

## **5-YEAR REVIEW**

Short Form Summary

**Species Reviewed:** *Phyllostegia kaalaensis* (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 kaalaensis* (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, 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](http://ecos.fws.gov/tess_public)).

### **Review Analysis:**

Please refer to the previous 5-year review for *Phyllostegia kaalaensis* published on January 18, 2008 (available at [http://ecos.fws.gov/docs/five\\_year\\_review/doc1852.pdf](http://ecos.fws.gov/docs/five_year_review/doc1852.pdf)) and the recovery plan for 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. kaalaensis*.

This short-lived shrub is endangered and occurs in the Waianae Mountains of Oahu. The current status and trends for *Phyllostegia kaalaensis* are provided in the tables below.

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 2010, all but the Manuwai area were ungulate free (U.S. Army Garrison 2010) and all units were ungulate free in 2011 (U.S. Army Garrison 2011).
- Threats research
  - In 2007-2008, the Oahu Army Natural Resources Program (OANRP) tested a variety of planting site characteristics, plant status pre-planting, variations in planting densities and variations of stocks, since previously reintroduced materials had not survived. This clarified the optimal size class required for successful reintroduction. The tests concluded that optimal reintroduction is achieved when plants are actively growing and sending out long branches. The use of young, vigorous plants, kept in shallower pots to prevent root rot, and more intensive site monitoring, were expected to increase success (U.S. Army Garrison 2007). Research continued in subsequent years to refine horticulture methods in order to produce plants that may be more able to establish and survive in reintroductions, but with little success (U.S. Army Garrison 2008, 2009, 2010, 2011).
  - In 2007, the OANRP deployed weather stations at *Phyllostegia kaalaensis* reintroduction sites to measure micro-site weather variation and begin to collect environmental data for developing future reintroduction plans (U.S. Army Garrison 2007).
- Captive propagation for genetic storage and reintroduction
  - Harold L. Lyon Arboretum (2012) has 2,029 plants of *Phyllostegia kaalaensis* in micropropagation from material deposited by OANRP from 1998 through 2006, but no seeds remain in storage.
  - In 2009, plants maintained at the Harold L. Lyon Arboretum were successfully removed from micropropagation vials and transferred to OANRP nursery (U.S. Army Garrison 2009).
  - While extinction in the wild since 2003, eight founders are represented in genetic storage (OANRP 2012).
- Reintroduction / translocation - Of the 379 plants reintroduced between 2006 and 2009, only two were observed to be alive in 2009 (U.S. Army Garrison 2009), and only one in 2010 and 2011 (U.S. Army Garrison 2010, 2011). By 2012, no plants were observed alive (U.S. Army Garrison 2012).

- Ecosystem-altering invasive plant species control
  - Weeding was conducted in Makaha in 2007 in preparation for a reintroduction of *Phyllostegia kaalaensis* (U.S. Army Garrison 2007).
  - Over 20 hours of weed control was conducted in Pahole in 2007 (U.S. Army Garrison 2007).

**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 kaalaensis* 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 mature wild individuals of *Phyllostegia kaalaensis* exist (Table 1) and all threats are not being sufficiently managed throughout all of the populations (Table 2). Therefore, *Phyllostegia kaalaensis* 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.
- Reintroduction / translocation
  - Determine which sites appear to have the highest likelihood of maintaining new reintroductions the necessary access for more frequent monitoring.
  - Continue to reintroduce the species back into its known historical range.
- Ecosystem-altering invasive plant species control – Control invasive introduced plant species around any future reintroduced populations.
- 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.
  - Research possible causes of low seed production and lack of embryo development.
  - Determine method to control powdery mildew in reintroduced sites.

**Table 1. Status of *Phyllostegia kaalaensis* 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)	<50	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	<40	3	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	<70	3	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2008 (5-yr review)	0	2	All threats managed in all 3 populations	Partially
			Complete genetic storage	Yes
			3 populations with 50 mature individuals each	No
2013 (5-yr review)	0	0	All threats managed in all 3 populations	Partially (see Table 2)
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

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

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat and herbivory	A, C	Ongoing	1/5 units partially controlled
Established ecosystem-altering invasive plant species	A, E	Ongoing	1/5 units partially controlled
Low seed set and embryo development	E	Ongoing	No, propagation by cuttings only
Low numbers	E	Ongoing	Partially: genetic storage for propagation and reintroduction
Climate change	A, E	Increasing	None

**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. 2012. Micropropagation and seed storage databases. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Oahu Army Natural Resources Program. 2012. Oahu implementation plan - population unit status; *Phyllostegia kaalaensis*. 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).

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[USFWS] U.S. Fish and Wildlife Service. Recovery plan for the Oahu plants. 1998. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages + appendices.

[USFWS] U.S. Fish and Wildlife Service. 2008. *Phyllostegia kaalaensis* (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/doc1852.pdf](http://ecos.fws.gov/docs/five_year_review/doc1852.pdf).

**U.S. FISH AND WILDLIFE SERVICE**  
SIGNATURE PAGE for 5-YEAR REVIEW of *Phyllostegia kaalaensis*  
(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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