

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Phyllostegia hirsuta* (no common name)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands . Federal Register 87(90): 28031–28034, May 10, 2022.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

Name of Reviewer:

Daniel Adamski, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, PIFWO

Megan Laut, Recovery Program 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 2023. The review was based on a review of current, available information since the last 5-year review for *Phyllostegia hirsuta* (USFWS 2019). The evaluation by Daniel Adamski, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery Program 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/ecp/species/5698>).

Review Analysis:

Please refer to the previous 5-year reviews for *Phyllostegia hirsuta* published in the Federal Register on January 18, 2008, (available at https://ecos.fws.gov/docs/tess/species_nonpublish/1191.pdf); August 7, 2013, (available at https://ecos.fws.gov/docs/tess/species_nonpublish/2090.pdf), and on September 30, 2019, (available at https://ecos.fws.gov/docs/tess/species_nonpublish/2887.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 *P. hirsuta*.

This short-lived perennial subshrub to scandent liana in the Lamiaceae (mint) family is endangered and is known from the island of O‘ahu. The status and trends for *Phyllostegia hirsuta* are provided in the tables below.

New Status Information:

- Currently, there are estimated to be 46 wild individuals (32 mature and 14 immature) of *Phyllostegia hirsuta* across nine population units in the Ko‘olau and Wai‘anae mountains on O‘ahu (Army Natural Resources Program on O‘ahu [ANRPO] 2023a). The two largest population units are found at Koloa and Hale‘au‘au to Mohiākea, with 11 and 13 individuals respectively. Six populations, however, have not been monitored since between 2006 and 2016, totaling 21 individuals (ANRPO 2023b, Appendix 4-1).
- Currently, there are approximately 35 founder lines represented in *ex situ* storage and propagation collections, including seeds in seed banks, explants in tissue culture, and propagated plants (ANRPO 2023b, Appendix 4-3).

New Threats:

- None

New Management Actions:

- Ungulate monitoring and management—Ungulates are controlled and fencing is maintained by ANRPO at six management units encompassing wild and reintroduced population sites (ANRPO 2023b, Appendix 4-2).
- Invasive nonnative plant management— The ANRPO controls non-native plants in four management units encompassing wild and reintroduced populations (ANRPO 2023b, Appendix 4-2).
- Control of predation and herbivory by rats— The ANRPO controls rats using Goodnature™ A24 rat traps. ANRPO reported control in four management units encompassing wild and reintroduced populations (ANRPO 2023b, Appendix 4-2).
- Control of predation by nonnative invertebrates— The ANRPO utilizes Ferroxx® to control slugs in two management units encompassing wild and reintroduced populations (ANRPO 2023b, Appendix 4-2).
- Collection and propagation for genetic storage and reintroduction—
 - ANRPO reports 22 total founder plants in seed storage, with 15 of the 22 founders having at least 50 viable seeds, and 35 individual founders as plants in cultivation (ANRPO 2023b, Appendix 4-3).
 - Lyon Arboretum Micropropagation Laboratory reports 938 explants in micropropagation representing 32 founders (Lyon Arboretum 2023).
 - The O‘ahu Nursery reports one founder plant in propagation (O‘ahu Nursery 2023).
- Reintroduction/ Augmentation/ Introduction—
 - There are 106 surviving reintroduced individuals of *Phyllostegia hirsuta* across three population units, with 13 mature and 93 immature individuals (Army Natural Resources Program on O‘ahu [ANRPO] 2023a). These population units include Hale‘au‘au to Mohiākea, Kōloa, and Pu‘u Palikea. The largest reintroduction site is at Pu‘u Palikea, with 97 total plants, 51 of which were reintroduced in 2023 (ANRPO 2023b, Appendix 4-1).

Table 1. Status and trends of *Phyllostegia hirsuta* from listing through current 5-year review. Table 1a shows progress according to Interim Stabilization Goals; Table 1b shows progress according to Preventing Extinction Goals.

Table 1a.

Date	No. wild individuals	No. Outplanted	Stability Goals identified in Recovery Plan	Stability Goals Completed?
1996 (Listing)	150-200	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2008 (5-year review)	160	72	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2013 (5-year review)	330-396	All available stock, unreported numbers	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially

Table 1b.

Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2019 (5-year review)	52	0	All threats managed in all 3 populations	Partially
			Reproduction (i.e., viable seeds, seedlings, saplings) at all 3 populations	Unknown
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2024 (5-year review)	25-46	106	All threats managed in all 3 populations	Partial
			Complete genetic storage	Partial
			Natural reproduction at all 3 populations	Partial
			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 *Phyllostegia hirsuta* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, ungulate control at six management units
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plant control at four management units
Fire destruction and degradation of habitat	A	Ongoing	Partial, fire management plans and coordinated response
Climate change degradation or loss of habitat, including hurricanes	A	Ongoing	None
Ungulate predations and herbivory	C	Ongoing	Yes, ungulate control at six management units
Invertebrate predation and herbivory-Slugs	C	Ongoing	Partial, control at two management units
Disease	C	Ongoing	Partial, long-term control measures for powdery mildew unknown
Competition with established invasive plant species	E	Ongoing	Partial, nonnative plant management in four management units
Military training activity	E	Ongoing	Partial, 6 management areas
Reduced viability due to low numbers	E	Ongoing	Partial, seed storage, micropropagation, and outplanting ongoing

Synthesis:

Currently there are 25-46 wild individuals of *Phyllostegia hirsuta* on O‘ahu. Some individuals are provided protection by fencing, nonnative plant control, rat, slug, and ungulate control. Seed storage, micropropagation, and outplanting are ongoing.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Recovery Plan for the O‘ahu 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.

Phyllostegia hirsuta is a short-lived perennial subshrub to scandent liana. 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 that are well managed. In addition, a minimum of a total of three populations should be documented on O‘ahu where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Although genetic storage is almost complete (Table 1), there are no wild populations with greater than 50 individuals, and all threats are not being managed (Table 1, Table 2). Therefore, *Phyllostegia hirsuta* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

No significant new information regarding the species’ biological status has been reported since the last 5-year review in 2019. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2024.

- Surveys and monitoring—
 - Continue monitoring known populations of *Phyllostegia hirsuta* regularly.
 - Determine suitable locations for reintroductions.
 - Survey within suitable habitat as appropriate.
- Ungulate monitoring and control—Continue to maintain fenced exclosures and construct new fences to protect individuals from the negative impacts of browsing by ungulates.
- Invasive nonnative plant monitoring and control—Continue control of established ecosystem-altering nonnative invasive plant species, and those that compete with *P. hirsuta*.
- Site and habitat protection—Develop and implement effective threat control measures to reduce the impact of small population size.
- Fire prevention and control—Continue to develop and implement fire prevention management plans.
- Climate change adaptation strategy—Research suitability of habitat for viability of species, including where to conduct translocations in the future due to the impacts of climate change, including increasing temperatures, periods between rain events, and increasing frequency and intensity of hurricanes. Additional management actions may be needed, such as locating key microsites that overlap with current and future climate envelopes for translocation efforts.

- Disease control—Continue to research and implement effective control methods for powdery mildew.
- Predator and herbivore monitoring and control—Determine and continue to implement effective methods to control rats and slugs.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- Build resiliency, redundancy, and representation — Increase species' viability through habitat restoration, threat control, and reintroduction and translocation into suitable habitat that is being managed for known threats to this species to reduce impacts of climate change degradation and nonnative plant competition.
- Alliance and partnership development—Continue to work with partners and other land managers in planning and implementation of ecosystem-level restoration and management to benefit this species.

References:

- [ANRPO] Army Natural Resource Program on O‘ahu. 2023a. 2023 status report for the Makua and Oahu implementation plans. 255 pp.
- [ANRPO] 2023b. Appendices to the Status report for the Mākua and O‘ahu Implementation Plans, Army Natural Resources Program, O‘ahu, Office of the Vice President for Research and Innovation, University of Hawai‘i.
- [HBMP] Hawaii Biodiversity and Mapping Program. 2010. Plant species GIS data and Access database.
- [HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.
- Lyon Arboretum. 2023. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.
- O‘ahu Nursery. 2023. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.
- [U.S. Fish and Wildlife Service] 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] 1999. Recovery Plan for the Multi-Island Plants. 2006 pp. + appendices.

- [USFWS] 2008. *Phyllostegia hirsuta* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
https://ecos.fws.gov/docs/five_year_review/doc1191.pdf.
- [USFWS] 2012. Endangered and threatened wildlife and plants; Endangered status for 23 species on Oahu and designation of critical habitat for 124 species; final rule. Department of the Interior, Federal Register 77 (181): 57648–57862, September 18, 2012.
- [USFWS] 2013. *Phyllostegia hirsuta* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
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SIGNATURE PAGE for 5-YEAR REVIEW of *Phyllostegia hirsuta* (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

For Field Supervisor, Pacific Islands Fish and Wildlife Office

Date _____