5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Pritchardia munroi* (loulu)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; 5-year status reviews of 46 species in Idaho, Oregon, Washington, Nevada, Montana, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 77(44):13248-13251.

Lead Region/Field Office:

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

Name of Reviewer(s):

Chelsie Javar-Salas, Plant Biologist, PIFWO
Maui Nui and Hawaii Island Team Manager, PIFWO
Marie Bruegmann, Plant Recovery Coordinator, PIFWO
Recovery Program Lead, PIFWO
Kristi Young, Programmatic Deputy 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 March 6, 2012. The review was based on a review of current, available information since the last 5-year review for *Pritchardia munroi* (USFWS 2011). The evaluation of Chelsie Javar-Salas, Plant Biologist, was reviewed by the Island 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).

Review Analysis:

Please refer to the previous 5-year review for *Pritchardia munroi* published on August 29, 2011 (available at http://ecos.fws.gov/docs/five_year_review/doc3844.pdf) 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. munroi*.

This long-lived perennial tree is endangered and currently found on the islands of Molokai and Maui (Hodel 2007; Imada 2012). The current status and trends for *Pritchardia munroi* are provided in the tables below.

New status information:
In addition to those populations cited in the previous 5-year review, new observations include the following:

- The Plant Extinction Prevention Program [PEPP] (2010, 2012) reported two populations containing one wild mature individual and one immature individual of *P. munroi* on Molokai.

Overall, the numbers of individuals have remained stable from approximately a single wild mature individual reported in the previous 5-year review and in 2014 (PEPP 2012). No current status on the number of individuals found on Maui was reported.

New taxonomic information:
Hodel (2012) classifies the population on Maui as *Pritchardia munroi*, which results in a change in range for the species. This review follows the Hodel (2012) taxonomic treatment and will address both the Maui and Molokai populations as *P. munroi*.

New threats:

- Slug herbivory – Herbivory by slugs (unidentified species) has been reported as a new threat to this species (PEPP 2013).
- Climate change degradation of habitat – Fortini *et al.* (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawaii 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 by Fortini *et al.* (2013) concluded that *P. munroi* is highly vulnerable to the impacts of climate change. Furthermore, *P. munroi* was identified as a species that will have no overlapping area between current and future climate envelope (areas that contain the full range of climate conditions under which the species is known to occur) by 2100. Therefore, additional management actions are needed to conserve this taxon into the future.

New management actions:

- Captive propagation for genetic storage and reintroduction
    - The Harold L. Lyon Arboretum Seed Conservation Laboratory (2013a) contains 15 seeds of *P. munroi* in genetic storage.
    - There is a single propagule at the Harold L. Lyon Arboretum Micropropagation Laboratory (2013b).
    - The Maui Nui Botanical Gardens (2013) has a single individual in propagation at their nursery.
    - Olinda Rare Plant Facility (2013) has six individuals in propagation at their nursery from West Maui.
    - Waimea Valley Arboretum (2013) has 13 individuals of *P. munroi* in its nursery propagated from the Molokai source population.
- Reintroduction / translocation – Seven individuals were outplanted within a fenced exclosure at Kawaikapu by PEPP and the Molokai Land Trust (PEPP 2013).
- Population viability monitoring and analysis – Monitoring of the wild and outplanted individuals on Molokai was conducted by PEPP (2010, 2011, 2013).

- Predator / herbivore monitoring and control – Rat traps were used to control rats (*Rattus* sp.) around the wild individual (PEPP 2010).

Synthesis:
Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Molokai plant cluster (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Pritchardia munroi* is a long-lived perennial, and to be considered stable, this species 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 total of three populations should be documented on Molokai where it now occurs or occurred historically and if possible, at least one other island where it now occurs or occurred historically. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 25 mature individuals per population.

The interim stabilization goals for this species have not been met, as currently no population of 25 mature individuals exists (Table 1) and all threats are not being sufficiently managed throughout all of the populations (Table 2). Therefore, *Pritchardia munroi* meets the definition of endangered, as it remains in danger of extinction throughout its range.

Recommendations for future actions:
- Surveys / inventories – Survey geographical and historical range for a current assessment of the species' status, especially for the population found on Maui.
- Captive propagation genetic storage and reintroduction
    - Continue collection of genetic resources for storage, propagation, and reintroduction into protected suitable habitat within historical range.
    - Evaluate genetic resources currently in storage to determine the need to place additional genetic resources in long-term storage due to this species' high vulnerability to climate change.
- Ungulate monitoring and control – Fence remaining populations to protect them from the impacts of feral ungulates.
- Invasive plant monitoring and control – Control invasive introduced plants within the vicinity of all known populations.
- Predator / herbivore monitoring and control – Control slugs and rodents within the vicinity of all known *P. munroi* populations.
- Population viability monitoring and analysis – Continue monitoring wild and outplanted individuals.
- Pollination biology research – pollinators – Research pollinators and low seed set *in situ* to encourage natural regeneration of the population.
- Climate change adaptation strategy – Research the suitability of habitat for reintroducing this species in the future due to the impacts of climate change. Develop a strategy for preventing the extinction of this species if no suitable habitat is predicted in the future.
- Alliance and partnership development – Initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this taxon.

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1992 (listing)	1	0	All threats managed in all 3 populations	No
			Complete genetic storage	Unknown
			3 populations with 25 mature individuals each	No
1996 (recovery plan)	1	0	All threats managed in all 3 populations	No
			Complete genetic storage	Unknown
			3 populations with 25 mature individuals each	No
2003 (critical habitat)	1	0	All threats managed in all 3 populations	No
			Complete genetic storage	Unknown
			3 populations with 25 mature individuals each	No
2011 (5-yr review)	1	0	All threats managed in all 3 populations	No
			Complete genetic storage	Yes
			3 populations with 25 mature individuals each	No
2014 (5-yr review)	1	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	No

Table 2. Threats to *Pritchardia munroi* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – degradation of habitat and herbivory	A, C, D, E	Ongoing	Partially, Kamalo and Kawaikapu is fenced
Invasive introduced plants	A, E	Ongoing	None
Landslides and flooding	A	Ongoing	None
Unauthorized collection and vandalism	B	Ongoing	None
Rodent predation or herbivory – rats	C	Ongoing	Partially, set rat snap traps
Slug herbivory	C	Ongoing	None
Fire	E	Ongoing	None
Low numbers	E	Ongoing	Partially, captive propagation for genetic storage and reintroduction
Climate change	A, E	Increasing	None

References:

See previous 5-year review for a full list of references (USFWS 2011). Only references for new information are provided below.

Fortini, L., J. Price, J. Jacobi, A. Vorsino, J. Burgett, K. Brinck, F. Amidon, S. Miller, S. Gon II, G. Koob, and E. Paxton. 2013. A landscape-based assessment of climate change vulnerability for all native Hawaiian plants. Technical report HCSU-044. Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hawaii. 141 pages.

Harold L. Lyon Arboretum Micropropagation Laboratory. 2013a. Micropropagation database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Harold L. Lyon Arboretum Seed Conservation Laboratory. 2013b. Seed storage database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Hodel, D. 2012. Loulu: the Hawaiian palm. University of Hawaii Press, Honolulu, Hawaii.

Maui Nui Botanical Gardens. 2013. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. 12 pages. Unpublished.

Olinda Rare Plant Facility. 2013. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. 5 pages. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2010. Plant Extinction Prevention Program annual report, fiscal year 2010 (July 1, 2009-June 30, 2010). 122 pages. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2011. Plant Extinction Prevention Program annual report, fiscal year 2011 (July 1, 2010-June 30, 2011). 200 pages. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2012. Plant Extinction Prevention Program annual report, fiscal year 2012 (July 1, 2011-June 30, 2012). 169 pages. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2013. Plant Extinction Prevention Program annual report, fiscal year 2013 (July 1, 2012-June 30, 2013). 207 pages. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 1996. Recovery plan for the Molokai plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 143 pages.

[USFWS] U.S. Fish and Wildlife Service. 2011. *Pritchardia munroi* 5-year review short form summary. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 11 pages.

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; listing 38 species on Molokai, Lanai, and Maui as endangered and designating critical habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 species; proposed rule. Federal Register 77(112):34464-34775.

Waimea Valley. 2013. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Waimea, Hawaii. 16 pages. Unpublished.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Pritchardia munroi* (loulu)

Pre-1992 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 **Programmatic Deputy Field Supervisor, Pacific Islands Fish and Wildlife Office**

Maine M Bluegmann Date 2014-06-05