

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Lysimachia iniki* (no common name)

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 *Lysimachia iniki* (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/8954>).

Review Analysis:

Please refer to the previous 5-year review for *Lysimachia iniki* published in the Federal Register on September 16, 2017 (available at:[://ecos.fws.gov/docs/tess/species_nonpublish/2465.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/2465.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 *L. iniki*.

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

New Status Information:

- In 2017, there were estimated to be approximately 40 individuals of *Lysimachia iniki* on Kaua‘i (USFWS 2017). In 2018, 35 to 50 plants were counted along the cliffs of the upper Wailua river (Kishida et al. 2018; PEPP 2018). In 2019, an unmanned aerial vehicle (drone) was used to search steep, inaccessible cliffs of Wailua; plants were counted and a new population was found, bringing the total to approximately 125 individuals (Nyberg 2019, p. 3).

New Threats:

- None reported.

New Management Actions:

- Surveys and inventories—In 2019, a drone was used by NTBG to search for and survey occurrences of *Lysimachia iniki* along steep cliffs of the Wailua river (Blue Hole) area on Kaua‘i (Nyberg 2019, p. 3).
- Collection and propagation—
 - In 2017, the Plant Extinction Prevention Program (PEPP) reported collection of 31 seeds from one founder for storage at NTBG and the State’s Division of Forestry and Wildlife (DOFAW) seed laboratories (PEPP 2017).
 - In 2021, the Lyon Arboretum Micropropagation Laboratory reported storage of 172 explants representing one founder of *L. iniki* (Lyon Arboretum 2022). In 2014, the Arboretum’s Seed Conservation Laboratory received 727 seeds representing three founders, and in 2021, an additional 25 seeds were stored representing a fourth founder (Lyon Arboretum 2022).
 - In 2021, the Kōke‘e Mid-Elevation Nursery (KMEN) reported propagation of eight individuals representing one founder (KMEN 2021).
 - In 2017, NTBG reported collection and storage of 160 seeds representing at least one founder (NTBG 2020). In 2021, NTBG collected and stored an additional 65 seeds from one founder (NTBG 2021).
- Reintroduction and augmentation—In 2019, KMEN reported reintroduction of 38 individuals representing four founders to an enclosure (KMEN 2019).

Table 1. Status and trends of *Lysimachia iniki* 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)	40	0	All threats managed in all 3 populations	No
			Complete genetic storage	No

			3 populations with 100 mature individuals each	No
2017 (5-year review)	40	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Unknown
			3 populations with 100 mature individuals each	No
2022 (5-year review)	125	38	All threats managed in all 3 populations	No
			Complete genetic storage	Partially, ca 4 founders represented
			Natural reproduction at all 3 populations	Unknown
			3 populations with 50 mature individuals each	Partially, 1 population >50

* 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 *Lysimachia iniki* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	None
Landslides and flooding destruction and 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 legislation	D	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, seed storage, propagation, and reintroduction ongoing

Synthesis:

Currently, there are approximately 125 wild individuals of *Lysimachia iniki* on Kauaʻi. New individuals were discovered in new places previously inaccessible for survey until the use of drone technology. Seeds and propagules are in storage representing at least four founders and 38 individuals were propagated and reintroduced to a fenced area.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Kauaʻi Islandwide Recovery Plan (USFWS 2021) 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.

Lysimachia iniki 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 Kauaʻi 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 *Lysimachia iniki* have not been met. Although more individuals have been discovered by using a drone, this population is limited to a small area at risk of destruction by landslides and habitat disturbance by ungulates (Table 1, Table 2). Storage of seeds and propagules and some reintroduction is ongoing with at least four founders represented (Table 1, Table 2). The reintroduced individuals are fenced and managed. Therefore, *L. iniki* 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 monitoring—Continue to survey for populations of *Lysimachia iniki* in areas of potentially suitable habitat and monitor known populations to determine their current status.

- Ungulate monitoring and control—Continue to construct and maintain exclosures to protect all occurrences from habitat disturbance and herbivory by feral ungulates.
- 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 propagation efforts for maintenance of genetic stock.
- Reintroduction and augmentation—Continue to reintroduce individuals into protected suitable habitat within historic range that is being managed for known threats to this species.
- Build resiliency and redundancy—Increase numbers of individuals and populations through historic range to reduce impacts of landslides and hurricanes.
- Population biology research—Study 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.

Kishida, W., S. Perlman, J. VanDeMark, and R. Loo. 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 *Lysimachia iniki*, Pacific Islands Fish and Wildlife Office.

[KMEN] Kōke‘e Mid-Elevation Nursery. 2019. 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.

[KMEN] 2021. 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.

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. 2020. 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] 2021. 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.
- Nyberg, B. 2019, in litt., Endangered surveys using unmanned aerial vehicle. National Tropical Botanical Garden, Kalaheo. 10 pp.
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- [PEPP] 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.
- [USFWS] 2017. *Lysimachia iniki* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
https://ecos.fws.gov/docs/tess/species_nonpublish/2465.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.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Lysimachia iniki*
(no common name)

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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