of Alabama. 04/26/2004 email, notifying of discovery of flat pebblesnail in a shoal 4.5 mi downstream from Booth Ford.

Garner, Jeff. 2006. 6 snail review. Alabama Department of Conservation and Natural Resources. 03/20/2006 email.

Haddock, R.C. 2004. Snail eggs. Cahaba River Society. 04/26/2004 email, regarding discovery of flat pebblesnail and eggs in shoal above Booths Ford.

- Johnson, P. D. and S.F. Novak. 2003. Augmentation proposal for the plicate rocksnail, *Leptoxis plicata*, in the Locust Fork of the Black Warrior River, Jefferson County, AL. Tennessee Aquarium Research Institute, Cohutta, GA. 3pp.
- Johnson, Paul. 2003. Re: snail release. Tennessee Aquarium Research Institute. 10/28/2003 email, with attachment from P. Hartfield announcing release of HR plicate rocksnails in Locust Fork.
- Johnson, Paul. 2004a. Re: snails. Tennessee Aquarium Research Institute. 07/23/2004 email regarding collections of HR plicate rocksnails in Locust Fork, and problems with the site.
- Johnson, Paul. 2004b. FW: Locust Fork. Tennessee Aquarium Research Institute. 10/19/2004 email, with attached email from J. Sides regarding potential causes of snail loss in Locust Fork.
- Johnson, Paul. 2005. Release report and release authorization. Tennessee Aquarium Research Institute. 01/06/2005 email, proposing new release site in the Locust Fork.
- Johnson, Paul. 2006. Cahaba results – FYI. Alabama Department of Conservation and Natural Resources. 04/11/2006 email with Cahaba Survey Results Table attached.
- Powell, Jeff. 2006. Little Cahaba River data. U.S. Fish and Wildlife Service. 05/22/2006 email.
- U.S. Fish and Wildlife Service. 2005. Recovery Plan for 6 Mobile River Basin Aquatic Snails. U.S. Fish and Wildlife Service, Jackson, Mississippi. 46 pp.

Peer Review: A draft copy of this 5-year review was emailed to the following knowledgeable individuals for their review and comment:

Jeff Garner
Alabama Department of Conservation and Natural Resources

Dr. Paul Johnson
Alabama Department of Conservation and Natural Resources

Paul Freeman
The Nature Conservancy

Dr. Randall Haddock
Cahaba River Society

Dr. Jeffrey Sides

University of Alabama at Birmingham

Dr. Russ Minton
University of Louisiana at Monroe

Jason Wisniewski
Georgia Natural Heritage Program

Results of Peer Review:

Jeff Garner responded with an observation of natural reproduction in a reintroduced population of plicate rocksnail in the Locust Fork, and an observation of the survival of at least two flat pebblesnails reintroduced into the Cahaba National Wildlife Refuge (Garner *in litt.* 2006).

Dr. J. Sides referenced an unpublished mollusk survey of the Cahaba River that he and Dr. P. Johnson were preparing (*in litt.* 2006).

Dr. P. Johnson provided a table of mollusk collections from the Cahaba River (*in litt.* 2006).

No comments or recommendations were received from the other correspondents.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW on CYLINDRICAL LIOPLAX, FLAT
PEBBLESNAIL, Plicate ROCKSNAIL, PAINTED ROCKSNAIL, ROUND
ROCKSNAIL, AND LACY ELIMIA

CURRENT CLASSIFICATION

Cylindrical lioplax: endangered
Flat pebblesnail: endangered
Plicate rocksnail: endangered
Painted rocksnail: threatened
Round rocksnail: threatened
Lacy elimia: threatened

RECOMMENDATION resulting from the 5-Year: No Change

APPROPRIATE LISTING/RECLASSIFICATION PRIORITY NUMBER: NA

REVIEW CONDUCTED BY:

Paul Hartfield

Lead Field Supervisor, Fish and Wildlife Service

Approve Craig Wozniak Date 4-6-06

Do not Approve _____ Date _____

Cooperating Field Supervisor, Fish and Wildlife Service

Concur Paul A. Ellis Date 4/6/06

Not concur _____ Date _____

Lead Regional Director, Fish and Wildlife Service

Concur Franklin Wood Date 8/29/06

Acting ARD-ES
Not concur _____ Date _____