

SPECTACLECASE

***Cumberlandia monodonta* (Say)**

OTHER NAMES. None.

DESCRIPTION. Moderately solid shell (max. length = 180 mm [7 1/16 in.]) elongate and arcuate with rounded anterior and posterior margins; taller anteriorly than posteriorly and somewhat inflated from the umbo posteriorly, forming a broadly rounded posterior ridge. Posterior slope and disk of shell unsculptured. Umbo sculpture in the form of ridges parallel to growth annuli. Periostracum of young shells tan to light brown and may have a greenish tinge, darkening to black or dark brown with age. Pseudocardinal teeth rudimentary, consisting of a single peg-like tooth in right valve that fits into a depression in left valve. Pseudocardinals somewhat better developed in young shells; lateral teeth become indistinct with age. No interdentum, and umbo cavity shallow. Shell nacre white. (Modified from Simpson 1914, Parmalee and Bogan 1998, Baird 2000)

DISTRIBUTION. Throughout Mississippi River system, including Tennessee River of Alabama (Parmalee and Bogan 1998). Extant only in riverine reaches downstream of Wilson and Guntersville Dams (Garner and McGregor 2001).

HABITAT. A variety of substrata, including gravel, sand, and mud, in free-flowing, medium to large rivers, often in water more than four meters (13 feet) deep. Lives mostly among, and under, large rocks (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. Reproductive biology in Gasconade and Meramec Rivers described by Baird (2000). A short-term brooder, with gravid period in April and May. White, feather-shaped conglomerates observed, but not determined if they functioned as host attractants, or were simply aborted glochidial contents. Experimental determination of glochidial hosts inconclusive, but glochidia from natural infestations observed on [bigeye chub](#) and [shorthead redhorse](#). Species often occurs in dense beds, with local densities reported as high as 120 per square Gasconade and Meramec Rivers.

BASIS FOR STATUS CLASSIFICATION. Although widespread, has suffered extensive habitat loss and population fragmentation caused by impoundment of rivers and other human perturbations throughout Mississippi River drainage. Recently categorized as rare in the two areas where extant (Garner and McGregor 2001). Restricted distribution, specialized habitat requirements, and declining population trend make it vulnerable to extirpation from the state. Listed as a species of special concern (Stansbery 1976a) and considered imperiled in Alabama (Lydeard *et al.* 1999), and classified as threatened throughout its distribution (Williams *et al.* 1993). **Recently elevated to *candidate status* for protection by the U.S. Fish and Wildlife Service.**

Prepared by: Jeffrey T. Garner

ALABAMA PEARLSHELL

***Margaritifera marrianae* R. I. Johnson**

OTHER NAMES. None.

DESCRIPTION. Has moderately thick and compressed shell (max. length = 95 mm [3 3/4 in.]), oblong and subrhomboidal in outline, being rounded to somewhat truncate anteriorly and bluntly pointed posteriorly, with the point located toward the posterior-ventral margin. Ventral margin straight to slightly convex and dorsal margin convex and meeting the upper extent of posterior margin obliquely. Posterior ridge low and rounded, somewhat doubled, and adorned with strong corrugations that extend onto the posterior slope and for a short distance onto disk of shell. Periostracum smooth on disk, but roughened on corrugated areas; varies from olivaceous to very dark brown or black. Pseudocardinal teeth triangular, low, and stumpy; lateral teeth straight with no interdentum between. Umbo cavity wide and shallow. Shell nacre white, sometimes with pale purple cast. (Modified from Johnson 1983, Mott and Hartfield 1994)

DISTRIBUTION. Endemic to four-county area in south-central Alabama. Most of the area lies in the headwaters of the Escambia River drainage in Butler, Conecuh, and Crenshaw Counties, but a disjunct

population is in Limestone Creek, a nearby tributary of the lower Alabama River in Monroe County (Mott and Hartfield 1994, Shelton 1997).

HABITAT. Shallow riffles and pool margins in substrata consisting of silty sand, sand, gravel, or a mixture of sand and gravel in headwater creeks (Mott and Hartfield 1994, Shelton 1997).

LIFE HISTORY AND ECOLOGY. Little known, although observed occupying streams in pairs, with male upstream of female (Shelton 1997). Females gravid in December, but not February, March, or July (Williams *et al.*, in review). Hosts of glochidia unknown.

BASIS FOR STATUS CLASSIFICATION. Restricted distribution, rarity, and declining population trend make it highly susceptible to extinction. Classified as endangered throughout its distribution (Williams *et al.* 1993), imperiled in Alabama (Lydeard *et al.* 1999), and **currently considered a candidate for protection by the U.S. Fish and Wildlife Service.**

Prepared by: Stuart W. McGregor

MUCKET

Actinonaias ligamentina (Lamarck)

OTHER NAMES. Grass Mucket, Brass Mucket, Steamboat Mucket.

DESCRIPTION. Has solid shell (max. length = 140 mm [5 1/2 in.]), variable in outline, with adults usually being elongate oval to elliptical. Juveniles may be somewhat trapezoidal in outline. Dorsal and ventral margins generally slightly convex, but may be straight in subadults. Anterior margin broadly rounded and posterior margin narrowly to broadly rounded. Adults usually moderately inflated, but juveniles compressed. Females may be slightly swollen posteriorly. Posterior ridge low and rounded, but posterior slope may be moderately steep near the umbo. Shell disk and posterior slope without sculpture. Umbos broad and slightly inflated, barely elevated above the hinge line. Umbo sculpture consists of faint, irregular, double-looped ridges. Periostracum smooth and varies from tawny to greenish, sometimes with variable green rays, usually darkening to dark brown with age. Pseudocardinal teeth triangular and striate, and separated from slightly curved lateral teeth by a long, narrow interdendum. Umbo cavity open and moderately shallow. Shell nacre generally white, rarely light pink. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Throughout the Mississippi River system, with exception of extreme southern and western reaches. Also occurs in St. Lawrence River Basin and tributaries of Lakes Erie, Michigan, and Ontario (Burch 1975, Parmalee and Bogan 1998). Apparently never common in lower bend of the Tennessee River, it has been reduced to no more than two tributary populations in Alabama, in Shoal and Second Creeks, Lauderdale County. Viability of both populations is questionable.

HABITAT. A variety of habitats, ranging from shoals with gravel and cobble bottoms to mud-bottomed pools (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A long-term brooder, being gravid from August to May (Surber 1912). Glochidia reportedly use a variety of fish hosts, including [rock bass](#), [green sunfish](#), [orangespotted sunfish](#), [bluegill](#), [smallmouth bass](#), [largemouth bass](#), [white crappie](#), [black crappie](#), [yellow perch](#), [sauger](#), [white bass](#), and banded killifish (Young 1911, Lefevre and Curtis 1910, Coker *et al.* 1921). [American eels](#) and [tadpole madtoms](#) natural hosts, but deemed of little significance (Coker *et al.* 1921).

BASIS FOR STATUS CLASSIFICATION. Restricted distribution, rarity, and declining population trend make species vulnerable to extirpation from state, where it has been listed as endangered (Stansbery 1976a) and imperiled (Lydeard *et al.* 1999). Williams *et al.* (1993) listed it as currently stable throughout most of its distribution.

Prepared by: Jeffrey T. Garner

SLIPPERSHELL MUSSEL

Alasmidonta viridis (Rafinesque)

OTHER NAMES. None.

DESCRIPTION. Has moderately thick shell (max. length = 55 mm [2 1/8 in.]), subrhomboidal in outline, with slightly convex dorsal and ventral margins, rounded anterior margin, and a posterior margin that is truncate or bluntly pointed ventrally. A well-developed, rounded posterior ridge extends to the point of the posterior margin. Shell disk and posterior slope unsculptured. A moderately inflated umbo is raised slightly above the hinge line and the umbo sculpture consists of irregular, heavy loops. Periostracum of young specimens greenish or yellowish, with numerous wavy green rays, darkening with age to a dark olive brown with rays often becoming indistinct. Pseudocardinal teeth triangular and somewhat rudimentary; lateral teeth indistinct. Interdentum narrow or absent and umbo cavity shallow. Shell nacre white. (Modified from Parmalee and Bogan 1998)

DISTRIBUTION. Widespread in eastern United States, and distributed from Lakes Huron, St. Clair, and Erie, and upper Mississippi River system, south to Ohio, Cumberland, and Tennessee River systems (Parmalee and Bogan 1998). In Alabama, confined to tributary streams of the Tennessee River system. Streams where recent collections have been made include Hurricane Creek in Paint Rock River system, Jackson County (Ahlstedt 1995, McGregor and Shelton 1995), and Fowler Creek in Flint River system, Madison County (McGregor and Shelton 1995).

HABITAT. Often found in slow to moderate current, usually at depths of less than one meter (Neves 1991). May reside in substrata ranging from sand to gravel and appears somewhat tolerant of silt (Mathiak 1979). Often found associated with aquatic vegetation, such as water willow (*Justicia americana*) (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A long-term brooder, becoming gravid in September (Ortmann 1921). Hosts of glochidia unknown.

BASIS FOR STATUS CLASSIFICATION. Restricted distribution, rarity, and declining population trend make species vulnerable to extirpation. Classified as a species of special concern in Alabama (Lydeard *et al.* 1999) and throughout its distribution (Williams *et al.* 1993).

Prepared by: Stuart W. McGregor

FANSHELL

Cyprogenia stegaria (Rafinesque)

OTHER NAMES. Eastern Fanshell, Ohio Fanshell, Pimpleback, Ringed Wartyback.

DESCRIPTION. Has solid shell (max. length = 70 mm [2 3/4 in.]) rounded in outline, with all margins at least slightly convex, although the posterior margin may be somewhat truncate. Posterior ridge well developed and angular proximal to the umbo, but becomes narrowly rounded ventrally. Shell sculpture consists of numerous rounded and irregular pustules on the posterior two thirds, with pustules near the middle of the shell often forming regular rows. Umbos moderately inflated and raised above the hinge line. Strong, low, concentric ridges, indicative of growth rests, often present. Umbo sculpture rudimentary, consisting of weak ridges. Periostracum usually pale greenish yellow, but may darken to yellowish brown in older individuals. Pattern on periostracum consists of small, green flecks or dots, usually arranged as wide rays. Pseudocardinal teeth thick, rough, and divergent; lateral teeth short, heavy, and slightly curved. Interdentum wide and flat, and the umbo cavity shallow and compressed. Shell nacre white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Historically, the Ohio, Tennessee, and Cumberland River systems (Simpson 1914). In Alabama, historically found in the Tennessee River across northern Alabama, and probably the Elk River. Although extant, it is very rare in the tailwaters of Wilson Dam, but has not been collected in Guntersville Dam tailwaters since reported by Isom (1969). Viability of Wilson tailwater population questionable.

HABITAT. Lotic areas of medium to large rivers, generally in shoals with clean, coarse, sand and gravel substrata (Neves 1991). However, also occurs in water over three meters deep in riverine habitats downstream of Tennessee River Dams (*e.g.*, Wilson Dam).

LIFE HISTORY AND ECOLOGY. Reproductive biology from Tennessee River headwaters (Jones and Neves 2002b) indicates it is a long-term brooder, with a gravid period from October through May. Produces conglomerates that resemble worms. Conglomerates are red when containing developing embryos, but pale with maturity. Hosts for glochidia include mottled and banded sculpins; greenside, snoobnose, banded,

tangerine, and Roanoke darters; [blotchside logperch](#); and [logperch](#) (Jones and Neves 2002b). However, Roanoke darter does not occur sympatrically with this species, so is not a natural host.

BASIS FOR STATUS CLASSIFICATION. Has suffered drastic habitat loss and population fragmentation with impoundment of rivers throughout its distribution. Vulnerable to extinction due to limited distribution, specialized habitat requirements, and susceptibility to habitat degradation. Was classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Stansbery 1976a), but now listed as extirpated from the state (Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1991.**

Prepared by: Jeffrey T. Garner

ALABAMA SPIKE

Elliptio arca (Conrad)

OTHER NAMES. None.

DESCRIPTION. Has solid and compressed to moderately inflated shell (max. length = 75 mm [2 15/16 in.]) elliptical in outline, with a rounded anterior margin and bluntly pointed or biangulate posterior margin; dorsal and ventral margins more or less straight. Posterior ridge variable and varies from well formed and angled, to low and rounded or absent. Disk and slope of shell unsculptured. Umbos low and compressed, not elevated above the hinge line. Umbo sculpture in form of strong longitudinal bars that may be double looped. Periostracum rough and dull olive brown to very dark brown, becoming darker with age. Pseudocardinal teeth triangular, usually deeply serrated and widely divergent; lateral teeth long and straight. Interdentum very narrow or absent and there is no umbo cavity. Shell nacre highly variable, ranging from purple to salmon or white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to Mobile Basin in Alabama, Georgia, Mississippi, and Tennessee. Although widespread in Mobile Basin, population in Sipsey River is only one that appears healthy.

HABITAT. Lotic areas in medium to large streams both above and below the Fall Line. Highest densities occur in shallow, swift shoals in gravel/sand substrata, but individuals also can be found in deep gravel and sand-bottomed runs with slow but steady current. Individuals rarely found in pools, silty stream margins, or backwater areas (W. R. Haag and M. L. Warren, USDA Forest Service, unpubl. data).

LIFE HISTORY AND ECOLOGY. A short-term brooder, and females release glochidia in June and July. Method of host infestation unknown, but glochidia released in association with copious amounts of mucus, which may serve to entangle fishes. Primary hosts for glochidia are redspotted and [blackbanded darters](#). [Southern sand darter](#) is a marginal host. (Summarized from Haag and Warren 2003)

BASIS FOR STATUS CLASSIFICATION. Vulnerable to extinction due to its restricted distribution, rarity, and declining population trend. Occurs primarily in small, isolated populations in Black Warrior, Coosa, and Tombigbee River systems, many of which could be easily lost with further habitat degradation. Was classified as threatened throughout its distribution (Williams *et al.* 1993), and in Alabama was listed as endangered (Stansbery 1976a) and imperiled by Lydeard *et al.* (1999).

Prepared by: Wendell R. Haag

DELICATE SPIKE

Elliptio arctata (Conrad)

OTHER NAMES. None.

DESCRIPTION. Shell elongate and somewhat compressed (max. length = 80 mm [3 1/8 in.]), elliptical and arcuate in outline, with a ventral margin straight to slightly concave, dorsal margin slightly convex, anterior margin narrowly rounded, and posterior margin narrowly rounded to somewhat truncate. Posterior ridge low and rounded. Shell disk and posterior ridge without sculpture. Umbos low and not elevated above the hinge line. Umbo sculpture consists of corrugated ridges parallel to growth lines. Periostracum varies from dull yellowish green in juveniles to dark brown or black in old specimens. Pseudocardinal teeth triangular, low,

and stumpy; lateral teeth long, thin, slightly curved, and remote from pseudocardinals. No interdentum, and umbo cavity very shallow. Shell nacre dull bluish white, but may be salmon in umbo cavity. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Problematic. Has been reported from throughout Mobile Basin. A form closely resembling *E. arctata* occurs in Alabama reaches of Escambia River system, but its true identity is uncertain at this time.

HABITAT. In coarse sand and gravel, often under and around large rocks, and usually in current (Parmalee and Bogan 1998). Several may be found packed vertically under large rocks (Hurd 1974).

LIFE HISTORY AND ECOLOGY. Unknown, but presumably a short-term brooder like its congeners.

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and specialized habitat requirements make *E. arctata* vulnerable to extinction. Was listed as threatened throughout its distribution (Williams *et al.* 1993) and imperiled in Alabama (Lydeard *et al.* 1999).

Prepared by: Jeffrey T. Garner

SPIKE

***Elliptio dilatata* (Rafinesque)**

OTHER NAMES. Lady Finger.

DESCRIPTION. Has thick, compressed shell (max. length = 120 mm [4 3/4 in.]), elliptical in outline, with a rounded anterior margin, bluntly pointed posterior margin, slightly convex dorsal margin, and straight to slightly convex ventral margin. Posterior ridge strongly developed and rounded. Shell disk and posterior ridge unsculptured. Umbos depressed and flattened, not elevated above the hinge line. Umbo sculpture consists of moderate to heavy loops. Periostracum varies from light brown to yellowish green in young shells, but becomes dark greenish brown to black with age. Rays may be present in young shells, but often become obscure with age. Pseudocardinal teeth strong and rough, two in left valve, one in right; lateral teeth straight and rough. Interdentum moderately wide. Shell nacre variable, varying from purple to light pink, rarely white (Modified from Cummings and Mayer 1992, Howells *et al.* 1996, Parmalee and Bogan 1998, Strayer and Jirka 1997)

DISTRIBUTION. Widespread in eastern United States, occurring throughout much of the Mississippi River system and portions of the Great Lakes drainage. In Alabama, restricted to Tennessee River drainage (Cummings and Mayer 1992, Howells *et al.* 1996, Parmalee and Bogan 1998, Strayer and Jirka 1997). Extant in tailwaters of Wilson and Gunterville Dams, where it was listed as uncommon and rare, respectively (Garner and McGregor 2001).

HABITAT. Creeks and rivers, primarily in areas with current, but also may be found in lakes under some conditions. Preferred substrata appear to be sand and gravel (Cummings and Mayer 1992, Howells *et al.* 1996, Parmalee and Bogan 1998, Strayer and Jirka 1997).

LIFE HISTORY AND ECOLOGY. A short-term brooder, with a gravid season from May to August. Reported glochidial hosts include rock bass, white and black crappie, rainbow darter, yellow perch, banded sculpin, gizzard shad, and flathead catfish. A dominant species in some mussel beds (Cummings and Mayer 1992, Howells *et al.* 1996, Parmalee and Bogan 1998, Strayer and Jirka 1997).

BASIS FOR STATUS CLASSIFICATION. Restricted distribution, rarity, and specialized habitat requirements make *E. dilatata* vulnerable to extirpation from Alabama. Currently listed as stable throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999).

Prepared by: Jeffrey J. Herod

FLUTED ELEPHANTEAR

***Elliptio mcmichaeli* Clench and Turner**

OTHER NAMES. None.

DESCRIPTION. Has thin and somewhat compressed shell (max. length = 100 mm [3 15/16 in.]), elliptical in outline and rounded anteriorly, and bluntly pointed posteriorly. Posterior ridge well defined and posterior slope slightly concave, often with a series of small, arcuate ridges extending from posterior ridge to dorsal margin. Umbos broad, but not elevated above the hinge line, and positioned well anterior of center. Periostracum very dark brown and may be faintly rayed in young specimens. One pseudocardinal tooth present in right valve, one large and one small pseudocardinal tooth present in left valve. Shell nacre white to pale pink or salmon. (Modified from Clench and Turner 1956)

DISTRIBUTION. Endemic to Choctawhatchee River system in Alabama and Florida (Clench and Turner 1956). Has suffered recent declines from some portions of its distribution (Blalock-Herod *et al.*, in review).

HABITAT. Areas with moderate current and sand, or a mixture of sand and gravel substrata. Appears somewhat tolerant of silty conditions (Blalock-Herod *et al.*, in review).

LIFE HISTORY AND ECOLOGY. A short-term brooder, found gravid with viable glochidia in April and May (J. J. Herod, USFWS, pers. comm., 2002). Glochidial hosts unknown, but its disappearance from Pea River upstream of Elba Dam suggests it uses a migratory fish (Blalock-Herod *et al.*, in review).

BASIS FOR STATUS CLASSIFICATION. Imperiled based on its restricted distribution, vulnerability to habitat degradation, and recent population declines. Minimal additional habitat degradation could result in extinction. Classified as a species of special concern throughout its distribution (Williams *et al.* 1993, Blalock-Herod *et al.*, in review). Listed as a species of special concern in Alabama (Lydeard *et al.* 1999).

Prepared by: Stuart W. McGregor

INFLATED SPIKE

***Elliptio purpurella* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has moderately thick, inflated shell (max. length = 65 mm [2 5/8 in.]), elliptical and slightly arcuate in outline, with a rounded anterior margin, posterior margin rounded to bluntly pointed, dorsal margin slightly convex, and ventral margin slightly concave. Posterior ridge well developed, but low and rounded. Shell disk and posterior ridge unsculptured. Umbos somewhat full, but not elevated above the hinge line. Periostracum brown with broad green rays that may be obscure. Two pointed, divergent pseudocardinal teeth in each valve; lateral teeth short and curved. No interdentum present, and umbo cavity shallow. Shell nacre purple. (Modified from Brim Box and Williams 2000)

DISTRIBUTION. Endemic to Apalachicola Basin. Historically, occurred in Chattahoochee and Chipola River systems in Alabama. Brim Box and Williams (2000) considered it extirpated from Alabama. However, specimens recently collected from Big Creek, Chipola River headwaters in Houston County, Alabama, appear to be *E. purpurella*, but identification unconfirmed (Jeff Garner, Ala. Div. Wildl. Freshwater Fish., unpubl. data).

HABITAT. Creeks and rivers, primarily in areas with current, but also may be found in lakes under some conditions. Preferred substrata appear to be sand and clay, often associated with limestone (Brim Box and Williams 2000).

LIFE HISTORY AND ECOLOGY. Nothing known; presumably a short-term brooder.

BASIS FOR STATUS CLASSIFICATION. Limited distribution and rarity make *E. purpurella* vulnerable to extinction. Only recently recognized as a valid species (Brim Box and Williams 2000), so was not addressed in Williams *et al.* (1993) or Lydeard *et al.* (1999).

Prepared by: Jeffrey J. Herod

PURPLE BANKCLIMBER

Elliptoideus sloatianus (Lea)

OTHER NAMES. None.

DESCRIPTION. Has thick shell (max. length \geq 200 mm [7 7/8 in.]) rhomboidal in outline, with a broadly rounded anterior margin and obliquely truncate posterior margin that has a slight biangulation ventrally; dorsal and ventral margins more or less straight. Posterior ridge well defined, doubled on the distal half resulting in the biangulation at its ventral margin. Shell disk and posterior ridge heavily sculptured with somewhat radial plications that are less prominent anteriorly. Umbos full, but only slightly elevated above the hinge line. Periostracum chestnut to dark brown. Pseudocardinal teeth stumpy, but strong, and striate; lateral teeth fairly short, two in the left valve and one in the right valve. Interdentum very narrow and umbo cavity shallow. Shell nacre white with purple along margins. (Modified from Lea 1840; Simpson 1900, 1914; Brim Box and Williams 2000)

DISTRIBUTION. Endemic to Apalachicola Basin and Ochlockonee River system in Alabama, Florida, and Georgia (Clench and Turner 1956). In Alabama, known only from main channel of Chattahoochee River (Brim Box and Williams 2000). Was considered extirpated until a single specimen was found recently in Goat Rock Reservoir (C. Stringfellow, University of Columbus, Columbus, Georgia, pers. comm., 2002).

HABITAT. Main channels of large streams and rivers in a variety of substrata, ranging from firm clay to sand and fine gravel, or sand over limestone (Clench and Turner 1956, Brim Box and Williams 2000). Does not appear to tolerate reservoir conditions (Brim Box and Williams 2000).

LIFE HISTORY AND ECOLOGY. A short-term brooder; found gravid in February and March (Brim Box and Williams 2000). Primary glochidial hosts have not been identified, but O'Brien (1997) reported secondary host to be eastern [mosquitofish](#).

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and specialized habitat requirements make species susceptible to extirpation from Alabama. Considered rare throughout its distribution (Clench and Turner 1956, Athearn 1970) and in Alabama (Stansbery 1971). More recently listed as threatened throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as *threatened* by the U.S. Fish and Wildlife Service in 1998.**

Prepared by: Holly Blalock-Herod

CUMBERLAND COMBSHELL

Epioblasma brevidens (Lea)

OTHER NAMES. None.

DESCRIPTION. Has solid, moderately thick shell (max. length = 80 mm [3 1/8 in.]), somewhat ovate to subtriangular in outline. Posterior margin of females rounded and those of males somewhat bluntly pointed. Shells of females moderately to greatly inflated, depending on age, but those of males hardly inflated. Posterior ridge rounded. Females of reproductive age usually have a narrow marsupial swelling that is manifested as a ventral extension of the posterior ridge, with sulci anteriorly and posteriorly separating it from the rest of the shell. Ventral margin of marsupial swelling ornamented with small serrations. Shell disk and posterior slope without sculpture. Umbos elevated slightly above the hinge line. Umbo sculpture consists of weak double loops. Periostracum smooth or cloth-like in texture and yellowish to tawny brown, marked with narrow, broken, green rays radiating out from the umbo. Pseudocardinal teeth triangular and ragged, separated from short, heavy lateral teeth by a short, narrow interdentum. Umbo cavity shallow. Shell nacre white. (Modified from Lea 1831, Simpson 1914, Johnson 1978, Parmalee and Bogan 1998)

DISTRIBUTION. Historic distribution includes entire Tennessee and Cumberland Rivers and some of their tributaries (Johnson 1978, Parmalee and Bogan 1998). However, has not been reported from Tennessee

River proper since it was impounded (Garner and McGregor 2001). Only known extant population in Alabama is in Bear Creek, Colbert County (McGregor and Garner, in review).

HABITAT. Lotic areas of small to large rivers and large creeks (Wilson and Clark 1914). Apparently not tolerant of silty conditions.

LIFE HISTORY AND ECOLOGY. A long-term brooder, with females brooding glochidia from autumn through June of the following year (TVA 1986). Glochidia discharged individually, rather than being discharged in host-attracting conglutinates (TVA 1986). Fishes reported to serve as hosts include greenside, fantail, spotted, redline, snubnose, wounded, and Roanoke darters; logperch; and mottled, black, and banded sculpins (TVA 1986, Yeager and Saylor 1995, Jones and Neves 2002a). The Roanoke darter does not occur sympatrically with *E. brevidens*, so not a natural host.

BASIS FOR STATUS CLASSIFICATION. Apparently, last extant population in Alabama decimated by construction of four dams in the Bear Creek system in Colbert and Franklin Counties, and it survives in only a 5.5-kilometer (3.4-mile) reach of Bear Creek in Colbert County (McGregor and Garner, in review). A restricted distribution, declining population trend, and specialized habitat requirements make *E. brevidens* very susceptible to extirpation from the state. Stansbery (1976a) originally listed species as threatened in Alabama. Now classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1997.**

Prepared by: Jeffrey T. Garner

SOUTHERN COMBSHELL

***Epioblasma penita* (Conrad)**

OTHER NAMES. None.

DESCRIPTION. Has solid shell (max. length = 55 mm [2 1/8 in.]) rhomboidal to subtriangular in outline, with a rounded anterior margin and truncate posterior margin. Females of reproductive age have a distinct marsupial swelling posteriorly and may be somewhat more rounded than males along that margin. Posterior ridge sharp dorsally, but becomes rounder with a ventral progression, and incorporated into marsupial swelling of females. Shell adorned with radial sculpturing posteriorly that is generally stronger in females. Umbos full and elevated above hinge line. Periostracum varies from brownish yellow to greenish yellow, sometimes with inconspicuous dots or triangles in a radial arrangement on posterior part of shell. Pseudocardinal teeth ragged and irregular; lateral teeth short and straight. Interdentum short and very narrow when present, and umbo cavity shallow. Shell nacre white or straw colored. (Modified from Simpson 1914, USFWS 2000)

DISTRIBUTION. Endemic to Mobile Basin in Alabama and Mississippi. Historic distribution within basin uncertain. Most records are from Tombigbee and lower Alabama Rivers, but a few historic records exist from the Cahaba and Coosa River systems (Stansbery 1976a, 1983a). Only known extant population is in lower Buttahatchee River, possibly ranging upstream into Alabama for a short distance.

HABITAT. Lotic areas of medium to large rivers, generally in gravel and sand substrata in moderate to swift current (Williams 1982).

LIFE HISTORY AND ECOLOGY. Unknown. Other species of *Epioblasma* are long-term brooders and use darters (Percidae) as glochidial hosts (Yeager and Saylor 1995, Rogers *et al.* 2001).

BASIS FOR STATUS CLASSIFICATION. Prior to 1980, the largest populations occurred in the Tombigbee River, but most of these populations were destroyed by construction of the Tennessee-Tombigbee Waterway. A small population persisted until mid-1980s in a short reach of the Tombigbee River in Mississippi not directly modified by the waterway (R. Jones, Mississippi Museum of Natural Science, pers. comm., 2002). Only known remaining population in Buttahatchee River, but McGregor (1999) reported habitat to be poor in Alabama reaches of river downstream of the city of Hamilton. Vulnerable to extinction

due to its severely limited distribution, declining population trend, and specialized habitat requirements. Was classified as endangered throughout its distribution (Williams *et al.* 1993), in Alabama (Stansbery 1976a), and Lydeard *et al.* (1999) more recently considered it extirpated from Alabama. **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1987.**

Prepared by: Wendell R. Haag

SNUFFBOX

Epioblasma triquetra (Rafinesque)

OTHER NAMES. None.

DESCRIPTION. Has solid, thick shell (max. length = approx. 70 mm [2 3/4 in.] in males; 50 mm [2 in.] in females) generally inflated and triangular, with a rounded anterior margin and truncate posterior margin. Ventral margin slightly convex in males and almost straight in females. Females have marsupial swelling posterior ventrally. Posterior ridge sharp, especially in females, with a widely flattened posterior slope. Shell disk and posterior slope without sculpture. Umbos inflated, elevated above hinge line, turned forward and inward, and located anterior to center of shell. Periostracum generally smooth, yellow to yellowish green, with irregular broken dark green rays that often appear as square, triangular, or chevron-shaped markings. Pseudocardinal teeth strong, elevated and roughened, or serrated; lateral teeth short, strong, serrated, and erect, with two in left valve and one in right valve. Interdentum narrow and short, or absent. Umbo cavity wide and deep. Shell nacre white, often with a silvery luster and a gray-blue tinge in umbo cavity. (Modified from Parmalee and Bogan 1998)

DISTRIBUTION. Distributed widely in Mississippi, lower Missouri, Ohio, Cumberland, and Tennessee River systems, and in middle Great Lakes Basin. In Alabama, once occurred in Tennessee River and several of its tributaries. However, now known to persist only in Paint Rock River system, Jackson County (Steve Fraley, North Carolina Wildlife Resources Commission, pers. comm., 2002).

HABITAT. Large creeks to large rivers, generally in gravel and sand substrata in shoal and riffle habitats. Individuals often completely buried, or with only their posterior slopes exposed (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A long-term brooder. Gravid females observed from September to May, with glochidial discharge taking place in late May (Ortmann 1919). Reported hosts include logperch, Roanoke darter, and banded and black sculpins (Yeager and Saylor 1995; J.W. Jones, Virginia Polytechnic Institute and State University, pers. comm., 2002). However, the Roanoke darter does not occur sympatrically with *E. triquetra*, so not a natural host.

BASIS FOR STATUS CLASSIFICATION. Only extant population in Alabama located in Paint Rock River system, Jackson County. Densities very low and long-term viability questionable. Many populations distribution-wide declining or have become extirpated. Considered threatened throughout its distribution (Williams *et al.* 1993) and endangered (Stansbery 1976a) or imperiled in Alabama (Lydeard *et al.* 1999). **Considered a *species of concern* by U.S. Fish and Wildlife Service, Southeast Region.**

Prepared by: Robert S. Butler

SHINY PIGTOE

Fusconaia cor (Conrad)

OTHER NAMES. None.

DESCRIPTION. Has solid and somewhat inflated shell (max. length = 80 mm [3 1/8 in.]) subtriangular in outline, with anterior margin broadly rounded and somewhat obliquely truncate above, and posterior margin nearly straight, but obliquely angled; dorsal and ventral margins nearly straight. Posterior ridge narrowly rounded or angular and may be slightly doubled, ending in a point or slight biangulation ventrally. A medial

swelling is located anterior of posterior ridge, with a shallow sulcus separating the two. Shell disk and posterior ridge without sculpture. Umbo moderately high and full, oriented anteriorly and elevated only slightly above hinge line. Umbo sculpture consists of a few broken, subnodulous ridges. Periostracum greenish yellow to yellowish tan, or brown, in young individuals, often darkening with age to dark brown, or black. Both wide and narrow green rays present in younger specimens, but may become indistinct with age. One of most distinctive characteristics is shininess of periostracum that persists even in old individuals. Pseudocardinal teeth heavy and triangular, separated from stout, straight lateral teeth by a short, but wide, interdentum. Umbo cavity deep and compressed. Shell nacre white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to Tennessee River system, historically occurring from its headwaters downstream to Muscle Shoals and in some of its large tributaries (Parmalee and Bogan 1998). Extirpated from Tennessee River proper (Garner and McGregor 2001), but still occurs in several tributaries, including [Paint Rock River](#) in Alabama (Ahlstedt 1995).

HABITAT. Shoal and riffle habitat of medium to large rivers (Neves 1991).

LIFE HISTORY AND ECOLOGY. A short-term brooder, spawning from late May to early June and gravid from mid-May to mid-July (Ortmann 1921, Kitchel 1985). Eggs and developing embryos usually crimson, but may be pink (Ortmann 1921). Fishes reported to serve as hosts for glochidia include [telescope](#), [warpaint](#), and common shiners (Kitchel 1985).

BASIS FOR STATUS CLASSIFICATION. Suffered severe distribution reductions during the twentieth century. Imperiled due to restricted distribution, specialized habitat requirements, and declining population trend. Classified as endangered throughout its distribution (Williams *et al.* 1993), and in Alabama (Stansbery 1976a, Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1976.**

Prepared by: Jeffrey T. Garner

FINERAYED PIGTOE

***Fusconaia cuneolus* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has solid, somewhat inflated, shell (max. length = 80 mm [3 1/8 in.]), subtriangular to rhomboidal in outline, with an anterior margin that is rounded, but often obliquely truncate on dorsal half, and posterior margin that is bluntly pointed to narrowly rounded. Posterior ridge well-developed, angular near umbo, but becoming more rounded ventrally, where it ends in a blunt point. Shell disk and posterior slope unsculptured. Umbos moderately full and elevated above hinge line. Periostracum has satiny texture and is dull yellowish green to olive brown, marked with green rays of varying length, which may be indistinct. Pseudocardinal teeth low, rough, and triangular; lateral teeth fairly long and usually straight, but may be slightly curved. Interdentum short and wide, and umbo cavity moderately deep. Shell nacre white. (Modified from Lea 1840, Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to Tennessee River system, historically occurring from headwaters in Virginia, downstream to Muscle Shoals, and in some tributaries (Parmalee and Bogan 1998). However, has been extirpated from Tennessee River proper (Garner and McGregor 2001). A population in Paint Rock River (Ahlstedt 1995) appears to be only one extant in Alabama.

HABITAT. Shoal habitat of medium to large rivers. Typically lives in stable, mixed substrata, with particle sizes ranging from sand to cobble (Neves 1991). However, Ortmann (1925) reported finding it in a sand and mud mixture in a small creek.

LIFE HISTORY AND ECOLOGY. A short-term brooder, spawning in May, with females being gravid until late July (Ortmann 1921, Bruenderman and Neves 1993). Embryos bright pink, but change to light orange or peach as they mature (Ortmann 1921, Bruenderman and Neves 1993). Fishes reported to serve as hosts

include river chub; [whitetail](#), white, [telescope](#), and [Tennessee shiners](#); central stoneroller; [fathead minnow](#); and mottled sculpin (Bruenderman and Neves 1993).

BASIS FOR STATUS CLASSIFICATION. Limited distribution, specialized habitat requirements, and declining population trend make *F. cuneolus* vulnerable to extinction. Classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Stansbery 1976a, Lydeard *et al.* 1999). **Listed as endangered by the U.S. Fish and Wildlife Service in 1976.**

Prepared by: Jeffrey T. Garner

NARROW PIGTOE

Fusconaia escambia Clench and Turner

OTHER NAMES. None.

DESCRIPTION. Has heavy, inflated shell (max. length \geq 70 mm [2 3/4 in.]) subcircular in outline, with a somewhat pointed posterior margin. Posterior ridge well defined and posterior slope slightly concave. Shell disk and posterior slope without sculpture. Umbos broad and full, elevated above hinge line, and positioned slightly anterior of center. Periostracum smooth on upper disk, but slightly roughened on posterior slope and along ventral margin; reddish brown in young specimens, but darkens with age to very dark brown. Pseudocardinal teeth crenulate, one large one in right valve, two in left valve. Shell nacre usually deep salmon, but rarely white. (Modified from Clench and Turner 1956, Williams *et al.*, in review)

DISTRIBUTION. Endemic to Gulf Coast drainages, where known from Escambia and Yellow River systems in Alabama and Florida (Johnson 1969, Williams and Butler 1994). Apparently extirpated from Yellow River system (Williams *et al.*, in review).

HABITAT. Small to medium rivers with sand, gravel, or sandy gravel substrata and slow to moderate flow (Williams and Butler 1994).

LIFE HISTORY AND ECOLOGY. A short-term brooder. Gravid females with red eggs and red glochidia reported in June (Williams *et al.*, in review). Glochidial hosts unknown.

BASIS FOR STATUS CLASSIFICATION. Vulnerable to extinction because of limited distribution, rarity, and susceptibility to habitat degradation. Classified as threatened throughout its distribution (Williams *et al.* 1993), and as a species of special concern (Stansbery 1976a) and imperiled in Alabama (Lydeard *et al.* 1999).

Prepared by: Stuart W. McGregor

ROUND EBONY SHELL

Fusconaia rotulata (Wright)

OTHER NAMES. None.

DESCRIPTION. Has heavy, inflated shell (max. length = 70 mm [2 3/4 in.]) almost circular in outline, with rounded margins on all sides. Posterior ridge faint, but well rounded, and posterior slope very slightly concave. Shell disk and posterior slope without sculpture. Umbos inflated and elevated above hinge line. Periostracum smooth and very dark brown to black. Pseudocardinal teeth heavy, broad, and divergent; lateral teeth short and slightly curved. Interdentum short, but broad, and umbo cavity deep. Shell nacre white. (Modified from Simpson 1914, Williams and Butler 1994.) Recently considered to belong to *Obovaria* until genetic evaluation and comparative studies of soft anatomy suggested a closer relationship to *Fusconaia* group (Williams and Butler 1994, Lydeard *et al.* 2000).

DISTRIBUTION. Endemic to Escambia River drainage in Alabama and Florida (Williams and Butler 1994). In Alabama, appears confined to main channel of [Conecuh River](#), where occurs as far upstream as Conecuh/Covington County line.

HABITAT. Known only from main channel of Escambia and Conecuh Rivers, in areas with moderate current and with sand or a mixture of sand and gravel substrata (Williams and Butler 1994).

LIFE HISTORY AND ECOLOGY. Although little known of life history, presumably a short-term brooder, as are its congeners. Hosts of glochidia unknown.

BASIS FOR STATUS CLASSIFICATION. Limited distribution and rarity make *F. rotulata* susceptible to extinction from habitat degradation within Escambia River watershed. Classified as endangered throughout its distribution (Williams *et al.* 1993), and deemed imperiled in Alabama (Lydeard *et al.* 1999).

Prepared by: Stuart W. McGregor

LONGSOLID

Fusconaia subrotunda (Lea)

OTHER NAMES. Round Solid, Pigtoe.

DESCRIPTION. Has solid shell (max. length = 100 mm [3 15/16 in.]) oval to broadly elliptical in outline, with dorsal and ventral margins gently convex, and anterior margin broadly rounded. Specimens from large rivers usually inflated, but those from smaller streams compressed to only moderately inflated. Posterior margin gently rounded to obliquely truncate. Posterior ridge weak to lacking. Shell disk and posterior slope without sculpture. Umbos high and full, elevated well above hinge line and turned anteriorly. Umbo sculpture weak, consisting of a few subnodulous ridges or wrinkles. Periostracum somewhat cloth-like in texture, tawny to greenish brown, darkening with age to almost black in some individuals. Pseudocardinal teeth low, heavy, and divergent; lateral teeth moderately long and straight. Interdentum somewhat short, but wide. Umbo cavity deep and somewhat compressed. Shell nacre white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Throughout much of the Tennessee, Cumberland, and Ohio River systems (Burch 1975). In Alabama, known to be extant only in Tennessee River tailwaters of Guntersville and Wilson Dams.

HABITAT. Lotic areas. In tailwaters of Wilson and Guntersville Dams, occurs in substrata composed of mixtures of sand, gravel and cobble, with minimal siltation, usually at depths of four to six meters (13 to 19 3/4 feet.).

LIFE HISTORY AND ECOLOGY. Little known; presumably a short-term brooder, being gravid from spring to mid-summer, like its congeners. Glochidial hosts unknown.

BASIS FOR STATUS CLASSIFICATION. Vulnerable to extirpation from Alabama because of limited distribution, rarity, and specialized habitat requirements. Rare in two remaining populations in state (Garner and McGregor 2001). Listed as a species of special concern throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999), although Stansbery (1976a) considered it endangered in Alabama.

Prepared by: Jeffrey T. Garner

CRACKING PEARLYMUSSEL

Hemistena lata (Rafinesque)

OTHER NAMES. None.

DESCRIPTION. Has thin, slightly inflated shell (max. length = 90 mm [3 1/2 in.]) elongate and elliptical to rhomboidal in outline, with rounded anterior margin and bluntly pointed to obliquely truncate posterior margin. Posterior ridge low and rounded, occasionally sculptured with a few strong ridges. Umbos low and compressed, turned slightly anteriorly. Periostracum dull yellow to brownish green or brown, usually with scattered, broken, dark green rays of varying width. Pseudocardinal teeth only a single raised knob or ridge; lateral teeth appear as a thickened hinge line with no interdentum. Umbo cavity very shallow or absent. Shell

nacre pale bluish white, with a dark purple umbo cavity. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Historically, in the Ohio, Cumberland, and Tennessee River systems. In Alabama, extant only in the Elk River, where densities very low and viability of population questionable.

HABITAT. Riverine reaches of large rivers, but more typically found in medium rivers, usually in less than one meter (3 1/4 feet) of water (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A short-term brooder; although Ortmann (1915) observed specimens gravid with eggs and glochidia in mid-May, Jones and Neves (2002a) reported finding only eggs and embryos in three gravid specimens collected from Clinch River between late April and late June. Hosts of glochidia include whitetail shiner, central stoneroller, and streamline chub, as well as banded sculpin and fantail darter (J.W. Jones, Virginia Polytechnic Institute and State University, pers. comm., 2002). Often difficult to collect, due to propensity for burrowing deeply into substrata of mud, sand, and fine gravel using its proportionally large foot (Yokley 1972, Parmalee and Bogan 1998).

BASIS FOR STATUS CLASSIFICATION. Severely restricted distribution, rarity, and specialized habitat requirements make *H. lata* vulnerable to extinction. Classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Stansbery 1976a), although most recently listed as extirpated from Alabama (Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1989.**

Prepared by: Jeffrey T. Garner

PINK MUCKET

Lampsilis abrupta (Say)

OTHER NAMES. Ohio Mucket, Tan Mucket, Square Mucket.

DESCRIPTION. Has very solid, somewhat inflated shell (max. length = 120 mm [4 3/4 in.]). Males generally attain greater size than females. Shell ovate to subquadrate in outline. Males rounded to very bluntly pointed posteriorly; females have a broadly rounded to truncate posterior margin. Valves often gape anteriorly, along ventral margin, especially in females. Posterior ridge well-defined in males and lies adjacent to dorsal margin, but indistinct in more inflated females. Shell disk and posterior slope without sculpture. Umbos inflated and raised above hinge line. Umbo sculpture consists of faint, scarcely looped ridges. Periostracum yellow to dark brown, darkening with age; variable dark green rays may be present. Pseudocardinal teeth large and triangular, separated from strong, slightly curved lateral teeth by a broad interdentum. Umbo cavity broad and deep. Shell nacre varies from white to pink or salmon. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Encompasses Ohio, Tennessee, Cumberland, and lower Mississippi Rivers, as well as some of their larger tributaries. Although historically found in entire reach of Tennessee River across northern Alabama, it currently occurs only in riverine reaches downstream of Wilson and Guntersville Dams, where reportedly uncommon to rare (Garner and McGregor 2001). A single gravid female recently found in lower, unimpounded reaches of Bear Creek, Colbert County (McGregor and Garner, in review).

HABITAT. Free-flowing reaches of large rivers, typically in silt-free, gravel substrata.

LIFE HISTORY AND ECOLOGY. A long-term brooder, gravid from August to the following June (Ortmann 1912, 1919). Fishes reportedly serving as hosts for glochidia include smallmouth bass, [spotted bass](#), and largemouth bass, as well as [freshwater drum](#) and possibly sauger (Parmalee and Bogan 1998, Madison and Layzer 2000).

BASIS FOR STATUS CLASSIFICATION. Although widespread, has suffered severe habitat loss and population fragmentation during the twentieth century. Rarity, specialized habitat requirements, and susceptibility to habitat degradation make it vulnerable to extinction. Was classified as a species of special concern in Alabama (Stansbery 1976a), and, more recently, as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). Specimens younger than 10 years of age reportedly rare in Wilson and Guntersville Dam tailwaters (Garner and McGregor 2001). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1976.**

Prepared by: Jeffrey T. Garner

SOUTHERN SANDSHELL

Lampsilis australis Simpson

OTHER NAMES. None.

DESCRIPTION. Has a moderately thick, elliptical, and moderately inflated shell (max. length \geq 80 mm [3 1/8 in.]), rounded anteriorly and somewhat pointed posteriorly; dorsal and ventral margins slightly convex. Females slightly more inflated and rounded posterior ventrally than males. Posterior ridge low and rounded. Shell disk and posterior slope without sculpture. Umbos moderately inflated, elevated slightly above hinge line. Periostracum smooth and shiny, varying from greenish yellow with green rays in younger specimens to almost black, with obscure rays, in older specimens. Pseudocardinal teeth delicate and somewhat compressed; lateral teeth straight and interdendum narrow. Umbo cavity moderately deep. Shell nacre white to bluish white and iridescent posteriorly. (Modified from Simpson 1900, Athearn 1964, Williams *et al.*, in review).

DISTRIBUTION. Endemic to Gulf Coast drainages, occurring in Escambia, Yellow, and Choctawhatchee River systems in southern Alabama and western Florida (Clench and Turner 1956, Blalock-Herod *et al.* 2002).

HABITAT. Usually clear, medium-sized creeks to rivers, with slow to moderate current and sandy substrata (Williams and Butler 1994).

LIFE HISTORY AND ECOLOGY. A long-term brooder; one of four species that produce superconglutinates to facilitate larval dispersal. Superconglutinates pigmented to resemble small fish and display a darting motion in stream currents, eliciting attacks from potential host fishes (Haag and Warren 1999). Superconglutinates discharged between April and June (Blalock-Herod *et al.* 2002; Haag *et al.* 1995). Preliminary data suggest *L. australis* uses bass species (*Micropterus* spp.) as glochidial hosts, as do other superconglutinate-producing species (Blalock-Herod *et al.* 2002, Haag *et al.* 1995, O'Brien and Brim Box 1999).

BASIS FOR STATUS CLASSIFICATION. Has very restricted distribution, somewhat rare, and has experienced recent declines in habitat. Considered endangered in Alabama for 30-plus years (Athearn 1970, Stansbery 1971). Was classified as threatened throughout its distribution (Williams *et al.* 1993), but now considered endangered throughout (Williams *et al.*, in review; Blalock-Herod *et al.*, in review; Blalock-Herod 2002). Currently listed as imperiled in Alabama (Lydeard *et al.* 1999).

Prepared by: Holly Blalock-Herod

SHINYRAYED POCKETBOOK

Lampsilis subangulata (Lea)

OTHER NAMES. None.

DESCRIPTION. Has a thin, but solid shell (max. length = 85 mm [3 3/8 in.]), subelliptical in outline. Females of reproductive age generally more inflated and rounded posteriorly than males, which are bluntly pointed. Posterior ridge rounded and posterior slope concave. Shell disk and posterior slope without sculpturing. Umbos broad and somewhat inflated, but elevated little above hinge line. Periostracum smooth and shiny, light yellowish brown, with variable bright green rays in young specimens; darkening and obscuring of rays occurs with age. Pseudocardinal teeth double, large, and erect in left valve, and single, large, and spatulate in right valve; lateral teeth straight to very slightly curved. Interdendum narrow. Shell nacre white or bluish, occasionally with salmon tint in umbo cavity. (Modified from Clench and Turner 1956, Williams and Butler 1994)

DISTRIBUTION. Known only from Apalachicola and Ochlockonee River systems. In Alabama, confined to Chattahoochee and upper Chipola River systems (Williams and Butler 1994, Brim Box and Williams 2000). Extant in Big Creek, Houston County, and possibly Uchee Creek, Russell County.

HABITAT. Generally in medium-sized creeks to rivers in clean or silty sand substrata, and slow to moderate current.

LIFE HISTORY AND ECOLOGY. A long-term brooder; females hold superconglutinate packets of glochidia from autumn until late spring or early summer to attract potential fish hosts (O'Brien and Brim Box 1999, Brim Box and Williams 2000). These superconglutinates are pigmented to resemble small fish that display a darting motion in stream currents, and elicit attacks from potential hosts (Haag and Warren 1999). Largemouth and spotted bass serve as hosts (O'Brien and Brim Box 1999).

BASIS FOR STATUS CLASSIFICATION. Restricted distribution, rarity, and dwindling habitat quality make *L. subangulata* susceptible to extinction. Classified as threatened throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1998.**

Prepared by: Stuart W. McGregor

ALABAMA LAMPMUSSEL

***Lampsilis virescens* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has moderately thin shell (max. length = 70 mm [2 3/4 in.]), elliptical to long ovate in outline and somewhat inflated. Anterior margin rounded and posterior margin bluntly pointed in males, slightly more inflated and rounded in females. Dorsal margin slightly rounded and ventral margin straight, but curved upward posteriorly. Posterior ridge low and rounded. Shell disk and posterior slope unsculptured. Umbos moderately full and slightly elevated above hinge line. Umbo sculpture consists of numerous delicate ridges, looped up in the middle. Periostracum greenish to yellow and typically shiny. Thin green rays may be present, especially on posterior slope. Pseudocardinal teeth compressed and elevated and lateral teeth slightly curved and delicate. Interdendum narrow and curved and umbo cavity broad and deep. Shell nacre bluish white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to Tennessee River system and, historically, occurred from its headwaters downstream to Muscle Shoals (Ortmann 1925, Parmalee and Bogan 1998). Now only known to be extant in upper reaches of Paint Rock River system, Jackson County, Alabama (Ahlstedt 1995).

HABITAT. Shoals in small to medium rivers (Parmalee and Bogan 1998). However, its presence at Muscle Shoals, prior to impoundment, indicates ability to exist in larger rivers under some conditions.

LIFE HISTORY AND ECOLOGY. Unknown, but presumably a long-term brooder like its congeners.

BASIS FOR STATUS CLASSIFICATION. Apparently eliminated throughout its distribution, with exception of upper reaches of Paint Rock River system, where rare. Imperiled due to severely restricted distribution, rarity, and vulnerability to habitat degradation. Classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Stansbery 1976a, Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1976.**

Prepared by: Jeffrey T. Garner

SLABSIDE PEARLYMUSSEL

***Lexingtonia dolabelloides* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has solid, moderately inflated, shell (max. length = 85 mm [3 3/8 in.]), generally subtriangular in outline, but exhibits considerable variability within and among populations. Anterior margin broadly rounded, posterior margin narrowly rounded to broadly pointed, dorsal margin slightly convex and ventral margin straight to slightly convex. Most shells have wide, flat disk, from umbo to ventral margin. Posterior ridge narrowly rounded and distinct, and dorsal slope strongly curved. Shell disk and posterior slope without sculpture. Umbos moderately inflated and turned slightly forward, elevated above hinge line and located toward anterior end. Periostracum greenish yellow in juveniles, darkening to tawny or brown with age, often with a few broken green rays or blotches, especially in young specimens. Pseudocardinal teeth triangular with a blade-like accessory tooth in left valve; lateral teeth large and curved. Interdentum well formed, but narrow, and umbo cavity shallow. Shell nacre usually white, but may be straw colored. In live specimens, foot always bright orange. (Modified from Lea 1840, Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Historically, included the Tennessee River from headwaters downstream to at least area now comprising tailwaters of Pickwick Dam, with a disjunct population in Duck River of central Tennessee (Ortmann 1924*b*, Yokley 1972, Parmalee and Bogan 1998). In Alabama, appears to be extant in Paint Rock River system (Ahlstedt 1995) and a short reach of Bear Creek, Colbert County (McGregor and Garner, in review).

HABITAT. Flowing water of large creeks and medium to large rivers.

LIFE HISTORY AND ECOLOGY. A short-term brooder, gravid between mid-May and August (Ortmann 1921, Kitchel 1985). Eggs and developing embryos usually deep red, but may be orange (Ortmann 1921). Fishes reported to serve as hosts of glochidia are popeye, rosyface, saffron, silver, telescope, and Tennessee shiners (Kitchel 1985).

BASIS FOR STATUS CLASSIFICATION. Impoundment of Tennessee River resulted in extensive habitat loss and fragmentation of populations. Restricted distribution, specific habitat requirements, and declining population trend make it vulnerable to extirpation from state. Was classified as threatened throughout distribution (Williams *et al.* 1993) and endangered (Stansbery 1976*a*) and imperiled (Lydeard *et al.* 1999) in Alabama.

Prepared by: Jeffrey T. Garner

CUMBERLAND MOCCASINSHELL

Medionidus conradicus (Lea)

OTHER NAMES. None.

DESCRIPTION. Has moderately thin shell (max. length = 60 mm [2 3/8 in.]), elongate and elliptical in outline, with a rounded anterior margin and posterior margin that comes to a rounded point at distal end of posterior ridge. Old males often become arcuate. Posterior ridge low and indistinct. Females somewhat more inflated along middle of ventral margin, sometimes with faint radial grooves in that area. Posterior slope usually has weak wrinkles or corrugations that may extend anteriorly on to shell disk. Umbos slightly inflated and elevated above hinge line. Umbo sculpture consists of fine, irregular, corrugated ridges that may be double looped. Periostracum slightly shiny and yellowish green to tawny, with weak, broken, dark green rays. Pseudocardinal teeth stumpy and short and lateral teeth straight to slightly curved. No interdentum, and umbo cavity very shallow. Shell nacre bluish white to salmon. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to Cumberland and Tennessee River systems, historically occurring in Tennessee River from its headwaters downstream to Muscle Shoals (Ortmann 1925, Parmalee and Bogan 1998). Known to be extant in Alabama only in Paint Rock River system (Ahlstedt 1995) and Foxtrap Creek, Colbert County.

HABITAT. Usually moderate to strong current, generally in small streams to medium rivers, and often under large flat rocks (Parmalee and Bogan 1998). However, its presence at Muscle Shoals, prior to impoundment of Tennessee River (Ortmann 1925) indicates ability to exist in large rivers under certain conditions.

LIFE HISTORY AND ECOLOGY. A long-term brooder, spawning in July; females brood mature glochidia September through late May (Ortmann 1915, 1921; Zale and Neves 1982a). Glochidia found in stream drift every month of year except July and August, suggesting a slow, continual, long-term discharge (Zale and Neves 1982b). Fishes reportedly serving as hosts for glochidia are rainbow, fantail, redline, and striped darters (Zale and Neves 1982a, Luo 1993).

BASIS FOR STATUS CLASSIFICATION. Vulnerable to extirpation due to limited distribution, rarity, and susceptibility to habitat degradation. Long-term viability of Foxtrap Creek population questionable. Although was listed as endangered (Stansbery 1976a), more recently classified as a species of special concern throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999).

Prepared by: Jeffrey T. Garner

GULF MOCCASINSHELL

Medionidus penicillatus (Lea)

OTHER NAMES. None.

DESCRIPTION. Has small, moderately thin, fairly inflated shell (max. length = 55 mm [2 1/8 in.]), elongate elliptical to rhomboidal in outline, with a rounded anterior margin, bluntly pointed posterior margin, very slightly convex dorsal margin, and straight to slightly convex ventral margin. Females tend to have posterior point higher on shell and be somewhat more inflated than males. Posterior ridge well defined and typically has a series of small, thin, radial plications along posterior slope. Shell disk smooth. Umbos moderately inflated and elevated above hinge line. Periostracum yellowish with fine, interrupted green rays and chevrons. Left valve has two stubby pseudocardinal teeth and right valve has one; lateral teeth curved, double in left valve and single in right valve. Shell nacre purple or greenish and slightly iridescent posteriorly. (Modified from Williams and Butler 1994, Brim Box and Williams 2000)

DISTRIBUTION. Appears endemic to Apalachicola Basin in Alabama, Georgia, and Florida, with a disjunct population in Econfinia Creek, Florida. In Alabama, known from main channel and tributaries of Chattahoochee River, as well as Chipola River headwater streams (Brim Box and Williams 2000). Currently restricted in Alabama to Big Creek, Houston County, a Chipola River headwater stream. Identity of *Medionidus* west of Apalachicola Basin (Choctawhatchee, Escambia, and Yellow River systems) uncertain, but have been assigned to *M. penicillatus* by some (e.g., Johnson 1977, Butler 1989). However, until their true identity can be resolved with comparative anatomical and genetic studies, they are tentatively considered *M. acutissimus*. Apalachicola Basin shows little affinity to westward basins, whereas Mobile Basin, to which *M. acutissimus* belongs, shares a number of species with Gulf Coast systems west of Apalachicola Basin (J.D. Williams, U.S. Geological Survey, pers. comm., 2002).

HABITAT. Small creeks to large rivers, with slight to moderate current in a variety of substrata. Most commonly found in sand, sand and cobble mixtures, gravel, and clay sediments (Brim Box and Williams 2000).

LIFE HISTORY AND ECOLOGY. A long-term brooder found with eggs in marsupia in September and mature glochidia in November, February, March, and April. In March, females detected lying on substratum surface displaying a mantle-flapping behavior, presumably to attract host fish. Primary glochidial hosts include brown and blackbanded darters. (Summarized from O'Brien 1997)

BASIS FOR STATUS CLASSIFICATION. Limited distribution, declining population trend, and reduction of quality habitat within distribution make it susceptible to extinction. Considered endangered throughout its

distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1998.**

Prepared by: Holly Blalock-Herod

RING PINK

Obovaria retusa (Lamarck)

OTHER NAMES. Golf-stick.

DESCRIPTION. Has inflated, very solid shell (max. length = 95 mm [3 3/4 in.]). Males grow slightly larger than females. Shell usually ovate in outline, with all margins rounded, but may be irregularly quadrate. Posterior ridge low and rounded in males, but females have a distinct groove posterior to ridge, giving it better definition. Marsupial area of females, located posteriorly, slightly more inflated than same area of males. Shell disk and posterior slope without sculpture. Umbos swollen and turned anteriorly, elevated well above hinge line. Umbo sculpture consists of a few weak, double-looped ridges. Periostracum shiny and without rays, yellowish green to brown in young shells, becoming dark brown or black with age. Pseudocardinal teeth very heavy and triangular and lateral teeth short, heavy, and curved with a wide, but short, interdentum between. Umbo cavity deep and compressed. Shell nacre inside of pallial line varies from light pink to salmon or deep purple; outside pallial line nacre white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Historically, throughout the Ohio, Tennessee, and Cumberland Rivers, as well as many of their major tributaries (Parmalee and Bogan 1998). Only extant populations appear to be in Green River, Kentucky (R.S. Butler, U.S. Fish and Wildlife Service, Asheville, North Carolina, pers. comm., 2001), and possibly middle reaches of Cumberland River (Parmalee and Bogan 1998) and tailwaters of Wilson Dam (Garner and McGregor 2001).

HABITAT. Primarily large rivers (Parmalee and Bogan 1998), but reported from Duck River, indicating it also could occur in small to medium rivers (Ortmann 1924*b*).

LIFE HISTORY AND ECOLOGY. A long-term brooder; females observed brooding eggs in late August and glochidia in September (Ortmann 1909, 1912). Hosts un-known.

BASIS FOR STATUS CLASSIFICATION. Suffered severe declines in distribution during the twentieth century. Has been classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Stansbery 1976*a*, Lydeard *et al.* 1999). One credible report from Wilson Dam tailwaters during 1990s suggests it still occurs there, but in very small numbers (Garner and McGregor 2001). Based on its extremely limited distribution, rarity, and declining population trend, **listed as *endangered* by the U.S. Fish and Wildlife Service in 1989.**

Prepared by: Jeffrey T. Garner

ROUND HICKORYNUT

Obovaria subrotunda (Rafinesque)

OTHER NAMES. None.

DESCRIPTION. Has solid shell (max. length = approx. 60 mm [2 3/8 in.]), elliptical to circular in outline, with all margins rounded. Posterior margins of adult females may be more bluntly rounded than those of males. Shells become inflated with age. Shell surface evenly rounded, without a posterior ridge. Shell disk and posterior slope without sculpture. Umbos full and elevated well above hinge line, turned inward. Umbo sculpture consists of weak, slightly sinuous bars. Periostracum olive to dark brown, occasionally black in old specimens. Young shells may have green rays. Periostracum often has yellowish area on posterior dorsal surface. Pseudocardinal teeth heavy and triangular; lateral teeth short, thick, and curved. Interdentum

narrow or absent and umbo cavity moderately deep. Shell nacre silvery white, sometimes with shades of pink or purple inside pallial line. (Modified from Parmalee and Bogan 1998)

DISTRIBUTION. Throughout the Tennessee and Cumberland River systems, and much of the Ohio River system. Also has been reported from some tributaries of Lakes Erie and St. Clair (Burch 1975, Parmalee and Bogan 1998). In Alabama, appears to be extant only in Paint Rock River (Ahlstedt 1995).

HABITAT. Generally, in medium to large rivers, where it occurs in sand and gravel substrata, usually at depths of less than two meters (6 1/2 feet) (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A long-term brooder, gravid from September into June (Ortmann 1919). Hosts of glochidia unknown.

BASIS FOR STATUS CLASSIFICATION. Extant in Alabama only in Paint Rock River, where its restricted distribution, rarity, and susceptibility to habitat degradation make it vulnerable to extirpation. Although Stansbery (1976a) considered it endangered in Alabama, more recently listed as a species of special concern throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999).

Prepared by: Jeffrey T. Garner

WHITE WARTYBACK

Plethobasus cicatricosus (Say)

OTHER NAMES. None.

DESCRIPTION. Has thick, solid, moderately inflated shell (max. length = 100 mm [3 15/16 in.]), elongate oval to subtriangular in outline, with a broadly rounded anterior margin, narrowly rounded posterior margin, broadly rounded ventral margin, and slightly curved dorsal margin. Posterior ridge low and narrowly rounded to somewhat flattened. On disk of shell an irregular row of low knobs, beginning near umbo and extending obliquely to ventral margin. Umbos full and elevated well above hinge line, turned anteriorly. Periostracum has cloth-like texture and is rayless, yellow or greenish yellow in young specimens, darkening to yellowish brown with age. Pseudocardinal teeth triangular and lateral teeth short, thick, and slightly curved. Interdentum short and wide, and umbo cavity broad and shallow. Shell nacre white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Historically widespread in Ohio, Cumberland, Tennessee, and lower Wabash Rivers (Parmalee and Bogan 1998). Currently, only known extant population in tailwaters of Wilson Dam on Tennessee River, where it is rare (Garner and McGregor 2001).

HABITAT. Lotic areas in large rivers. In Wilson Dam tailwaters it occurs in silt-free substrata composed of a mixture of gravel and sand.

LIFE HISTORY AND ECOLOGY. Unknown, but presumably a short-term brooder like its congeners.

BASIS FOR STATUS CLASSIFICATION. Suffered drastic declines with impoundment of almost all large rivers throughout distribution during twentieth century. Extremely limited distribution, rarity, and declining population trend make it vulnerable to extinction. Originally listed as endangered in Alabama, and possibly extinct, but more recently classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1976.**

Prepared by: Jeffrey T. Garner

ORANGEFOOT PIMPLEBACK

Plethobasus cooperianus (Lea)

OTHER NAMES. Cumberland Pigtoe.

DESCRIPTION. Has solid and moderately inflated shell (max. length = 90 mm [3 1/2 in.]), oval to subtriangular in outline, with a rounded anterior margin and posterior margin obliquely truncate dorsally and rounded ventrally. Posterior ridge low and rounded, or nonexistent. Posterior two-thirds of shell covered with numerous irregular pustules. Umbos full and elevated above hinge line, oriented anteriorly. Periostracum varies from yellowish brown to reddish brown, with juveniles usually having numerous dark green rays that are lost with age. Pseudocardinal teeth somewhat roughened and triangular; lateral teeth short and straight. Interdentum wide and umbo cavity deep and compressed. Shell nacre white, but may be pink inside of pallial line. Foot of live specimens bright orange. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Historically, throughout much of the Ohio, Cumberland, and Tennessee Rivers (Parmalee and Bogan 1998). Still survives in tailwaters of at least some Tennessee River dams (e.g., Pickwick Dam, Hardin County, Tennessee). Although not reported from Alabama since 1979 (Garner and McGregor 2001), may still occur in Wilson or Guntersville Dam tailwaters in very low numbers.

HABITAT. Lotic areas in large rivers (Parmalee and Bogan 1998). In tailwaters of Pickwick Dam, found in silt-free areas in a mixture of sand and gravel.

LIFE HISTORY AND ECOLOGY. A short-term brooder; females gravid from early June through early August (Wilson and Clark 1914, Yokley 1972). Glochidial hosts unknown.

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and susceptibility to habitat degradation make species vulnerable to extinction. Classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Stansbery 1976a, Lydeard *et al.* 1999). May be extirpated from Alabama, but its presence in tailwaters of Pickwick Dam gives hope that it still occurs in very small numbers in tailwaters of Wilson and/or Guntersville Dams (Garner and McGregor 2001). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1976.**

Prepared by: Jeffrey T. Garner

SHEEPNOSE

Plethobasus cyphus (Rafinesque)

OTHER NAMES. Bullhead.

DESCRIPTION. Has thick, moderately inflated shell (max. length = 120 mm [4 3/4 in.]), elongated and oval in outline, with a rounded anterior margin and bluntly pointed or slightly truncate posterior margin. Posterior ridge rounded and slightly curved ventrally. Most specimens have row of large, irregular, broad knobs on shell disk, extending obliquely from near umbo to ventral margin. A shallow depression lies between posterior ridge and row of knobs in most specimens. Umbos full and elevated above hinge line, located toward anterior margin. Umbo sculpture consists of irregular concentric ridges. Periostracum without rays and light yellow to yellowish brown, usually shiny in young specimens, but becoming dull with age. Pseudocardinal teeth erect, roughened and somewhat triangular and divergent; lateral teeth heavy, finely serrate, and slightly curved. Interdentum variable, ranging from very narrow to moderately wide, or may be absent. Umbo cavity shallow. Shell nacre white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Historically, throughout much of the Ohio, Cumberland, and Tennessee River systems, and north to upper Mississippi River (Parmalee and Bogan 1998). Now occurs in scattered populations within those systems. In Alabama, extant only in Tennessee River downstream of Wilson and Guntersville Dams, where it is rare (Garner and McGregor 2001).

HABITAT. Large rivers (Neves 1991). May be found in clean sand and gravel substrata of shoals, as well as in deeper water, such as riverine reaches downstream of large river dams that often exceed six meters (19 3/4 feet) in depth.

LIFE HISTORY AND ECOLOGY. A short-term brooder, with gravid females reported from May through July (Surber 1912). Surber (1913) reported sauger as glochidial host.

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and declining population trend make *P. cyphus* vulnerable to extinction. Classified as threatened throughout its distribution (Williams *et al.* 1993). In Alabama, listed as a species of special concern (Stansbery 1976a) and as imperiled (Lydeard *et al.* 1999). ***Candidate for listing as endangered by the U.S. Fish and Wildlife Service.***

Prepared by: Jeffrey T. Garner

PAINTED CLUBSHELL

***Pleurobema chattanoogaense* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has thick, solid, moderately inflated shell (max. length = approx. 65 mm [2 5/8 in.]), ovate, broadly elliptical, or elongate in outline. Anterior margin broadly rounded and posterior margin narrowly rounded, bluntly pointed or biangulate; dorsal and ventral margins slightly convex. Posterior ridge low and rounded when present, but generally absent. Shell disk and posterior slope unsculptured. Umbos fairly high and inflated, extend only slightly above hinge line and located very near anterior end of shell. Periostracum cloth-like in texture and dull yellowish or greenish tan in juveniles, becoming darker with age. Very dark green, wide, and concentric rest lines also may appear. Juveniles also may have a few narrow green rays on umbo. Pseudocardinal teeth triangular, low, stumpy and double in left valve, moderately high, wedge shaped, often serrated, and single in right valve; lateral teeth long and straight. Interdentum short and fairly wide and umbo cavity shallow. Shell nacre a dull bluish white. (Modified from Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to eastern reaches of Mobile Basin, where known from Coosa and lower Tallapoosa River systems. Thought to persist in Alabama only in Weiss bypass of Coosa River, downstream of Terrapin Creek, Cherokee County.

HABITAT. Large creeks to large rivers, generally in gravel and sand substrata of shoal and riffle habitats.

LIFE HISTORY AND ECOLOGY. A short-term brooder. Reported glochidial hosts include blacktail and Alabama shiners, with much higher transformation rates occurring on former (P.D. Johnson, Tennessee Aquarium Research Institute, pers. comm., 2002).

BASIS FOR STATUS CLASSIFICATION. Only extant population known in Alabama located in a short reach of Coosa River, Cherokee County. Many populations have been lost, and until recently was considered extinct. Limited distribution, specialized habitat requirements, and susceptibility to habitat degradation make it vulnerable to extinction. Considered endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). ***Candidate for protection by the U.S. Fish and Wildlife Service.***

Prepared by: Robert S. Butler

DARK PIGTOE

***Pleurobema furvum* (Conrad)**

OTHER NAMES. None.

DESCRIPTION. Has solid and somewhat inflated shell (max. length = 60 mm [2 3/8 in.]), ovate in outline, with broadly rounded anterior and bluntly pointed posterior margins. Dorsal and ventral margins convex. Posterior ridge rounded, steeper posteriorly. Shell disk and posterior slope without sculpture. Umbos full and elevated above hinge line, positioned anterior of center. Periostracum dull reddish brown to dark brown, sometimes nearly black. Pseudocardinal teeth heavy and angular; lateral teeth very slightly curved. Interdentum short, but well developed, and shell nacre white, sometimes reddish. (Modified from Simpson 1914, USFWS 2000)

DISTRIBUTION. Endemic to upper Black Warrior River system in Alabama (USFWS 2000). Extirpated from most of its former distribution, and currently known to occur only in Sipsey Fork headwaters of Bankhead National Forest and in North River (McGregor and Pierson 1999).

HABITAT. Lotic areas in medium to large streams. Individuals most frequently encountered in riffle habitats with gravel and sand substrata.

LIFE HISTORY AND ECOLOGY. A short-term brooder; females release mature glochidia in June. Transmission of glochidia to host fishes facilitated by females releasing glochidia in conglutinates that resemble food items of small fishes. Conglutinates flattened, oval shaped, and pink to peach colored. Primary glochidial hosts include blacktail shiner, Alabama shiner, and creek chub. The largescale stoneroller and blackspotted topminnow are marginal hosts. (Summarized from Haag and Warren 1997)

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and declining population trend make *P. furvum* vulnerable to extinction. Classified as endangered throughout distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as endangered by the U.S. Fish and Wildlife Service in 1993.**

Prepared by: Wendell R. Haag

SOUTHERN PIGTOE *Pleurobema georgianum* (Lea)

OTHER NAMES. None.

DESCRIPTION. Has solid shell (max. length = 65 mm [2 5/8 in.]), moderately inflated in juveniles, but becoming more compressed with age. Shell outline subrhomboid to ovate, with a broadly rounded anterior margin and bluntly pointed or obliquely truncate posterior margin. Posterior ridge low and rounded, often indistinct. Shell disk and posterior slope unsculptured. Umbos somewhat compressed and elevated only slightly above hinge line. Periostracum dull light yellow or greenish brown in young specimens, darkening to brown with age. Typically one wide, dark green ray on umbo and disk, usually broken and becoming indistinct ventrally. Pseudocardinal teeth low and triangular or linear; lateral teeth low, thick, and slightly curved. Interdentum wide in old specimens, but umbo cavity very shallow. Shell nacre bluish white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to Coosa River system in Alabama, Georgia, and Tennessee (USFWS 2000). Extant in a few widely scattered tributaries, including some streams in Talladega National Forest.

HABITAT. Lotic areas of small to medium streams. Individuals most frequently encountered in riffle habitats with gravel and sand substrata.

LIFE HISTORY AND ECOLOGY. Unknown. Other species of *Pleurobema* are short-term brooders and use cyprinids as glochidial hosts (Haag and Warren 2003).

BASIS FOR STATUS CLASSIFICATION. Extant in only a few, very small, isolated populations. Limited distribution, rarity, and declining population trend make it vulnerable to extinction. Has been classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as endangered by the U.S. Fish and Wildlife Service in 1993.**

Prepared by: Wendell R. Haag

TENNESSEE CLUBSHELL *Pleurobema oviforme* (Conrad)

OTHER NAMES. None.

DESCRIPTION. Has solid, fairly heavy shell (max. length = approx. 90 mm [3 1/2 in.]), obovate, elliptical, or rhomboidal in outline, and slightly to moderately inflated. Anterior margin broadly rounded and posterior

margin bluntly pointed or somewhat truncate; dorsal and ventral margins slightly convex. Posterior ridge low and rounded, often indistinct. Shell disk and posterior slope without sculpture. Umbos moderately full, elevated slightly above hinge line, turned forward, and located very near anterior end of shell. Periostracum generally smooth and dull straw yellow, greenish yellow, or gray brown. Broken green rays of variable width may be associated with umbo and disk. Pseudocardinal teeth stout, triangular, deeply serrate and erect, projecting ventrally from hinge line at a nearly right angle; lateral teeth erect, heavy, long and straight, with two in left valve and one in right valve. Interdentum wide, but umbo cavity shallow. Shell nacre silvery or bluish white. (Modified from Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to Cumberland and Tennessee River systems. Historically, in the Tennessee River downstream to Muscle Shoals and in several of its tributaries. In Alabama, now restricted to Paint Rock River system, Jackson County (Ahlfstedt 1995).

HABITAT. Creeks and small to large rivers in shoals and riffles with substrata of coarse gravel and sand (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A short-term brooder (Parmalee and Bogan 1998). Reported hosts include whitetail and common shiners, central stoneroller, and fantail darter (Weaver *et al.* 1991). Common shiners and central stonerollers do not occur in Tennessee River system of Alabama, but related native fishes such as striped shiners and largescale stonerollers do occur in state and may serve as hosts.

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and declining population trend make *P. oviforme* vulnerable to extirpation from Alabama. Appears to be declining throughout most of its distribution and **considered a species of concern by the U.S. Fish and Wildlife Service** and Williams *et al.* (1993). Once listed as endangered in Alabama (Stansbery 1976a), but more recently listed as a species of concern in state (Lydeard *et al.* 1999).

Prepared by: Robert S. Butler

OVATE CLUBSHELL

***Pleurobema perovatum* (Conrad)**

OTHER NAMES. None.

DESCRIPTION. Has moderately thick shell (max. length = 45 mm [1 3/4 in.]), oval in outline, with a rounded anterior margin and bluntly pointed posterior margin. Posterior ridge narrowly rounded. Shell disk and posterior slope without sculpture. Umbos inflated and rounded, elevated well above hinge line. Periostracum dull yellow to olive in young specimens, darkening to brown with age. Some specimens have a few weak green rays, variable in width. Pseudocardinal teeth erect and triangular; lateral teeth long and straight. When present, interdentum short and narrow. Umbo cavity shallow and open. Shell nacre white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to Mobile Basin (Parmalee and Bogan 1998). Populations remain only in widely scattered localities in Tombigbee, Coosa, and Tallapoosa River systems (McGregor *et al.* 1999, McCullagh *et al.*, in review). Populations in Coosa and Tallapoosa River systems small and isolated. Appears to be extirpated from Black Warrior and Cahaba River systems.

HABITAT. Medium to large streams. In coastal plain streams, found most frequently in silt or silty sand along stream margins or in side channels, and rarely found in main channel riffle or run habitats (W. R. Haag and M. L. Warren, USDA Forest Service, unpubl. data).

LIFE HISTORY AND ECOLOGY. A short-term brooder, gravid from May to July (W. R. Haag and M. L. Warren, USDA Forest Service, unpubl. data). Hosts of glochidia unknown, but other species of *Pleurobema* use cyprinids (Haag and Warren 2003).

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and declining population trend make *P. perovatum* vulnerable to extinction. Also classified as endangered throughout its distribution (Williams *et al.*

1993) and in Alabama (Stansbery 1976a, Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1993.**

Prepared by: Wendell R. Haag

ROUGH PIGTOE

***Pleurobema plenum* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has solid, inflated shell (max. length = 80 mm [3 1/8 in.]), subtriangular in outline, with a truncate anterior margin, straight posterior margin, slightly convex dorsal margin, and rounded ventral margin. Posterior ridge narrowly rounded and slightly curved, ending in a blunt point ventrally on posterior margin. A shallow sulcus often present just anterior to posterior ridge, with a median ridge located centrally. Shell disk and posterior slope without sculpture. Umbos elevated well above hinge line and turned anteriorly. Umbo sculpture consists of a few irregular, nodulous ridges. Periostracum has satiny texture, yellowish brown to reddish brown, sometimes with a series of fine, dark green rays on posterior half of shell. Pseudocardinal teeth large and radial; lateral teeth thick and short. Interdentum broad and umbo cavity moderately deep, wide, and open. Shell nacre usually white, but may be pink. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Historically, from the Ohio, Cumberland, and Tennessee Rivers, southwest to Kansas and Arkansas (Parmalee and Bogan 1998). In Alabama, extant populations exist in Tennessee River tailwaters of Wilson Dam, where very rare, and possibly Guntersville Dam (Garner and McGregor 2001).

HABITAT. Can occur in lotic areas of small to medium-sized rivers, but primarily found in large rivers (Neves 1991, Parmalee and Bogan 1998). In tailwaters of Wilson Dam, found in a mixture of sand and gravel in areas kept free of silt by moderate to strong current.

LIFE HISTORY AND ECOLOGY. A short-term brooder, with gravid females in May (Ortmann 1919). Glochidial hosts unknown.

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and declining population trend make *P. plenum* vulnerable to extinction. Classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Stansbery 1976a, Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1976.**

Prepared by: Jeffrey T. Garner

OVAL PIGTOE

***Pleurobema pyriforme* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has moderately thick, compressed shell (max. length = 60 mm [2 3/8 in.]), subovate to elliptical in outline, with a rounded anterior margin, bluntly pointed posterior margin, slightly convex ventral margin, and almost straight dorsal margin. Posterior ridge biangulate, ending in a blunt point posterior ventrally. Shell disk and posterior slope unsculptured. Umbos elevated slightly above hinge line and positioned anterior of center. Periostracum smooth and shiny, yellowish to chestnut brown, often shaded with green. Pseudocardinal teeth large, crenulate, and doubled in both valves; lateral teeth short and slightly curved. Interdentum very narrow and umbo cavity shallow. Shell nacre salmon to bluish white. (Modified from Simpson 1914, Williams and Butler 1994)

DISTRIBUTION. From Econfinia Creek system, east to Suwannee River system (Brim Box and Williams 2000). In Alabama, confined to headwaters of Chipola River and lower Chattahoochee River system (Brim

Box and Williams 2000). Only known extant population in Big Creek, a headwater tributary of Chipola River, Houston County.

HABITAT. Medium-sized creeks to small rivers, usually in slow to moderate current, especially in stream channels with clean sand or gravel substrata. Tolerates some silt (Williams and Butler 1994, Blalock-Herod 2000).

LIFE HISTORY AND ECOLOGY. A short-term brooder. Gravid individuals observed from March to July (Brim Box and Williams 2000). Fishes reportedly serving as hosts for glochidia include sailfin shiner and eastern mosquitofish (O'Brien 1997).

BASIS FOR STATUS CLASSIFICATION. Limited distribution, dwindling habitat quality within its distribution, and declining population trend make *P. pyriforme* vulnerable to extinction. Although once listed as threatened in Alabama (Stansbery 1976a), more recently classified as endangered throughout its distribution (Williams *et al.* 1993) and within Alabama (Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1998.**

Prepared by: Stuart W. McGregor

PYRAMID PIGTOE

Pleurobema rubrum (Rafinesque)

OTHER NAMES. Pink Pigtoe.

DESCRIPTION. Has thick and solid shell (max. length = 90 mm [3 1/2 in.]), subtriangular in outline, with a somewhat truncate anterior margin, bluntly pointed posterior margin, and straight ventral margin. Posterior ridge low and rounded, but distinct. A very shallow and wide sulcus lies just anterior to posterior ridge, but generally does not extend dorsally to umbo. Shell disk and posterior slope without sculpture. Umbos greatly inflated and elevated well above hinge line, turned anteriorly and located at anterior end of shell. Periostracum light tan to brownish green, usually with green rays in juveniles, but darkens with age to almost black and rays become obscure. Pseudocardinal teeth low, triangular, and rough; lateral teeth straight and finely serrate. Interdentum wide, but umbo cavity very shallow and open. Shell nacre variable, ranging from white to pink or salmon. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Historically, from the Ohio, Cumberland, and Tennessee Rivers, west to Arkansas and possibly Nebraska and upstream in Mississippi River to Wisconsin (Parmalee and Bogan 1998). In Alabama, extant, but uncommon, in tailwaters of Guntersville and Wilson Dams on Tennessee River (Garner and McGregor 2001).

HABITAT. Lotic areas of medium to large rivers (Neves 1991). In unimpounded rivers, often found in shoals at depths of less than one meter (3 1/4 feet), but in tailwaters of dams on large rivers, may be found at depths of more than six meters (19 3/4 feet) (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A short-term brooder, with gravid females in May and July (Ortmann 1919). Hosts of its glochidia unknown.

BASIS FOR STATUS CLASSIFICATION. Noted as uncommon with no specimens less than 10 years old encountered in two extant populations in Alabama (Garner and McGregor 2001). Limited distribution, declining population trend, and specific habitat requirements make species vulnerable to extirpation from state. Classified as threatened throughout its distribution (Williams *et al.* 1993) and imperiled in Alabama (Lydeard *et al.* 1999).

Prepared by: Jeffrey T. Garner

ROUND PIGTOE

***Pleurobema sintoxia* (Rafinesque)**

OTHER NAMES. Solid Pigtoe, Pink Pigtoe, Flat Pigtoe.

DESCRIPTION. Has thick, solid shell (max. length = 120 mm [4 3/4 in.]), usually compressed and highly variable in shape. Most shells subtriangular, but may be elongate oval or subquadrate in outline. Ventral margin may be straight or slightly convex and dorsal margin generally slightly convex. Anterior margin often rounded below and obliquely truncate above. Posteriorly, shell obliquely truncate, with blunt point of posterior ridge located ventrally. Posterior ridge rounded, narrow toward umbo, becoming wider ventrally. Umbos compressed and only slightly elevated above hinge line in specimens from smaller streams, but large river specimens typically have umbos that are full and elevated well above hinge line. In both cases, umbos oriented anteriorly. Umbo sculpture consists of a few coarse, irregular ridges, curving upward posteriorly. Periostracum of juveniles dull tan, with distinct green rays, but darkening with age, becoming deep reddish brown to black, with obscure rays. Pseudocardinal teeth stout, triangular, and serrate; lateral teeth straight, moderately high and finely serrate. Interdentum wide, but umbo cavity very shallow. Shell nacre usually white, but may be various shades of pink. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Historically, throughout the upper Mississippi River system, south to Alabama and Arkansas (Parmalee and Bogan 1998). In Alabama, extant, but rare, in the Tennessee River in the tailwaters of Wilson and Guntersville Dams.

HABITAT. Primarily medium to large rivers, occurring in lotic areas with firm, coarse sand and gravel substrata (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A short-term brooder. Gravid from early May to late July in Wisconsin (Baker 1928). Fish hosts of glochidia include spotfin shiner, bluntnose minnow, and northern redbelly dace, as well as bluegill (Surber 1912, Hove *in* Parmalee and Bogan 1998).

BASIS FOR STATUS CLASSIFICATION. Vulnerable to extirpation from state due to its limited distribution, rarity, and specific habitat requirements. Classified as a species of special concern throughout its distribution (Williams *et al.* 1993) and imperiled in Alabama (Lydeard *et al.* 1999).

Prepared by: Jeffrey T. Garner

HEAVY PIGTOE

***Pleurobema taitianum* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has thick, solid, inflated shell (max. length = 50 mm [2 in.]), obliquely triangular in outline, with a broadly rounded to obliquely truncate anterior margin, slightly convex to obliquely truncate posterior margin, straight ventral margin, and slightly convex dorsal margin. Posterior ridge low, steeper dorsally. Shell disk and posterior slope unsculptured. A wide, radial swelling located just anterior of posterior slope, sometimes with a weak sulcus separating them. Umbos full and elevated well above hinge line, situated at, or exceeding anterior margin. Periostracum dull, varying from tawny to brown, usually darkening with age. Pseudocardinal teeth solid and ragged; lateral teeth moderately long and slightly curved. Interdentum short and well developed, but umbo cavity shallow. Shell nacre white or pink. (Modified from Simpson 1914, USFWS 2000)

DISTRIBUTION. Endemic to Mobile Basin in Alabama and Mississippi, including Cahaba, Coosa, and Tombigbee River systems (Williams 1982, Stansbery 1983c). However, known to be extant only in short reaches of Alabama and Tombigbee Rivers.

HABITAT. Main channel lotic habitat of large rivers, in gravel and sand substrata in moderate to swift current (Williams 1982).

LIFE HISTORY AND ECOLOGY. Unknown. Other species of *Pleurobema* are short-term brooders and use cyprinids as host fishes (Haag and Warren 2003).

BASIS FOR STATUS CLASSIFICATION. Prior to 1980, largest populations occurred in Tombigbee River in Alabama and Mississippi. These populations were destroyed by construction of Tennessee-Tombigbee Waterway. Small populations existed until mid-1980s in lower reaches of Buttahatchee and Sipsey Rivers, in Mississippi and Alabama, respectively. These populations were likely maintained by immigration from Tombigbee River and live individuals have not been found in these two rivers in almost 20 years. Populations in Cahaba and Coosa Rivers likely extirpated and only known remaining population is in a short reach of the Alabama River in Dallas County, and a short reach of the Tombigbee River in Choctaw County. Extremely limited distribution, declining population trend, and specific habitat requirements make *P. taitianum* vulnerable to extinction. Classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Stansbery 1976a, Lydeard *et al.* 1999). **Listed as endangered by the U.S. Fish and Wildlife Service in 1987.**

Prepared by: Wendell R. Haag

KIDNEYSHELL

Ptychobranhus fasciolaris (Rafinesque)

OTHER NAMES. None.

DESCRIPTION. Has solid, but compressed shell (max. length = 150 mm [5 7/8 in.]), elongate and elliptical in outline, with a rounded anterior margin, bluntly pointed posterior margin, slightly convex dorsal margin, and almost straight ventral margin. Posterior ridge located more or less dorsally and rounded, but prominent. Shell disk and posterior ridge without sculpture. Umbos flattened and compressed, elevated little, if any, above hinge line. Umbo sculpture consists of fine, indistinct, wavy ridges. Periostracum yellow to yellowish green, darkening with age to dark chestnut brown. Most specimens adorned with variable green rays that are usually wide and broken and may be wavy. Pseudocardinal teeth low, thick, serrate, and triangular; lateral teeth heavy and usually widely separated, short, and straight. Interdentum long and moderately wide and umbo cavity shallow. Shell nacre white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Throughout Mississippi River system, including the Ohio, Tennessee, and Cumberland Rivers (Parmalee and Bogan 1998). In Alabama, extant populations exist only in Paint Rock River system (Ahlstedt 1995), a short reach of Bear Creek in Colbert County (McGregor and Garner, in review), and the tailwaters of Guntersville and Wilson Dams on the Tennessee River (Garner and McGregor 2001). Very rare in Tennessee River, and populations there may not be viable.

HABITAT. A variety of river types, from large creeks to large rivers, but always found associated with lotic conditions (Parmalee and Bogan 1998). Usually occurs in gravel and cobble substrata kept free of silt by moderate to swift current.

LIFE HISTORY AND ECOLOGY. A long-term brooder. Ortmann (1919) reported species to be gravid in August, and to brood glochidia until following summer, with glochidial discharge taking place from June through August. Glochidial hosts unknown.

BASIS FOR STATUS CLASSIFICATION. Although widespread, species has suffered severe distribution reductions. Limited distribution, rarity, and declining population trend make it vulnerable to extirpation from state. Classified as a species of special concern throughout its distribution (Williams *et al.* 1993) and in Alabama (Stansbery 1976a, Lydeard *et al.* 1999).

Prepared by: Jeffrey T. Garner

TRIANGULAR KIDNEYSHELL

Ptychobranhus greenii (Conrad)

OTHER NAMES. None.

DESCRIPTION. Has solid and moderately inflated shell (max. length = 70 mm [2 3/4 in.]), elongate and subtriangular in outline, being broadly rounded anteriorly and broadly pointed posteriorly, with slightly convex dorsal and ventral margins. Posterior ridge broadly rounded and more or less doubled, usually

distinct. Shell disk and posterior slope unsculptured. Umbos full and high, but not elevated above hinge line. Periostracum dull yellow, darkening to light brown with age. Pseudocardinal teeth low and triangular; lateral teeth high, thin, and straight. Interdentum narrow and umbo cavity moderately shallow. Shell nacre creamy or bluish white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to Mobile Basin, and has been reported from Black Warrior, Cahaba, and Coosa River systems in Alabama, Georgia, and Tennessee. Healthy populations appear to remain in only two streams in Bankhead National Forest. Very small, isolated populations exist in Locust Fork, Cahaba River, and upper Coosa River system (McGregor *et al.* 2000).

HABITAT. Lotic areas in medium to large streams above the Fall Line. Individuals most frequently encountered in riffle habitats with gravel and sand substrata.

LIFE HISTORY AND ECOLOGY. A long-term brooder that releases glochidia in April. Transmission of glochidia to hosts facilitated by females releasing glochidia in conglutinates that resemble food items of hosts. Conglutinates vary among individual mussels and may resemble dipteran larvae or fish eggs. Primary hosts include Warrior, Tuskaloosa, and blackbanded darters, and Mobile logperch. (Summarized from Haag and Warren 1997)

BASIS FOR STATUS CLASSIFICATION. Has experienced dramatic reduction in distribution. Limited distribution, rarity, and declining population trend make *P. greenii* vulnerable to extinction. Was listed as threatened in Alabama (Stansbery 1976a), but more recently classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1993.**

Prepared by: Wendell R. Haag

SOUTHERN KIDNEYSHELL

Ptychobranthus jonesi (van der Schalie)

OTHER NAMES. None.

DESCRIPTION. Has moderately thin, but inflated shell (max. length = 65 mm [2 5/8 in.]), elliptical in outline, with a rounded anterior margin and biangulate posterior margin. Females have a slight marsupial swelling posterior ventrally. Posterior ridge doubled and posterior slope moderately steep. Shell disk and posterior slope without sculpturing. Umbos full, but barely elevated above hinge line, positioned well anterior of center. Periostracum smooth, olivaceous to dark brown, with irregular, often obscure green rays. Two solid, compressed pseudocardinal teeth in left valve, one well developed and one rudimentary pseudocardinal tooth in right valve; lateral teeth thin and slightly curved. Interdentum narrow. Shell nacre bluish white. Gravid females may be easily distinguished from any other sympatric species by folded outer gill demibranchs. (Modified from van der Schalie 1934, Athearn 1964, Fuller and Bereza 1973, Williams and Butler 1994)

DISTRIBUTION. Includes the Choctawhatchee, Yellow, and Escambia River systems in Alabama and Florida (Burch 1975, Butler 1989). However, only recent records from West Fork Choctawhatchee River (Blalock-Herod *et al.*, in review; Williams *et al.*, in review).

HABITAT. Medium-sized creeks to small rivers, usually in silty sand substrata and slow current (Williams and Butler 1994). Also found in small depressions in clay substrata (Blalock-Herod *et al.*, in review).

LIFE HISTORY AND ECOLOGY. Unknown. Presumably a long-term brooder.

BASIS FOR STATUS CLASSIFICATION. Suffered severe declines during recent past. Vulnerable to extinction due to limited distribution and rarity, along with dwindling habitat quality within its distribution. Classified as threatened throughout its distribution (Williams *et al.* 1993, Blalock-Herod *et al.*, in review) and imperiled in Alabama (Lydeard *et al.* 1999).

Prepared by: Stuart W. McGregor

RABBITSFOOT

Quadrula cylindrica cylindrica (Say)

OTHER NAMES. Cylinder, Smooth Cob Shell, Spectacle-case Mussel.

DESCRIPTION. Has solid shell (max. length = 120 mm [4 3/4 in.]), elongate and rhomboidal to rectangular in outline. Young specimens somewhat compressed, but shells become very inflated with age, becoming almost cylindrical. Anterior margin rounded; posterior margin truncate, sometimes obliquely; dorsal margin straight or slightly convex; and ventral margin straight or very slightly concave. Posterior ridge full and rounded, extending obliquely from umbo to posterior ventral margin. Posterior ridge generally adorned with a row of knobs that may be rudimentary in specimens from large rivers, taking the form of broad undulations. Specimens from smaller rivers may have additional, smaller, lachrymous nodules or plications (grading to a very tuberculate form of Tennessee River headwater streams, *Q. c. strigillata*.) Above posterior ridge a wide, shallow radial depression that sometimes ends in a slight biangulation on posterior margin. Posterior slope usually marked with a series of broadly rounded ridges that curve up toward dorsal margin. Posterior slope of specimens from large rivers may be smooth or only weakly sculptured. Umbos moderately elevated above hinge line. Umbo sculpture consists of a few irregular strong ridges or folds. Periostracum varies from light yellow to greenish, darkening to yellowish brown with age. Numerous dark green markings, in form of streaks, chevrons or ventrally pointed triangular spots, cover most of shell surface. Pseudocardinal teeth low and triangular; lateral teeth long and straight. Interdentum, when present, narrow. Umbo cavity moderately deep. Shell nacre usually white, often bluish gray within pallial line, but also may have a pinkish tinge. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Throughout much of lower Mississippi River system, including the Tennessee River. In headwaters of Tennessee River, replaced by *Q. c. strigillata*. In Alabama, extant populations known to exist only in Paint Rock River system (Ahlstedt 1995) and a short reach of Bear Creek, Colbert County (McGregor and Garner, in review). A viable population still exists in tailwaters of Pickwick Dam on Tennessee River, so it is conceivable that it is present, but overlooked, in Wilson Dam tailwaters (Garner and McGregor 2001).

HABITAT. Large creeks to large rivers. In creeks and small rivers often occurs along margins of riffles and runs. In lotic reaches of larger rivers, may be found at depths of more than six meters (19 3/4 feet), as well as upon marginal shelf in shallower water. Majority of specimens in tailwaters of Pickwick Dam found in sand and clay substrata on channel slope and upon marginal shelf.

LIFE HISTORY AND ECOLOGY. A short-term brooder. Hosts of glochidia unknown. However, Yeager and Neves (1986) reported whitetail and spotfin shiners and bigeye chub serve as hosts for *Q. c. strigillata* glochidia.

BASIS FOR STATUS CLASSIFICATION. Although widespread, has suffered severe distribution reductions in Alabama. Limited distribution, rarity, and declining population trend make it vulnerable to extirpation. Classified as threatened throughout its distribution (Williams *et al.* 1993). Stansbery (1976) listed it as endangered and Lydeard *et al.* (1999) listed it as imperiled in Alabama.

Prepared by: Jeffrey T. Garner

SCULPTURED PIGTOE

Quincuncina infucata (Conrad)

OTHER NAMES. None.

DESCRIPTION. Has small, heavy shell (max. length =50 mm [2 in.]), inflated and subcircular in outline. Anterior margin broadly rounded and posterior margin tapered to a rounded point posterior ventrally. Dorsal and ventral margins slightly convex. Posterior ridge poorly defined and posterior slope flat to slightly concave. Sculpturing highly variable, with inconspicuous to distinct chevron shaped plications across most of shell disk and arcuate ridges on posterior slope. Umbos only slightly inflated and not elevated above hinge line. Periostracum dark brown to black. Pseudocardinal teeth triangular and divergent, with two in each valve; lateral teeth short and straight. Shell nacre white to bluish white. (Modified from Clench and Turner 1956, Brim Box and Williams 2000)

DISTRIBUTION. Endemic to Apalachicola and Ochlockonee River basins in Alabama, Georgia, and Florida. In Alabama, historically occurred throughout Chattahoochee River system and headwaters of Chipola River.

Only known extant populations in Alabama in Uchee and Little Uchee Creeks, Russell and Lee Counties, respectively (Brim Box and Williams 2000, Lydeard *et al.* 2000), and Big Creek, Houston County (J.T. Garner, Ala. Div. Wildl. Freshwater Fish., unpubl. data).

HABITAT. Small to large streams and rivers with moderate to swift current in substrata ranging from muddy sand to rocky areas (Brim Box and Williams 2000). Does not appear to tolerate impoundments (Brim Box and Williams 2000), but this species and a closely related species (*Q. kleiniana*) have been reported to be occasionally common in shallow pools and deeper reaches of rivers, often under detritus (Clench and Turner 1956, Jenkinson 1973, Blalock-Herod 2000).

LIFE HISTORY AND ECOLOGY. Little known. Presumably a short-term brooder, since closely related species found gravid in June (Brim Box and Williams 2000). All four gills used to brood glochidia (Ortmann and Walker 1922). Hosts of glochidia unknown.

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and reduction of quality habitat within distribution make it susceptible to extirpation from Alabama. Was listed as a species of special concern throughout its distribution (Williams *et al.* 1993), in Alabama (Lydeard *et al.* 1999), and in Apalachicola Basin (Brim Box and Williams 2000).

Prepared by: Holly Blalock-Herod

CREEPER

Strophitus undulatus (Say)

OTHER NAMES. Squawfoot, Strange Floater, Sloughfoot.

DESCRIPTION. Has compressed and thin shell when young, becoming somewhat inflated and thick with age (max. length = 115 mm [4 1/2 in.]). Elliptical and somewhat rhomboid in outline, with a rounded anterior margin and bluntly pointed posterior margin; point sometimes positioned posterior ventrally. Posterior ridge broadly rounded and usually pronounced in older shells. Shell disk and posterior slope without sculpture. Umbos compressed and elevated only slightly above hinge line. Umbo sculpture consists of heavy bars, somewhat oblique to hinge line. Periostracum yellowish to greenish, marked by dark green rays, sometimes wavy. Shells darken with age to black or dark brown and rays become obscure. Pseudocardinal teeth rudimentary, consisting of thickened areas along hinge line; lateral teeth merely suggested by a thickened hinge line, or absent altogether. Shell without interdentum and umbo cavity shallow. Shell nacre white or bluish white, sometimes salmon or cream within pallial line. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Throughout Mississippi River and Great Lakes systems, northern Atlantic Coast drainages, and parts of Canadian Interior Basin (Burch 1975, Parmalee and Bogan 1998). Presumably throughout Tennessee River system historically. In Alabama, current distribution appears restricted to short reach of Bear Creek, Colbert County, where population may not be viable (McGregor and Garner, in review).

HABITAT. A generalist found in waters varying from high gradient streams to slow, meandering rivers, usually in substrata of fine sand and mud (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A long-term brooder. Gravid from July through April or May of following year (Baker 1928). One of a few species in which glochidia have been reported to develop directly to juvenile stage in gills of female parent without a parasitic stage on a fish (Lefevre and Curtis 1910). However, glochidia also have been shown to undergo a parasitic stage in some cases, utilizing a variety of fishes as hosts, including green sunfish, bluegill, largemouth bass, spotfin shiner, fathead minnow, creek chub, black and yellow bullheads, Plains killifish, and walleye (Hove *in* Parmalee and Bogan 1998).

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and susceptibility to habitat degradation make *S. undulatus* vulnerable to extirpation from Alabama. Listed as currently stable throughout most of its distribution (Williams *et al.* 1993), but Lydeard *et al.* (1999) considered it possibly extirpated from Alabama.

Prepared by: Jeffrey T. Garner

SOUTHERN PURPLE LILLIPUT *Toxolasma corvunculus* (Lea)

OTHER NAMES. Southern Lilliput.

DESCRIPTION. Has moderately thick, somewhat inflated shell (max. length \geq 30 mm [1 1/4 in.]), inequilateral and elliptical to obovate in outline. Anterior margin rounded. Males rounded posteriorly, but mature females have a small, angular marsupial swelling near the posterior end, giving the shell an obliquely truncate posterior margin. Posterior slope rudimentary, narrow, and elliptical. Shell disk without sculpture. Umbos low, sculptured, with undulations. Periostracum dark brown to black, without rays. Pseudocardinal teeth small, erect, somewhat compressed and crenulate; lateral teeth moderately long and slightly curved. Umbo cavity shallow. Shell nacre purple. (Modified from Lea 1868, Simpson 1914)

DISTRIBUTION. Endemic to Mobile River Basin in Alabama. Current distribution poorly known, but seldom encountered and has not been reported for several years.

HABITAT. Creeks and rivers, usually found in sand or silt substrata in areas exposed to variable flow.

LIFE HISTORY AND ECOLOGY. Little known. Ortmann (1924a) reported it to be gravid. Glochidial hosts unknown.

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and reduction of quality habitat make species susceptible to extinction. Listed as poorly known throughout its distribution (Williams *et al.* 1993) and imperiled in Alabama (Lydeard *et al.* 1999).

Prepared by: Jeffrey J. Herod

PALE LILLIPUT *Toxolasma cylindrellus* (Lea)

OTHER NAMES. None.

DESCRIPTION. Has moderately solid shell (max. length = 35 mm [1 3/8 in.]), elongate and elliptical in outline, and inflated in some older specimens. Anterior margin rounded and posterior margin obliquely angled dorsally, rounded ventrally. Dorsal and ventral margins usually straight. Females differ slightly from males in having a weak marsupial swelling posteriorly. Posterior ridge low or absent. Shell disk and posterior slope without sculpture. Umbos moderately inflated, but elevated only slightly above hinge line. Periostracum has cloth-like texture and is tawny or yellowish green, without rays. Pseudocardinal teeth short and stumpy; lateral teeth short and straight. Interdentum narrow and umbo cavity shallow. Shell nacre white outside of pallial line and coppery purple inside it. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to Tennessee River drainage, where historically found in some tributaries from Sequatchie River system downstream to Duck River system (Parmalee and Bogan 1998). One possible record from a Mobile Basin stream in northwestern Georgia (Parmalee and Bogan 1998). Apparently, has been eliminated throughout distribution, except in Paint Rock River system, where rare (Ahlstedt 1995).

HABITAT. Large creeks and small rivers, typically found in gravel in moderate current (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A long-term brooder. Glochidial hosts unknown.

BASIS FOR STATUS CLASSIFICATION. Vulnerable to extinction due to extremely limited distribution, rarity, and susceptibility to habitat degradation. Classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Stansbery 1976a, Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1976.**

Prepared by: Jeffrey T. Garner

DEERTOE

Truncilla truncata Rafinesque

OTHER NAMES. Deerhorn.

DESCRIPTION. Has solid and moderately inflated shell (max. length = 70 mm [2 3/4 in.], but usually less than 50 mm [2 in.]), somewhat triangular to subrhomboid in outline, with a rounded anterior margin and posterior margin that is pointed to obliquely truncate. Posterior ridge prominent and sharply angled, with a steep posterior slope. Often has a wide, shallow sulcus anterior to posterior ridge. Shell disk and posterior slope without sculpture. Umbos full and elevated well above hinge line, turned inward. Umbo sculpture consists of fine, concentric, and double looped ridges. Periostracum yellow, yellowish brown or greenish, rarely reddish, usually with numerous green rays of varying width and may have darker wavy or zigzag blotches. Pseudocardinal teeth strong, triangular and erect, somewhat compressed in left valve; lateral teeth high, compressed, and slightly curved. Interdentum narrow or absent and umbo cavity fairly shallow. Shell nacre usually white, but occasional specimens have salmon or pink nacre. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Throughout Mississippi River system, as well as some tributaries of Lakes Erie and St. Clair (Burch 1975). In Alabama, extant in Tennessee River in tailwaters of Wilson Dam (Garner and McGregor 2001), Paint Rock River (Ahlstedt 1995), and Bear Creek in Colbert County (McGregor and Garner, in review).

HABITAT. Most often medium-sized rivers, but occasionally in large rivers or lakes (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A long-term brooder, remaining gravid from autumn until July of following year (Ortmann 1919). Sauger and freshwater drum reportedly serve as hosts for glochidia.

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and susceptibility to habitat degradation make *T. truncata* vulnerable to extirpation from Alabama. Although Williams *et al.* (1993) considered it to be currently stable overall, Stansbery (1976a) classified it as threatened and Lydeard *et al.* (1999) listed it as a species of special concern in Alabama.

Prepared by: Jeffrey T. Garner

Freshwater Mussels

PRIORITY 2

HIGH CONSERVATION CONCERN

Taxa imperiled because of three of four of the following: rarity; very limited, disjunct, or peripheral distribution; decreasing population trend/population viability problems; specialized habitat needs/habitat vulnerability due to natural/human-caused factors.

Timely research and/or conservation action needed.

Order Unionoida

Family Unionidae

RAYED CREEKSHELL *Anodontooides radiatus*

TENNESSEE PIGTOE *Fusconaia barnesiana*

FINERAYED POCKETBOOK *Lampsilis altilis*

ORANGENACRE MUCKET *Lampsilis perovalis*

FLUTEDSHELL *Lasmigona costata*

TENNESSEE HEELSPLITTER *Lasmigona holstonia*

BLACK SANDSHELL *Ligumia recta*

ALABAMA MOCCASINSHELL *Medionidus acutissimus*

ALABAMA HICKORYNUT *Obovaria unicolor*

SOUTHERN CLUBSHELL *Pleurobema decisum*

FUZZY PIGTOE *Pleurobema strodeanum*

ALABAMA HEELSPLITTER *Potamilus inflatus*

CHOCTAW BEAN *Villosa choctawensis*

COOSA CREEKSHELL *Villosa umbrans*

TAPERED PIGTOE *Quincuncina burkei*

ALABAMA CREEKMUSSEL *Strophitus connasaugaensis*

DOWNY RAINBOW *Villosa villosa*

RAYED CREEKSHELL

Anodontooides radiatus (Conrad)

OTHER NAMES. None.

DESCRIPTION. Shell thin, moderately inflated (may be ≥ 70 mm [2 3/4 in.] long), oblong ovate in outline, with a rounded anterior margin, bluntly pointed posterior margin, straight dorsal margin, and gently convex ventral margin. Posterior ridge well formed dorsally, but becomes low and flattened near ventral margin. Shell disk and slope without sculpture. Umbos full and elevated slightly above the hinge line. Umbo sculpture in the form of profound undulations. Periostracum light olive with dark green rays, but tends to darken with age. Pseudocardinal teeth elongate and thin; lateral teeth rudimentary. Shell nacre yellowish. (Modified from Simpson 1914, Johnson 1967)

DISTRIBUTION. Eastern Gulf Coast drainages from Tickfaw River system in Louisiana, east to Apalachicola Basin (Williams and Butler 1994), including Mobile Basin. Also occurs in Mississippi River Basin in upper Yazoo River tributaries in northern Mississippi (Haag *et al.* 2002).

HABITAT. Most commonly in small to medium-sized coastal plain streams, but historical records exist for larger rivers as well (Brim Box and Williams 2000). Typically occurs in sand or silt substrata in areas of low to moderate current (Brim Box and Williams 2000, Haag *et al.* 2002, Blalock-Herod *et al.*, in review).

LIFE HISTORY AND ECOLOGY. Poorly known. Gravid females have been found in September and December (Brim Box and Williams 2000), suggesting it is a long-term brooder. Hosts of glochidia unknown, but many other related species are generalists and able to use a wide variety of fishes as hosts.

BASIS FOR STATUS CLASSIFICATION. Con-tinues to survive throughout a large portion of its historical distribution, but remaining populations few in number, small, and widely scattered (Haag *et al.* 2002). Imperiled due to its vulnerability to habitat degradation and declining population trend. Was classified as a species of concern in Alabama (Lydeard *et al.* 1999) and throughout its distribution (Williams *et al.* 1993). Decline of this species appears to be more serious in Gulf Coast systems.

Prepared by: Wendell R. Haag

TENNESSEE PIGTOE

***Fusconaia barnesiana* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has moderately thick shell (max. length = 95 mm [3 3/4 in.]) highly variable in outline, ranging from almost oval to triangular. Anterior margin well rounded and posterior margin obliquely truncate. Dorsal and ventral margins straight to slightly convex. Posterior ridge distinct, but usually low and rounded. Shell disk and posterior slope without sculpture. Umbos may be high and full or only slightly inflated, extending little above hinge line. Periostracum has satiny texture, and is dull yellowish olive to brown, often with variable dark green rays, usually darkening to dark brown with age. Pseudocardinal teeth erect and elongate, usually oriented perpendicular to lateral teeth, which are moderately long and straight. Interdentum short, but wide and umbo cavity shallow. Shell nacre white. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to Tennessee and Cumberland River systems (Parmalee and Bogan 1998). In Alabama, extant in only a few Tennessee River tributaries, including Limestone and Round Island Creeks, Limestone County, and the Paint Rock River system.

HABITAT. Varies from small streams to medium-sized rivers. However, historically occurred in Tennessee River at Muscle Shoals, but was extirpated when river was impounded (Garner and McGregor 2001). Appears to prefer shallow water with moderate current and a substratum of coarse sand, silt, and gravel (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. Little known, but presumably a short-term brooder, being gravid from spring to mid-summer, like its congeners. Hosts of glochidia unknown (Parmalee and Bogan 1998).

BASIS FOR STATUS CLASSIFICATION. In Alabama, distribution has been reduced to a few tributaries of the Tennessee River. Limited distribution and susceptibility to habitat degradation make it vulnerable to extirpation from state. Was listed as endangered in Alabama (Stansbery 1976a), but more recently listed as a species of special concern throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999).

Prepared by: Jeffrey T. Garner

FINERAYED POCKETBOOK

***Lampsilis altilis* (Conrad)**

OTHER NAMES. None.

DESCRIPTION. Has moderately thin and inflated shell (max. length = 85 mm [3 3/8 in.]), subelliptical to ovate in outline, with a broadly rounded anterior margin and narrowly rounded or bluntly pointed posterior margin. Posterior ridge, when present, very low and broadly rounded, sometimes faintly doubled, giving a slight biangulation to posterior ventral margin. Shell disk and posterior slope without sculpture. Umbos moderately full and slightly elevated above hinge line. Periostracum dull yellowish brown, with most specimens having green, usually narrow, rays. Pseudocardinal teeth doubled in each valve, thin in left valve, triangular in right; lateral teeth thin, elevated, and straight or very slightly curved. A narrow interdentum

separates pseudocardinal and lateral teeth. Umbo cavity moderately deep. Shell nacre white, but may have a pink or salmon tint. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to eastern reaches of Mobile Basin in Alabama, Georgia, and Tennessee, including Coosa, Tallapoosa, and Cahaba River systems (Haag *et al.* 1999). Remains widespread, but populations isolated and often small.

HABITAT. Most frequently in small to medium-sized streams above the Fall Line, but historical records indicate also once occurred in larger rivers such as the Cahaba, Coosa, and Tallapoosa. Individuals occur in a wide variety of substrata from clean sand and gravel riffles to depositional areas along stream margins.

LIFE HISTORY AND ECOLOGY. A long-term brooder, with females reportedly releasing glochidia in March (Haag *et al.* 1999). Ortmann (1924a) reported a female from the Chattooga River that was gravid with eggs in May, which is atypical for a lampsiline. Only species known to attract host fishes using both mantle flap displays and superconglutinates (Haag *et al.* 1999). Superconglutinates pigmented to resemble small fish, and display a darting motion in stream currents eliciting attacks from potential host fish (Haag and Warren 1999). Superconglutinates fusiform in shape and dusky white, with a dark stripe dorsally. Mantle lure dusky gray, with numerous fine, black spots and distinct white bars, and with a black eyespot, surrounded by a white halo at posterior end. Margin of lure ornamented with long, finely branched papillae. Primary hosts include redeye, spotted, and largemouth bass. Green sunfish a marginal host (Haag *et al.* 1999).

BASIS FOR STATUS CLASSIFICATION. Has experienced a dramatic reduction in distribution, but still persists in low numbers at several sites in the Coosa and Tallapoosa River systems. Small populations vulnerable to habitat degradation. Currently extremely rare in Cahaba River system (McGregor *et al.* 2000). Classified as threatened throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as *threatened* by the U.S. Fish and Wildlife Service in 1993.**

Prepared by: Wendell R. Haag

ORANGENACRE MUCKET

Lampsilis perovalis (Conrad)

OTHER NAMES. None.

DESCRIPTION. Has moderately solid and somewhat inflated shell (max. length = 90 mm [3 1/2 in.]), ovate in outline, with a rounded anterior margin and bluntly pointed posterior margin; may be somewhat more truncate in females. Posterior ridge well developed and rounded, steeper dorsally. Shell disk and posterior slope without sculpture. Umbos moderately full and elevated above hinge line, positioned anterior of center. Umbo sculpture in form of strong, double-looped ridges. Periostracum greenish yellow to brown, darkening with age, with faint rays that usually are obscure in older specimens. Two strong, high pseudocardinal teeth in left valve and one strong pseudocardinal tooth in right valve accompanied by a rudimentary secondary tooth; lateral teeth short and strong, removed from pseudocardinal teeth. Interdentum absent and umbo cavity wide and moderately deep. Shell nacre salmon or pink, occasionally white. (Modified from Simpson 1914, USFWS 2000)

DISTRIBUTION. Endemic to Tombigbee and lower Alabama River systems in Alabama and Mississippi (Stansbery 1983b, Roe *et al.* 2001). Currently common only in upland streams of the Sipsey Fork drainage within Bankhead National Forest in Alabama.

HABITAT. Lotic areas in a wide variety of stream types from small, upland streams, to large Coastal Plain rivers. Individuals can be found in a wide variety of substrata, but most common in depositional areas along riffle margins or flowing pools.

LIFE HISTORY AND ECOLOGY. A long-term brooder; females attract host fish from approximately February to May by releasing glochidia in a pair of superconglutinate packets. Superconglutinates pigmented to resemble small fish display a darting motion in stream currents, eliciting attacks from potential hosts (Haag *et al.* 1995, Haag and Warren 1999) that include redeye, spotted, and largemouth bass (Haag and Warren 1997).

BASIS FOR STATUS CLASSIFICATION. Continues to survive throughout large portion of historical distribution, but remaining populations small and widely scattered, leaving them vulnerable to habitat degradation. Once listed as endangered in Alabama (Stansbery 1976a), more recently classified as

threatened throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as threatened by the U.S. Fish and Wildlife Service in 1993.**

Prepared by: Wendell R. Haag

FLUTEDSHELL

Lasmigona costata (Rafinesque)

OTHER NAMES. Sand Mussel, Squawfoot.

DESCRIPTION. Has solid, compressed, and elongate shell (max. length = 200 mm [7 7/8 in.]), rhomboidal in outline, with straight dorsal and ventral margins and obliquely angled anterior and posterior margins. Posterior ridge usually well developed. Numerous, heavy costations, or rounded flutings, typically present on posterior slope and posterior end of shell, oriented more or less perpendicular to margin. Anterior end of shell usually unsculptured. Umbos compressed and flattened, scarcely elevated above hinge line. Umbo sculpture consists of heavy bars, parallel to hinge line, the first of which is curved, others double looped. Periostracum yellowish with numerous green rays in young shells, darkening with age to dark brown or black. Pseudocardinal teeth heavy and single, pyramidal and elevated in left valve, low and somewhat elongate in right valve; lateral teeth rudimentary, in form of thickened hinge lines. Interdentum, when present, narrow and umbo cavity very shallow. Shell nacre white, often tinged with salmon or cream. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Throughout most of Mississippi River system, some of the southern and western tributaries of the Great Lakes, and some tributaries of Hudson Bay (Burch 1975, Parmalee and Bogan 1998). In Alabama, appears to be extant only in a short reach of Bear Creek, Colbert County, and in the Paint Rock and Elk Rivers. Viability of Bear Creek population questionable.

HABITAT. Generally in large creeks to medium-sized rivers (Parmalee and Bogan 1998). However, historically occurred in Tennessee River at Muscle Shoals prior to its impoundment, indicating that it occurred in large rivers under some conditions (Garner and McGregor, 2001).

LIFE HISTORY AND ECOLOGY. A long-term brooder, gravid from August into May (Baker 1928). Glochidia use a wide variety of fishes as hosts, including green and longear sunfish; bluegill; rock, smallmouth, and largemouth bass; rainbow, fantail, and striped darters; yellow perch; walleye; banded sculpin; central stoneroller; brown bullhead; northern studfish; gizzard shad; river redhorse; bowfin; and northern pike (Luo 1993, Weiss and Layzer 1995, Hove *in* Parmalee and Bogan 1998). Also, glochidia can transform on common carp, an exotic species (Fuller 1974).

BASIS FOR STATUS CLASSIFICATION. Within Alabama, distribution has been reduced to three disjunct populations in tributaries of the Tennessee River. Restricted distribution and declining population trend make it vulnerable to extirpation from state. Listed as stable throughout distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999).

Prepared by: Jeffrey T. Garner

TENNESSEE HEELSPLITTER

Lasmigona holstonia (Lea)

OTHER NAMES. None.

DESCRIPTION. Has thin, but not fragile, moderately inflated shell (max. length = approx. 75 mm [2 15/16 in.]), somewhat elongate and rhomboidal in outline, with a broadly rounded anterior margin, broadly pointed or truncate posterior margin, and almost straight ventral margin. Posterior ridge pronounced, but broadly rounded, appearing double in some individuals. Shell disk and posterior ridge without sculpture. Umbos full, but not high, and project only slightly above hinge line, located anterior of center. Periostracum roughened and dull, greenish brown to yellowish brown, becoming dark brown with age. Pseudocardinal teeth compressed and nearly parallel with hinge line, double in left valve and single in right valve; lateral teeth rudimentary, represented by thickened hinge line. Interdentum absent and umbo cavity shallow. Shell nacre bluish white, often with a pale salmon wash in umbo cavity. (Modified from Parmalee and Bogan 1998)

DISTRIBUTION. In upper Tennessee and upper Coosa River systems. Extant in a few tributaries of Coosa River in northeastern Alabama, including Terrapin and Spring Creeks in Cherokee County. A single specimen reported from Hurricane Creek, Paint Rock River system, Jackson County (Ahlstedt 1995).

HABITAT. Creeks with flowing water over substrata of sand and mud (Parmalee and Bogan 1998). Sometimes found below riffles in shallow stream margins. May occur in very small creeks where often it is only mussel species present.

LIFE HISTORY AND ECOLOGY. A long-term brooder (Parmalee and Bogan, 1998). Hosts of glochidia include banded sculpin, rock bass, and possibly other headwater fish species, since it appears to be a host generalist like many other members of the subfamily Anodontinae (J. W. Jones, Virginia Polytechnic Institute and State University, pers. comm., 2002).

BASIS FOR STATUS CLASSIFICATION. Reduced to only a few populations in Alabama. **Considered a species of concern throughout its distribution by the U.S. Fish and Wildlife Service** and Williams *et al.* (1993), and in Alabama (Lydeard *et al.* 1999). Earlier listed as endangered in Alabama (Stansbery 1976a).

Prepared by: Robert S. Butler

BLACK SANDSHELL

***Ligumia recta* (Lamarck)**

OTHER NAMES. Black Sand Mussel, Long John, Sow's Ear, Lady's Slipper, Mule Ear.

DESCRIPTION. Has moderately thick shell (max. length = 160 mm [6 5/16 in.]), elliptical in outline, with a rounded anterior margin, and dorsal and ventral margins straight and parallel. Males pointed and compressed posteriorly, with point located toward the dorsal margin. Females more gently rounded and broadened posteriorly, with posterior margin obliquely truncate. Posterior ridge rounded, distinct near the umbo, but becoming flattened posterior ventrally. Shell disk and posterior ridge unsculptured. Umbos elevated slightly to moderately above the hinge line. Umbo sculpture consists of weak double-looped ridges. Periostracum smooth and shiny, dark green to brown in young specimens, darkening to dark brown or black with age. Green rays present on young shells. Pseudocardinal teeth strong and triangular, two in the left valve, one in the right; lateral teeth long, thin, and straight. Interdentum long and narrow, but may be absent. Umbo cavity shallow. Shell nacre usually white with pink or purple in umbo cavity, but may be entirely white and rarely entirely pink or purple. (Modified from Cummings and Mayer 1992, Parmalee and Bogan 1998, Strayer and Jirka 1997)

DISTRIBUTION. Widespread in eastern and central United States and Canada, occurring from the Great Lakes Basin south into the Mississippi River drainage to Louisiana and in some Gulf Coast drainages. In Alabama, occurs in Tennessee and Mobile River drainages (Cummings and Mayer 1992, Parmalee and Bogan 1998, Strayer and Jirka 1997). Extant in Tennessee River in tailwaters of Wilson and Guntersville Dams, where uncommon or rare (Garner and McGregor 2001). Extirpated from most reaches of Mobile Basin.

HABITAT. Coarse sand and gravel substrata in areas with current (Cummings and Mayer 1992, Parmalee and Bogan 1998, Strayer and Jirka 1997).

LIFE HISTORY AND ECOLOGY. A long-term brooder, with a gravid season from mid-August to July. Reported glochidial hosts are white crappie, bluegill, green and orangespotted sunfish, largemouth bass, walleye, sauger, and banded killifish (Cummings and Mayer 1992, Parmalee and Bogan 1998, Strayer and Jirka 1997).

BASIS FOR STATUS CLASSIFICATION. Has suffered drastic declines in Alabama from impoundment of major rivers. Although uncommon in tailwaters of Wilson Dam, it is reproducing there. Viability of Guntersville Dam tailwaters population is questionable. Almost extirpated from Mobile Basin. Its limited distribution and rarity make it vulnerable to extirpation from the state. Listed as a species of special concern throughout distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999).

Prepared by: Jeffrey J. Herod

ALABAMA MOCCASINSHELL

***Medionidus acutissimus* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has small and moderately thin shell (max. length = 55 mm [2 1/8 in.]), rhomboidal to elliptical in outline, with a rounded anterior margin, pointed posterior margin, straight to slightly convex dorsal margin, and very slightly convex ventral margin. Males may be somewhat arcuate and generally more acutely pointed posteriorly than females. Females often more swollen posteriorly. Posterior ridge high and sharp, often doubled. Posterior slope covered with low, parallel corrugations or ridges. Low corrugations also may be on posterior portion of shell disk. Umbos slightly inflated and very slightly elevated above hinge line. Periostracum may be shiny or dull, yellowish or tan to green, covered with faint, fine green rays that are broken or in form of zigzags. Pseudocardinal teeth short and triangular; lateral teeth slightly curved. No interdentum present and umbo cavity shallow. Shell nacre variable, ranging from white to purple, but may be tan or pale red. (Modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. Distributed throughout Mobile Basin in Alabama, Georgia, Mississippi, and Tennessee (Parmalee and Bogan 1998). Specimens from Gulf Coast drainages, west of Apalachicola Basin, tentatively identified as *M. acutissimus* (Williams *et al.*, in review). However, comparative anatomical and genetic studies may prove them to represent an undescribed species. Several populations of *M. acutissimus* in Alabama appear healthy, including Sipsev Fork in Bankhead National Forest and Sipsev River. However, now gone from much of former distribution and existing populations isolated.

HABITAT. Lotic areas in a wide variety of stream types from small, upland streams to large Coastal Plain rivers. Most frequently encountered in swift, gravel-bottomed shoals or riffles where often tethered to stones by a byssal thread (Haag and Warren 2003).

LIFE HISTORY AND ECOLOGY. A long-term brooder; females release glochidia from approximately February to May. Females attract host fish by rapidly flickering mantle lure (matte inky black, with a small, white patch [about two square millimeters, or 0.08 square inches]) located along posterior portion of mantle margin. Primary hosts of glochidia include naked sand, southern sand, redspotted, Tuskaloosa, Johnny, speckled, Gulf, blackbanded, and saddleback darters. Rock darter and blackspotted topminnow are marginal hosts. (Summarized from Haag and Warren 1997, Haag and Warren 2003)

BASIS FOR STATUS CLASSIFICATION. Remain-ing populations usually small, widely scattered, and isolated, making it vulnerable to extinction. Classified as threatened throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as *threatened* by the U.S. Fish and Wildlife Service in 1993.**

Prepared by: Wendell R. Haag

ALABAMA HICKORYNUT ***Obovaria unicolor* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has solid and only slightly inflated shell (max. length = 50 mm [2 in.]), ovate to short elliptical in outline, with rounded anterior and posterior margins, although posterior margin much more broadly rounded. Posterior ridge low and rounded. Shell disk and posterior slope without sculpture. Umbos full and slightly elevated above hinge line. Umbo sculpture in form of weak, imperfectly looped ridges. Periostracum shiny, often greenish in young specimens, becoming yellowish brown to brown with age, and often weakly rayed. Pseudocardinal teeth small and radially arranged; lateral teeth almost straight. Interdentum short, but well developed, and umbo cavity shallow and compressed. Shell nacre usually pinkish, but may be white or bluish. (Modified from Lea 1838, Simpson 1914)

DISTRIBUTION. Taxonomic status and distribution unclear. May be endemic to western Mobile Basin; occurs in Cahaba, lower Black Warrior, and Tombigbee River systems (van der Schalie 1981, Williams *et al.* 1992, McCullagh *et al.* 2002) in Alabama and Mississippi. Although two historical reports from Coosa River system, previous occurrence there doubtful (Hurd 1974). Similar to, and may be conspecific with, *O. jacksoniana*, which has an almost identical distribution in western Mobile Basin. Both species also reported from Pascagoula, Pearl, and Amite River systems in Mississippi and Louisiana, but their relationships to Mobile Basin populations unclear.

HABITAT. Medium-sized to large streams below the Fall Line (van der Schalie 1981, Williams *et al.* 1992). Characteristically found in sandy substrata in areas of low flow, but individuals can be found in practically any habitat type in appropriate streams including: swift, gravel bottomed shoals, deep gravel and sand bottomed runs, silty stream margins, pools, backwater sloughs, and high water side channels (W. R. Haag and M. L. Warren, USDA Forest Service, unpubl. data).

LIFE HISTORY AND ECOLOGY. A long-term brooder; females release glochidia from April to June. Method of host infestation unknown. Glochidial hosts are naked sand, southern sand, and red spotted darters. Marginal hosts include Johnny, Gulf, blackbanded, and dusky darters. (Summarized from Haag and Warren 2003)

BASIS FOR STATUS CLASSIFICATION. Limited distribution and declining population trend make it vulnerable to extinction. In Mobile Basin, only large population found in Sipsy River. Extant in Buttahatchee River but has declined precipitously there in recent years (Jones 1991), and rare in lower Cahaba and Black Warrior Rivers (Pierson 1991, Williams *et al.* 1992, McGregor *et al.* 2000). Although considered endangered in Alabama earlier (Stansbery 1976a), more recently classified as a species of special concern throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999).

Prepared by: Wendell R. Haag

SOUTHERN CLUBSHELL

***Pleurobema decisum* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has solid and inflated shell (max. length = 70 mm [2 3/4 in.]), elongate and subtriangular in outline, with an anterior margin usually rounded in younger specimens, but often obliquely truncate in older specimens, and bluntly pointed posterior margin. Dorsal and ventral margins very slightly convex to straight. Posterior slope not greatly elevated, but steep dorsally, becoming rounder and flatter with a ventral progression. A wide, radial swelling located just anterior of posterior ridge. Shell disk and slope without sculpture. Umbos full and elevated well above hinge line, positioned near anterior end, often exceeding anterior margin in old specimens. Periostracum tawny to greenish brown or brown, sometimes weakly rayed. Pseudocardinal teeth irregular and divergent; lateral teeth moderately long, heavy, and very slightly curved. A well-developed interdentum separates them. Umbo cavity shallow. Shell nacre white. (Modified from Lea 1831, Simpson 1914, USFWS 2000)

DISTRIBUTION. Endemic to Mobile Basin in Alabama, Georgia, and Mississippi, including Alabama, Black Warrior, Cahaba, Coosa, Tallapoosa, and Tombigbee River systems (Stansbery 1976a). Rarely encountered in large rivers today. Large populations remain only in widely scattered localities in Tombigbee River system (McCullagh *et al.* 2002). Small, isolated populations exist in Alabama, Coosa, and Tallapoosa River systems (McGregor *et al.* 1999, 2000). May be extirpated from Black Warrior and Cahaba River systems.

HABITAT. Lotic areas in medium sized to large streams both above and below the Fall Line. Highest densities occur in deep, gravel and sand-bottomed runs with slow but steady current, but individuals also found in variety of other habitats from swift, shallow shoals to pools (W. R. Haag and M. L. Warren, USDA Forest Service, unpubl. data).

LIFE HISTORY AND ECOLOGY. A short-term brooder; females release glochidia in June and July. Transmission of glochidia to host fishes facilitated by females releasing glochidia in conglutinates that resemble food items of small fishes. Presence of conglutinates shown to elicit feeding responses from fishes both in laboratory and in wild. Conglutinates flat and oval shaped, approximately three by five millimeters (1/16 by 1/4 inches), and orange or white. Primary glochidial host is blacktail shiner. Striped shiner is a marginal host. (Sum-marized from Haag and Warren 2003)

BASIS FOR STATUS CLASSIFICATION. Has experienced dramatic reduction in distribution and fragmentation of its populations. Limited distribution and declining population trend make it vulnerable to extinction. Classified as endangered throughout its distribution (Williams *et al.* 1993) and in Alabama (Stansbery 1976a, Lydeard *et al.* 1999). **Listed as *endangered* by the U.S. Fish and Wildlife Service in 1993.**

Prepared by: Wendell R. Haag

FUZZY PIGTOE

Pleurobema strodeanum (Wright)

OTHER NAMES. None.

DESCRIPTION. Shell rather thin and compressed (max. length = 60 mm [2 3/8 in.]), ovate or subtriangular to subelliptical in outline, with a rounded anterior margin and bluntly pointed posterior margin. Posterior ridge poorly defined and posterior slope slightly concave. Shell disk without sculpture, but may be one, or a few, thread-like ridges on the posterior slope, parallel to the posterior ridge. Umbos somewhat full, but barely extend above hinge line. Periostracum shiny on the shell disk, but becomes roughened near the margins, and varies from dark olivaceous brown to almost black, sometimes weakly rayed. Pseudocardinal teeth triangular, two divergent teeth in left valve and one in right. Lateral teeth short and almost straight. Shell nacre bluish white. (Modified from Simpson 1914, Williams and Butler 1994)

DISTRIBUTION. Occurs in Choctawhatchee, Escambia, and Yellow River drainages in Alabama and Florida (Clench and Turner 1956; Blalock-Herod *et al.*, in press).

HABITAT. Predominately sand substrata in small to large streams with scattered gravel, woody debris, and moderate flow (Clench and Turner 1956).

LIFE HISTORY AND ECOLOGY. Nothing known. Presumably a short-term brooder like its congeners.

BASIS FOR STATUS CLASSIFICATION. Limited distribution and dwindling habitat quality make *P. strodeanum* vulnerable to extinction. Was classified as a species of special concern (Williams *et al.* 1993) and a species in need of protection in Alabama (Lydeard *et al.* 1999). Blalock-Herod *et al.* (in press) considered it to be a species of special concern within the Choctawhatchee River system.

Prepared by: Stuart W. McGregor

ALABAMA HEELSPLITTER

Potamilus inflatus (Lea)

OTHER NAMES. Inflated Heelsplitter.

DESCRIPTION. Has thin, somewhat inflated shell (max. length = 140 mm [5 1/2 in.]). Sexual dimorphism expressed as size difference, with males growing much larger than females. Shell trapezoidal in outline, with anterior margin bluntly pointed, posterior margin obliquely truncate, and ventral margin slightly convex. A large dorsal wing positioned just posterior of umbo is rounded when intact, but often broken. A much smaller dorsal wing, located just anterior of umbo, usually more or less bluntly pointed. Posterior ridge high and widely rounded. Umbos low and compressed, elevated little, if any, above hinge line. Periostracum somewhat dull and olive to dark brown, darkening with age. Young shells often weakly rayed, but rays become obscure as shell darkens. Pseudocardinal teeth weak and elongate; lateral teeth short and curved, distant from pseudocardinal teeth. No interdentum present and umbo cavity shallow. Shell nacre purple. (Modified from Lea 1831, Simpson 1914, USFWS 2000)

DISTRIBUTION. Known from Alabama, Black Warrior, Coosa, and Tombigbee Rivers of Mobile Basin (Roe *et al.* 1997). Known to be extant in Alabama, Black Warrior, and Tombigbee Rivers, but Alabama River population may not be viable. A similar form in Amite, Pearl, and Tangipahoa Rivers of Mississippi and Louisiana has recently been reported to differ genetically and may represent a distinct species. Genetic affinity of Pearl River populations unknown (Roe and Lydeard 1998).

HABITAT. Large rivers in silt and sand substrata in slow to moderate current, and at depths exceeding six meters (19 3/4 feet) (Brown and Curole 1997, USFWS 2000). Can survive in impounded rivers to limited extent (Williams *et al.* 1992).

LIFE HISTORY AND ECOLOGY. A long-term brooder; females release glochidia in June and July. A probable host for glochidia is the freshwater drum (Roe *et al.* 1997). Method of host infestation unknown.

BASIS FOR STATUS CLASSIFICATION. Limited distribution and susceptibility to habitat degradation from river dredging operations make *P. inflatus* vulnerable to extinction. Was considered endangered in Alabama (Stansbery 1976a), but more recently listed as threatened throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999). **Listed as *threatened* by the U.S. Fish and Wildlife Service in 1990.**

Prepared by: Wendell R. Haag

CHOCTAW BEAN

***Villosa choctawensis* (Athearn)**

OTHER NAMES. None.

DESCRIPTION. Has somewhat inflated shell, with slightly thickened margin (may exceed 40 mm [1 5/8 in.] long), ovate in outline, with rounded anterior and posterior margins. Females may be somewhat more truncate or more broadly rounded posteriorly. Posterior ridge low and rounded. Shell disk and posterior slope unsculptured. Umbos broad and full, extending little, if any, above hinge line and positioned well anterior of center. Umbo sculpture consists of thin, undulating ridges. Periostracum shiny and smooth, but may be roughened ventrally and posteriorly. Color is chestnut to dark brown or black, with variable fine, green rays that may be obscure. Two well-developed pseudocardinal teeth occur in left valve and one well developed and two rudimentary pseudocardinal teeth in right valve; lateral teeth short and almost straight. Interdentum moderately wide and umbo cavity moderately deep. Shell nacre white, but may be blotched and brown. (Modified from Athearn 1964, Williams and Butler 1994)

DISTRIBUTION. Includes Choctawhatchee, Escambia, and Yellow River systems in Alabama and Florida (Butler 1989, Williams and Butler 1994).

HABITAT. Occurs in small to medium-sized rivers with sand or silty sand substrata in areas with moderate to swift current (Athearn 1964).

LIFE HISTORY AND ECOLOGY. Little known, but presumably a long-term brooder. Williams *et al.* (in review) reported gravid females in August. Hosts of glochidia unknown.

BASIS FOR STATUS CLASSIFICATION. Limited distribution and habitat degradation within its distribution make *V. choctawensis* susceptible to extinction. Classified as threatened throughout its distribution (Williams *et al.* 1993) and imperiled in Alabama (Lydeard *et al.* 1999). Within drainages, considered a species of special concern in Choctawhatchee River system (Blalock-Herod *et al.*, in press) and endangered in Escambia and Yellow River systems (Williams *et al.*, in review).

Prepared by: Stuart W. McGregor

COOSA CREEKSHELL

***Villosa umbrans* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Has solid, somewhat inflated, shell (max. length approx. 70 mm [2 3/4 in.]), generally elliptical or somewhat obovate in outline. Anterior margin broadly rounded in both sexes. Males have a rather sharply pointed posterior margin, with point occurring medially. Females have a prominent posterior swelling along posterior ventral margin, with shell truncate beyond this swelling to a point about two thirds of way up posterior margin. Older females may have a strong constriction posterior to marsupial swelling. Ventral margin broadly rounded in males to nearly straight in females. Posterior ridge only slightly developed in both sexes. Umbos low and not elevated above hinge line, located anterior of center in males and near center in females. Periostracum smooth and varying from tan or olive to dark brown, often darkening to nearly black with age. When present, rays generally indistinct in young shells and become even more obscure with age. Pseudocardinal teeth short, compressed and triangular, with two in left valve and one in right valve; lateral teeth thin and slightly curved, with two in left valve and one in right valve. Interdentum usually absent and umbo cavity very shallow. Shell nacre varies from a light lavender, copper or pinkish purple, to very dark purple. (Modified from Parmalee and Bogan 1998)

DISTRIBUTION. Endemic to upper Coosa River system. Although once fairly widespread, now thought to persist only in a few tributaries in uppermost reaches of system, primarily in Georgia.

HABITAT. Creeks and small rivers, generally in gravel and sand substrata in shoal and riffle habitats. Sometimes associated with water willow (*Justicia americana*) beds (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. A long-term brooder. Reported hosts of its glochidia include bluegill and banded sculpin, with much higher transformation rates occurring on former (P. D. Johnson, Tennessee Aquarium Research Institute, pers. comm., 2002).

BASIS FOR STATUS CLASSIFICATION. May be extant in a few tributaries of Coosa River in Alabama. Appears to be in decline distribution wide. This, along with its limited distribution and specific habitat requirements, makes it vulnerable to extinction. Considered to be of special concern throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999).

Prepared by: Robert S. Butler

TAPERED PIGTOE

***Quincuncina burkei* (Walker)**

OTHER NAMES. None.

DESCRIPTION. Has small, inflated shell, subelliptical in outline, and reaching a length of 60 millimeters [2 3/8 inches]. Anterior margin broadly rounded and posterior margin narrowly pointed, with point located posterior-ventrally. Dorsal and ventral margins straight to slightly convex. Posterior ridge well defined and posterior slope slightly concave. Sculpturing in form of chevron-like ridges over much of disk and radial ridges on posterior slope. Shell sculpture may be indistinct in some specimens. Umbo inflated little, barely elevated above hinge line. Periostracum dark brown to black, but can be brown or greenish yellow in young specimens. Pseudocardinal teeth well developed and divergent, double in both valves. Two lateral teeth in left valve and usually one in right valve. Interdentum very narrow. Shell nacre varies from light purple to bluish white (Modified from Ortmann and Walker 1922, Clench and Turner 1956, Williams and Butler 1994)

DISTRIBUTION. Endemic to Choctawhatchee River system of southern Alabama and western Florida. Eliminated from much of its historical distribution. In Alabama, known to be extant at nine locations scattered in tributaries of Choctawhatchee drainage, including headwaters of Pea River (Blalock-Herod *et al.*, in review).

HABITAT. Medium sized creeks to large rivers in stable sand or sand and gravel substrata, occasionally occurring in silty sand in slow to moderate current (Williams and Butler 1994).

LIFE HISTORY AND ECOLOGY. Little known, but presumably a short-term brooder. Ortmann and Walker (1922) reported a female gravid with eggs in May, with all four gills used as marsupia, and subcylindrical conglutinates. Glochidial hosts unknown.

BASIS FOR STATUS CLASSIFICATION. Limited distribution, rarity, and reduction of quality habitat within distribution make it susceptible to extinction. Considered threatened throughout distribution (Williams *et al.* 1993). Lydeard *et al.* (1999) considered it imperiled in Alabama. Blalock-Herod *et al.* (in review) considered it endangered.

Prepared by: Holly Blalock-Herod

ALABAMA CREEKMUSSEL

***Strophitus connasaugaensis* (Lea)**

OTHER NAMES. None.

DESCRIPTION. Shell thin and slightly inflated (max. length = 120 mm [4 3/4 in.]), elongate and somewhat rhomboid in outline, often narrower anteriorly. Dorsal and ventral margins straight to slightly convex, anterior margin narrowly rounded and posterior margin obliquely truncate. Posterior ridge full, but widely rounded. Shell disk and posterior ridge without sculpture. Umbos full and moderately high, elevated slightly above

hinge line. Umbo sculpture consists of a few strong ridges oriented parallel to growth lines. Periostracum yellowish green in juveniles, becoming dull brown with age. Occasionally patterned with weak dark green rays, mostly on posterior half of shell. Pseudocardinal teeth irregular and compressed, only slightly elevated; lateral teeth rudimentary, represented by slightly raised, rounded ridges in each valve. No interdentum present and umbo cavity open and shallow. Shell nacre bluish gray, often with salmon in umbo cavity. (Description modified from Simpson 1914, Parmalee and Bogan 1998)

DISTRIBUTION. A Mobile Basin endemic, where it appears to be restricted to eastern reaches. Extant in widely scattered, isolated localities.

HABITAT. Small to medium-sized rivers and shallow embayments of larger rivers, usually in fine gravel, sand, or silt in shallow water (Parmalee and Bogan 1998).

LIFE HISTORY AND ECOLOGY. Nothing known, but its congeners are long-term brooders. Suggested that *Strophitus undulatus*, of Mississippi River Basin, capable of completing its life history without benefit of a host (Lefevre and Curtis 1910). However, unknown if this characteristic is shared with any other members of genus. Hosts of glochidia unknown.

BASIS FOR STATUS CLASSIFICATION. Although widespread in Mobile Basin, populations isolated and often small. Limited distribution and declining population trend make *S. connasaugaensis* vulnerable to extinction. Listed as a species of special concern throughout its distribution (Williams *et al.* 1993) and in Alabama (Lydeard *et al.* 1999).

Prepared by: Jeffrey T. Garner

DOWNY RAINBOW

***Villosa villosa* (Wright)**

OTHER NAMES. None.

DESCRIPTION. Has thin shell (max. length = 70 mm [2 3/4 in.]), elliptical in outline, with straight, parallel dorsal and ventral margins, rounded anterior margin, and rounded to bluntly pointed posterior margin. Females more inflated and slightly more rounded posteriorly than males. Posterior ridge well defined and angular near the umbo, but becomes flatter and less distinct ventrally. Shell disk and posterior ridge unsculptured. Umbos elevated slightly to moderately above hinge line. Umbo sculpture consists of weak double-looped ridges. Periostracum has a cloth-like texture and is brown or black with green, blue, or yellow rays. Pseudocardinal teeth strong and triangular, two in left valve and one in right; lateral teeth long, thin, and straight. No interdentum, and umbo cavity shallow. Shell nacre variable, most commonly white or bluish white (Modified from Brim Box and Williams 2000, Clench and Turner 1956)

DISTRIBUTION. Known from eastern Gulf Coast drainages, from Escambia River east throughout upper peninsular Florida, north to St. Mary's River drainage in Florida and Georgia. In Alabama, extant in Uchee Creek system of Chattahoochee River drainage and possibly Eight-Mile Creek of Choctawhatchee River system (Williams *et al.*, in review; Blalock-Herod *et al.*, in review; Brim Box and Williams 2000; J.T. Garner, Ala. Div. Wildl. Freshwater Fish., unpubl. data).

HABITAT. A variety of habitats, varying from spring-fed creeks to backwaters, with silt, mud, sand, or gravel substrata. May be found in tannic or clear water (Brim Box and Williams 2000, Clench and Turner 1956.)

LIFE HISTORY AND ECOLOGY. A long-term brooder, reportedly gravid from April to September. Bluegill and largemouth bass are reported glochidial hosts (Keller and Ruessler 1997).

BASIS FOR STATUS CLASSIFICATION. Limited distribution and rarity make *V. villosa* vulnerable to extirpation from Alabama. Listed as a species of special concern throughout its distribution (Williams *et al.* 1993), but was not included on the list of Alabama species (Lydeard *et al.* 1999.)

Prepared by: Jeffrey J. Herod

ALABAMA FRESHWATER MUSSEL WATCH LIST

MODERATE CONSERVATION CONCERN

Taxa with conservation problems because of insufficient data, OR because of two of four of the following: small population; limited, disjunct, or peripheral distribution; decreasing population trend/population viability problem; specialized habitat need/habitat vulnerability due to natural/human caused factors. Research and/or conservation action recommended.

Order Unionoida Family Unionidae

COMMON NAME	SCIENTIFIC NAME	PROBLEM(s)	
COOSA FIVERIDGE	<i>Amblema elliotii</i>	Limited distribution	Decreasing population trend
APALACHICOLA FLOATER	<i>Anodonta heardi</i>	Insufficient data on distribution	
ROCK POCKETBOOK	<i>Arcidens confragosus</i>	Decreasing population trend	Limited distribution
ROUND PEARLSHELL	<i>Glebula rotundata</i>	Insufficient data on distribution	
WAVYRAYED LAMPMUSSEL	<i>Lampsilis fasciola</i>	Decreasing population trend	Habitat vulnerability
ROUGH FATMUCKET	<i>Lampsilis straminea straminea</i>	Limited distribution	Habitat vulnerability
WHITE HEELSPLITTER	<i>Lasmigona complanata complanata</i>	Limited distribution	Decreasing population trend
ALABAMA HEELSPLITTER	<i>Lasmigona complanata alabamensis</i>	Limited distribution	Decreasing population trend
PONDMUSSEL	<i>Ligumia subrostrata</i>	Insufficient data on distribution	
SOUTHERN HICKORYNUT	<i>Obovaria jacksoniana</i>	Insufficient data on distribution	
OHIO PIGTOE	<i>Pleurobema cordatum</i>	Decreasing population trend/	Habitat vulnerability
FUZZY PIGTOE	<i>Pleurobema strodeanum</i>	Decreasing population trend/	Habitat vulnerability
EASTERN FLOATER	<i>Pyganodon cataracta</i>	Insufficient data on distribution	
MONKEYFACE	<i>Quadrula metanevra</i>	Decreasing population trend	Habitat vulnerability
PURPLE PIMPLEBACK	<i>Quadrula refulgens</i>	Insufficient data on distribution	
SOUTHERN CREEKMUSSEL	<i>Strophitus subvexus</i>	Decreasing population trend	Habitat vulnerability
LILLIPUT	<i>Toxolasma parvus</i>	Insufficient data on distribution	
IRIDESCENT LILLIPUT	<i>Toxolasma paulus</i>	Insufficient data on distribution	
FAWNSFOOT	<i>Truncilla donaciformis</i>	Decreasing population trend	Habitat vulnerability
FLORIDA PONDHORN	<i>Unio merus carolinianus</i>	Insufficient data on distribution	
FLORIDA FLOATER	<i>Utterbackia peggyae</i>	Insufficient data on distribution	
RAINBOW	<i>Villosa iris</i>	Decreasing population trend	Limited distribution
ALABAMA RAINBOW	<i>Villosa nebulosa</i>	Decreasing population trend	Habitat vulnerability
PAINTED CREEKSHELL	<i>Villosa taeniata</i>	Decreasing population trend	Habitat vulnerability

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