

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Endangered Status for Marshall's Mussel (*Pleurobema marshalli*), Curtus' Mussel (*Pleurobema curtum*), Judge Tait's Mussel (*Pleurobema taitianum*), the Stirrup Shell (*Quadrula stapes*), and the Penitent Mussel (*Epioblasma* (= *Dysnomia*) *penita*)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The Service has determined Marshall's mussel (*Pleurobema marshalli* Frierson), Curtus' mussel (*Pleurobema curtum* (Lea)), Judge Tait's Mussel (*Pleurobema taitianum* (Lea)), the stirrup shell (*Quadrula stapes* (Lea)), and the penitent mussel (*Epioblasma* (= *Dysnomia*) *penita* (Conrad)) to be endangered species under the Endangered Species Act (Act) of 1973, as amended. These five freshwater clams are restricted to areas in the Tombigbee River system that represent remnants of their historic ranges. They have been found in moderate-to-large rivers with moderate-to-swift current. Their preferred habitats are riffle or shoal areas with stable substrates ranging from sandy gravel to gravel-cobble. Much of the historic habitat has been modified by reservoir and barge canal construction. The remaining populations are in a bendway or meander of the Tombigbee River that was bypassed by the Tennessee-Tombigbee Waterway (TTW) and in a few tributaries of the Tombigbee River. They are away from and not affected by present operation of the completed TTW. The remaining habitat is threatened by siltation from a variety of sources and by gravel dredging. The U.S. Army Corps of Engineers is currently undertaking conservation efforts for these species through reconstruction

and management of gravel bar habitat as well as ecological studies. The construction of impoundments adversely impacted these five species by physical destruction during dredging, increasing siltation, reducing water flow, suffocating juveniles with sediment, and possibly disturbing host fish movements. This determination implements the protection of the Endangered Species Act of 1973, as amended, for these five freshwater clams.

DATE: The effective date of this rule is May 7, 1987.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the Endangered Species Field Station, U.S. Fish and Wildlife Service, Jackson Mall Office Center, Suite 316, 300 Woodrow Wilson Avenue, Jackson, Mississippi 39213.

FOR FURTHER INFORMATION CONTACT: Mr. Dennis B. Jordan, Endangered Species Field Supervisor, at the above address (601/965-4900 or FTS 490/4900).

SUPPLEMENTARY INFORMATION:**Background**

Marshall's mussel was described as *Pleurobema marshalli* by Frierson in 1927 from specimens collected by A.A. Hinkley from the Tombigbee River in Greene County, Alabama (Stansbery 1983b). Marshall's mussel is a bivalve mollusk about 60 mm long, 50 mm high, and 30 mm wide. The shell has a shallow umbonal cavity, a rounded sub-ovate or obliquely elliptical outline, nearly terminal beaks, and very low pustules or welts on the postventral surface. This mussel was historically known from the main stem of the Tombigbee River from just above Tibbee Creek near Columbus, Mississippi, down to Epes, Alabama (Stansbery 1983b). Studies of clams of the Gulf Coast rivers from the Escambia River to the Suwannee River by Clench and Turner (1956) and of Mississippi streams by Grantham (1969), did not reveal Marshall's mussel in those areas. Extensive surveys of the Cahaba River

by van der Schalie (1938) and Baldwin (1973) and of the Coosa River by Hurd (1974) did not find Marshall's mussel (Stansbery 1983b). This complete lack of specimens from anywhere except the Tombigbee River from Tibbee Creek to Epes, Alabama, suggests that the historical range of this species was restricted to this river reach. An extensive survey of the Tombigbee River in 1971-1976 by Williams (Stansbery 1983b) recorded Marshall's mussel in the lowermost half of the river from Tibbee Creek downstream to just above the mouth of the Noxubee River. Yokley (1978) did not find Marshall's mussel in his survey of the Buttahatchie River. The only remaining viable habitat for this species in the Tombigbee River is a gravel bar in a bendway in Sumter County, Alabama.

Curtus' mussel was originally described as *Unio curtus* by Lea in 1859. The Service recognizes the following name combinations (based on Stansbery 1963d) as equivalent to *Pleurobema curtum* (Lea, 1859):

Unio curtus Lea, 1859:113.

Margaron (Unio) curtus (Lea).—Lea 1870:40.

Pleurobema curta (Lea).—Simpson 1900:754.

Pleurobema curtum (Lea).—Simpson 1914:762.

Obovaria (Pseudoon) curta (Lea).—Frierson 1927:91.

Curtus' mussel is a bivalve mollusk 50 mm long, 35 mm high, and 30 mm wide. The shell varies from green in young shells to a dark greenish-brown in older shells. The shell is subtriangular, is inflated in front, and has a bluish-white, iridescent, thin nacre (Simpson 1914). Curtus' mussel was historically found in the main stem of the Tombigbee River. The Service considers the single record of this species from the Big Black River in Mississippi (Hinkley 1906:54) to be erroneous. The species has been collected from only five locations, and only two living specimens are known to have been collected. The single remaining viable habitat is in the East

Fork Tombigbee River, Mississippi. Grantham (1969) did not record *Curtus* mussel from the Big Black River, nor have more recent surveys found it there (P. D. Hartfield, Mississippi Museum of Natural Science, pers. comm.).

Judge Tait's mussel was described as *Unio taitianus* by Lea in 1834, with the type locality identified as the Alabama River (Stansbery 1983a). The Service recognizes the following abbreviated synonymy (based on Stansbery 1983a) for *Pleurobema taitianum* (Lea, 1834):

Unio taitianus (Lea) 1834:39.

Margarita taitianus (Lea).—Lea 1836:21.

Margaron taitianus (Lea).—Lea 1852:25.

Pleurobema taitiana (Lea).—Simpson 1900:754.

Pleurobema taitianum (Lea).—Simpson 1914:764.

Pleurobema tombigbeanum Frierson 1908:27.

Judge Tait's mussel is a bivalve mollusk about 50 mm long, 45 mm high, and 30 mm wide. The shell is brown to brownish-black, obliquely triangular, and inflated, with narrowly pointed beaks directed forward, a very shallow but distinct furrow, pink-tinted nacre, and shallow beak cavities (Stansbery 1983a, Simpson 1914). Judge Tait's mussel was historically found in the Tombigbee River from the mouth of Tibbee Creek near Columbus, Mississippi, to Demopolis, Alabama; the Alabama River at Claiborne and Selma, Alabama; the lower Cahaba River, Alabama; and possibly the Coosa River, Alabama (Stansbery 1983a, Williams 1982). Several shells from recently dead specimens were found at one location on the Buttahatchie River, a tributary of the Tombigbee, in Mississippi (Schultz 1981). This species has also been reported from the East Fork Tombigbee River (Schultz 1981) and from the Sipsey River, Alabama. Only four sites with suitable habitat remain: these consist of localities in a bendway of the Tombigbee River, Sumter County, Alabama; the East Fork Tombigbee River, Mississippi; the Buttahatchie River, Mississippi; and the Sipsey River, Pickens and Greene Counties, Alabama.

The stirrup shell was originally described from the Alabama River as *Unio stapes* by Lea in 1831. The Service recognizes the following name combinations (based on Stansbery 1981) as equivalent to *Quadrula stapes* (Lea, 1831):

Unio stapes Lea, 1831:77.

Margarita (Unio) stapes (Lea).—Lea 1836:15.

Margaron (Unio) stapes (Lea).—Lea 1852b:22.

Quadrula stapes (Lea).—Simpson 1900:775.

Orthonymus stapes (Lea).—Haas 1969:310.

The stirrup shell is a bivalve mollusk about 55 mm long, 50 mm high, and 30 mm wide. The shell is yellowish-green, with the green, zigzag markings of young individuals becoming brown with age. It is irregularly quadrate, with a sharp posterior ridge, truncated posterior, tubercles, and a silvery white nacre that is thinner and iridescent behind (Simpson 1914). The stirrup shell was found historically in the Tombigbee River from the mouth of Tibbee Creek near Columbus, Mississippi, downstream to Epes, Alabama; The Black Warrior River in Alabama; and in the Alabama River (Stansbery 1981, Williams 1982). One specimen was found recently in the Sipsey River, Pickens and Greene Counties, Alabama, by Dr. Paul Yokley. Only two small areas of viable habitat remain: one in the Sipsey River and the other in a bendway of the Tombigbee River in Sumter County, Alabama.

The penitent mussel was described as *Unio penitus* by Conrad in 1834. The type locality is the Alabama River near Claiborne, Alabama (Stansbery 1983c). The Service recognizes the following name combinations (based on Stansbery 1983c) as equivalent to *Epioblasma penita* (Conrad, 1834):

Unio penitus Conrad, 1834:33.

Margarita (Unio) penitus (Conrad).—Lea 1836:19.

Margaron (Unio) penitus (Conrad).—Lea 1852a:24.

Truncilla penita (Conrad).—Simpson 1900.

Dysnomia penita (Conrad).—Frierson 1927:93.

Epioblasma penita (Conrad).—Stansbery 1976:48.

Plagiola (Plagiola) penita (Conrad) [in part].—Johnson 1978:254.

The penitent mussel is a bivalve mollusk about 55 mm long, 40 mm high, and 34 mm wide. The shell is yellowish, greenish-yellow, or tawny, sometimes with darker dots; is rhomboid with irregular growth lines and a radially sculptured posterior; and has white or straw-colored nacre (Simpson 1914). The females have a large radially-grooved swelling projecting behind the shell. This species was historically known from the Tombigbee River from Bull Mountain Creek above Amory, Mississippi, downstream to Epes, Alabama; the Alabama River at Claiborne and Selma; the Cahaba River below Centreville, Alabama; and the Coosa River in Alabama and Georgia (Stansbery 1983c, Williams 1982). Live specimens were found recently in the Buttahatchie River in Alabama (Yokley

1978, Schultz 1981). The only remaining viable habitats are in the Buttahatchie River, Alabama, the East Fork Tombigbee River, and a single locality in a bendway of the Tombigbee River, Sumter County, Alabama.

These five species have historically been found in moderate-to-large rivers with moderate-to-swift current. Their preferred habitats are riffle-run or shoal areas with stable substrates ranging from sandy gravel to gravel-cobble (Stansbery 1976, 1980, 1981, 1983a, 1983b, 1983c, 1983d). These clams have been taken in water up to 0.7 meters deep (Williams 1982).

Land ownership in the portions of the Tombigbee and Alabama River systems where these species have been collected includes Federal, State, corporate, and individual. Governmental regulation of alterations of these habitats is primarily the responsibility of the U.S. Army Corps of Engineers (COE).

The status of each of these clams has declined owing to habitat alteration. The modification of the free-flowing Tombigbee River into a series of impoundments to form a barge canal has adversely impacted these species through physical destruction during dredging, increased siltation, reduction of water flow, and possible disturbance of host fish movements. Remaining populations are in a bendway and tributaries that are outside of the navigation channel of the Tennessee-Tombigbee Waterway (TTW). The COE has authorized channelization and snagging projects in portions of the Buttahatchie, Sipsey, Tombigbee, East Fork, and Cahaba Rivers where these species have been found.

On April 11, 1980, the Service published a notice in the **Federal Register** (45 FR 24904), that a status review was being conducted for these five clam species. In comments received in response to that notice, former Congressman David Bowen of Mississippi opposed the notice and possible listing based on his concern that Service employees opposed the construction of the TTW. The Service responds that it has based the notice, proposed rule, and final rule to list these five clams solely on the most current biological data available, as required by the Endangered Species Act. Former Governors Fob James of Alabama and William F. Winter of Mississippi commented that the classification and life histories of these five species required clarification, and that the species were not threatened by the TTW. Both governors cited van der Schalie (1980) in support of their comments. The Service responds that it

has examined the reports by Drs. van der Schalie and Stansbery and all relevant scientific literature and museum collections and believes that the taxonomic characterizations presented in the previous paragraphs represent the soundest and most current interpretation of available data. The Service also notes that the TTW populations survive only at sites that are outside of the navigation channel, which is now completed, and conservation efforts for these species are likely to be expended on habitats that have not been altered by the waterway.

The COE submitted documents describing studies of these species and suggesting possible conservation and management procedures for remaining populations. The Service has incorporated the distributional data from these studies with data from other sources in the process of making final determinations of endangered status. As stated above, the Service has considered taxonomic questions raised in these and other studies and believes that the taxonomy employed here is most consistent with all available information.

Three conservation groups and two individuals, including a professional malacologist, presented or cited data in support of a proposal of protective status under the Endangered Species Act for these species. The proposed rule was published in the **Federal Register** (51 FR 11761) on April 7, 1986.

Summary of Comments and Recommendations

In the April 7, 1986, proposed rule (51 FR 11761) and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to the development of a final rule. Appropriate State agencies, county governments, Federal agencies, scientific organizations, and other interested parties were contacted and requested to comment. Newspaper notices that invited general public comment were published in the *Columbus Commercial Dispatch* on April 27, 1986, the *Jackson Clarion Ledger* on April 25, 1986, the *Jackson Daily News* on April 25, 1986, the *Tupelo Journal* on April 22, 1986, the *Birmingham News* on April 26, 1986, the *Birmingham Post Herald* on April 26, 1986, and the *Tuscaloosa News* on April 22, 1986. A public hearing was requested by the Tenn-Tom Waterway Authority. The hearing was held in Columbus, Mississippi, on July 10, 1986, and the comment period was reopened until July 20, 1986, to accommodate the public hearing. Comments, either written or

presented orally at the public hearing, were received from eight parties.

Three parties supported the proposal: these included the Mississippi Department of Wildlife Conservation, the U.S. Army Corps of Engineers, and a professional malacologist. One individual expressed concern over the listing of a short river reach at Columbus as habitat for the mussels but did not otherwise comment on the listing. One professional malacologist expressed taxonomic concerns about Marshall's mussel. One agency requested the designation of critical habitat if these species were listed but did not express a position on the listing.

The two statements obtained at the public hearing were opposed to listing until further data were collected. All comments and statements of similar content are grouped in a number of general issues. These issues and the Service's response to each are discussed below.

Issue 1: The data do not support the continued existence of these species since none of them were collected alive during the status surveys in the 1970's upon which much of the proposed rule is based. The collections were made before the TTW construction extirpated the species. **Response—**The available data support the continued existence of all five species. Marshall's mussel was collected alive in 1972 in Sumter County, Alabama by Stansbery and in Pickens County, Alabama by Williams. The Sumter County gravel bar is still viable habitat in a bendway that is assured a continuous water flow. The Pickens County collection site has heavy sedimentation and is not considered viable habitat. Curtus' mussel was collected alive in 1972 and 1974 by Williams in Pickens County, Alabama. Shells of recently dead (less than two years) individuals were collected by Williams from the East Fork in 1974. The Pickens County site has heavy sedimentation. The East Fork continues to provide excellent habitat for this species, and the Service finds no basis for doubting that it continues to exist there. The lack of live specimens is due to the scarcity of the species and the lack of collecting effort during the past decade. Judge Tait's mussel was collected alive by Stansbery in 1972 in Sumter County, Alabama. Shells of recently dead individuals were collected by Service biologists in 1984 from the Sipsey and Buttahatchie Rivers. The stirrup shell was collected alive in 1972 by Stansbery in Sumter County, Alabama, and by Williams in Pickens County, Alabama. Service biologists collected the shell of a recently dead

individual in 1984 from the Sipsey River. The Sumter County and Sipsey River sites continue to provide viable habitat for this species. The penitent mussel was collected alive in 1972 by Stansbery in Sumter County, Alabama; in 1974 by Williams, and in 1977 by Yokley in the Buttahatchie River. In 1984, the shell of a recently dead individual was collected by Service biologists in the Buttahatchie River. The Sumter County and Buttahatchie River sites continue to provide viable habitat. The collection of shells of recently dead individuals in 1984 indicates that the TTW has not completely extirpated these species. The lack of records of live individuals since surveys of the 1970's is due to the difficulties in censusing low-density populations in rivers that represent the remaining habitat.

Issue 2: The taxonomy of *Pleurobema* is questionable and should be clarified before listing. **Response—**One commenter questioned the validity of Marshall's mussel based upon a review of the type specimen and one shell. The Service views this as an inadequate sample on which to base a taxonomic decision, and has based its recognition of the species' validity on the examination of more than 300 shells. The appropriate use of the specific epithet *taitianum* for Judge Tait's mussel was questioned by a commenter who suggested that an earlier name "may" exist. The commenter did not suggest what that earlier name might be. If an earlier, valid name for Judge Tait's mussel is discovered and generally accepted by the scientific community, the Service will recognize that name as applying to this species. The peril of the species remains, regardless of its formal scientific name. Curtus' mussel was not specifically addressed by any commenters. The species within the genus *Pleurobema* remain a subject of discussion by many malacologists. The current scientific literature supports the Service's position. Should future research, published in the scientific literature, support a generally accepted view that is significantly different, the Service will reassess the status of these species.

Issue 3. The COE and other agencies will be required to continuously monitor (look for mussels) their activities during the operation and maintenance of the TTW and associated channel and port facilities. **Response—**The service does not believe that any of these species currently exist in the TTW. The current operation and maintenance procedures of the TTW do not affect any of the five species. Unless the operation and maintenance of the TTW is significantly

changed, the COE will not be required to monitor these activities within the TTW. Any channel or port facilities proposed for construction outside the TTW may be required to conduct a biological assessment prior to construction. If none of the species are found in the project area or the area impacted by the project, the Service does not anticipate a need for continuously monitoring project activities. Should the activities change from those included in the biological assessment, a new assessment may be required.

Issue 4: Critical habitat should be designated so that areas outside of critical habitat would be free of the restrictions that listing may invoke. Response—The designation of critical habitat does not remove the mandates of the Endanger Species Act in areas where a listed species occurs outside of critical habitat. The Service's reasons for not designating critical habitat are presented in the Critical Habitat section of this rule.

Issue 5: The fish hosts of these clams should be identified. Response—The Service expects this to be accomplished as part of its effort to recover these species.

Issue 6: Surveys should be conducted to determine whether these species are common in other locations. Response—Surveys have been and are continuing to be conducted on other streams. Since impoundment of the Coosa River, none of these species have been found outside the Tombigbee River system. Should any of the five species be found in other systems, the Service will reassess the status of these species and take appropriate action. The Service sees little likelihood that these species exist elsewhere in numbers that would abrogate the need for protection under the Act.

Issue 7: Laws Bar in the Columbus bendway should not be included in the listing. Response—Specific areas of habitat are not designated except when critical habitat is determined. A survey of Laws Bar in 1985 found a thick layer of sediment and no mussels, which generally prefer sand and gravel substrates. The Service no longer considers Laws Bar to be viable habitat for any of the five species.

Issue 8: Mussels in bendways should be relocated to suitable habitat before the bendways receive enough sediment to kill the mussels. Response—The only remaining bendway where these species still are known to occur is in Sumter County Alabama, and it appears to remain clear of sediment.

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that these five species of mussels should be classified as endangered species. Procedures found at section 4(a)(1) of the Endangered Species Act (16 U.S.C. 1531 *et seq.*) and regulations (50 CFR Part 424) promulgated to implement the listing provisions of the Act were followed. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to Marshall's mussel (*Pleurobema marshalli*), Curtus' mussel (*P. curtum*), Judge Tait's mussel (*P. taitianum*), the stirrup shell (*Quadrula stapes*), and the penitent mussel (*Epioblasma penita*) are as follows:

A. The present or threatened destruction, modification, or curtailment of their habitat or range. All five of the subject species have greatly declined in range and/or numbers in the Tombigbee River owing to alteration of their habitat from a free-flowing riverine system to an impounded system by the construction of the Tennessee-Tombigbee Waterway (TTW). The modification of the free-flowing Tombigbee River into a series of impoundments adversely impacted these clams by physical destruction during dredging, increasing siltation, reducing water flow, and suffocating juveniles with sediment (Stansbery 1980, 1983b; Stein 1971, Williams 1982). These species survive in the Tombigbee River proper only in meander or bendway that was bypassed by the TTW. The situation of this population away from the navigation channel allowed it to escape the full force of the threats that extirpated these species elsewhere in the Tombigbee River. Dredging and snagging for channel maintenance and flood control threaten populations in tributaries of the Tombigbee River.

Marshall's mussel has been collected from only the Tombigbee River in a reach from just above the confluence with Tibbee Creek downstream to Epes, Alabama. Construction of the TTW effectively eliminated, by impoundment, the historic habitat of Marshall's mussel except for gravel bars in one river bendway bypassed by the TTW. The gravel bars are receiving some sedimentation. In addition, the river flows are significantly reduced by backwater from impoundments. This flow reduction impacts clams by increasing siltation and changing the fishery habitat. This latter impact may result in the loss of the fish host for

glochidial development. Since Marshall's mussel has only been found in large river systems, the fish host may be a large-river species that has been adversely impacted by impoundments.

The known historic range of Curtus' mussel is the main stem Tombigbee River, but it is now limited to the East Fork. The East Fork is the principal extension of the Tombigbee River proper upstream from the confluence of the East Fork and Town Creek. The East Fork site remains similar to historic habitat but continues to face threats. The COE has approved a final supplement to the environmental impact statement to conduct dredging and snagging activities in a 53-mile reach of the East Fork in the area where the last known collection of a live Curtus' mussel was made. The East Fork water flows have been affected by construction of the TTW canal, which has diverted the flow of Bull Mountain Creek. Bull Mountain Creek provides nearly half the flow of the East Fork (U.S. Army Corps of Engineers 1984). Even with flow now restored to the East Fork, the water quality is undoubtedly altered. Bull Mountain Creek is a cool water stream that is likely warmed to some degree when it is routed through the TTW canal.

Judge Tait's mussel is known historically from the Tombigbee River in a reach from Bull Mountain Creek above Amory, Mississippi, downstream to Demopolis, Alabama; the Alabama River at Claiborne and Selma, Alabama; the lower Cahaba River, Alabama; and the Coosa River, Alabama (Stansbery 1983a, Williams 1982). Shells of recently dead Judge Tait's mussel were found recently on the Buttahatchie River (Schultz 1981) and the Sipsey River. Judge Tait's mussel has not been collected from the Alabama and Cahaba Rivers since the 1800's (Stansbery 1983a) or the Coosa River since 1974, which was prior to impoundment of its habitat there (Williams 1982). Judge Tait's mussel was last collected from the mainstem Tombigbee River in 1972 (Stansbery 1983a). Habitat remaining there is marginal and remaining clams must cope with the continuing impacts of siltation, reduced water flows, water quality degradation, and possible loss of their fish host. Judge Tait's mussel is surviving in the Buttahatchie River (Schultz 1981), East Fork Tombigbee River, and Sipsey River. The species is threatened in these three Tombigbee River tributaries by a 59-mile channel improvement project in the Buttahatchie, a 53-mile clearing and snagging project in the East Fork (U.S. Army Corps of Engineers 1983), and an 84.5-mile

channel improvement project in the Sipsey River (U.S. Army Corps of Engineers 1981). The COE has the authority to spend up to \$100,000 per year per stream for the removal of snags, clearing, and straightening for flood control purposes. Such a project has been carried out on the East Fork upstream of Mill Creek (U.S. Army Corps of Engineers 1984). The East Fork population is also impacted by water diversion. Bull Mountain Creek is a cool water stream that contributes nearly half the flow of the East Fork. During construction of the canal, the entire flow of Bull Mountain Creek was diverted. The cool inflow from Bull Mountain Creek will undoubtedly be warmed as it mixes with the canal water, resulting in warming of the East Fork. Changes in water temperatures can be physiologically stressful to clams, alter their food supply, and impact their fish hosts.

The stirrup shell is known historically from the Alabama River and the Tombigbee River. Museum records indicate the stirrup shell was restricted historically to the lowermost part of the Alabama River (Stansbery 1981). The lack of fresh shells or living specimens from the Alabama River for several decades indicates the likely extirpation of the stirrup shell from this portion of the historic range. This species has been collected from a reach of the Tombigbee River from near Epes, Alabama, upstream to just above the confluence of Tibbee Creek. One specimen was recently collected by Yokley in the lower Sipsey River, and a recent survey by Fish and Wildlife Service biologists found a fresh stirrup shell at the same site. The present known distribution of this clam is limited to a single Tombigbee River bendway and the Sipsey River. This limited distribution continues to be threatened by habitat modification. Impoundment of the Tombigbee River has altered water flows and increased siltation on the gravel bars. This alteration suffocated mussels with silt and may have modified habitat so as to eliminate the fish host, if the host is a riverine species that is intolerant of impoundments. The COE has a channel improvement project for 84.5 miles of the Sipsey River that includes 32 miles of clearing and snagging (U.S. Army Corps of Engineers 1981). Channel modifications adversely impact clams by alteration of the substrate, increased siltations, altered water flows, and direct mortality of mussels from dredging and snagging activities.

The penitent mussel is known historically from the Tombigbee River

from the confluence of the East Fork and Bull Mountain Creek above Amory, Mississippi, downstream to Epes, Alabama; the Alabama River at Claiborne and Selma; the Cahaba River below Centreville, Alabama; and the Coosa River in Alabama and Georgia (Stansbery 1983c, Williams 1982). Live specimens were found recently on the Buttahatchie River (Yokley 1978, Schultz 1981). The penitent mussel has not been collected from the Alabama and Cahaba Rivers since the 1800's (Stansbery 1983c) or the Coosa River since 1974, prior to impoundment of its habitat there (Williams 1982). The penitent mussel was last collected from the mainstem Tombigbee River in 1972 (Stansbery 1983c). Remaining habitat in the Tombigbee River is in the bendway in Sumter County, Alabama. This habitat is marginal and is subject to siltation, reduced water flows, water quality degradation, and possible loss of habitat of the fish host. The penitent mussel is surviving in the Buttahatchie River (Yokley 1978, Schultz 1981) and the East Fork Tombigbee River. The species is threatened in these two Tombigbee River tributaries by a 59-mile channel improvement project in the Buttahatchie (U.S. Army Corps of Engineers 1981) and a 53-mile clearing and snagging project in the East Fork (U.S. Army Corps of Engineers 1983). The COE has the authority to spend up to \$100,000 per year per stream for the removal of snags, clearing, and channel straightening for flood control purposes. Such a project has been conducted on the East Fork upstream of Mill Creek (U.S. Army Corps of Engineers 1984). The East Fork population is also impacted by water diversion. Bull Mountain Creek is a cool water stream that contributes nearly half the flow of the East Fork. During construction of the canal, the entire flow of Bull Mountain Creek was diverted. The cool inflow from Bull Mountain Creek will be warmed as it mixes with the canal water, resulting in warmer water temperatures in the East Fork. Changes in water temperatures can physiologically stress clams, alter their food supply, and impact their fish hosts.

B. Overutilization for commercial, recreational, scientific, or educational purposes. These rare species occur in such low numbers that collection for private collections and scientific purposes poses an additional threat. Considering the historic rarity of these species and their loss of historic habitat by construction of the TTW, collection of live specimens could result in the loss of a significant proportion of surviving individuals.

C. Disease or predation. There is no evidence of threats from disease or predation.

D. The inadequacy of existing regulatory mechanisms. These species occur in Mississippi and Alabama. Both States have regulations that require a permit to take clams. Enforcement of this regulation is very difficult and limited. Limited enforcement results from several factors, including limited enforcement resources, enforcement priorities, and the difficulty of apprehending violators. In addition, these regulations do not affect habitat degradation, the major threat to these species.

E. Other natural or manmade factors affecting their continued existence. Marshall's mussel is restricted to the lower half of the Tombigbee River and is found in free-flowing riffle areas (Stansbery 1983b). Construction of the TTW effectively eliminated this entire reach of free-flowing river except for the site discussed earlier. The isolation of the remaining population, along with very low population size, increases vulnerability to any single adverse event. Reproduction becomes increasingly difficult at low population densities owing to the decreased concentration of gametes in the water column.

Curtus' mussel is also limited to the Tombigbee River system. The population in Pickens County, Alabama, has likely been extirpated by the TTW, which leaves the East Fork Tombigbee River as the only remaining occupied habitat. The historic low numbers and difficulties in successful reproduction for such a rare species increase the likelihood of a further decline.

Judge Tait's mussel is threatened by limited range and low numbers. The four remaining populations are isolated from each other by the TTW. This effectively isolates these small gene pools and leaves them susceptible to the loss of genetic variation, and thereby limits their adaptability to changing conditions. Isolation of populations and individuals also decreases the likelihood of successful reproduction because this species depends upon water currents to transport gametes from one individual to another.

The stirrup is restricted to the Sipsey River and one site in the Tombigbee River. The Sipsey River, Tombigbee River, and the bendway in Sumter County, Alabama, support the only viable populations, and these populations are threatened by low numbers and the associated difficulties of successful reproduction.

The penitent mussel is threatened by limited range and low numbers. The remaining populations are isolated from each other by the TTW. This effectively creates isolated gene pools of small size that are therefore subject to loss of genetic variability. Isolation of populations and low density of individuals also decreases the likelihood of successful reproduction, since this species also depends upon water currents to transport gametes from one individual to another.

All five species are affected by runoff of fertilizers and pesticides. Runoff of fertilizers into small streams can exceed the assimilation ability of the stream and result in algal blooms and excesses of other aquatic vegetation. This condition can produce stream eutrophication and result in the death of the native fauna. Herbicides, insecticides, fungicides, and other pesticides are easily washed from fields into streams, along with silt particles to which these substances adhere. While being transported downstream, these particles may be ingested by filter feeders, which include these native clams. Pesticide laden silt particles eventually settle to and become a part of the substrate. This increases the concentrations of pesticides in the clams' habitat.

All five species may also be adversely affected by loss of their fish hosts. Although the host fish for these particular species have not been identified, the hosts of clams from riffle habitats tend to be riffle-dwelling species (Fuller 1974) and are likely to decline or become extirpated as this habitat is modified.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by these five species of clams in determining to make this rule final. Based on this evaluation, the preferred action is to list Marshall's mussel, Curtus' mussel, Judge Tait's mussel, the stirrup shell, and the penitent mussel as endangered. Endangered status is appropriate because of the loss of historic habitat in the Tombigbee River by construction of the TTW and the reduction in quality of the remaining habitat owing to reduced water velocity and resulting sedimentation. Tributary populations also face threats. Threatened status would not be appropriate because these species are restricted to very limited areas, are reduced to low numbers, and remain vulnerable to a single catastrophic event. The Tombigbee River populations are close to extinction. Critical habitat is

not proposed for these species for reasons given in the next section.

Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time a species is determined to be endangered or threatened. The Service finds that designation of critical habitat is not prudent for these five mussels at this time owing to lack of benefit from such designation. The COE is the Federal agency most involved and is already aware of the location of the remaining populations of these five species. The COE has conducted numerous studies of the Tombigbee River system fauna and is very knowledgeable of the fauna and of project impacts. No additional benefits would accrue from a critical habitat designation that do not already accrue from the listing. In addition, these species are so rare that taking for scientific purposes and private collections is a threat. The publication of critical habitat maps and other publicity accompanying critical habitat designation would increase that threat. The locations of populations of these species have consequently been described only in general terms in this rule. Precise locality data are available to appropriate Federal agencies through the Service office described in the **ADDRESSES** section.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. Such actions are initiated by the Service following listing. The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR Part 402. Section 7(a)(2) requires Federal

agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

Federal involvement is expected to include COE projects for flood control and navigation and Soil Conservation Service watershed projects on Tombigbee River tributary streams. The COE will conduct annual maintenance dredging for navigation on the TTW and will manage a number of the bendways for recreation and other beneficial values. This will require the maintenance of some river flow and of boat access from one or both ends of these bendways. Structural management will be required at 12 bendways. Structural management actions include blockage structures, using dredged material, at the upstream end of seven bendways to prevent sedimentation. The downstream ends of the bendways would remain open for access. The upstream ends of five bendways would be dredged initially and maintained to pre-TTW channel dimensions, plus sediment basins designed to contain the projected annual sediment deposition would be dredged and maintained (U.S. Army Corps of Engineers 1984). This management action would maintain water flows and boat access, but would require periodic dredging to remove sediment. The remaining 22 bendways will be monitored to determine the need for further structural management measures. Other COE projects that occur in rivers where these species have been found are: 84.5 miles of channel improvements and 32 miles of clearing and snagging in the Sipsey River (U.S. Army Corps of Engineers 1981); 53 miles of clearing and snagging in the East Fork (U.S. Army Corps of Engineers 1983); and 70 miles of clearing, snagging, enlargement, channels, and cutoffs in 18 streams for flood control on the Tombigbee River (U.S. Army Corps of Engineers 1983). The Soil Conservation Service has eight watersheds in operation, one in the planning stage, and one application for planning in the western tributaries of the Tombigbee River in Mississippi (U.S. Department of Agriculture 1983). Channelization activities associated with watershed projects could increase siltation and adversely affect potential habitat.

The Act and implementing regulations found at 50 CFR 17.21 set forth a series of general prohibitions and exceptions

that apply to all endangered wildlife. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to take, import or export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. It also is illegal to possess, sell, delivery, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving endangered wildlife species under certain circumstances. Regulations governing permits are at 50 CFR 17.22 and 17.23. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, and/or for incidental take in connection with otherwise lawful activities. In some instances, permits may be issued during a specified period of time to relieve undue economic hardship that would be suffered if such relief were not available.

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

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Authors

The primary authors of this proposed rule are James H. Stewart and John J. Pulliam, III (see **ADDRESSES** section).

List of Subjects in 50 CFR Part 17

Endangered and threatened wildlife, Fish, Marine mammals, Plants (agriculture).

Regulations Promulgation

PART 17—[AMENDED]

Accordingly, Part 17, Subchapter B of Chapter I, Title 50 of the Code of Federal Regulations, is amended as set forth below:

1. The authority citation for Part 17 continues to read as follows:

Authority: Pub. L. 93-205, 87 Stat. 884; Pub. L. 94-359, 90 Stat. 911; Pub. L. 95-632, 92 Stat. 3751; Pub. L. 96-159, 93 Stat. 1225; Pub. L. 97-304, 96 Stat. 1411 (16 U.S.C. 1531 *et seq.*).

2. Amend § 17.11(h) by adding the following, in alphabetical order under

CLAMS, to the list of Endangered and Threatened Wildlife:

§ 17.11 Endangered and threatened wildlife.

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(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
CLAMS							
Mussel, Curtis	<i>Pleurobema curtum</i>	U.S.A. (AL, MS)	NA	E		NA	NA
Mussel, Judge Tar's	<i>Pleurobema taitianum</i>	U.S.A. (AL, MS)	NA	E	262	NA	NA
Mussel, Marshall's	<i>Pleurobema marshalli</i>	U.S.A. (AL, MS)	NA	E	262	NA	NA
Mussel, penitent	<i>Epioblasma (= Dysomia) penita</i>	U.S.A. (AL, MS)	NA	E	262	NA	NA
Stirrup shell	<i>Quadrula stapes</i>	U.S.A. (AL, MS)	NA	E	262	NA	NA

Dated: March 24, 1987.
Susan Recce,
Acting Secretary for Fish and Wildlife and Parks.
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