

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Euphorbia deppeana* ('akoko)

**Current Classification:** Endangered

**Federal Register Notice announcing initiation of this review:**

[USFWS] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90):28031–28034, May 10, 2022.

**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, PIFWO

Megan Laut, Recovery Program 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 2023. The review was based on a review of current, available information since the last 5-year review for *Euphorbia deppeana* (USFWS 2019). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery Program 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/6446>).

**Review Analysis:**

Please refer to the previous 5-year reviews for *Euphorbia deppeana* published in the Federal Register on August 2, 2007, August 28, 2012, and September 25, 2019 (available at [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/2864.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/2864.pdf), [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/14004.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/14004.pdf), and [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/1091.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1091.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. deppeana*.

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

New Status Information:

- In 2019, one population was known consisting of approximately 26 wild individuals (USFWS 2019). Later in 2019, botanists rappelled to the site and counted the 26 individuals but suspected there may be more individuals (Plant Extinction Prevention Program [PEPP] 2019–2023). No surveys for *Euphorbia deppeana* have been conducted since that time as access is difficult (Ching 2024, pers. comm.).
- In 2019, cuttings from 11 founders were taken for propagation at the Pahole Rare Plant Facility (PEPP 2019–2023).

New Threats:

- Landslides and erosion are a threat to the only known population of *Euphorbia deppeana* (Spork-Koehler 2018).

New Management Actions:

- Surveys and monitoring—The last visit to the population was in July 2019 (PEPP 2019–2023).
- Collection and propagation for genetic storage and reintroduction—
  - In 2019, cuttings were taken from 11 wild individuals for propagation at the Pahole Rare Plant Facility (PEPP 2019–2023).
  - In 2011, the Lyon Seed Conservation Laboratory reported storage of five seeds collected from one cultivated plant at the Pahole Rare Plant Facility (Lyon Arboretum 2022).
  - From 1990 to 1992, the National Tropical Botanical Garden (NTBG) reported storage of 21 seeds from wild plants and a living collection of two individuals at the Southshore Gardens (NTBG 2022).

**Table 1. Status and trends of *Euphorbia deppeana* from listing through current 5-year review. Table 1a shows progress according to Interim Stabilization Goals; Table 1b shows progress according to Preventing Extinction Goals.**

**Table 1a.**

Date	No. wild individuals	No. Outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1994 (listing)	50–100	0	All threats managed in all 3 populations	No
			Complete genetic storage	No

			3 populations with 50 mature individuals each	No
<b>2007 (5-year review)</b>	possibly >100	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partial
			3 populations with 50 mature individuals each	No
<b>2012 (5-year review)</b>	>50	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partial
			3 populations with 50 mature individuals each	Partial, 1 population

**Table 1b.**

<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>*Preventing Extinction Targets identified by HPPRCC</b>	<b>*Preventing Extinction Targets Completed?</b>
<b>2019 (5-year review)</b>	26	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partial
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	No
			3 populations with 50 mature individuals each	No
<b>2024 (5-year review)</b>	ca 26 +	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partial, ca 11 founders represented

			Natural reproduction at all 3 populations	None reported
			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 deppeana* and ongoing conservation efforts.**

<b>Threat</b>	<b>Listing factor</b>	<b>Current Status</b>	<b>Conservation/ Management Efforts</b>
Established ecosystem altering invasive plant species destruction and degradation of habitat and competition	A, E	Ongoing	None
Landslides and erosion destruction and degradation of habitat	A	Ongoing	None
Fire destruction and degradation of habitat	A	Potential	None
Climate change degradation or loss of habitat	A	Ongoing	None
Hybridization	E	Potential	None
Human impacts	E	Ongoing	None
Small populations	E	Ongoing	Partial, seeds in storage

**Synthesis:**

Currently, one population of *Euphorbia deppeana* may total more than 26 individuals. Approximately 11 founders are represented in seed collections or as living collections. Status of the cuttings taken for propagation at Pahole Rare Plant Facility is unknown and there are no current *ex situ* plants representing this collection. No other current conservation measures are reported.

Stabilizing (interim), and downlisting and delisting criteria are provided in the Recovery Plan for the O‘ahu Plants (USFWS 1998) and preventing extinction targets have been added and criteria 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 deppeana* is a short-lived perennial subshrub. 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 O‘ahu where they now occur 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 this species have not been met. There are no populations with 50 reproducing individuals. The current status of the only known population is uncertain (Table 1). Approximately 11 founders are represented in seed collections or in a living collection. Landslides/erosion is an increasing threat to the species (Table 2). Hybridization and wildfire are potential threats to this species (Table 2). No other conservation actions are conducted. Therefore, *Euphorbia deppeana* meets the definition of Endangered as it remains in danger of extinction throughout its range.

#### **Recommendations for Future Actions:**

Landslides/erosion is added as a threat to *Euphorbia deppeana*, but no significant new information regarding the species’ biological status has been reported since the last 5-year review in 2019. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2024.

- Surveys and monitoring—Continue to conduct surveys in suitable and historical habitat for additional populations. Reassess the status of the known population when the area is accessible.
- Nonnative invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *Euphorbia deppeana*, if the area is accessible.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use to determine future landscape needed for its recovery.
- Captive propagation for genetic storage and reintroduction—
  - Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
  - Continue to assess genetic variability within the extant populations and develop a plan for conserving the species’ genetic diversity in *ex situ* and reintroduced populations.

- Reintroduction and augmentation—Begin translocation efforts to establish new populations into suitable habitat that is more accessible and augment the existing population of *E. deppeana* that are being managed for known threats to this species.
- Build resiliency, redundancy, and representation—Increase species’ viability through habitat restoration, threat control, and reintroduction and translocation to reduce impacts of erosion, climate change, human disturbance, and potential hybridization and wildfires.
- Alliance and partnership development—Continue to work with ANRPO, NEPM, and other land managers and partners to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

## References:

- Ching, S. 2024, pers. comm. Email regarding current status of *Euphorbia deppeana*. 24 JUN 2024.
- [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.
- [NTBG] National Tropical Botanical Garden. 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.
- [PEPP] Plant Extinction Prevention Program. 2019–2023. Plant Extinction Prevention Program fiscal years 2019 to 2023 interim performance report (October 1, 2018-September 30, 2023). U.S. Fish and Wildlife Service CFDA Program \$15.657 Endangered Species Conservation—Recovery Implementation Funds, Cooperative Agreement: F18AC00502 (Final performance report), University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit. 105 pp.
- Spork-Koehler, M. 2018. *Euphorbia deppeana*. The IUCN Red List of Threatened Species 2018: e.T44130A83799515. <http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T44130A83799515.en>.
- [USFWS] U.S. Fish and Wildlife Service. 1998. Recovery Plan for the O‘ahu Plants. Portland. 207 pp. + appendices.

- [USFWS] 2007. *Euphorbia deppeana*. 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [https://ecos.fws.gov/docs/five\\_year\\_review/doc/1091.pdf](https://ecos.fws.gov/docs/five_year_review/doc/1091.pdf).
- [USFWS] 2012. *Euphorbia deppeana*. 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/14004.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/14004.pdf).
- [USFWS] 2019. *Euphorbia deppeana*. 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/1091.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1091.pdf).
- [USFWS] 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90): 28031–28034, May 10, 2022.

**U.S. FISH AND WILDLIFE SERVICE**  
SIGNATURE PAGE for 5-YEAR REVIEW of *Euphorbia deppeana* ('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**

\_\_\_\_\_ Date \_\_\_\_\_