

Lepidium arbuscula
(Anaunau)

**5-Year Review
Summary and Evaluation**

**U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawaii**

5-YEAR REVIEW
Species reviewed: *Lepidium arbuscula* (Anaunau)

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5-YEAR REVIEW
***Lepidium arbuscula* Anaunau**

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:

Region 1, Endangered Species Program, Division of Recovery, Jesse D'Elia,
(503) 231-2071

Lead Field Office:

Pacific Islands Fish and Wildlife Office, Gina Shultz, Deputy Field Supervisor,
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Cooperating Field Office(s):

N/A

Cooperating Regional Office(s):

N/A

1.2 Methodology used to complete the review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (USFWS) beginning on March 8, 2007. The Bernice P. Bishop Museum provided most of the updated information on the current status of *Lepidium arbuscula* and also provided recommendations for conservation actions needed prior to the next five-year review. The evaluation of the status of the species was prepared by the lead PIFWO biologist and reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species, and Deputy Field Supervisor, before submission to the Field Supervisor for approval.

1.3 Background:

1.3.1 Federal Register (FR) Notice citation announcing initiation of this review:

USFWS. 2007. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 71 species in Oregon, Hawaii, Commonwealth of the Northern Mariana Islands, and Territory of Guam. Federal Register 72(45):10547-10550.

1.3.2 Listing history

Original Listing

FR notice: USFWS. 1996. Endangered and threatened wildlife and plants; determination of endangered status for twenty-five plant species from the island of Oahu, Hawaii; final rule. Federal Register 61(198):53089-53108.

Date listed: October 10, 1996

Entity listed: Species

Classification: Endangered

Revised Listing, if applicable

FR notice: N/A

Date listed: N/A

Entity listed: N/A

Classification: N/A

1.3.3 Associated rulemakings:

USFWS. 2003a. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 101 plant species from the island of Oahu, HI: final rule. Federal Register 68(116):35949-35998.

Critical habitat was designated for *Lepidium arbuscula* in three units totaling 547 hectares (1,350 acres) on Oahu. This designation includes habitat on state, federal and private lands (USFWS 2003a).

1.3.4 Review History:

Species status review [FY 2007 Recovery Data Call (September 2007)]:

Declining

Recovery achieved:

1 (0-25%) (FY 2007 Recovery Data Call)

1.3.5 Species' Recovery Priority Number at start of this 5-year review:

8

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: Recovery Plan for the Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages, plus appendices.

Date issued: August 10, 1998.

Dates of previous revisions, if applicable: N/A

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

Yes
 No

2.1.2 Is the species under review listed as a DPS?

Yes
 No

2.1.3 Was the DPS listed prior to 1996?

Yes
 No

2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?

Yes
 No

2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?

Yes
 No

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?

Yes
 No

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

Yes
 No

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?

Yes
 No

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

Yes
 No

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:

A synthesis of the threats (Factors A, C, D, and E) affecting this species is presented in section 2.4. Factor B (overutilization for commercial, recreational, scientific, or educational purposes) is not known to be a threat to this species.

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 taxon must be managed to control threats (e.g., fenced, weeding, etc.) and be represented in an *ex situ* (off-site) collection. In addition, a minimum of three populations should be documented on Oahu. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

This recovery objective has been partially met.

For downlisting, a total of five to seven populations of *Lepidium arbuscula* should be documented on Oahu. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of five consecutive years before downlisting is considered.

This recovery objective has not been met.

For delisting, a total of eight to ten populations of *Lepidium arbuscula* should be documented on Oahu. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with 300 mature individuals per population for short-lived perennials. Each population should persist at this level for a minimum of five consecutive years before delisting is considered.

This recovery objective has not been met.

2.3 Updated Information and Current Species Status

In addition to the status summary table below, information on the species' status and threats was included in the final critical habitat rule referenced above in section 1.3.3 ("Associated Rulemakings") and in section 2.4 ("Synthesis") below, which also includes any new information about the status and threats of the species.

Table 1. Status of *Lepidium arbuscula* (ʻAnaunau) from listing through 5-year review.

Date	No. wild individuals	No. outplanted	Downlisting Criteria identified in Recovery Plan	Downlisting Criteria Completed?
1996 (listing)	< 900	0	5-7 populations with 300 mature individuals each documented on Oahu	No
			Population naturally reproducing, stable or increasing for 5 years	No
			All populations secured from threats	No
1998 (recovery plan)	< 900	0	5-7 populations with 300 mature individuals each documented on Oahu	Partially
			Population naturally reproducing, stable or increasing for 5 years	Unknown
			All populations secured from threats	Partially
2003 (critical habitat)	~ 1,000	unknown	5-7 populations with 300 mature individuals each documented on Oahu	Partially
			Population naturally reproducing, stable or increasing for five years	Unknown
			All populations secured from threats	No
2008 (5-year review)	906	0	5-7 populations with 300 mature individuals each documented on Oahu	Only one population exceeds 300 mature individuals
			Population naturally reproducing, stable or increasing	Unknown
			All populations secured from threats	No

2.3.1 Biology and Habitat [see note in section 2.3]

2.3.1.1 New information on the species' biology and life history:

2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

2.3.1.4 Taxonomic classification or changes in nomenclature:

2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

2.3.1.7 Other:

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms) [see note in section 2.3]

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

No new information.

2.3.2.3 Disease or predation:

2.3.2.4 Inadequacy of existing regulatory mechanisms:

No new information.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

2.4 Synthesis

Historically, *Lepidium arbuscula* was recorded from 11 populations occurring in the Waianae Mountains on Oahu. At the time of Federal listing, the species was reduced

to ten extant populations of about 900 individuals on open dry ridges in Waianae Mountains (USFWS 1996). In 2003, the ten extant populations consisted of 906 individuals, with populations declining and small clumps of extant individuals widely dispersed (USFWS 2003b). Populations are distributed from Kuaokala in the northern Waianae Mountains to Lualualei-Nanakuli Ridge in the southern Waianae Mountains. Known locations include Ohikilolo (one individual); Makua-Keaau Ridge (60); Kapuhi Gulch (20); and Manini Gulch (one); Pahoa and Halona (30), northwest of Puu Kaua (120), Halona (600), Lualualei-Nanakuli Ridge (13), Kamaileunu Ridge (51), and Mohiakea Gulch (10). Little is known about the life history or biology of *L. arbuscula*, or the genetic variability within the species (USFWS 1998, 2003a, b).

The major threats affecting the species include habitat destruction and direct damage and predation of individuals by feral ungulates such as goats (*Capra hircus*) and pigs (*Sus scrofa*) (Factor A, C, and D) (USFWS 2003a, b, 2008). Competition from invasive introduced plant species for space, light, nutrients and water is one of the primary threats for this species (Factor E). Invasive introduced plant species threatening this species include *Schinus terebinthifolius* (Christmas berry), *Lantana camara* (lantana), *Ageratina adenophora* (Maui pamakani), *Ageratina riparia* (hamakua pamakani), *Morella faya* (firetree), *Grevillea robusta* (silk oak), and *Psidium cattleianum* (strawberry guava).

One population of 20 individuals is located close to a road (Factor E) and two populations (92 individuals; ten percent of total individuals) occur within military action areas (Factor E), and are at threat from fire and other military activities (Factor E) (USFWS 2003b).

To safeguard existing genetic material, propagation for genetic storage and reintroduction is occurring at the University of Hawaii's Lyon Arboretum Micropropagation Laboratory and National Tropical Botanical Garden (Harold L. Lyon Arboretum Micropropagation Laboratory Database 2007; National Tropical Botanical Garden 2007).

The downlisting goals for this species have not been met (see table 1), as only one population contains over 300 individuals and the threats are not being managed. Therefore, *Lepidium arbuscula* meets the definition of endangered as it remains in danger of extinction throughout its range.

3.0 RESULTS

3.3 Recommended Classification:

Downlist to Threatened

Uplist to Endangered

Delist

Extinction

Recovery

Original data for classification in error

No change is needed

3.2 New Recovery Priority Number:

Brief Rationale:

3.3 Listing and Reclassification Priority Number:

Reclassification (from Threatened to Endangered) Priority Number: _____

Reclassification (from Endangered to Threatened) Priority Number: _____

Delisting (regardless of current classification) Priority Number: _____

Brief Rationale:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Survey geographical and historical range for a thorough current assessment of the species.
- Construct enclosure fences to protect individuals from the activities of feral ungulates, and eradicate invasive introduced plant species within the enclosures.
- Initiate planning and contribute to implementation of ecosystem level restoration and management to benefit this species.
- Augment current natural populations with appropriate genetic individuals.
- Assess genetic variability within extant populations.
- 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.

5.0 REFERENCES

- Harold L. Lyon Arboretum Micropropagation Laboratory. 2007. Database. Unpublished.
- National Tropical Botanical Garden. 2007. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.
- [USFWS] U.S. Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants; determination of endangered status for twenty-five plant species from the Island of Oahu, Hawaii; final rule. Federal Register 62(198):53089–53108.
- [USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. U.S. Fish and Wildlife Service, Portland, OR. 270 pages, plus appendices.
- [USFWS] U.S. Fish and Wildlife Service. 2003a. Endangered and threatened wildlife and plants: final designation or nondesignation of critical habitat for 101 plant species from the island of Oahu, HI: final rule. Federal Register 68(116):35949–35998.
- [USFWS] U.S. Fish and Wildlife Service. 2003b. Biological Opinion of the U.S. Fish and Wildlife Service for routine military training and transformation of the 2nd Brigade 25th Infantry Division (Light), U.S. Army installations, island of Oahu. Unpublished.
- [USFWS] U.S. Fish and Wildlife Service. 2008. Rare plant tracking database. Pacific Islands Fish and Wildlife Office, Honolulu, HI. Accessed on April 28, 2008. Unpublished.

Signature Page
U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Lepidium arbuscula* (Anaunau)

Current Classification: _____ E _____

Recommendation resulting from the 5-Year Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: _____

Review Conducted By:

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Approved  Date 21 July 2009
Acting Field Supervisor, Pacific Islands Fish and Wildlife Office