CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Margaritifera marrianae Johnson 1983

COMMON NAME: Alabama pearlshell

LEAD REGION: 4

INFORMATION CURRENT AS OF: January 2003

STATUS/ACTION (Check all that apply):
___ New candidate
_X_ Continuing candidate
    _X_ Non-petitioned
    ___ Petitioned - Date petition received: ___
        ___ 90-day positive - FR date: ___
        ___ 12-month warranted but precluded - FR date: ___
        __ Is the petition requesting a reclassification of a listed species?
    ___ Listing priority change
        Former LP: __
        New LP: __
Latest date species first became a Candidate: _____
___ Candidate removal: Former LP: ___ (Check only one reason)
    ___ A - Taxon more abundant or widespread than previously believed or not subject to a degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
    ___ F - Range is no longer a U.S. territory.
    ___ M - Taxon mistakenly included in past notice of review.
    ___ N - Taxon may not meet the Act=s definition of Aspecies.@
    ___ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Clams and Mussels - Unionidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama

LEAD REGION CONTACT (Name, phone number): Rick Gooch, 404/679-7124

LEAD FIELD OFFICE CONTACT (Office, name, phone number): Jackson, Mississippi Field Office, Paul Hartfield, 601/321-1125

SUPPORT FIELD OFFICE(S): Daphne, Alabama Field Office
BIOLOGICAL INFORMATION (Describe habitat, historic vs. current range, historic vs. current population estimates (# populations, #individuals/population), etc.):

Species Description

The Alabama pearlshell is a medium-sized mussel, up to 95 millimeters (mm) (3.8 inches (in)) in length, and oblong in outline. The shell exterior is colored a dark olivaceous or blackish-brown and is marked by small irregular ridges on the posterior slope of the shell. The nacre is bluish-white and moderately iridescent (see Johnson 1983 for a more detailed description).

Taxonomy

The Alabama pearlshell, (Margaritifera marrianae Johnson 1983), is a fresh water mussel in the family Margaritiferidae. Known only from certain tributaries of the Alabama and Escambia River drainages of south-central Alabama, the Alabama pearlshell was described as a distinct species by Johnson (1983). It had previously been included with the Louisiana pearlshell, Margaritifera hembeli (Conrad 1838), a species now considered endemic to central Louisiana.

Habitat

The Alabama pearlshell is found in shallow riffles and along pool margins of small creeks and streams. The host fish and other aspects of its life history are unknown.

Historical Range/Distribution

The historic and present distribution of the Alabama pearlshell is confined to south-central Alabama (Ortmann 1912, Simpson 1914, Clench and Turner 1956, Stansbery 1976, National Biological Survey (NBS) in litt. 1994; Shelton 1995, 1996, in litt. 1998). In the Escambia River drainage, the species has been reported from tributaries of the Conecuh River, including Sandy Creek; Murder Creek and its tributaries Jordan, Autrey, Gin, Hunter, Otter, Beaver Creeks, and Little Cedar Creek, in Conecuh County; Bottle Creek, Conecuh County; Burnt Corn Creek, Conecuh/Monroe Counties; and Horse Creek, Crenshaw County. The species has also been reported from three streams in the Alabama River drainage: Limestone Creek and its tributary Brushy Creek, and Big Flat Creek, Monroe County, Alabama.

Current Range/Distribution

Knowledge of the current status and distribution of the Alabama pearlshell is based on recent surveys of more than 80 historic and potential localities of the Alabama pearlshell in the Brushy, Burnt Corn, and Patsaliga Creek drainages, and the Conecuh and Sepulga River drainages in Monroe, Conecuh, Crenshaw, Escambia, Covington, and Butler Counties, Alabama. These surveys were conducted between 1991 and 1998 by biologists from the National Fisheries Research Center (Gainesville, Florida), Douglas Shelton (Alabama Malacological Research Center, Mobile, Alabama), and Service biologists (Jackson Field Office, Mississippi, Daphne Field Office, Alabama). More than 50 tributaries of the Alabama River have been recently surveyed for mollusks (Malcolm Pierson, Calera, Alabama, in litt. 1993; McGregor et al. 1996).

Only three populations of Alabama pearlshells were confirmed by the recent survey efforts: Hunter, Jordan, and Little Cedar Creeks, Murder Creek drainage, Conecuh County, Alabama (NBS field records in litt. 1991, 1993; Service field records in litt. 1991-1994, Shelton in litt. 1998). However, the status of the Hunter Creek population is currently in doubt. Numbers of Alabama pearlshell were low in Hunter Creek in 1998 (8 individuals reported, Shelton in litt.),

but two 1999 visits to the stream found no evidence of the species (Shelton in litt. 1999) at which time increased sedimentation of Hunter Creek was observed.

Population Estimates/Status

Jordan Creek supports the highest numbers of Alabama pearlshell (63 individuals reported in 1998), and the presence of a few juvenile/subadult individuals indicates some level of recruitment in this population. Little Cedar Creek also contains good numbers of Alabama pearlshells (54 individuals reported in 1998) and shows the greatest variety of age classes of the three populations. Both Jordan and Little Cedar Creeks continued to sustain good populations with considerable evidence of recent recruitment in 1999 (Shelton in litt. 1999).

Evidence suggests that much of the decline of this species has occurred within the past few decades. The Alabama pearlshell was relatively common in localized portions of Limestone Creek and its tributary Brushy Creek, Alabama River drainage, as recently as 1974 (Williams, National Biological Survey (NBS), pers. comm. 1993). Searches of this creek drainage in recent years have located only a few shell fragments (NBS in litt. 1994). Twelve specimens of the Alabama pearlshell were collected from Horse Creek, Conecuh River drainage, Crenshaw County, as recently as 1981 (University of Massachusetts collection record). Repeated searches of this stream drainage have failed to locate even shell fragments, and the species appears to be extirpated from this portion of its range. Records of occurrence exist for Autrey Creek from 1964 (Museum of Fluvatile Mollusks collection record). The most recent records from other historically occupied sites in Murder Creek proper, three of its tributaries, and Burnt Corn Creek, date from the early 1900's. The species has apparently been extirpated from these localities.

The most recent surveys indicate that the distribution of the Alabama pearlshell continues to decline. The species was last reported in 1995 from Sandy Creek, Conecuh County, and Big Flat Creek, Monroe County, however, 1998 surveys failed to relocate Alabama pearlshells at these sites (Shelton in litt. 1998).

Specific causes of the decline and disappearance of the Alabama pearlshell from historic stream localities are unknown. However, they are probably related to past and present land use patterns. Many of the small streams historically inhabited by the Alabama pearlshell are impacted to various degrees by nonpoint source pollution.
THREATS (Describe threats in terms of the five factors in section 4 of the ESA providing specific, substantive information. If this is a removal of a species from candidate status or a change in listing priority, explain reasons for change):

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

The Alabama pearlshell has disappeared from most of its historic range, including 13 stream systems in south Alabama. The species is now known to inhabit two small stream systems in Conecuh County, Alabama. The small stream habitats of the Alabama pearlshell are vulnerable to habitat modification, sedimentation, and water quality degradation from a number of activities associated with modern civilization. Highway construction, improper logging practices, agriculture, housing developments, pipeline crossings, or cattle grazing often result in physical

disturbance of stream substrates or the riparian zone, and/or changes in water quality, temperature, or flow.

Sedimentation can cause direct mortality of freshwater mussels by deposition and suffocation (Ellis 1936, Box and Mossa 1999) and can eliminate or reduce the recruitment of juvenile mussels (Negus 1966, Box and Mossa 1999). Suspended sediment can also interfere with feeding activity (Dennis 1984). Many of the streams recently surveyed for the Alabama pearlshell were characterized by high sediment loads (NBS and Service field observations, 1991-1994). Heavy sand bedloads in some of the streams have apparently rendered them unsuitable for any mussel species. Current sources of sand and other sediment accumulation in south-central Alabama stream channels include cultivated fields, silviculture practices, cattle grazing, and unpaved road drainage. Certain silvicultural and agricultural activities cause erosion, riparian buffer degradation, and increased sedimentation of stream habitats. Strict adherence to Forestry Best Management Practices and maintaining buffers between cultivated fields and riparian areas minimizes these impacts. Uncontrolled access to small streams by cattle may result in destruction of riparian vegetation, bank degradation and erosion, and localized sedimentation of stream habitats. Alabama pearlshell habitat in Hunter Creek exhibited evidence of recent sedimentation during surveys in 1999 (Shelton in litt. 1999), presumably from construction of an upstream nature trail.

Several streams surveyed for the presence of the Alabama pearlshell showed signs of eutrophication, such as heavy growth of blue-green and other algae (NBS in litt. 1994, Service field observations 1994). Nutrients, usually phosphorus and nitrogen, may emanate from agricultural fields, residential lawns, livestock feedlots, poultry houses, and leaking septic tanks in levels that result in eutrophication and reduced oxygen levels in small streams.

Pesticide residues from agricultural, residential, or silvicultural activities may also impact Alabama pearlshell populations. There is no information on the sensitivity of this species to common pesticides. The Alabama pearlshell may be more susceptible to pesticide residues than test organisms currently used in bioassays, therefore, pesticide label restrictions may be inadequate to protect them. Agricultural crops locally grown within the range of the Alabama pearlshell that are associated with high pesticide use include cotton, peanuts, and soybeans.

The confirmed extant populations of the Alabama pearlshell are in the vicinity of highway crossings. The primary habitat and highest abundance of the Hunter Creek population is immediately downstream of a heavily used U.S. Highway. Highway and bridge construction and widening could eliminate this population unless appropriate precautions are implemented to protect the species.

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

The Alabama pearlshell is not a commercially valuable species nor are the small streams it inhabits subject to harvesting activities for commercial mussel species. The species has been taken for scientific and private collections in the past. Such activity may increase as the species rarity becomes known. Although collecting is not considered a factor in the decline of this species, the localized distribution and small size of the known extant populations renders them vulnerable to overzealous recreational or scientific collecting.

C. Disease or predation.

Diseases of freshwater mussels are poorly known. Juvenile and adult mussels are prey items for some invertebrate predators and parasites (nematodes, mites, etc.), and provide prey for a few vertebrate species (racoons, muskrats, otter, etc.). Although predation by naturally occurring predators is a normal aspect of the population dynamics of a healthy mussel population, predation may contribute to the further decline of this species due to the localized extent and low numbers of mussels associated with the extant populations.

D. The inadequacy of existing regulatory mechanisms.

Although the negative effects of point source discharges on aquatic communities in Alabama have been reduced over time by compliance with State and Federal regulations pertaining to water quality, there has been less success in dealing with nonpoint source pollution impacts to small stream drainages. Such impacts result from individual private landowner activities (e.g., construction, grazing, agriculture, silviculture, etc.), and public construction works (e.g., bridge and highway construction and maintenance, etc.). The effects of such activities can be, and often are reduced by employing Best Management Practices. There is currently no requirement within the scope of Federal environmental laws to specifically consider the Alabama pearlshell during Federal activities, or to ensure that Federal projects will not jeopardize its continued existence.

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

The threats to the Alabama pearlshell are compounded by its limited range and low numbers. The three known populations are vulnerable to random catastrophic events (e.g., flood scour, drought, toxic spills, etc.). The effects of the 2000 drought on Alabama pearlshell are currently unknown, however, the small stream habitat of the species is susceptible to dewatering from droughts. Limited range and low numbers also makes the species vulnerable to land use changes within the three occupied watersheds that would result in increases in nonpoint source pollution impacts.
The Alabama pearlshell would be adversely affected by the loss or reduction in numbers of the fish host essential to its parasitic glochidial stage. The specific fish host for larval Alabama pearlshells is not known, therefore, impacts on this aspect of the mussel's life cycle cannot be evaluated.

FOR RECYCLED PETITIONS:

a. Is listing still warranted? ___
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? ___
c. Is a proposal to list the species as threatened or endangered in preparation? ___
d. If the answer to c. above is no, provide an explanation of why the action is still precluded.

LAND OWNERSHIP (Estimate proportion Federal/state/local government/private, identify non-private owners): All habitat is privately owned.

PRELISTING (Describe status of conservation agreements or other conservation activities):

Conservation activities have been limited to working with private landowners in south Alabama to encourage the use of Best Management Practices to reduce the effects of agriculture and silviculture.

REFERENCES (Identify primary sources of information (e.g., status reports, petitions, journal publications, unpublished data from species experts) using formal citation format):

Box, J.B. and J. Mossa. 1999. Sediment, land use, and freshwater mussels: prospects and problems. J. N. Am. Benthol. Soc. 18(1):99-117.

Clench, W.J. and R.D. Turner. 1956. Fresh-water mollusks of Alabama, Georgia, and Florida from the Escambia to the Suwannee River. Bulletin of the Florida State Museum 1:97-239.

Conrad, T.A. 1838. Monography of the family Unionidae, or naiades of Lamarck, (Fresh water bivalve shells) of North America. Philidelphia, Pennsylvania, pp. 93-94, plate 51.

Dennis, S.D. 1984. Distributional analysis of the freshwater mussels of the Tennessee River system, with special reference to possible limiting effects of siltation. Ph.D. Dissertation, VPI & SU, Blacksburg, Virginia, 171 pp.

Ellis, M.M. 1936. Erosion silt as a factor in aquatic environments. Ecology 17:29-42.

Johnson, R.I. 1983. Margaritifera marrianae, a new species of Unionacea (Bivalvia:Margaritiferidae) from the Mobile-Alabama-Coosa and Escambia River systems, Alabama. Occ. Papers on Mollusks, Harvard Univ., Cambridge, Massachusetts.

McGregor, S.W., T.E. Shepard, T.D. Richardson, and J.F. Fitzpatrick, Jr. 1996. A survey of the primary tributaries of the Alabama and lower Tombigbee Rivers for listed and candidate species of freshwater mussels, snails and crayfish, 1994-1996. Geological Survey of Alabama, Tuscaloosa, AL. 34 pp.

Negus, C.L. 1966. A quantitative study of growth and production of unionid mussels in the River Thames at Reading. J. Animal Ecol. 35:513-532.

Ortmann, A.E. 1912. Notes upon the families and genera of the najades. Annals of the Carnegie Museum 8(2):222-365.

Shelton, D.N. 1995. A status survey for the Alabama Pearl Shell, Margaritifera marrianae R.I. Johnson, 1983. Barry A. Vittor and Associates, Inc., Mobile, AL. 11 pp.

Shelton, D.N. 1996. The distribution, abundance, and life history of the Alabama pearlshell, Margaritifera marrianae R.I. Johnson, 1983. Alabama Malacological Research Center. Mobile, AL. 12 pp.

Simpson, C.T. 1914. A descriptive catalogue of the naiades or pearly freshwater mussels. Detroit, Michigan, Parts 1-3,pp. 523-524.

Stansbery, D.H. 1976. Naiad mollusks. In: H. Boschung (ed.). Endangered and threatened plants and animals of Alabama. Alabama Museum of Natural History Bulletin (2):44.

LISTING PRIORITY (place * after number)

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2*
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: Small stream habitats occupied by Alabama pearlshell are highly vulnerable to changes in adjacent land use and resulting perturbations.

Imminence: There are now only three small, localized populations of Alabama pearlshell known. One of these may have been recently extirpated.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all additions of species to the candidate list, removal of candidates, and listing priority changes.

Approve: Linda Kelsey March 14, 2003
Acting Regional Director, Fish and Wildlife Service Date

Concur: _____ _____
Director, Fish and Wildlife Service Date

Do not concur: _____ _____
Director, Fish and Wildlife Service Date

Director's Remarks:

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Date of annual review: January 2003

Conducted by: Paul Hartfield - Jackson, Mississippi FO

Comments:

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