Amendment to The Cave Crayfish (*Cambarus aculabrum*) Recovery Plan

Original Recovery Plan Approved: 1996
Original Recovery Plan Prepared by: Theresa R. Jacobson

AMENDMENT 1

The best available information indicates the need to amend the *Cambarus aculabrum* recovery criteria. In this modification, we synthesize the adequacy of the existing recovery criteria, present the amended recovery criteria, and discuss the rationale for the amended recovery criteria. The modification is shown as an addendum that supplements the recovery plan (USFWS 1996). Recovery plans are a non-regulatory document that provides guidance on how best to help recover species.

For
U.S. Fish and Wildlife Service
Atlanta, Georgia

Approved: Franklin D. Arnold III
Acting **Regional Director, U.S. Fish and Wildlife Service**

Date: 9/24/19

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

This amendment was developed using the most recent and best available information for the species. Sources included peer reviewed literature and published and unpublished data provided by species experts and the U.S. Fish and Wildlife Service (Service). The lead biologist for the species in the Service's Arkansas Ecological Services Field Office gathered the information and notified species experts of the Service's process to complete this amendment.

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.

Recovery Criteria

The recovery plan (USFWS 1996; https://ecos-beta.fws.gov/docs/recovery_plan/961030.pdf) states, "*this species will be considered for reclassification to threatened when the two known populations are self-sustaining and are protected to the degree that they are secure from present or foreseeable threats*". No delisting criteria were identified in the recovery plan.

Synthesis

C. aculabrum was listed as endangered on May 23, 1993 (58 FR 25742). No critical habitat has been designated for the species. The most recent status review for *C. aculabrum* was in 2013 (USFWS 2013), and recommended no change to the species endangered status. The 5-year review summarizes information presented since the recovery plan was written that pertains to the species' life history, distribution, abundance, and factors affecting its survival.

Several recovery actions have been achieved since the recovery plan was approved in 1996. Cave gates have been installed and management plans developed for both Logan and Bear Hollow Caves. In addition, the following new information has been presented. Two new populations were discovered and genetically confirmed at Elm Springs and Old Pendergrass (Graening et al. 2006; U.S. Fish and Wildlife Service 2013). Recharge areas for the known populations (Logan Cave, Bear Hollow Cave, Elm Springs, and Old Pendegrass) have been delineated (Aley and Aley 1987; Aley and Aley 1998; Aley and Slay 2006; Aley and Slay 2007). Farming and housing development have increased in the recharge areas for all populations (Aley and Aley 1987; Aley and Slay 2006; TNC 2001; USFWS 2008; USFWS 2013).

In 1999, survey route length was standardized for Bear Hollow and Logan Caves. Survey numbers indicate potentially increasing populations at both sites, but additional data is still required to validate the trend. At Old Pendegrass Cave, *C. aculabrum* individuals have only been observed after high flow events push them into the accessible portion of the cave. High flow events at Bear Hollow and Logan Caves may also impact survey results. Furthermore, disturbance has the potential to impact survey results through trampling, collection, and movement of individuals to stream reaches where they are not distributed. Surveys at Old Pendegrass have been intermittent due to the requirement for high flow events to conduct surveys. The Elm Springs population is inaccessible to humans.

The Bear Hollow Cave entrance and 6.93 acres (2.8 hectares) of the recharge area is owned and managed by The Nature Conservancy (TNC)(USFWS 2013). The remaining 2,207 acres (893 hectares) of the Bear Hollow recharge area is owned by Bella Vista Property Owners Association (BVPOA) and private owners (USFWS 2013). In 2001, TNC developed a revised conservation plan for Bear Hollow Cave and its recharge (TNC 2001). The plan identified incompatible chemical use/disposal, hazardous material spills, incompatible wastewater treatment, incompatible livestock practices, limestone quarrying, incompatible recreational and scientific access/vandalism, and incompatible forestry practices as threats. The plan identified strategies to alleviate and minimize the threats. However, there are insufficient long-term agreements in place

to provide protection from groundwater contamination, hydrologic alteration, or trampling associated with vandalism and trespassing (USFWS 2013). Sampling has confirmed lead concentrations in the Bear Hollow Cave stream are above the Arkansas acute and chronic concentrations criteria threshold for aquatic life (TNC 2001). Although Bear Hollow Cave is gated, vandalism of the gate and illegal entry into Bear Hollow Cave continues to be a periodic problem.

Similar to Bear Hollow, the Old Pendegrass recharge area is primarily owned by the BVPOA. It has similar threats to Bear Hollow Cave. The Old Pendegrass Cave entrance is not gated, but illegal entry and subsequent threats to *C. aculabrum* are thought to be minimal due to difficulty in accessing the entrance.

The Logan Cave entrance is managed under the Comprehensive Conservation Plan for Logan Cave (USFWS 2008). The plan provides general conservation strategy to aid in recovery of *C. aculabrum*, but lacks specific management strategies to ensure long-term survival and recovery of the population. It also does not address conservation of the 7,450 acres (3,015 hectares) in the recharge area beyond the 123 acres (50 hectares) owned by USFWS. Conversion for urban development and farming is an increasing threat to water quality in the recharge area. Forested area decreased from 59% in 1968, to 43% in 1987 (Aley and Aley 1987). Remaining forested areas are primarily along creek bottoms or ridge tops (USFWS 2008). There is groundwater contamination from residential and commercial development (USFWS 2013) and wastewater contaminants have been identified in Logan Cave (Bidwell et al. 2009).

The Elm Springs recharge is also experiencing substantial urbanization and commercial development (Aley and Slay 2006). Highway 112 navigates two miles of the Elm Springs recharge and is in close proximity (<300 ft. (91 m)) to the Elm Springs sinking stream and upwelling where *C. aculabrum* are found. Widening of the highway from two to four lanes is in the planning phase. Improved access between the Elm Springs recharge and the city of Fayetteville is likely to spur additional development. In 2012, the TNC conducted restoration work on riparian areas and sinks around the Elm Springs property (Kottmyer and Slay 2012). However, no other work has taken place in the Elm Springs recharge area.

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 the species may be delisted. Delisting is the removal of a species from the Federal List of Endangered and Threatened Wildlife and Plants. Reclassification is moving a species from endangered to threatened or vice versa. 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*.

Reclassification Recovery Criteria

We are not amending the existing reclassification criterion.

Delisting Recovery Criteria

C. aculabrum may be considered for delisting when the following criteria are met:

1) Populations at Bear Hollow Cave, Logan Cave, and one additional population exhibit a stable or increasing trend, natural recruitment, and multiple age classes (Factors A, B, C, & E).

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

Justification

C. aculabrum occurs in four locations (Logan Cave, Bear Hollow Cave, Old Pendegrass Cave, and Elm Springs). Logan and Bear Hollow Cave are 23.3 miles (37.5 km) apart and in different recharge areas. Establishment of robust populations that demonstrate a stable or increasing trend in abundance with multiple age classes and recruitment ensures *C. aculabrum* will withstand any stochastic disturbances. The requirement of three resilient populations in different recharge areas will shield populations from unforeseen catastrophic events. This should allow for future adaptations to changing environmental conditions. Habitat loss and degradation are the leading threats to *C. aculabrum*. These criteria ensure amelioration or management of threats to a sufficient level to maintain suitable habitat that supports the species.

Rationale for Recovery Criteria

The delisting recovery criteria reflect the best available information for *C. aculabrum* and

addresses all five factors. While all threats identified at listing are still present, degradation of habitat/water quality from agricultural development and urbanization is the primary threat to *C. aculabrum*. Factors B and C were included in the listing rule, but are considered minimal threats at this time.

The current downlisting criteria calls for two known populations to be self-sustaining and protected to the degree that they are secure from present or foreseeable threats (USFWS 1996). Delisting recovery criterion 1 similarly requires demonstration of resiliency, but for three populations, instead of two. In doing so, delisting recovery criterion 1 ensures there is sufficient population persistence of *C. aculabrum* throughout a significant portion of its range to safeguard against extinction prior to delisting.

The main threat to *C. aculabrum* is habitat loss and degradation resulting from conversion of forested areas to agricultural and urban landscapes. Delisting recovery criterion 2 addresses safeguarding existing suitable habitat while improving degraded areas that historically supported the species. This criterion maximizes representation by ensuring sufficient habitat diversity to support resilient populations distributed across the species range. *C. aculabrum* populations have demonstrated some resilience to potential threats in isolated areas, in part due to the implementation of recovery actions and monitoring. Actions towards monitoring and threat abatement will continue in order to ensure the populations meet the new criteria. The Service will continue to evaluate threats to the species and its habitat.

Logan and Bear Hollow Caves are located 23.3 miles (37.5 km) apart and in different recharge areas. Sustaining spatial distribution of the species in multiple cave systems protects against catastrophic or stochastic events that may eliminate or substantially reduce isolated or fragmented populations. Ensuring populations are distributed throughout the range addresses redundancy and representation.

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APPENDIX – SUMMARY OF PUBLIC, PARTNER, AND PEER REVIEW COMMENTS RECEIVED

Summary of Public Comments

We published a notice of availability in the *Federal Register* on June 27, 2019 (84 FR 30764-30768) to announce that the draft amendment to the recovery plan for the cave crayfish (*Cambarus aculabrum*) was available for public review, and to solicit comments by the scientific community, State and Federal agencies, Tribal governments, and other interested parties on the general information base, assumptions, and conclusions presented in the draft revision. An electronic version of the draft amendment was posted on the Service's Species Profile website (https://ecos.fws.gov/docs/recovery_plan/Cambarus%20aculabrum_Recovery%20Plan%20Amendment.pdf). We also developed and implemented an outreach plan that included (1) publishing a news release on our national webpage (https://www.fws.gov/news/) on June 27, 2019, (2) sending specific notifications to Congressional contacts in Districts 2 and 4, and (3) sending specific notifications to key stakeholders in conservation and recovery efforts. These outreach efforts were conducted in advance of the *Federal Register* publication to ensure that we provided adequate notification to all potentially interested audiences of the opportunity to review and comment on the draft amendment. We did not receive any comments in response to our request.

Summary of Peer Review Comments

We did not solicit independent peer review of science supporting the draft amendment since the science was peer reviewed in the last 5-Year Review.

Summary of Partner Review and Comments

On June 25, 2019 we sent an email announcing the availability to comment to Arkansas Game and Fish Commission, Arkansas Natural Heritage Commission, Logan Cave National Wildlife Refuge staff and the Nature Conservancy. On July 09, 2019 we sent a reminder to partners who manage *C. aculabrum* habitat. We did not receive any specific feedback from these partners and stakeholders.