

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Delissea subcordata* (oha)

**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 5-year review for *Delissea subcordata* (USFWS 2008). 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](http://ecos.fws.gov/tess_public)).

### **Review Analysis:**

Please refer to the previous 5-year review for *Delissea subcordata* published on January 18, 2008 (available at [http://ecos.fws.gov/docs/five\\_year\\_review/doc1777.pdf](http://ecos.fws.gov/docs/five_year_review/doc1777.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 *D. subcordata*.

This short-lived shrub is endangered and occurs on the island of Oahu. The current status and trends for *Delissea subcordata* are provided in the tables below.

**New status information:**

As of spring 2012, seven populations have 24 mature and 48 juvenile wild individuals and 736 mature and 668 juvenile reintroduced individuals (OANRP 2012a). This represents an increase from the 40 wild individuals reported in the last five-year review.

**New taxonomic information:**

As stated in the previous 5 year review, a 2005 revision of the genus *Delissea* split the Waianae *Delissea subcordata* populations into three species, of which *D. waianaensis* is the only extant species. All of the populations discussed here are included under *D. waianaensis* (USFWS 2008).

**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 to be available sometime in 2013.

**New management actions:**

- Captive propagation for genetic storage and reintroduction - Oahu Army Natural Resource Program (OANRP) has 49 individuals of *Delissea waianaensis* represented in seed storage and 17 plants in the nursery (OANRP 2012b). This species shows no decrease in viability after ten years in storage (U.S. Army Garrison 2011).
- Ecosystem-altering invasive plant species control - Weed control is occurring for individuals in Kaluaa area (U.S. Army Garrison 2011).
- Predator / herbivore control - Slug control at *Delissea waianaensis* populations began with the first Sluggo treatment in October 2011. This will be continued biweekly during the wet season. Annual monitoring of *Delissea waianaensis* for seedling recruitment will continue, focusing on detecting evidence of slug feeding such as slime trails, leaf edges consumed, lower leaves consumed. If no slug feeding is observed, then Sluggo applications may be reduced or halted (U.S. Army Garrison 2011).
- Threat control research - Intact seeds of *Delissea waianaensis* were found in the stomachs of black rats (*Rattus rattus*) indicating seeds are not destroyed in the digestive process as are seeds of other related species (Shiels 2010).

**Synthesis:**

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for 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. *Delissea subcordata* is a short-lived perennial, and to be considered stable, the taxon must be managed to control threats (e.g., fenced) and be represented in an *ex situ* (offsite) collection. In addition, a minimum of three populations should be documented on Oahu, where the species now occurs or occurred historically. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

For downlisting, a total of five to seven populations of *Delissea subcordata* should be documented on Oahu where it now occurs or occurred historically. 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.

For delisting, a total of eight to ten populations of *Delissea subcordata* should be documented on Oahu where it now occurs or occurred historically. 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.

The stabilization goals for this species have been partially met, as three populations (Kaluaa, Ekahanui and Kahanahaiki to Keawapilau) of 50 or more mature individuals exist. Downlisting goals have not been met, as only one population has over 300 mature individuals (Table 1) and not all threats are sufficiently controlled throughout all of the populations (Table 2). Therefore, *Delissea waianaensis* meets the definition of endangered as it remains in danger of extinction throughout its range.

#### **Recommendations for Future Actions:**

- Captive propagation for genetic storage and reintroduction - Complete full genetic storage of all populations.
- Ungulate exclosures - Fence remaining populations to protect from ungulates.
- Ecosystem-altering invasive plant species control - Control invasive plant species within and around remaining populations.
- Predator / herbivore control - Control rats around remaining individuals.
- Threat control research - Continue research to develop efficient and effective methods of slug control.
- Surveys / inventories
  - Survey for surviving plants of the two species that were formerly also considered *Delissea subcordata*: *D. takeuchii* and both subspecies of *D. subcordata*.
  - Survey for new populations of *Delissea waianaensis* in suitable habitat, and revisit historical sites for regeneration from seed banks.
- Population biology research - Study *Delissea waianaensis* 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. Alliance and partnership development - Initiate planning and contribute to implementation of ecosystem-level management and restoration to benefit this species.
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- Federal Register updates - Update the listed entity on 50 CFR 17 to match the currently recognized taxonomy.

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

<b>Date</b>	<b>No. wild individual</b>	<b>No. outplanted</b>	<b>Downlisting Criteria identified in Recovery Plan</b>	<b>Downlisting Criteria Completed?</b>
1996 (listing)	70-80	0	All threats managed in all 5-7 populations	No
			Complete genetic storage	No
			5-7 populations with 300 mature individuals each	No
1998 (recovery plan)	<80	3	All threats managed in all 5-7 populations	No
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	No
2003 (critical habitat)	<70	Unknown	All threats managed in all 5-7 populations	Unknown
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	No
2008 (5-yr review)	40	275	All threats managed in all 5-7 populations	Partially
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	No
2013 (5-yr review)	72	1,404	All threats managed in all 5-7 populations	Partially (Table 2)
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	Partially, 1 population

**Table 2. Status of threats to *Delissea waianaensis* and ongoing conservation efforts.**

<b>Threat</b>	<b>Listing factor</b>	<b>Current Status</b>	<b>Conservation/ Management Efforts</b>
Ungulates – habitat modification by goats and pigs	A, D	Ongoing	Almost accomplished, exceptions are Kapuna Gulch, Kealia and Palikea Gulch
Rats - herbivory	C	Ongoing	No
Fire – habitat modification and plant destruction	A, E	Ongoing	Partially: firebreaks at Makua
Military training activities	E	Ongoing	No
Invasive introduced plants	A, E	Ongoing	Partially: weed control ongoing but not within the entire range
Genetic bottleneck	E	Ongoing	Partially
Stochastic events	A, E	Ongoing	No
Slug herbivory	C	Ongoing	Partially
Climate change	A, E	Increasing	No

**References:**

See previous 5-year review for a full list of references (USFWS 2007). Only references for new information are provided below.

[OANRP] Oahu Army Natural Resource Program. 2012a. Makua implementation plan - population unit status: *Delissea waianaensis*. 2 pages. Unpublished.

[OANRP] Oahu Army Natural Resources Program. 2012b. Genetic storage summary, 2012-03-20 for *Delissea waianaensis*. 1 page. Unpublished.

Shiels, Aaron. 2010. Ecology and impacts of introduced rodents (*Rattus* spp. and *Mus musculus*) in the Hawaiian Islands; a dissertation submitted to the Graduate Division of the University of Hawaii in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Botany. Available on line at <[http://manoa.hawaii.edu/hpicesu/DPW/AS\\_THESIS/AS\\_2010.pdf](http://manoa.hawaii.edu/hpicesu/DPW/AS_THESIS/AS_2010.pdf)>.

U.S. Army Garrison. 2011. 2011 status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 269 pages. Available online at <[http://manoa.hawaii.edu/hpicesu/DPW/2011\\_YER/default.htm](http://manoa.hawaii.edu/hpicesu/DPW/2011_YER/default.htm)>.

[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. 2008. *Delissea subcordata* 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 13

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<[http://ecos.fws.gov/docs/five\\_year\\_review/doc1777.pdf](http://ecos.fws.gov/docs/five_year_review/doc1777.pdf)>.

**U.S. FISH AND WILDLIFE SERVICE**  
SIGNATURE PAGE for 5-YEAR REVIEW of *Delissea subcordata* (oha)

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

*acting deputy*

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Date 2013-08-01