

5-YEAR REVIEW

Short Form Summary

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

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 129 Species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85(48): 14240–14243, March 11, 2020.

Lead Region/Field Office:

Interior 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 or USFWS) beginning in October 2021. The review was based on a review of current, available information since the last 5-year review for *Phyllostegia renovans* (USFWS 2017). 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 (<https://ecos.fws.gov/ecp/species/8958>).

Review Analysis:

Please refer to the previous 5-year review for *Phyllostegia renovans* published in the Federal Register on September 17, 2017 (available at http://ecos.fws.gov/docs/tess/species_nonpublish/2484.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. renovans*.

This short-lived perennial shrub in the Lamiaceae (mint) family is listed as endangered and is known from the island of Kaua‘i. The status and trends for *Phyllostegia renovans* are provided in the tables below.

New Status Information:

- A survey conducted in 2019 confirmed an occurrence of a patch of *Phyllostegia renovans* at Kamo‘oloa and one individual at Wainiha (National Tropical Botanical Garden [NTBG] 2019a; Perlman and Loomis 2019). In 2020, three individuals were found at the Hanalei river headwaters below Pōhakupele (NTBG 2020a). Currently, data shows there are approximately 70 wild individuals at Waiahuakua, Hanakoa, Hanakāpī‘ai, Limahuli, Wainiha, and Hanalei (PEPP 2021). There are reintroductions at upper Wailua river and Wahiawa (Kanaele).

New Threats:

- None reported.

New Management Actions:

- Surveys and monitoring—The Plant Extinction Prevention Program (PEPP) and the National Tropical Botanical Garden (NTBG) survey for and monitor populations of *Phyllostegia renovans* (Nagendra et al. 2020, 2021; NTBG 2019a, 2020a; Perlman and Loomis 2019; PEPP 2021).
- Captive propagation for genetic storage and reintroduction—
 - In 2021, the Kōke‘e Mid-Elevation Nursery (KMEN) reported propagation of two individuals in the nursery representing one founder from Hanakoa (KMEN 2021).
 - In 2019, NTBG propagated more than 400 plants representing five founders and a second-generation plant from Limahuli, and one founder from Kamo‘oloa, for a living collection at Limahuli Preserve (NTBG 2019b). More than 900 seeds were collected and stored representing three founders from Limahuli and one founder from Kamo‘oloa (NTBG 2019b). In 2020, NTBG reported three plants in the nursery representing founders from Kamo‘oloa, Wainiha, and Limahuli (NTBG 2020b). In 2020 and 2021, NTBG reported collection of seeds from wild plants at Limahuli Preserve (Nagendra et al. 2020, p. 4; Nagendra et al. 2021, p. 8).
 - In 2017, PEPP reported collection of seeds from one founder at Hanakāpī‘ai (PEPP 2017). In 2019, PEPP collected seeds from one patch of plants at Wainiha (Perlman and Loomis 2019).
 - In 2011, the Lyon Arboretum Seed Conservation Laboratory reported storage of 234 seeds representing one founder from upper Hanakoa. In 2015, 1,367 seeds were stored representing six founders from the north fork of Wainiha and 170 seeds stored representing one founder from the south fork of Wainiha. In 2021, 184 seeds were stored representing one founder from Hanalei (Lyon Arboretum 2022).
- Reintroduction and augmentation—PEPP and NTBG monitor reintroduced populations. In 2015, there were 236 immature reintroduced plants at upper Wailua River (current status not reported) (Kishida et al. 2018) and from 2015 to 2017, approximately 96 individuals were added to the initial 144 outplanted at Wahiawa in 2011 (DeMotta 2011, 2015; Kishida and Perlman 2015, Kishida et al. 2017). By 2017, 235 of the 240 reintroductions had died (Kishida and Perlman 2017).

Table 1. Status and trends of *Phyllostegia renovans* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2010 (listing and critical habitat)	ca 36	188	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 100 mature individuals each	No
2017 (5-year review)	70	>500, at least 90 survive	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Unknown
			3 populations with 100 mature individuals each	No
2022 (5-year review)	70	236	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially, 16 founders from 6 populations represented
			Natural reproduction at all 3 populations	Unknown
			3 populations with 50 mature individuals each	No, no regeneration at reintroductions

* 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 renovans* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Destruction and degradation of habitat and herbivory by feral ungulates	A, C	Ongoing	Partial, reintroductions in exclosures
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	Partially, some invasive nonnative plant control in exclosures
Landslide and flooding destruction and degradation of habitat	A	Ongoing	None
Climate change degradation and destruction of habitat, including hurricanes	A	Ongoing	None
Predation and herbivory by rodents	C	Ongoing	None
Inadequacy of existing regulatory mechanisms—lack of adequate hunting and biosecurity legislation	D	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, collection, propagation, and reintroduction

Synthesis:

Currently, there are approximately 70 individuals of *Phyllostegia renovans* on Kaua‘i. At least 16 founders from six populations are represented in collections and propagation. Hundreds of individuals have been reintroduced in protected areas; however, surviving numbers are low and regeneration has not been reported.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Kaua‘i Islandwide Recovery Plan (USFWS 2021) 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 renovans is a short-lived perennial shrub. 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 Kaua'i where this species now occurs 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 *Phyllostegia renovans* have not been met. There are only wild 70 individuals in widely scattered occurrences (Table 1). Genetic storage goals are only partially completed; approximately 16 founders from six populations are represented in collections and propagation (Table 1). Hundreds of individuals have been reintroduced into exclosures with some management, but survival is low and no natural regeneration is reported (Table 1, Table 2). This species is susceptible to ongoing threats, such as, habitat destruction and herbivory by feral ungulates, nonnative plant competition, landslides, herbivory by rats, and hurricanes (Table 2). Therefore, *P. renovans* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

No new threats and no significant new information regarding the species' biological status have been reported since the last 5-year review in 2017. Thus, the following recommendations for future actions are reiterated and updated for the 5-year review for 2022.

- Surveys and inventories—Continue to survey for populations of *Phyllostegia renovans* in areas of potentially suitable habitat.
- Feral ungulate monitoring and control—Continue to construct and maintain exclosures to protect occurrences against disturbance and herbivory by feral ungulates.
- Nonnative invasive plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species at all populations.
- Rodent predation and herbivory control—Implement effective control measures for rodents at all populations.
- Climate change adaptation strategy—Research suitability of habitat for viability of species, including where to conduct translocations in the future due to impacts of climate change.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock.
- Reintroduction and augmentation—Continue reintroduction of individuals into protected suitable habitat that is being managed for known threats to this species.
- Build resiliency and redundancy—Increase numbers of individuals and populations through habitat restoration and translocations to reduce impacts of landslides and hurricanes, as well as reduced viability due to small population size.
- Population biology research—Study *P. renovans* populations to determine viable population size and structure, geographical distribution, flowering cycles,

- pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- 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:

- DeMotta, M. 2011. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Phyllostegia renovans*, Pacific Islands Fish and Wildlife Office.
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- Kishida, W. and S. Perlman. 2015. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Phyllostegia renovans*, Pacific Islands Fish and Wildlife Office.
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- Kishida, W. N. Tangalin, M. Spork, S. Perlman, and L. Arnold. 2018. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Phyllostegia renovans*, Pacific Islands Fish and Wildlife Office.
- [KMEN] Kōke‘e Mid-Elevation Nursery. 2021. 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.
- Lyon Arboretum. 2022. 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.
- Nagendra, U., A. Ramelb, and K. Jensen. 2020. Limahuli Preserve rare plant conservation collections and habitat restoration project, National Tropical Botanical Garden, FWS Agreement #F18AC00508, October 1, 2019-September 30, 2020. 18 pp.
- Nagendra, U., M. Kahokulua, Jr., and S. Umetsu. 2021. Limahuli Preserve rare plant conservation collections and habitat restoration project, National Tropical Botanical Garden, FWS Agreement #F18AC00508, October 1, 2020-September 30, 2021. 21 pp.
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- [NTBG] 2019b. 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.
- [NTBG] 2020a. NTBG database herbarium record detail for *Phyllostegia renovans*, PTBG1000082061, 083530, 9 DEC 2020.

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Perlman, S. and A. Loomis. 2019. Hawai'i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Phyllostegia renovans*, Pacific Islands Fish and Wildlife Office.

[PEPP] Plant Extinction Prevention Program. 2017. Plant Extinction Prevention Program FY 2017 Annual Report (Oct 1, 2016-Sep 30, 2017), Coop Agreement: F14A00174, U.S. Fish and Wildlife Service CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds. 235 pp.

[PEPP] Plant Extinction Prevention Program. 2021. Fiscal year 2021 interim performance report (October 1, 2020-September 30, 2021) cooperative agreements F18AC00502 and F19AC00532, US Fish and Wildlife Service CFDA Program #15.657, Endangered species conservation—recovery implementation funds, University of Hawaii at Manoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program.

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[USFWS] 2021. Kaua'i Islandwide Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR. 65 pp. + appendices.

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