

CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Leavenworthia crassa Rollins

COMMON NAME: glade-cress

LEAD REGION: 4

INFORMATION CURRENT AS OF: February 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: June 13, 2002

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: Plant - Brassicaceae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama

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

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

LEAD FIELD OFFICE CONTACT (Office, name, phone number): Jackson, Mississippi Field Office, Cary Norquist, 601/321-1128

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

Species Description/Taxonomy

Leavenworthia crassa is a glabrous a winter annual from 1 to 3 decimeters (4 to 12 inches (in.)) tall. The leaves are mostly basal, forming a rosette and entire to very deeply lobed or parted. Flowers are on elongating stems and approximately 8 to 15 millimeters (mm) (0.3 to 0.6 in.) long. The petals are either yellow with orange or white with yellow, usually with both color forms intermixed in a single population. The fruit is globe-shaped or slightly more elongate and about 12 mm (0.5 in.) long with a slender beak at the tip.

Leavenworthia crassa can be distinguished from Leavenworthia alabamica, another gladecress species which occurs in the area, by its globular to oblong fruit with smooth exterior, in contrast to the much more elongated linear fruit, with corrugated surfaces, of the latter species.

Leavenworthia alabamica also does not have the yellow and orange flower forms usually found mixed in population of this species (McDaniel and Lyons 1987).

Leavenworthia crassa, was described by Rollins in 1963 from material collected in 1959 from Morgan County, Alabama. Rollins (1963) delineated the species into two varieties (var. crassa and var. elongata) based on differences in fruit length. However, herbarium and field studies have shown var. elongata to have variation in fruit length within the range of fruit lengths for var. crassa (McDaniel and Lyons 1987). Thus, the species is treated as one taxon throughout this document.

Habitat

This species is a component of glade flora and occurs in association with limestone outcroppings. The terms Aglade and Acedar glade refer to shallow-soiled, open areas that are dominated by herbaceous plants and characterized by exposed sheets of limestone or gravel. Eastern redcedar (Juniperus virginiana) trees are frequent in the deeper soils along the edges of the glades (Hilton 1997, Baskin et al. 1986, Baskin and Baskin 1985). Historically, glades in northern Alabama occurred as glade complexes where open areas of exposed or nearly exposed limestone were separated by segments of woody vegetation to form an intricate pattern of habitats grading into one another (Hilton 1997). Few undisturbed examples of this community type remain (Hilton 1997, McDaniel and Lyons 1987, Baskin and Baskin 1985, Rollins 1963). Populations of Leavenworthia crassa are now located in glade-like areas exhibiting various degrees of disturbance including pastures, roadside rights-of-way, and cultivated or plowed fields (Hilton 1997). As with most of the cedar glade endemics, Leavenworthia crassa exhibits weedy tendencies, and it is not uncommon to find the species growing in altered habitats; however, its geographical range is probably very similar to what it was in pre-settlement times since none of the cedar glade endemics appear to spread far from their original glade habitat (Baskin et al. 1986).

Historical and Current Range

Leavenworthia crassa is endemic to a 13-mile radius area in north central Alabama in Lawrence and Morgan counties (Rollins 1963). A 1961 record from Lauderdale County has never been confirmed (McDaniel and Lyons 1987). Surveys by Lyons (in litt. 1981 to R. Sutter), McDaniel and Lyons (1987), and Hilton (1997) were unsuccessful at locating a number of historical sites for Leavenworthia crassa. McDaniel and Lyons (1987) failed to locate eight sites previously

reported by Rollins (1963) and Lloyd (1965), and Hilton (1997) was unsuccessful at relocating seven sites listed in McDaniel and Lyons (1987). Currently, only six populations of this species are thought to survive with three populations each in Morgan and Lawrence counties, Alabama.

Population Estimates/Status

Only one of the six populations is rated a high quality site (A-rank), having 500 or more plants in a relatively undisturbed glade. Of the remaining populations, two are given a B-rank (50 or more plants on a glade with some disturbance); two have a C-rank (20 or more plants in disturbed glade community); and one was given a D-rank (few plants in unrestorable habitat) (Hilton 1997). The Nature Conservancy ranks sites and populations using A through D, but criteria may vary depending upon the species and habitat type. Hilton developed these ranks specific to Leavenworthia crassa and its habitat type.

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.

This species is endemic to cedar glade areas in north central Alabama that have been significantly altered from their original condition. More than a 50 percent loss in glade habitat has occurred since European settlement (Hilton 1997). Glade habitats today have been reduced to remnants fragmented by agriculture and development.

Hilton (1997) conducted a thorough survey of cedar glade communities in north Alabama using historical records, soil maps, topographic maps, geology and aerial photography. Her efforts resulted in the identification of 22 high priority glades. However, field surveys found only five of these to be in good condition and restorable, and only two of these were considered high quality sites (Hilton, pers. comm. 1999).

At four of the Leavenworthia crassa populations, plants occur in pasture areas, on roadside rights-of-way, and/or in planted fields surrounded by agriculture or residential developments (Hilton 1997). Periodic disturbance, such as plowing in row crop farming, arrests succession and maintains populations in this type of habitat; however, plowing or herbicide treatment in the spring prior to seed set and dispersal could be detrimental to populations. Plants extend into pastures at two sites. Populations are enhanced by the disturbance created from light grazing; however, pastures that are heavily grazed create unfavorable conditions (i.e. soil compaction, soil eutrophication) for Leavenworthia crassa. Improvement of pastures with fertilizer treatments and/or the introduction of forage grasses would eventually decimate populations due to competition. Lyons (in litt. 1981) considered that her failure to relocate many of the historical Leavenworthia crassa sites from the 1960's was due to the change in agricultural practices from growing corn to using those sites for cattle pastures. McDaniel and Lyons (1987) considered the trend toward converting agricultural sites for use as pasture as a primary threat to the species.

Populations extend onto roadsides or are near roads at five of the six sites. Mowing and herbicide application prior to seed set pose threats to those populations located on roadside rights-of-way. Three historical sites near roads have not been relocated and a portion of one of

the existing populations was destroyed by road widening and grading in the 1980's (McDaniel and Lyons 1987). The largest population of this species has a dirt road traversing through a portion of the site, and this has made the site vulnerable to off-road vehicles and dumping (Hilton 1997).

Hilton (pers. comm. 1999) considers residential and industrial development to be the primary threat to cedar glade communities today and the primary reason for the loss of cedar glade habitat in the last decade. One of the six populations is located in the front yard of a residence.

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

Overutilization is not considered a threat to this species.

C. Disease or predation.

One population was lost due to infection by a mustard rust in the early 1980's (Lyons and Antonovics 1991, McDaniel and Lyons 1987). It is not known if this disease poses a significant long-term threat to the species.

D. The inadequacy of existing regulatory mechanisms.

This species is considered endangered in Alabama by the Alabama Natural Heritage Program; however, there are no State or Federal laws that give this species any legal protection. The population within the Bankhead National Forest is within a Native American cultural site and, as such, is taken out of active timber management. No other protective measures are afforded to this species and its habitat at this site.

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

Winter annuals, such as Leavenworthia crassa, are excluded from many habitats because they are poor competitors (Baskin and Baskin 1985). The most vigorous populations of Leavenworthia crassa are located in areas which receive full, or near full, sunlight at the canopy level and have limited herbaceous competition (Hilton 1997). Rollins (1963) documented the loss of Leavenworthia crassa individuals caused by invading grasses in an unweeded portion of an experimental plot, while Leavenworthia crassa individuals in the hand-weeded part of the plot thrived. Lloyd (1965) also noted that Leavenworthia species competed poorly with invading weedy species in fallow agricultural fields in north Alabama. Hilton (1997) was unable to relocate five populations in abandoned fields and pastures, which McDaniel and Lyons (1987) had noted as appearing depressed due to competition from invading weedy species. Shading and competition are potential threats at the two largest populations of Leavenworthia crassa (Hilton 1997). One site, reported to be widely open in 1963, is now partially shaded due to a partial closing of the canopy (Hilton 1997).

Non-native plants are a major problem in many glades due to the ever present disturbances that allow for their colonization (Hilton 1997). Non-native plant species pose a threat to one population of Leavenworthia crassa where they have established near an unimproved road traversing the site (Hilton 1997).

Under natural conditions, cedar glades are maintained edaphically through drought and erosion. The shallow soil, exposed rock, and frequent hot, dry summers create xeric conditions that keep competition and/or shading effects of encroaching vegetation in check (Hilton 1997, McDaniel and Lyons 1987, Baskin et al. 1986, Rollins 1963). The soils that develop on glades are easily eroded, moving downslope or into fractures in the substrate. Periodic fires also likely played a role in maintaining these communities (Hilton 1997). Due to the continuing loss and modification of cedar glade habitats, presently available habitat for Leavenworthia crassa is primarily in areas modified by human activity where less than optimum conditions exist to perpetuate appropriate habitat. Periodic disturbance is needed to arrest succession and perpetuate suitable habitat.

As with all annuals, this species' long-term survival is dependent upon its ability to reproduce and reseed an area every year. Thus, populations decline and move toward extinction if conditions remain unsuitable for reproduction for many years.

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): One population occurs on U.S. Forest Service land. The remaining sites are located on private land with plants at some populations extending onto county-maintained roadside rights-of-way.

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

The Nature Conservancy, Alabama Natural Heritage Program, has approached the Forest Service concerning protection and management needs for the population on Forest Service property, but no management plan has been drafted yet for this site. The Service funded a survey of cedar glade habitats in the Moulton Valley physiographic region of northwestern Alabama, the major area for this habitat type.

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

Baskin, J.M. and C.C. Baskin. 1985. Life cycle ecology of annual plant species of cedar glades of southeastern United States, pp. 371-398. In: J. White (ed.). The Population Structure of Vegetation. Dr. W. Junk Publishers, Dordrecht.

Baskin, J.M., E. Quarterman, and C. Caudle. 1986. Preliminary check-list of the herbaceous vascular plants of cedar glades. J. Tenn. Acad. Sci. 43:65-71.

- Hilton, J.L. 1997. North Alabama Glade Study. Unpublished report to U.S. Fish and Wildlife Service. Jackson, MS. 96 pp. + appendices.
- Kral, R. 1983. Leavenworthia crassa. A report on some rare, threatened, or endangered forest-related vascular plants of the South. Vol. 1. 492. U.S. Forest Service Technical Publ. R8-TP2.
- Lloyd, D.G. 1965. Petal color polymorphism in Leavenworthia (Cruciferae). Contr. Gray Herb. 198:9-40.
- Lyons, E.E. and J. Antonovics. 1991. Breeding system evolution in Leavenworthia: Breeding system variation and reproductive success in natural populations of Leavenworthia crassa (Cruciferae). American Journal of Botany 78:270-287,
- McDaniel, S. and E. Lyons. 1987. Status report on Leavenworthia crassa Rollins. Unpublished report to U.S. Fish and Wildlife Service, Jackson, MS. 13 pp.
- Rollins, R.C. 1963. The evolution and systematics of Leavenworthia (Cruciferae). Contr. Gray Herb. 192:1-98.

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: There are only six populations known for this species so the loss of any would have a significant impact on this species= survival.

Imminence: Though the species occurs in somewhat disturbed areas, populations appear to be able to adjust to periodic disturbances. Threats to the species, from competition and exotics, are insidious. At this time, we know of no projects which are planned in the area that would lead to the destruction of habitat where this species is currently located.

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: _____ Date _____
Director, Fish and Wildlife Service

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

Director's Remarks:

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Date of annual review: February 2003

Conducted by: Cary Norquist - Jackson, Mississippi FO

Comments:

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