

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Kadua st.-johnii* (no common name)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 129 Species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85(48): 14240–14243, March 11, 2020.

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 or USFWS) beginning in October 2021. The review was based on a review of current, available information since the last 5-year review for *Kadua st.-johnii* (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 (<https://ecos.fws.gov/ecp/species/4337>).

Review Analysis:

Please refer to the previous 5-year reviews for *Kadua st.-johnii* published in the Federal Register on July 21, 2009, and September 13, 2017 (available at https://ecos.fws.gov/docs/tess/species_nonpublish/1405.pdf and https://ecos.fws.gov/docs/tess/species_nonpublish/2454.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. st.-johnii*.

This short-lived perennial herb in the Rubiaceae (coffee) family is listed as endangered and is known from the island of Kaua‘i. The status and trends for *Kadua st.-johnii* are provided in the tables below.

New Status Information:

- There are 18 wild individuals of *Kadua st.-johnii* on Kaua‘i (Walsh et al. 2021).

New Threats:

- None reported.

New Management Actions:

- Surveys and inventories—The Plant Extinction Prevention Program (PEPP) and the National Tropical Botanical Garden (NTBG) survey for and monitor populations of *Kadua st.-johnii* (Perlman and Kishida 2018a, b; Perlman and Wood 2018). PEPP received Coastal Grant funds on behalf of the Pacific Cooperative Studies Unit of the University of Hawai‘i (PCSU-UH) to conduct plant conservation actions on the islands of Hawai‘i, Moloka‘i, and Kaua‘i (PEPP 2019, 25 pp.). The cliff areas of Nu‘alolo ‘Aina, Awa‘awapuhi, and Nu‘alolo Kai were surveyed using binoculars. Only one plant was found in an inaccessible area of Nu‘alolo (PEPP 2019, p. 21). There is one plant in an enclosure at Nu‘alolo Kai.
- Captive propagation for genetic storage and reintroduction—
 - Between 2018 and 2019, PEPP collected propagules from nine founders from four of seven populations, exceeding project goals (PEPP 2019, pp. 20, 25). These accessions are stored at NTBG. Seeds were collected from four of nine founders at Mākaha and propagules were collected from two founders at Miloli‘i (PEPP 2019, p. 21).
 - The Lyon Arboretum Seed Conservation Laboratory reports storage of more than 78,000 seeds representing seven founders from three subpopulations at Miloli‘i, and storage of 1,899 seeds representing one founder from Mākaha (Lyon Arboretum 2022).
 - In 2019, the Kōke‘e Mid-Elevation Nursery (KMEN) reported seed collections representing three founders from Miloli‘i for use in germination trials by Lyon Arboretum, and in 2020, propagation of 15 individuals of *K. st.-johnii* representing two founders from Miloli‘i (KMEN 2019, 2020).
 - In 2019, NTBG reported collection and storage of 425 seeds representing one founder at Nu‘alolo, collection of 6,000 seeds representing one founder at Nu‘alolo Kai, and collection of 5,000 seeds from a first-generation plant in a living collection. Two of each of these individuals were planted as living collections at the Limahuli or Southshore garden (NTBG 2019). In 2020, NTBG collected and stored 771 seeds representing one founder from Awa‘awapuhi, 4,903 seeds representing one founder from Nu‘alolo, 26,310 seeds representing five founders from Mākaha, and 2,805 seeds representing one founder from Miloli‘i (NTBG 2020). In the nursery, one founder from Nu‘alolo is represented by one plant; three founders from Mākaha are represented by 31 plants; and one founder from Miloli‘i is represented by three plants. In addition, one individual representing one founder from Miloli‘i was added to the living collection at the Southshore garden along with one plant representing one founder from Nu‘alolo, and two plants representing one founder from Mākaha.

- Reintroduction and augmentation—PEPP and NTBG reintroduced two individuals of *Kadua st.-johnii* in a protected site at Lāwa‘i Kai in 2018 (PEPP 2019, p. 25).

Table 1. Status and trends of *Kadua st.-johnii* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	Stability Criteria identified by Recovery Plan	Stability Criteria Completed?
1991 (listing)	<200	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1995 (recovery plan)	<200	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	227–292	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2009 (5-year review)	<50	11	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?

2017 (5-year review)	47	0	All threats managed in all 3 populations	Partially, strategic fence at 1 location
			Complete genetic storage	Partially
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Unknown
			3 populations with 100 mature individuals each	No
2022 (5-year review)	18	4	All threats managed in all 3 populations	Partially, strategic fence at 1 location
			Complete genetic storage	Partially, ca 18 founders from 4 populations represented
			Natural reproduction at all 3 populations	No
			3 populations with 100 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 st.-johnii* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Destruction and degradation of habitat and herbivory by feral ungulates	A, C	Ongoing	Partially, strategic fence at 1 location
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	None
Drought destruction and degradation	A	Ongoing	None
Landslide destruction and degradation	A	Ongoing	None
Fire destruction and degradation	A	Ongoing	None

Climate change degradation and destruction of habitat, including hurricanes	A	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, seed collection, propagation, and reintroductions

Synthesis:

Currently there are 18 wild individuals of *Kadua st.-johnii* on Kaua‘i. At the time of the last 5-year review there were 47 estimated individuals, which documents a further decline since listing in 1991 when the population was estimated at approximately 200 individuals. NTBG and PEPP monitor the areas where *K. st.-johnii* occurs. One population is protected by strategic fencing. Collections, propagation, and reintroduction are ongoing, with approximately 18 founders from four populations represented; however, most propagated plants are in living collections.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Kaua‘i Islandwide Recovery Plan (USFWS 2021) 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, 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.

Kadua st.-johnii is a short-lived perennial herb and an obligate outcrosser. 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 Kaua‘i where this species now occurs or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 100 mature, reproducing individuals per population.

The preventing extinction goals for *Kadua st.-johnii* have not been met. Numbers of known individuals have declined by 38 percent (to only 18 individuals) since the last 5-year review. There are no populations totaling 100 mature individuals (Table 1). There is some genetic representation (approximately 18 founders from four populations) most of which represent one population (Miloli‘i); however, most propagated plants are in living collections (Table 1, Table 2). Threats including habitat degradation and competition by nonnative plants, drought, landslides, fire, and hurricanes are not being addressed.

Therefore, *K. st.-johnii* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

No new threats and no significant new information regarding the species' biological status have been reported since the last 5-year review in 2017. Thus, the following recommendations for future actions are reiterated or updated for the 5-year review for 2022.

- Surveys and inventories—Continue to survey current and historical range of *Kadua st.-johnii* for a thorough assessment of the species.
- Ungulate monitoring and control—Construct small-scale exclosures or strategic fencing where *K. st.-johnii* occurs to provide protection from the negative impacts of feral ungulates.
- Nonnative invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species and those that compete with *K. st.-johnii*.
- Climate change adaptation strategy—Research suitability of habitat for viability of species, including where to conduct translocations in the future due to impacts of climate change.
- Captive propagation for genetic storage and reintroduction—Continue to collect seeds and propagative materials from representatives of all populations for storage and for maintenance of genetic stock.
- Reintroduction and augmentation—Augment wild populations and establish new populations within protected and managed suitable habitat.
- Build resiliency and redundancy—Increase numbers of individuals and populations through historic range to reduce impacts of drought, landslides, fire, hurricanes, and low numbers.
- Alliance and partnership development—Continue to work with partners and other land managers in 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.

[KMEN] Kōke'e Mid-Elevation Nursery. 2019. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai'i.

[KMEN] 2020. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai'i.

Lyon Arboretum. 2022. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.

[NTBG] National Tropical Botanical Garden. 2019. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.

[NTBG] 2020. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.

[PEPP] Plant Extinction Prevention Program. 2019. U.S. Fish and Wildlife Service Coast Program, CFDA 15.630, Award #F17AC00452 Plant Extinction Prevention Program Final Report (Reporting Period October 1, 2018-September 30, 2019). Pacific Cooperative Studies Unit, University of Hawaii, Honolulu. 28 pp.

[USFWS] U.S. Fish and Wildlife Service. 2009. *Kadua st.-johnii* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. https://ecos.fws.gov/docs/tess/species_nonpublish/1405.pdf.

[USFWS] 2017. *Kadua st.-johnii* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. https://ecos.fws.gov/docs/tess/species_nonpublish/2454.pdf.

[USFWS] 2020. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 129 Species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85(48): 14240–14243, March 11, 2020.

[USFWS] 2021. Kaua‘i Islandwide Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR. 65 pp. + appendices.

Walsh, S., B. Nyberg, and K. Wood. 2021. *Kadua st.-johnii*. The IUCN Red List of Threatened Species 2021: e.T80092309A89535649. <https://dx.doi.org/10.2305/IUCN.UK.2021-1.RLTS.T80092309A89535649.en>.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Kadua st.-johnii*
(no common name)

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

Date _____