

## 5-YEAR REVIEW

Short Form Summary

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

**Current Classification:** Endangered

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

[USFWS] U.S. Fish and Wildlife Service. 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. Federal Register 88(83): 20088–20092, May 7, 2018.

### **Lead Region/Field Office:**

Interior Region 12/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 2019. The review was based on a review of current, available information since the last 5-year review for *Cyrtandra giffardii* (USFWS 2012). The evaluation 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 review for *Cyrtandra giffardii* published in the Federal Register on August 28, 2012 (available at [https://ecos.fws.gov/docs/five\\_year\\_review/doc4045.pdf](https://ecos.fws.gov/docs/five_year_review/doc4045.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 *C. giffardii*.

This short-lived perennial shrubby tree in the Gesneriaceae (African violet) family is endangered. The status and trends for *Cyrtandra giffardii* are provided in the tables below.

#### New Status Information:

- There are no recent surveys assessing the current status of this species except for one individual of *Cyrtandra giffardii* found near the ‘Ōla‘a Forest Reserve (FR) in 2015 (Hawai‘i Volcanoes National Park (HVNP) 2020, in litt.). A collection of what was believed to be *C. giffardii* made at the Honua‘ula FR is likely *C. menziesii* (VRPF 2019; VanDeMark 2020, in litt.).

#### 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. This assessment concluded that *Cyrtandra giffardii* is vulnerable to the impacts of climate change, with a vulnerability score of 0.189 (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 *C. giffardii* into the future, such as locating key microsites that overlap with current and future climate envelopes for outplanting efforts

#### New Management Actions:

- Captive propagation for genetic storage and reintroduction—
  - The Lyon Arboretum Seed Conservation Laboratory reports collection and storage of 628 seeds representing one founder from Laupāhoehoe in 2018 (Lyon Arboretum 2019).
  - The HVNP reports that in 2013, 82 percent of the previous reintroductions had survived 22 to 38 months post planting with 1.2 percent flowering. In 2015, overall survival was 62.4 percent with 22 percent reproductive 34 to 63 months post planting. These seedlings were derived from ‘Ōla‘a founders and likely represent natural hybrids with *C. lysiosepala* (VanDeMark *et al.* 2010). Cuttings of known *C. giffardii* from ‘Ōla‘a were taken and propagated in 2012. These were planted in the Thurston Unit away from *C. lysiosepala* to minimize hybridization. In 2015, 120 plants were reintroduced into the Thurston site. In addition, 27 fruits were collected from *ex situ* plants in the greenhouse for propagation. In 2016, 44 individuals were planted at Thurston. Survival remained high for those planted in 2009, 69 percent were alive (15.4 percent flowering). One-year survival was 89 percent for those planted in 2015 (17.5 percent flowering). In 2016, 74.7 percent were alive (15.8 percent flowering). In 2017, 70 percent were alive with 6 percent flowering. In 2019, plants remain *ex situ* at the park nursery. In addition, three cuttings were taken from ‘Ōla‘a for propagation. Approximately 3,000 seeds are in storage representing one individual from Puu Maka‘ala ‘Ōla‘a Koa Unit (HVNP 2019).
  - The Volcano Rare Plant Facility (VRPF) reported nine plants in inventory representing a founder from Tom’s Trail (Waiākea Upper) and reintroduction of one plant into Kūlani (representing one founder from

Tom’s Trail) and reintroduction of five plants into Kūlani representing one founder from Puu Maka‘ala (VRPF 2019).

- Population biology research—Hybridization—Research is ongoing to investigate current species treatments and possible reassignments resulting from hybridization (Roalson 2020, in litt.; Kleinkopf *et al.* 2019, 18 pp.).

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

<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>Stabilization Criteria identified in Recovery Plan</b>	<b>Stabilization Criteria Completed?</b>
1994 (listing)	14–20	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1996 (recovery plan)	>1,000	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Partially
2003 (critical habitat)	<500	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Partially
2012 (5-year review)	<100	77	All threats managed in all 3 populations	Partially

			Complete genetic storage	Partially
			3 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>
2020 (5-year review)	Unknown, ca <100	ca 164 planted	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			Reproduction (i.e. viable seeds, seedlings) at all 3 populations	Yes (viable seeds)
			3 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 stage after Preventing Extinction).

**Table 2. Threats to *Cyrtandra giffardii* 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 'Ōla'a
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	None
Climate change degradation or loss of habitat	A	Ongoing	None
Human disturbance	E	Ongoing	None
Hybridization	E	Ongoing	Partial, reintroduction of individuals to areas without other <i>Cyrtandra</i> species

Loss of vigor due to low numbers	E	Ongoing	Partial, collection, propagation, and reintroduction
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**Synthesis:**

Currently, there are an unknown number of wild individuals, likely fewer than 100, of *Cyrtandra giffardii* at two locations on the island of Hawai‘i. 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 *C. giffardii* is vulnerable to the effects of climate change. Approximately 23 plants are in storage or propagation representing at least four founders and more than 3,628 seeds are in storage representing at least two founders, with 164 individuals reintroduced to Hawai‘i Volcanoes National Park. Some wild individuals may be hybrids with *C. lysiosepala* or other *Cyrtandra* species.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for Big Island Plant Cluster (USFWS 1996), 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.

*Cyrtandra giffardii* is a short-lived perennial shrubby tree. 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 the island of Hawai‘i where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings, saplings), with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. There are two populations of unknown status totaling fewer than 100 individuals; however, some of these plants may be determined to be hybrids (Table 1, Table 2). There is genetic material in storage and propagation but the storage goals have not been met, and reintroduction is ongoing (Table 1). Also, not all threats are being managed (Table 1, Table 2). Therefore, *Cyrtandra giffardii* meets the definition of Endangered as it remains in danger of extinction throughout its range.

### Recommendations for Future Actions:

There are no new threats and no other significant new information is reported regarding the species' biological status since the last 5-year review in 2012. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2020.

- Surveys and inventories—Survey the current and historical range of *Cyrtandra giffardii* to assess its current status and discover new populations.
- Ungulate exclosures—Continue to construct exclosures at known populations and monitor and maintain fencing to protect *C. giffardii* from feral ungulates.
- Ecosystem-altering invasive plant species control—Control invasive nonnative plants at all wild and reintroduced populations of *C. giffardii*.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use to determine future landscape needed for its recovery.
- Captive propagation for genetic storage and reintroduction—
  - Continue collection of material for genetic storage and propagation for reintroduction.
  - Research effective propagation methods for this species.
- Reintroduction and translocation—Continue reintroduction into suitable protected habitat.
- Population biology research—
  - Conduct field studies to determine effective pollinators for this species.
  - Determine the impact of hybridization on this species and develop a reintroduction plan to avoid this impact if necessary.
  - Assess the level of genetic diversity remaining within the species through genetic studies.
  - Develop a breeding program to maintain the genetic diversity of the species.
- Alliance and partnership development—Continue to work with the National Park Service, the Division of Forestry and Wildlife, and other partners and land managers in planning and implementation of ecosystem-level restoration and management to benefit this species.

### References:

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, Hawai'i. 134 pp.

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

[HVNP] Hawai'i Volcanoes National Park. 2019. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished

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- Kleinkopf, J.A., W.R. Roberts, W.L. Wagner, and E.H. Roalson. 2019. Diversification of Hawaiian *Cyrtandra* (Gesneriaceae) under the influence of incomplete lineage sorting and hybridization. *Journal of Systematics and Evolution*. 18 pp. doi: 10.1111/jse.12519.
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- [USFWS] U.S. Fish and Wildlife Service. 1996. Recovery plan for the Big Island plant species. Portland. 176 pp. + appendices.
- [USFWS] 2003. Endangered and threatened wildlife and plants; final designation and nondesignation of critical habitat for 46 plant species from the island of Hawaii, HI; final rule. 68 FR 39624, July 2, 2003.
- [USFWS] 2012. *Cyrtandra giffardii* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.  
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- [USFWS] 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. Federal Register 88 FR 20088, May 7, 2018.
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**U.S. FISH AND WILDLIFE SERVICE**  
SIGNATURE PAGE for 5-YEAR REVIEW of *Cyrtandra giffardii*  
(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**

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Date \_\_\_\_\_