

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Euphorbia remyi* var. *remyi* (‘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 remyi* var. *remyi* (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/6388>).

### **Review Analysis:**

Please refer to the previous 5-year review for *Euphorbia remyi* var. *remyi* published in the Federal Register on September 13, 2017 (available at [https://ecos.fws.gov/docs/tess/species\\_nonpublish/2443.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/2443.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. remyi* var. *remyi*.

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 remyi* var. *remyi* are provided in the tables below.

New Status Information:

- In 2018, two new, small populations of *Euphorbia remyi* var. *remyi* were reported at Limahuli on Kaua‘i (Nagendra 2018, p. 9). In 2020, it was reported that there were 11 subpopulations totaling approximately 1,180 individuals; however, none of the subpopulations totaled more than 250 individuals. In addition, numbers are observed to be declining (Walsh et al. 2020).
- Another variety, *Euphorbia remyi* var. *hanaleiensis*, was believed to be extinct when an unusual *Euphorbia* specimen was found in 2014 (Wood and Walsh 2022, pp. 29–31). An error in the original description of this variety by Koutnik (in Wagner et al. 1999, p. 614) caused the delay in reporting of this discovery until now. After examination of the original holotype, the surveyors realized the colony of 100 individuals consisted of *E. remyi* var. *hanaleiensis*. The status of this variety will continue to be assessed.

New Threats:

- None reported.

New Management Actions:

- Surveys and inventories—Two new, small populations were found at Limahuli and are being monitored (Nagendra 2018, p. 9).
- Collections and propagation—Cuttings were collected from two small populations of *Euphorbia remyi* var. *remyi* at Limahuli (Nagendra 2018, p. 9).

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

Date	No. wild individuals	No. outplanted	Interim Criteria identified by HPPRCC	Interim Criteria Completed?
2010 (5-year review)	>350	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 300 mature individuals each	No
2017 (5-year review)	300	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No

			Replacement and regeneration (seedlings become mature plants) at all 3 populations	Unknown
			3 populations with 300 mature individuals each	No
2022 (5-year review)	ca 1,180	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially, cuttings collected
			Replacement and regeneration (seedlings become mature plants) at all 3 populations	Unknown
			3 populations with 300 mature individuals each	No, none >250 individuals

**Table 2. Threats to *Euphorbia remyi* var. *remyi* and ongoing conservation efforts.**

<b>Threat</b>	<b>Listing factor</b>	<b>Current Status</b>	<b>Conservation/ Management Efforts</b>
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	Partial
Landslides and erosion 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
Inadequacy of existing regulatory mechanisms—Lack of adequate hunting and biosecurity regulations	D	Ongoing	None

**Synthesis:**

Currently, *Euphorbia remyi* var. *remyi* occurs at Limahuli, Kahuama‘a Flats to Honopū, Kalalau, Awa‘awapuhi, ‘Iole-Waiahe, ‘Ili‘ili‘ula, Wahiawa, and Hulē‘ia on Kaua‘i. These populations are estimated to total 1,180 individuals based on available habitat. Currently, there are no seeds and only a few cuttings in storage for propagation. None of the populations are within exclosures.

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 remyi* var. *remyi* is a short-lived perennial shrub. To reach interim stabilization goals, the second step 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 *adequately* 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 demonstrate regeneration of seedlings and growth to at least sapling stage for woody species and documented regeneration within each of the target populations.

The interim stabilization goals for *Euphorbia remyi* var. *remyi* have not been met. Although there are estimated to be 1,180 wild individuals, no populations total more than 250 individuals (Table 1). There are no seeds and only a few cuttings in storage for propagation (Table 1). In addition, not all threats are being addressed (Table 2). Therefore, *E. remyi* var. *remyi* 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 additional populations of *Euphorbia remyi* var. *remyi* and monitor known occurrences.

- Ungulate monitoring and control—Construct exclosures to prevent disturbance and browsing by feral ungulates.
- Nonnative invasive plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species and those that compete with *E. remyi* var. *remyi* at all populations.
- Predator and herbivore monitoring and 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—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.
- 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.
- Koutnik, D.L. 1999. *Chamaesyce* S.F. Gray, spurge, native species. *In* Manual of the Flowering Plants of Hawai‘i, Wagner, W.L., D R. Herbst, and S.H. Sohmer (eds.), University of Hawaii Press, Bishop Museum Press. Pp. 602–617.
- Nagendra, U. 2018. Limahuli Preserve rare plant restoration project, National Tropical Botanical Garden, FWS Agreement #F13AC00504, September 30, 2014-October 30, 2018. 16 pp.
- [USFWS] 2017. *Euphorbia remyi* var. *remyi* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [https://ecos.fws.gov/docs/tess/species\\_nonpublish/2443.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/2443.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. 2020. *Euphorbia remyi* var. *remyi*. The IUCN Red List of Threatened Species 2020: e.T44149A97884972.  
<https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T44149A97884972.en>.

Wood, K.R. and S.K. Walsh. 2022. Notes on the Hawaiian flora: Kaua‘i rediscoveries and range extensions. Records of the Hawaii Biological Survey for 2021. N.L. Evenhuis (ed.), Bishop Museum Occasional Papers 142: 27–34.

**U.S. FISH AND WILDLIFE SERVICE**

SIGNATURE PAGE for 5-YEAR REVIEW of *Euphorbia remyi* var. *remyi* ('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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Date\_\_\_\_\_