

CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Cicindela highlandensis

COMMON NAME: highlands tiger beetle

LEAD REGION: 4

INFORMATION CURRENT AS OF: March 2003

STATUS/ACTION (Check all that apply):

New candidate

Continuing candidate

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?

Listing priority change

Former LP: \_\_

New LP: \_\_

Latest date species first became a Candidate: \_\_\_\_\_

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 Aspecies.@

X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Insect - Cicindelidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Florida

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

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

LEAD FIELD OFFICE CONTACT (Office, name, phone number): South Florida Field Office, Paula Halupa, 772/ 562-3909 extension 257

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

Cicindela highlandensis is restricted to open, sandy, well-drained, Florida scrub habitat on Lake Wales Ridge in central Florida (Knisley and Hill 1992, 1994, 1996; Deyrup 1994). Within this habitat, it is restricted to open scrub with bare sand, but is found only in a fraction of suitable

sites. The adults are fast running predators, easily seen, showing orange on the abdomen in flight, and are weak fliers with limited dispersal capability (Knisley and Hill 1992).

Since Cicindela highlandensis has only been known since it was described in 1984, there are no records of its past distribution and abundance in Florida. It seems quite likely that it was common, widespread, and well established throughout the natural scrub and possibly high pine communities of the Lake Wales Ridge in Highlands and Polk counties prior to the widespread destruction of its habitat during the past 50 years (Knisley and Hill 1992). Most of Cicindela highlandensis's suitable scrub habitat has already been eradicated.

Knisley and Hill (1991, 1992, 1994, 1996) found the Highlands tiger beetle at 40 sites, 25 in Polk County and 15 in Highlands County. The sites are all on the Lake Wales Ridge, including the hilly uplands along U.S. Highway 27. The range of the Highlands tiger beetle does not extend to the south end of the Lake Wales Ridge, while it does extend northward to the north side of Lake Marion, east of Haines City. A number of tiger beetle collectors have sought but not found this species in other areas in this vicinity in recent years.

The Highlands tiger beetle is present in some protected areas, including the Allen David Broussard Catfish Creek Preserve northeast of Lake Wales, The Nature Conservancy's Tiger Creek Preserve, Lake Wales Ridge State Forest, Lake Arbuckle State Park, Carter Creek (partly in the Lake Wales Ridge National Wildlife Refuge), the Jack Creek tract managed by the Southwest Florida Water Management District, and an adjoining tract of the Lake Wales Ridge Wildlife and Environmental Area. Most of the remaining sites are small, privately owned, and are subject to development activities which could negatively affect the species or its habitat.

This species' narrow distribution may be in part due to its lack of dispersal. Among tiger beetles there is a general trend of decreasing flight distance with decreasing body size (Pearson, pers. comm.). Cicindela highlandensis is one of the smallest tiger beetles and an extremely weak flier (usually flying only five to ten meters). Species in woodland, scrub or dune habitats seem to disperse less than water edge species, and this could further explain the apparent limited dispersal of C. highlandensis (Knisley and Hill 1996). The thermal requirements of the Highlands tiger beetle may also limit its dispersal. Adults may overheat in full sun, preferring partially shaded habitats. Larval burrows tend to be near vegetation, where they are shaded for part of the day. Cicindela hirtilabris, a much more widely-distributed scrub species, inhabits larger and more open patches of bare sand, further from the bases of trees and shrubs than the Highlands tiger beetle. The difference in habitat preference may have to do with C. hirtilabris adults being better able to tolerate heat, since they are larger and white in color. The larval burrows of C. hirtilabris are deeper than those of the Highlands tiger beetle and, therefore, may remain cooler (Knisley and Hill 1996).

Knisley and Hill (1996) view high quality habitat as primarily scrub or pine woodland with a high percent of open sand (greater than 50 percent) and with many natural openings which are continuous or connected to adjacent open patches, or connected by lightly disturbed trails or paths. Adult Highlands tiger beetles were never found in areas of dense scrub (except along the edges of trails) nor in areas of low shrubs. The Highlands tiger beetle was regularly found on trails with evidence of at least moderate off-road vehicle traffic and where there was evidence of past vegetation clearing or other ground disturbance (Knisley and Hill 1992a, 1996). This

suggests that fire suppression has caused the vegetation has become artificially dense, harming the beetle and other species. This also suggests the need for prescribed burning or alternative methods of clearing openings such as scraping with a bulldozer (Knisley and Hill 1996).

The Fish and Wildlife Service may be able to fund new survey work in fiscal year 2003.

**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 Highlands tiger beetle depends on open, sandy areas within the Lake Wales Ridge's upland vegetation. This vegetation has largely been converted to citrus groves and residential areas. Peroni and Abrahamson (1985) used aerial photography to determine that in Highlands County, 64.2 percent of the xeric vegetation (scrub, scrubby flatwoods, and high pinelands) present before settlement had been destroyed by 1981. Thus, by the time the Highlands tiger beetle was described as a new species in 1984, much of its potential habitat had already been destroyed. However, land acquisition efforts by the State of Florida, the Service, and others are on-going in the Lake Wales Ridge such that most good examples of Highlands tiger beetle habitat are now under public or conservation ownership. Also, the Service estimates that approximately 50 percent of the remaining available habitat for the species that has been targeted for acquisition has been purchased or is currently being purchased.

Lack of management of the remaining scrub and high pineland vegetation may constitute a threat as serious as habitat loss (Knisley and Hill 1992, 1996). The vegetation in which Highlands tiger beetle occurs is subject to fire, ranging from relatively frequent and low-intensity in high pineland to infrequent and high intensity in some scrub (Myers and Ewel 1990). Years of fire suppression in most upland habitats of the Lake Wales Ridge led to the vegetation becoming much thicker, with few patches of bare ground. One indicator of ecological problems caused by fire suppression is that small scrub plants (herbs and smaller shrubs) are now typically most abundant in artificially disturbed areas such as firebreaks.

Since the last Candidate Notice of Review, land managers in the area have begun to implement fire management plans and programs to manage scrub vegetation that will benefit the Highlands tiger beetle. For instance, the Florida Division of Forestry has received strong State support for implementing fire management on State lands in the Lake Wales Ridge, and across the State, in the wake of several disastrous wildfire seasons. In addition, the research and other programs of Archbold Biological Station emphasize fire management and development of alternatives to fire (Lohrer 1999) that will restore and enhance scrub habitats in the area. The Multispecies Recovery Plan for south Florida (USFWS 1999) sets recovery criteria for species on the Lake Wales Ridge that requires restoration of native vegetation, and some of this restoration will occur through the use of fire and fire combined with other land management activities. Cumulatively, these efforts will enhance and restore scrub habitats on the Lake Wales Ridge, and this, coupled with more scrub habitats and occupied Highlands tiger beetle habitat in public and conservation ownership, has effectively reduced the immediacy of the threats to the Highlands tiger beetle.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

Tiger beetles of the genus Cicindela may be the subject of more intense collecting and study than any other single insect genus. Knisley and Hill (1992) stated that over-collecting of the Highlands tiger beetle may be of some importance and suggest that over-collecting may have been partly responsible for the apparent extirpation of the species from the site where Choate had first collected it (i.e., the type locality). They estimated that well over 1,000 adults had been collected at this site (Knisley and Hill 1996). Concerns about collection of the Ohlone tiger beetle of coastal California, recently proposed for listing as an endangered species, are probably relevant to the Highlands tiger beetle. The proposal, citing a personal communication from R. Morgan (1988), noted that the original petitioner for listing the Ohlone tiger beetle has been contacted by several people from such places as France, Wisconsin, and California, looking for Ohlone tiger beetle specimens to add to their private collections, as well as others asking where tiger beetle colonies are located so they could collect the species at those locations.

C. Disease or predation.

The major natural enemies of adult tiger beetles are robber flies (Family Asilidae) and birds. Parasitoid wasps (Family Tiphidae, genus Methocha) and bombyliid flies (genus Anthrax) are the major predators of larvae (Knisley and Hill 1989, Hill and Knisley 1990). Ants may sometimes affect larvae, especially during first instar (a stage in the life of an arthropod between two successive molts) (Knisley 1987). Most tiger beetle species that have been intensely studied experienced relatively high levels of larval parasitism (10 to over 40 percent) (Knisley and Hill 1992). It is likely that Cicindela highlandensis experiences the limiting effects from natural enemies and generally low survivorship that are seen for other tiger beetle species.

D. The inadequacy of existing regulatory mechanisms.

Cicindela highlandensis is not currently listed by the State of Florida and, therefore, is not afforded any regulatory protection. Furthermore, there is very little protection of its habitat since the species only occurs on a few protected sites.

E. Other natural or manmade factors affecting its continued existence.

The larvae of Cicindela highlandensis live in burrows near the ground surface (The Nature Conservancy 1999). Although the species may benefit from the clearing activities that accompany trail construction, the off-road vehicle traffic that often follows will harm the species by crushing the individual or its burrow.

An additional threat is fire suppression, which changes the nature and composition of the scrub communities. Much of the present scrub is unsuitable for the species as a result of fire suppression (Knisley and Hill 1992). Such modified scrub is much more densely vegetated and often lacks the natural open, bare patches that Cicindela highlandensis occupies (Knisley and Hill 1992). Recently, Knisley and Hill (1992) documented how ecological succession can

change habitat and cause the decline and local extirpation of tiger beetle species. An example of this was documented for Cicindela abdominalis (the species to which C. highlandensis is most closely related) at a Virginia pine barrens site. Encroaching vegetation and fire suppression caused the species to be extirpated from the site during the 1930s (Knisley and Hill 1992).

Little is known about the dispersal of Cicindela highlandensis, but its small size and weak flight suggest it probably has a limited dispersal (Knisley and Hill 1992). This limited dispersal characteristic could cause the species to be extirpated from isolated sites since much of Cicindela highlandensis habitat has been highly fragmented throughout its range.

**FOR RECYCLED PETITIONS:**

- a. Is listing still warranted? \_\_\_
- b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? \_\_\_
- c. Is a proposal to list the species as threatened or endangered in preparation? \_\_\_
- 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):

Knisley and Hill (1996) graded sites with Highlands tiger beetles, based on numbers of tiger beetles and extent of suitable habitat. They graded the following as AB-@ or better: Catfish Creek (a State Park operated by Florida Department of Environmental Protection), Flaming Arrow Boy Scout Camp (a private tract within the Hesperides acquisition project of Florida's Conservation and Recreation Lands program [CARL]), another site in the Hesperides CARL area, Livingston Creek (Lake Wales Ridge State Forest), Tiger Creek Preserve (The Nature Conservancy), Tiger Creek South, Hesperides, Tiger Creek South (Hesperides CARL project), Moon Ranch road (Carter Creek CARL project vicinity), and Flamingo Villas (Lake Wales Ridge National Wildlife Refuge). The State of Florida is continuing to acquire land on the Lake Wales Ridge.

**PRELISTING** (Describe status of conservation agreements or other conservation activities):

The State of Florida is acquiring and has acquired a number of lands that are occupied by Cicindela highlandensis. These sites include the Lake Wales Ridge Ecosystem project, Hesperides, and Walk-in-the-Water areas within Polk and Highland counties (Knisley and Hill 1992). The Service is acquiring smaller areas that may have this species for the Lake Wales Ridge National Wildlife Refuge. Land managers in the Lake Wales Ridge area have begun to conduct more prescribed burning in recent years to enhance or restore scrub habitat. Under these efforts, it is probable that prescribed burning on State, Refuge, and private conservation lands has improved habitat for the species and will provide better habitat conditions for this species in the future. However, no information is available on the response of this species to fire.

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

Deyrup, Mark. 1994. Rare and Endangered Biota of Florida. Volume IV. Invertebrates. University presses of Florida, Gainesville.

Hill, J.M. and C.B. Knisley. 1990. Current status and biological studies of C. dorsalis and C. puritana in Maryland. Unpublished report to Maryland Heritage Program. 69 pp.

Knisley, C.B. 1987. Habitats, food resources, and natural enemies of a community of larval Cicindela in Arizona. Can. J. Zool. 65:1191-1200.

Knisley, C.B. and J.M. Hill. 1989. Human impact on Cicindela dorsalis at Flag Ponds, Maryland. Final report to Maryland Department of Natural Resources, Annapolis.

Knisley, C.B. and J.M. Hill. 1991. An inventory of rare tiger beetles in Florida scrub habitats. Unpublished report to Florida Nature Conservancy, Winter Park, Florida.

Knisley, C.B. and J.M. Hill. 1992. Status survey of the rare Florida scrub tiger beetle, Cicindela highlandensis. Report to U.S. Fish and Wildlife Service, Jacksonville Field Office, Jacksonville, Florida.

Knisley, C. B. and J. M. Hill. 1994. Studies of the rare Florida scrub tiger beetle, Cicindela highlandensis: Distribution, abundance, habitat characteristics and biology. Report prepared for U. S. Fish and Wildlife Service, Jacksonville, Florida. 33 pages, 1 table, 7 figures.

Knisley, C. B. and J. M. Hill. 1996. The Florida Highlands tiger beetle, Cicindela highlandensis: habitat requirements, remaining range, life history, and management. Final report, Florida nongame wildlife program grant (NG91-012). Submitted to Florida Game and Fresh Water Fish Commission, Bureau of Nongame Wildlife.

Peroni, P. A. and W. G. Abrahamson. 1985. A rapid method for determining losses of native vegetation.

Richardson, D.R. 1989. The sand pine scrub community: an annotated bibliography. Florida Scientist 52: 65-93.

The Nature Conservancy, Conservation Science Division, in cooperation with The Association for Biodiversity Information, and the International Network of Natural Heritage Programs and Conservation Data Centers. 1999. Biodiversity Conservation Data Source (BioSource). Arlington, Virginia.

LISTING PRIORITY (place \* after number)

THREAT
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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:* This tiger beetle will almost certainly not persist outside of conservation lands, and status surveys suggest that lack of prescribed fire on conservation lands within its very narrow range pose a serious threat of extinction.

*Imminence:* Much of the land acquisition that is feasible in its range (the Lake Wales Ridge of Florida) has already been purchased and prescribed fire planning and execution is underway on most of these lands, which harbor one of the richest concentrations of endemic plants in the United States, as well as several endemic vertebrates.

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, removal of candidates, and listing priority changes.

Approve: Linda Kelsey March 14,  
2003  
Acting Regional Director, Fish and Wildlife Service Date

Concur: \_\_\_\_\_  
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: David Martin - South Florida Ecological Services Office

Comments:

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