

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyrtandra munroi* (ha‘iwale)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2016. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 76 species in Hawaii, Oregon, Washington, Montana, and Idaho. Federal Register 81(29): 7571–7573.

Lead Region/Field Office:

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

Name of Reviewers:

Cheryl Phillipson, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, PIFWO

Gregory Koob, 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 (USFWS) beginning in August 2017. The review was based on a review of current, available information since the last 5-year review for *Cyrtandra munroi* (USFWS 2011). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Gregory Koob, 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).

Review Analysis:

Please refer to the previous 5-year review for *Cyrtandra munroi* published in the Federal Register on August 2, 2011 (available at https://ecos.fws.gov/docs/five_year_review/doc3817.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 *C. munroi*.

This short-lived perennial shrub in the Gesneriaceae (African violet) family is endangered and occurs on the islands of Maui and Lanai. The current status and trends for *Cyrtandra munroi* are provided in the tables below.

New Status Information:

- In 2011, the 5-year review reported eight populations of *Cyrtandra munroi* on west Maui (totaling less than 100 individuals), and two individuals on Lāna‘i. Currently, there are several dozen to possibly a few hundred individuals in six locations on west Maui, and a few individuals at Hauola on Lāna‘i (Oppenheimer 2018, in litt.).
- In 2012, three critical habitat units were proposed on Lāna‘i in two ecosystems (montane wet and wet cliff) (1,209 ac; 490 ha); however, the Service excluded critical habitat for this species on the island of Lāna‘i because, as demonstrated by the ongoing conservation activities by the private landowner, their commitment to develop the Lāna‘i Natural Resources Plan, and a memorandum of understanding with the Service, exclusion from critical habitat would provide greater long-term benefits to the species than would designation of critical habitat (USFWS 2015; 81 FR 17790, March 30, 2016). In 2016, 10 critical habitat units were designated in two ecosystems (lowland wet and wet cliff) on west Maui for *Cyrtandra munroi* (6,474 ac; 2,621 ha) (81 FR 17790, March 30, 2016).

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 Hawaii 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 *Cyrtandra munroi* is highly vulnerable to the impacts of climate change, with a vulnerability score of 0.606 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, additional management actions are needed to conserve this taxon into the future.

New Management Actions:

- Invasive plant monitoring and control—
 - Populations of *Cyrtandra munroi* in Kapunakea PR on west Maui will benefit from nonnative plant control activities conducted by The Nature Conservancy of Hawaii (TNCH) (TNCH 2011).
 - Maui Land & Pineapple Company (ML & P) manages Puu Kukui Watershed Preserve, and monitors and targets invasive nonnative plant species for control, in the preserve that will benefit *C. munroi* (ML & P 2010).
- Ungulate monitoring and control—
 - Individuals of *C. munroi* that occur in Kapunakea PR will be provided protection from feral ungulates because of fencing and feral ungulate removal (TNCH 2011). The upper preserve has been ungulate-free since 1999; however, feral ungulates are still present in the lower preserve.
 - Puu Kukui WP is managed to control feral pigs (ML & P 2010).

- The West Maui Mountains Watershed Partnership has installed 4.4 miles of 8-ft deer fence along the Partnership’s northern boundaries with more fencing in progress or proposed for the entire boundary (WMMWP 2013).
- Captive propagation for genetic storage and reintroduction—In 2017, Lyon Arboretum reported approximately 59 containers of propagules of *Cyrtandra munroi* in storage from Hauola on Lāna‘i. The Lyon Seed Laboratory reported over 2,500 seeds in storage collected from at least two individuals at Honokōwai (Lyon Arboretum 2018).

Synthesis:

Currently, there are several dozen to a few hundred *Cyrtandra munroi* on west Maui and a few individuals on Lāna‘i. A landscape-based assessment of climate change vulnerability for native plants of Hawaii using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *C. munroi* is highly vulnerable to the effects of climate change, in that there will be a smaller area of suitable habitat available for the species in the near future. Populations in Kapunakea PR and in Pu‘ukukui WP may be provided protection by fencing and ongoing ungulate control and nonnative plant control. Seed collection and storage efforts are ongoing.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Lanai Plant Cluster Recovery Plan (USFWS 1995), and have been updated according to the draft revised recovery objective guidelines developed by the Hawaii 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.

Cyrtandra munroi is a short-lived perennial 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 Maui and Lāna‘i. Each of these populations must be naturally reproducing 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 as there are no populations of at least 50 reproducing individuals, genetic representation is incomplete (Table 1), and all threats are not being sufficiently managed throughout the range of the species (Table 2). Therefore, *Cyrtandra munroi* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

We are not aware of any new threats or significant new information regarding the species' biological status since the last 5-year review in 2011. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2018.

- Population viability and monitoring—Continue to monitor the wild populations on west Maui and Lānaʻi.
- Ungulate monitoring and control—Continue to construct and maintain exclusion fences to protect *Cyrtandra munroi* from the impacts of feral ungulates.
- Invasive plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species around all populations.
- Predator and herbivore monitoring and control—
 - Implement effective control methods for rodents at wild and reintroduced populations.
 - Develop and implement effective control methods for slugs.
- Captive propagation for genetic storage and reintroduction—
 - Continue collection of genetic resources for storage, propagation, and reintroduction into protected suitable habitat within historical range.
 - Evaluate genetic resources currently in storage to determine the need to place additional material into long-term storage due to this species' vulnerability to climate change.
- Reintroduction and translocation—Begin reintroduction of individuals into suitable habitat within historic range that is being managed for known threats to this species.
- Climate change adaptation strategy—Research the suitability of habitat for reintroducing this species in the future due to impacts from climate change.
- Alliance and partnership development—Initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this taxon.

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

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1992 (listing)	1 (Maui) 20 (Lānaʻi)	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	No
1995 (recovery plan)	30 (Maui) 17 (Lānaʻi)	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	No
2003 (critical habitat)	ca 1,000 (Maui) 17 (Lānaʻi)	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	No
2011 (5-year review)	< 100 (Maui) 2 (Lānaʻi)	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	No
2016 (critical habitat)	45 (Maui) 23 (Lānaʻi)	0	All threats managed in all three populations	No

			Complete genetic storage	Partially, ungulate and nonnative plant management
			Three 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)	sev dozen to few 100 (Maui) few (Lānaʻi)	0	All threats managed in all three populations	Partially, ungulate and nonnative plant management
			Complete genetic storage	Partially
			Reproduction (<i>i.e.</i> viable seeds, seedlings) at all three populations	No
			Three 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 after Preventing Extinction).

Table 2. Threats to *Cyrtandra munroi* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate degradation of habitat	A	Ongoing	Partial, protected areas on Maui
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, protected areas on Maui
Landslides and flooding loss or modification and destruction of habitat	A	Ongoing	None
Climate change degradation or loss of habitat	A	Ongoing	None
Ungulate predation or herbivory	C	Ongoing	Partial, protected areas on Maui
Rodent predation or herbivory	C	Ongoing	None
Invertebrate predation or herbivory	C	Ongoing	None
Stochastic events—Reduced viability due to small populations	E	Ongoing	Partial, seed collection ongoing

References:

See the previous 5-year review for a full list of references (USFWS 2011). Only references for new information are provided below.

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] Hawaii and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.

Lyon Arboretum. 2018. Micropropagation and seed conservation laboratory databases.

[ML & P] Maui Land & Pineapple Company, Inc. 2010. Puu Kukui watershed preserve, fiscal years 2012-2018 management plan. Prepared for Division of Forestry and Wildlife, Department of Land and Natural Resources, State of Hawaii, June 2010. 49 pp.

[TNCH] The Nature Conservancy of Hawaii. 2011. Kamakou Preserve, Molokai, Hawaii, draft long-range management plan, fiscal years 2013-2018. Submitted to the Department of Land & Natural Resources, Natural Area Partnership Program, May 2011. 30 pp. + appendices.

- [USFWS] U.S. Fish and Wildlife Service. 2011. *Cyrtandra munroi* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. https://ecos.fws.gov/docs/five_year_review/doc3817.pdf.
- [USFWS] U.S. Fish and Wildlife Service. 2015. Memorandum of understanding between Lanai Resorts, LLC, Castle & Cooke Properties, Inc., and U.S. Department of the Interior, Fish and Wildlife Service. 36 pp.
- [USFWS] U.S. Fish and Wildlife Service. 2016. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 76 species in Hawaii, Oregon, Washington, Montana, and Idaho. Federal Register 81(29): 7571–7573, February 12, 2016.
- [USFWS] U.S. Fish and Wildlife Service. 2016. Endangered and threatened wildlife and plants; designation and nondesignation of critical habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 species; final rule. Federal Register 81 (61): 17790–18110, March 30, 2016.
- [WMMWP] West Maui Mountains Watershed Partnership. 2013. West Maui Mountains watershed management plan. 113 pp.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Cyrtandra munroi* (ha‘iwale)

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