5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Tetramolopium capillare* (pāmakani)

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:

Daniel Adamski, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, Acting Recovery Team Coordinator, 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 *Tetramolopium capillare* (USFWS 2018). The evaluation by Daniel Adamski, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, Acting Recovery Team Coordinator, PIFWO.

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/4584*).

Review Analysis:

Please refer to the previous 5-year reviews for *Tetramolopium capillare* published in the Federal Register on August 28, 2012, (available at *https://ecos.fws.gov/docs/tess/species_nonpublish1959.pdf*) and October 23, 2018, (available at *https://ecos.fws.gov/docs/tess/species_nonpublish2665.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 *T. capillare*.

This short-lived perennial sprawling shrub in the Asteraceae (sunflower) family is endangered and is known from the island of Maui. The status and trends for *Tetramolopium capillare* are provided in the tables below.

New Status Information:

- Currently, *Tetramolopium capillare* may be extinct in the wild (PEPP 2022). There have not been any observations of *T. capillare* for over 15 years, and it was last observed in the West Maui Forest Reserve and lands within the West Maui Mountains Watershed Partnership (Oppenheimer 2006).

New Threats:

- None

New Management Actions:

- Monitoring and surveys—The Plant Extinction Prevention Program surveys for endangered plants on Maui (PEPP 2022).
- Collection and propagation for genetic storage and reintroduction—
  - National Tropical Botanical Garden reports at least 4 seeds in storage representing three founder plants (NTBG 2022).

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

Date	**No. wild individuals**	**No. outplanted**	**Stability Criteria identified in Recovery Plan**	**Stability Criteria Completed?**
1994 (listing)	12	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2012 (5-year review)	0–120	0	All threats managed in all 3 populations	Partially
			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)	0	0	All threats managed in all 3 populations	Partially

			Reproduction (i.e., viable seeds, seedlings, saplings) at all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 150 mature individuals each	No
2023 (5-year review)	0	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			Natural reproduction at all 3 populations	No
			3 populations with 150 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 *Tetramolopium capillare* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	None
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	None
Climate change degradation or loss of habitat, including hurricanes	A	Ongoing	None
Degradation and destruction by landslides	A	Ongoing	None
Predation and herbivory by feral ungulates	C	Ongoing	None

Reduced viability due to low numbers	E	Ongoing	Partial, seed storage

Synthesis:
Currently there are no known wild individuals of *Tetramolopium capillare* on Maui, and *T. capillare* may be extinct in the wild. There is still suitable habitat to be surveyed for this species. There are a few seeds in storage but the collections are from 1992-1995 and the viability is currently unknown.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Recovery Plan for the Maui Plant Cluster (USFWS 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.

Tetramolopium capillare is a short-lived perennial sprawling 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 and seedlings) with a minimum of 150 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. There are few seeds in genetic storage (Table 1), and no known wild individuals. There is still suitable habitat to be surveyed for this species. Therefore, *Tetramolopium capillare* 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 reiterated for the 5-year review for 2023.

- Surveys and monitoring—Survey for populations of *Tetramolopium capillare* in areas of potentially suitable habitat.
- Ungulate monitoring and control—Construct new fences to protect future reintroduced individuals from the negative impacts of browsing by ungulates.

- Invasive nonnative plant monitoring and control—Control of established ecosystem-altering nonnative invasive plant species, and those that compete with *Tetramolopium capillare* within and around any newly discovered populations.
- Fire prevention and control—Develop and implement fire prevention management plans and monitor populations after fire occurrence.
- 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, including increasing temperatures, periods between rain events, and frequency and intensity of hurricanes. Additional management actions may be needed, such as locating microsites that overlap with current and future climate envelopes for translocation efforts.
- Predator and herbivore monitoring and control—Determine and implement effective methods for rodents and slugs around newly discovered populations.
- Captive propagation for genetic storage and reintroduction— Initiate propagation efforts for maintenance of genetic stock and for reintroduction.
- Build resiliency, redundancy, and representation — Increase species' viability through habitat restoration, threat control, and reintroduction and translocation. Initiate reintroduction into suitable habitat that is being managed for known threats to this species to reduce impacts of erosion, treefall, flooding, 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.

[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.

Oppenheimer, H. 2006. Plant Extinction Prevention Program of Maui Nui progress report for the period ending 2006.06.30. Plant Extinction Prevention Program, Lahaina, Hawaii. 19 pages. Unpublished.

[PEPP] 2022. Plant Extinction Prevention Program fiscal year 2022 interim performance report (October 1, 2021-September 30, 2022), Cooperative Agreement F19AC00532 (Interim report), U.S. Fish and Wildlife Service CFDA Program #15.657 Endangered Species Conservation—Recovery Implementation Funds, University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 50 pp.

[USFWS] U.S. Fish and Wildlife Service. 1997. Recovery plan for the Maui plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 130 pages + appendices.

[USFWS] 2012. *Tetramolopium capillare* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/1959.pdf.*

[USFWS] 2018. *Tetramolopium capillare* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/2665.pdf*.

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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 16:57:29 -10'00'

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