Recovery Plan for the Endangered Warrior (=Dark) Pigtoe (*Pleurobema rubellum* (=*furvum*))
https://ecos.fws.gov/docs/recovery_plan/001117.pdf

Original Approved: November 17, 2000
Original Prepared by: Jackson, Mississippi U.S. Fish and Wildlife Service and Mobile River Basin Coalition Planning Committee

We have identified best available information that indicates the need to amend recovery criteria for Warrior Pigtoe (*Pleurobema rubellum*). In this proposed modification, we synthesize the adequacy of existing recovery criteria, show amended recovery criteria, and the rationale supporting the proposed recovery plan modification. This amendment supplements the Recovery Objective and Criteria section of the *Recovery Plan for Mobile River Basin Aquatic Ecosystem* (USFWS, 2000, p. 53). Recovery plans are a non-regulatory document that provide guidance on how best to help recover species.

For
U.S. Fish and Wildlife Service
Region 4
Atlanta, GA

March 2019

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

The proposed amendments to the recovery criteria were developed using the most recent and best available information for the species. The lead biologist gathered the information and notified conservation partners of the Service's process to complete this amendment. Ultimately, biologists and managers in the Alabama Ecological Services Field Office developed the amended recovery criteria for the Warrior Pigtoe.

ADEQUACY OF RECOVERY CRITERIA

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, "objective, measurable criteria which, when met, would result in a determination…that the species be removed from the list." Legal challenges to recovery plans (see Fund for Animals v. Babbitt, 903 F. Supp. 96 (D.D.C. 1995)) and a Government Accountability Audit (GAO 2006) also have affirmed the need to frame recovery criteria in terms of threats assessed under the five listing factors.

Current Recovery Criteria

The current recovery plan (https://ecos.fws.gov/docs/recovery_plan/001117.pdf) (USFWS 2000) does not provide recovery criteria, but it does outline recovery objectives, see page 53.

Synthesis

The Warrior Pigtoe was listed as endangered in 1993 (58 FR 14330) and critical habitat was designated in July 2004 (69 FR 40171). Currently, the species is threatened by habitat modification, sedimentation, degradation of water quality, impoundment by dams, mining, point and non-point discharges, redirection of flow (Factor A); predation disproportionately affecting small populations (Factor C); lack of adequate enforcement of existing Federal or State regulations prohibiting take (Factor D); and fragmentation of populations leading to genetic diversity loss (Factor E).

The historical distribution of Warrior Pigtoe was probably restricted to the Black Warrior River system above the fall line, with some historical records from the Cahaba River above the Fall Line (Williams *et al.* 2008). Since listing, the presence of Warrior Pigtoe has been confirmed in the Black Warrior River drainage from Sipsey Fork and its tributaries in Winston and Lawrence counties, Alabama; North River and a tributary in Fayette County, Alabama; and the Locust Fork in Blount County, Alabama (Johnson 2018; McGregor *et al*. 2013; McGregor and Wynn 2008; Moran 2010, 2011, 2012, 2013, 2015, 2017; Williams *et al.* 2008). McGregor *et al*. (2013) reported a weathered dead shell of a possible Warrior Pigtoe from Davis Creek, a direct tributary to the Black Warrior River, near Tuscaloosa, Alabama. Alabama Aquatic Biodiversity Center **(**AABC) collected gravid females from the Locust Fork upstream of the Wallstown Bridge site in Blount County, Alabama, as brood stock for a small host suitability trial in 2015 (Johnson 2018, P. Johnson pers. comm. 2018). For specific location information, refer to the most recent 5-year review (https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=F03A) (USFWS 2008).

Populations of Warrior Pigtoe are small and localized. It was one of the most abundant species during sampling in the North River system from 1991 to 1996. However, a survey in 2008 only found a single live individual in Clear Creek (out of 61 sampling sites) (McGregor and Wynn 2008), indicating a sharp decline in abundance in this system (O'Neil *et al*. 2010). Highest densities measured during field surveys have been from the Sipsey Fork and its headwater tributaries in the Bankhead National Forest. Quantitative sampling from selective sites estimated Warrior Pigtoe densities from 0 to 0.48/m^2 (0 to 5.2/ft^2) (Warren and Haag 1994). Populations of all mussels in the National Forest declined from 1993-2002, likely due to the effects of severe drought in 2000 (Haag and Warren 2003). Recent surveys in Brushy Creek and Sipsey Fork have documented recent recruitment with the collection of multiple age classes (n=29, 28-57 mm (1.1-2.2 in)) (Moran 2015).

The range of Warrior Pigtoe has expanded slightly since listing with the discovery of the Locust Fork population. The largest populations in the Sipsey Fork and tributaries in Bankhead National Forest remain stable, but the once robust population in the North River drainage has suffered significant decline in the past two decades (O'Neil *et al*. 2010). The range remains highly fragmented and all populations are small and isolated. The Warrior Pigtoe remains vulnerable to extinction due to extreme curtailment of range and habitat, low numbers, and vulnerability to nonpoint source pollution, drought, and stochastic events.

AMENDED RECOVERY CRITERIA

Recovery criteria serve as objective, measurable guidelines to assist in determining when an endangered species has recovered to the point that it may be reclassified to threatened, or that the protections afforded by the Act are no longer necessary and Warrior Pigtoe may be delisted. Delisting is the removal of a species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Downlisting is the reclassification of a species from an endangered species to a threatened species. The term "endangered species" means any species (species, sub-species, or DPS) which is in danger of extinction throughout all or a significant portion of its range. The term "threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Revisions to the Lists, including delisting or reclassifying a species, must reflect determinations made in accordance with sections 4(a)(1) and 4(b) of the Act. Section 4(a)(1) requires that the Secretary determine whether a species is an endangered species or threatened species (or not) because of threats to the species. Section 4(b) of the Act requires that the determination be made "solely on the basis of the best scientific and commercial data available." Thus, while recovery plans provide important guidance to the Service, states, and other partners on methods of minimizing threats to listed species and measurable objectives against which to measure progress towards recovery, they are guidance and not regulatory documents.

Recovery criteria should help indicate when we would anticipate that an analysis of the species' status under section 4(a)(1) would result in a determination that the species is no longer an endangered species or threatened species. A decision to revise the status of or remove a species from the Federal Lists of Endangered and Threatened Wildlife and Plants, however, is ultimately based on an analysis of the best scientific and commercial data then available, regardless of whether that information differs from the recovery plan, which triggers rulemaking. When changing the status of a species, we first propose the action in the *Federal Register* to seek public comment and peer review, followed by a final decision announced in the *Federal Register*.

We provide recovery criteria for the Warrior Pigtoe as an amendment to the existing recovery plan (USFWS 2000). The below recovery criteria describe a recovered species, or a species that should be considered for removal from the Federal Lists of Endangered and Threatened Wildlife and Plants (50 CFR 17).

Delisting Recovery Criteria

We are providing recovery criteria for the Warrior Pigtoe recovery plan (USFWS 2000). The below recovery criteria describe a recovered species, or a species that should be considered for removal from the Federal Lists of Endangered and Threatened Wildlife and Plants (50 CFR 17).

1) Five (5) populations in the Black Warrior River and Cahaba River sub basins exhibit a stable or increasing trend, natural recruitment, and multiple age classes (Factors A, C, D, and E).

2) Populations (as defined in Criterion 1) continue to occur in the Sipsey Fork and Brushy Creek basins and an additional population occurs in either the North River or Locust Fork basin to protect against stochastic and catastrophic disturbance events (Factors A, C, D, and E).

3) Threats have been addressed and/or managed to the extent that the species will remain viable into the foreseeable future (Factors A, C, D, and E).

Justification for Amended Recovery Criteria

Criterion 1: Five populations would expand the species range into historically occupied river drainages increasing its resiliency, representation, and redundancy, and reducing threats due to curtailment of its range or stochastic events. The species' range has been reduced due to to habitat degradation from reservoir construction, cumulative effects of land use change, and watershed level effects on water quality, water quantity, habitat connectivity, and instream habitat quality. Recovery Criterion 1 maximizes resiliency by ensuring presence of multiple age classes, and sufficient number of individuals to sustain viability. The criterion also maximizes redundancy by defining the number of resilient populations and proportion of range occupied to delist the species (Factors A, C, D and E).

Criterion 2: Sustaining spatial distribution of the species throughout each targeted river basin protects against catastrophic or stochastic events that may eliminate or substantially reduce isolated or fragmented populations. To ensure that the species will not become threatened with extinction in the foreseeable future a sufficient number of populations should be distributed throughout its historical range, therefore, we believe it is necessary for the species to occur in Sipsey Fork, Brushy Creek, North River, and Locust Fork basins as described in Criterion 2. By ensuring a sufficient number of resilient populations are distributed across the species range, we address representation in order to maintain adaptive potential through preserving genetic and ecological diversity (Factors A, C, D, and E).

Criterion 3: Abatement of the threats to the Warrior Pigtoe will allow populations to become stable and contribute to the viability of the species. The Warrior Pigtoe is only known to persist in free-flowing streams. Current State and Federal regulations regarding pollutants are assumed to be protective of native aquatic species; however, some native species may have lower thresholds to some pollutants than the test organisms commonly used in developing the criteria. Eliminating significant sources of sedimentation, avoiding channelization and further dam construction, and adhering to good land management practices that minimize non-point source pollution in these basins, will contribute to the conservation of the species into the foreseeable future (Factors A, C, D, and E).

Rationale for Amended Recovery Criteria

The Service adopted analysis of Resiliency, Redundancy, and Representation (3Rs) as a means to determine species viability in regards to listing and other regulatory decisions. The amended criteria follow a similar analysis process. All criteria must address and meet the species needs to accomplish the standards under the 3Rs.

Resiliency (as defined in Smith *et al*. 2018) is met through Criterion 1 listed above. The Service believes establishment of a robust population that demonstrates a stable or increasing trend in population numbers, and determining successful recruitment through multiple age classes, the Warrior Pigtoe will withstand any stochastic disturbance that may occur into the future.

Redundancy (as defined in Smith *et al*. 2018) is addressed in Criteria 1 and 2. The requirement of five resilient populations across the historical range will represent multiple stream orders and provide the distribution necessary to avoid extinction following any unforeseen catastrophic events. These different drainages possess unique land characteristics, annual climate variations, and stream morphology. These variances will shield populations across multiple possible catastrophic events.

Representation (as defined in Smith *et al*. 2018) will be accomplished when all three criteria listed above are accomplished. The species will be distributed across stream orders. This should allow for preservation of genetic exchange into the future between two or more populations, distribution across multiple natural variances in habitat types, and allow for future adaptations to changing environmental conditions.

LITERATURE CITED

Haag, W. R., and M.L. Warren, Jr. 2003. Changes in freshwater mussel populations in Bankhead National Forest from 1993-2002. Final Report. USDA Forest Service. Center for Aquatic Technology Transfer, Oxford, MS. 24 pp.

Johnson, P.D. 2018. U.S. Fish and Wildlife Service assistance with propagation, reintroduction, research and monitoring of federally listed mollusks in Alabama. USFWS Agreement Ap00133, Final report – January 18, 2018. 54 pp. (Appendices)

McGregor, S.W., and E.A. Wynn. 2008. An evaluation of the mussel fauna in the North River System. 2008. Open-File Report 0814. Geological Survey of Alabama, Tuscaloosa, Alabama. 28 pp.

McGregor, S.W., E.A. Wynn, and J.T. Garner. 2013. Results of a survey of the mussel fauna at selected stations in the Black Warrior River System, Alabama, 2009-2012. Open-File Report 1301. Geological Survey of Alabama, Tuscaloosa, Alabama. 50 pp.

Moran, J. 2010. Aquatic surveys on the National Forests in Alabama, 2010. Report to U.S. Fish and Wildlife Service, Atlanta, GA. 6 pp.

---. 2011. Aquatic surveys on the National Forests in Alabama, 2011. Report to the U.S. Fish and Wildlife Service, Atlanta, GA. 8 pp.

---. 2012. Aquatic surveys on the National Forests in Alabama, 2012. Report to the U.S. Fish and Wildlife Service, Atlanta, GA. 7 pp.

---. 2013. Aquatic surveys on the National Forests in Alabama, 2013. Report to the U.S. Fish and Wildlife Service, Atlanta, GA. 62 pp.

---. 2015. Aquatic surveys on the National Forests in Alabama, 2015. Report to the U.S. Fish and Wildlife Service, Atlanta, GA. 56 pp.

---. 2017. Aquatic surveys on the National Forests in Alabama, 2017. Report to the U.S. Fish and Wildlife Service, Atlanta, GA. 55 pp.

O'Neil, P.E., S.W. McGregor, and E.A. Wynn. 2010. Watershed assessment of the North River System for recovery and restoration of rare mussel species. Open-File Report 0918. Geological Survey of Alabama, Tuscaloosa, AL. 94 pp.

Smith, D.R., N.L. Allan, C.P. McGowan, J.A. Szymanski, S.R. Oetker, and H.M. Bell. 2018. Development of a Species Status Assessment Process for Decisions under the U.S. Endangered Species Act. Journal of Fish and Wildlife Management 9(1):302-320.

U.S. Fish and Wildlife Service [USFWS]. 2000. Mobile River Basin Aquatic Ecosystem Recovery Plan. Atlanta, GA. 128 pp.

U.S. Fish and Wildlife Service [USFWS]. 2008. Eleven Southeastern mussels 5-year review. Atlanta, GA. 37 pp.

Warren, M.L., Jr. and W.R. Haag. 1994. Characterization of community structure and development of monitoring protocols for freshwater mussels in Bankhead National Forest, Alabama. Progress Report. USDA Forest Hydrology Laboratory, Oxford, MS.

Williams, J.D., A.E. Bogan, and J.T. Garner. 2008. The Freshwater Mussels of Alabama and the Mobile Basin of Georgia, Mississippi, and Tennessee. University of Alabama Press, Tuscaloosa, Alabama. 908 pp.