

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Euphorbia halemanui* (‘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 halemanui* (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/8441>).

Review Analysis:

Please refer to the previous 5-year reviews for *Euphorbia halemanui* published in the Federal Register on August 27, 2010, and September 13, 2017 (available at https://ecos.fws.gov/docs/tess/species_nonpublish/1633.pdf https://ecos.fws.gov/docs/tess/species_nonpublish/2441.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. halemanui*.

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 halemanui* are provided in the tables below.

New Status Information:

- In 2010, there were between 300 to 400 individuals of *Euphorbia halemanui* on Kaua‘i (USFWS 2010). By 2017, the numbers of individuals dropped by half and because of continued decline the Plant Extinction Prevention Program (PEPP) reevaluated the species’ status as a “Potential PEP” species (i.e., POP; a species at risk of reaching 50 or fewer plants in the wild) (PEPP 2017).
- In 2020, there were estimated to be seven subpopulations of *Euphorbia halemanui* totaling approximately 225 individuals on Kaua‘i (Nagendra et al. 2020).

New Threats:

- None reported.

New Management Actions:

- Surveys and inventories—In 2017, surveys at Mākaha, Po‘omau, and Kohua ridge found scattered individuals of *Euphorbia halemanui* (11 at Mākaha, six at Po‘omau, and a few at Kohua) (National Tropical Botanical Garden [NTBG] 2017; PEPP 2017).
- Collections and propagation—Seeds and cuttings are collected opportunistically (Nagendra et al. 2020). There are no other reported collections or propagation since 2013 (NTBG 2021).

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

Date	No. wild individuals	No. outplanted	Stability Criteria identified by HPPRCC	Stability Criteria Completed?
1992 (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
1995 (recovery plan)	96–151		All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No

2003 (critical habitat)	85–135		All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2010 (5-year review)	300–400	11, 3 survived	All threats managed in all 3 populations	No
			Complete genetic storage	Partially, seed collections
			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)	85–195	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially, cuttings in storage
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Unknown
			3 populations with 50 mature individuals each	No
2022 (5-year review)	ca 225	0	All threats managed in all 3 populations	No
			Complete genetic storage	No, none currently
			Natural reproduction at all 3 populations	Unknown
			3 populations with 50 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 *Euphorbia halemanui* 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
Drought destruction or degradation of habitat	A	Ongoing	None
Fire destruction or degradation of habitat	A	Ongoing	None
Climate change degradation and destruction of habitat, including hurricanes	A	Ongoing	None
Predation and herbivory by rodents	C	Ongoing	None
Predation and herbivory by invertebrates	C	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	None
Human disturbance— Development and roads	E	Ongoing	None

Synthesis:

Currently, approximately 225 individuals of *Euphorbia halemanui* occur at Mākaha, Po‘omau, Koai‘e, and possibly Miloli‘i, on Kaua‘i. Cuttings were stored at NTBG in 2013; however, there is no current information regarding storage or collections since that time (NTBG 2021). Reintroduction was last attempted in 2010.

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 halemanui is a short-lived perennial climbing 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 halemanui* have not been met. There are estimated to be 225 wild individuals in three to four widely separated populations (Table 1). None of the populations are within exclosures (Table 1, Table 2). There are no reported current collections in storage or propagation. Not all threats are being addressed. Therefore, *E. halemanui* 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 halemanui* and monitor known occurrences.
- Ungulate monitoring and control—Construct fencing to prevent disturbance and browsing by feral ungulates.
- Nonnative invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species and those that compete with *E. halemanui* at all populations.
- Fire monitoring and control—Develop and implement fire management plans for all wild and reintroduced populations.
- Predator and herbivore monitoring and control—
 - Implement effective control methods for rats.
 - Study *E. halemanui* populations to determine the level of threat from invertebrates and the need for additional recovery actions.
- 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 drought and hurricanes.

- Human interaction monitoring and management—Develop and implement effective measures to reduce the impacts of development such as road clearing and realignment.
- 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 halemanui*. The IUCN Red List of Threatened Species 2020: e.T44132A83799761.
<https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T44132A83799761.en>.

[NTBG] National Tropical Botanical Garden. 2017. NTBG herbarium database record details for *Euphorbia halemanui*, PTBG 1000062239, BG1000062537, PTBG 100006514, 14 FEB 2017, 30 MAR 2017, 14 JUN 2017.

[PEPP] Plant Extinction Prevention Program. 2017. Plant Extinction Prevention Program FY 2017 Annual Report (Oct 1, 2016-Sep 30, 2017), Coop Agreement: F14A00174, U.S. Fish and Wildlife Service CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, 235 pp.

[USFWS] 2010. *Chamaesyce halemanui* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
https://ecos.fws.gov/docs/tess/species_nonpublish/1633.pdf.

[USFWS] 2017. *Euphorbia halemanui* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
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[USFWS] 2021. Kaua'i Islandwide Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR. 65 pp. + appendices.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Euphorbia halemanui* ('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
- X No Change in listing status

For Field Supervisor, Pacific Islands Fish and Wildlife Office

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