

CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Linum arenicola (Small) H.J.P. Winkler

COMMON NAME: sand flax

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 *Species*.@

X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Plant - Linaceae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Florida

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

LEAD REGION CONTACT (Name, phone number): Richard Gooch, 404/679-7217

LEAD FIELD OFFICE CONTACT (Office, name, phone number): South Florida Field Office, Paula Halupa, 561/562-3909 extension 257

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

Linum arenicola is a wiry, yellow-flowered perennial herb with one to several stems from its base, linear leaves 7 to 10 millimeters long, and flowers with yellow petals about 4.5-5.5 millimeters long (Bradley and Gann 1999, adapted from Rogers 1963). It historically was distributed in Monroe County in the lower Florida Keys, and in central and southern Miami-Dade County. In Miami-Dade, the plant was widespread from Coconut Grove to what is now the main entrance to Everglades National Park and Turkey Point. In Monroe County, the plant was recorded from Big Pine Key, Ramrod Key, Sugarloaf Key, Park Key, Boca Chica Key, and Middle Torch Key.

Linum arenicola is currently known from only four sites in Miami-Dade County: Camp Owaissa Bauer (owned by Miami-Dade County) and nearby private land, Homestead Air Reserve Base, Homestead Bayfront Park (on a limestone canal levee), and two other private sites. In Monroe County, it is on Big Pine Key (in part on the National Key Deer Refuge and also on a small private preserve). It is also on Big Torch Key and Sugarloaf Key, on the Florida Keys Wildlife and Environmental Area, operated by the Florida Fish and Wildlife Conservation Commission (Gann et al. 2002).

Kernan and Bradley (1996) determined that seven mainland (Miami-Dade County) populations of Linum arenicola exist in six areas. They estimated that approximately 1,000 plants of Linum arenicola occur in Miami-Dade County. All populations but one were estimated by walking transects across populations and counting individuals. The Homestead Air Force base population number 1 was estimated by counting a 1 x 1 meter (3.3 x 3.3 feet) sampling quadrant, and extrapolating the mean to the area of the population (Kernan and Bradley 1996). The Homestead Air Reserve Base population number 1 contains 60 percent of the known individuals in Miami-Dade County (Kernan and Bradley 1996). A population known as the Old Cutler contained 26 percent of the known individuals in Miami-Dade County, prior to being cleared. There are fewer than 200 plants in the remaining populations on the mainland (Kernan and Bradley 1996).

Ross and Ruiz (1996) found Linum arenicola in 16 plots in five pine rockland vegetation sampling transects at the National Key Deer Refuge on Big Pine Key. They provided no estimates of numerical abundance. No plants were found at other pine rockland vegetation sampling sites elsewhere in the Florida Keys. Bradley and Gann (1999) estimate this population at fewer than 10,000 plants.

This yellow-flowered, perennial herb can be found around solution pits and shallow soils of semi-shaded ephemeral pools on limerock in open pine rocklands, pineland clearings, and adjacent roadsides (Long and Lakela 1976). Several other species of Linum occur within the range of Linum arenicola (Kernan and Bradley 1996). Linum medium, L. carteri var. carteri, and L. carteri var. smallii also grow on the Southeast Florida mainland (Kernan and Bradley 1996). Linum arenicola is recognized as a taxonomically distinct species (Kernan and Bradley 1996).

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.

Residential and commercial development has drastically reduced the habitat for Linum arenicola throughout pine rockland habitats in south Florida and the Florida Keys. Pine rockland habitat in Miami-Dade County has been reduced to about 11 percent of its natural extent (Kernan and Bradley 1996). Of the original 74,000 hectares (ha) (182,780 acres) of pine rockland habitat, 8,140 ha (20,106 acres) remained in 1996. Less than 2 percent of the 65,000 ha (160,550 acres) of pine rockland habitat that existed outside Everglades National Park in 1900 remains today (Kernan and Bradley 1996). Given the number of people moving to Florida, pressures from development are not expected to diminish in the years to come, especially throughout South Florida. Florida has experienced a 15.3 percent increase in the human population from April 1, 1990, to July 1, 1998, and was ranked the fourth fastest growing State in the nation during 1998 (U.S. Census Bureau 1998).

Acreage of pine rocklands on Big Pine Key was reduced from 1,049 ha (2,592 acres) in 1955, to 701 ha (1,732 acres) in 1989 (Folk 1991). This has resulted in a loss of approximately 33 percent of habitat. A significant amount of pine rockland habitat in the Keys is still threatened by development (C.R. Kruer, pers. comm. 1998).

Homestead Air Reserve Base is in the process of being transferred to private ownership, and the populations of Linum arenicola in this area (more than 60 percent of the known plants) will likely be subject to various types of development. The second largest population in Miami-Dade County (256 plants) was destroyed by clearing for commercial development (D. Garvue, pers. comm. 1999).

Seven Linum arenicola populations are on preserves and protected from urban development, Camp Owaissa Bauer (Miami-Dade County), Homestead Bayfront Park, National Key Deer Refuge, a Nature Conservancy preserve on Big Pine Key, Big Torch Key and Sugarloaf Key (Florida Fish and Wildlife Conservation Commission), and a private preserve in Miami-Dade County.

The species= restricted ecological range, the drastic loss of its habitat, and the infrequency of collections suggests that Linum arenicola may be facing extirpation on the Florida mainland (Kernan and Bradley 1996).

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

None are known.

C. Disease or predation. None are known.

D. The inadequacy of existing regulatory mechanisms.

The Florida Department of Agriculture and Consumer Services has designated Linum arenicola as endangered under Chapter 5B-40, Florida Administrative Code. This listing provides little or no habitat protection beyond the State's Development of Regional Impact process, which serves to disclose impacts from projects, but provides no regulatory protection for State-listed plants on private lands. Without local or county ordinances preventing the destruction of the plant, conservation is not likely to occur.

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

Fire is required to maintain the pine rockland community. Under natural conditions, lightning fires typically occurred at 3- to 7-year intervals. With fire suppression, hardwoods eventually invade pine rocklands and shade out understory species like Linum arenicola. Natural fires are unlikely to occur or will be suppressed in the remaining highly fragmented pine rockland habitat in Miami-Dade County.

Exotic plants have significantly affected pine rocklands. At least 277 taxa of exotic plants are now known to invade pine rocklands in South Florida (U.S. Fish and Wildlife Service 1998). Some of these may compete directly with Linum arenicola for space and resources, while others have a profound effect on community structure and responses to fire. The exotic tree, Brazilian pepper (Schinus terebinthifolius) is the most widespread and one of the most invasive species. If left uncontrolled in a pineland where no fires are being conducted, it will form a single-species thicket that almost completely eliminates native vegetation. Earleaf acacia (Acacia auriculiformis), natal grass (Rhynchelytrum repens), shrub verbena (Lantana camara), and tongue tree (Albizia lebeck) are some of the other exotic pests in pine rocklands. All of these species affect the characteristics of a fire when it does occur. Fires that once burned fairly cool with mostly pine needle duff for fuel may now burn much hotter and affect the type of community that develops following fire. For instance, a catastrophic fire moves the herbaceous component to bracken fern thickets rather than grasses. Therefore, with the presence of exotic species, it is uncertain just how fire, even under a managed situation, will affect Linum arenicola.

Based on the low number of individuals within the species= narrow range, catastrophic events such as hurricanes and tropical storms may negatively affect the species by altering the vegetation composition or water levels.

Illegal dumping could destroy some Linum arenicola. After Hurricane Andrew in 1992, the Bauer Drive site was disturbed by the placement and collection of a pile of clean-up debris that was illegally dumped on a portion of the population (Kernan and Bradley 1996).

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):

Some plants occur on the National Key Deer Refuge, but the exact number is unknown. The largest population on the mainland is on Homestead Air Force Base, which is being closed and the property sold for private development. One site, Camp Owaissa Bauer is a park owned and managed by Miami-Dade County, but the plants there are located along the roadside and, consequently, are exposed to various types of inadvertent abuse, including illegal dumping. One site in private ownership is protected under the Environmentally Endangered Lands Covenant Program. All other sites are in private ownership with no special management or protection; most are on valuable development properties.

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

In 1979, Miami-Dade County enacted the Environmentally Endangered Lands Covenant Program which gives private land owners of pine rockland habitat a tax break if they agree to not develop the property and manage it for a period of 10 years (U.S. Fish and Wildlife Service 1998). This program is ongoing and has protected many pine rockland sites. One Linum arenicola site is on land managed under this program.

Although Linum arenicola is not specifically managed within the National Key Deer Refuge, the species may benefit from the conservation efforts made for the Key deer (Odocoileus virginianus clavium).

We have developed a multi-species recovery plan for the threatened and endangered species of South Florida. This plan is ecosystem-based and includes many recommendations for conservation of the communities where Linum arenicola occurs (U.S. Fish and Wildlife Service 1999).

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

Bradley, K. A. and G. D. Gann. 1999. Status summaries of 12 rockland plant taxa in southern Florida. Report submitted to U.S. Fish and Wildlife Service, Vero Beach, Fla. The Institute for Regional Conservation, 22601 S.W. 152 Ave., Miami, Florida 33170. 82 pp.

Gann, G.D., K.A. Bradley, and S.W. Woodmansee. 2002. Rare Plants of South Florida: Their History, Conservation, and Restoration. Institute for Regional Conservation, Miami. 1056 pages.

Kernan, C. and K. Bradley. 1996. Conservation survey of Linum arenicola in Dade County, Florida. A report to the U.S. Fish and Wildlife Service. Fairchild Tropical Garden, Miami, Florida.

Long, R.W. and O. Lakela. 1971. A flora of tropical Florida; a manual of the seed plants and ferns of southern peninsular Florida. University of Miami Press, Coral Gables.

Ross, M.S. and P.L. Ruiz. 1996. A study of the distribution of several South Florida endemic plants in the Florida Keys. A report to the U.S. Fish and Wildlife Service. Southeast Environmental Research Program, Florida International University, Miami.

U.S. Census Bureau. 1998. State and metropolitan area data book 1997-1998.

U.S. Fish and Wildlife Service. 1999. South Florida multi-species recovery plan. Atlanta, Georgia. 2172 pp.

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: Few plants are known from only 6 sites, of which 3 or 4 are probably managed to favor this plant. The largest population is at Homestead Air Reserve Base.

Imminence: A relatively large population was destroyed recently, and the future of Homestead Air Reserve Base is uncertain, so threats appear imminent.

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: March 2003

Conducted by: Paula Halupa - South Florida FO

Comments:

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