

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Hesperomannia arbuscula* (no common name)

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

Marie Bruegmann, 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 *Hesperomannia 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 *Hesperomannia arbuscula* published on April 7, 2009 (available at http://ecos.fws.gov/docs/five_year_review/doc2472.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 *Hesperomannia arbuscula*.

This long-lived tree is endangered. This species occurs on West Maui and the Waianae Mountains of Oahu. The current status and trends for *Hesperomannia arbuscula* are provided in the tables below.

New taxonomic information:

Under the taxonomic treatment of the genus *Hesperomannia* (Morden and Harbin 2013), all Maui Nui plants are genetically cohesive and share morphological similarity and are considered *Hesperomannia arborescens*. The plants restricted to the Waianae Mountains on Oahu are now treated as *H. oahuensis*, except the Palikea Gulch population, which has been grouped with the Koolau Mountains populations and is treated as *H. swezeyi* (see the *H. arborescens* five-year review for a full discussion of *H. swezeyi*). This population is considered extirpated and *H. oahuensis* is now known solely from the Waianae Mountains. This review follows the Morden and Harbin taxonomic treatment and will address the West Maui populations of *H. arbuscula* as *H. arborescens* and the Waianae Mountain populations on Oahu will be addressed as *H. oahuensis*. *Hesperomannia arbuscula* has been subsumed into *H. arborescens*, and *H. arbuscula* is no longer considered a valid species (Ching-Harbin 2003; Morden and Harbin 2013). In this five-year review, *H. oahuensis* and *H. arborescens* will be addressed separately.

New status information:

- The *Hesperomannia arborescens* population at Waihee Valley, Maui, contains 34 individuals; the population at Iao Valley contains 15 mature and 5 immature individuals (Maui Nui Plant Extinction Prevention Program [PEPP] 2013).
- The Oahu Army Environmental Program (OANRP) has identified nine *H. oahuensis* populations on Oahu. One mature wild individual remains in Haleauau, and 59 immature individuals have been reintroduced in Pahole. Currently, Makaha contains three wild mature individuals, three wild immature individuals, and 25 immature individuals that were reintroduced in the spring of 2012. Pualii contains 75 reintroduced immature individuals (OANRP 2012).
- Three *H. oahuensis* individuals in Waianae Kai were vegetative in April of 2011; fruit was immature in August (Perlman 2012).

Combined totals for *Hesperomannia oahuensis* are seven wild and 159 reintroduced individuals, most of which are reintroductions (OANRP 2012), and for *H. arborescens* 54 individuals (Maui Nui PEPP 2013).

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.

New management actions:

Hesperomannia oahuensis:

- Ungulate exclosures - All populations are protected from ungulates by the 1.9-acre Napepeiaulelo fence in the U.S. Army's Makua Training Area on Oahu (U. S. Army Garrison 2010).
- Ecosystem-altering invasive plant species control - Weed control is ongoing and is used to create fuel breaks (U. S. Army Garrison 2010).
- Captive propagation for genetic storage and reintroduction - Three populations, at Napepeiaulelo, North Palawi and Waianae Kai, are being managed for genetic storage (U. S. Army Garrison 2010).

Synthesis:

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for plants from the island of Oahu (USFWS 1998), based on whether the species is an annual, a long-lived perennial (fewer than 10 years), or a long-lived perennial.

Hesperomannia arborescens as listed is a long-lived perennial, and to be considered stabilized, which is the first step in recovering the species, it must be managed to control threats (*e.g.*, fenced) and be represented in an *ex situ* (at other than the plant's natural location, such as a nursery or arboretum) collection. In addition, a minimum of three populations should be documented. For the species to be considered stable, each of these populations must be naturally reproducing and increasing in number, with a minimum of 25 mature individuals per population.

Hesperomannia oahuensis has no populations with more than 25 mature individuals and *H. arborescens* has one population with over 25 individuals. In addition, all threats are not being managed throughout the species as listed. Therefore, *H. arbuscula* as listed 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
 - Continue hand-pollination to produce viable seeds.
 - Continue collection of genetic material for storage.
 - Develop a managed breeding population to generate more seeds.
 - Consider other methods of propagation to increase numbers in genetic storage including air layering and grafting.
- Predator/herbivore control - Determine and implement adequate rat control methods.
- Invertebrate control research - Determine and implement adequate slug control methods.
- Reintroduction / translocation
 - Enhance current natural populations with genetically appropriate individuals where threats have been controlled, not mixing stock between islands.
 - Augment genetic diversity among populations on the same island.
 - Establish new populations within the historical range or in suitable habitat where threats have been controlled.
- Alliance and partnership development

- Initiate planning and contribute to implementation of ecosystem level restoration and management to benefit this taxon.
 - Contact community groups near the Waianae Kai population to increase awareness of the conservation of this species.
- Surveys/inventories - Survey historical range in the Waianae Mountains for a thorough current assessment of the status of populations.
- Life history research - Study 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.
- Federal Register updates - Update 50 CFR 17 to reflect revised taxonomy.

Table 1. Status and trends of *Hesperomannia 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)	~50	0	All threats managed in 3 populations	Unknown
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	~90		All threats managed in 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	Oahu 90-92	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2009 (5-yr review)	Oahu 13	0	All threats managed in 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2013 (5-yr review) <i>Hesperomannia arborescens</i> (West Maui)	55		All threats managed in 3 populations	Partially, 1 population
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
<i>Hesperomannia</i>	7	159	All threats managed	Partially (Table 2)

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
<i>oahuensis</i> (Waianae Mtns, Oahu)			in all 3 populations	
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

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

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – pigs degrade habitat and dig up seedlings	A, C, D, E	Ongoing	Yes
Fire – habitat modification and plant destruction	A, E	Ongoing	Partially
Invasive introduced plants	A, E	Ongoing	Partially
Human trampling	E	Unknown	Partially, presumably by fencing
Flower collection for lei	B	Unknown	Partially, presumably by fencing
Reduced reproduction due to low pollen viability, seedling mortality and small number of plants	E	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.

Ching-Harbin, S. L. 2003. Measures of fitness and genetic variation in the endangered Hawaiian genus *Hesperomannia*. M.S. Thesis. Department of Botany, University of Hawaii at Manoa, Honolulu, Hawaii. 201 pages.

[Maui Nui PEPP] Maui Nui Plant Extinction Prevention Program. 2013. Monthly report. July 2013. 3 pages. Unpublished.

Morden, Clifford W. and S.C. Harbin. 2013. Evolution and biographic origins of the endemic Hawaiian genus *Hesperomannia* (Asteraceae). *Pacific Science* 67(2):219-235.

- Perlman, Steve. 2012. 5 year review data 2012. National Tropical Botanical Garden, Kalaheo, Hawaii. 2 pages. Unpublished.
- [OANRP] Oahu Army Natural Resource Program. 2012. Makua implementation plan - population unit status: *Hesperomannia arbuscula*. 1 page. Unpublished.
- U.S. Army Garrison. 2010. Status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 588 pages. Available online at http://manoa.hawaii.edu/hpicesu/DPW/2010_YER/2010_YER_Edited.pdf.
- [USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 270 pages, plus appendices.
- [USFWS] U.S. Fish and Wildlife Service. 2007. *Hesperomannia arbuscula* (no common name) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 9 pages. Available online at http://ecos.fws.gov/docs/five_year_review/doc2472.pdf.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Hesperomannia arbuscula*
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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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