

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018-AB56

Endangered and Threatened Wildlife and Plants; Endangered Status Determined for the Cave Crayfish *Cambarus aculabrum*

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The Service determines the cave crayfish, *Cambarus aculabrum*, to be an endangered species under the authority of the Endangered Species Act of 1973, as amended (Act). This freshwater crayfish is currently known from two caves in Benton County, Arkansas. Groundwater pollution represents the major threat to the species. This determination implements the protection of the Act for *Cambarus aculabrum*.

EFFECTIVE DATE: May 27, 1993.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the Jackson Field Office, U.S. Fish and Wildlife Service, 6578 Dogwood View Parkway, suite A, Jackson, Mississippi 39213.

FOR FURTHER INFORMATION CONTACT: Paul Hartfield at the above address (telephone 601/965-4900).

SUPPLEMENTARY INFORMATION:**Background**

Cambarus aculabrum was described from two cave streams in Benton County, Arkansas by H.H. Hobbs, Jr. and A.V. Brown (1987). It is a small, white, obligate cave-dwelling (troglobitic) crayfish with an overall body length reaching about 48 millimeters (1.8 inches). This species is distinguished from related surface species by a total lack of pigment, and by reduced eyes. It is distinguished from its closest troglobitic relatives by an acute or subacute apex of the anteromedian lobe of the epistome (mouthpart). First form males (those with fully formed and hardened first pleopods, or reproductive appendages) are further separated from the closely related troglobitic species, *Cambarus setosus* and *C. tartarus*, by the absence of a transverse groove separating the proximalateral lobe from the shaft on the first pleopod. It differs from first form males of another closely related cave species, *C. zophanastes*, by a longer central projection of the first pleopod that also has a shallow

subapical notch (Hobbs and Brown 1987). Recent studies indicate that *Cambarus aculabrum* is genetically distinct from the other cave crayfish species (Koppelman 1990).

The type locality, Logan Cave, is an Ozarkian solution channel located in the Mississippian cherty-limestone Boone Formation of the Springfield Plateau (Hobbs and Brown 1987). A stream flows through the entire length of the cave, approximately 2000 meters (m) [6000 feet(ft)]. Logan Cave also contains a lake approximately 200 m (600 ft) long, 2-6 m (6-18 ft) wide, and 2-3 m (6-9 ft) deep that was formed by the collapse of the cave roof. Water exits the cave approximately 300 m (900 ft) from the lake. *Cambarus aculabrum* is usually observed along the walls of the pool, or along the stream edges. Population numbers appear to be very small in Logan Cave. As many as six crayfish have been seen during one survey, but often none are evident (Hobbs and Brown 1987). In 14 visits to the cave, Brown observed crayfish on only three occasions (Brown *in litt.*, 1987). During a 1990 search of the cave lake and stream by Service biologists, only three *Cambarus aculabrum* were seen, one of which was dead. The U.S. Fish and Wildlife Service purchased 123.9 acres at Logan Cave, including the property that contains the cave's entrances, in 1989. The cave's recharge area covers 30.15 square kilometers (11.64 square miles), most of which is privately owned (Aley and Aley 1987).

Cambarus aculabrum is also known from Bear Hollow Cave, located approximately 38 kilometers (23 miles) from Logan Cave. Bear Hollow Cave is also a solution tunnel in the Boone Formation and contains a small stream approximately 200 m (600 ft) long and 0.2 m (8 inches) deep (Hobbs and Brown 1987). Although there is less available habitat in Bear Hollow Cave than in Logan Cave, as many as nine crayfish have been seen during a single visit (Hobbs and Brown 1987). As in Logan Cave, however, numbers of crayfish observed may vary dramatically between visits. In the Service's 1990 survey, only a single crayfish was found in the Bear Hollow Cave stream. The extent of the Bear Hollow Cave recharge area is unknown. The cave's entrance and surrounding property are privately owned.

In general, very little is known about the ecology and natural history of cave crayfish, and only limited observations have been made of this species. First form males have been collected during the months of January, February, October and December. Females

carrying eggs and young *C. aculabrum* have not been observed.

On July 15, 1988, the Service was petitioned by Dr. Arthur Brown, the University of Arkansas, to list *Cambarus aculabrum* as an endangered species. A finding of insufficient information to indicate the petitioned action was warranted was published by the Service in the Federal Register (53 FR 52745) on December 28, 1988. The finding noted that at the time of the petition there were 29 caves within the Springfield Plateau that were known to harbor cave crayfish, and in only seven of these had the species of crayfish been determined. Recent cave crayfish surveys (Smith 1984, Figg and Lister 1990) and an electrophoretic investigation (Koppelman 1990) have resulted in the identification of these cave crayfish populations, and confirmed the restricted distribution of *Cambarus aculabrum*. The proposed rule to list the cave crayfish, *Cambarus aculabrum*, as an endangered species was published on May 26, 1992 (57 FR 21929).

Summary of Comments and Recommendations

In the May 26, 1992, proposed rule 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. A newspaper notice was published in The Northwest Arkansas Times, Fayetteville, Arkansas, on June 14, 1992.

A total of 13 individuals, agencies or organizations commented on the proposed rule: 3 were opposed to the listing action; 4 were in support; 1 stated no objection to the listing; and 5 expressed no position. The Missouri Department of Conservation supported the listing, and noted that groundwater pollution is a threat to many cave organisms. The Arkansas Game and Fish Commission expressed no objection to the listing action.

Opposing comments of a similar nature or point have been grouped into several general issues. These issues and the Service's response to each are discussed below:

Issue 1: Cave waters are polluted by bat waste, not poultry and swine waste.

Response: A large colony of bats occupy Logan Cave during the summer months. The areas where they roost are very localized within the cave. Some of the roosts are over water, some are not. Water quality may be affected locally

and for a distance below a bat roost over water. However, bats and bat guano are a natural component of the cave ecosystem. Bat guano provides an energy source within a cave environment and a foundation for bacterial and fungal growth. Crayfish and other cave organisms can move within and around guano piles and exploit the organisms associated with them for food. While water quality may be locally affected by bat guano, areas of higher water quality are also available for reproduction and other essential life history functions. However, the improper disposal of animal waste can result in water degradation throughout the aquifer which may result in the mortality or impaired reproduction of cave crayfish (see Factor A, below).

Issue 2: Two commenters noted that there are currently eight swine and poultry operations within the immediate recharge area of Logan Cave, not 85 as cited in the proposed rule. They believe that operations peripheral to the recharge area should not be considered as a threat. They consider the contamination potential from poultry and swine farms within the recharge area of Logan Cave to be minimal.

Response: The proposed rule's source for the number of animal confinement areas is Aley and Aley (1987). This document considered individual buildings, not operations, that were used to confine swine or poultry as potential point sources of water contamination. Operations within the recharge area were known to have from one to 12 swine and poultry confinement areas, and a total of 85 confinement buildings were identified from 1980 aerial photographs. While these numbers have probably changed since 1980, indications are that the number of confinement areas are likely to have increased. In fact, one commenter noted that five new poultry confinement areas have been recently constructed, and five others are under construction in the vicinity.

Swine and poultry operations outside of the recharge area are not considered as point source contamination areas. However, wastes from these operations may be applied to agricultural land within the recharge area as fertilizer, and contribute to non-point source contamination.

The Service considers poultry and swine operations in the vicinity of the Logan Cave recharge area as a principal potential source for both point and non-point source groundwater contamination. However, proper waste management, which includes strict adherence to Arkansas Department of

Pollution Control and Ecology regulations for the application of animal wastes, can significantly reduce the threat of contamination.

Issue 3: Subterranean habitat for the crayfish is likely to exist that is inaccessible for surveying. Therefore, the size and scope of the species' population and habitat has not been adequately assessed to warrant listing as endangered.

Response: While inaccessible subterranean habitat does occur in the vicinity of the two known populations, this habitat will be affected by the same factors impacting accessible cave habitat. The cave surveys cited in the rule, as well as more recent unpublished survey efforts by Service, State, and private agencies and individuals, support the rarity and restricted distribution of *Cambarus aculabrum*. Although the existence of an unknown population is possible, such a discovery would not offset the magnitude of the activities that threaten the species.

Issue 4: One commenter noted that a 1988 Service response to a petition to list *Cambarus aculabrum* as an endangered species found insufficient evidence to warrant listing. The commenter expressed an opinion that this was still the case.

Response: The Service's finding of insufficient evidence to list *Cambarus aculabrum* was based on a lack of information. The finding noted that at the time of the petition there were 29 caves within the Springfield Plateau that were known to harbor cave crayfish, and in only seven of these had the species of crayfish been determined. Additional survey work since the petition, however, has resulted in the identification of these unknown populations, none of which were determined to be *Cambarus aculabrum* (see Background, above). This new information supported the restricted distribution of *Cambarus aculabrum* as presented in this rule.

Issue 5: One commenter questioned the reliability of the Aley and Aley (1987) study cited in the proposed rule that delineated the Logan Cave recharge area, as well as the competence of the principal investigator, Thomas Aley.

Response: Thomas Aley has performed a number of groundwater drainage studies throughout the country and is widely recognized for his competence and professionalism.

Issue 6: The proposed rule did not document a decline of the species, or provide other proof that the cave crayfish is endangered. There is insufficient evidence that listing is warranted.

Response: While a decline in the species has not been demonstrated, the Service considers endangered status warranted for *Cambarus aculabrum* due to the existence of only two known populations and the immediacy and severity of threats facing both populations.

Issue 7: Service studies on the Ozark cavefish in Logan Cave may threaten *Cambarus aculabrum*.

Response: The Ozark cavefish study in Logan Cave was designed to minimize risk to *Cambarus aculabrum*. Fish drift traps that were used for a short period of time within the cave stream are no longer in use. Drift nets in the stream below the cave entrance are set every two weeks for a 48 hour period. These are checked every 24 hours for cave organisms. No cave crayfish have been taken in these traps.

Issue 8: Listing would result in undue economic hardship for poultry and swine producers. The economic impact of listing *Cambarus aculabrum* should be considered.

Response: The Service is required to base decisions regarding endangered or threatened status solely on biological information and is prohibited from allowing economic or nonbiological factors to affect such decisions. However, the actual extent and limits of listing effects on socioeconomic conditions are usually not as great as many people fear. For example, the Ozark cavefish is a threatened species that also occurs in the Logan Cave drainage. It is unlikely that any additional restrictions will be placed on poultry and swine producers within the recharge drainage as a result of listing *Cambarus aculabrum* that are not already enforced due to the presence of the Ozark cavefish.

Issue 9: Listing may cause rerouting of the proposed U.S. Highway 412, causing increased taxpayer expense.

Response: As noted above, economic factors may not be considered during the listing process. However, since the publication of the proposed rule, the Arkansas Highway and Transportation Department has selected an alternative route for U.S. Highway 412 that will avoid impact to Logan Cave and its recharge area.

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that the cave crayfish, *Cambarus aculabrum*, should be classified as an 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 the cave crayfish, *Cambarus aculabrum*, are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Water quality degradation represents the major threat to *Cambarus aculabrum*. Crayfish must have dissolved oxygen in the water for respiration. Severe water contamination by sewage, animal waste, gasoline, or a number of other materials results in seriously depleted oxygen concentrations and suffocation of cave crayfish. Contamination by toxic compounds, including heavy metals, many organic chemicals, and pesticides can destroy aquatic cave fauna, including crayfish. Sedimentation damages or destroys breeding habitat and invertebrates upon which crayfish feed.

The discrete recharge area of Logan Cave has been delineated (Aley and Aley 1987), and the principal point sources of water contamination within the recharge area have been identified as poultry and hog operations. Using 1980 aerial photos, Aley and Aley identified 85 hog or poultry confinement areas (buildings) adjacent to, or within the cave groundwater recharge area. Sixty-three of these pollution sources were in high to extremely high hazard areas (lands known or presumed to lie within the cave groundwater recharge area, or lands that contribute water exclusively to the cave spring). Since their study, one additional poultry operation has been constructed within a few hundred meters of the cave's sinkhole entrance, and a hog confinement area has become operational within one kilometer of the cave. The principal non-point source of water contamination identified by the Aley and Aley study (1987) was the use of liquid animal waste from the livestock operations to fertilize pasture lands in the Logan Cave recharge area. Runoff from improper applications of liquid waste, or heavy precipitation following applications, can rapidly enter the groundwater and result in oxygen depletion.

The Aley and Aley study (1987) also identified residential development as a potential source of water contamination in the Logan Cave aquifer. Although the Logan Cave recharge area is lightly populated at the present, 8 of 11 springs sampled indicated contamination by

sewage. In view of the rapid population growth of Benton County, Arkansas, future residential land development represents a potential threat to Logan Cave water quality.

A well has been recently drilled in the immediate recharge area of Logan Cave for agricultural purposes. Water withdrawal through this well could affect flows in the cave during late summer low flow conditions. Exploitation of this portion of the aquifer for future agricultural expansion, commercial or residential development would significantly effect the cave stream flows and the cave crayfish.

Site selection alternatives for the Northwest Arkansas Regional Airport in Benton County include a location within the Logan Cave recharge area. Airport construction activities and airport operation would threaten this population through construction activities, siltation, fuel and oil spills, storm runoff, sewage treatment, and development of associated service industries.

Residential development is the primary threat to the Bear Hollow Cave crayfish population. Residential development may cause water quality degradation in caves due to leakage from sewage disposal systems and solid waste landfills, sedimentation, increased storm runoff, lawn fertilizers, herbicides, and pesticides. Residential growth also attracts secondary developments such as roads and gasoline stations, which contribute to water quality degradation (Aley and Aley 1987).

Bear Hollow Cave lies on the northern edge of Bella Vista Village, a large retirement development. The cave entrance is a large sinkhole at the base of a ridge, and surface runoff in the vicinity of the cave drains into the sinkhole. The hills above the cave entrance have been subdivided for residential use, but many of the lots including those adjacent to the cave have not yet been developed. Currently, the population of Bella Vista Village is approximately 9000. Sewage disposal is by septic tanks. Although current impact to the cave aquifer is not known, the potential impact is significant. Over 36,000 lots have been sold in the community, including all of the lots in the subdivisions adjacent to, or in the vicinity of, Bear Hollow Cave, and the population is expected to increase by 1000/year into the foreseeable future (Jim Medin, General Manager, Property Owners Association, Bella Vista Village, Arkansas, pers. comm., 1990).

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The species is currently not of commercial value; however, albinistic cave species are often viewed as items of curiosity and intrigue. Bear Hollow Cave is heavily used by humans, as evidenced by a well-marked trail, extensive graffiti on the cave walls, and a large amount of litter inside the cave. The crayfish population of Bear Hollow Cave is subject to take from human curiosity and for aquarium pets. The entrances to Logan Cave have been purchased by the Service, and access is restricted.

C. Disease or Predation

Diseases are not known for cave crayfish. Predation of crayfish by the Ozark cavefish has been documented by Poulson (1961). The Ozark cavefish occurs in Logan Cave, but is not known from Bear Hollow Cave. Predation by naturally occurring predators is a normal aspect of the population dynamics of a species, and is not considered a threat to an otherwise healthy population of *Cambarus aculabrum*.

D. The Inadequacy of Existing Regulatory Mechanisms

Arkansas requires a scientific collecting permit for collecting any species, except taking for fish bait under other State regulations. Troglotic species are further protected from possession and sale by Arkansas State law. This affords very limited protection owing to the difficulty of apprehending violators and limited resources for law enforcement. The species is not recognized or protected by any other existing Federal or State regulation.

E. Other Natural or Manmade Factors Affecting its Continued Existence

The limited distribution of *Cambarus aculabrum*, with only two known populations, leaves the species vulnerable to localized environmental degradation. Population numbers in both caves are likely to be very small. The maximum number of crayfish observed from either cave at a single sighting has been 19. Small troglotic crayfish population size appears to result from food limitation in cave habitats (Culver 1982). Other adaptations that have been noted in cave crayfish and other troglotic species include lower metabolic rates, increased longevity, delayed maturity and reproduction, and decreased fecundity. One cave crayfish's life span has been estimated from 37 to 176 years, and sexual maturity was reached in 35

years on average (Culver 1982). The life span and other population parameters of *Cambarus aculabrum* are unknown, but it is likely they follow those known for other cave species. These characteristics would make the populations of *Cambarus aculabrum* more vulnerable to environmental pollution, bioaccumulation of toxins, and take, and limit the species' ability to recover from, or adapt to, environmental impacts.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to make this rule final. Based on this evaluation, the preferred action is to list the cave crayfish, *Cambarus aculabrum*, as endangered. Endangered status is appropriate because of the species' limited distribution and the vulnerability and isolation of the only two known populations. An endangered species, as defined by the Act, is threatened with extinction throughout all or a significant portion of its range. Critical habitat is not being designated for reasons discussed below.

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 the species is determined to be endangered or threatened. The Service's regulations (50 CFR 424.12(a)) state that designation of critical habitat is not prudent when one or both of the following situations exist: (1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of such threat to the species; or, (2) such designation of critical habitat would not be beneficial to the species. The Service finds that designation of critical habitat is not prudent for reasons discussed below.

Section 7 of the Act requires Federal agencies to consult with the Service if any action they authorize, fund or conduct is likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of critical habitat, if designated. The primary benefit of designating critical habitat lies in the protection of portions of a species' habitat that may be destroyed or adversely modified without the survival of the species being jeopardized. This crayfish, however, is only known to occur in two caves, and has never been reported from any other cave systems despite substantial surveys. With such a limited range, any activity that would

destroy or adversely modify either of these caves' habitats would also jeopardize the continued existence of the species. In addition, Logan Cave is owned and protected by the Service as a part of the National Refuge System. Designation of this cave as critical habitat would not afford any additional increment of protection not already afforded by Service ownership. Bear Hollow Cave is privately owned and is easily accessed by the public. The crayfish population in this cave is extremely vulnerable to any vandalism that may occur from its designation as critical habitat. The Service believes that no appreciable benefits would accrue from critical habitat designation that are not afforded by the jeopardy standard and by the protection already afforded to Logan Cave by Service ownership. Protection will be afforded through the section 7 jeopardy standard and by prohibitions against take in section 9. Therefore, it is now prudent to designate critical habitat for *Cambarus aculabrum*.

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. 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 to destroy or adversely modify any designated 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 the Environmental Protection

Agency through the Clean Water Act's provisions for pesticide registration and waste management actions. The Corps of Engineers will include this species in project planning and operation and during the permit review process. The Federal Highway Administration will consider impacts of bridge and road construction when known habitat may be impacted. Continuing urban development within the drainage basins may involve the Farmers Home Administration and their loan programs. The Soil Conservation Service will consider the species under their farmer's assistance programs.

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 (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, or collect; or to attempt any of these), 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, deliver, 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 for a specified time to relieve undue economic hardship that would be suffered if such relief were not available. Since this species is not in trade, no permits are expected.

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).

References Cited

Aley, T., and C. Aley. 1987. Water quality protection studies, Logan Cave, Arkansas. Ozark Underground Laboratory. Report to Arkansas Game and Fish Commission. Pp. 1-2, 11-15.

Culver, D.C. 1982. Cave Life (Evolution and Ecology). Harvard Univ. Press. Pp 35, 51-54.

Figg, D.E., and K.B. Lister. 1990. Status survey of the troglobitic crayfish *Cambarus setosus* in Missouri. Missouri Department of Conservation. 7pp.

Hobbs, H.H., Jr., and A.V. Brown. 1987. A new troglobitic crayfish from Northwestern Arkansas (Decapoda: Cambaridae). Proc. Biol. Soc. Wash. 100(4), pp. 1041-1048.

Koppelman, J.B. 1990. A biochemical genetic analysis of troglobitic crayfish (*Cambarus* spp.) in Missouri, Oklahoma and Arkansas. Report to Missouri Department of Conservation, Oklahoma Natural Heritage Inventory, and Arkansas Game and Fish Commission. 12 pp.

Poulson, T.L. 1961. Cave adaptation in Amblyopsid fishes. Ph.D. dissertation, University of Michigan. Pp. 64-67.

Smith, K.L. 1984. The status of *Cambarus zophonastes* Hobbs and Bedinger, an endemic cave crayfish from Arkansas. Arkansas Natural Heritage Commission, Little Rock, Arkansas. 15 pp.

Author

The primary author of this rule is Paul D. Hartfield (see ADDRESSES section).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, imports, Reporting and recordkeeping requirements, and Transportation.

Regulation 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: 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1544; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500; unless otherwise noted.

2. Amend § 17.11(h) for animals by adding the following, in alphabetical order under "CRUSTACEANS", to the List of Endangered and Threatened Wildlife:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
CRUSTACEANS							
Crayfish (no common name).	<i>Cambarus aculabrum</i> .	U.S.A. (AR)	NA	E	499	NA	NA

Dated: February 26, 1993.
Richard N. Smith,
 Deputy Director, Fish and Wildlife Service.
 [FR Doc. 93-9747 Filed 4-26-93; 8:45 am]
BILLING CODE 4310-56-M

50 CFR Part 17

RIN 1018-AB83

Endangered and Threatened Wildlife and Plants; Endangered or Threatened Status for Seven Central Florida Plants

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The Service determines endangered status pursuant to the Endangered Species Act of 1973 as amended (Act) for the following five plants: *Cladonia perforata* (Florida perforate cladonia), *Crotalaria avonensis* (Avon Park harebells), *Nolina brittoniana* (Britton's beargrass), *Polygala lewtonii* (Lewton's polygala), and *Polygonella myriophylla* (sandlace). The Service determines threatened status for two plants: *Clitoria fragrans* (pigeon wings) and *Eriogonum longifolium* var. *gnaphalifolium* (scrub buckwheat). All seven plants are found

in Highlands and Polk Counties in central Florida; four of the species range farther to the north or east, into Hernando, Lake, Osceola, Orange, and Marion Counties. One plant occurs on a barrier island in Okaloosa County, northwest Florida. Loss of habitat, mainly to citrus groves and residential development, is the primary threat to these species. This rule extends the Act's protection and recovery provisions to these seven species.

EFFECTIVE DATE: May 27, 1993.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the Jacksonville Field Office, U.S. Fish and Wildlife Service, 3100 University Boulevard South, suite 120, Jacksonville, Florida 32216.

FOR FURTHER INFORMATION CONTACT: Michael M. Bentzien, Assistant Field Supervisor, at the above address (telephone: 904-232-2580).

SUPPLEMENTARY INFORMATION:

Background

The seven plants determined to be endangered or threatened inhabit dry upland vegetation (including scrub, high pine, or intermediate "turkey oak barrens") in central peninsular Florida;

one, the lichen *Cladonia perforata*, also occurs in coastal scrub in northwestern Florida.

Scrub is "a xeromorphic shrub community dominated by a layer of evergreen, or nearly evergreen oaks * * * or Florida rosemary (*Ceratiola ericoides*), or both, with or without a pine overstory, occupying well drained, infertile, sandy soils" (Myers 1990, pp. 154-155). The usual pine species in scrub is sand pine (*Pinus clausa*). Scrub is the habitat of the Florida scrub jay (*Aphelocoma coerulescens*), a threatened species. Scrub occurs on dune ridges along Florida's Gulf and Atlantic coasts and on older inland sand ridges. Endemic plant species (species with limited geographic distributions) occur in scrub in various parts of Florida, with the largest concentration of endemics on the southernmost high interior ridge, the Lake Wales Ridge, northwest of Lake Okeechobee. Plants endemic to the Lake Wales Ridge are concentrated in scrub dominated by Florida rosemary on sites where the sand is apparently particularly devoid of nutrients; sites with slightly better nutrient status usually have dense stands of oaks, hickory, and sand pines (Myers 1990).