DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R4-ES-2010-0011]

[MO 92210-0-0008]

Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List the Berry Cave Salamander as Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding on a petition to list the Berry Cave salamander (*Gyrinophilus gulolineatus*) as endangered under the Endangered Species Act of 1973, as amended (Act). After review of all available scientific and commercial information, we find that listing the Berry Cave salamander is warranted. Currently, however, listing is precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Upon publication of this 12-month petition finding, we will add the Berry Cave salamander to our candidate species list. We will develop a proposed rule to list the Berry Cave salamander as our priorities allow. We will make any determination on critical habitat during development of the proposed listing rule. During any interim period, we will address the status of the candidate taxon through our annual Candidate Notice of Review (CNOR).

DATES: The finding announced in this document was made on [INSERT DATE OF FEDERAL REGISTER PUBLICATION].

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov* at Docket Number FWS-R4-ES-2010-0011. Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Tennessee Ecological Services Field Office, 446 Neal Street, Cookeville, TN 38501. Please submit any new information, materials, comments, or questions concerning this finding to the above street address.

FOR FURTHER INFORMATION CONTACT: Mary E. Jennings, Field Supervisor, Tennessee Ecological Services Field Office, 446 Neal Street, Cookeville, TN 38501; by telephone 931-528-6481; or by facsimile at 931-528-7075. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Act (16 U.S.C. 1531 *et seq*.) requires that, for any petition to revise the Federal Lists of Threatened and Endangered Wildlife and Plants that contains substantial scientific or commercial information that listing a species may be warranted, we make a finding within 12 months of the date of receipt of the petition. In this finding, we

determine whether the petitioned action is: (a) not warranted, (b) warranted, or (c) warranted, but immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether species are endangered or threatened, and expeditious progress is being made to add or remove qualified species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Section 4(b)(3)(C) of the Act requires that we treat a petition for which the requested action is found to be warranted but precluded as though resubmitted on the date of such finding, that is, requiring a subsequent finding to be made within 12 months. We must publish these 12-month findings in the **Federal Register**.

Previous Federal Actions

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 received 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, we would not be able to further address the petition at that time.

The 90-day petition finding was published in the **Federal Register** on March 18, 2010 (75 FR 13068). The Service found that the information provided in the petition, supporting information submitted with the petition, and information otherwise available in our files did provide substantial scientific or commercial information indicating that listing the Berry Cave salamander may be warranted. In the finding, we stated that we were initiating a status review to determine whether listing the species was warranted, and would issue a 12-month finding

accordingly. This document constitutes the 12-month finding on the January 15, 2003, petition to list the Berry Cave salamander.

Species Information

Taxonomy and Species Description

Three taxonomic entities have been formally described within the Tennessee cave salamander species complex. The pale salamander (*Gyrinophilus palleucus 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 (*G. gulolineatus*) (formerly recognized as the subspecies *G. p. gulolineatus*) has been recorded from nine locations in eastern Tennessee.

Members of the Tennessee cave salamander complex are related to the spring salamander (*G. porphyriticus*); however, unlike the spring salamander, they usually are found in caves and are neotenic, meaning that they normally retain larval characteristics as adults. Individuals occasionally metamorphose and lose their larval characters (Simmons 1976, p. 256; Yeatman and Miller 1985, pp. 305-306), and metamorphosis can be induced by subjecting them to hormones (Dent and Kirby-Smith 1963, p. 123).

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 a larger size (Brandon 1965, p. 347). Despite these differences, the taxonomic status of the Berry Cave salamander has been debated for some time. The Berry Cave salamander was recognized as a distinct aquatic, cave-dependant taxon of the Tennessee cave salamander

complex by Brandon (1965, pp. 346-352), who described it as a subspecies (*G. p. gulolineatus*). The Tennessee Wildlife Resources Agency (TWRA) (2005, p. 50) still uses this subspecific designation. Brandon *et al.* (1986, pp. 1-2) suggested the Berry Cave salamander be considered separate from the Tennessee cave salamander based on nonadjacent ranges (it is geographically isolated from other members of the complex), dissimilarity in bone structures of transformed adults, and morphology of neotenic adults. Furthermore, Niemiller *et al*. (2010b, p. 5) found that Berry Cave salamander populations they sampled have three unique alleles when compared to the Tennessee cave salamander. According to Niemiller *et al.* (2008, p. 2), current taxonomy recognizes the Tennessee cave salamander (*G. palleucus*) and the Berry Cave salamander (*G. gulolineatus*) as two independent species. Because most authorities now assign the Berry Cave salamander species-level status (Brandon 1965, p. 347; Brandon 1986, pp. 1-2; Collins 1991, p. 43; Simmons 1976, p. 276; IUCN 2010; ITIS 2010), we consider the Berry Cave salamander to be a distinct species, *G. gulolineatus,* for the purposes of this finding.

Distribution

Until recently, only eight populations of the Berry Cave salamander were documented: seven from caves and one from a roadside ditch in McMinn County, Tennessee, where three individuals were collected (presumably washed into the ditch from a cave). Salamanders in Cruze Cave, formerly considered to be Berry Cave salamanders, are now thought to be spring salamanders (Miller and Niemiller 2008, p. 14). A closer analysis of Cruze Cave animals revealed the presence of an iris (absent in the Berry Cave salamander), a high propensity to metamorphose (23 percent of individuals collected), and relatively large eye size when compared to Berry Cave salamanders (Miller and Niemiller 2008, p. 14). Furthermore, genetics indicated

that Cruze Cave individuals shared the spring salamander's haplotype (closely linked genetic markers present on a single chromosome) and group (having a common ancestor) (Niemiller 2006, p. 41). Therefore Cruze Cave is no longer thought to contain a population of Berry Cave salamanders.

However, recent population surveys (April 2004 through June 2007) resulted in the discovery of Berry Cave salamanders in two new Knox County caves (Aycock Spring and Christian caves). According to Miller and Niemiller (2008, p. 10), the Berry Cave salamander is recorded from nine localities within the Appalachian Valley and Ridge Province in East Tennessee. These include eight caves within the Upper Tennessee River and Clinch River drainages (Niemiller *et al.* 2009, p. 243) and one unknown cave in McMinn County, Tennessee (Brandon 1965, p. 348). The Berry Cave salamander is currently known from Berry Cave, which is located south of Knoxville, Tennessee (in Roane County) (Niemiller 2006, p. 96); from Mud Flats, Aycock Spring, Christian, Meades Quarry, Meades River, and Fifth caves in Knox County (Niemiller and Miller 2010, p. 2), the latter three being part of the larger Meades Quarry Cave System (Brian Miller, Middle Tennessee State University, pers. comm., 2010); from Blythe Ferry Cave (in Meigs County) (Niemiller and Miller 2010, p. 2); and from an unknown cave in Athens, McMinn County, Tennessee. The Athens record is based solely on the three specimens collected in a roadside ditch during a flooding of Oostanaula (Eastanollee) Creek (Brandon 1965, pp. 348-349). The species has not been observed in the Athens area since 1953.

Miller and Niemiller (2008, p. 11) suggested that populations of the Berry Cave salamander could occur throughout the Valley and Ridge Province in interconnected subterranean waters associated with the Tennessee River. Distribution studies are limited due to inaccessibility of smaller cave systems, but Miller and Niemiller (2006, p. 15) suggest that cave

salamander populations are likely small. Western dispersal appears to be prohibited by a fault zone located west of the East Tennessee Aquifer System (Miller and Niemiller 2008, p. 10).

Historical estimates of Berry Cave salamander densities and population trends are lacking. Miller and Niemiller (2006, p. 44) provided numbers of Berry Cave salamanders observed in Berry and Mudflats caves by decade, but the information has gaps and is insufficient for analysis. Miller and Niemiller (2005, p. 93) planned to implant salamanders with tags for population estimates on return cave visits, comparing marked to unmarked individuals captured. However, in an unpublished report to TWRA (Miller and Niemiller 2006, p. 15), the authors state that time constraints did not allow for mark-recapture studies to be performed in each cave and that population estimates were based on the number of salamanders found during the surveys. These surveys concluded that Berry Cave salamander populations are robust at Berry and Mudflats caves where population declines had been previously reported (Miller and Niemiller 2008, p. 1; Miller and Niemiller 2006, p. 44). According to Miller and Niemiller (2008, pp. 1, 17-20), a total of 113 caves in Middle and East Tennessee were surveyed from the time period of April 2004 through June 2007, resulting in observations of 63 Berry Cave salamanders.

Habitat

Limited information is available concerning the habitat requirements of the Berry Cave salamander. According to Miller and Niemiller (2008, pp. 10-11), the Berry Cave salamander is associated with subterranean waters within the Appalachian Valley and Ridge Province in East Tennessee. In general, cave-obligate salamanders require an inflow of organic detritus, aquatic organisms on which to feed, and sufficient cover in the form of rocks and ledges. Studies

indicate that the tendency to utilize cover varies between caves, but the Berry Cave salamander often seeks refuge in crevices, cover areas, and overhanging ledges when disturbed (Niemiller *et al.* 2010b, p. 10; Miller and Niemiller 2006, p. 11).

Biology

Life requirements of the Tennessee cave salamander complex are poorly documented due to their reclusive nature and the obscurity of subterranean environments (Niemiller 2006, p. 9). Animals found in the same location during mark-recapture studies indicate that Berry Cave salamander territories are diminutive (Miller and Niemiller 2008, p. 11).

Little is known in general about breeding habits, life spans, or numbers comprising individual populations within the Tennessee cave salamander complex (Miller and Niemiller 2005, p. 92). Transition time from larval stage to reproductive adult is currently undocumented. Members of the Tennessee cave salamander complex are paedomorphic (retain juvenile characteristics as an adult) and become sexually mature without metamorphosing into an adult form (Brandon 1966, in Niemiller *et al.* 2008, p. 2). Female salamanders in the Tennessee cave salamander complex are believed to be gravid from late autumn to early winter (Niemiller *et al*. 2010a, p. 39). *Gyrinophilus* species are generalist feeders and cannibalization of other conspecifics (belonging to the same species) may cause females of some species to seek isolation from main cave streams for oviposition (laying eggs) (Niemiller *et al*. 2010a, pp. 38-39). To date, neither eggs nor embryos have been described (Niemiller and Miller 2010, p. 1).

Summary of Information Pertaining to the Five Factors

Section 4 of the Act (16 U.S.C. 1533), and implementing regulations (50 CFR 424), set forth procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife

and Plants. Under section 4(a)(1) of the Act, a species may be determined to be endangered or threatened based on any of the following five factors:

(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 considering what factors might constitute threats to a species, we must look beyond the mere exposure of the species to the factor to evaluate whether the species may respond to the factor in a way that causes actual impacts to the species. If there is exposure to a factor and the species responds negatively, the factor may be a threat and we attempt to determine how significant a threat it is. The threat is significant if it drives, or contributes to, the risk of extinction of the species such that the species warrants listing as endangered or threatened as those terms are defined in the Act.

In making this finding, information pertaining to the Berry Cave salamander in relation to the five factors provided in section 4(a)(1) of the Act is discussed below.

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

According to Caldwell and Copeland (1992, pp. 3-4), the greatest threats to the Tennessee cave salamander complex are derived from agricultural runoff, pesticide use in

residential and agricultural settings, over-collection, increased water flow into and through cave systems following timber operations, and siltation caused by the removal of trees from riparian zones. Although standard best management practices (BMPs) for timber harvesting require intact riparian buffers and prohibit instream operation of heavy equipment, these BMPs are not always followed and may not fully prevent sediment from entering streams. Siltation may adversely affect reproduction by filling crevices used for egg deposition or covering the eggs themselves (Miller and Niemiller 2006, p. 22). Niemiller and Miller (2006, p. 10) believe that Berry Cave salamander populations, specifically, are most vulnerable to habitat degradation associated with urbanization, over-collecting, and poor silvicultural and agricultural practices.

Boone and Bridges (2003) (in Miller and Niemiller (2006, p. 22)) found that water contamination caused by pesticide and roadway runoff poses a considerable threat to cave systems. Hayes *et al.* (2006, p. 40) suggest that amphibians are particularly vulnerable to pesticides due to their highly permeable skin combined with the fact that their critical reproductive and developmental stages occur while they are in aquatic environments. Some persistent pesticides are active at low environmental concentrations and act as endocrine disrupters in amphibians, causing delayed metamorphosis, developmental retardation, and stunted larval growth (Hayes *et al.* 2006, p. 40).

According to Miller and Niemiller (2008, p. 13), there are few water quality data available for caves where the Berry Cave salamander is documented, and the source of the streams is not well understood. Niemiller (2006, p. 96) observed three individuals in Meades Quarry Cave and three in Mudflats Cave, caves that are heavily silted and prone to flooding (Miller and Niemiller 2006, p. 22). The Mudflats Cave system is thought to be affected by residential pollution (e.g., herbicides, pesticides, exhaust runoff, and silt load) from a nearby

housing development (Miller and Niemiller 2008, p. 13), although no studies have been done to substantiate this (Miller, pers. comm., 2005). Caldwell and Copeland (1992, p. 3) suggest that increased "through flow" (water passing through the cave) can flush salamanders and their aquatic invertebrate food base from caves as well as introduce contaminants into them at a quicker rate. Miller and Niemiller (2006, pp. 22-23) cite Boone and Bridges (2003) as evidence of adverse effects to amphibian species from pesticide contamination, but note that regular flooding of caves appears to wash silt from the systems and that data on the long-term effects to the species from "through flow" fluctuations are lacking.

Meades Quarry Cave continues to be greatly impacted by past quarrying activities. Niemiller *et al*. (2010b, p. 11) indicate that cave passages were destroyed by quarrying and that lye leaching continues to alkalize the system near the main entrance to the cave. Water pH tests reveal fluctuations in pH levels from 8.4 to 12.7 downstream of the cave entrance, and Berry Cave salamanders have been observed with chemical burns (Niemiller *et al*. 2010b, p. 11). Matthew Niemiller (University of Tennessee, pers. comm., 2010) suggested that removal of larger lye deposits would reduce alkalinity input if the main point source could be located.

There are substantial concerns for the six documented Knox County caves where Berry Cave salamanders are known to occur (Mud Flats, Aycock Spring, Christian, Meades Quarry, Meades River, and Fifth caves) due to growth of metropolitan Knoxville (Miller and Niemiller 2008, p. 1). Construction activities, such as residential and business developments, land clearing, and highway projects, frequently result in stream siltation, toxic runoff (e.g., solvents, chemical spills, road salt oil and grease), and urban pollution. Stream temperatures are elevated by removal of trees from riparian zones (forested land along streams and rivers), and hydrologic fluctuations result from increased silt load; elevated stream temperatures and hydrologic

fluctuations both potentially affect the quantity and quality of organic matter available to cave systems. Data are currently lacking on long-term effects of hydrologic fluctuations on salamander population size, but it is thought that an increase in siltation affects reproduction (Miller and Niemiller 2006, pp. 22-23). While Berry Cave salamander populations have persisted, development is known to be occurring and affecting the salamander in all six Knox County caves. Heavy siltation is present in Mudflats Cave, believed to be associated with the Gettysvue housing development (Niemiller *et al*. 2010b, p. 11). Miller and Niemiller (2008, p. 13) indicate that residential housing developments and roads are being constructed near Aycock Spring and Christian caves. Development of a major roadway known as the James White Parkway (South Knoxville Boulevard) has potential to impact Berry Cave salamander populations in the Meades Quarry Cave system (Meades Quarry, Meades River, and Fifth caves) by increased siltation from construction, the creation or closures of cave openings by blasting and excavating activities which could affect organic input into the system, and an increase in impervious surface runoff that may contain various environmental contaminants (e.g., oil, herbicides, salt). Meades Quarry Cave contains the largest population of Berry Cave salamanders documented and is currently impacted by hybridization with the spring salamander and lye leaching associated with past quarrying activities (Niemiller and Miller 2010, p. 3; M. Niemiller, pers. comm., July 2010).

Due to the proximity of the Meades Quarry Cave system to the proposed James White Parkway, the Service requested, during a March 4, 2003, meeting with the Tennessee Department of Transportation (TDOT), that a study be prepared to determine whether the potential alignments would impact the surface area that recharges the Meades Quarry Cave system. As a result, TDOT contracted ARCADIS to perform a dye trace study of the affected

watershed. ARCADIS (2009, p. 1-2) conducted a hydrogeologic dye trace study from April through June 2009 to determine which karst features within the Toll Subwatershed (i.e., a surface watershed overlying Meades Quarry and Cruze caves) are connected to the Meades Quarry Cave system. A positive trace from a large sinkhole, just north of Sevierville Pike, indicates that it directly recharges the Meades Quarry Cave system, and it is likely that four smaller sinkholes, in proximity to this one, also drain into the Meades Quarry Cave (ARCADIS 2009, pp. 5-1, 5-2). Dye trace results demonstrated a general southwest to northeast orientation of groundwater flow (ARCADIS 2009, p. 5-1) and appeared to substantiate the hypothesis (based on surface flow) that Cruze Cave and Meades Quarry Cave systems were not hydrologically connected.

TDOT, in cooperation with the Federal Highway Administration, is preparing an EIS for the James White Parkway project (John Hunter, TDOT Project Manager, pers. comm., June 2009; Luke Eggering, Parsons Consulting, pers. comm. October 2010). The concerns for potential impacts to the Meades Quarry Cave system and the Berry Cave salamander are being addressed by substantial changes in project design. In an effort to satisfy the purpose and need of the project while minimizing environmental impacts, TDOT is now proposing to construct a fully access-controlled facility (South Knoxville Boulevard EIS 2010, p. 10). Furthermore, the alignments under consideration have been purposefully designed to avoid or minimize impacts to the recharge area for the Meades Quarry Cave system (South Knoxville Boulevard EIS 2010, p. 43). If direct impacts are unavoidable, TDOT is proposing to install filtration systems at sinkholes that recharge the Meades Quarry Cave system and to suggest that local planners control growth by implementing development buffers around environmentally sensitive areas (South Knoxville Boulevard EIS 2010, pp. 43-44).

Ogden (2005) conducted a dye trace study on the watershed contributing groundwater to

the Berry Cave system in Roane County, Tennessee. As determined by Ogden (2005, p. 4), five first-order streams contribute to surface recharge of the Berry Cave system. The recharge area was delineated following two dye traces and is comprised of first-order streams that join the main sinking stream at the cave entrance (Ogden 2005, p. 19). The cave stream is believed to receive year-round input from Lawhon and Schommen springs and empties into a spring on the bank of the Watts Bar Lake (Ogden 2005, p. 4). Water quality results indicated normal conductivity levels and low nitrate levels despite extensive cattle grazing within the recharge area. Sulfate, iron, and phosphate levels were also determined to be low, and pH measured at approximately 7.0 at the time of sampling (Ogden 2005, p. 14). According to The Nature Conservancy (2006, Table 2), current threats to Berry Cave include bacteriological loading in the form of fecal coliform from agricultural runoff, disruption of organic flow due to a lack of cattle exclusion, and erosion/sedimentation caused by cattle access to streams that feed into Berry Cave. However, water quality tests conducted in conjunction with the dye trace study indicate that the system is uncontaminated (Ogden 2005, p. 14), and we have no evidence to suggest that any of these impacts are occurring.

The Federal Government's Clean Water Act (CWA) of 1972 (33 U.S.C. 1251 et seq.) sets standards for releasing pollutants into waters of the United States and regulates water quality standards for surface water. Projects that could impact waters having a "significant nexus" to "navigable waters" are required under this law to apply for a National Pollutant Discharge Elimination System (NPDES) permit prior to construction. The Tennessee Department of Environment and Conservation's Division of Water Pollution Control under the Tennessee Water Quality Control Act requires that the applicant perform compensatory mitigation for loss of linear feet of stream or pay into the Tennessee Stream Mitigation Program. While these laws

are designed to protect water quality, impacts from projects are seldom viewed cumulatively, and compensatory mitigation might not involve reparation activities within the affected watershed. Therefore, degradation of habitat for this species is ongoing, and these laws have not been adequate to fully protect this species from water quality impacts associated with increasing development and urbanization.

In summary, Knox County populations are believed to be highly susceptible to habitat degradation from surrounding development (Miller and Niemiller 2008, p. 13). Residential pollutants, increased silt load from construction activities, and runoff of impervious surfaces associated with urban development are ongoing threats to Berry Cave salamander populations in six caves within metropolitan Knoxville. Three of these populations (Meades Quarry, Meades River, and Fifth caves) are part of the larger Meades Quarry Cave system (Miller, pers. comm., 2010) and could be impacted by development of the proposed James White Parkway Project. Past quarrying activities have resulted in high water pH levels within the Meades Quarry Cave and observations of Berry Cave salamanders with chemical burns. Residential housing developments and road construction are occurring in proximity to Aycock Spring and Christian caves (Miller and Niemiller 2008, p. 13). The Mudflats Cave population is believed to be impacted by a nearby housing development and associated water quality impacts (Miller and Niemiller 2008, p. 13). Water samples indicate that Berry Cave is uncontaminated, and cattle access to streams that recharge the system is evidently not impacting the cave system at this time. However, because of the overall vulnerability of the Berry Cave salamander to impacts associated with urbanization and the extent of overlap between current and projected urbanization and Berry Cave salamander populations, we find the present or threatened destruction, modification, or curtailment of its habitat or range to be a significant threat of

moderate magnitude. Further, the information available to us at this time does not indicate that the magnitude or imminence of this threat is likely to be appreciably reduced in the foreseeable future.

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

Most caves containing Berry Cave salamander populations are privately owned, and visits to some of these caves are unsupervised (Miller and Niemiller 2006, p. 24; Niemiller *et al*. 2010b, p. 12), making the Berry Cave salamander vulnerable to recreational harvest. The most robust Berry Cave salamander populations occur in caves that are either gated or owned by conscientious landowners who monitor access, but the threat of harvesting individuals for the pet trade exists in unmonitored caves (M. Niemiller, pers. comm., 2010). Because populations are considered to be small (Miller and Niemiller 2006, p. 15) and reproductive rates are low, unregulated take of individuals could severely deplete breeding populations of Berry Cave salamanders (Niemiller *et al*. 2010b, p. 12). However, we currently have no evidence to suggest that recreational harvesting of Berry Cave salamander populations is occurring.

The Tennessee Cave salamander is listed as Threatened by the State of Tennessee. This listing provides protection for the Berry Cave salamander as a State-classified subspecies of the Tennessee cave salamander under the Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974 (Tennessee Code Annotated sections 70-8-101-112). Take of a listed species, as defined by this State legislation, is unlawful, and potential collectors are required to possess a State permit. However, many cave visitors and recreational cavers are likely unaware of the protected status of the Berry Cave salamander. Moreover, Miller and Niemiller (2005, p. 93) find that most recreational cavers are unable to properly identify

salamander species, and even biologists misidentify larval spring salamanders as Tennessee cave salamanders. Thus, the State listing of the Berry Cave salamander as a subspecies of the Threatened Tennessee cave salamander may not alone provide adequate protection for this species.

In summary, although the potential for harvesting of individuals exists in unmonitored caves, we have no information to indicate that collection for the pet trade or other purposes is occurring. Furthermore, the Tennessee State law discussed above is designed to provide State protection to the Berry Cave salamander as a classified subspecies of the Tennessee cave salamander, although a general lack of public knowledge with regard to State wildlife laws and common species misidentification may limit the State law's protectiveness. Because we have no evidence to believe otherwise, we find that overutilization for commercial, recreational, scientific, or educational purposes is a low and nonimminent threat.

Factor C. Disease or Predation

In a June 20, 2005, email to the Service, Dr. Brian Miller of Middle Tennessee State University communicated concerns for parasitic infections in *Gyrinophilus* species in two caves. Miller and Niemiller (2006, p. 24) observed pervasive, raised nodules on the skin of all Berry Cave salamanders collected within the Berry Cave system. The population appeared otherwise healthy, and no individuals were taken for analysis (Miller and Niemiller 2006, p. 15). Crayfish are believed to be predators of the Tennessee cave salamander complex and were numerous in caves where injured individuals were found, but Miller and Niemiller (2006, p. 23) did not consider crayfish predation to be a serious threat to cave salamanders.

In summary, we are uncertain as to whether disease or predation constitutes a

demonstrable threat to Berry Cave salamander populations at this time. Because of the otherwise healthy appearance of individuals, we find disease or predation to be a minimal threat of low magnitude.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

The Berry Cave salamander and its habitats are afforded some protection from water quality and habitat degradation under the Federal Clean Water Act and the Tennessee Department of Environment and Conservation's Division of Water Pollution Control under the Tennessee Water Quality Control Act. However, as demonstrated under Factor A, degradation of habitat for this species is ongoing despite the protection afforded by these laws. These laws alone have not been adequate to fully protect this species from water quality impacts associated with increasing development and urbanization.

The Tennessee Cave salamander was listed as Threatened by the State of Tennessee in 1994. This listing provided protection for the Berry Cave salamander as a classified subspecies of the Tennessee cave salamander. Under the Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974 (Tennessee Code Annotated sections 70-8-101-112), "[I]t is unlawful for any person to take, attempt to take, possess, transport, export, process, sell or offer for sale or ship nongame wildlife, or for any common or contract carrier knowingly to transport or receive for shipment nongame wildlife." Further, regulations included in the Tennessee Wildlife Resources Commission Proclamation 00-15 Endangered or Threatened Species state the following: "Except as provided for in Tennessee Code Annotated, Section 70-8-106 (d) and (e), it shall be unlawful for any person to take, harass, or destroy wildlife listed as threatened or endangered or otherwise to violate terms of Section 70-8-105 (c) or to destroy

knowingly the habitat of such species without due consideration of alternatives for the welfare of the species listed in (1) of this proclamation, or (2) the United States list of Endangered fauna." Under these regulations, potential collectors of this species are required to have a State collection permit, although the effectiveness of this permit is uncertain (see Factor B analysis above).

In summary, degradation of Berry Cave salamander habitat is ongoing despite the protection afforded by State and Federal laws and corresponding regulations. Despite these laws, development and associated pollution continue to adversely affect the species. Because of the vulnerability of Knox County populations of the Berry Cave salamander and the imminence of these threats, we find the inadequacy of existing regulatory mechanisms to be a significant threat of high magnitude. Further, the information available to us at this time does not indicate that the magnitude or imminence of this threat is likely to be appreciably reduced in the foreseeable future.

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

According to M. Niemiller (pers. comm., July 2010), molecular and morphological evidence exists of hybridization between the Berry Cave salamander and the spring salamander in Meades Quarry Cave. Hybridization between the two species may be a natural threat to pure Berry Cave salamander populations as it affects the genetic integrity of the species. Studies are underway by Ben Fitzpatrick (Assistant Professor, Department of Ecology and Evolutionary Biology, University of Tennessee) and Niemiller to determine the extent of hybridization that is occurring between taxa in this system. It is debatable as to whether this phenomenon is anthropogenically induced or a natural process (M. Niemiller, pers. comm., July 2010). Currently, the Berry Cave salamander maintains its species distinctiveness in spite of ongoing

interbreeding and range overlap with spring salamanders (Niemiller *et al.* 2010b, p. 5), and hybridization is only known to be occurring in Meades Quarry Cave (M. Niemiller, pers. comm., July 2010). Research indicates that there is low gene flow between the two species (Niemiller *et al.* 2008, p. 2), and Berry Cave salamanders and spring salamanders are infrequently observed in the same cave systems (Niemiller *et al.* 2010b, p. 13).

The Intergovernmental Panel on Climate Change (IPCC) concluded that evidence of warming of the climate system is unequivocal (IPCC 2007a, p. 30). Numerous long-term climate changes have been observed, including changes in arctic temperatures and ice, and widespread changes in precipitation amounts, ocean salinity, wind patterns, and aspects of extreme weather including droughts, heavy precipitation, heat waves, and the intensity of tropical cyclones (IPCC 2007b, p. 7). While continued change is certain, the magnitude and rate of change is unknown in many cases. Species that are dependent on specialized habitat types, that are limited in distribution, or that have become restricted to the extreme periphery of their range will be most susceptible to the impacts of climate change. As previously mentioned, the Berry Cave salamander is known only from the Appalachian Valley and Ridge Province in East Tennessee within the Upper Tennessee River and Clinch River drainages in Knox, Roane, Meigs, and McMinn Counties, Tennessee. The species is believed to be confined to subterranean aquatic environments (Niemiller *et al.* 2010, p. 5), and has been documented in only eight caves and a roadside observation where individuals were presumably washed from a cave. Western dispersal is prohibited by a fault that occurs along the west of the East Tennessee Aquifer System (Miller and Niemiller 2008, p. 10). Data on recent trends and predicted changes for the Southeast United States (Karl *et al.* 2009, pp. 111-116) provide some insight for evaluating the threat of climate change to the species. Since 1970, the average annual temperature of the region has

increased by about 2 degrees Fahrenheit (^{o}F) (1.1^{o} Celsius (^{o}C)), with the greatest increases occurring during winter months. The geographic extent of areas in the Southeast region affected by moderate to severe drought has increased by 12 percent in the spring and 14 percent in the summer over the past three decades (Karl *et al.* 2009, p. 111). These trends are expected to increase.

Rates of warming are predicted to more than double in comparison to what the Southeast has experienced since 1975, with the greatest increases projected for summer months. Depending on the emissions scenario used for modeling change, average temperatures are expected to increase by 4.5 ^{o}F to 9 ^{o}F (2.5 ^{o}C to 5 ^{o}C) by the 2080s (Karl *et al.* 2009, p. 111). While there is considerable variability in rainfall predictions throughout the region, increases in evaporation of moisture from soils and loss of water by plants in response to warmer temperatures are expected to contribute to increased frequency, duration, and intensity of droughts (Karl *et al.* 2009, p. 112). If these rainfall predictions are accurate, streams that feed karst systems could experience significant decreases in flow volumes, lower dissolved oxygen content, and warmer temperatures. These variables could influence the amount and quality of organic input to cave systems essential in sustaining healthy prey populations for the Berry Cave salamander.

Application of continental-scale climate change models to regional landscapes and even more local or "step-down'' models projecting habitat potential based on climatic factors, is informative but contains a high level of uncertainty when predicting future effects to individual species and their habitats. This is due to a variety of factors including regional weather patterns, local physiographic conditions, life stages of individual species, generation time of species, and species' reactions to changing carbon dioxide levels. Therefore, the usefulness of models in

assessing the threat of climate change on the Berry Cave salamander within its range is also limited. Due to variety of factors, e.g., variability surrounding regional rainfall predictions and how these precipitation events would affect the species, uncertainty remains regarding whether cave systems would maintain current ambient temperatures and how climate changes might affect inflow of organic detritus and availability of invertebrate food sources; we are therefore unable to confidently identify climate change threats (or their magnitude) to the Berry Cave salamander. We have no evidence that climatic changes observed to date have had any adverse impact on the species or its habitat.

In summary, hybridization is occurring between the Berry Cave salamander and the spring salamander in Meades Quarry Cave (Niemiller *et al.* 2010b, p. 5), although there appears to be low gene flow between the two species (Niemiller *et al.* 2008, p. 2). Because Meades Quarry Cave is still believed to house the healthiest population (Niemiller and Miller 2010, p. 3) and hybridization is not known to be impacting Berry Cave salamander populations in other caves, we find this natural or manmade factor affecting the species' continued existence to be a threat of low magnitude. Although climate change may affect the species in the future, we lack adequate information to make reasonable predictions regarding the extent of the impact at this time. The available information does not indicate that climate change is a significant threat to the Berry Cave salamander, or that it is likely to become a significant threat in the foreseeable future.

Finding

As required by the Act, we conducted a review of the status of the species and considered the five factors in assessing whether the Berry Cave salamander is in danger of extinction or

likely to become so within the foreseeable future throughout all or a significant portion of its range. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by the Berry Cave salamander. We reviewed the petition, information available in our files, and other available published and unpublished information, and we consulted with species and habitat experts and other Federal and State agencies.

This status review identified threats to the Berry Cave salamander attributable to Factors A, B, C, D, and E (see Table 1 below). However, ongoing threats are from habitat modification, inadequacy of existing regulatory mechanisms, and other natural and manmade factors (Factors A, D, and E). These are in the form of lye leaching in the Meades Quarry Cave as a result of past quarrying activities, a proposed roadway with potential to impact the recharge area for the Meades Quarry Cave system, urban development in Knox County, water quality impacts despite existing State and Federal laws, and hybridization between spring salamanders and Berry Cave salamanders in Meades Quarry Cave. Because the available evidence would suggest that the Berry Cave salamander exists in relatively low population densities (Miller and Niemiller 2006, p. 15) and distribution is confined to subterranean waters within the Tennessee River and Clinch River watersheds (Miller and Niemiller 2008, p. 10), the species cannot readily tolerate losses of populations or even many individuals.

TABLE 1. Summary of Berry Cave salamander status and threats by documented population.

Population Locality	**Current Status**	**Regional/Local Threats**
Aycock Spring Cave (Knox County, TN)	Extant	Factors A, B, and D: urban development, potential for unregulated take, and inadequacy of existing regulatory mechanisms (ongoing threat)
Berry Cave (Roane County, TN)	Extant	Factor C: parasites (perceived threat)
Blythe Ferry Cave (Meigs County, TN)	Unknown (last obs. 1975)	Unknown
Christian Cave (Knox County, TN)	Extant	Factors A, B, and D: urban development, potential for unregulated take, and inadequacy of existing regulatory mechanisms (ongoing threat)

Fifth Cave (Knox County, TN)	Extant	Factors A and D: proposed roadway, urban development, and inadequacy of existing regulatory mechanisms (ongoing threat)
Meades River Cave (Knox County, TN)	Extant	Factors A and D: proposed roadway, urban development, and inadequacy of existing regulatory mechanisms (ongoing threat)
Meades Quarry Cave (Knox County, TN)	Extant	Factors A, D, and E: proposed roadway, urban development, inadequacy of existing regulatory mechanisms, lye leaching, and other natural and manmade factors (ongoing threat)
Mudflats Cave (Knox County, TN)	Extant	Factors A, B, and D: urban development, potential for unregulated take, and inadequacy of existing regulatory mechanisms (ongoing threat)
Roadside ditch (McMinn County, TN)	Unknown (last obs. 1953)	Factors A and D: urban development and inadequacy of existing regulatory mechanisms (ongoing threat if the population exists)

Development is largely responsible for pollution entering cave systems where Berry Cave salamanders occur and could additionally cause fluctuations in organic matter input and hydrologic levels as a result of sediment deposition, higher temperatures in streams that recharge systems when trees are removed from riparian zones (forested land along streams and rivers), and an increase in toxic runoff. The proposed James White Parkway project has the potential to directly impact Berry Cave salamander populations within the Meades Quarry Cave system (Meades Quarry, Meades River, and Fifth caves) by increased siltation from construction, creation or closures of cave openings by blasting activities that would affect organic input into the system, and toxic roadway runoff into sinkholes that recharge the Meades Quarry Cave system. We have determined that these factors could lead to a decline in Berry Cave salamander abundance because the majority of documented populations are located within the urban growth boundary of metropolitan Knoxville, and Meades Quarry Cave houses the largest population known.

On the basis of the best scientific and commercial information available, we find that the petitioned action, to list the Berry Cave salamander under the Act is warranted. We will make a determination on the status of the species as endangered or threatened when we prepare a

proposed listing determination. However, as explained in more detail below, an immediate proposal of a regulation implementing this action is precluded by higher priority listing actions, and progress is being made to add or remove qualified species from the Lists of Endangered and Threatened Wildlife and Plants.

Emergency Listing

We reviewed the available information to determine if the existing and foreseeable threats render the species at risk of extinction now such that issuing an emergency regulation temporarily listing the species in accordance with section 4(b)(7) of the Act is warranted. We determined that issuing an emergency regulation temporarily listing the species is not warranted at this time because recent studies have documented two new populations of Berry Cave salamanders (Aycock Spring and Christian caves) and have resulted in observations of robust populations at historical sites previously reported to be in decline (Miller and Niemiller 2008, p. 1). Furthermore, the threat to Berry Cave salamander populations from construction of the James White Parkway is being partially addressed by TDOT's proposal for a fully access-controlled facility and the design of alignment alternatives to purposefully avoid or minimize impacts to sinkholes that recharge the Meades Quarry Cave system (South Knoxville Boulevard EIS 2010, pp. 10, 43). However, if at any time we determine that issuing an emergency regulation temporarily listing the Berry Cave salamander is warranted, we will initiate the action at that time.

Listing Priority Number

The Service adopted guidelines on September 21, 1983 (48 FR 43098) to establish a rational system for utilizing available resources for the highest priority species when adding

species to the Lists of Endangered or Threatened Wildlife and Plants or eclassifying species listed as threatened to endangered status. These guidelines, titled "Endangered and Threatened Species Listing and Recovery Priority Guidelines," address the immediacy and magnitude of threats, and the level of taxonomic distinctiveness by assigning priority in descending order to monotypic genera (genus with one species), full species, and subspecies (or equivalently, distinct population segments of vertebrates). Using these guidelines, we assign each candidate a listing priority number (LPN) of 1 to 12, depending on the magnitude of the threats (high or moderate to low), immediacy of threats (imminent or nonimminent), and taxonomic status of the species. The lower the LPN, the higher the listing priority (that is, a species with an LPN of 1 would have the highest listing priority). We assigned the Berry Cave salamander an LPNof 8 based on our finding that the species faces threats that are of moderate magnitude and are imminent. These threats include the present or threatened destruction, modification, or curtailment of its habitat or range, and the inadequacy of existing regulatory mechanisms. Our rationale for assigning the Berry Cave salamander a LPN of 8 is outlined below.

Under the Service's LPN guidelines, the magnitude of threat is the first criterion we look at when establishing a listing priority. The guidelines indicate that species with the highest magnitude of threat are those species facing the greatest threats to their continued existence. These species receive the highest listing priority. We consider the threats facing the Berry Cave salamander to be moderate in magnitude. Several of the threats to the species (roadway construction, development in proximity to populations, and impacts to water quality) occur across the majority of the species' range. Due to its limited geographic range within subterranean waters of the Tennessee and Clinch River systems, impacts to these systems could have a detrimental effect on Berry Cave salamander populations. Habitat degradation associated

with residential, business, and commercial development has high potential to adversely affect Berry Cave salamander populations by impacting water quality. While water quality regulations such as the Clean Water Act and the Tennessee Water Quality Control Act are designed to protect aquatic systems, stream mitigation practices only provide for loss of linear feet of stream and do not consider water quality concerns or impacts to affected species. Six of the eight caves where the species has been documented are within Knoxville's urban boundary (Niemiller and Miller 2010, p. 2) and are highly susceptible to future development activities. While the threats facing the species are numerous and in some cases widespread, we decided they were of moderate, rather than high, magnitude because the salamander still occurs in several different cave systems, and existing populations appear stable. Nonetheless, intensification of these threats could threaten the long-term viability of the species.

Under our LPN guidelines, the second criterion we consider in assigning a listing priority is the immediacy of threats. This criterion is intended to ensure that the species that face actual, identifiable threats are given priority over those for which threats are only potential or for those that are intrinsically vulnerable but are not known to be presently facing such threats. The threats are imminent because we have factual information that the threats are identifiable and on-going, and that they often overlap or occur throughout most of the species' range. These actual, identifiable threats are covered in detail under the discussion of Factors A and D of this finding and currently include chronic lye leaching in the Meades Quarry Cave due to past quarrying activities, highway development and urban growth in Knox County, and water quality impacts despite existing State and Federal laws.

The third criterion in our LPN guidelines is intended to devote resources to those species representing highly distinctive or isolated gene pools as reflected by taxonomy. The Berry Cave

salamander is a valid taxon at the species level, and therefore receives a higher priority than subspecies, but a lower priority than species in a monotypic genus.

In summary, the Berry Cave salamander faces imminent threats of moderate magnitude, and is a valid taxon at the species level. Thus, in accordance with our LPN guidelines, we have assigned the Berry Cave salamander an LPN of 8.

We will continue to monitor the threats to, and status of, the Berry Cave salamander on an annual basis, and should the magnitude or the imminence of the threats change, we will revisit our assessment of the LPN.

Work on a proposed listing determination for the Berry Cave salamander is precluded by work on higher priority listing actions with absolute statutory, court-ordered, or court-approved deadlines and on final listing determinations for those species that were proposed for listing with funds from Fiscal Year 2011. This work includes all the actions listed in the tables below under expeditious progress.

Preclusion and Expeditious Progress

Preclusion is a function of the listing priority of a species in relation to the resources that are available and the cost and relative priority of competing demands for those resources. Thus, in any given fiscal year (FY), multiple factors dictate whether it will be possible to undertake work on a listing proposal regulation or whether promulgation of such a proposal is precluded by higher-priority listing actions.

The resources available for listing actions are determined through the annual Congressional appropriations process. The appropriation for the Listing Program is available to support work involving the following listing actions: Proposed and final listing rules; 90-day and 12-month findings on petitions to add species to the Lists of Endangered and Threatened

Wildlife and Plants (Lists) or to change the status of a species from threatened to endangered; annual "resubmitted" petition findings on prior warranted-but-precluded petition findings as required under section 4(b)(3)(C)(i) of the Act; critical habitat petition findings; proposed and final rules designating critical habitat; and litigation-related, administrative, and program-management functions (including preparing and allocating budgets, responding to Congressional and public inquiries, and conducting public outreach regarding listing and critical habitat). The work involved in preparing various listing documents can be extensive and may include, but is not limited to: Gathering and assessing the best scientific and commercial data available and conducting analyses used as the basis for our decisions; writing and publishing documents; and obtaining, reviewing, and evaluating public comments and peer review comments on proposed rules and incorporating relevant information into final rules. The number of listing actions that we can undertake in a given year also is influenced by the complexity of those listing actions; that is, more complex actions generally are more costly. The median cost for preparing and publishing a 90-day finding is $39,276; for a 12-month finding, $100,690; for a proposed rule with critical habitat, $345,000; and for a final listing rule with critical habitat, $305,000.

We cannot spend more than is appropriated for the Listing Program without violating the Anti-Deficiency Act (see 31 U.S.C. 1341(a)(1)(A)). In addition, in FY 1998 and for each fiscal year since then, Congress has placed a statutory cap on funds that may be expended for the Listing Program, equal to the amount expressly appropriated for that purpose in that fiscal year. This cap was designed to prevent funds appropriated for other functions under the Act (for example, recovery funds for removing species from the Lists), or for other Service programs, from being used for Listing Program actions (see House Report 105-163, 105th Congress, 1st Session, July 1, 1997).

Since FY 2002, the Service's budget has included a critical habitat subcap to ensure that some funds are available for other work in the Listing Program ("The critical habitat designation subcap will ensure that some funding is available to address other listing activities" (House Report No. 107 - 103, 107th Congress, 1st Session, June 19, 2001)). In FY 2002 and each year until FY 2006, the Service has had to use virtually the entire critical habitat subcap to address court-mandated designations of critical habitat, and consequently none of the critical habitat subcap funds have been available for other listing activities. In some FYs since 2006, we have been able to use some of the critical habitat subcap funds to fund proposed listing determinations for high-priority candidate species. In other FYs, while we were unable to use any of the critical habitat subcap funds to fund proposed listing determinations, we did use some of this money to fund the critical habitat portion of some proposed listing determinations so that the proposed listing determination and proposed critical habitat designation could be combined into one rule, thereby being more efficient in our work. At this time, for FY 2011, we do not know if we will be able to use some of the critical habitat subcap funds to fund proposed listing determinations.

We make our determinations of preclusion on a nationwide basis to ensure that the species most in need of listing will be addressed first and also because we allocate our listing budget on a nationwide basis. Through the listing cap, the critical habitat subcap, and the amount of funds needed to address court-mandated critical habitat designations, Congress and the courts have in effect determined the amount of money available for other listing activities nationwide. Therefore, the funds in the listing cap, other than those needed to address court-mandated critical habitat for already listed species, set the limits on our determinations of preclusion and expeditious progress.

Congress identified the availability of resources as the only basis for deferring the initiation of a rulemaking that is warranted. The Conference Report accompanying Pub. L. 97-304 (Endangered Species Act Amendments of 1982), which established the current statutory deadlines and the warranted-but-precluded finding, states that the amendments were "not intended to allow the Secretary to delay commencing the rulemaking process for any reason other than that the existence of pending or imminent proposals to list species subject to a greater degree of threat would make allocation of resources to such a petition [that is, for a lower-ranking species] unwise." Although that statement appeared to refer specifically to the "to the maximum extent practicable" limitation on the 90-day deadline for making a "substantial information" finding, that finding is made at the point when the Service is deciding whether or not to commence a status review that will determine the degree of threats facing the species, and therefore the analysis underlying the statement is more relevant to the use of the warranted-but-precluded finding, which is made when the Service has already determined the degree of threats facing the species and is deciding whether or not to commence a rulemaking.

In FY 2011, on March 2, 2011, Congress passed a continuing resolution which provides funding at the FY 2010 enacted level through March 18, 2011. Until Congress appropriates funds for FY 2011 at a different level, we will fund listing work based on the FY 2010 amount. Thus, at this time in FY 2011, the Service anticipates an appropriation of $22,103,000 for the listing program based on FY 2010 appropriations. Of that, the Service anticipates needing to dedicate $11,632,000 for determinations of critical habitat for already listed species. Also $500,000 is appropriated for foreign species listings under the Act. The Service thus has $9,971,000 available to fund work in the following categories: compliance with court orders and

court-approved settlement agreements requiring that petition findings or listing determinations be completed by a specific date; section 4 (of the Act) listing actions with absolute statutory deadlines; essential litigation-related, administrative, and listing program-management functions; and high-priority listing actions for some of our candidate species. In FY 2010, the Service received many new petitions and a single petition to list 404 species. The receipt of petitions for a large number of species is consuming the Service's listing funding that is not dedicated to meeting court-ordered commitments. Absent some ability to balance effort among listing duties under existing funding levels, it is unlikely that the Service will be able to initiate any new listing determination for candidate species in FY 2011.

In 2009, the responsibility for listing foreign species under the Act was transferred from the Division of Scientific Authority, International Affairs Program, to the Endangered Species Program. Therefore, starting in FY 2010, we used a portion of our funding to work on the actions described above for listing actions related to foreign species. In FY 2011, we anticipate using $1,500,000 for work on listing actions for foreign species which reduces funding available for domestic listing actions; however, currently only $500,000 has been allocated for this function. Although there are no foreign species issues included in our high-priority listing actions at this time, many actions have statutory or court-approved settlement deadlines, thus increasing their priority. The budget allocations for each specific listing action are identified in the Service's FY 2011 Allocation Table (part of our record).

For the above reasons, funding a proposed listing determination for the Berry Cave Salamander, which has an LPN of 8, is precluded by court-ordered and court-approved settlement agreements, listing actions with absolute statutory deadlines, and work on proposed

listing determinations for those candidate species with a higher listing priority (i.e., candidate species with LPNs of 1 to 7).

Based on our September 21, 1983, guidelines for assigning an LPN for each candidate species (48 FR 43098), we have a significant number of species with a LPN of 2. Using these guidelines, we assign each candidate an LPN of 1 to 12, depending on the magnitude of threats (high or moderate to low), immediacy of threats (imminent or nonimminent), and taxonomic status of the species (in order of priority: monotypic genus (a species that is the sole member of a genus); species; or part of a species (subspecies, distinct population segment, or significant portion of the range)). The lower the listing priority number, the higher the listing priority (that is, a species with an LPN of 1 would have the highest listing priority).

Because of the large number of high-priority species, we have further ranked the candidate species with an LPN of 2 by using the following extinction-risk type criteria: International Union for the Conservation of Nature and Natural Resources (IUCN) Red list status/rank, Heritage rank (provided by NatureServe), Heritage threat rank (provided by NatureServe), and species currently with fewer than 50 individuals, or 4 or fewer populations. Those species with the highest IUCN rank (critically endangered), the highest Heritage rank (G1), the highest Heritage threat rank (substantial, imminent threats), and currently with fewer than 50 individuals, or fewer than 4 populations, originally comprised a group of approximately 40 candidate species ("Top 40"). These 40 candidate species have had the highest priority to receive funding to work on a proposed listing determination. As we work on proposed and final listing rules for those 40 candidates, we apply the ranking criteria to the next group of candidates with an LPN of 2 and 3 to determine the next set of highest priority candidate species. Finally, proposed rules for reclassification of threatened species to endangered are lower priority,

because as listed species, they are already afforded the protection of the Act and implementing regulations. However, for efficiency reasons, we may choose to work on a proposed rule to reclassify a species to endangered if we can combine this with work that is subject to a court-determined deadline.

With our workload so much bigger than the amount of funds we have to accomplish it, it is important that we be as efficient as possible in our listing process. Therefore, as we work on proposed rules for the highest priority species in the next several years, we are preparing multi-species proposals when appropriate, and these may include species with lower priority if they overlap geographically or have the same threats as a species with an LPN of 2. In addition, we take into consideration the availability of staff resources when we determine which high-priority species will receive funding to minimize the amount of time and resources required to complete each listing action.

As explained above, a determination that listing is warranted but precluded must also demonstrate that expeditious progress is being made to add and remove qualified species to and from the Lists of Endangered and Threatened Wildlife and Plants. As with our "precluded" finding, the evaluation of whether progress in adding qualified species to the Lists has been expeditious is a function of the resources available for listing and the competing demands for those funds. (Although we do not discuss it in detail here, we are also making expeditious progress in removing species from the list under the Recovery program in light of the resource available for delisting, which is funded by a separate line item in the budget of the Endangered Species Program. So far during FY 2011, we have completed one delisting rule.) Given the limited resources available for listing, we find that we are making expeditious progress in FY

2011 in the Listing Program. This progress included preparing and publishing the following determinations:

FY 2011 Completed Listing Actions			
Publication Date	Title	Actions	FR Pages
10/6/2010	Endangered Status for the Altamaha Spinymussel and Designation of Critical Habitat	Proposed Listing Endangered	75 FR 61664-61690
10/7/2010	12-month Finding on a Petition to list the Sacramento Splittail as Endangered or Threatened	Notice of 12-month petition finding, Not warranted	75 FR 62070-62095
10/28/2010	Endangered Status and Designation of Critical Habitat for Spikedace and Loach Minnow	Proposed Listing Endangered (uplisting)	75 FR 66481-66552
11/2/2010	90-Day Finding on a Petition to List the Bay Springs Salamander as Endangered	Notice of 90-day Petition Finding, Not substantial	75 FR 67341-67343
11/2/2010	Determination of Endangered Status for the Georgia Pigtoe Mussel, Interrupted Rocksnail, and Rough Hornsnail and Designation of Critical Habitat	Final Listing Endangered	75 FR 67511-67550
11/2/2010	Listing the Rayed Bean and Snuffbox as Endangered	Proposed Listing Endangered	75 FR 67551-67583
11/4/2010	12-Month Finding on a Petition to List Cirsium wrightii (Wright's Marsh Thistle) as Endangered or Threatened	Notice of 12-month petition finding, Warranted but precluded	75 FR 67925-67944
12/14/2010	Endangered Status for Dunes Sagebrush Lizard	Proposed Listing Endangered	75 FR77801-77817
12/14/2010	12-month Finding on a Petition to List the North American Wolverine as Endangered or Threatened	Notice of 12-month petition finding, Warranted but precluded	75 FR 78029-78061

12/14/2010	12-Month Finding on a Petition to List the Sonoran Population of the Desert Tortoise as Endangered or Threatened	Notice of 12-month petition finding, Warranted but precluded	75 FR 78093-78146
12/15/2010	12-Month Finding on a Petition to List *Astragalus microcymbus* and *Astragalus schmolliae* as Endangered or Threatened	Notice of 12-month petition finding, Warranted but precluded	75 FR 78513-78556
12/28/2010	Listing Seven Brazilian Bird Species as Endangered Throughout Their Range	Final Listing Endangered	75 FR 81793-81815
1/4/2011	90-Day Finding on a Petition to List the Red Knot subspecies *Calidris canutus roselaari* as Endangered	Notice of 90-day Petition Finding, Not substantial	76 FR 304-311
1/19/2011	Endangered Status for the Sheepnose and Spectaclecase Mussels	Proposed Listing Endangered	76 FR 3392-3420
2/10/2011	12-Month Finding on a Petition to List the Pacific Walrus as Endangered or Threatened	Notice of 12-month petition finding, Warranted but precluded	76 FR 7634-7679
2/17/2011	90-Day Finding on a Petition To List the Sand Verbena Moth as Endangered or Threatened	Notice of 90-day Petition Finding, Substantial	76 FR 9309-9318
2/22 /2011	Determination of Threatened Status for the New Zealand-Australia Distinct Population Segment of the Southern Rockhopper Penguin	Final Listing Threatened	76 FR 9681-9692
2/22/2011	12-Month Finding on a Petition to List *Solanum conocarpum* (marron bacora) as Endangered	Notice of 12-month petition finding, Warranted but precluded	76 FR 9722-9733
2/23/2011	12-Month Finding on a Petition to List Thorne's Hairstreak Butterfly as Endangered	Notice of 12-month petition finding, Not warranted	76 FR 991-10003
2/23/2011	12-Month Finding on a Petition to List *Astragalus hamiltonii*, *Penstemon flowersii*, *Eriogonum soredium*, *Lepidium ostleri*, and *Trifolium friscanum* as Endangered or Threatened	Notice of 12-month petition finding, Warranted but precluded & Not Warraned	76 FR 10166-10203

2/24/2011	90-Day Finding on a Petition to List the Wild Plains Bison or Each of Four Distinct Population Segments as Threatened	Notice of 90-day Petition Finding, Not substantial	76 FR 10299-10310
2/24/2011	90-Day Finding on a Petition to List the Unsilvered Fritillary Butterfly as Threatened or Endangered	Notice of 90-day Petition Finding, Not substantial	76 FR 10310-10319
3/8/2011	12-Month Finding on a Petition to List the Mt. Charleston Blue Butterfly as Endangered or Threatened	Notice of 12-month petition finding, Warranted but precluded	76 FR 12667-12683
3/8/2011	90-Day Finding on a Petition to List the Texas Kangaroo Rat as Endangered or Threatened	Notice of 90-day Petition Finding, Substantial	76 FR 12683-12690
3/10/2011	Initiation of Status Review for Longfin Smelt	Notice of Status Review	76 FR 13121-31322

Our expeditious progress also includes work on listing actions that we funded in FY 2010 and FY 2011 but have not yet been completed to date. These actions are listed below. Actions in the top section of the table are being conducted under a deadline set by a court. Actions in the middle section of the table are being conducted to meet statutory timelines, that is, timelines required under the Act. Actions in the bottom section of the table are high-priority listing actions. These actions include work primarily on species with an LPN of 2, and, as discussed above, selection of these species is partially based on available staff resources, and when appropriate, include species with a lower priority if they overlap geographically or have the same threats as the species with the high priority. Including these species together in the same proposed rule results in considerable savings in time and funding, when compared to preparing separate proposed rules for each of them in the future.

Actions funded in FY 2010 and FY 2011 but not yet completed	
Species	**Action**
Actions Subject to Court Order/Settlement Agreement	
Mountain plover[4]	Final listing determination
Hermes copper butterfly[3]	12-month petition finding
4 parrot species (military macaw, yellow-billed parrot, red-crowned parrot, scarlet macaw)[5]	12-month petition finding
4 parrot species (blue-headed macaw, great green macaw, grey-cheeked parakeet, hyacinth macaw)[5]	12-month petition finding
4 parrots species (crimson shining parrot, white cockatoo, Philippine cockatoo, yellow-crested cockatoo)[5]	12-month petition finding
Utah prairie dog (uplisting)	90-day petition finding
Actions with Statutory Deadlines	
Casey's june beetle	Final listing determination
6 Birds from Eurasia	Final listing determination
5 Bird species from Colombia and Ecuador	Final listing determination
Queen Charlotte goshawk	Final listing determination
5 species southeast fish (Cumberland darter, rush darter, yellowcheek darter, chucky madtom, and laurel dace)[4]	Final listing determination
Ozark hellbender[4]	Final listing determination
Altamaha spinymussel[3]	Final listing determination
3 Colorado plants (*Ipomopsis polyantha* (Pagosa Skyrocket), *Penstemon debilis* (Parachute Beardtongue), and *Phacelia submutica* (DeBeque Phacelia))[4]	Final listing determination
Salmon crested cockatoo	Final listing determination
6 Birds from Peru &Bolivia	Final listing determination
Loggerhead sea turtle (assist National Marine Fisheries Service)[5]	Final listing determination
2 mussels (rayed bean (LPN = 2), snuffbox No LPN)[5]	Final listing determination

CA golden trout[4]	12-month petition finding
Black-footed albatross	12-month petition finding
Mojave fringe-toed lizard[1]	12-month petition finding
Kokanee – Lake Sammamish population[1]	12-month petition finding
Cactus ferruginous pygmy-owl[1]	12-month petition finding
Northern leopard frog	12-month petition finding
Tehachapi slender salamander	12-month petition finding
Coqui Llanero	12-month petition finding/Proposed listing
Dusky tree vole	12-month petition finding
3 MT invertebrates (meltwater lednian stonefly (*Lednia tumana*), *Oreohelix* sp.3, *Oreohelix* sp. 31) from 206 species petition	12-month petition finding
5 WY plants (*Abronia ammophila*, *Agrostis rossiae*, *Astragalus proimanthus*, *Boechere* (*Arabis*) *pusilla*, *Penstemon gibbensii*) from 206 species petition	12-month petition finding
Leatherside chub (from 206 species petition)	12-month petition finding
Frigid ambersnail (from 206 species petition)[3]	12-month petition finding
Platte River caddisfly (from 206 species petition)[5]	12-month petition finding
Gopher tortoise – eastern population	12-month petition finding
Grand Canyon scorpion (from 475 species petition)	12-month petition finding
Anacroneuria wipukupa (a stonefly from 475 species petition)[4]	12-month petition finding
3 Texas moths (*Ursia furtiva*, *Sphingicampa blanchardi*, *Agapema galbina*) (from 475 species petition)	12-month petition finding
2 Texas shiners (*Cyprinella* sp., *Cyprinella lepida*) (from 475 species petition)	12-month petition finding
3 South Arizona plants (*Erigeron piscaticus*, *Astragalus hypoxylus*,	12-month petition finding

Amoreuxia gonzalezii) (from 475 species petition)	
5 Central Texas mussel species (3 from 475 species petition)	12-month petition finding
14 parrots (foreign species)	12-month petition finding
Berry Cave salamander[1]	12-month petition finding
Striped Newt[1]	12-month petition finding
Fisher – Northern Rocky Mountain Range[1]	12-month petition finding
Mohave Ground Squirrel[1]	12-month petition finding
Puerto Rico Harlequin Butterfly[3]	12-month petition finding
Western gull-billed tern	12-month petition finding
Ozark chinquapin (*Castanea pumila* var. *ozarkensis*)[4]	12-month petition finding
HI yellow-faced bees	12-month petition finding
Giant Palouse earthworm	12-month petition finding
Whitebark pine	12-month petition finding
OK grass pink (*Calopogon oklahomensis*)[1]	12-month petition finding
Ashy storm-petrel[5]	12-month petition finding
Honduran emerald	12-month petition finding
Southeastern pop snowy plover & wintering pop. of piping plover[1]	90-day petition finding
Eagle Lake trout[1]	90-day petition finding
Smooth-billed ani[1]	90-day petition finding
32 Pacific Northwest mollusks species (snails and slugs)[1]	90-day petition finding
42 snail species (Nevada & Utah)	90-day petition finding
Peary caribou	90-day petition finding
Spring Mountains checkerspot butterfly	90-day petition finding
Spring pygmy sunfish	90-day petition finding
Bay skipper	90-day petition finding

Spot-tailed earless lizard	90-day petition finding
Eastern small-footed bat	90-day petition finding
Northern long-eared bat	90-day petition finding
Prairie chub	90-day petition finding
10 species of Great Basin butterfly	90-day petition finding
6 sand dune (scarab) beetles	90-day petition finding
Golden-winged warbler[4]	90-day petition finding
404 Southeast species	90-day petition finding
Franklin's bumble bee[4]	90-day petition finding
2 Idaho snowflies (straight snowfly & Idaho snowfly)[4]	90-day petition finding
American eel[4]	90-day petition finding
Gila monster (Utah population)[4]	90-day petition finding
Arapahoe snowfly[4]	90-day petition finding
Leona's little blue[4]	90-day petition finding
Aztec gilia[5]	90-day petition finding
White-tailed ptarmigan[5]	90-day petition finding
San Bernardino flying squirrel[5]	90-day petition finding
Bicknell's thrush[5]	90-day petition finding
Chimpanzee	90-day petition finding
Sonoran talussnail[5]	90-day petition finding
2 AZ Sky Island plants (*Graptopetalum bartrami* & *Pectis imberbis*)[5]	90-day petition finding
I'iwi[5]	90-day petition finding
High-Priority Listing Actions	
19 Oahu candidate species[2] (16 plants, 3 damselflies) (15 with LPN = 2, 3 with LPN = 3, 1 with LPN =9)	Proposed listing
19 Maui-Nui candidate species[2] (16 plants, 3 tree snails) (14 with LPN = 2, 2 with LPN = 3, 3 with LPN = 8)	Proposed listing
2 Arizona springsnails[2] (*Pyrgulopsis bernadina* (LPN = 2), *Pyrgulopsis*	Proposed listing

trivialis (LPN = 2))	
Chupadera springsnail[2] (*Pyrgulopsis chupaderae* (LPN = 2)	Proposed listing
8 Gulf Coast mussels (southern kidneyshell (LPN = 2), round ebonyshell (LPN = 2), Alabama pearlshell (LPN = 2), southern sandshell (LPN = 5), fuzzy pigtoe (LPN = 5), Choctaw bean (LPN = 5), narrow pigtoe (LPN = 5), and tapered pigtoe (LPN = 11))[4]	Proposed listing
Umtanum buckwheat (LPN = 2) and white bluffs bladderpod (LPN = 9)[4]	Proposed listing
Grotto sculpin (LPN = 2)[4]	Proposed listing
2 Arkansas mussels (Neosho mucket (LPN =2) & Rabbitsfoot (LPN = 9))[4]	Proposed listing
Diamond darter (LPN = 2)[4]	Proposed listing
Gunnison sage-grouse (LPN =2)[4]	Proposed listing
Coral Pink Sand Dunes Tiger Beetle (LPN = 2)[5]	Proposed listing
Miami blue (LPN = 3)[3]	Proposed listing
Lesser prairie chicken (LPN = 2)	Proposed listing
4 Texas salamanders (Austin blind salamander (LPN = 2), Salado salamander (LPN = 2), Georgetown salamander (LPN = 8), Jollyville Plateau (LPN = 8))[3]	Proposed listing
5 SW aquatics (Gonzales Spring Snail (LPN = 2), Diamond Y springsnail (LPN =2), Phantom springsnail (LPN = 2), Phantom Cave snail (LPN = 2), Diminutive amphipod (LPN = 2))[3]	Proposed listing
2 Texas plants (Texas golden gladecress (*Leavenworthia texana*) (LPN = 2), Neches River rose-mallow (*Hibiscus dasycalyx*) (LPN = 2))[3]	Proposed listing
4 AZ plants (Acuna cactus (*Echinomastus erectocentrus* var. *acunensis*) (LPN = 3), Fickeisen plains cactus (*Pediocactus peeblesianus fickeiseniae*) (LPN = 3), Lemmon fleabane (*Erigeron lemmonii*) (LPN = 8), Gierisch mallow (*Sphaeralcea gierischii*) (LPN =2))[5]	Proposed listing

FL bonneted bat (LPN =2)[3]	Proposed listing
3 Southern FL plants (Florida semaphore cactus (*Consolea corallicola*) (LPN = 2), shellmound applecactus (*Harrisia* (=*Cereus*) *aboriginum* (=*gracilis*)) (LPN = 2), Cape Sable thoroughwort (*Chromolaena frustrata*) (LPN = 2))[5]	Proposed listing
21 Big Island (HI) species[5] (includes 8 candidate species – 5 plants & 3 animals; 4 with LPN = 2, 1 with LPN = 3, 1 with LPN = 4, 2 with LPN = 8)	Proposed listing
12 Puget Sound prairie species (9 subspecies of pocket gopher (*Thomomys mazama* ssp.) (LPN =3), streaked horned lark (LPN = 3), Taylor's checkerspot (LPN = 3), Mardon skipper (LPN = 8))[3]	Proposed listing
2 TN River mussels (fluted kidneyshell (LPN = 2), slabside pearlymussel (LPN = 2)[5]	Proposed listing
Jemez Mountain salamander (LPN = 2)[5]	Proposed listing

[1] Funds for listing actions for these species were provided in previous FYs.

[2] Although funds for these high-priority listing actions were provided in FY 2008 or 2009, due to the complexity of these actions and competing priorities, these actions are still being developed.

[3]Partially funded with FY 2010 funds and FY 2011 funds.

[4] Funded with FY 2010 funds.

[5]Funded with FY 2011 funds.

We have endeavored to make our listing actions as efficient and timely as possible, given the requirements of the relevant law and regulations, and constraints relating to workload and personnel. We are continually considering ways to streamline processes or achieve economies of scale, such as by batching related actions together. Given our limited budget for implementing section 4 of the Act, these actions described above collectively constitute expeditious progress.

The Berry Cave salamander will be added to the list of candidate species upon publication of this 12-month finding. We will continue to monitor the status of this species as

new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

We intend that any proposed listing action for the Berry Cave salamander will be as accurate as possible. Therefore, we will continue to accept additional information and comments from all concerned governmental agencies, the scientific community, industry, or any other interested party concerning this finding

References Cited

A complete list of references cited is available on the Internet at *http://www.regulations.gov* and upon request from the Tennessee Ecological Services Field Office (see **ADDRESSES** section).

Authors

The primary authors of this notice are the staff members of the Tennessee Ecological Services Field Office.

Authority

The authority for this section is section 4 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.).

Dated: March 8, 2011

/s/ Rowan W. Gould

Acting Director, Fish and Wildlife Service

Billing Code 4310-55-P

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