5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Hesperomannia arborescens* (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 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 5-year review for *Hesperomannia arborescens* (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 arborescens* published on April 7, 2009 (available at http://ecos.fws.gov/docs/five_year_review/doc2471.pdf) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species' biological status have come to light since listing to warrant a change in the Federal listing status of *Hesperomannia arborescens.*

This long-lived tree is endangered was formerly known from locations on three islands: Lanai, Koolau Mountains on Oahu, and Molokai. The species is now considered

extirpated form Lanai (USFWS 1994). The current status and trends for *Hesperomannia arborescens* are provided in the tables below.

New taxonomic information:
The taxonomic revision based on genetic studies at the University of Hawaii by Morden and Harbin (2013) classifies the Koolau Mountain populations on Oahu of *Hesperomannia arborescens* as *H. swezeyi.* Under this treatment, all individuals of *Hesperomannia* on West Maui, Molokai, and Lanai are considered *H. arborescens*, although these populations were listed as *H. arbuscula* and will be addressed in that five-year review (Ching-Harbin 2003, Morden and Harbin 2013). This review will address populations originally listed as *H. arborescens*.

New status information:

- In 2012, Oahu Army Natural Resource Program (OANRP) reported populations as follows: Kamananui to Kaluanui -133 mature individuals and 158 immature plants; Kaukonahua – 76 mature plants and 180 immature; Lower Opaeula – 18 mature and 9 immature (OANRP 2012c). No new information is available for other populations on Oahu.

The current status of the species listed as *Hesperomannia arborescens* is: *H. arborescens* -30 individuals on Molokai (USFWS 2009); *H. swezeyi* - over 600 plants on Oahu (OANRP 2012c). However, additional individuals originally treated as *H. arbuscula* are now considered part of the listed species *H. arborescens* and are discussed in that five-year review.

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 swezeyi:

- Captive propagation for genetic storage and reintroduction - Nineteen individual plants currently exist at the Oahu Army Natural Resource Program (OANRP) nursery on Oahu (OANRP 2012b).

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.

The stabilization goals for this species have not been met. *Hesperomannia swezeyi* has two populations with more than 25 mature individuals and *Hesperomannia arborescens* has one population with over 25 individuals (Table 1), but this species is not producing viable seed in the wild, so populations are not reproducing. In addition, all threats are not being managed throughout the species as listed (Table 2). Therefore, *Hesperomannia arborescens* 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 collection of genetic material for storage, controlled propagation and future population augmentation.
  - Determine and implement propagation techniques for this species.
  - Study the use of hand-pollination techniques to produce viable seeds and to augment genetic diversity among populations.
- Ungulate exclosures - Construct exclosure fences to protect individuals from the activities of feral pigs.
- Ecosystem-altering invasive plant species control - Eradicate introduced invasive plant species within the exclosures.
- Threats control research - Determine and implement adequate methods for rat control.
- Reintroduction / translocation
  - Augment current natural populations to increase numbers of individuals.
  - Establish new populations within historical range or suitable habitat where threats have been controlled.
- Surveys / inventories - Survey the geographical and historical range of *Hesperomannia arborescens* as listed for additional populations and a thorough current assessment of the status of known populations. Surveys should be mostly conducted in, but not limited to, West Maui Mountains and also in the wet forests of the northern coastal cliffs of Molokai and Lanai.
- Population biology research - Study *Hesperomannia arborescens* 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 arborescens* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1996 (listing)	<70	0	All threats managed in 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
1998(recovery plan)	100		All threats managed in 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Unknown
2003 (critical habitat)	185	unknown	All threats managed in 3 populations	Unknown
			Complete genetic storage	Unknown
			3 populations with 25 mature individuals each	Unknown
2009 (5-yr review)	>597	0	All threats managed in 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Yes, but not producing viable seed
2013 (5-yr review)	*H. arborescens*: 30	0	All threats managed in 3populations	Partially
			Complete genetic storage	Unknown
			3 populations with 25 mature individuals each	Partially
	H. swezeyi: >600	0	All threats managed in all 3populations	Partially
			Complete genetic storage	Partially

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
			3 populations with 25 mature individuals each	Partially

Table 2. Threats to *Hesperomannia arborescens* and ongoing conservation efforts

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – habitat degraded and modified by goats and pigs	A, D	Ongoing	Partially
Herbivory by rats and pigs	C	Ongoing	Partially
Fire – habitat modification and plant destruction	A, E	Ongoing	Partially
Invasive introduced plants	A, E	Ongoing	Partially
Low seed set and viability	E	Ongoing	Partially
Military activities (*H. swezeyi* only)	E	Ongoing	Partially
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.

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 Plant Extinction Prevention Program. 2013. Monthly report. July 2013. 3 pages. Unpublished.

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

National Tropical Botanical Garden. 2008. Provenance report 081028. Asteraceae: *Hesperomannia arborescens.* 1 page. Unpublished.

[OANRP] Oahu Army Natural Resource Program. 2012b. Army nursery inventory summary. 1 page. Unpublished.

[OARNP] Oahu Army Natural Resource Program. 2012c. Status report for the Makua and Oahu implementation plans. Oahu Army Natural Resources Program, Pacific Cooperative Studies Unit, Schofield Barracks, Hawaii. 232 pages. Unpublished.

[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. 2009. *Hesperomannia arborescens* (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/doc2471.pdf>.

U.S. FISH AND WILDLIFE SERVICE

SIGNATURE PAGE for 5-YEAR REVIEW of *Hesperomannia arborescens* (no common name)

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
__X__ No Change in listing status

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Maile M. Bluegmann Date 2013-08-07