

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Lepidium arbuscula* (anaunau)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2010. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 58 species in Washington, Oregon, California, and Hawaii. Federal Register 75(226):71726-71729.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawaii

Name of Reviewer(s):

Vickie Caraway, Plant Biologist, PIFWO

Daniel Clark, Oahu, Kauai, Northwest Hawaiian and American Samoa Islands Team
Manager, PIFWO

Marie Brueggemann, Plant Recovery Coordinator, PIFWO
Recovery Program Lead, PIFWO

Kristi Young, Programmatic Deputy Field Supervisor, PIFWO

Methodology used to complete this 5-year review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS), beginning on January 31, 2012. The review was based on a review of current, available information since the last five-year review for *Lepidium arbuscula* (USFWS 2009). The National Tropical Botanical Garden provided an initial draft of portions of the five-year review and recommendations for conservation actions needed prior to the next five-year review. The document was reviewed by the Plant Biologist, Islands Team Manager, and Plant Recovery Coordinator, followed by the Recovery Program Lead. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor.

Background:

For information regarding the species' listing history and other facts, please refer to the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database for threatened and endangered species (http://ecos.fws.gov/tess_public).

Review Analysis:

Please refer to the previous 5-year review for *Lepidium arbuscula* published on July 21, 2009 (available at http://ecos.fws.gov/docs/five_year_review/doc2479.pdf) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species' biological status has come to light since listing to warrant a change in the Federal listing status of *L. arbuscula*.

This short-lived perennial shrub is endangered and occurs in the Waianae Mountains on Oahu. The current status and trends for *Lepidium arbuscula* are provided in the tables below.

New status information:

- The current known populations, number of individuals, and dates of observations are as follows: Kuaokala Road (seven in 1997), Halona-Nanakuli (76 in 2003 and again in 2004); Kamaileunu Ridge (126 in 1999 and again in 2000); Mohiakea Gulch (ten in 1993); Kuaokala (seven in 1997); Puu Kawiwi (eleven in 2005); and Kahanahaiki (eight in 2007), for a combined total of 245 individuals (Oahu Army Natural Resources Program [OANRP] 2012). No additional new data was available from the following locations that were listed in the previous five-year review: Lualualei-Nanakuli Ridge, Ohikilolo, Makua-Keaau Ridge, Kapuhi Gulch, Manini Gulch, Pahoa and Halona, and northwest of Puu Kaua.
- *Lepidium arbuscula* is prone to large fluctuations in population size (M. Keir, OANRP, pers. comm. 2012).

New threats:

- Climate change – Climate change may pose a threat to this species. However, current climate change analyses in the Pacific Islands lack sufficient spatial resolution to make predictions on impacts to this species. The Pacific Islands Climate Change Cooperative (PICCC) funded climate modeling that will help resolve these spatial limitations. High spatial resolution climate outputs are expected in 2013.

Synthesis:

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Oahu plants (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Lepidium arbuscula* is a short-lived perennial, and to be considered stable, the threats to the taxon must be controlled (e.g., fenced) and the taxon must be represented in an *ex situ* (at a location other than the plant's natural location, such as a nursery or arboretum) collection. In addition, a minimum of three populations should be documented within the Waianae Mountains of Oahu. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

The stabilization goals for this species have not been met. Two populations of 50 or more mature individuals are known (Table 1) but threats are not being managed throughout all of the populations (Table 2). Therefore, *Lepidium arbuscula* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Survey/inventories - Survey the geographical and historical range of *Lepidium arbuscula* for additional populations and a thorough current assessment of the status of known populations.

- Captive propagation for genetic storage and reintroduction - Collect seed for genetic storage and propagation.
- Ungulate exclosure and control - Construct exclosure fences to protect individuals from the activities of feral ungulates,
- Ecosystem-altering invasive plant species control - Eradicate invasive introduced plant species within the exclosures.
- Alliance and partnership development - Initiate collaborative and coordinated interagency planning to implement ecosystem level restoration and management to benefit this species.
- Existing population management and restoration - Augment naturally occurring populations with genetically appropriate individuals.
- Genetic research - Assess genetic variability within extant populations.
- Life history research - Study *Lepidium arbuscula* populations with regard to population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.

Table 1. Status and trends of *Lepidium arbuscula* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1996 (listing)	<900	0	All threats managed in 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	<900	0	All threats managed in 3 populations	Partially
			Complete genetic storage	Unknown
			3 populations with 50 mature individuals each	Partially
2003 (critical habitat)	~1,000	unknown	All threats managed in 3 populations	Partially
			Complete genetic storage	Unknown
			3 populations with 50 mature individuals each	No
2009 (5-yr review)	906	0	All threats managed in 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2013 (5-yr review)	245	0	All threats managed in 3 populations	No (Table 2)
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Partially

Table 2. Status of threats to *Lepidium arbuscula* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – pigs and goats degrade habitat and predate on these plants	A, C, D	Ongoing	None
Fire – habitat modification and plant destruction	A, E	Ongoing	None
Invasive introduced plants	A, E	Ongoing	None
Climate change	A, E	Increasing	None

References:

See previous 5-year review for a full list of references (USFWS 2009). Only references for new information are provided below.

[OANRP] Oahu Army Natural Resource Program. 2012. Makua implementation plan - population unit status: *Lepidium arbuscula*. 1 page. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages, plus appendices.

[USFWS] U.S. Fish and Wildlife Service. 2009. *Lepidium arbuscula* (anaunau) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 12 pages. Available online at http://ecos.fws.gov/docs/five_year_review/doc2479.pdf.

Personal Communications:

Keir, Matt. 2011. Botanist, Oahu Army Natural Resources Program. E-mail to Margaret Clark, National Tropical Botanical Garden, dated May 31, 2011. Subject: A favor for *Lepidium arbuscula*.

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SIGNATURE PAGE for 5-YEAR REVIEW of *Lepidium arbuscula* (anaunau)

Pre-1996 DPS listing still considered a listable entity? N/A

Recommendation resulting from the 5-year review:

- Delisting
- Reclassify from Endangered to Threatened status
- Reclassify from Threatened to Endangered status
- No Change in listing status

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