5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Pritchardia remota* (loulu)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2019. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 91 species in Oregon, Washington, Hawaii, and American Samoa. Federal Register 84(112): 27152–27154, June 11, 2019.

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) beginning in October 2020. The review was based on a review of current, available information since the last 5-year review for *Pritchardia remota* (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 (*http://ecos.fws.gov/tess_public*).

Review Analysis:

Please refer to the previous 5-year reviews for *Pritchardia remota* in the Federal Register on July 2, 2009 and September 17, 2017 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1376.pdf* and *https://ecos.fws.gov/docs/tess/species_nonpublish/2262.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. remota*.

This long-lived perennial tree in the Arecaceae (palm) family is endangered and is known from the islands of Nihoa and Ni‘ihau. The status and trends for *P. remota* are provided in the tables below.

New Status Information:

- At the time of the last 5-year review in 2017, there were two large colonies on Nihoa in two separate valleys, totaling 1,100 individuals. A population census was conducted in 2017 on Nihoa. Mature plants were counted from above so totals may not have included seedling plants in the understory. There were 463 plants in East Palm valley, 4 plants in Palm Valley, 1,035 plants in Middle Valley, and 1 plant at Dog's Head, with a few plants scattered in other areas. These colonies (subpopulations) totaled slightly more than 1,500 individuals (Plentovich et al. 2017, pp. 18–19). Site visits in 2018 and 2020 reported the same sized subpopulations to be present and they were represented by plants in all size classes and stages of flowering and fruiting (Plentovich et al. 2018, p. 12; Rounds et al. 2020, p. 12; Rounds et al. 2021, p. 14). In 2021, no census was conducted but hundreds of healthy trees were observed in both valleys (ca 200 in East Palm valley and 300 to 400 in West Palm valley), mostly mature with immature fruit, and recruiting (Weisenberger 2021, in litt.).

New Threats:

- Fortini et al. (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawai‘i using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. The assessment was not conducted specifically for *Pritchardia remota*, but for *P. aylmer-robinsonii*, which is currently considered synonymous with *P. remota*. In the 2017 5-year review, we reported an incorrect vulnerability ranking of 0.583, instead of 0.959 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, *P. remota* is likely extremely vulnerable to climate change and additional management actions may be needed to conserve this taxon into the future, such as locating key microsites that overlap with current and future climate envelopes for outplanting efforts.

New Management Actions:

- Site management—
  - Nonnative plants are controlled on Nihoa (Plentovich et al. 2018, pp. 13–17; Rounds et al. 2020, pp. 6-7, 14-15; Rounds et al. 2021, pp. 28-30).
  - A new weather station was installed near the palm population as part of the remote monitoring system (Plentovich et al. 2018, p. 23).
- Collection and propagation for genetic storage and reintroduction—
  - The Lyon Seed Conservation Laboratory reported more than 400 seeds collected from a living collection of *P. remota* at Koko Crater (O‘ahu) that were used for storage testing or genetic research (Lyon Arboretum 2020).
  - The Kaua‘i Mid-Elevation Nursery (KMEN) reported two individuals in the living collection (KMEN 2020).
  - Waimea Arboretum reported storage of eight seeds representing one founder from Nihoa (Waimea Arboretum 2017, 2018).

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

Date	No. wild individuals	No. outplanted	Downlisting Criteria identified in Recovery Plan	Downlisting Criteria Completed?
1996 (listing)	680	0	5 colonies with a minimum of 100 mature individuals for a minimum of 5	Partially
			Successful propagation and outplanting *ex situ*	Partially
			Remote monitoring system	No
1998 (recovery plan)	>1,072	0	5 colonies with a minimum of 100 mature individuals for a minimum of 5 consecutive years	Partially
			Successful propagation and outplanting *ex situ*	Partially
			Remote monitoring system	No
2003 (critical habitat, Nihoa)	>1,072	0	5 colonies with a minimum of 100 mature individuals for a minimum of 5 consecutive years	Partially
			Successful propagation and outplanting *ex situ*	Partially
			Remote monitoring system	No
2009 (5-year review)	ca 1,100	0	5 colonies with a minimum of 100 mature individuals for a minimum of 5 consecutive years	Partially
			Successful propagation and outplanting *ex situ*	Partially
			Remote monitoring system	No

Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2017 (5-year review)	ca 1,100	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			Reproduction (i.e. viable seeds, seedlings, saplings) at all 3 populations	Partially
			3 populations with 25 mature individuals each	Partially
2021 (5-year review)	ca 1500 (Nihoa)	0	All threats managed in all 3 populations	Partially, nonnative plant control Nihoa
			Complete genetic storage	Partially
			Natural reproduction at all 3 populations	Partially, 1 population
			3 populations with 25 mature individuals each	Partially, 1 population

* 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 *Pritchardia remota* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plants controlled on Nihoa
Degradation and destruction by landslides and erosion	A	Ongoing	None
Collection impacts	B	Ongoing	None
Predation and herbivory by rats and mice	C	Ongoing	Partial, strict guidelines followed for Nihoa to limit introduction of rodents
Predation and herbivory by invertebrates—	C	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, seed collection and propagation
Climate change, including hurricanes	E	Ongoing	None

Synthesis:
The most recent census in 2017 estimated 1,500 individuals of *Pritchardia remota* on Nihoa, and at least hundreds were observed in 2021 (but no census was conducted). Nonnative plants are controlled on Nihoa. Ungulates and rodents are not present on Nihoa. A few plants are in living collections with seed collections ongoing.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Final Recovery Plan for Three Plant Species on Nihoa Island (USFWS 1998) and have been updated according to the draft revised recovery objective guidelines developed by the Hawai‘i and Pacific Plants Recovery Coordinating Committee a (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.

Pritchardia remota 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 where they now occur 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 this species have not been met. Although a single population of approximately 1,500 individuals on Nihoa appears fairly stable with recruitment, no reintroductions have been conducted and genetic representation is incomplete (Table 1). Nonnative plants are controlled on Nihoa, but other known threats are not being managed (Table 2). Therefore, *Pritchardia remota* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
No significant new information regarding the species' biological status has been reported since the last 5-year review in 2017. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2021.

- Surveys and inventories—Periodically survey the population on Nihoa to assess status.
- Invasive nonnative plant monitoring and control—
  - Continue to control invasive introduced plants on Nihoa.
  - Continue efforts to prevent introduction of nonnative invasive plant species to Nihoa.
- Collection impacts—Continue to restrict access to Nihoa.
- Predator and herbivore monitoring and control—
  - Continue to implement strict measures to prevent introduction of rats and mice to Nihoa.
  - Determine effects of predation by the nonnative grasshopper *Schistocerca nitans* and if additional recovery actions are needed.
  - Determine the identity of the unknown fungus observed on fruit, the impact to seeds and germination, and if control methods should be implemented.
- Captive propagation for genetic storage and reintroduction—Continue collection of genetic resources for storage, propagation, and reintroduction.
- Reintroduction and translocation—
  - Assess potential sites for establishing introductions on Laysan or other NWHI such as Mokumanamana or Lehua in areas with suitable habitat.
  - Increase numbers of populations and individuals within suitable habitat to reduce impacts from hurricanes and climate change.
- Climate change adaptation strategy—Research suitability of habitat for reintroduction of this species in the future due to impacts of climate change, including hurricanes.
- Taxonomic and genetic research—Assess genetic variability within extant colonies and determine if there are any distinct genetic differences between *P. remota* and plants previously identified as *P. aylmer-robinsonii*.

- Alliance and partnership development—Continue to work with partners and other land managers in planning and implementation of remote monitoring methods and ecosystem-level restoration and management to benefit this taxon.
- Update the listed entity at 50 CFR 17.12 to include individuals on Niʻihau as *Pritchardia remota* and delist and remove *P. aylmer-robinsonii*.

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U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Pritchardia remota*
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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
__X__ No Change in listing status

For **Field Supervisor, Pacific Islands Fish and Wildlife Office**

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