

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Pritchardia kaalae* (loulou)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2010. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 58 species in Washington, Oregon, California, and Hawaii. Federal Register 75(226):71726-71729.

Lead Region/Field Office:

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

Name of Reviewer(s):

Vickie Caraway, Plant Biologist, PIFWO

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Manager, PIFWO

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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 January 31, 2012. The review was based on a review of current, available information since the last 5-year review for *Pritchardia kaalae* (USFWS 2008). The National Tropical Botanical Garden provided an initial draft of portions of the five-year review. The document was reviewed by the Plant Biologist, Islands Team Manager, and Plant Recovery Coordinator, followed by the Recovery Program Lead. It was subsequently reviewed and approved by the 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 kaalae* published on January 18, 2008 (available at http://ecos.fws.gov/docs/five_year_review/doc1790.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. kaalae*.

This long-lived perennial is endangered and occurs on the island of Oahu. The current status and trends for *Pritchardia kaalae* are provided in the tables below.

New taxonomic information:

- Genetic research on the Hawaiian *Pritchardia* species confirmed *Pritchardia kaalae* as an independent lineage despite some mixture with *P. martii* (Bacon *et al.* 2012).

New status information;

- The Ohikilolo population contains 78 mature and 1,073 immature individuals and 12 seedlings, and has been augmented with three mature and 428 immature reintroduced individuals (Oahu Army Natural Resources Program [OANRP] 2012b).
- The Ohikilolo East to West Makaleha population contains 307 immature reintroduced individuals (OANRP 2012b).
- The Makaleha to Manuwai population contains 102 mature and ten immature individuals and two seedlings (OANRP 2012b).
- Makaha which contains four mature wild individuals (OANRP 2012b).
- Waianae Kai which contains four mature and five immature individuals (OANRP 2012b).

Overall, this represents an increase from the 555 individuals reported in the last five-year review, with 1,120 wild individuals and 738 reintroduced. However, since only 188 wild and 3 reintroduced plants are mature, the species is not considered stable.

New threats:

- Climate change - Climate change may also pose a threat to this species. However, current climate change analyses in the Pacific Islands lack sufficient spatial resolution to make predictions on impacts to this species. The Pacific Islands Climate Change Cooperative (PICCC) funded climate modeling that will help resolve these spatial limitations. High spatial resolution climate outputs are expected to be available sometime in 2013.

New management actions:

- Ungulate exclosures
 - A fence protects the Ohikilolo population and a portion of the East Ohikilolo and West Makaleha population from goats, and has resulted in the establishment of many new seedlings in those areas. These two populations are considered ungulate free (U.S. Army Garrison 2010).
 - Fences are planned for West Makaleha, East Makaleha and Manuwai which will help stabilize populations in this area (U.S. Army Garrison 2007).
 - Feral goats were removed from the Makaleha area (U.S. Army Garrison 2007). Ecosystem-altering invasive plant species control
 - In 2007, OANRP staff removed 31 *Araucaria columnaris* (Norfolk pine) trees in the Ohikilolo campsite area. Weed monitoring and control around *Pritchardia kaalae* was conducted first to clean up mostly native areas, then to expand out to weedier areas (U.S. Army Garrison 2007).
 - In 2007, 111 staff hours were spent weeding about 47 percent of the area in West Makaleha containing *Pritchardia kaalae* (U.S. Army Garrison 2007).

- Extensive weed control efforts were conducted in 2008 in the Ohikilolo, Ohikilolo East to West Makaleha, and Makaleha to Manuwai populations (U.S. Army Garrison 2009).
- Predator / herbivore control
 - Ten years of rat control efforts finally allowed the development of mature fruit, seed collection for propagation, and the establishment of seedlings within the Ohikilolo and Makaleha to Manuwai populations in 2007 (U.S. Army Garrison 2007).
 - Rat control continued to be successful in allowing the development of mature fruit and the establishment of seedlings within the Ohikilolo population, and the baited section of the Makaleha to Manuwai population (U.S. Army Garrison 2010).
- Captive propagation for genetic storage and reintroduction
 - Seed collections were made from both the Ohikilolo and Makaleha to Manuwai populations in 2010. Complete genetic representation has been obtained from six individuals (U.S. Army Garrison 2010).
 - Research on the best storage conditions for *Pritchardia kaalae* continues, in collaboration with the National Center for Genetic Resource Preservation (U.S. Army Garrison 2010).
 - OANRP staff has 35 individuals of *Pritchardia kaalae* in cultivation (OANRP 2012a).
 - Waimea Valley Arboretum has ten individuals of *Pritchardia kaalae* in cultivation and five trees established on the grounds (Waimea Valley 2011).
 - Pahole Rare Plant Facility has 20 individuals of *Pritchardia kaalae* in cultivation (Pahole Rare Plant Facility 2011).
 - Harold L. Lyon Arboretum (2012) has 35 plants of *Pritchardia kaalae* in their micropropagation facility.
- Reintroduction / translocation
 - Seven hundred and thirty eight individuals have been reintroduced in the Ohikilolo and Ohikilolo East to West Makaleha populations (U.S. Army Garrison 2010) (See Table 1 below for details).
 - Both populations with reintroductions were monitored in 2012 (OANRP 2012b).

Synthesis:

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for plants from the island of Oahu (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial.

Pritchardia kaalae is a long-lived perennial, and to be considered stable, the taxon 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 of three populations of at least 25 individuals should be documented on the island of Oahu. Each of these populations must be naturally reproducing and increasing in number.

The stability goal of 25 reproducing plants has been met for the Ohikilolo and Makaleha to Manuwai populations (Table 1), but all threats are not being sufficiently managed throughout all populations (Table 2). Therefore, *Pritchardia kaalae* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Captive propagation for genetic storage and reintroduction
 - Continue seed collection from tagged individuals, recording the maternal source for ex situ propagation and sending these seeds to at least two or three different facilities for propagation and storage.
 - Continue research on storage conditions best suited to *Pritchardia* seeds.
- Reintroduction / translocation - Continue to reintroduce the species back into its known historical range.
- Ungulate exclosures - Complete construction of ungulate-proof fenced exclosures around all populations and monitor the fences for any signs of breaching.
- Ecosystem-altering invasive plant species control – Continue controlling invasive introduced plant species around all populations.
- Predator / herbivore control – Continue implementing effective control methods for rodents.
- Fire protection – Develop and implement fire management plans for all wild and reintroduced populations.
- Alliance and partnership development - Initiate planning and contribute to implementation of ecosystem-level management and restoration to benefit this species.
- Population biology research – Study *Pritchardia kaalae* populations with regard to population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- Threats research: Assess the modeled effects of climate change on this species, and use results to determine future landscape needed for the recovery of the species.

Table 1. Status of *Pritchardia kaalae* from listing through current 5-year review.

Date	No. wild indivs	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1996 (listing)	130	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	Partially
1998 (recovery plan)	130	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially
2003 (critical habitat)	200	Unknown	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially
2008 (5-yr review)	555	356	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially
2013 (5-yr review)	188 mature, 1,088 immature and 14 seedlings – total 1,390	3 mature, 735 immature – total 738	All threats managed in all 3 populations	Partially (see Table 2)
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially, 2 populations

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

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat by feral pigs and goats.	A, C, D	Ongoing	Partially: Ungulates eliminated in two population units and partially in third population.
Established ecosystem-altering invasive plant species	A, E	Ongoing	Partially
Herbivory by goats, trampling by pigs.	C	Ongoing	Mostly controlled by fencing
Seed predation by rats	C	Ongoing	Partially: Rat monitoring and control with bait and traps ongoing
Lethal yellowing disease, a mycoplasma-like organism transmitted by a sap-sucking plant hopper (<i>Myndus crudus</i>)	C	Ongoing	None
Fire	A, E	Ongoing	Partially
Illegal collection of seed for horticultural trade	B	Ongoing	None, but fencing should help.
Low numbers	E	Ongoing	Partially: Captive propagation and genetic storage, reintroduction and monitoring are ongoing
Climate change	A, E	Increasing	None

References:

See previous 5-year review for a full list of references (USFWS 2008). Only references for new information are provided below.

Bacon, C.D., M.J. McKenna, M.P. Simmons, and W.L. Wagner. 2012. Evaluating multiple criteria for species delimitation: an empirical example using Hawaiian palms (Arecaceae: *Pritchardia*). *BMC Evolutionary Biology* 12:23. Available online at <<http://www.biomedcentral.com/1471-2148/12/23/#refs>>.

Harold L. Lyon Arboretum. 2012. Micropropagation database and seed storage databases. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

[OANRP] Oahu Army Natural Resource Program. 2012a. Army nursery inventory summary. 1 page. Unpublished.

- [OANRP] Oahu Army Natural Resources Program. 2012b. Oahu implementation plan - population unit status; *Pritchardia kaalae*. 1 page. Unpublished.
- Pahole Rare Plant Facility. 2011. Controlled propagation report to U.S. Fish and Wildlife Service. Harold L. Lyon Arboretum, University of Hawaii, Honolulu, Hawaii. 15 pages. Unpublished.
- U.S. Army Garrison. 2007. 2007 Status Reports for the Makua implementation plan and the draft Oahu implementation plan. 719 pages. Available online at [≤
http://manoa.hawaii.edu/hpicesu/DPW/2007_YER/YER_2007_edited.pdf](http://manoa.hawaii.edu/hpicesu/DPW/2007_YER/YER_2007_edited.pdf)>.
- U.S. Army Garrison. 2008. Final implementation plan for Oahu training areas: Schofield Barracks Military Reservation, Schofield Barracks East Range, Kawaihoa Training Area, Kahuku Training Area, and Dillingham Military Reservation. 624 pages. Available online at [<http://manoa.hawaii.edu/hpicesu/DPW/2008_OIP/2008_OIP_edited.pdf](http://manoa.hawaii.edu/hpicesu/DPW/2008_OIP/2008_OIP_edited.pdf)>.
- U.S. Army Garrison. 2009. 2009 status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 711 pages. Available online at [<http://manoa.hawaii.edu/hpicesu/DPW/2009_OIP/2009_OIP_Edited.pdf](http://manoa.hawaii.edu/hpicesu/DPW/2009_OIP/2009_OIP_Edited.pdf)>.
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- [USFWS] U.S. Fish and Wildlife Service. Recovery plan for the Oahu plants. 1998. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages + appendices.
- [USFWS] U.S. Fish and Wildlife Service. 2008. *Pritchardia kaalae* (loulou) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 11 pages. Available online at [<http://ecos.fws.gov/docs/five_year_review/doc1123.pdf](http://ecos.fws.gov/docs/five_year_review/doc1123.pdf)>.
- Waimea Valley. 2011. Controlled propagation report to U.S. Fish and Wildlife Service. Waimea Valley Arboretum, Waimea, Hawaii. 15 pages. Unpublished.

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

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

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