

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. 2010. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 58 species in Washington, Oregon, California, and Hawaii. Federal Register 75(226):71726-71729.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawaii

Name of Reviewer(s):

Jiny Kim, Fish and Wildlife Biologist, PIFWO

Daniel Clark, Oahu, Kauai, Northwest Hawaiian and American Samoa Islands Team
Manager, PIFWO

Marie Brueggemann, Plant Recovery Coordinator, PIFWO
Recovery Program Lead, PIFWO

Kristi Young, Programmatic Deputy Field Supervisor, PIFWO

Methodology used to complete this 5-year review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS), beginning on January 31, 2012. The review was based on a review of current, available information since the last 5-year review for *Tetramolopium filiforme* (USFWS 2008). The National Tropical Botanical Garden provided an initial draft of portions of the five-year review and recommendations for conservation actions needed prior to the next five-year review. The document was reviewed by the Fish and Wildlife Biologist, Islands Team Manager, and Plant Recovery Coordinator, followed by the Recovery Program Lead. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor.

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).

Review Analysis: Please refer to the previous 5-year review for *Tetramolopium filiforme* published on January 18, 2008 (available at http://ecos.fws.gov/docs/five_year_review/doc1812.pdf) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species' biological status has come to light since listing to warrant a change in the Federal listing status of *T. filiforme*.

This short-lived shrub is endangered and occurs on Oahu. The current status and trends for *Tetramolopium filiforme* are provided in the tables below.

New status information:

The greatest number of individuals in a wild population occurs in Ohikilolo Ridge in Makua Valley which contains 2,551 mature and 592 immature individuals and 20 seedlings. Waianae Kai has 30 mature and eight immature individuals and one seedling, all wild. Puu Kalena has 18 mature and 12 immature individuals and two seedlings. Puhawai has eleven mature individuals which were reintroduced and no wild individuals (Oahu Army Natural Resources Program [OANRP] 2012c). This represents little change from the 3,500 individuals reported in the last five-year review.

New threats:

- Climate change - Climate change may pose a threat to this species. However, current climate change analyses in the Pacific Islands lack sufficient spatial resolution to make predictions on impacts to this species. The Pacific Islands Climate Change Cooperative (PICCC) funded climate modeling that will help resolve these spatial limitations. High spatial resolution climate outputs are expected in 2013.

New management actions:

- Ungulate exclosures
 - In 2011, three populations managed for stability by OANRP were completely fenced from ungulates. One population managed for stability has been partially completed (U.S. Army Garrison 2011).
- Captive propagation for genetic storage and reintroduction
 - Cuttings from all plants in Kalena are established in the nursery to secure seed for storage (U.S. Army Garrison 2007).
 - In 2009, genetic storage goals were met for the Kahanahaiki and Ohikilolo populations (U.S. Army Garrison 2009).
 - A living collection of clones from plants in the Kalena and Puhawai populations is maintained in the nursery for collecting seeds for genetic storage and outplanting (U.S. Army Garrison 2009).
 - No decline in viability of stored seeds was detected after ten years in preferred storage conditions. However, test results the following year suggest a decline in viability. Low seed set has continued to complicate interpretation of viability results (U.S. Army Garrison 2009).
 - In 2012, OANRP had 36 individuals in the nursery, and had stored seeds from 30 individual founders (OANRP 2012a, b).
 - Waimea Valley Arboretum had one plant in its nursery in 2011 (Waimea Valley 2011).
- Reintroduction / translocation
 - *Tetramolopium filiforme* was successfully reintroduced on a cliff at Puu Kumakalii by utilizing rappelling techniques (U.S. Army Garrison 2007).
 - Only one individual remained at the wild site in the Puhawai population when it was monitored in March of 2008. All 31 reintroduced individuals at this site died in that year, but two apparently healthy immature second generation individuals were seen (U.S. Army Garrison 2009).

- The Puhawai population received additional augmentations in 2012 (OANRP 2012c).
- Ecosystem-altering invasive plant species control
 - *Leucaena leucocephala* (haole koa) and *Panicum maximum* (guinea grass) need to be eradicated from Waianae Kai, a slot gulch with very high cliff walls. *Tetramolopium filiforme* grows primarily on the top of the cliffs. Managing the weeds on cliffs is problematic given the lack of accessible anchor points for securing rappelling ropes (U.S. Army Garrison 2007).

Synthesis:

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for plants from the island of Oahu (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Tetramolopium filiforme* is a short lived perennial, and to be considered stable, the taxon must be managed to control threats (e.g., fenced) and be represented in an *ex situ* (at other than the plant's natural location, such as a nursery or arboretum) collection. In addition, a minimum of three populations should be documented on the island of Oahu. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

The stabilization goals for this species have not been met, as only 2 populations of 50 or more mature individuals exist (Table 1) and all threats are not being managed throughout all of the populations (Table 2). Therefore, *Tetramolopium filiforme* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Captive propagation for genetic storage and reintroduction - Continue collection of cuttings or seed from tagged individuals, keeping close track of the maternal source for use in *ex situ* propagation.
- Reintroduction / translocation
 - While surveying for new populations or reintroduced populations, determine which sites are least invaded by invasive introduced plant species and which appear to have the highest likelihood of maintaining new reintroductions.
 - Continue to reintroduce the species back into its known historical range.
- Ungulate exclosures – Complete construction, maintain, and monitor ungulate-proof exclosures around each population.
- Ecosystem-altering invasive plant species control – Control invasive introduced plant species around all populations.
- Site / area / habitat protection – Develop and implement effective measures to reduce the impact of landslides and flooding and military activities.
- Fire protection – Develop and implement fire management plans for all wild and reintroduced populations.
- Alliance and partnership development - Enhance coordination and collaboration among other land managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

- Threats research – Assess the modeled effects of climate change on this species, and use the results to determine future landscape needed for the recovery of the 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 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	1,500	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2003 (critical habitat)	253	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2008 (5-yr review)	3,500	18	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2013 (5-yr review)	2,974 mature, 653 immature, 40 seedlings – total 3,677	11	All threats managed in all 3 populations	Partially (see Table 2)

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
			Complete genetic storage	Partially, 2 populations
			3 populations with 50 mature individuals each	Partially

Table 2. Threats to *Tetramolopium filiforme* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat by feral goats and pigs	A, D	Ongoing	Partially- control is complete in 3 populations and partial in a fourth
Herbivory by feral goats and pigs	C	Ongoing	Mostly controlled in 4 populations
Trampling and collecting by humans on or near trails	B, E	Ongoing	Partially
Nonnative insects, including scale insects and ants	C	Ongoing	Unknown
Fire	A, E	Ongoing	No
Established invasive plant species competition, especially guinea grass which exacerbates fire risk	A, E	Ongoing	Partially – threat varies among populations
Low numbers in most populations and limited distribution increases vulnerability to random demographic fluctuations and localized catastrophes like hurricanes.	E	Ongoing	Partially: Captive propagation and genetic storage, reintroduction / translocation implementation, and monitoring
Climate change	A, E	Increasing	No

References:

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

[OANRP] Oahu Army Natural Resources Program. 2012 a. Army nursery inventory summary. 1 page. Unpublished.

[OANRP] Oahu Army Natural Resources Program. 2012 b. Genetic storage summary. 7 pages. Unpublished.

[OANRP] Oahu Army Natural Resources Program. 2012 c. Oahu implementation plan - population unit status; *Tetramolopium filiforme*. 1 page. Unpublished.

U.S. Army Garrison. 2007. 2007 Status reports for the Makua implementation plan and the draft Oahu implementation plan. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 719 pages. Available online at http://manoa.hawaii.edu/hpicesu/DPW/2007_YER/YER_2007_edited.pdf.

U.S. Army Garrison. 2009. 2009 status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 711 pages. Available online at http://manoa.hawaii.edu/hpicesu/DPW/2009_OIP/2009_OIP_Edited.pdf.

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[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages + appendices.

[USFWS] U.S. Fish and Wildlife Service. 2008. *Tetramolopium filiforme* (no common name) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 13 pages. Available online at http://ecos.fws.gov/docs/five_year_review/doc1812.pdf.

Waimea Valley. 2011. Controlled propagation report to U.S. Fish and Wildlife Service. Waimea Valley Arboretum, Waimea, Hawaii. 15 pages. Unpublished.

U.S. FISH AND WILDLIFE SERVICE
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

acting deputy
Field Supervisor, Pacific Islands Fish and Wildlife Office

Miriam Bluegman

Date *2013-08-15*