5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Lysimachia lydgatei* (kolokolo kuahiwi)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2021. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 77 Species in Oregon, Washington, Idaho, and Hawaii. Federal Register 86(120):33726–33728, June 25, 2021.

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, Acting Recovery 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) beginning in October 2022. The review was based on a review of current, available information since the last 5-year review for *Lysimachia lydgatei* (USFWS 2018). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Acting Recovery 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 (*http://ecos.fws.gov/ecp/species/4684*).

Review Analysis:

Please refer to the previous 5-year reviews for *Lysimachia lydgatei* published in the Federal Register on August 2, 2011, and October 23, 2018 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1738.pdf* and *https://ecos.fws.gov/docs/tess/species_nonpublish/2641.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. lydgatei*.

This short-lived perennial shrub in the Primulaceae (primrose) family is endangered and occurs on Mauna Kahālāwai (west Maui). The status and trends for *Lysimachia lydgatei* are provided in the tables below.

New Status Information:

- Currently, there are three wild populations of *Lysimachia lydgatei* at Launiupoko, Līhau, and Ukumehame on Mauna Kahālāwai (west Maui) totaling approximately 23 individuals (Bustamente et al. 2011; Oppenheimer and Bustamente 2013; Oppenheimer et al. 2017a, 2017b; Oppenheimer and Bustamente 2017). Other occurrences at Kaua‘ula and Makamaka‘ole totaling approximately 40 individuals have not been revisited since 2016 and their current status is unknown; however, these populations are represented in collections (Lyon Arboretum 2022; Olinda Rare Plant Facility [ORPF] 2023).
- Currently, there are 12 founders (wild plants) from 4 populations, represented in *ex situ* storage and propagation.

New Threats:

- None reported.

New Management Actions:

- Monitoring and surveys—The Maui Plant Extinction Prevention Program (PEPP) monitors the wild and translocated populations of *Lysimachia lydgatei* on Mauna Kahālāwai (Maui PEPP 2017-2023).
- Ungulate monitoring and control—Part of the occurrences at Kaua‘ula are within an exclosure.
- Invasive nonnative plant monitoring and control—Maui PEPP conducts invasive nonnative plant control at the Launiupoko, Līhau, and Ukumehame populations (Oppenheimer 2020 LAU-D; Oppenheimer et al. 2017a, 2017b; Maui PEPP 2017, 2018, 2020, 2023).
- Rodent control—Maui PEPP conducts rat control at the Ukumehame population (Oppenheimer et al. 2017b).
- Collection and propagation for genetic storage and translocation—
  - From 2019 to 2023, the Olinda Rare Plant Facility (ORPF) reported propagation of 31 plants representing three founders at Launiupoko and Makamaka‘ole (ORPF 2019, 2020, 2023).
  - In 2021, the Lyon Arboretum Micropropagation Laboratory reported storage of 102 explants representing one founder at Kaua‘ula (Lyon Arboretum 2022). Between 2013 and 2015, the Lyon Arboretum Seed Conservation Laboratory received collections and now currently have more than 3,000 seeds representing wild and second generation plants at Kaua‘ula, almost 1,700 seeds representing five individuals at Launiupoko, 325 seeds representing second generation plants sourced from Nua‘ailua, and almost 1,000 seeds representing five founders at Ukumehame (Lyon Arboretum 2022).
- Reintroductions, augmentations, translocation—
  - In 2018, Maui PEPP translocated five individuals to Kaua‘ula and 14 individuals to Launiupoko, currently 18 survive. In 2023, five individuals were translocated to Līhau (Maui PEPP 2018-2023; PEPP 2018, p. 18; PEPP 2019, p. 27).

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

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1992 (listing)	<10	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2011 (5-year review)	35	>4	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2018 (5-year review)	ca 50	<20	All threats managed in all 3 populations	No
			Reproduction (i.e., viable seeds, seedlings, saplings) at all 3 populations	No
			Complete genetic storage	Partially, > 10 founders represented
			3 populations with 50 mature individuals each	No

2023 (5-year review)	23+	24, 23 survive	All threats managed in all 3 populations	Partially, 1 population partially fenced; nonnative plant control at 3 populations; rodent control at 1
			Complete genetic storage	Partially
			Natural reproduction at all 3 populations	No
			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 *Lysimachia lydgatei* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, 1 population partially fenced
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plant control at 3 populations
Landslides and flooding destruction and degradation of habitat	A	Ongoing	None
Fire destruction and degradation of habitat	A	Ongoing	None
Climate change degradation or loss of habitat including hurricanes	A	Ongoing	None
Predation and herbivory by feral ungulates	C	Ongoing	Partial, 1 population partially fenced
Predation and herbivory by rodents	C	Ongoing	Partial, control at 1 population

Predation and herbivory by invertebrates	C	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, seed collection, propagation and translocation ongoing

Synthesis:
Currently, there are approximately 23 wild and 23 translocated individuals of *Lysimachia lydgatei* on Mauna Kahālāwai. Part of one population occurs within a fenced area and nonnative plant control is conducted at three populations. At least 12 founders are represented in seed collections and propagation. Translocation efforts are ongoing.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Recovery Plan for the Maui Plant Cluster (Hawai‘i) (U.S. Fish and Wildlife Service 1997) 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.

Lysimachia lydgatei 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 Maui 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 as there are no populations of at least 50 mature individuals (Table 1). Twelve wild plants from four populations are currently represented in collections (Table 1). All threats, including landslides, fire, predation by nonnative invertebrates, and climate change, are not sufficiently managed throughout the range of the species (Table 1, Table 2). A small number of individuals are translocated or augmenting wild populations. Therefore, *Lysimachia lydgatei* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

No significant new information regarding the species' biological status has been reported since the last 5-year review in 2018. Thus, the following recommendations for future actions are added or reiterated for the 5-year review for 2023.

- Surveys and inventories—Continue to survey for additional populations of *Lysimachia lydgatei* in areas of potentially suitable habitat on Mauna Kahālāwai and assess the current status of known populations.
- Ungulate monitoring and control—Continue to construct and maintain exclosures, or strategic fencing as appropriate, to protect *L. lydgatei* from the negative impacts of feral ungulates.
- Invasive nonnative plant monitoring and control—Continue control of established ecosystem-altering nonnative invasive plant species, and those that compete with *L. lydgatei*, at all populations.
- Fire prevention and control—Develop and implement fire management plans for all populations on Mauna Kahālāwai.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use this information to determine future landscape needed for recovery of the species.
- Predator and herbivore monitoring and control—
    - Protect all occurrences against browsing by feral ungulates.
    - Implement effective control methods for rats at all populations.
    - Determine and implement effective control methods for slugs at all populations.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock and for translocation.
- Translocation and augmentation—Continue to translocate individuals into suitable habitat within historic range that is being managed for known threats to this species.
- Build resiliency, redundancy, and representation—Continue translocation of individuals into suitable habitat that is being managed for known threats to this species to reduce impacts of landslides, flooding, fire, and predation.
- 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 taxon.

References:

Bustamente, K., H. Oppenheimer, and D. Tanaka. 2011. Hawai'i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2022: Plant Extinction Prevention Program, FY 2022 Annual Report (Oct 1, 2021-Sep 30, 2022), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F19AC00532 (Interim Report), December 29, 2022, UH Mānoa, PCSU, PEPP. 50 pp. BioPacifica database record for *Lysimachia lydgatei*, Pacific Islands Fish and Wildlife Office.

[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.

[Maui PEPP] Maui Plant Extinction Prevention Program. 2017-2023. Maui Nui plant species monitoring reports, 2017-2023. Excel data tables.

[ORPF] Olinda Rare Plant Facility. 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.

[ORPF] 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.

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Oppenheimer, H. and K. Bustamente. 2013. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2022: Plant Extinction Prevention Program, FY 2022 Annual Report (Oct 1, 2021-Sep 30, 2022), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F19AC00532 (Interim Report), December 29, 2022, UH Mānoa, PCSU, PEPP. 50 pp. BioPacifica database record for *Lysimachia lydgatei*, Pacific Islands Fish and Wildlife Office.

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Oppenheimer, H., M. Padgett, and J. Nielsen. 2017b. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2022: Plant Extinction Prevention Program, FY 2022 Annual Report (Oct 1, 2021-Sep 30, 2022), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F19AC00532 (Interim Report), December 29, 2022, UH Mānoa, PCSU, PEPP. 50 pp. BioPacifica database record for *Lysimachia lydgatei*, 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] U.S. Fish and Wildlife Service. 1997. Recovery Plan for the Maui Plant Cluster (Hawaii). U.S. Department of the Interior. Portland. 130 pp. + appendices.

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[USFWS] 2018. *Lysimachia lydgatei* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/2641.pdf*.

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SIGNATURE PAGE for 5-YEAR REVIEW of *Lysimachia lydgatei* (kolokolo kuahiwi)

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**

LAUREN WEISENBERGER Digitally signed by LAUREN WEISENBERGER Date: 2023.08.23 10:39:49 -10'00'

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