

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Tetramolopium filiforme* (no common name)

**Current Classification:** Endangered

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

[USFWS] U.S. Fish and Wildlife Service. 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

### **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, 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) beginning in October 2018. The review was based on a review of current, available information since the last 5-year review for *Tetramolopium filiforme* (USFWS 2013). The evaluation completed 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 ([http://ecos.fws.gov/tess\\_public](http://ecos.fws.gov/tess_public)).

### **Review Analysis:**

Please refer to the previous 5-year reviews for *Tetramolopium filiforme* published in the Federal Register on January 18, 2008 and August 15, 2013 (available at [https://ecos.fws.gov/docs/five\\_year\\_review/doc1812.pdf](https://ecos.fws.gov/docs/five_year_review/doc1812.pdf) and [https://ecos.fws.gov/docs/five\\_year\\_review/doc4242.pdf](https://ecos.fws.gov/docs/five_year_review/doc4242.pdf)) for a complete review of the species' status, threats, and management efforts. 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. filiforme*.

This short-lived perennial dwarf shrub in the Asteraceae (sunflower) family is endangered and endemic to O‘ahu. The current status and trends for *Tetramolopium filiforme* are provided in the tables below.

#### New Status Information:

- Currently, there are six populations of *Tetramolopium filiforme* (ranging throughout the northern Wai‘anae mountains from Kahanahāiki to Pūhāwai, just north of Kolekole Pass) totaling approximately 2,200 mature individuals and 1,300 immature plants. However, two populations have not been monitored for over ten years, and 80 percent of the all known individuals occur in only one population (‘Ōhikilolo) (Army Natural Resources Program-O‘ahu (ANRP) 2018).
- In 2012, eight critical habitat units were designated for *Tetramolopium filiforme* in the dry cliff ecosystem of the Wai‘anae mountains of O‘ahu (7,788 acres, 3,152 hectares) (77 FR 57648, September 18, 2012).

#### New Threats:

- Climate change loss or degradation of habitat—Climate change may pose a threat to this species. Fortini *et al.* (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawai‘i using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. The assessment by Fortini *et al.* (2013) concluded that *Tetramolopium filiforme* is extremely vulnerable to the impacts of climate change, with a vulnerability score of 0.923 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, additional management actions may be needed to conserve this taxon into the future, such as locating key microsites that overlap with current and future climate envelopes for outplanting efforts.

#### New Management Actions:

- Ungulate control—Wild and reintroduced plants are protected by fencing and ungulate control at ‘Ōhikilolo and Pu‘u Kalena, and by a partial fence at Wai‘anae Kai (ANRP 2018).
- Nonnative invasive plant control—Nonnative plants are controlled in part at ‘Ōhikilolo and Wai‘anae Kai (ANRP 2018).
- Captive propagation for genetic storage and reintroduction—The ANRP reports collection and storage of more than 129,000 seeds representing 338 individuals from six populations (Kahanahāiki, ‘Ōhikilolo, Kea‘au, Pūhāwai, Pu‘u Kalena, and Wai‘anae Kai) (ANRP 2018). In addition, 78 individuals are being propagated in their nursery representing seven individuals from Pūhāwai (ANRP 2018).
- Reintroductions—Between 2006 and 2012, the ANRP reintroduced 108 individuals at Pūhāwai. By 2014, 75 immature plants had naturally recruited and seedlings were present. One year later, all plants that remained were plants that had naturally recruited, *i.e.* all outplants had died, but there was natural regeneration with 21 mature and 9 immature individuals. However, by 2017 no plants had survived and it is unknown if a soil seed bank is still present (ANRP 2018). The ANRP also tested seed sowing at two other sites, with some seedlings observed three months after sowing (50 and 30, respectively) (ANRP 2018).

**Synthesis:**

Currently there are approximately 2,200 mature individuals of *Tetramolopium filiforme*, most of which are at 'Ōhikilolo in the Wai'anae mountains of O'ahu, and there appears to be a gradual decline in the total number of individuals. A landscape-based assessment of climate change vulnerability for native plants of Hawai'i using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *T. filiforme* is extremely vulnerable to the effects of climate change. Collection, propagation, and reintroductions are ongoing. Two areas are fenced and managed for ungulates and nonnative plants. Reintroductions appear to decline fairly rapidly.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the O'ahu Plants (USFWS 1998), 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 filiforme* is a short-lived perennial dwarf shrub. To prevent extinction, which is the first step 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. In addition, a minimum 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, saplings) and increasing in number, with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. There are only two populations with more than 50 individuals and plants continue to decline in numbers. Genetic representation is incomplete and not all threats are managed (Table 1, Table 2). Therefore, *Tetramolopium filiforme* meets the definition of Endangered as it remains in danger of extinction throughout its range.

**Recommendations for Future Actions:**

Other than the new data on this taxon's vulnerability to climate change, we are not aware of any new threats. There is no significant new information regarding the species' biological status since the last 5-year review in 2013. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2019.

- Surveys and inventories—Continue to survey known populations for a current update on their status.

- Ungulate monitoring and control—Continue to construct and maintain fencing and monitor reintroduced populations to protect plants from impacts of feral ungulates.
- Invasive plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species, and those that compete with *Tetramolopium filiforme* at all reintroduced populations.
- Fire management—Implement fire management plans and coordinate fire response efforts.
- Climate change adaptation strategy—Assess the effects of climate change on this species and use to determine future landscape needed for the recovery of the species.
- Captive propagation for genetic storage and reintroduction—Continue seed collections from tagged individuals, keeping close track of the maternal source for use in *ex situ* propagation.
- Reintroduction—Continue to establish new populations and determine which sites have the highest likelihood of maintaining new introductions.
- Alliance and partnership development—Enhance coordination and collaboration land managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1991 (listing)	<500	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	No
1998 (recovery plan)	1,500	0	All threats managed in all three populations	No
			Complete genetic storage	Yes
			Three populations with 50 mature individuals each	No
2003 (critical habitat)	253	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially

			Three populations with 50 mature individuals each	Partially
2008 (5-year review)	2,857	28, 18 survived	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
2012 (critical habitat)	ca 3,000	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
2013 (5-year review)	2,599 mature, 612 immature, total 3,111	31, all died, two recruits	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>*Preventing Extinction Criteria identified by HPPRCC</b>	<b>*Preventing Extinction Criteria Completed?</b>
2019 (5-year review)	ca 2,200 mature, 1300 immature	108 planted, 0 survived	All threats managed in all three populations	Partially
			Complete genetic storage	Partially

			Reproduction ( <i>i.e.</i> viable seeds, seedlings) at all three populations	Partially, a few recruits observed
			Three populations with 50 mature individuals each	Partially, two populations > 50 mature individuals

\* 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 after Preventing Extinction).

**Table 2. Threats to *Tetramolopium filiforme* 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, two areas fenced, partial fencing at a third area
Degradation of habitat by established ecosystem-altering invasive plant species	A	Ongoing	Partial, nonnative plant management in two areas
Fire destruction and degradation of habitat	A	Ongoing	Partial, fire management plan and coordinated fire management efforts
Climate change degradation or loss of habitat	A	Ongoing	None
Ungulate predation and herbivory	C	Ongoing	Partial, two areas fenced, partial fencing at a third area
Invertebrate predation and herbivory	C	Ongoing	None
Competition with established invasive plant species	E	Ongoing	Partial, nonnative plant management in two areas
Human disturbance—Hikers and military activity			Partial, two areas fenced
Loss of reproductive vigor	E	Ongoing	Partial, collection, propagation and reintroduction ongoing

**References:**

See previous 5-year reviews for a full list of references (USFWS 2008, 2013). Only references for new information are provided below.

[ANRP] Army Natural Resource Program-O‘ahu. 2018. 2018 status report for the Makua and Oahu implementation plans. 217 pp.

Fortini, L., J. Price, J. Jacobi, A. Vorsino, J. Burgett, K. Brinck, F. Amidon, S. Miller, S. Gon II, G. Koob, and E. Paxton. 2013. A landscape-based assessment of climate change vulnerability for all native Hawaiian plants. Technical report HCSU-044. Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hawaii. 134 pp.

[HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; Endangered status for 23 species on Oahu and designation of critical habitat for 124 species; final rule. Department of the Interior, Federal Register 77 (181): 57648–57862, September 18, 2012.

[USFWS] 2013. *Tetramolopium filiforme* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.  
[https://ecos.fws.gov/docs/five\\_year\\_review/doc4242.pdf](https://ecos.fws.gov/docs/five_year_review/doc4242.pdf).

[USFWS] 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

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SIGNATURE PAGE for 5-YEAR REVIEW of *Tetramolopium filiforme* (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
- No Change in listing status

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

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