

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Phyllostegia knudsenii* (No common name)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2007. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 71 species in Oregon, Hawaii, Commonwealth of the Northern Mariana Islands, and territory of Guam. Federal Register 72(45):10547-10550.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii

Name of Reviewer(s):

Christian Torres-Santana, Pacific Islands Fish and Wildlife Office, Student Trainee Biologist
Marie Bruegmann, Pacific Islands Fish and Wildlife Office, Plant Recovery Coordinator
Marilet A. Zablan, Pacific Islands Fish and Wildlife Office, Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species

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 (USFWS) beginning on March 8, 2007. The review was based on the final critical habitat designation for *Phyllostegia knudsenii* and other species from the island of Kauai (USFWS 2003), as well as a review of current, available information. The Bernice P. Bishop Museum provided an initial draft of portions of the five-year review. The evaluation of the status of the species was prepared by the lead PIFWO biologist and reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species before submission to the Field Supervisor for approval.

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/).

Application of the 1996 Distinct Population Segment (DPS) Policy:

This Policy does not apply to plants.

Review Analysis:

Please refer to the final critical habitat designation for *Phyllostegia knudsenii* published in the Federal Register on February 27, 2003, (USFWS 2003) for a complete review of the species' status (including biology and habitat), threats, and management efforts. No new threats and 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 *P. knudsenii*.

At the time of Federal listing *Phyllostegia knudsenii* was known from one location with one individual in Koaie Canyon, Kauai (USFWS 1996). Three individuals of *Phyllostegia knudsenii* were rediscovered in May 1993 (K.R. Wood and S. Perlman specimen #2583, Herbarium of the National Tropical Botanical Garden or PTBG); prior to this the species was considered extinct, known only from the type collection from Waimea, Kauai that was collected in the 1800s (Wagner *et al.* 1990; Lorence *et al.* 1995). In 1999, three individuals and one immature plant were reported within the Koaie enclosure (K. Wood, National Tropical Botanical Garden, *in litt.* 1999). An additional five immature individuals was subsequently found growing in Kawai Iki Valley in 2001 (K. Wood, pers. comm. 2008). In 2003, the USFWS (2003) reported one known population with a total of 4 to 13 individuals on State-owned land in Koaie Canyon within the Alakai Wilderness Preserve. The number of genetically distinct individuals was difficult to determine, as the species can grow from runners touching the ground and rooting. As of February 2004, Perlman (2006) reported three individuals in a single population and no *ex situ* (off-site) collections. More recently, Ken Wood (National Tropical Botanical Garden, pers. comm. 2008) confirmed that the population at Koaie Canyon died several years ago and that the population in Kawai Iki has not been relocated since 2001. Kauai species experts indicated at a recent Plant Extinction Prevention Program meeting that there are likely to be up to 50 more individuals extant, and more surveys are needed within suitable habitat to locate them (Plant Extinction Prevention 2008).

The major threats to *Phyllostegia knudsenii* are habitat degradation by feral pigs (*Sus scrofa*) and goats (*Capra hircus*) (Factors A and D); and competition with introduced invasive plant species such as *Rubus rosifolius* (thimbleberry), *R. argutus* (prickly Florida blackberry), *Paspalum conjugatum* (Hilo grass), *Erigeron karvinskianus* (daisy fleabane), *Erechtites valerianifolia* (fireweed), *Bryophyllum pinnatum* (airplant), *Drymaria cordata* (pipili), *Psidium cattleianum* (strawberry guava), *Passiflora tarminiana* (banana poka), *Gravillea robusta* (silk oak), *Setaria parviflora* (marsh bristlegrass), *Cyperus meyenianus* (Meyen's flatsedge), *Myrica faya* (firetree), and *Lantana camara* (lantana) (Factor E) (Lorence *et al.* 1995; USFWS 1996, 1998, 2003, 2008; K. Wood, pers. comm. 2008).

In addition to other threats, species such as *Phyllostegia knudsenii* that are endemic to a small portion of a single island are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by random demographic fluctuations and localized catastrophes such as hurricanes, landslides, reduced reproductive vigor, and disease outbreaks (Factor E). When considered on their own, the natural processes associated with being a single island endemic do not affect *P. knudsenii* to such a degree that it is threatened or endangered with extinction in the foreseeable future, but these natural processes can exacerbate the threat from anthropogenic factors, such as habitat loss from human activities or predation by introduced species (Factor E) (USFWS 1995).

There are no reports of material in seed storage, nurseries, or tissue culture. An enclosure fence was built around a single individual (USFWS 1998), but it has since died (K. Wood, pers. comm. 2009). The site could be used for future reintroductions.

Stabilizing, downlisting, and delisting objectives are provided in the addendum of the recovery plan addendum for plants from the island of Kauai (USFWS 1998), based on whether the species

is an annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. *Phyllostegia knudsenii* is a short-lived perennial, and to be considered stabilized, which is the first step in recovering the species, the taxon must be managed to control threats (*e.g.*, fenced) and be represented in an *ex situ* collection. In addition, a minimum of three populations should be documented on the island of Kauai. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

The stabilization and recovery goals for this species have not been met (see Table 1), as no plants have been located in recent years but there is more suitable habitat that needs surveying, none of the threats are being managed, and there are no *ex situ* collections. Therefore, *Phyllostegia knudsenii* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Survey suitable habitat within geographical and historical range to locate extant individuals.
- Collect genetic resources from any found individuals for storage, future propagation, and reintroduction into protected suitable habitat within historical range.
- Construct enclosure fences to protect all found individuals from feral pigs, and eradicate introduced invasive plant species within the enclosures.
- Work with Hawaii Division of Forestry and Wildlife to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species in Koaie Canyon.
- Develop methods for propagation and establish *ex situ* genetic collection.

References:

- Lorence, D.H., T.W. Flynn, and W.L. Wagner. 1995. Contributions to the flora of Hawaii. III. New additions, range extensions, and rediscoveries of flowering plants. Bishop Museum Occasional Papers 41:19-58.
- Perlman, S. 2006. Plant Extinction Prevention status of Kauai species. August 28, 2006. Unpublished.
- Plant Extinction Prevention Program. 2008. Plant Extinction Prevention status of Kauai species. October 20, 2008. Unpublished.
- [USFWS] U.S. Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants; determination of endangered or threatened status for nineteen plant species from the island of Kauai, Hawaii; final rule. Federal Register 61(198):53070-53089.

[USFWS] U.S. Fish and Wildlife Service. 1998. Kauai II addendum to the recovery plan for the Kauai plant cluster. U.S. Fish and Wildlife Service, Portland, OR. 84 pages + appendices.

[USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 95 plant species from the islands of Kauai and Niihau, HI; final rule. Federal Register 68(39):9116-9479.

[USFWS] U.S. Fish and Wildlife Service. 2008. Rare plant tracking database. Pacific Islands Fish and Wildlife Office, Honolulu, HI. Accessed on April 28, 2008. Unpublished.

Wagner, W.L., D. Herbst, and S.H. Sohmer (editors). 1990. Manual of the flowering plants of Hawaii. University of Hawaii Press, Bishop Museum Press, Special Publication. 97:1-1918.

Personal communications:

Wood, K.R. Observation data, *In litt.* on February 3, 1999.

Wood, K.R. Research Biologist, National Tropical Botanical Garden. Communication to Bernice P. Bishop Museum in June 2008.

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

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1996 – listing	1	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 – recovery plan	3	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 – critical habitat	4-13	0	All threats managed in all 3 populations	No
			Complete genetic storage	Unknown
			3 populations with 50 mature individuals each	No
2008 – 5-yr review	0 (up to 50?)	0	All threats managed	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No

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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

Acting Field Supervisor, Pacific Islands Fish and Wildlife Office

Patrick Souse

Date 6/2/09