

## 5-YEAR REVIEW

### Short Form Summary

**Species Reviewed:** *Peperomia subpetiolata* (‘ala‘ala wai nui)

**Current Classification:** Endangered

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

[USFWS] U.S. Fish and Wildlife Service. 2023. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 133 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands . Federal Register 88(56): 17611–17614, March 23, 2023.

### Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

### Name of Reviewer:

Daniel Adamski, 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 *Peperomia subpetiolata* (USFWS 2020). The evaluation by Daniel Adamski, 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/7437>).

### Review Analysis:

Please refer to the previous 5-year review for *Peperomia subpetiolata* published in the Federal Register on August 19, 2020 (available at [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/3037.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3037.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 *P. subpetiolata*.

This short-lived perennial herb in the Piperaceae (pepper) family is endangered and found on Maui. The status and trends for *Peperomia subpetiolata* are provided in the tables below.

#### New Status Information:

- Currently, there are no known wild individuals of *Peperomia subpetiolata* on Maui, only putative hybrids with *P. cookiana*, and *P. subpetiolata* is extinct in the wild (Plant Extinction Prevention Program [PEPP] 2024; Royal Botanical Gardens Kew [RBGK] 2025).
- Currently, there are two founder lines represented in *ex situ* storage and propagation collections, including explants in micropropagation, seeds in seed banks, and plants in a living collection (Lyon Arboretum 2024; Olinda Rare Plant Facility [ORPF] 2025).

#### New Threats:

- None

#### New Management Actions:

- Monitoring and surveys—PEPP conducts surveys at historic populations of *Peperomia subpetiolata* on Maui and monitors putative hybrid reintroduced populations (PEPP 2024).
- Feral ungulate control—PEPP monitors and maintains fenced exclosures to exclude ungulates (PEPP 2024).
- Nonnative plant control—PEPP controls nonnative plants within fenced populations of putative hybrids of *Peperomia subpetiolata* at Makawao (PEPP 2024).
- Collection and propagation for genetic storage and reintroduction—
  - Lyon Arboretum Micropropagation Laboratory reports 72 explants in micropropagation representing one founder from Makawao and Lyon Arboretum Seed Conservation Laboratory reports 202 seeds in storage representing one founder plant from Waikamoi. (Lyon Arboretum 2024).
  - ORPF reports 33 potted plants in cultivation representing unknown founder plants from Makawao (ORPF 2025).
- Reintroduction—Between 2007 and 2019, The Plant Extinction Prevention Program (PEPP) reintroduced individuals of hybrids of *P. subpetiolata* at eight locations, totaling 48 mature individuals, 27 immature individuals, and 27 seedlings. Monitoring in 2020 and 2022 revealed 41 individuals remained at five locations (PEPP 2024). In addition, ORPF reports 63 individuals of hybrids of *P. subpetiolata* sent for outplanting in 2024 at Waikamoi (ORPF 2025).

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

<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>Preventing Extinction Targets identified by Recovery Plan</b>	<b>*Preventing Extinction Targets Completed?</b>
<b>2013 (Listing)</b>	0, all hybrids	7 mature 4 immature 4 seedlings	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
<b>2020 (5-year review)</b>	0, all hybrids	47	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			Reproduction (i.e., viable seeds, seedlings, saplings) at all 3 populations	No
			3 populations with 50 mature individuals each	No
<b>2025 (5-year review)</b>	0, all hybrids	63–104	All threats managed in all 3 populations	Partially
			Complete Genetic Storage	Yes
			Reproduction (i.e., viable seeds, seedlings, saplings) at all 3 populations	No
			All known populations with 50 mature individuals each	No

**Table 2. Threats to *Peperomia subpetiolata* and ongoing conservation efforts.**

<b>Threat</b>	<b>Listing factor</b>	<b>Current Status</b>	<b>Conservation/ Management Efforts</b>
Ungulate destruction and degradation of habitat	A	Ongoing	Partial, fencing at some populations
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plant control within some fenced populations
Disease	A	Potential	None
Stochastic events including hurricanes	A	Ongoing	None
Ungulate predation or herbivory	C	Ongoing	Partial, fencing at some populations
Predation and herbivory by non-native vertebrates– rats	C	Ongoing	None
Predation and herbivory by non-native invertebrates– slugs	C	Ongoing	None
Inadequacy of existing regulatory mechanisms	D	Ongoing	None
Hybridization	E	Ongoing	None
Low numbers	E	Ongoing	Propagation and outplanting
Climate change	E	Ongoing	None

**Synthesis:**

Currently there no known wild individuals of *Peperomia subpetiolata* on Maui. Individuals are provided protection from ungulates by fencing, and nonnative plant control. Individuals are represented *ex situ*, but extensive controlled breeding is required to propagate individuals with pure *P. subpetiolata* characteristics. Seed collections, seed storage, propagation, and translocations are ongoing.

Stabilizing (interim) and preventing extinction targets, and Downlisting, and Delisting criteria are provided in the Recovery Plan for 44 Species from Maui Nui (Islands of Maui, Moloka‘i, and Lāna‘i) (2023). 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.

*Peperomia subpetiolata* is a short-lived herb. 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 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. There are no known wild individuals, hybrids are represented in controlled propagation, and all threats are not being managed (Table 1, 2). Therefore, *Peperomia subpetiolata* 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 2020. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2025.

- Surveys and monitoring—
  - Continue surveys for populations of *Peperomia subpetiolata* in areas of potentially suitable habitat.
  - Determine suitable locations for reintroductions.
- Ungulate monitoring and control—Maintain fenced exclosures and construct new fences to protect individuals from the negative impacts of browsing by ungulates.
- Invasive nonnative plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *Peperomia subpetiolata*.
- Site and habitat protection—
  - Develop and implement effective control measures to reduce the impacts of destruction hurricanes.
  - Develop and implement effective control measures to reduce the impact of invasive invertebrate predation, specifically from slugs.
  - Develop and implement effective control measures to reduce the impact of invasive vertebrate predation from rats.
- Climate change adaptation strategy—Research suitability of habitat for viability of species, including where to conduct translocations in the future due to the impacts of climate change.
- Captive propagation for genetic storage and reintroduction—Continue to maintain collection and propagation efforts for maintenance of genetic stock and for reintroduction, to reduce the impacts of low numbers and hybridization.
- Research—Investigate plant diseases from related *Peperomia* species, and genetic studies to further evaluate hybrid populations.
- Build resiliency, redundancy, and representation—Increase species' viability through habitat restoration, threat control, and reintroduction and translocation into suitable habitat that is being managed for known threats to this species to reduce impacts of reduced viability due to low numbers.
- 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:

- Lyon Arboretum. 2024. 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] Olinda Rare Plant Facility. 2025. 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] 2024. Plant Extinction Prevention Program FY 2023 annual report Oct 1, 2023-Sep 30, 2024), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F14AC00174, December 24, 2016, UH Mānoa, PCSU, PEPP. 56 pp.
- [RBGK] Royal Botanical Gardens Kew. 2025. The International Plant Names Index and World Checklist of Vascular Plants 2025. Published on the Internet at <http://www.ipni.org> and <https://powo.science.kew.org/>.
- [USFWS] U.S. Fish and Wildlife Service. 2020. *Peperomia subpetiolata* 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/3037.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3037.pdf).
- [USFWS] 2023. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 133 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 88(56): 17611–17614, March 23, 2023.
- [USFWS] 2023. Recovery plan for 44 Species from Maui Nui (Islands of Maui, Moloka‘i, and Lāna‘i). Portland, OR. 94 pp. + appendices.

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

SIGNATURE PAGE for 5-YEAR REVIEW of *Peperomia subpetiolata* ('ala'ala wai nui)

**Pre-1996 DPS listing still considered a listable entity?** N/A

**Recommendation resulting from the 5-year review:**

<u>          </u>	Delisting
<u>          </u>	Reclassify from Endangered to Threatened status
<u>          </u>	Reclassify from Threatened to Endangered status
<u>  X  </u>	No Change in listing status

**For Field Supervisor, Pacific Islands Fish and Wildlife Office**

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