CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC AND COMMON NAME:

Pseudanophthalmus inexpectatus Barr, Surprising cave beetle

LEAD REGION: 4

INFORMATION CURRENT AS OF: February 26, 2003

STATUS/ACTION (Check all that apply):
___ New candidates
_X_ Continuing candidate
_X_ Non-petitioned
___ Petitioned - Date petition received: ___
____ 90-day positive - FR date: ___
____ 12-month warranted but precluded - FR date: ___
____ Is the petition requesting a reclassification of a listed species?
_X_ Listing priority change
Former LP: 5
New LP: 11
Latest date species first became a Candidate: October 30, 2001
___ Candidate removal: Former LP: ___ (Check only one reason)
___ A - Taxon more abundant or widespread than previously believed or not subject to a degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
___ F - Range is no longer a U.S. territory.
___ M - Taxon mistakenly included in past notice of review.
___ N - Taxon may not meet the Act=s definition of “species.”
___ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Insects - Carabidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Kentucky

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Kentucky

LEAD REGION CONTACT (Name, phone number): Richard Gooch, 404/679-7124

LEAD FIELD OFFICE CONTACT (Office, name, phone number): Asheville, North Carolina Field Office, Robert R. Currie, 828/258-3939, extension 224

SUPPORT FIELD OFFICE(S): Cookeville, Tennessee Field Office; Frankfort, Kentucky Field Office

BIOLOGICAL INFORMATION (Describe habitat, historic vs. current range, historic vs. current population estimates (# populations, #individuals/population), etc.):

Species Description

Cave beetles in the genus Pseudanophthalmus are fairly small, eyeless, reddish-brown insects. Like most other insects, they have six legs and a body that consists of a head, thorax, and abdomen. Body length is generally from 3.0 to 8.0 millimeters (mm) (0.12 to 0.32 inches), depending upon the species. The different species within the genus are differentiated by differences in the shape and size of the various body parts, especially the shape of the male appendages used during reproduction. Barr (1996) states that there are approximately 255 species in the genus Pseudanophthalmus. The insect genus Pseudanophthalmus is in the predatory ground beetle family Carabidae. Most members of this genus are cave dependent (troglobites) and are not found outside the cave environment. All are predatory and feed upon small cave invertebrates such as spiders, mites, millipedes, and diplurans, while the larger Pseudanophthalmus species also feed on cave cricket eggs (Barr 1996). Members of this genus vary in rarity from fairly common, widespread species that are found in many caves to species that are extremely rare and restricted to only one cave or, at most, two caves.

Little detailed life history information is available for the rarest of the cave beetles that are considered here, but the generalized summary that follows is accurate for the more common and more easily studied species and is believed to also apply to the rarer species (Barr 1998). Cave beetles copulate in the fall, and the eggs are deposited in the cave soil during late fall. The eggs hatch and larvae appear in late fall through early winter. Pupation occurs in late winter to early summer with the adult beetles emerging in early summer (Barr 1996).

Habitat

The limestone caves in which these cave beetles are found to provide a unique and fragile environment that supports a variety of species that have evolved to survive and reproduce under the demanding conditions found in cave ecosystems. No photosynthesis takes place within the dark zone of a cave. Therefore, all organisms that are adapted to life within a cave are dependent upon energy from the surface. This energy can be in the form of leaf litter, woody debris or small bits of organic matter that is washed or falls into the cave, or guano deposited by cave-dependent bats that feed on the surface and return to the cave to roost (Barr 1996).

Status

Pseudanophthalmus inexpectatus, the surprising cave beetle, was described by Barr (1959) from specimens collected in the historic section of Mammoth Cave and White Cave, Mammoth Cave National Park (MCNP), Edmonston County, Kentucky. Subsequent to these original discoveries, the species was also found in MCNP=s Great Onyx Cave (Barr 1996). It appears that the basis of the food chain at the site within the historic section of Mammoth Cave that once supported the surprising cave beetle was discarded wood. An addition population was discovered at another cave within MCNP, the size and viability of this new population is not currently known.

THREATS (Describe threats in terms of the five factors in section 4 of the ESA providing specific, substantive information. **If this is a removal of a species from candidate status or a change in listing priority, explain reasons for change**):

A. The present or threatened destruction, modification, or curtailment of its habitat or range. The surprising cave beetle is known to occur in four caves within MCNP. The limited distribution of this species makes it vulnerable to isolated events that would only have a minimal effect on the more wide-ranging members of the genus. Events such as toxic chemical spills, discharges of large amounts of polluted water, closure of entrances, alteration of entrances, or the creation of new entrances can have serious adverse impacts on these cave beetles and could result in their extinction (Barr 1996). Caves and the species that are completely dependent upon them (troglobites) receive the energy that forms the basis of the cave food chain from outside the cave. This energy can be in the form of bat guano deposited by cave-dependent bats, large or small woody debris washed or blown into the cave, or tiny bits of organic matter that is carried into the cave by water through small cracks in the rocks overlaying the cave (Barr 1996). Activities such as industrial, residential, commercial, or highway construction can, if not planned in a manner to protect caves, directly destroy caves or result in severe modification of the natural processes that maintain the sensitive biological systems they support. Pollution and chemical contamination can, under certain circumstances, result in the complete destruction of the unique life found within a cave impacted by these factors. Loss or reduction of the supply of energy can result in the loss or severe reduction of cave beetle populations (Barr 1996).

Many of these fragile caves have been adversely impacted. About 40 years ago, the wooden debris within the historic section of Mammoth Cave was removed and the surprising cave beetle has not been observed there since then. Wood is also the basis of the food chain in Whites Cave and the wood at this site is slowly decaying. Barr (1996) has observed a gradual decrease in the number of surprising cave beetles in White Cave as the quantity of wood available has decreased. Protection of caves and cave dependent species must include both the physical environment in which the species are found and the surface components that provide the energy and clean water needed for survival.

The magnitude of the threat to the surprising cave beetle has been reduced due to a Candidate Conservation Agreement between the MCNP and the Service.

B. Overutilization for commercial, recreational, scientific, or educational purposes. Most populations are extremely small and careless collecting, whether for scientific or other purposes, could adversely affect them. These species have no known commercial value, however, the caves in which these species occur may be used for recreational purposes by spelunkers and by passive recreationists.

C. Disease or predation.
Disease or predation is not known to be a significant problem for any of these species. However, since each species appears to exist with low numbers of individuals, mortality via either of these two factors may have a significant, negative impact on recruitment and long-term survival.

D. The inadequacy of existing regulatory mechanisms.
MCNP requires a park scientific collecting permit before any collecting or scientific study is initiated. Otherwise, this species is not protected under Kentucky or Tennessee state law.

E. Other natural or manmade factors affecting its continued existence.
None are known at this time.

BRIEF SUMMARY OF REASONS FOR REMOVAL OR LISTING PRIORITY CHANGE:
The magnitude of the threats is reduced due to protections from the MCNP and the Candidate Conservation Agreement between the MCNP and the Service (see below in PRELISTING).

FOR RECYCLED PETITIONS:

a. Is listing still warranted? NA

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? NA

c. Is a proposal to list the species as threatened or endangered in preparation? NA

d. If the answer to c. above is no, provide an explanation of why the action is still precluded:

LAND OWNERSHIP (Estimate proportion Federal/state/local government/private, identify non-private owners): All but four of the caves supporting these species are privately owned. The four caves supporting surprising cave beetles are within lands managed by the National Park Service (NPS).

PRELISTING (Describe status of conservation agreements or other conservation activities):
The Kentucky Department of Fish and Wildlife Resources (KDFWR) in cooperation with the Service funded a status survey for the rarer cave beetles that occur in Kentucky. In September 2001, MCNP and the Service entered into a Candidate Conservation Agreement for the surprising cave beetle. The purpose of this Agreement is for the Service and NPS to jointly implement conservation measures for the surprising cave beetle in MCNP. The Agreement will ensure that all habitat components required to protect and improve the conservation status of this species, especially an adequate food source, are provided through the NPS=s management of the caves that support the species. Under this agreement MCNP has developed and implemented a monitoring program for the species and its habitat. In 2002, MCNP discovered a previously unknown population of this species in a forth MCNP cave. Activities undertaken by MCNP under the Candidate Conservation Agreement will increase protection and enhance the status of this species.

REFERENCES (Identify primary sources of information (e.g., status reports, petitions, journal publications, unpublished data from species experts) using formal citation format):

Barr, Thomas C. 1959. New cave beetles (Carabidae, Trechini) from Tennessee and Kentucky. Journal Tennessee Academy of Science 34:5-30.

Barr, Thomas C. 1995. Kentucky Cave Beetles: Progress Report II. Unpublished Report to Kentucky Department of Fish and Wildlife Resources. Frankfort, Kentucky. 20 pp.

Barr, Thomas C., 1996. Cave Beetle Status Survey and Prelisting Recovery Project. Unpublished Report to Kentucky Department of Fish and Wildlife Resources, Frankfort, Kentucky, and the U.S. Fish and Wildlife Service, Asheville, North Carolina. 63 pp.

Barr, Thomas C. 1998. Study of Potentially Threatened or Endangered Species of Cave Beetles in Tennessee, Alabama and Georgia. Interim Progress Report to the Tennessee Wildlife Resources Commission. 11 pp.

Krekeler, C. H. 1973. Cave Beetles of the Genus Pseudanophthalmus (Coleoptera, Carabidae) from the Kentucky Bluegrass and Vicinity. Feildiana 62(4):35-83.

LISTING PRIORITY (place * after number)

THREAT

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11*
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: The surprising cave beetle is known to occur in four caves which are all within MCNP. Its' limited distribution make this species vulnerable to isolated events that would only have a minimal effect on the more wide-ranging members of the genus. Events such as toxic chemical spills, discharges of large amounts of polluted water, closure of entrances, alteration of entrances, or the creation of new entrances can have serious adverse impacts on these cave beetles and could result in their extinction. The magnitude of the threat to the surprising cave beetle is reduced because of its location on Federal land and the formal commitment through a Candidate Conservation Agreement between MCNP and the Service to protect the species.

Imminence: The threats faced by this species are significant, however, it is not anticipated that this species will be subject to these threats in the immediate future (next 1-2 years).

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all additions of species to the candidate list, annual retentions of candidates, removal of candidates, and listing priority changes.

Approve: Linda H. Kelsey — March 14, 2003
Regional Director, Fish and Wildlife Service — Date

Concur: Steve Williams — April 5, 2004
Director, Fish and Wildlife Service — Date

Do not concur: _____ — _____
Director, Fish and Wildlife Service — Date

Director's Remarks:

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Date of annual review: February 2003

Conducted by: Robert Currie - Asheville, North Carolina FO

Comments:

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(rev. 7/02)