

## 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. 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. Federal Register 88(83): 20088–20092, May 7, 2018.

### **Lead Region/Field Office:**

Interio Region 12/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

### **Name of Reviewer:**

Cheryl Phillipson, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, PIFWO

Megan Laut, Conservation & Restoration Team Manager, PIFWO

### **Methodology used to complete this 5-year review:**

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (Service) beginning in October 2019. The review was based on a review of current, available information since the last 5-year review for *Hesperomannia arbuscula* (USFWS 2013). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Conservation and Restoration Team Manager.

### **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 reviews for *Hesperomannia arbuscula* published in the Federal Register on September 7, 2009 and August 15, 2013 (available at [https://ecos.fws.gov/docs/five\\_year\\_review/doc2472.pdf](https://ecos.fws.gov/docs/five_year_review/doc2472.pdf) and [https://ecos.fws.gov/docs/five\\_year\\_review/doc4216.pdf](https://ecos.fws.gov/docs/five_year_review/doc4216.pdf)) for a complete review of the species' status, threats, management efforts, and references cited. We are not aware of any significant new information regarding the species' biological status since listing to warrant a change in the Federal listing status of *H. arbuscula*; however, the taxonomic change should be addressed in the *Federal Register*.

This long-lived perennial shrubby tree in the Asteraceae (sunflower) family is endangered and known from to the islands of O‘ahu and Maui; however, occurrences on west Maui are now recognized as *Hesperomannia arborescens*, and those in the Wai‘anae mountains of O‘ahu are recognized as *H. oahuensis* (Morden and Ching Harbin

2013). These populations will be included in this report as they were previously identified as *H. arbuscula*. The current status and trends for *H. arbuscula* are provided in the tables below.

#### New Status Information:

- Currently, there are two wild populations totaling four mature individuals at Mākaha and Schofield Barracks-West-Hale‘au‘au in the Wai‘anae mountains on the island of O‘ahu (Plant Extinction Prevention Program (PEPP) 2015, 2016, 2017, 2019; U.S. Army 2019). On west Maui, there are seven wild individuals at upper Waihe‘e (PEPP 2016).
- In 2012, critical habitat was designated on O‘ahu for *Hesperomannia arbuscula* in eight units in the lowland mesic and lowland wet ecosystems (2,653 hectares (ha); 6,553 acres (ac)) (77 FR 57648, September 18, 2012). In 2016, critical habitat was designated on Maui for *H. arbuscula* in 14 units in the lowland dry, lowland wet, dry cliff, and wet cliff ecosystems (4,836 ha; 11,950 ac) (81 FR 17790, March 30, 2016). Since designation of critical habitat, the taxonomy of this species has changed and critical habitat should be reassessed for *H. arbuscula* (as *H. oahuensis* and *H. swezeyi* on O‘ahu and as *H. arborescens* on west Maui).

#### New Threats:

- Climate change loss or degradation of habitat—Climate change may pose a threat to this species. Fortini *et al.* (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawai‘i using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. The assessment by Fortini *et al.* (2013) concluded that *Hesperomannia arbuscula* is highly vulnerable to the impacts of climate change, with a vulnerability score of 0.63 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, additional management actions are likely needed to conserve this taxon into the future, such as locating key microsites that overlap with current and future climate envelopes for outplanting efforts.

#### New Management Actions:

- Ungulate monitoring and control—The Army Natural Resources Program-O‘ahu (ANRP) manages ungulates at all wild and reintroduced populations (ANRP 2018).
- Nonnative plant control—The ANRP controls nonnative plants at three locations in the Wai‘anae mountains: Pahole, Mākaha, and Puali‘i (ANRP 2018).
- Rat control—The ANRP controls rats at Kapuna, Hale‘au‘au, and Mākaha (ANRP 2018).
- Captive propagation for genetic storage and reintroduction—
  - Lyon Arboretum Micropropagation Laboratory reports two explants in storage representing one founder from the Wai‘anae mountains (Lyon Arboretum 2019).

- The Olinda Rare Plant Facility (ORPF) reports propagation of eight potted plants representing seven founders from ‘Īao, Waihe‘e, and Waiehu on west Maui (ORPF 2019).
- The ANRP reports propagation of 27 plants representing seven individuals from populations at Mākaha, Pālāwai, and Hale‘au‘au (Schofield Barracks-West) (U.S. Army 2019). ANRP also collected and has stored 83 seeds representing nine individuals from four populations at Mākaha, Pālāwai, Hale‘au‘au (Schofield Barracks-West), and Wai‘anae Kai (U.S. Army 2019).
- Reintroduction and translocation—The ANRP reintroduced 252 plants representing 10 founders from four source populations, 134 of which remain (U.S. Army 2019).
- Population biology research—
  - The ANRP and PEPP conduct hand pollination for improved seed set at wild and reintroduced populations on O‘ahu and Maui, with moderate success (ANRP 2018; PEPP 2016).
  - PEPP and ANRP set up game cameras at Ke‘awapilau and Mākaha to monitor the reintroduced populations (PEPP 2016).

**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?
1991 (listing)	ca 50 O‘ahu and Maui combined	0	All threats managed in all 3 populations	Unknown
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	88–90 (O‘ahu) 1 (Maui)	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

2003 (critical habitat)	90–92 (O‘ahu) 37 (Maui)	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2009 (5-year review)	13 (O‘ahu) 3 (Maui)	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2012 (critical habitat)	14 (O‘ahu)	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2013 (5-year review)	54 (Maui <i>H. arborescens</i> ) 7 (O‘ahu <i>H. arbuscula</i> )	159 (O‘ahu <i>H. arbuscula</i> )	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2016 (critical habitat)	3 (Maui)	185 (O‘ahu)	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially

			3 populations with 50 mature individuals each	No
<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>*Preventing Extinction Criteria identified by HPPRCC</b>	<b>*Preventing Extinction Criteria Completed?</b>
2020 (5-year review)	4 (O‘ahu) 7 (Maui)	134 (252 planted on O‘ahu)	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			Reproduction (i.e. viable seeds, seedlings) at all 3 populations	Partially
			3 populations with 50 mature individuals each	No

\* The Preventing Extinction Stage was established in 2011. Prior to 2011, the Interim Stabilization Stage was the first stage towards recovery (now it is the second stage after Preventing Extinction).

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

<b>Threat</b>	<b>Listing factor</b>	<b>Current Status</b>	<b>Conservation/ Management Efforts</b>
Ungulate destruction and degradation of habitat	A	Ongoing	Partial, exclosures protect 4 populations on O‘ahu
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, invasive plant control at 3 populations on O‘ahu
Fire destruction and degradation of habitat	A	Ongoing	Partial, fire management and response plan on O‘ahu
Climate change degradation or loss of habitat	A	Ongoing	None
Collecting impacts	B	Unknown	Partial, exclosures may provide protection on O‘ahu
Ungulate predation or herbivory	C	Ongoing	Partial, exclosures protect 4 populations on O‘ahu
Lack of adequate hunting regulations	D	Ongoing	Partial, exclosures on O‘ahu

Reduced viability due to low numbers, low pollen viability, and seedling mortality	E	Ongoing	Partial, seed storage, hand pollination, propagation, and reintroduction efforts
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**Synthesis:**

Currently there are four mature wild individuals of *Hesperomannia oahuensis* on O‘ahu and seven mature wild individuals of *H. arborescens* on west Maui. A landscape-based assessment of climate change vulnerability for native plants of Hawai‘i using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *H. arbuscula* is highly vulnerable to the effects of climate change. Wild and reintroduced populations on O‘ahu are provided protection from feral ungulates by fencing. Hand pollination, seed collection, propagation, and reintroduction are ongoing.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the Oahu Plants (USFWS 1998), and have been updated according to the draft revised recovery objective guidelines developed by the Hawai‘i and Pacific Plants Recovery Coordinating Committee (HPPRCC 2011). The HPPRCC identifies an additional initial objective, the Preventing Extinction Stage, in addition to the Interim Stabilization, Delisting, and Downlisting objectives. Furthermore, life history traits such as breeding system, population size fluctuation or decline, and reproduction type (sexual or vegetative), have been included in the calculation of goals for the number of populations and reproducing individuals for each stage. The goals for each stage remain grouped by life span defined as annual, short-lived perennial (fewer than 10 years), or long-lived perennial.

*Hesperomannia arbuscula*, now recognized as *H. oahuensis* on O‘ahu, and as *H. arborescens* on west Maui, is a long-lived self-incompatible perennial shrubby tree. To prevent extinction, which is the first milestone in recovering the species, the taxon must be managed to control threats (e.g., fenced) and have 50 individuals (or the total number of individuals if fewer than 50 exist) from each of three populations represented in *ex situ* (secured off-site, such as a nursery or seed bank) collections. In addition, a minimum of three populations should be documented on the islands where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings, saplings), with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. There are no populations totaling at least 50 reproducing individuals, there are only 11 wild plants and no regeneration at reintroductions. Genetic storage goals have not been met, and all threats are not being managed (Table 1, Table 2). Therefore, *Hesperomannia arbuscula* (as *H. oahuensis* and *H. arborescens*) meets the definition of Endangered as it remains in danger of extinction throughout its range.

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

We are not aware of any new threats or other significant new information regarding the species' biological status since the last 5-year review in 2013. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2020.

- Surveys and inventories—Continue to survey historical range on O‘ahu for a thorough assessment of the status of populations.
- Ungulate monitoring and control—Continue to maintain fenced exclosures to protect individuals from the negative impacts of habitat destruction and browsing by ungulates.
- Invasive plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species, and those that compete with *Hesperomannia* species.
- Predator and herbivore monitoring and control—Implement effective methods to control rats and slugs.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use to determine future landscape needed for the recovery of the species.
- Captive propagation for genetic storage and reintroduction—
  - Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
  - Develop a managed breeding program to generate more seeds and increase genetic diversity among populations on O‘ahu.
  - Continue hand pollination efforts to produce viable seeds.
  - Consider other methods of propagation including air-layering and grafting to increase numbers for genetic representation.
- Reintroduction and translocation—Continue to reintroduce individuals into suitable habitat within historic range that is being managed for known threats to this species to build resiliency and redundancy to reduce impacts of loss of viability.
- Alliance and partnership development—Continue to work with partners in planning and implementation of ecosystem-level restoration and management to benefit this species. Increase community awareness of the importance of conservation of this species.
- Federal Register updates—Update 50 CFR 17 to reflect the revised taxonomy.

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- [PEPP] 2019. Plant Extinction Prevention Program, annual recovery subpermit FWSPIFWO-26 report (January 1<sup>st</sup>, 2018–December 31<sup>st</sup> 2018), as designated under the U.S. Endangered Species Act. Unpublished report submitted to U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii. 569 pp.
- [U.S. Army] U.S. Army, Environmental Division. 2019. Report to the U.S. Fish and Wildlife Service for Oahu Army Natural Resource Program Permit: TES-043638, reporting period January 1, 2018-December 31, 2018. 16 pp. + appendices.
- [USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. Portland. 207 pp. + appendices.
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[USFWS] 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. 88 FR 20088, May 7, 2018.

**U.S. FISH AND WILDLIFE SERVICE**

SIGNATURE PAGE for 5-YEAR REVIEW of *Hesperomannia arbuscula* (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
- No Change in listing status

**For Field Supervisor, Pacific Islands Fish and Wildlife Office**

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Date \_\_\_\_\_