5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyrtandra viridiflora* (haʻiwale)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90): 28031–28034, May 10, 2022.

Lead Region/Field Office:

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

Name of Reviewer:

Cheryl Phillipson, Biologist, PIFWO
Lauren Weisenberger, Plant Recovery Coordinator, PIFWO
Megan Laut, Recovery Program 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 2023. The review was based on a review of current, available information since the last 5-year review for *Cyrtandra viridiflora* (USFWS 2019). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery Program 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/ecp/species/8154*).

Review Analysis:

Please refer to the previous 5-year reviews for *Cyrtandra viridiflora* published in the Federal Register on April 8, 2009, August 1, 2013, and September 20, 2019 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1400.pdf, https://ecos.fws.gov/docs/tess/species_nonpublish/2069.pdf, and https://ecos.fws.gov/docs/tess/sepcies_nonpublish/2848.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. viridiflora*.

This short-lived perennial shrub in the Gesneriaceae (African violet) family is endangered and is known from the island of Oʻahu. The status and trends for *Cyrtandra viridiflora* are provided in the tables below.

New Status Information:

- The current status of this species unknown. Only one population of three individuals at ʻŌpaeʻula have been monitored recently. There were eight populations of *Cyrtandra viridiflora* totaling 43 mature and 9 immature individuals known from Koloa, Kaipapaʻu, Kaluanui, ʻŌpaeʻula, Kawai Nui, Kawai Iki, Helemano, and Kaukonahua in the northern Koʻolau mountains of Oʻahu (PEPP 2019-2023; Army Natural Resource Program of Oʻahu [ANRPO] 2023). The largest number of individuals occurred in the two adjacent populations of ʻŌpaeʻula and Helemano, totaling 18 mature and 4 immature individuals.
- The Army Natural Resources Program of Oʻahu (ANRPO) seed collection totals almost 5,000 seeds representing 13 founders in three populations (Helemano, Koloa, and ʻŌpaeʻula (ANRPO 2023) The Lyon Arboretum Seed Conservation Laboratory reported an additional 179 seeds in storage representing only one other founder from ʻŌpaeʻula (Lyon Arboretum 2022).

New Threats:

- None reported.

New Management Actions:

- Monitoring and management—
  - The Plant Extinction Prevention Program (PEPP) most recently monitored one occurrence of *Cyrtandra viridiflora* at ʻŌpaeʻula in 2020 (PEPP 2019–2023).
  - The Army Natural Resources Program of Oʻahu (ANRPO) last monitored individuals at Koloa; however, ANRPO no longer prioritizes management for this species (ANRPO 2022, p. 253).
- Collection and propagation for genetic storage and reintroduction—
  - Prior to 2019, the ANRPO collected and stored 4,981 seeds representing five founders at Helemano, three founders at Koloa, and five founders at ʻŌpaeʻula (ANRPO 2023).

Table 1. Status and trends of *Cyrtandra viridiflora* from listing through current 5-year review. Table 1a shows progress according to Interim Stabilization Goals; Table 1b shows progress according to Preventing Extinction Goals.

Table 1a.

Date	No. wild individuals	No. Outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1996 (listing)	<10	0	All threats managed in all 3 populations	No
			Complete genetic storage	No

			3 populations with 50 mature individuals each	No
2009 (5-year review)	69	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2013 (5-year review)	70	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

Table 1b.

Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Targets identified by HPPRCC**	***Preventing Extinction Targets Completed?**
2019 (5-year review)	59–63	0	All threats managed in all 3 populations	Partial
			Complete genetic storage	Partial
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	No
			3 populations with 50 mature individuals each	No
2024 (5-year review)	≥ 3	0	All threats managed in all 3 populations	Partial, two populations within exclosures

			Complete genetic storage	Partial, 19 founders from 3 populations represented
			Natural reproduction at all 3 populations	None reported
			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 viridiflora* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, 2 populations fenced
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	Partial, 2 populations in managed areas
Climate change degradation or loss of habitat	A	Ongoing	None
Predation and herbivory by rodents	C	Ongoing	Partial, one area managed
Predation and herbivory by invertebrates—Slugs and snails	C	Ongoing	Partial, one area managed

Synthesis:
The current status of *Cyrtandra viridiflora* is unknown; there are three individuals recently observed in 2020 at one population. Previously there were eight populations in the Koʻolau mountains of Oʻahu totalling approximately 43 mature and 9 immature wild individuals. Two populations area within exclosures that provide protection from feral ungulates. Seed collections are in storage, but no propagation or translocation is reported. Nineteen founders from three populations are represented, all in seed collections.

Stabilizing (interim), and downlisting and delisting criteria are provided in the Recovery Plan for the Oʻahu Plants (USFWS 1998) and preventing extinction targets have been added and criteria updated according to the draft revised recovery objective guidelines developed by the Hawaiʻi 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 viridiflora is a short-lived perennial 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 O‘ahu where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for *Cyrtandra viridiflora* have not been met. The number of wild individuals continues to decline. No populations total at least 50 reproducing individuals, and no recruitment is observed (Table 1, Table 2). No populations have met genetic representation goals (Table 1). No propagation or translocation efforts are reported (Table 1). Only 19 founders are represented in collections (Table 1). Two populations are in fenced areas that are managed for other endangered species (Table 2). Therefore, *C. viridiflora* 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 2019. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2024.

- Surveys and monitoring—Continue to monitor known populations.
- Ungulate monitoring and control—Continue to construct and maintain exclosures to provide protection from the negative impacts of habitat degradation and browsing by feral ungulates.
- Nonnative invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *C. viridiflora*, at all populations.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use to determine future landscape needed for its recovery.
- Predator and herbivore monitoring and control—
    - Implement control methods for rats at all populations.
    - Implement effective methods for control of slugs/snails at all populations.
- Captive propagation for genetic storage and reintroduction—

    - Continue collection and begin propagation efforts for maintenance of genetic stock and for reintroduction.
    - Assess genetic variability within the extant populations and develop a plan for conserving the species' genetic diversity in *ex situ* and reintroduced populations.
- Reintroduction and augmentation—Establish new populations and augment existing populations of *C. viridiflora* in suitable habitat within historical range that is being managed for known threats to this species.
- Build resiliency, redundancy, and representation—Increase species' viability through habitat restoration, threat control, and reintroduction and translocation to reduce impacts of climate change.
- Population biology research—Study *C. viridiflora* populations with regard to populations size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- Alliance and partnership development—Work with ANRPO, the State's Native Ecosystems Protection & Management program, and other land managers and partners to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

References:

[ANRPO] Army Natural Resources Program of Oʻahu. 2022. 2022 Status report for the Mākua and Oʻahu Implementation Plans. Office of the Vice President for Innovation and Research, University of Hawaiʻi. 228 pp. + appendices, 690 pp.

[ANRPO] 2023. 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, Hawaiʻi.

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

Lyon Arboretum. 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, Hawaiʻi.

[PEPP] 2019–2023. Plant Extinction Prevention Program fiscal years 2019 to 2023 interim performance report (October 1, 2018-September 30, 2023). U.S. Fish and Wildlife Service CFDA Program $15.657 Endangered Species Conservation—Recovery Implementation Funds, Cooperative Agreement: F18AC00502 (Final performance report), University of Hawaii at Manoa, Pacific Cooperative Studies Unit. 105 pp. + database.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery Plan for the O‘ahu Plants. Portland. 207 pp. + appendices.

[USFWS] 2009. *Cyrtandra viridiflora* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/1400.pdf.*

[USFWS] 2013. *Cyrtandra viridiflora* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/2069.pdf.*

[USFWS] 2019. *Cyrtandra viridiflora* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/2848.pdf.*

[USFWS] 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90): 28031–28034, May 10, 2022.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Cyrtandra viridiflora* (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
__X__ No Change in listing status

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

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