

*Pritchardia kaalae*  
(Lo`ulu)

**5-Year Review  
Summary and Evaluation**

**U.S. Fish and Wildlife Service  
Pacific Islands Fish and Wildlife Office  
Honolulu, Hawaii**

**5-YEAR REVIEW**  
**Species reviewed: *Pritchardia kaalae* (Lo`ulu)**

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**5-YEAR REVIEW**  
***Pritchardia kaalae* (Lo`ulu)**

**1.0 GENERAL INFORMATION**

**1.1 Reviewers**

**Lead Regional Office:**

Region 1, Jesse D'Elia, Chief, Division of Recovery, (503) 231-2071

**Lead Field Office:**

Pacific Islands Fish and Wildlife Office, Gina Shultz, Assistant Field Supervisor for Endangered Species, (808) 792-9400

**Cooperating Field Office(s):**

N/A

**Cooperating Regional Office(s):**

N/A

**1.2 Methodology used to complete the review:**

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (USFWS) between June 2006 and June 2007. The evaluation of the lead PIFWO biologist was reviewed by the Plant Recovery Coordinator. These comments were incorporated into the draft five-year review. The draft document was then reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species before final approval.

**1.3 Background:**

**1.3.1 FR Notice citation announcing initiation of this review:**

USFWS. 2006. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 70 species in Idaho, Oregon, Washington, Hawaii, and Guam. Federal Register 71(69):18345-18348.

**1.3.2 Listing history**

Original Listing

**FR notice:** USFWS. 1991. Endangered and threatened wildlife and plants; determination of endangered status for 26 plants from the Waianae Mountains, island of Oahu, Hawaii; final rule. Federal Register 58(209):55770-55786.

**Date listed:** October 10, 1996

**Entity listed:** Species

**Classification:** Endangered

Revised Listing, if applicable

**FR notice:** N/A

**Date listed:** N/A

**Entity listed:** N/A

**Classification:** N/A

**1.3.3 Associated rulemakings:**

USFWS. 2003. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 101 plant species from the island of Oahu, HI; final rule. Federal Register 68(116):35950-36406.

The designation of critical habitat for *Pritchardia kaalae* was determined to be not prudent because it would likely increase the threats from vandalism or collection of this species on Oahu (USFWS 2003).

**1.3.4 Review History:**

Species status review [FY 2006 Recovery Data Call (September 2006)]:

Improving

**Recovery achieved:**

1 (0-25%) (FY 2006 Recovery Data Call)

**1.3.5 Species' Recovery Priority Number at start of this 5-year review:**

5

**1.3.6 Current Recovery Plan or Outline**

**Name of plan or outline:** Recovery plan for the Oahu plants. 1998. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages + appendixes.

**Date issued:** October 10, 1998

**Dates of previous revisions, if applicable:** N/A

**2.0 REVIEW ANALYSIS**

**2.1 Application of the 1996 Distinct Population Segment (DPS) policy**

**2.1.1 Is the species under review a vertebrate?**

     Yes  
  X   No

**2.1.2 Is the species under review listed as a DPS?**

     Yes  
  X   No

**2.1.3 Was the DPS listed prior to 1996?**

     Yes  
     No

**2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?**

*Yes*  
 *No*

**2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?**

*Yes*  
 *No*

**2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?**

*Yes*  
 *No*

## **2.2 Recovery Criteria**

**2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?**

*Yes*  
 *No*

**2.2.2 Adequacy of recovery criteria.**

**2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?**

*Yes*  
 *No*

**2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery?**

*Yes*  
 *No*

**2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:**

A synthesis of the threats (Factors A, B, C, D, and E) affecting this species is presented in section 2.4.

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for Oahu plants (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than ten 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* (off-site) collection. In

addition, a minimum of three populations should be documented on Oahu. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 25 mature individuals per population.

This recovery objective has not been met.

For downlisting, a total of five to seven populations of *Pritchardia kaalae* should be documented on Oahu. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with a minimum of 100 mature individuals per population. Each population should persist at this level for a minimum of five consecutive years before downlisting is considered.

This recovery objective has not been met.

For delisting, a total of eight to ten populations of *Pritchardia kaalae* should be documented on Oahu. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with 100 mature individuals per population for long-lived perennials. Each population should persist at this level for a minimum of five consecutive years before delisting is considered.

This recovery objective has not been met.

### 2.3 Updated Information and Current Species Status

In addition to the status summary table below, information on the species' status and threats was included in the final critical habitat rule referenced above in section 1.3.3 ("Associated Rulemakings") and in section 2.4 ("Synthesis") below, which also includes any new information about the status and threats of the species.

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

| Date                 | No. wild inds | No. outplanted | Stability Criteria                            | Stability 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      | Partially                     |

| <b>Date</b>             | <b>No. wild inds</b> | <b>No. outplanted</b> | <b>Stability Criteria</b>                     | <b>Stability Criteria Completed?</b> |
|-------------------------|----------------------|-----------------------|---|--------------------------------------|
|                         |                      |                       | each  |                                      |
| 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                            |
| 2007 – 5-yr review      | 555                  | 356                   | All threats managed                           | Partially                            |
|                         |                      |                       | Complete genetic storage                      | Partially                            |
|                         |                      |                       | 3 populations with 25 mature individuals each | Partially                            |

### **2.3.1 Biology and Habitat**

#### **2.3.1.1 New information on the species' biology and life history:**

**2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:**

**2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):**

**2.3.1.4 Taxonomic classification or changes in nomenclature:**

**2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):**

**2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):**

**2.3.1.7 Other:**

### **2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)**

#### **2.3.2.1 Present or threatened destruction, modification or curtailment**

**of its habitat or range:**

**2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:**

**2.3.2.3 Disease or predation:**

**2.3.2.4 Inadequacy of existing regulatory mechanisms:**

**2.3.2.5 Other natural or manmade factors affecting its continued existence:**

## **2.4 Synthesis**

*Pritchardia kaalae* is endemic to the northern Waianae Mountains in Oahu (Makua Implementation Team 2003). Total numbers of *P. kaalae* have increased from 130 to 911 individuals, with recent reintroductions and natural seedling recruitment. Of the 911 individuals, 15 percent are mature and 85 percent are immature (including natural regeneration and outplanted individuals) (U.S. Army 2006). The majority of the known individuals of this taxon are on the Ohikilolo Ridge or on the northern side of Kaala from East Makaleha Valley to Manuwai Gluch.

*Pritchardia* species usually have perfect flowers, and *P. kaalae* is most likely self-compatible (U.S. Army 2006). *Pritchardia kaalae* was reported as growing up to 5 meters (16.4 feet) tall (Read and Hodel 1999) and recent observations suggested that can reach up to 10 meters (33 feet). Seeds of *P. kaalae* are smaller than those of other Hawaiian *Pritchardia* species and it is suggested that seeds were dispersed by the now extinct flightless birds (Makua Implementation Team 2003).

At the time of listing, *Pritchardia kaalae* was known from five populations in the northern Waianae Mountains of Oahu, with a total of 130 wild individuals (USFWS 1996). In the recovery plan, the species was still known from five populations totaling about 130 individuals (USFWS 1998). Another population was discovered in Makaha Valley with 70 individuals (USFWS 2003). In 2006, the species totalled 911 individuals. The population from Ohikilolo has approximately 75 mature individuals, 3 immature and 407 seedlings occurring naturally. This population has been augmented with 284 immature plants and is located on federal land at Makua Military Reservation (U.S. Army 2006). The U.S. Army 72 outplanted individuals on the ridge between Ohikilolo East and West Makaleha to reestablish a population at a historical site. The population reaching from East Makaleha Valley to Manuwai Gluch has 54 mature and three immature individuals and is located on State land in Mt. Kaala Natural Area Reserve. The species also occurs on the ridge between Waianae Kai and Schofield Barracks Military Reservation with four mature and five immature individuals and at Makaha Valley with four mature individuals. Three plants in Palawai Gulch, discovered after *Pritchardia kaalae* was listed, were initially thought to be *P. kaalae*. Currently, it is unclear which species these individuals belong to, and



further genetic research is needed (C. Gemmill, University of Waikato, pers. comm. 2007). In total, with wild and outplanted individuals, the species consists of 911 individuals.

*Pritchardia kaalae* occurs in lower elevation mesic forests where the vegetation is dominated by *Diospyros-Metrosideros* (ohia-lama) and in wetter zones dominated by *Metrosideros tremuloides* (ohia ahihi). *Pritchardia kaalae* grows on moderately steep, open cliffs and very steep slopes vegetated with grasses and sedges, shrubs and small trees at elevations ranging from 480 to 980 meters (1,476 to 3,214 feet) (Read and Hodel 1999; Makua Implementation Team 2003; Chapin *et al.* 2004; U.S. Army 2006).

Threats affecting *Pritchardia kaalae* include habitat degradation by feral goats and pigs (Factors A and D) (USFWS 1996, 1998 and 2003; Makua Implementation Team 2003; U.S. Army 2005 and 2006). Three of the populations are being managed for stability by the U.S. Army, as defined in the recovery criteria above. A fence completed in 2000 runs along the southern perimeter of Makua Valley, preventing feral goats from entering the valley from the adjacent valleys of Makaha and Keaau and protecting the Ohikilolo population. Goats have been almost completely eradicated from *Pritchardia kaalae*'s habitat on Ohikilolo Ridge. However, goat sign was observed by U.S. Army staff in 2006 within the perimeter fence and control is ongoing. Large numbers of goats are present on the Ohikilolo Ridge system outside of the Makua Military Reservation in Makaha and Keaau Valleys. The part of Waianae Kai Valley that contains five *P. kaalae* also harbors large numbers of feral goats (U.S. Army 2006).

Threats to *Pritchardia kaalae* include potential use for horticulture purposes (Factor B) (USFWS 1996 and 2003), seed predation by rats (Factor C), seedling predation by goats (Factor C), and lethal yellowing disease, a mycoplasma-like organism transmitted by a sap-sucking plant hopper (*Myndus crudus*) (Factor C) (USFWS 1996, 1998 and 2003; Gemmill 1998; Makua Implementation Team 2003; Chapin *et al.* 2004; U.S. Army 2006)

The U.S. Army is addressing the threat of predation by rats by monitoring fruit set and setting protection nets around fruiting stalks when fruits are maturing. Rats are controlled around the Ohikilolo population, around 40 to 50 individuals in the Makelaha to Manuwai population, and in the reintroduced population using baits and snap traps. The recruitment rates have increased dramatically since rats have been controlled (Makua Implementation Team 2003; U.S. Army 2006).

Habitat degradation by, and competition from, invasive introduced plant species pose a major threat to *Pritchardia kaalae* (Factor E) (USFWS 1996, 1998, and 2003; U.S. Army 2006). Invasive plant species including *Schinus terebinthifolius* have been eradicated from the main patch in the Ohikilolo population, but continue to threaten much of the ecosystem (U.S. Army 2006).

Fire is a threat to *Pritchardia kaalae*, with 92 percent of the Ohikilolo population at risk from military training-related wildfires (Factor E) (USFWS 1996, 1998, and 2003; U.S. Army 2006).

The U.S. Army is propagating the species for genetic storage and reintroduction in the Army's baseyard, the University of Hawaii's Lyon Arboretum Micropropagation and Seed Storage Laboratories, National Tropical Botanical Garden, the State of Hawaii Division of Forestry and Wildlife's Pahole Rare Plant Facility, and at Waimea Valley Park. Germination from seed is a reliable propagation technique, particularly if the embryos are cut out of the seed. Reintroduction in the wild had been successful, but seedlings grow slowly and the survival rated in two years has been approximately 90 percent (U.S. Army 2006; Makua Implementation Team 2003).

The stabilization and recovery goals for this species have not been met, as only two populations have numbers above interim stability, and not all of the threats are being managed in any of populations. In addition, less than 150 individuals are mature and all but approximately 60 of the individuals are within military lands and threatened by fire from military training. Therefore, *Pritchardia kaalae* meets the definition of endangered as it remains in danger of extinction throughout its range.

### 3.0 RESULTS

#### 3.1 Recommended Classification:

Downlist to Threatened

Uplist to Endangered

Delist

*Extinction*

*Recovery*

*Original data for classification in error*

No change is needed

#### 3.2 New Recovery Priority Number:

**Brief Rationale:**

#### 3.3 Listing and Reclassification Priority Number:

**Reclassification (from Threatened to Endangered) Priority Number:** \_\_\_\_\_

**Reclassification (from Endangered to Threatened) Priority Number:** \_\_\_\_\_

**Delisting (regardless of current classification) Priority Number:** \_\_\_\_\_

**Brief Rationale:**

### 4.0 RECOMMENDATIONS FOR FUTURE ACTIONS:

- Continue seed collection for *ex situ* genetic storage and reintroduction.

- Control introduced invasive plant species around wild and outplanted plants.
- Continue rodent control around remaining plants.
- Fence areas to control feral pigs and goats.
- Develop a post-fire revegetation plan and decrease the fuel levels around current populations.
- 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.
- Study the potential for genetic contamination of the native *Pritchardia* species of Oahu by the planted Hawaiian *Pritchardia* spp. from other islands.

## 5.0 REFERENCES:

Chapin, M.H., K.R. Wood, S. Perlman, and M. Maunder. 2004. A review of the conservation status of the endemic *Pritchardia* palms of Hawaii. *Oryx* 38(3):273-281.

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Makua Implementation Team. 2003. Implementation Plan for the Makua Military Reservation, Island of Oahu. Prepared for U.S. Army Garrison, Hawaii, May 2003.

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[U.S. Army] U.S. Army Garrison, Hawaii. 2006. 2006 Status reports for the Makua Implementation Plan and the draft O'ahu implementation plan. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designations or nondesignations of critical habitat for 101 plant species from the island of Oahu, Hawaii; final rule. *Federal Register* 68(116):35950-35993.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. Portland, Oregon. 207 pages + appendixes.

[USFWS] U.S. Fish and Wildlife Service. 1996. Determination of endangered status for twenty-five plant species from the Island of Oahu, HI; final rule. Federal Register 61(198):53089-53108.

**Personal Communications:**

Gemmill, Chrissen. 2007. Lecturer, University of Waikato. Email to Christian Torres, USFWS, May 18, 2007.

**Signature Page**  
**U.S. FISH AND WILDLIFE SERVICE**  
5-YEAR REVIEW of *Pritchardia kaalae* (Lo`ulu)

**Current Classification:** \_\_\_\_\_ E \_\_\_\_\_

**Recommendation resulting from the 5-Year Review:**

- \_\_\_\_\_ Downlist to Threatened
- \_\_\_\_\_ Uplist to Endangered
- \_\_\_\_\_ Delist
- X   No change needed

**Appropriate Listing/Reclassification Priority Number, if applicable:** \_\_\_\_\_

**Review Conducted By:**

Marilet A. Zablan, Recovery Program Leader and Acting Assistant Field Supervisor for Endangered Species, July 3, 2007

Marie Bruegmann, Plant Recovery Coordinator, July 3, 2007

Christian Torres-Santana, Fish and Wildlife Biologist, May 18, 2007

Approve  Date 1/18/08  
**Lead Field Supervisor, Fish and Wildlife Service**