5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Hibiscus waimeae* ssp. *hannerae* (koki‘o ke‘oke‘o)

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 *Hibiscus waimeae* ssp. *hannerae* (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/5364*).

Review Analysis:

Please refer to the previous 5-year reviews for *Hibiscus waimeae* ssp. *hannerae* published in the Federal Register on August 27, 2010, and September 13, 2017 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1613.pdf* and *https://ecos.fws.gov/docs/tess/species_nonpublish/2451.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 *H. waimeae* ssp. *hannerae*.

This long-lived perennial tree in the Malvaceae (mallow) family is listed as endangered and is known from the island of Kaua‘i. The status and trends for *Hibiscus waimeae* ssp. *hannerae* are provided in the tables below.

New Status Information:

- A few more wild individuals were found at Hanakāpīʻai (total 13 counted) and more may be found with further surveys (Plant Extinction Prevention Program [PEPP] 2021). In total, there are fewer than 80 wild individuals of *Hibiscus waimeae* ssp. *hannerae* on Kauaʻi (Tangalin and Wood 2015; USFWS 2017).

New Threats:

- None reported.

New Management Actions:

- Surveys and inventories—The Kauaʻi Plant Extinction Prevention Program (KPEPP) surveys for populations of *Hibiscus waimeae* ssp. *hannerae* and in 2017 discovered a new population at Hanakāpīʻai of 13 mature individuals (Perlman and Walsh 2017).
- Captive propagation for genetic storage and reintroduction—
    - From 2018 through 2019, the National Tropical Botanical Garden (NTBG) reported collection of more than 300 seeds representing second- and third-generation plants in their living collections. From 2018 to 2020, NTBG also propagated 73 individuals for storage in nursery conditions or for addition to the living collections. In 2020 to 2021, NTBG reported collection of cuttings and seeds of *H. waimeae* ssp. *hannerae* from Limahuli Preserve (663 seeds representing first- and second-generation plants sourced from Hanakāpīʻai, Limahuli, and Pōhakuao) (Nagendra et al. 2020, pp. 4, 6, 8). In 2021, NTBG reported opportunistic collections from plants in Limahuli Preserve (Nagendra et al. 2021, p. 10).
    - In 2017, PEPP collected cuttings from 13 individuals at Hanakāpīʻai for propagation at NTBG (Perlman and Walsh 2017).
    - In 2021, the Lyon Arboretum Seed Conservation Laboratory reported storage of 54 seeds representing five founders from Hanakāpīʻai (Lyon Arboretum 2022).
- Reintroduction and augmentation—In 2020, NTBG reported reintroduction of eight individuals in Limahuli Preserve (Nagendra et al. 2020, pp. 6, 8). In 2021, NTBG reported reintroduction of 28 individuals in Limahuli Preserve (Nagendra et al. 2021, p. 15). Also in 2021, NTBG reintroduced six individuals to lower Limahuli Preserve as part of the spring-fed stream restoration project (Nagendra 2021, p. 6).

Table 1. Status and trends of *Hibiscus waimeae* ssp. *hannerae* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	Stability Criteria identified by Recovery Plan	Stability Criteria Completed?
1996 (listing)	75–125	0	All threats managed in all 3 populations	No

			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
1998 (recovery plan)	75–125	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
2003 (critical habitat)	27	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
2010 (5-year review)	80–85	0	All threats managed in all 3 populations	
			Complete genetic storage	
			3 populations with 25 mature individuals	
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2017 (5-year review)	ca 100	0	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 25 mature individuals each	No, reintroductions primarily for living collections

2022 (5-year review)	<80	42	All threats managed in all 3 populations	Partially, 1 population (wild and reintroduced) within exclosure
			Complete genetic storage	Partially, 13 founders from 1 population represented by cuttings and seed collections
			Natural reproduction at all 3 populations	Unknown
			3 populations with 25 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 *Hibiscus waimeae* ssp. *hannerae* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partially, upper Limahuli exclosure
Established ecosystem altering invasive plant species degradation of habitat and competition	A	Ongoing	Partially, upper Limahuli exclosure
Climate change degradation and destruction of habitat, including hurricanes	A	Ongoing	None
Predation and herbivory by rats	C	Ongoing	None
Predation and herbivory by invertebrates	C	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, seed collection, propagation, and reintroduction

Synthesis:
Currently there are fewer than 80 wild individuals of *Hibiscus waimeae* ssp. *hannerae* on Kaua‘i. NTBG and PEPP monitor the areas where *H. waimeae* ssp. *hannerae* occurs. One population, including living collections, is fenced. Nonnative plant control is conducted within the exclosure. Collection, propagation, and reintroduction are ongoing with 13 founders from one population represented.

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.

Hibiscus waimeae ssp. *hannerae* is a long-lived perennial tree. 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 25 mature, reproducing individuals per population.

The preventing extinction goals for *Hibiscus waimeae* ssp. *hannerae* have not been met. The current status of populations outside the fenced area is unknown. There are no populations totaling 25 mature individuals (Table 1). There is genetic representation and propagation for one population (Table 1, Table 2). Threats including hurricanes and vertebrate and invertebrate predation are not being addressed. Therefore, *H. waimeae* ssp. *hannerae* 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 or updated for the 5-year review for 2022.

- Surveys and inventories—Continue to survey current and historical range of *Hibiscus waimeae* ssp. *hannerae* to determine the status of the species.

- Ungulate monitoring and control—Continue to construct fencing to protect all occurrences from disturbance by feral ungulates.
- Nonnative invasive plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species and those that compete with *H. waimeae* ssp. *hannerae*.
- Predator and herbivore monitoring and control—
  - Implement effective measures to control rats.
  - Determine level of threat from invertebrate seed predation and the need for additional recovery actions.
- 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 to collect seeds and propagative materials from representatives of all populations for storage and for maintenance of genetic stock.
  - Determine if hand pollination is needed to produce viable seed.
- Reintroduction and augmentation—Continue to augment wild populations and establish new populations within protected and managed suitable habitat.
- Build resiliency and redundancy—Increase numbers of individuals and populations through historic range to reduce impacts of hurricanes, seed predation, and low numbers.
- Population biology and genetic research—Continue to increase genetic diversity of the species by using propagules from a mixture of genetic stock to increase reproductive vigor.
- 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:

[HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.

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. 2021. Lower Limahuli PR spring-fed stream restoration project. National Tropical Botanical Garden, FWS Agreement #F18AC00509, October 1, 2020-September 30, 2021. 12 pp.

Nagendra, U., M. Kahokuloa, 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.

[NTBG] National Tropical Botanical Garden. 2020. 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] 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.

[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.

Perlman, S. and S. Walsh. 2017. 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 *Hibiscus waimeae* ssp. *hannerae*, Pacific Islands Fish and Wildlife Office.

Tangalin, N. and K. Wood. 2015. *Hibiscus waimeae* subsp. *hannerae*. The IUCN Red List of Threatened Species 2015: e.T33627A78767630. *http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T33627A78767630.en.*

[USFWS] U.S. Fish and Wildlife Service. 2010. *Hibiscus waimeae* ssp. *hannerae* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/1613.pdf.*

[USFWS] 2017. *Hibiscus waimeae* ssp. *hannerae* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/2451.pdf*.

[USFWS] 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.

[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 *Hibiscus waimeae* ssp. *hannerae*
(koki‘o ke‘oke‘o)

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**

MEGAN LAUT Digitally signed by MEGAN LAUT
Date: 2022.07.20 12:42:37 -10'00'

_____ Date_____