

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Kadua coriacea* (kio‘ele)

**Current Classification:** Endangered

### **Federal Register Notice announcing initiation of this review:**

[USFWS] U.S. Fish and Wildlife Service. 2023. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 133 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 88(56): 17611–17614, March 23, 2023.

### **Lead Region/Field Office:**

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

### **Name of Reviewer:**

Daniel Adamski, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, PIFWO

Megan Laut, Recovery Program 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 2023. The review was based on a review of current, available information since the last 5-year review for *Kadua coriacea* (USFWS 2020). The evaluation by Daniel Adamski, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery Program 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/ecp/species/5504>).

### **Review Analysis:**

Please refer to the previous 5-year reviews for *Kadua coriacea* published in the Federal Register on January 18, 2008 (available at [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/1170.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1170.pdf)), August 3, 2015 (available at [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/2277.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/2277.pdf)), and on September 28, 2020 (available at [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/3112.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3112.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 *K. coriacea*.

This short-lived perennial shrub in the Rubiaceae (coffee) family is endangered and found on the island of Hawai‘i. The status and trends for *Kadua coriacea* are provided in the tables below.

New Status Information:

- Currently there are 129 total wild individuals of *Kadua coriacea*, 123 mature and 6 immature plant at Pōhakuloa Training Area [PTA] (U.S. Army Garrison-Hawai‘i [USAG-HI] 2024).
- Currently, there are 189 founder lines represented in *ex situ* storage and propagation collections, including seeds in seed banks and plants in a nursery or living collection (USAG-HI 2024).

New Threats:

- None

New Management Actions:

- Monitoring and surveys—The Center for Environmental Management of Military Lands (CEMML) monitors fences, monitors plants, and collects seeds of *Kadua coriacea* at PTA (USAG-HI 2024).
- CEMML conducted weed control around *Kadua coriacea* plants and maintains fuel breaks across PTA to protect plants from wildfires (USAG-HI 2024).
- Collection and propagation for genetic storage and reintroduction—
  - PTA Rare Plant Propagation Facility (PTA RPPF) reports over 134,000 seeds in storage representing 189 wild founder plants, and an additional 90 potted plants, representing 28 founder plants (USAG-HI 2024).
  - CEMML reported collecting 153 seeds from seven founders for storage at PTA RPPF and collected 35 seeds from six founders for storage at Army Natural Resources Program O‘ahu [ANPRO] (USAG-HI 2024).
  - Reintroduction/ Augmentation/ Introduction—Between 2004 and 2014, there were 20 individuals reintroduced at PTA, and monitoring in 2024 revealed one individual remains. Between 2019 and 2023, there were 147 individuals reintroduced at PTA, and monitoring in 2024 revealed eight individuals remain. In addition, 35 individuals were reintroduced in 2024 at one site at PTA (USAG-HI 2024).
- Research/Germination Trials—Germination trials were conducted by PTA RPPF in 2023 and tested 1,330 seeds from 51 founders that were in storage for 10–20 years. The average germination rate was reported to be approximately 60% for all seeds tested (USAG-HI 2024).

**Table 1. Status and trends of *Kadua coriacea* from listing through current 5-year review. Table 1a shows progress according to Interim Stabilization Goals; Table 1b shows progress according to Preventing Extinction Goals.**

**Table 1a.**

<b>Date</b>	<b>No. wild individuals</b>	<b>No. Outplanted</b>	<b>Stability Goals identified in Recovery Plan</b>	<b>Stability Goals Completed?</b>
<b>1992 (Listing)</b>	3	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 individuals each	No
<b>2008 (5-year review)</b>	156	85	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 individuals each	Partially
<b>2015 (5-year review)</b>	162 mature, 5 immature	448	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 individuals each	Partially

**Table 1b.**

<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>*Preventing Extinction Targets identified by HPPRCC</b>	<b>*Preventing Extinction Targets Completed?</b>
<b>2020 (5-year review)</b>	145 mature, 3 immature	ca 80	All threats managed in all 3 populations	Partially
			Reproduction (i.e., viable seeds, seedlings, saplings) at all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
<b>2025 (5-year review)</b>	123 mature, 6 immature	44	All threats managed in all 3 populations	Partially
			Complete genetic storage	Complete
			Reproduction (i.e., viable seeds, seedlings, saplings) at all 3 populations	No
			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 *Kadua coriacea* and ongoing conservation efforts.**

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate destruction and degradation of habitat	A, E	Ongoing	Partial, most individuals in exclosures
Established ecosystem altering invasive plant species degradation of habitat	A, E	Ongoing	Partial, nonnative plant control efforts
Fire destruction and degradation of habitat	A	Ongoing	Partial, weed control and fire management plan for PTA
Climate change degradation and loss of habitat, including drought	A	Ongoing	None
Herbivory by ungulates	C	Ongoing	Partial, most individuals in exclosures
Predation by invertebrates–scale	C	Ongoing	None
Lack of adequate hunting regulations	D	Ongoing	Partial, most individuals in exclosures
Military training activities	E	Ongoing	Partial, PTA management plan
Reduced viability due to low numbers	E	Ongoing	Partial, collection, propagation, and reintroduction

**Synthesis:**

Currently there 149 (143 mature, 6 immature) wild individuals of *Kadua coriacea* on the island of Hawai‘i. Individuals are provided protection from ungulates by fencing, and nonnative plant control. Seed collections, propagation, and reintroductions are ongoing.

Stabilizing (interim) targets, and Downlisting and Delisting criteria are in the Recovery Plan for the Maui Plant Cluster (USFWS 1997) 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 targets, and Downlisting and Delisting criteria. 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.

*Kadua coriacea* is a short-lived perennial shrub. 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 the island of Hawai‘i, and at least one other island (Maui, O‘ahu) where they now occur or occurred historically 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 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met (Table 1). There are not three populations of 50 reproducing individuals each, and all threats are not being managed, although genetic storage is complete (Table 2). Therefore, *Kadua coriacea* 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 2020. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2025.

- Surveys and monitoring—
  - Continue to monitor known populations of *Kadua coriacea* to assess resiliency and make collections.
  - Determine suitable locations for reintroductions.
- Ungulate monitoring and control—Monitor and maintain existing fenced enclosures and construct new fences to protect individuals from the negative impacts of browsing by ungulates.
- Invasive nonnative plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species, and those that compete with *Kadua coriacea*.
- Site and habitat protection—
  - Develop and implement effective control measures to reduce the impacts of destruction by fire, drought, and military training activities.
  - Develop and implement effective control measures to reduce the impact of invasive invertebrate predation, specifically from scale.
- Climate change adaptation strategy—Research suitability of habitat for viability of species, including where to conduct translocations in the future due to the impacts of climate change.
- Captive propagation for genetic storage and reintroduction—Continue to maintain collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- Build resiliency, redundancy, and representation—Increase species’ viability through habitat restoration, threat control, and reintroduction and translocation into suitable habitat that is being managed for known threats to this species to reduce impacts of reduced viability due to low numbers.
- Research—Conduct genetic studies to determine genetic variation within the population (and between populations) and plan an effective breeding program.

- Alliance and partnership development—Continue to work with partners and other land managers in preventing site destruction from fire and nonnative plant degradation of habitat, as well as 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.
- [USAG-HI] United States Army Garrison-Hawai‘i. 2024. U.S. Army Garrison Pōhakuloa Training Area Natural Resources Program FY 2022 to FY 2023 Biennial Report. Prepared by Center for Environmental Management of Military Lands, Colorado State University. June 2024. 558pp.
- [USFWS] U.S. Fish and Wildlife Service. 1997. Recovery plan for the Maui Plant Cluster. Portland, OR 130 pp. + appendices.
- [USFWS] 2008. *Kadua coriacea* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/1170.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1170.pdf).
- [USFWS] 2015. *Kadua coriacea* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/2277.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/2277.pdf).
- [USFWS] 2020. *Kadua coriacea* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/311.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/311.pdf).
- [USFWS] 2023. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 133 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 88(56): 17611–17614, March 23, 2023.

**U.S. FISH AND WILDLIFE SERVICE**  
SIGNATURE PAGE for 5-YEAR REVIEW of *Kadua coriacea* (kio‘ele)

**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

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

\_\_\_\_\_ Date \_\_\_\_\_