

**Recovery Plan for Alabama Cave Shrimp (*Palaemonias alabamae*)**

[https://ecos.fws.gov/docs/recovery\\_plan/970904.pdf](https://ecos.fws.gov/docs/recovery_plan/970904.pdf)

**Original Approved:** September 4, 1997

**Original Prepared by:** Theresa R. Jacobson and Paul Hartfield

**AMENDMENT 1**

We have identified best available information that indicates the need to amend recovery criteria for Alabama cave shrimp (*Palaemonias alabamae*) since the recovery plan was completed. In this modification, we synthesize the adequacy of the existing recovery criteria, show amended recovery criteria, and the rationale supporting the recovery plan modification. The modification will be shown as an addendum that supplements the recovery plan, superseding only Part II, page 13, of the recovery plan. Recovery plans are a non-regulatory document that provides guidance on how best to help recover the species.

**For  
U.S. Fish and Wildlife Service  
Atlanta, GA**

Approved: Frankly Andrew  
Acting Regional Director, U.S. Fish and Wildlife Service

Date: 9/25/19

**METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT**

The amendments to the recovery criteria are based on the Alabama Cave Shrimp 5-year Status Review (USFWS 2016), which collected the most recent information of the species. The information was discussed with U.S. Fish and Wildlife Service (Service) biologists and managers in the Alabama Ecological Services Field Office (AFO) in order to develop the delisting criteria for Alabama cave shrimp utilizing the best available information.

**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 factors.

## Recovery Criteria

The current recovery plan (USFWS 1997, p. 13; [https://ecos.fws.gov/docs/recovery\\_plan/970904.pdf](https://ecos.fws.gov/docs/recovery_plan/970904.pdf)) only provides downlisting criteria for the Alabama cave shrimp.

## Synthesis

The Alabama cave shrimp was federally listed as endangered on September 7, 1988 (USFWS 1988, *see* 53 FR 34696). This species is endemic to cave systems in the Tennessee Valley in north Alabama. The most recent 5-year review for Alabama Cave Shrimp was finalized by the Service in January 2016, and it summarized the information that was gathered since the species was listed on September 7, 1988.

The Alabama cave shrimp is a rare, troglobitic cave shrimp that survives in only three of its four known locations. The population in its type locality, Shelta Cave, has not been seen since the early 1970s. Population levels in Bobcat Cave and the Hering, Glover and Brazelton (HGB) cave system appear to be low. The species has been identified in Muddy Cave (B. Kuhajda, pers. comm., December 11, 2014, and K. Roe, pers. comm., February 5, 2015) and in Fern Cave (M. Niemiller, pers. comm., September 14, 2018) but it is unclear if these represent distinct populations. A cave shrimp was observed in Limrock Blowing Cave (in western Jackson County), reported by McGregor et al. (1994); however, it has not been confirmed to be Alabama cave shrimp. Results from survey data throughout the range indicate that population sizes remain low where the species exists.

Specific life history and habitat needs have not been well documented. Water quality and suitable cave habitat continue to be chronically plagued by polluted surface runoff. Water quality data from Bobcat Cave indicate that polluted deep groundwater may also pose a potential impact (McGregor and O'Neil 2002, 2003, 2004, 2008a, 2008b, 2012, 2013, 2014).

Many of the studies conducted over the past 25 years have advanced our understanding of surface/groundwater interactions, as well as how precipitation relates to the timing and magnitude of water being delivered to caves. However, the cave environment is extremely dynamic and more research is needed to better understand the quality of water in caves and how and when it is delivered. This is a critical concept, not only for the cave shrimp, but for all karst dependent species.

The Alabama cave shrimp, despite numerous surveys over the past 25 years, remains extremely rare throughout its range and is in danger of extinction. According to recovery criteria (USFWS 1997), a total of five viable populations in five distinct groundwater systems need to be identified, protected, and documented as viable prior to downlisting the species. A viable population for this species is defined as a population that maintains a stable or increasing trend,

evidenced by natural recruitment and multiple size classes. Currently, there are only two confirmed populations in two distinct groundwater basins.

## **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 downlisted to threatened, or that the protections afforded by the Act are no longer necessary and the Alabama cave shrimp 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 downlisting 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*.

### **Amended Recovery Criteria**

We are providing recovery criteria for the Alabama Cave Shrimp Recovery Plan (USFWS 1997), which will supersede the downlisting criteria included in the Recovery Plan for Alabama Cave Shrimp (refer to page 2 above or page 13 of the species recovery plan). The below recovery criteria or criteria for delisting, describes the criteria for determining if the Alabama cave shrimp should be considered for removal from the List of Endangered and Threatened Species.

The Alabama cave shrimp will be considered for delisting when:

1. A minimum of five (5) populations in five distinct groundwater systems (determined by hydrologic studies that can distinguish different systems), show a stable or increasing trend, evidenced by natural recruitment, and multiple size classes (addresses Factors A, C, and E).
2. Threats have been addressed and/or managed to the extent that the species will remain viable into the foreseeable future (addresses Factors A and E).
3. A minimum of three (3) populations occur in groundwater systems protected via a conservation mechanism (addresses Factors A and E).

### **Justification for Amended Recovery Criteria**

Criterion 1: Populations (distinct groundwater systems) that exhibit a stable or increasing trend, natural recruitment, and multiple age classes demonstrate that the population is secure and will be resilient to habitat destruction, predation, and stochastic events (Factors A, C, and E). For the Alabama cave shrimp, it is believed that five populations exhibiting these traits are necessary to ensure the species will no longer require protection under the Act.

Criterion 2: Abatement of the threats to the Alabama cave shrimp will allow populations to become stable and contribute to the viability of the species (Factors A and E). Active management of these groundwater systems with assurances for suitable habitat and water quality will contribute to the conservation of the species into the foreseeable future.

Criterion 3: To ensure that the species will not become threatened with extinction in the future, a sufficient number of populations should be protected. Protecting the Alabama cave shrimp in multiple cave systems will increase its resiliency, representation, and redundancy, and reduce threats due to habitat destruction and stochastic events (Factors A and E).

### **Rationale for Amended Recovery Criteria**

The recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat. The principal listing criteria for this species, in 1988, were the extirpation of one of the three known populations and the vulnerability to groundwater contamination (Factor A and Factor E). The Alabama cave shrimp occurs in pools in a cave environment. Basic chemical and physical conditions in the caves are highly influenced by land use in the recharge area and can be impacted by surface runoff from developments and manipulation of landscapes (e.g., clearing of forestland) in the recharge area (USFWS 2016).

The rationale for the recovery criteria is to minimize or eliminate the threats to

known populations of the Alabama cave shrimp, to the degree that the species is viable or self-sustainable. The Bobcat Cave and HGB complex cave systems are considered to be persistent populations and have been continually monitored since the early 1990's. Bobcat Cave is located on Redstone Arsenal, a U.S. Army installation, and access is restricted and urban development is reduced. Additional occurrences have been documented at Muddy Cave and Fern Cave, but have not yet been confirmed as distinct populations. Muddy Cave is owned by the North Alabama Land Trust and is operated by the Southeastern Cave Conservation, Inc. and Fern Cave is located on a National Wildlife Refuge, and access is restricted at both sites.

Conservation mechanisms such as a conservation easement or private landowner agreement should be established for each of the known populations where applicable to ensure their viability. In addition to these two confirmed populations, three new distinct, self-sustaining populations should be identified within suitable habitat in the karst region. Also, the implementation of management and conservation practices on known population sites are needed to ensure either stable or increasing population trends.

Establishing protection of five stable and viable or self-sustainable populations (i.e., a population that maintains a stable or increasing trend, evidenced by natural recruitment and multiple size classes) within suitable lands would increase species resilience and redundancy during stochastic events.

#### **LITERATURE CITED**

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