CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Percina aurora

COMMON NAME: Pearl darter

LEAD REGION: 4

INFORMATION CURRENT AS OF: February 2003
STATUS/ACTION (Check all that apply):
___ New candidate
_X_ Continuing candidate
_X_ Non-petitioned
___ Petitioned - Date petition received: ___
___ 90-day positive - FR date: ___
___ 12-month warranted but precluded - FR date: ___
__ Is the petition requesting a reclassification of a listed species?
___ Listing priority change
Former LP: ___
New LP: ___
Latest date species first became a Candidate: _____
___ Candidate removal: Former LP: ___ (Check only one reason)
___ A - Taxon more abundant or widespread than previously believed or not subject to a degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
___ F - Range is no longer a U.S. territory.
___ M - Taxon mistakenly included in past notice of review.
___ N - Taxon may not meet the Act=s definition of Aspecies.@
___ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Fishes - Percidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Louisiana, Mississippi

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

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

LEAD FIELD OFFICE CONTACT (Office, name, phone number): Jackson, Mississippi Field Office, Daniel J. Drennen, 601/321-1127

BIOLOGICAL INFORMATION (Describe habitat, historic vs. current range, historic vs. current population estimates (# populations, #individuals/population), etc.):

Species Description and Taxonomy

The Pearl darter is a small percid fish with a blunt snout, horizontal mouth, large eyes situated high on the head, and a medial black caudal spot at the base of the caudal fin (Ross 2001). In 1994, Suttkus et al. (1994) described the Pearl darter. It was previously known as Percina sp. 3 and the Pearl River channel darter (Ross and Brenneman 1991). The Pearl darter belongs to the subgenus Cottogaster and is closely allied to the channel darter (Percina copelandi). The Pearl darter is distinguished from the channel darter by its large average body size, lack of tubercles and heavy pigmentation of breeding males, high number of marginal spines on the modified belly scales of breeding males, and fully scaled cheeks. Breeding males have two dark bands across the spinous dorsal fin, a broad, diffuse, dusky marginal band, and a pronounced dark band across the fin near its base. Breeding females are devoid of pigmentation on the ventral surface of head and body. The Pearl darter reaches a maximum standard length of 57 millimeters (mm) (2.28 inches (in)) in females and 64 mm (2.56 in) in males (Suttkus et al. 1994).

Habitat/Life History

Little is known about the habitat requirements of the Pearl darter. Pearl darters have been collected from gravel riffles and rock outcrops; deep runs over gravel and sand pools below shallow riffles; swift (90 centimeters per second or 35.1 inches per second), shallow water over firm gravel and cobble in mid-river channels; and swift water near brush piles. Slack (2002) found Pearl darters associated with scour holes on the inside bend of the river downstream from point bars; and substrata primarily of course sand with accumulation of detritus in troughs perpendicular to the shore line. A single post-spawning individual was collected in a deep, sluggish run over silty sand (Bart and Piller 1997).

The Pearl darter is believed to have comparable habitat requirements to the channel darter. Habitat use of the Pearl darter is likely centered on deeper runs and pools with larger substrate particle size (Schofield et al.1999). The channel darter generally inhabits rivers and large creeks in areas of moderate current, usually over sand and gravel substrates. Such conditions are often found at the lower ends of riffles or at the edges of deep channels. Seasonally, channel darters move into the slower current of pools to use the scattered rubble as spawning sites (Kuehne and Barbour 1983). Channel darters typically avoid deep sluggish pools, headwater creeks, and lacustrine/palustrine environments (Burr and Warren 1986) with insufficient current to maintain a bottom of sand or sand mixed with gravel and rock (Page 1983). Channel darters most often remain at depths approaching 1 meter (3.28 feet) during the day but move to shallow water at night (Trautman 1957). Chironomids and small crustaceans are the most important food items (Kuehne and Barbour 1983).

Suttkus et al. (1994) found Pearl darters in the Pearl and Strong Rivers in Mississippi spawning in March and April in 1969. Collection data indicated that the species probably spawned in various locations of the Pearl River main stem and upper reaches of the middle Bogue Chitto River. In fish samples from the Pearl River, young-of-the year Pearl darters were collected in June. Females were sexually mature at 39 mm (1.56 in) standard length (SL), while males matured at 42 mm (1.68 in) SL. Five breeding males were collected from the Leaf River (Pascagoula system, Mississippi) during May in shallow water (15 cm (5.85 in)) over firm gravel and cobble in mid channel with a water temperature of 21 degrees C (69.8 degrees F) (Bart and Piller 1997). Most Pearl darters mature in 1 year. Sub-adult Pearl darters may migrate upstream during the fall and winter to spawn in suitable gravel reaches and that elevated river

discharge during the Spring aids in downstream dispersal of young of the year (Bart et al. 2001, Ross et al. 2000).

Historical Range/Distribution

The Pearl darter is historically known only from localized sites within the Pearl and Pascagoula River drainages in Mississippi and Louisiana. Examination of site records of museum fish collections from the Pearl River drainage (Suttkus et al. 1994) suggest that the darter once inhabited the large tributaries and main channel habitats from St. Tammany Parish, Louisiana, to Simpson County, Mississippi, including approximately 96 river miles of the Pearl River, 10 river miles of the Strong River, and 32 river miles of the Bogue Chitto River. Even before its description in 1994, the Pearl darter was considered rare and of conservation concern (Deacon et al. 1997) because it was uncommon, infrequently collected, and occurred in low numbers (Bart and Piller 1997). The Pearl darter was collected from only 14 percent of 716 fish collections from site specific locations within the Pearl River drainage despite annual collection efforts by Suttkus from 1958 to 1973 (Bart and Suttkus 1996, Suttkus et al. 1994). No Pearl darters have been collected in the Pearl River drainage since 1973, even though Suttkus has made 64 fish collections over the last 25 years from the Pearl River (Bart and Piller 1997). Suttkus et al. (1994) attributed the loss of the Pearl darter in the Pearl River to increasing sedimentation from habitat modification caused by removal of riparian vegetation and extensive cultivation near the river=s edge.

Collection data from Bart and Piller (1997), Bart and Suttkus (1996), Suttkus et al. (1994), and Ross (in press) suggest that the Pearl darter is very rare in the Pascagoula River system. Bart and Piller (1997) examined Suttkus= work before 1974 and found that only 19 Pearl darters were collected out of 19,300 total fish in 10 Tulane University Museum of Natural History collections. Additionally, from the AMississippi Freshwater Fishes Database@Dr. Stephen Ross (in Bart and Piller 1997) estimated the rarity of the Pearl darter within the Pascagoula drainage from 379 collections (81,514 fish specimens) since 1973, and found only one Pearl darter collected for every 4,795 specimens. Site records from museum fish collections suggest that the Pearl darter inhabited the main channels of large Pascagoula drainage tributaries from Jackson to Lauderdale Counties, Mississippi, and had a historical noninclusive range of about 30 river miles of the Pascagoula River, 24 river miles of Black Creek, 48 river miles of the Leaf River, 24 river miles of Okatoma Creek, 102 river miles of the Chickasawhay River, 24 river miles of the Bouie River, and 8 river miles of Chunky Creek.

Current Range/Distribution and Population Estimate/Status

Since 1983, Pearl darters have only been found in scattered sites within approximately 102 miles of the Pascagoula drainage, including the Pascagoula, Chickasawhay, Chunky, Leaf and Bouie Rivers and Okatoma and Black Creeks resulting in a decrease of range of approximately 66 percent (compiled from Bart and Piller 1997 and Ross 2001). Bart and Piller (1997) made 27 ancillary collections in 1996 and 1997 from the Pascagoula drainage and collected only 10 Pearl darters at four sites (the Leaf River at Estabutchie; lower Leaf River at Merril; Bouie River downstream of I-59 crossing; and Okatoma Creek at Collins). Three specimens were collected in the Leaf River at Estabutchie in the spring of 1998, whereas, in December 1998, no Pearl darters were found in the upper reaches of the Leaf River between Estabutchie and north

Hattiesburg (Bart and Ross, pers. com. 1998). Slack (2002) found Pearl darters in the Pascagoula River at the confluence with Big Black Creek (Dead Lake) and in various locations 22 km (13.7 mi) downstream of Dead Lake. The Big Black Creek site was the locality where Hildebrand collected Pearl darters in 1933 (Suttkus et al. 1994). No Pearl darters were found in selected sites of the Chunky River in 1995 and 1997 (Bart, pers. com. 1999). Suttkus et al. (1994) speculated that portions of the Leaf River and possibly the lower Black Creek may continue to support reproducing populations even though no recent collecting attempts had been made.

THREATS (Describe threats in terms of the five factors in section 4 of the ESA providing specific, substantive information. If this is a removal of a species from candidate status or a change in listing priority, explain reasons for change):

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

Because of its restriction to the Pascagoula drainage and localization to specific habitats, the Pearl darter is vulnerable to non-point source pollution, changes in river and stream geomorphology, and other human-induced threats to its environment, such as dam construction.

Non-point source pollution from land surface runoff can originate from virtually any land use activity, and may include sediments, fertilizers, herbicides, pesticides, animal wastes, septic tank and gray water leakage, oils and greases. Construction activities that involve significant earthworks typically increase sediment loads into nearby streams. Siltation sources include timber clear cutting, clearing of riparian vegetation, and mining and agricultural practices that allow exposed earth to enter streams. Practices that affect sediment and water discharges into a stream system change the erosion or sedimentation pattern, which can lead to the destruction of riparian vegetation, bank collapse, and increased water turbidity and temperature. Excessive sediments are believed to impact the habitat of darters and associated fish species, by making the habitat unsuitable for feeding and reproduction. Sediment has been shown to abrade and or suffocate periphyton, disrupt aquatic insect natural processes, and, ultimately, negatively impact fish growth, survival, and reproduction (Waters 1995).

In the Pascagoula drainage, water quality problems exist on the Leaf River from municipal runoff at Hattiesburg and dioxin contamination at New Augusta and on the Chickasawhay River from brine water releases from oil fields (U.S. Fish and Wildlife Service 1990). Permitted effluents to the Pascagoula River Basin include ammonia, chloride, sodium sulfate, toluene, cyclohexane and acetone (EPA 1989). Bart and Piller (1997) noted extensive algal growth during warmer months in the Leaf and Bouie rivers, suggesting nutrient and organic enrichment. Municipal and industrial discharges into the watershed, particularly during low water, concentrate pollutants. Releases from the Leaf River Paper Mill at New Augusta affect temperature, dissolved oxygen, and pH in the lower reaches of the Leaf River. Existing housing and urbanization along the banks of the Leaf River between I-59 and Estabutchie may contribute nutrient loading through sewage and septic water effluent.

The flora and fauna of many coastal plain streams have been adversely affected by accelerated geomorphic processes, specifically headcutting caused by in-stream sand and gravel mining (Patrick et al. 1993). The bed of the Bouie River is considered a significant natural resource by American Sand and Gravel (ASGC) (1995). Historically, ASGC has mined sand and gravel

using a hydraulic suction dredge, which is operated within the banks of the Bouie River. Sand and gravel mining also has occurred within and adjacent to the Leaf River. Large sections of the river and its floodplain have been removed over the past 50 years resulting in the creation of very large open water areas that function as deep lake systems (ASGC 1995). Currently, only two permitted mines are operating within the Pascagoula drainage (Stan Phielling, Mississippi Geological Survey, Mining Office, pers. comm. 1998). However, due to the permit exemption category for mining of less than 4 acres and less than 1/4 mile from other mine sites, there are numerous non-permitted operators mining gravel throughout the Pascagoula and Pearl River drainages (Stan Phielling, Mississippi Geological Survey, Mining Office, pers. comm. 1998).

Hartfield (1993) and Patrick and Hartfield (1996) investigated the negative impacts of stream erosion due to headcutting on aquatic life in several Mississippi river drainages and believed that the drainages were also experiencing geomorphic instability caused by in-stream sand and gravel mining. Mining in active river channels typically results in incision upstream of the mine (by nickpoint migration) and sediment deposition downstream. The upstream migration of nickpoints or headcutting may cause undermining of structures, lowering of alluvial water tables, channel de-stabilization and widening, and loss of aquatic and riparian habitat. Geomorphic change, particularly headcutting, may cause the extirpation of riparian and lotic (flowing water) species (Patrick et al. 1993). Lyttle (1993) and Brown and Lyttle (1992) found that in-stream gravel mining reduces overall fish species diversity in Ozark streams and favors a large number of a few small fish species. Patrick et al. (1993) documented geomorphic changes that were adversely affecting the bayou darter, an endangered species endemic to the Bayou Pierre basin.

Bart and Piller (1997) attribute the decline of the Pearl darter in the Leaf and Bouie Rivers and Black Creek of the Pascagoula drainage to threats from siltation caused by unstable banks and loose and unconsolidated stream beds. Bart (pers. comm. 1999) believes that bank erosion and bar migration on the Leaf River at Eastabutchie is affecting the riffles where the only known spawning of the Pearl darter is occurring.

The confluence of the Bouie and Leaf Rivers, within the Pascagoula drainage, possibly provides significant habitat for the Pearl darter. Fish collections from this area indicate that it may be a site critical for maintaining the current population of Pearl darters. The Bouie River at the confluence with the Leaf River, is being considered by the city of Hattiesburg to be dammed and used as a major water supply (The Clarion-Ledger, October 28, 1998, Jackson, Mississippi; Kemp Associates, PA, 2000). Such a project would substantially alter and fragment significant occupied habitat of the Pearl darter in the Bouie River. Locality records (1997) of the Pearl darter within the gravel mine area of the Bouie River in Hattiesburg place the species within the exact vicinity of the proposed dam (Ross, pers. comm. 1998). Pearl darters have not been collected in impounded waters and are intolerable of lentic (standing water) habitats.

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

In general, small species of fish such as the Pearl darter, which are not utilized for either sport or bait purposes, are unknown to the general public. Therefore, take of these species by the general public has not been a problem. Scientific collecting and take by private and institutional collectors are not presently identified as threats. Scientific collecting is controlled by the State through permits.

C. Disease or predation.

Predation upon the Pearl darter undoubtedly occurs; however, there is no evidence to suggest that disease or natural predators threatens this species. To the extent that disease or predation occurs, it becomes a more important consideration as the total population decreases in number.

D. The inadequacy of existing regulatory mechanisms.

There is currently no requirement within the scope of other environmental laws to specifically consider the Pearl darter or ensure that a project will not jeopardize its continued existence. There is insufficient information on the Pearl darter=s ecology, life history, and sensitivity to contaminants to determine the effectiveness of existing environmental laws and regulations.

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

The current range of the Pearl darter is restricted to localized sites within the Pascagoula River drainages. Subsequently, genetic diversity has likely declined due to fragmentation and separation of Pearl darter populations. The long-term viability of a species is founded on conservation of numerous local populations throughout its geographic range (Harris 1984). These features are essential for the species to recover and adapt to environmental change (Noss et al. 1994, Harris 1984). Interbreeding populations of Pearl darters are becoming increasingly disjunct. This disjunct distribution makes Pearl darter populations vulnerable to extirpation from catastrophic events, such as toxic spills, large in-stream-gravel mining projects, or changes in flow regime.

FOR RECYCLED PETITIONS:

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

LAND OWNERSHIP (Estimate proportion Federal/state/local government/private, identify non-private owners):

The species is believed to currently inhabit only navigable waters of the Pascagoula River drainage, under the jurisdiction of the U.S. Army Corps of Engineers. The Pascagoula River drainage includes 9,700 square miles (U.S. Army Corps of Engineers 1987) with a wide variety of land uses. Much of the area is in private ownership and agricultural production. The U.S. Forest Service manages significant acreage in Desoto National Forest. The Mississippi Department of Wildlife, Fisheries and Parks owns or manages several wildlife management areas in the drainage.

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

No prelisting activities are known or have been completed to date.

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

American Sand and Gravel Company. 1995. Permit documents submitted to the U.S. Corps of Engineers, Mississippi Office of Pollution Control, and Mississippi Bureau of Geology.

Bart, H. and K. Piller. 1997. Status survey of the Pearl darter (Percina aurora) in the Pascagoula River system. Final project report. U.S. Fish and Wildl. Serv., Jackson, MS. 17 pp.

Bart, H., K. Pilar and N. E. Rios. 2001. Conservation status of the Pearl darter (Percina aurora) in the Chunky, Chickasawhay and Bowie rivers and Okatoma Creek, Mississippi. Final Project report to the U. S Fish and Wildlife Service. pp 16.

Bart, H. and R. Suttkus. 1996. Status survey of the Pearl darter (Percina aurora) in the Pascagoula River system. Museum Tech. Rep. No. 45., MS. Dept. Wildl. Fish. and Parks. 13 pp.

Brown, A. V. and M. M. Lyttle. 1992. Impacts of gravel mining on Ozark stream ecosystems. AR Coop. Fish and Wildl. Res. Unit. Univ. of AR, Fayetteville.

Burr, B. M. and M. L. Warren, Jr. 1986. A distributional atlas of Kentucky fishes. Kentucky Nature Preserves Comm., Scientific and Tech. Series No. 4: 398 pp.

Clarion-Ledger. 1998. State/Metro, Update Environment. Wednesday, October 28. Jackson, Mississippi. p. 1B.

Deacon, J. E., G. Kobetich, J. D. Williams, S. Contreras, and other members of the endangered species committee of the Amer. Fish. Soc. 1979. Fishes of North America endangered, threatened, or of special concern: 1979. Fisheries, 4(2): 29-44.

Environmental Protection Agency. 1989. Toxic release inventory system reports (dated December 12, 19890. Manuscript 8 pp.

Harris, L. D. 1984. The Fragmented Forest. Univ. of Chicago Press. 211 pp.

Hartfield, P. 1993. Headcuts and their effect on freshwater mussels. Conservation and management of freshwater mussels. Proceedings of UMRCC symposium, pp. 131-141.

Kemp Associates, PA. 2000. Phase 1 Report. Feasibility study/planning document for constructing a water supply reservoir on the Bouie River for the Pat Harrison Waterway District. Meridian, MS. 45 pp.

Kuehne, R. A. and R. W. Barbour. 1983. The American darters. University Press of Kentucky. 177 pp.

Lyttle, M. M. 1993. Impacts of gravel mining on fish communities in three Ozark streams. AR. Coop. Fish and Wildlife Res. Unit, University of AR., Fayetteville, AR. Coop Unit Publ. #13. 71 pp.

Noss, R. E. and A. Y. Cooperrider. 1994. Saving Nature=s Legacy. Protecting and Restoring Biodiversity. Island Press. Cali. pp. 416.

Page, L. A. 1983. Handbook of darters. Illinois Natural History Survey. TFH. Publication, Inc. Ltd. Neptune City. 271 pp.

Patrick, D. M. and P.D. Hartfield. 1996. Riparian mining and its effects on the channel stability and aquatic habitats. Geological Society of America 28(2):40.

Patrick, D. M., S. T. Ross and P. D. Hartfield. 1993. Fluvial geomorphic considerations in the management and stewardship of fluvial ecosystems. Riparian ecosystems in the humid U. S.: functions, values and management. Conf. Proc., 15-18 Mar., Atlanta, Ga., Nat. Assoc. of Cons. Distr., Wash. D. C. pp. 90-99.

Ross, S. T. 2001. Inland Fishes of Mississippi. Univ. Press of Miss. pp. 624.

Ross, S.T., M.F. Cashner, and R. Darden. 2002. Conservation status of the Pearl darter, Percina aurora: survey of the upper Pascagoula drainage. Museum Technical Report No. 85. Miss. Dept. of Wildlife, Fisheries and Parks, Mississippi Museum of Natural Science. p 27.

Ross, S. T. and W. M. Brenneman. 1991. Distribution of freshwater fishes in Mississippi. Freshwater Fisheries Report No. 108. D-J Project Completion Report F-69. Mississippi Department of Wildlife and Freshwater Fisheries and Parks. Jackson, MS. pp.548.

Schofield, P.S., S.T. Ross and P. Rakes. 1999. Conservation of the Pearl Darter, Percina aurora,: habitat selection and development of a protocol for larval rearing, year II. Museum Tech. Rep. No. 75, MS Dept. Wildl. Fish. and Parks, Jackson. 42 pp.

Slack, W.T. and R.J. Heise, M.A. Dugo and J.A. Ewing, III. 2002. Status of the pearl darter (Percidae: Percina aurora) in the Pascagoula River, Mississippi. Miss. Dept. of Wildlife Fisheries and Parks. Report to the U.S. Fish and Wildlife Service. Jackson Field Office. pp. 31.

Suttkus, R. D., B. A. Thompson, and H. L. Bart, Jr. 1994. Two new darters, Percina (Cottogaster), from the southeastern United States, with a review of the subgenus. Occasional Papers Tulane University Museum of Natural History No. 4. 46 pp.

Trautman, M. B. 1957. The fishes of Ohio, with illustrated keys. Ohio State Univ. Press. Columbus. 683 pp.

Waters, T. F. 1995. Sediment in streams: sources, biological effects and control. Am. Fish. Soc. Mono. 7. Bethesda, MD. 251 pp.

U.S. Army Corps of Engineers. 1987. Pascagoula River Basin Mississippi. A review report on the Pascagoula River Basin, Mississippi. 10 pp.

U. S. Fish and Wildlife Service. 1990. Endangered and threatened wildlife and plants: threatened status for the yellow-blotched map turtle, Graptemys flavimaculata. 56 FR 1459.

LISTING PRIORITY (place * after number)

THREAT

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

Rationale for listing priority number:

Magnitude: Extirpated in the Pearl River system, the Pearl darter is known in specific reaches of the Pascagoula River basin. These reaches are subject to changes due to adjacent land use and disturbances within the river basin.

Imminence: Federal and state water quality laws have reduced water quality threats to some degree. Non-point pollution threats and modification of reach geomorphology and hydrology are cumulative and gradual.

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

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

Concur: _____ _____
Director, Fish and Wildlife Service Date

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

Director's Remarks:

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Date of annual review: February 2003

Conducted by: Daniel J. Drennen - Jackson, Mississippi FO

Comments:

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