

## 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. 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):**

Jiny Kim, Fish and Wildlife 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

Loyal Mehrhoff, 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 *Phyllostegia hirsuta* (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 Fish and Wildlife Biologist, Island 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 *Phyllostegia hirsuta* published on January 18, 2008 (available at [http://ecos.fws.gov/docs/five\\_year\\_review/doc1854.pdf](http://ecos.fws.gov/docs/five_year_review/doc1854.pdf)) and the recovery plan for the Oahu plants (USFWS 1998), 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 *P. hirsuta*.

This short-lived vine is endangered and occurs on the island of Oahu in both the Koolau and Waianae Mountains. The current status and trends for *Phyllostegia hirsuta* are provided in the tables below.

New status information:

- In 2009, several population units showed declines. No wild plants were known south of Kaluaa. No plants were located during surveys conducted at a historically known site in the Haleauau-Mohiakea population unit. A few new plants were observed near a known site in the Helemano population unit and a possible hybrid of *P. hirsuta* was found in the Kawaiiki (U.S. Army Garrison 2009).
- Several populations were monitored in 2010 and 2011: Haleauau-Mohiakea, Helemano-Opaepa and Kaukonahua. A new site with a single mature plant was observed during snail surveys in Kawainui (U.S. Army Garrison 2010).

The total numbers of individuals for all age classes in all populations is 38 mature and 25 immature individuals and seven seedlings (OANRP 2012a). This represents a loss of almost half of the known number of individuals since 2007, when 167 individuals were reported (OANRP 2012c; U.S. Army Garrison 2007).

New threats:

- Climate change - Climate change may also 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:

- Ungulate exclosures
  - In 2009, the Hapapa-Kaluaa population was partially fenced. A plan was developed in 2009 and 2010 to begin construction of the 1,800 acre Schofield Barracks-Lihue Fence, complete the Kaala fence and remove pigs (U.S. Army Garrison 2009, 2010).
  - In 2011, the Laie-Puu Kainapuaa population was considered 100 percent free of ungulates, and the Hapapa-Kaluaa population partially free of ungulates (U.S. Army Garrison 2011).
- Threats research:
  - In 2009, slug control research using Sluggo, a slug and snail bait, began in the field at the Kahanahaiki population unit on U.S. Army lands (U.S. Army Garrison 2009, 2010).
  - In October 2010, Sluggo was registered for use by the Hawaii Department of Agriculture for control of slugs and nonnative snails in forested areas for the protection of native, threatened, and endangered plants of Hawaii. However, since native snails also exist in areas where threatened and endangered plants occur, additional research is needed to find a control

method that can be used in areas where native snail species co-occur with listed plants to prevent non-target effects of treatment (U.S. Army Garrison 2010).

- Captive propagation for genetic storage and reintroduction
  - In 2010, collections of vegetative propagules were made from a newly discovered wild plant in the Haleauau-Mohiakea population and from two newly discovered plants in the Hapapa- Kaluaa population. These vegetative propagules were established in the greenhouse and will be used as genetic storage and for future reintroductions (U.S. Army Garrison 2010).
  - Seven of 38 founder plants have complete genetic storage. This represents at least one individual from five of the 13 populations (Oahu Army Natural Resource Program [OANRP] 2012a).
  - Seventy *Phyllostegia hirsuta* plants were in OANRP nursery in 2012 (OANRP 2012b).
  - The Harold L. Lyon Arboretum (2012) has 245 plants in micropropagation storage, grown from either cuttings or apical or lateral shoots from OANRP.
- Reintroduction / translocation
  - The OANRP plan is to in conduct three reintroductions: 1) all available Waianae Mountains stock was planted at Kaala (the North Haleauau, South Haleauau and Mohiakea areas) in 2012; 2) all available Waianae Mountains stock will also be planted at Puu Palikea this during the winter of 2013; and 3) all available Koolau Mountains stock will be planted into Koloa Gulch during the 2013 winter (M. Keir, OANRP, pers. comm. 2013).
  - In 2008, it was noted that previous reintroduction attempts in Waianae sites for this species had not been very successful. No reintroductions had been attempted in the Koolau Mountains (U.S. Army Garrison 2008).
- Ecosystem-altering invasive plant species control - One unit, Ekahanui, no longer has any individuals of *Phyllostegia hirsuta* present, and is not being managed (OANRP 2012c).

### **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 short-lived perennial (fewer than 10 years), or a long-lived perennial.

*Phyllostegia hirsuta* is a short lived perennial, and to be considered stable, 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 on the island of Oahu. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

The stabilization goals for this species have not been met, since no populations have 50 or more mature individuals (Table 1) and all threats are not sufficiently being managed

throughout the populations (Table 2). Therefore, *Phyllostegia hirsuta* 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
  - Collect cuttings or seed from tagged individuals, keeping close track of the maternal source for use in *ex situ* propagation.
  - Continue to collect seeds or other propagative materials from all existing populations, and send to at least two or three different facilities for propagation and storage.
- Reintroduction / translocation – Continue to reintroduce the species back into several sites within its known historical range, to maximize the survival potential of small population numbers.
- Ungulate exclosures – Construct and monitor ungulate-proof exclosures around all populations.
- Invertebrate control research – Monitor the *Phyllostegia hirsuta* individuals within each population to determine the level of slug damage and implement slug controls if appropriate.
- Ecosystem-altering invasive plant species control – Control invasive introduced plant species around all populations.
- Surveys / inventories – Survey known population areas that have not been visited in three or more years (Helemano-Poamoho, Kaipapau-Kawainui, Kawaiiki and Laie-Puu Kainapuaa).
- Site / area / habitat protection – Develop and implement effective measures to reduce the impact of military activities.
- Fire protection – Develop and implement fire management plans for all wild and reintroduced populations.
- Alliance and partnership development - Initiate planning and contribute to implementation of ecosystem level restoration and management to benefit this taxon. Genetic research – Assess genetic variability within extant populations.
- Population biology research – Study *Phyllostegia hirsuta* 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.
- Threats research – Assess the modeled effects of climate change on this species, and use to determine future landscape needed for the recovery of the species.

**Table 1. Status of *Phyllostegia hirsuta* from listing through current 5-year review.**

<b>Date</b>	<b>No. wild indivs</b>	<b>No. outplanted</b>	<b>Stabilization Criteria identified in Recovery Plan</b>	<b>Stabilization Criteria Completed?</b>
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
1998 (recovery plan)	150-200	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	214-227	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2008 (5-yr review)	167	Unknown	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2012 (5-yr review)	70	Unknown	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially

**Table 2. Threats to *Phyllostegia hirsuta* and ongoing conservation efforts.**

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – pigs degrade habitat and destroy plants	A, C, D	Ongoing	Partially
Established ecosystem-altering invasive plant species	A, E	Ongoing	Partially
Slugs herbivory	C	Ongoing	Partially
Military training activity – fire, trampling and introduced invasive plants	E	Ongoing	No
Low numbers in narrow population range increased risk from demographic fluctuations and catastrophic weather events	E	Ongoing	Partially
Climate change	A, E	Increasing	No

**References:**

See previous 5-year review for a full list of references (USFWS 2008). Only references for new information are provided below.

Harold L. Lyon Arboretum Micropropagation Laboratory. 2012. Micropropagation database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Oahu Army Natural Resources Program. 2012a. Genetic storage summary. 9 pages. Unpublished.

Oahu Army Natural Resources Program. 2012b. Army nursery inventory summary. 1 page. Unpublished.

Oahu Army Natural Resources Program. 2012c. Oahu implementation plan. PhyHir IP population unit plant count summary 2. 1 page. Unpublished.

U.S. Army Garrison. 2007. 2007 Status reports for the Makua implementation plan and the draft Oahu implementation plan. 719 pages. Available online at [http://manoa.hawaii.edu/hpicesu/DPW/2007\\_YER/YER\\_2007\\_edited.pdf](http://manoa.hawaii.edu/hpicesu/DPW/2007_YER/YER_2007_edited.pdf).

U.S. Army Garrison. 2008. Final implementation plan for Oahu training areas: Schofield Barracks Military Reservation, Schofield Barracks East Range, Kawaihoa Training Area, Kahuku Training Area, and Dillingham Military Reservation. 624 pages. Available online at [http://manoa.hawaii.edu/hpicesu/DPW/2008\\_OIP/2008\\_OIP\\_edited.pdf](http://manoa.hawaii.edu/hpicesu/DPW/2008_OIP/2008_OIP_edited.pdf).

U.S. Army Garrison. 2009. 2009 status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 711 pages. Available online at <[http://manoa.hawaii.edu/hpicesu/DPW/2009\\_OIP/2009\\_OIP\\_Edited.pdf](http://manoa.hawaii.edu/hpicesu/DPW/2009_OIP/2009_OIP_Edited.pdf)>.

U.S. Army Garrison. 2010. 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](http://manoa.hawaii.edu/hpicesu/DPW/2010_YER/2010_YER_Edited.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/2011\\_YER\\_Edited.pdf](http://manoa.hawaii.edu/hpicesu/DPW/2011_YER/2011_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. 207 pages + appendices.

[USFWS] U.S. Fish and Wildlife Service. 2008. *Phyllostegia hirsuta* (no common name) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 10 pages. Available online at <[http://ecos.fws.gov/docs/five\\_year\\_review/doc1854.pdf](http://ecos.fws.gov/docs/five_year_review/doc1854.pdf)>.

**Personal communications:**

Keir, Matthew. 2013. Oahu Army Natural Resources Program. E-mail to Margaret Clark, National Tropical Botanical Garden, dated July 22, 2013. Subject: Phy\_hir 5 yr review answer from FWS.

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

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
- No Change in listing status

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