5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Kokia cookei* (koki‘o)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2021. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 77 Species in Oregon, Washington, Idaho, and Hawaii. Federal Register 86(120): 33726–33728, June 25, 2021.

Lead Region/Field Office:

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

Name of Reviewer:

Cheryl Phillipson, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, Acting Recovery 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) beginning in October 2022. The review was based on a review of current, available information since the last 5-year review for *Kokia cookei* (USFWS 2018). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Acting Recovery 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 (*http://ecos.fws.gov/ecp/species/2459*).

Review Analysis:

Please refer to the previous 5-year reviews for *Kokia cookei* published in the Federal Register on January 18, 2008, March 27, 2014, and October 23, 2018 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1181.pdf* *https://ecos.fws.gov/docs/tess/species_nonpublish/2192.pdf*, and *https://ecos.fws.gov/docs/tess/species_nonpublish/2638.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. cookei*.

This long-lived perennial tree in the Malvaceae (mallow) family is endangered and is endemic to Moloka‘i. The status and trends for *Kokia cookei* are provided in the tables below.

New Status Information:

- Currently, *Kokia cookei* is extinct in the wild; however, there are *ex situ* plants on Molokaʻi (3) and Maui (11) (Coelho and Moriyasu 2020; Coelho 2019; Bakutis and Coelho 2016; Maui Plant Extinction Prevention Program [Maui PEPP] 2020–2023). In addition, there is one *ex situ* individual at a plant nursery on Oʻahu. Grafted plants (on root stocks of other native *Kokia* species, *K. kauaiensis* and *K. drynarioides*) are producing fruit with viable seeds. and some individuals are propagated from these seeds.
- Currently, all three founders (wild plants) are represented in *ex situ* storage and propagation.

New Threats:

- None reported.

New Management Actions:

- Monitoring and surveys—The Molokaʻi Plant Extinction Prevention Program (MoPEPP) monitors individuals of *Kokia cookei* on Molokaʻi (Coelho and Moriyasu 2020; Coelho 2019; Bakutis and Coelho 2016). The Maui Plant Extinction Prevention Program (Maui PEPP) monitors *ex situ* individuals on Maui (Maui PEPP 2020-2023).
- Invasive nonnative plant control—Maui PEPP controls nonnative invasive plants at the translocation sites on Maui (Maui PEPP 2020).
- Collection and propagation for genetic storage and translocation—
    - Maui PEPP collects seeds and scion material from plants on Maui for storage and propagation at Lyon Arboretum (Maui PEPP 2020–2023)
    - In 2021, the Lyon Arboretum Micropropagation Laboratory reported storage of one explant representing one *inter situ* founder at Fleming Arboretum and in 2022, reported storage of nine explants representing three more *inter situ* founders at Fleming Arboretum and three explants representing one *inter situ* founder at Makawao (Lyon Arboretum2022).
    - In 2017, the Olinda Rare Plant Facility (ORPF) reported propagation and storage in the nursery of one individual representing one *inter situ* founder at Fleming Arboretum (Maui) and propagation of five individuals representing two *in situ* founders on Molokaʻi (ORPF 2023).
    - In 2022, the Waimea Valley Arboretum reported storage of five plants representing three individuals at Fleming Arboretum on Maui (Waimea Arboretum 2022).

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

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1979 (listing)	0	0	1,000 cloned individuals in 8 field populations and 5 cultivated collections (80–100 individuals each)	No
2008 (5-year review)	0	2	1,000 cloned individuals in 8 field populations and 5 cultivated collections (80–100 individuals each)	No
2014 (5-year review)	0	8	1,000 cloned individuals in 8 field populations and 5 cultivated collections (80–100 individuals each)	No
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2018 (5-year review)	0	17–18	All threats managed in all 3 populations	No
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	No
			Complete genetic storage	Yes
			3 populations with 25 mature individuals each	No
2023 (5-year review)	0	15 grafted or F1 of grafted individuals	All threats managed in all 3 populations	No

			Complete genetic storage	Yes
			Natural reproduction 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 *Kokia cookei* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, feral ungulates a threat in some areas
Established ecosystem altering invasive nonnative plant species degradation of habitat	A	Ongoing	Partial, nonnative plant control at translocation sites
Fire destruction and degradation of habitat	A	Ongoing	None
Climate change degradation or loss of habitat	A	Ongoing	None
Predation and herbivory by ungulates	C	Ongoing	Partial, feral ungulates a threat in some areas
Predation and herbivory by rodents	C	Ongoing	None
Predation and herbivory by invertebrates	C	Ongoing	None
Inadequacy of regulatory mechanisms–Lack of adequate hunting regulations	E	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, grafting, hand pollination, seed collection, propagation, and translocation

Synthesis:

Currently there are 15 grafted or first-generation progeny of *Kokia cookei* at three sites on Maui, at one site on Molokaʻi and one site on Oʻahu. Survivorship is only moderately successful. Threats including feral ungulates, nonnative invasive plants, fire, and small populations are partially addressed. Seed collection, propagation, and translocation are ongoing. There is no natural recruitment observed.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Recovery Plan for *Kokia cookei* (USFWS 1998) and have been updated according to the draft revised recovery objective guidelines developed by the Hawaiʻi 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.

Kokia cookei is a long-lived perennial tree. 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 Molokaʻi where they now occur or occurred historically. Each of these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 25 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. There are 15 grafted or first-generation individuals of *Kokia cookei* (Table 1). Although plants are in managed areas, threats of predation and herbivory by feral ungulates, rodents, and invertebrates; fire; and small population size continue (Table 2). Therefore, *K. cookei* 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 2018. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2023.

- Surveys and monitoring—Continue to monitor *ex situ* populations of *Kokia cookei.*
- Ungulate monitoring and control—Construct and maintain exclosures to protect individuals from the negative impacts of habitat destruction and degradation, and herbivory, by feral ungulates.
- Invasive nonnative plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species within and around all populations of *K. cookei*.

- Fire monitoring and management—Develop and implement fire management plants for *ex situ* and *inter situ* individuals, as well as translocated individuals, on Maui and Molokaʻi.
- Predator and herbivore monitoring and control—
    - Implement effective control methods for rodents at all translocated populations.
    - Develop and implement effective control methods for invertebrates at all populations.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock and for translocation.
- Translocation and augmentation—Continue to reintroduce individuals into suitable habitat that is being managed for known threats to this species.
- Build resiliency, redundancy, and representation—Increase numbers of populations and individuals at translocation sites to reduce impacts of predation, fires, and reduced viability.
- 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 taxon.

References:

Bakutis, A. and K. Coelho. 2016. Hawaiʻi Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2022: Plant Extinction Prevention Program, FY 2022 Annual Report (Oct 1, 2021-Sep 30, 2022), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F19AC00532 (Interim Report), December 29, 2022, UH Mānoa, PCSU, PEPP. 50 pp. BioPacifica database record for *Kokia cookei*, Pacific Islands Fish and Wildlife Office.

Coelho, K. 2019. Hawaiʻi Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2022: Plant Extinction Prevention Program, FY 2022 Annual Report (Oct 1, 2021-Sep 30, 2022), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F19AC00532 (Interim Report), December 29, 2022, UH Mānoa, PCSU, PEPP. 50 pp. BioPacifica database record for *Kokia cookei*, Pacific Islands Fish and Wildlife Office.

Coelho, K. and P. Moriyasu. 2020. Hawaiʻi Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2022: Plant Extinction Prevention Program, FY 2022 Annual Report (Oct 1, 2021-Sep 30, 2022), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F19AC00532 (Interim Report), December 29, 2022, UH Mānoa, PCSU, PEPP. 50 pp. BioPacifica database record for *Kokia cookei*, Pacific Islands Fish and Wildlife Office.

[HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.

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.

[Maui PEPP] Maui Plant Extinction Prevention Program. 2020-2023. Maui PEP species monitoring reports. Excel data tables.

[ORPF] Olinda Rare Plant Facility. 2023. 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.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for *Kokia cookei* Portland. 75 pp.

[USFWS] 2008. *Kokia cookei* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/1181.pdf.*

[USFWS] 2014. *Kokia cookei* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/2192.pdf.*

[USFWS] 2018. *Kokia cookei* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/2638.pdf*.

[USFWS] 2021. Endangered and Threatened wildlife and plants; initiation of 5-year status reviews for 77 Species in Oregon, Washington, Idaho, and Hawaii. Federal Register 86(120): 33726–33728, June 25, 2021.

Waimea Valley 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.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Kokia cookei* (koki‘o)

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**

LAUREN WEISENBERGER Digitally signed by LAUREN WEISENBERGER Date: 2023.08.23 10:24:04 -10'00'

_____ Date_____