Salamander as Endangered
Petition to List the Berry Cave salamander from governmental agencies, Native American Tribes, the scientific community, industry, or any other interested parties. We seek information on:

1. The species’ biology, range, and population trends, including:
   - Habitat requirements for feeding, breeding, and sheltering;
   - Genetics and taxonomy;
   - Historical and current range, including distribution patterns;
   - Historical and current population levels, and current and projected trends; and
   - Past and ongoing conservation measures for the species, its habitat, or both.

2. The factors that are the basis for making a listing determination for a species under section 4(a) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.), which are:
   - The present or threatened destruction, modification, or curtailment of its habitat or range;
   - Overutilization for commercial, recreational, scientific, or educational purposes;
   - Disease or predation;
   - The inadequacy of existing regulatory mechanisms; or
   - Other natural or manmade factors affecting its continued existence.

3. The potential effects of climate change on this species and its habitat. If, we determine that listing the Berry Cave salamander is warranted, it is our intent to propose critical habitat to the maximum extent prudent and determinable at the time we propose to list the species. Therefore, with regard to areas within the geographical range currently occupied by the Berry Cave salamander, we also request data and information on what may constitute physical or biological features essential to the conservation of the species, where these features are currently found, and whether any of these features may require special management considerations or protection.

In addition, we request data and information regarding whether there are areas outside the geographical area occupied by the species that are essential for the conservation of the species. Please provide specific comments and information as to what, if any, critical habitat you think we should propose for designation if the species is proposed for listing, and why such habitat meets the requirements of the Act.

Please include sufficient information with your submission (such as scientific journal articles, other supporting publications, or data) to allow us to
verify any scientific or commercial information you include.

Submissions merely stating support for or opposition to the action under consideration, without providing supporting information, although noted, will not be considered in making a determination. Section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or threatened species must be made "solely on the basis of the best scientific and commercial data available." You may submit your information concerning this status review by one of the methods listed in the ADDRESSES section. If you submit information via http://www.regulations.gov, your entire submission—including any personal identifying information—will be posted on the website. If you submit a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this personal identifying information. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on http://www.regulations.gov.

Information and supporting documentation that we received and used in preparing this finding will be available for public inspection on http://www.regulations.gov, or you may make an appointment during normal business hours, at the U.S. Fish and Wildlife Service, Cookeville Ecological Services Field Office (see FOR FURTHER INFORMATION CONTACT).

Background

Section 4(b)(3)(A) of the Act requires that we make a finding on whether a petition to list, delist, or reclassify a species presents substantial scientific or commercial information indicating that the petitioned action may be warranted. We are to base this finding on information provided in the petition, supporting information submitted with the petition, and information otherwise available in our files. To the maximum extent practicable, we are to make this finding within 90 days of our receipt of the petition and publish our notice of the finding promptly in the Federal Register.

Our standard for substantial scientific or commercial information within the Code of Federal Regulations (CFR) with regard to a 90–day petition finding is "that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted" (50 CFR 424.14(b)). If we find that substantial scientific or commercial information was presented, we are required to promptly review the status of the species, which is subsequently summarized in our 12-month finding.

Petition History

On January 22, 2003, we received a petition dated January 15, 2003, from Dr. John Nolt, University of Tennessee – Knoxville, requesting that we list the Berry Cave salamander as endangered under the Act. The petition clearly identified itself as such and included the requisite identification information for the petitioner, as required in 50 CFR 424.14(a). In a February 24, 2003, letter to the petitioner, we responded that we had reviewed the petition but that, due to court orders and settlement agreements for other listing and critical habitat actions that required nearly all of our listing and critical habitat funding for fiscal year 2003, we would not be able to further address the petition at that time.

Species Information

The Berry Cave salamander (Gyrinophilus gulolineatus) was recognized as a distinct aquatic cave-dwelling species when it was originally described as a subspecies (G. palleucus gulolineatus) of the Tennessee cave salamander (G. palleucus) by Brandon (1965, pp. 346–352). The Tennessee cave salamander is found in eastern and middle Tennessee, northern Alabama, and northwestern Georgia. The Tennessee cave salamander is related to the spring salamander (G. porphyriticus); however, unlike the spring salamander, it is usually found in caves and is neotenic, meaning that it normally retains larval characteristics as an adult. Individuals occasionally metamorphose and lose their larval characters (Simmons 1976, p. 256; Yeatman and Miller 1984, pp. 305–306), and metamorphosis can be induced by subjecting them to hormones (Dent and Kirby-Smith 1963, p. 123).

Three taxonomic entities have been formally described within the Tennessee cave salamander species complex. The pale salamander (G. p. palleucus) is the most widely distributed member of the group and is found in middle Tennessee, northern Alabama, and northwestern Georgia. The Big Mouth Cave salamander (G. p. necturoides) is restricted to one cave in middle Tennessee, and the Berry Cave salamander has been recorded from five locations in eastern Tennessee.

The Berry Cave salamander is differentiated from other members of the group by a distinctive dark stripe on the upper portion of the throat, a wider head, a flatter snout, and possibly larger size (Brandon 1965, p. 347). Based on these differences and its apparent isolation from other members of the group, Collins (1991, p. 43) recommended that this subspecies be recognized as a distinct species (G. gulolineatus).

The Berry Cave salamander is restricted to the Ridge and Valley Physiographic Province of eastern Tennessee. It has been reported from Berry Cave, which is located south of Knoxville, Tennessee; from Mud Flats, Meads Quarry, and Cruze Caves in Knoxville; and from an unknown cave in the Athens, Tennessee, area. The Athens record is based solely on three specimens collected in a roadside ditch that are presumed to have washed out of a cave during flooding (Brandon 1965, pp. 348–349). The species has not been observed in the Athens area since 1953.

Evaluation of Information for This Finding

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations at 50 CFR 424 set forth the procedures for adding species to, or removing a species from, the Federal Lists of Endangered and Threatened Wildlife and Plants. 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) of the Act: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence.

In making this 90–day finding, we evaluated whether information regarding threats to the Berry Cave salamander, as presented in the petition and other information available in our files, is substantial, thereby indicating that the petitioned action may be warranted. Our evaluation of this information is presented below.

A. The Present or Threatened Destruction, Modification, or Curtailment of the Species’ Habitat or Range

Information Provided in the Petition

The petitioner stated that the Berry Cave salamander is known from only four populations, all in eastern Tennessee, and that all but one of these populations are immediately threatened or already extirpated. These four locations include Berry Cave in Roane County; Mud Flats Cave in Knox County; an unknown location in the
town of Athens, McMinn County; and Meades Quarry/Cruze Cave complex in South Knoxville, Knox County (treated as two separate localities in discussion above). The petitioner stated that Berry Cave was the only location containing a pure and unthreatened population of the species.

The petitioner stated that the only record of Berry Cave salamanders from the town of Athens was based on a 1953 collection of three specimens from a roadside ditch that was flooded by Oostanaula Creek. These specimens were collected near a hole in the ground, presumably an opening into a cave out of which the animals had been washed, but the exact location was unknown. The petitioner concluded that this population, if it still exists, is potentially under pressures from development and pollution that affected other sites in urban areas.

The petitioner also stated that the habitat in Mud Flats Cave was degraded several years prior to the petition date, due to siltation from a nearby housing development, and that efforts to find the Berry Cave salamander subsequent to this development have failed, suggesting this population might be extirpated. The petitioner also asserted that if the species has survived at this location, it is subjected to continued pollution and siltation from this development.

In addition, the petitioner asserted that Meades Quarry Cave and Cruze Cave are connected, forming one system. Evidence of a connection included: (1) Information on the position of Meades Quarry Cave, which is thought to extend southwest in the general direction of Cruze Cave; (2) the location of both caves within the Holston Formation, a long band of relatively soluble marble-like limestone known as “Tennessee marble” that is found in an area only a few hundred yards or meters wide; and (3) genetic studies that suggest that salamanders from both caves are part of the same population. The petitioner stated that if the two caves are part of the same system, the proposed James White Parkway, which would be located midway between the entrance to Meades Quarry Cave and the entrance to Cruze Cave, must pass directly over the system and constitutes a significant threat to the Meades Quarry/Cruze Cave habitat of the Berry Cave salamander. In addition, the petitioner stated that a proposed interchange for the James White Parkway would be located on a hillside immediately above a sinkhole complex that lies in the Holston formation midway between the entrances to Cruze and Meades Quarry Caves. The sinkhole is presumably connected to this cave system. The petitioner concluded that the proposed construction project and resulting road would threaten the Berry Cave salamander population by disrupting the food chain upon which the species depends, increasing siltation in the cave system, and altering the hydrologic and thermal regimes of the stream system. Other road-related impacts to this site that the petitioner stated would threaten the species either directly or by reducing its prey included filling of cave passages with concrete, collapse of cave passages, pollution from toxic runoff, and toxic chemical spills.

Evaluation of Information Provided in the Petition and Available in Service Files

Information in Service files supports the petitioner’s claim that the Berry Cave salamander is known from only 4 populations in eastern Tennessee (Wynn and Jacobs 1988, pers. comm.). In addition, we have no information in our files indicating that Berry Cave salamanders have been collected from the vicinity of Athens, Tennessee, since the initial discovery there in 1953.

The source of much of the information included in the petition was notes taken by the petitioner during a meeting about the Berry Cave salamander and related taxa within the G. palleucus species complex, which was held by the Service on December 10, 2002. Several persons knowledgeable about the distribution, status, and ongoing taxonomic studies of the species were present at that meeting. During this meeting, Ron Caldwell reported that he visited Mud Flats Cave in 1994 and did not observe any salamanders. At the time of the visit, the mud in the cave was hip deep whereas the mud was only ankle deep during prior visits he made to the cave. He also reported that a housing development had filled in a sinkhole overlaying the cave and that lawn runoff from the development and from a golf course may be impacting the cave (Caldwell 2002, pers. comm.).

If the James White Parkway is constructed as the petitioner describes, the habitat of the Berry Cave salamander may be negatively impacted. Construction of the parkway has the potential to cause erosion of surrounding land and cause excessive siltation to enter the Meades Quarry/Cruze Cave complex, which in turn could cause a disruption in the amount of organic matter (salamander food source) in the complex. It could also cause fluctuations in water flow through the cave system, fluctuations in temperature of water entering the cave system, and an increase in pollution from toxic runoff. We believe that these factors could lead to a decline in the population in the Meades Quarry/Cruze Cave complex, given the apparent decline at Mud Flats Cave in the face of similar threats, primarily excessive siltation. Because the Berry Cave salamander is restricted to no more than four localities, one of which might already be extirpated (see discussion above concerning Mud Flats Cave), we believe the petitioner presents substantial information to suggest the species could be placed at risk of becoming extinct in the foreseeable future.

In summary, we find that the information provided in the petition, as well as other information in our files, presents substantial scientific or commercial information indicating that the petitioned action may be warranted due to present or threatened destruction, modification, or curtailment of the species’ habitat or range. Specifically, the petitioner’s claims that (1) the Mud Flats Cave population of Berry Cave salamander may be extirpated and that habitat in this location has been modified by siltation and other development-related threats, and (2) the Meades Quarry/Cruze Cave complex may be threatened by proposed road development in the vicinity of the cave, indicate that the petitioned action may be warranted.

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

The petition presents no substantial scientific or commercial information, nor do we have such information in our files, indicating that the petitioned action may be warranted due to threats from overutilization for commercial, recreational, scientific, or educational purposes. However, we will evaluate all factors, including threats from overutilization for commercial, recreational, scientific, or educational purposes, when we conduct our status review.

C. Disease or Predation

The petition presents no substantial scientific or commercial information, nor do we have such information in our files, indicating that the petitioned action may be warranted due to disease or predation. However, we will evaluate all factors, including threats from disease and predation, when we conduct our status review.
D. The Inadequacy of Existing Regulatory Mechanisms

The petition presents no substantial scientific or commercial information, nor do we have such information in our files, indicating that the petitioned action may be warranted due to threats resulting from the inadequacy of existing regulatory mechanisms. However, we will evaluate all factors, including the inadequacy of existing regulatory mechanisms when we conduct our status review.

E. Other Natural or Manmade Factors Affecting the Species’ Continued Existence

Information Provided in the Petition

The petitioner stated that specimens so far collected from the Meades Quarry/Cruze Cave complex have hybridized with the spring salamander (Gyrinophilus porphyriticus), which occurs near the cave entrances.

Evaluation of Information Provided in the Petition and Available in Service Files

The petitioner’s claims concerning hybridization are supported by correspondence in our files, which indicate that, based upon electrophoretic data, populations in Meades Quarry and Cruze Caves hybridize with spring salamanders (Wynn and Jacobs 1988, pers. comm.). While this may be a natural occurrence that has gone on for quite some time, there is a possibility that unique Berry Cave salamander genetic material is being lost through interbreeding with spring salamanders, threatening the genetic integrity of the species.

Therefore, we find that the information provided in the petition, as well as other information in our files, presents substantial scientific or commercial information indicating that the petitioned action may be warranted due to the potential threat to the genetic integrity of two of the four known populations of Berry Cave salamander by hybridization with the spring salamander.

Finding

On the basis of our determination under section 4(b)(3)(A) of the Act, we have determined that the petition presents substantial scientific or commercial information indicating that listing the Berry Cave salamander may be warranted. This finding is based on the possibility of habitat loss and degradation from development, which has been implicated in the reduction or possible loss of Berry Cave salamanders in Mud Flats Cave. It is also based on the potential threat of the loss of genetic diversity due to interbreeding between Berry Cave and spring salamanders in Meades Quarry and Cruze caves.

Because we have found that the petition presents substantial information indicating that listing the Berry Cave salamander may be warranted, we are initiating a status review to determine whether listing the Berry Cave salamander under the Act is warranted.

The “substantial information” standard for a 90–day finding differs from the Act’s “best scientific and commercial data” standard that applies to a status review to determine whether a petitioned action is warranted. A 90–day finding does not constitute a status review under the Act. In a 12–month finding, we will determine whether a petitioned action is warranted after we have completed a thorough status review of the species, which is conducted following a substantial 90–day finding. Because the Act’s standards for 90–day and 12–month findings are different, as described above, a substantial 90–day finding does not mean that the 12–month finding will result in a warranted finding.

References Cited

A complete list of references cited is available on the Internet at http://www.regulations.gov and upon request from the Cookeville Ecological Services Field Office (see FOR FURTHER INFORMATION CONTACT).

Author

The primary authors of this notice are the staff members of the Cookeville Ecological Services Field Office (see FOR FURTHER INFORMATION CONTACT).

Authority: The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.).

Dated: March 9, 2010.

Rowan W. Gould,
Acting Director, U.S. Fish and Wildlife Service.

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