

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Euphorbia eleanoriae* (‘akoko)

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 *Euphorbia eleanoriae* (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/1368>).

Review Analysis:

Please refer to the previous 5-year review for *Euphorbia eleanoriae* published in the Federal Register on September 13, 2017 (available at https://ecos.fws.gov/docs/tess/species_nonpublish/2439.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 *E. eleanoriae*.

This short-lived perennial shrub in the Euphorbiaceae (spurge) family is listed as endangered and is known from the island of Kaua‘i. The status and trends for *Euphorbia eleanoriae* are provided in the tables below.

New Status Information:

- Recent drone surveys have helped to locate remote and inaccessible occurrences of *Euphorbia eleanoriae* (Perlman 2018; PEPP 2018, 2019; Williams 2021, pp. 2–3). In 2018, observations of more than 100 individuals (flowering) along the cliff faces of Limahuli valley were made using drone technology (PEPP 2018, p. 4). Observations of 30 to 40 of these plants were made in another survey in 2019 (PEPP 2019). In 2020, there were estimated to be 261 mature individuals of *E. eleanoriae* in three subpopulations on Kaua‘i (Nagendra et al. 2020).

New Threats:

- None reported.

New Management Actions:

- Collections and propagation—In 2018, cuttings were taken from accessible plants (of the 30 counted) at Pōhakuao for propagation at the National Tropical Botanical Garden (NTBG) (PEPP 2018, pp. 4–5).

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

Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2010 (listing and critical habitat)	<50	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2017 (5-year review)	26	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	No
			3 populations with 50 mature individuals each	No

2022 (5-year review)	261	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially, cuttings in storage
			Natural reproduction at all 3 populations	Unknown
			3 populations with 50 mature individuals each	Partially, 1 population >50 mature individuals

* 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 *Euphorbia eleanoriae* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat and herbivory by feral ungulates	A, C	Ongoing	None
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	None
Landslides and flooding destruction or degradation of habitat	A	Ongoing	None
Climate change degradation and destruction of habitat, including hurricanes	A	Ongoing	None
Inadequacy of existing regulatory mechanisms—lack of adequate hunting and biosecurity legislation	D	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, collection and propagation efforts

Synthesis:

Currently, approximately 261 individuals of *Euphorbia eleanoriae* occur from Kalalau and Pōhakuao to Limahuli on the north coast of Kaua‘i. This species is found on inaccessible cliffs and more individuals have been found with the use of drone technology. Collections may be attempted at those populations that can be reached by

rappelling. Cuttings are being propagated at NTBG. There are collections at Limahuli Preserve and the area is managed.

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.

Euphorbia eleanoriae 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 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 50 mature, reproducing individuals per population.

The preventing extinction goals for *Euphorbia eleanoriae* have not been met. There are estimated to be 261 wild individuals in three widely separated populations (Table 1). Most individuals occur on inaccessible cliffs as observed by drone technology (Table 1, Table 2). Although difficult to reach, cuttings were recently collected for propagation and storage. However, not all threats are being addressed. Therefore, *E. eleanoriae* 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 suitable habitat in current and historical range for populations of *Euphorbia eleanoriae* and monitor known occurrences.
- Ungulate monitoring and control—Construct strategic fencing to prevent disturbance and browsing by feral ungulates.
- Nonnative invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species at all populations of *E. eleanoriae*
- Rodent control—Implement effective control methods for rats.

- 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 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 historical range to reduce impacts of landslides and hurricanes.
- Population viability monitoring and analysis—Study *E. eleanoriae* populations to determine viable population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- 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.

Nagendra, U., B. Nyberg, and K. Wood. 2020. *Euphorbia eleanoriae*. The IUCN Red List of Threatened Species 2020: e.T44131A83799613.
<https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T44131A83799613.en>.

Perlman, S. 2018. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Euphorbia eleanoriae*, Pacific Islands Fish and Wildlife Office.

[PEPP] Plant Extinction Prevention Program. 2018. Plant Extinction Prevention Program, fiscal year 2018 interim performance report (October 1, 2017-September 30, 2018) cooperative agreement F18AC00502, US Fish and Wildlife Service CFDA Program #15.657, Endangered species conservation—recovery implementation funds, University of Hawaii at Manoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 49 pp.

[PEPP] 2019. Plant Extinction Prevention Program, fiscal year 2019 interim performance report (October 1, 2018-September 30, 2019) cooperative agreement F18AC00502 (interim report), F14AC00174 (final report), US Fish and Wildlife Service CFDA Program #15.657, Endangered species conservation—recovery

- implementation funds, University of Hawaii at Manoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 53 pp.
- [USFWS] 2017. *Euphorbia eleanoriae* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
https://ecos.fws.gov/docs/tess/species_nonpublish/2439.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.
- Williams, A. 2021. Upper Manoa Valley rare plant protection, Progress report, Grant #F18AC00510, USFWS Partners Program, December 29, 2021. 8 pp,

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SIGNATURE PAGE for 5-YEAR REVIEW of *Euphorbia eleanoriae* ('akoko)

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

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