Recovery Plan

Speckled Pocketbook Mussel

(*Lampsilis streckeri*)

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for

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Recovery plans delineate reasonable actions which are believed to be required to recover and/or protect the listed species. Plans are prepared by the U.S. Fish and Wildlife Service, sometimes with the assistance of recovery teams, contractors, State agencies, and others. Objectives will only be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints. Recovery plans do not necessarily represent the views nor the official positions or approvals of any individuals or agencies, other than the U.S. Fish and Wildlife Service, involved in the plan formulation. They represent the official position of the U.S. Fish and Wildlife Service only after they have been signed by the Regional Director or Director as approved. Approved recovery plans are subject to modification as dictated by new findings, changes in species' status, and the completion of recovery tasks.

Literature citation should read as follows:

U.S. Fish and Wildlife Service. 1991. Speckled Pocketbook Mussel (*Lampsilis streckeri*) Recovery Plan. U.S. Fish and Wildlife Service. Jackson, Mississippi. 14 pp.

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EXECUTIVE SUMMARY

Current Status: The speckled pocketbook is only known from the Middle Fork Little Red River, Van Buren and Stone Counties, Arkansas. Populations in the South Fork and Archey Fork have been eliminated in recent years by channel modifications.

Habitat Requirements and Limiting Factors: Specific habitat requirements are not known. The species is found in coarse to muddy sand in depths up to 0.4 meters (1.3 feet) with a constant flow of water. The occurrence in areas of constant water flow suggests a requirement for well-oxygenated conditions. The impoundment of Greers Ferry Reservoir and channel modifications in much of the historic range contributed to its decline.

Recovery Objective: The objective is to reclassify this species from endangered status to threatened status.

Recovery Criteria: The speckled pocketbook may be reclassified when: (1) four additional populations are discovered or reestablished, (2) all five populations are viable and the habitat is fully protected, and (3) viable population levels are maintained for a period of at least 20 years.

Actions Needed:

1. Protect the only known population and its habitat.
2. Conduct life history research.
3. Determine the feasibility of reestablishing the species.
4. Develop and implement a plan to monitor all populations.

Total Estimated Cost of Recovery: The identified cost of recovery is $516,000. However, there are several tasks for which a cost estimate depends upon the accomplishment of other recovery tasks. Estimating the total cost of recovery is not possible at this time.

Date of Recovery: Recovery of this species will take at least 20 years after the additional populations have been located or reestablished. It is not possible to estimate the time required to conduct the various required studies, even if all the funding were immediately available.

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PART I: INTRODUCTION

The speckled pocketbook, Lampsilis streckeri, is restricted to the Middle Fork Little Red River, Van Buren and Stone Counties, Arkansas, with a range of about 9 river miles. The historic range included the South and Archey Forks and the mainstream of the Little Red River, in addition to the Middle Fork. Records from other river systems have been determined to be misidentifications (Clarke 1987). The historic range of this species has been impacted by reservoir construction, water pollution, and channel modification. This species was listed as an endangered species in the Federal Register on February 28, 1989 (U.S. Fish and Wildlife Service 1989).

Description

The speckled pocketbook was described by Frierson in 1927 with the type locality an unspecified site on the Little Red River, Arkansas. The speckled pocketbook is a thin mussel in both shell thickness and depth of shell. It is about 80 millimeters (mm) (3.1 inches) long. The shells are elliptical, dark yellow or brown with chevron-like spots, and rays that are chain-like (Frierson 1927, Harris and Gordon 1990). The shells exhibit sexual dimorphism, with the females becoming broader and more evenly rounded posteriorly. It can be confused with species of similar shell morphology unless an individual is knowledgeable of mussels and is very observant.

Villosa vibex occurs in streams to the south and east of Arkansas, and, based only upon shell morphology, is very similar to Lampsilis streckeri. However, members of the genus Lampsilis have a very distinctive mantle flap that resembles a small minnow. In Lampsilis streckeri, the mantle flap has a small pigment spot and about five triangular processes that provide a flaring appearance. This unique mantle is apparently used to entice fish close enough for the mussel's larvae or glochidia to attach.

Other similar species are L. reeviana (Arkansas broken-ray), L. siliquoidea (fatmucket), and L. bracteata (Texas fatmucket). In all three of these similar species, the shell lacks chevron-like spots and rays are continuous rather than ribbon-like. Lampsilis bracteata is only reported from Texas. In L. siliquoidea, the rays are limited to the posterior slope of the shell or become faded before reaching the ventral margin (Burch 1975). Lampsilis reeviana further differs by having a large pigment spot and up to twice the triangular processes on the mantle flap (Clarke 1987).

Distribution

The current known range of Lampsilis streckeri is limited to about 9 miles of the Middle Fork Little Red River, Van Buren and Stone Counties, Arkansas (Figure 1). Historically, populations occurred in Archey and South Forks of the Little Red River, Van Buren County, Arkansas (Clarke 1987, John Harris, Arkansas Department of Transportation, pers. comm. 1988). Records of this species from the Arkansas River drainage, and from Onion Creek (Travis County) and Bell Creek (Bell County), Texas are either misidentifications or cannot be confirmed (Johnson 1980, Clarke 1987).

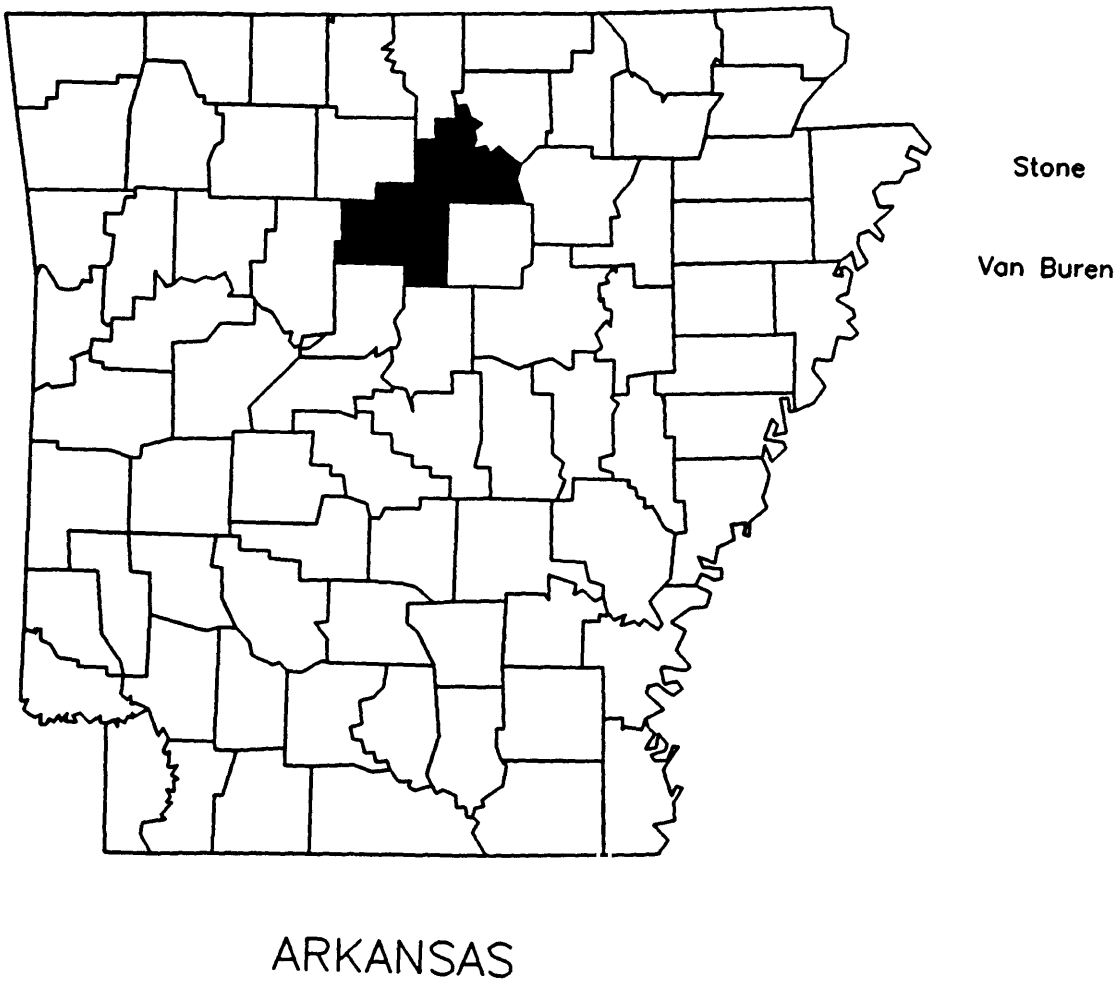

Figure 1
Known Range of
Speckled Pocketbook Mussel

The record of Lampsilis streckeri from the Arkansas River drainage, reported as Actinonaias streckeri, was determined by Johnson (1980) to be a misidentification. These specimens were identified as A. rafinesqueana by Johnson with this species now considered to be in the genus Lampsilis. The Texas records of Lampsilis streckeri either cannot be confirmed or are misidentifications of L. bracteata (Clarke 1987). The Texas streams are low-gradient and do not provide the required habitat. Numerous recent collections in these streams have contained L. bracteata but not L. streckeri. The only confirmed sites for L. streckeri are in the watershed of the Little Red River.

Within the Little Red River drainage, the only known remaining population is in the Middle Fork. Populations in the South Fork and Archey Fork have been eliminated in recent years by channel modifications. In the Middle Fork, the known range extends from the influence of Greers Ferry Reservoir near Shirley, Arkansas, upstream to the confluence of Meadow Creek. Above Meadow Creek, the Middle Fork is reduced to intermittent flows during dry periods. Clarke (1987) did not find the speckled pocketbook in the Middle Fork downstream of the confluence of Tick Creek. Under contract to the Fish and Wildlife Service, Dr. John Harris has found live mussels, including the speckled pocketbook, in the Middle Fork downstream of the confluence with Tick Creek (pers. comm. 1991).

Life History/Ecology

The life history of Lampsilis streckeri has not been studied. It is presumed to be similar to that of other unionids. During the spawning period, males discharge sperm into the water and females collect the sperm by the siphoning process. Eggs are fertilized and held in the females' gills where they develop into larvae or glochidia. The glochidia are discharged into the water where they attach to a fish host, become encysted, and metamorphose into juvenile mussels that are capable of surviving if they fall to suitable substrate. Mussels are also dependent upon the water currents to bring food particles within the range of their siphons.

Clarke (1987) found this species in coarse to muddy sand with a constant flow of water. This suggests that a constant flow of water with good oxygenation is necessary. On this basis, Clarke (1987) contends that it cannot survive in pools.

Reasons for Listing

The speckled pocketbook once occurred in the stretch of the Little Red River now impounded by Greers Ferry Reservoir, and in the area downstream of the reservoir that is now altered by cold (hypolimnetic) discharges. The lentic conditions imposed by the reservoir and the hypolimnetic discharges undoubtedly eliminated any speckled pocketbook population in this stretch of river. Archey and South Forks have been modified for flood control. The modification of these channels are the likely cause of the species'

disappearance from these tributaries. The small population of speckled pocketbooks in the South Fork, below the confluence with Archey Fork, apparently has been extirpated by floods scouring the mussel's habitat (Clarke 1987). This scouring likely results from increased water velocity due to channel modification upstream. The only remaining population of the speckled pocketbook is in the Middle Fork Little Red River, Van Buren and Stone Counties, Arkansas (Clarke 1987).

The fish host for the glochidial stage of the speckled pocketbook is unknown; therefore, impacts on this aspect of the mussel's life cycle cannot be evaluated. The Middle Fork population's available habitat is limited upstream by low or non-existent water flows during the dry months of the year. Much of Archey and South Forks have intermittent water flows during dry seasons, which may be partially due to channel modification for flood control. The population is so limited that isolated gene pools are likely and loss of genetic variability increases susceptibility to environmental disturbance. The reduced density of the population decreases the likelihood of successful reproduction.

Strategy for Recovery

The recovery of this species will focus on the restoration of historic habitat in the Little Red River headwaters and the reestablishment of populations in that restored habitat. Due to the very limited population of this species and its restriction to a single stretch of one stream, all the recovery tasks are critical to its continued survival. Without restoration of historic habitat and reestablishment of *Lampsilis streckeri*, it is only a matter of when, rather than if, a natural or man-made event eliminates the Middle Fork population. Reestablishment of populations in historic range will be accomplished by relocation of adults and/or artificial culture and release after the habitat has been restored. The reestablishment of *Lampsilis streckeri* will depend upon successful determination of life history requirements, characterization of habitat, determination of associated mussel and fish species, and evidence that restored habitat is suitable for this species.

Part II: Recovery

A. Objective

The objective of this plan is to reclassify the speckled pocketbook mussel, *Lampsilis streckeri*, from endangered to threatened status. The speckled pocketbook may be reclassified when: (1) four additional populations are discovered or reestablished, (2) all five populations are viable and the habitat is fully protected, and (3) viable population levels are maintained for a period of at least 20 years.

Fully protected is defined as the implementation of protective measures, such as land management standards and guidelines for mussel habitat management, to ensure populations of this species remain at or greater than the levels required for a sustaining population. Protection should extend in the watershed, including public and private lands, to the point where activities in the watershed no longer adversely affect the stream.

A viable population is defined as a population with the reproductive capability to sustain itself without immigration of individuals from other populations.

Once this species has been reclassified to the threatened category, criteria for delisting may be developed. The time required for attaining the objective is 20 years after five viable populations are protected.

B. Narrative Outline for Recovery Actions Addressing Threats

1. Protect the only known population and its habitat from further impacts. The only known population occurs in the Middle Fork Little Red River, Van Buren and Stone Counties, Arkansas. The continued survival of this species mandates that every effort is expended to protect this population.

   1.1 Conduct population surveys. Clarke (1987) conducted the most extensive population survey of this species. That data provides some baseline for developing population trends. The population in the Middle Fork should be surveyed at 3-year intervals to establish trends. Other streams within the Little Red River drainage should be periodically surveyed to determine if this species was overlooked or is expanding its range. This information should alert us to any sudden decline in the population, and allow consideration of corrective actions.

   1.2 Use existing legislation to prevent further habitat modification. Habitat modification for flood control in the lower reaches of Archey Fork and the South Fork of the Little Red River has resulted in the extirpation of this species from these streams. The impoundment of Greers Ferry Reservoir and

resultant hypolimnetic water releases extirpated the speckled pocketbook from the impounded portion of the Little Red River and the tailwaters below the reservoir. Any modification to the habitat of the Middle Fork that would adversely impact this species should be carefully considered under provisions of Section 7 of the Endangered Species Act and other applicable environmental legislation.

2. Conduct life history research on the species. While protecting adult mussels and the known habitats is of utmost importance, it is equally important that we know the life history requirements of the species if we are to ensure survival and recovery. This task should determine fish host(s), preferred habitats, water quality requirements and other life history parameters. Survival is dependent upon protection of all aspects of the life history. For example, loss of the fish host(s) means loss of the mussel.

   2.1 Characterize habitat. In determining the suitability of restoring this species to former habitat, we must determine habitat characteristics where it now exists. This should provide a standard by which other habitat can be compared.

   2.2 Determine associated fish and mussel species. Mussel and fish species that are associated with *Lampsilis streckeri* in the Middle Fork can be indicators of other suitable habitat by comparing species composition. A determination of associated species will be considered. This should also provide information on potential fish host.

   2.3 Develop life history data. Research to determine gametogenesis, fish host identification, age class structure, growth rate, life tables, and mortality factors will be considered. Without this information, all efforts to recover this species, especially by artificial propagation, may be futile.

3. Determine the feasibility of restoring historic habitat and reestablishing the species. This species existed in at least the upper Little Red River and its major headwater streams. To ensure recovery of this species, it may be necessary that populations be discovered or reestablished in the headwater streams above Greers Ferry Reservoir.

   3.1 Develop a plan to restore historic habitat. Archey Fork and South Fork once supported populations of the speckled pocketbook mussel. A plan to restore the habitat for the reestablishment of mussels should be developed.

3.2 Develop a plan for reestablishing mussel populations. This task will develop a plan for reestablishing mussel populations. This plan should include, but not be limited to, determining the suitability of restored habitat by relocating and monitoring closely related species, determining the feasibility of reestablishing *Lampsilis streckeri* by artificial culture and/or by transplanting from the Middle Fork population, and methods of marking introduced individuals for survival determinations. Closely related associate species should be marked and monitored for a period of at least 5-years before *Lampsilis streckeri* is reintroduced.

3.3 Implement plan to restore historic habitat. Based upon information gained in Tasks 3.1 and 3.2, restoration of historic habitat may be considered. Archey and South Forks should be the highest priority for habitat restoration based upon the mussels most recent occurrence in these streams.

3.4 Implement plan to reestablished the speckled pocketbook in historic habitat. Based upon the information gained from Tasks 2.0, 3.1, and 3.2, the feasibility of reintroducing this species may be considered. If feasible, mussels should be reintroduced into restored habitat using methods in accord with the plan developed in Task 3.2.

4. Develop and implement a plan to monitor all populations. A plan to determine minimum population levels should be developed and implemented. This plan should be the basis for determining when individuals can be removed from the Middle Fork and when the species has reached a level at which it may be downlisted. All populations should be monitored for a period of at least 20 years after they have attained the minimum population level developed by this task.

4.1 Determine minimum population levels. Some minimum number of individuals is required for a self-sustaining population. A minimum of 500 individual mussels has been suggested in other publications. This task will determine the minimum number of individuals required for a self-sustaining population.

4.2 Develop a plan to monitor populations that have attained the minimum viable population level. This plan should include the minimum number of adults required in a self-sustaining population and the size classes required as evidence of sufficient recruitment. The frequency and method of monitoring over the 20 year period will be developed.

4.3 Implement the monitoring plan. The monitoring should be accomplished according to the plan developed in Task 4.2. All monitoring should be under the close supervision of someone with demonstrated expertise with freshwater mussels.

C. Literature Cited

Burch, J.B. 1975. Freshwater unionacean clams (Mollusca: Pelecypoda) of North America. Malacological Publ. 204 pp.

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Frierson, L.S. 1927. A classified and annotated check list of the North American naiades. Baylor University Press, Waco, Texas. 111 pp.

Harris, J.L. and M.E. Gordon. 1990. Arkansas mussels. Arkansas Game and Fish Commission, Little Rock, AR. 32 pp.

Johnson, R.I. 1980. Zoogeography of North American Unionacea (Mollusca:Bivalvia) north of the maximum Pleistocene glaciation. Bull. Mus. Comp. Zool. 149(2):77-189.

U.S. Fish and Wildlife Service. 1989. Endangered and threatened wildlife and plants; endangered status for the speckled pocketbook (*Lampsilis streckeri*). Federal Register 54(38):8339-8341.

PART III: IMPLEMENTATION SCHEDULE

Priorities in column one of the following implementation schedule are assigned as follows:

1. Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.

2. Priority 2 - An action that must be taken to prevent a significant decline in species' population/habitat quality or some other significant negative impact short or extinction.

3. Priority 3 - All other actions necessary to meet the recovery objective.

Key to acronyms used in Implementation Schedule

FWE - Fish and Wildlife Enhancement, U.S. Fish and Wildlife Service
RES - Division of Research, U.S. Fish and Wildlife Service
EPA - Environmental Protection Agency
ARGF - Arkansas Game and Fish Commission
COE - U.S. Army Corp of Engineers
ARPCE - Arkansas Department of Pollution Control and Ecology
ECE - Environmental Contaminant Evaluation, U.S. Fish and Wildlife Service

IMPLEMENTATION SCHEDULE

PRIOR-ITY #	TASK #	TASK DESCRIPTION	TASK DURATION	RESPONSIBLE PARTY			COST ESTIMATES ($K)			COMMENTS/NOTES *
				USFWS						
				Region	Division	Other	FY 1	FY 2	FY 3	
1	1.1	Conduct population surveys	Continuous at 3 year intervals	4	FWE	ARGF COE	6			
1	1.2	Use legislation to protect habitat	continuous	4	FWE	ARPCE ARGF COE EPA	5	5	5	
1	2.1	Characterize habitat	1 year	4	FWE RES	ARGF COE		10		
1	2.2	Determine associate species	1 year	4	FWE RES	ARGF COE		10		
1	2.3	Develop life history data	3 years	4	FWE RES	ARGF COE		100	100	
1	3.1	Develop plan to restore historic habitat	1 year	4	FWE RES ECE	ARGF ARPCE COE		100		
1	3.2	Develop plan for reestablishing mussel populations	5 years	4	FWE RES	ARGF COE		50	50	
1	3.3	Implement plan to restore historic habitat	To be determined	4	FWE RES	ARGF COE				Costs will be determined during completion of earlier tasks.
1	3.4	Implement plan to reestablish populations in historic habitat	To be determined	4	FWE RES	ARGF COE				Costs will be determined during completion of earlier tasks.

IMPLEMENTATION SCHEDULE

PRIOR-ITY #	TASK #	TASK DESCRIPTION	TASK DURATION	RESPONSIBLE PARTY			COST ESTIMATES ($K)			COMMENTS/NOTES *
				USFWS						
				Region	Division	Other	FY 1	FY 2	FY 3	
1	4.1	Determine minimum population levels	10 years	4	FWE RES	ARGF COE	25	25	25	
1	4.2	Develop plan to monitor populations	1 year	4	FWE RES	ARGF COE				Costs will be determined after completion of Task 4.1
1	4.3	Implement monitoring plan	20 years	4	FWE RES	ARGF COE				Costs will be determined after completion of Task 4.2

Part IV: APPENDIX

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