5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyanea pinnatifida* (hāhā)

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, Hawai‘i

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 *Cyanea pinnatifida* (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/6397*).

Review Analysis:

Please refer to the previous 5-year reviews for *Cyanea pinnatifida* published in the Federal Register on August 2, 2007, August 28, 2012, and September 20, 2019 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1096.pdf, https://ecos.fws.gov/docs/tess/species_nonpublish/2115.pdf,* and *https://ecos.fws.gov/docs/tess/sepcies_nonpublish/2840.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. pinnatifida*.

This short-lived perennial shrub in the Campanulaceae (bellflower) family is endangered and is known from the island of O‘ahu. The status and trends for *Cyanea pinnatifida* are provided in the tables below.

New Status Information:

- Currently, there are three reintroduced populations of *Cyanea pinnatifida* in the Waiʻanae mountains of Oʻahu at Kaluaʻā and ʻĒkahanui, totaling approximately 49 individuals; however, the last observation at ʻĒkahanui, totally 8 individuals, was in 2016 (Army Natural Resources Program on Oʻahu [ANRPO] 2023a; Plant Extinction Prevention Program [PEPP] 2019–2023).
- Since 2000, the last wild individual was represented in *ex situ* storage and propagation from original wild collections and collections from reintroduced individuals. Currently, there are more than 33,000 seeds in seed banks, 653 explants in tissue culture, and 318 plants in a nursery representing this single founder (ANRPO 2023a; Lyon Arboretum 2022; Oʻahu Native Ecosystems Protection & Management [NEPM] Rare Plant Nursery 2020).

New Threats:

- None reported.

New Management Actions:

- Monitoring and surveys—
  - The ANRPO expanded and monitors The Nature Conservancy's reintroduction site at Kaluaʻā (ANRPO 2023b appendices, p. 127).
  - The Plant Extinction Prevention Program (PEPP) monitors all populations of *Cyanea pinnatifida* (PEPP 2021, pp. 8, 17; PEPP 2022, pp. 10,18).
- Nonnative invasive plant control—In 2021–2022, PEPP reported nonnative plant control at one or more reintroductions of *C. pinnatifida* (PEPP 2021, p. 17; PEPP 2022, p. 18).
- Rodent control—The ANRPO conducts rodent control in a fenced area where *C. pinnatifida* was reintroduced (ANRPO 2023 appendices, p. 132).
- Nonnative slug/snail control—In 2021, PEPP reported use of a molluscicide to control slugs (PEPP 2021, pp. 8, 17).
- Collection and propagation for genetic storage and reintroduction—
  - The ANRPO reported storage of more than 5,000 seeds and 196 explants representing the last wild plant at Kaluaʻā (ANRPO 2023a).
  - In 2021, the Lyon Arboretum Micropropagation Laboratory reported storage of 457 explants representing the last wild plant at Kaluaʻā (Lyon Arboretum 2022). From 2000 to 2021, the Lyon Arboretum Seed Conservation Laboratory reported storage of 33.000 seeds from the last wild plant and reintroduced plants (with various crosses) at Kaluaʻā (Lyon Arboretum 2022). These include nearly 1,500 seeds from the wild individual and early reintroduced plants; nearly 10,000 seeds resulting from crosses of the wild and initial reintroduced plants at Kaluaʻā; more than 14,000 seeds representing a second population of reintroduced plants at Kaluaʻā, and more than 4,000 seeds from plants grown at the Pahole Rare Plant Facility (PRPF) (Lyon Arboretum 2022).
  - In 2023, the Oʻahu Rare Plant Nursery reported propagation of four plants representing the last wild plant (Oʻahu RPF 2023). The State's NEPM

Program reported propagation of 314 seedlings representing the last wild plant (O‘ahu NEPM Nursery 2020).
    - In 2022, PEPP reported collection of fruit from plants at an unspecified location (PEPP 2022, p. 18).
- Reintroduction and augmentation—
    - Three reintroduction sites are currently monitored, two at Kalua‘ā and one at ‘Ēkahanui (PEPP 2019–2023). Since 2016, at least 30 mature and 24 immature individuals were outplanted (PEPP 2019–2023). Seven individuals were observed to have died.
    - In 2022, PEPP reported reintroduction of 64 individuals at Kalua‘ā (PEPP 2022, p. 10).
- Research—Breeding plan implemented for crossing between individuals used for reintroductions to increase genetic diversity (PEPP 2019–2023).

Table 1. Status and trends of *Cyanea pinnatifida* 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?
1991 (listing)	1	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2007 (5-year review)	0	70	All threats managed in all 3 populations	Partial
			Complete genetic storage	Yes
			3 populations with 50 mature individuals each	No
2012 (5-year review)	0	20	All threats managed in all 3 populations	Partial
			Complete genetic storage	Yes

			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)	0	ca 57	All threats managed in all 3 populations	Partial
			Complete genetic storage	Yes
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	No
			3 populations with 50 mature individuals each	No
2024 (5-year review)	0	94 mature 24 immature 7 died, at most 49 survive	All threats managed in all 3 populations	Partial, 3 reintroduced populations fenced
			Complete genetic storage	Yes
			Natural reproduction at all 3 populations	No, 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 *Cyanea pinnatifida* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat and herbivory by feral ungulates	A, E	Ongoing	Partial, 3 managed areas fenced
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	Partial, nonnative plants controlled at 2 fenced and managed areas
Landslides and flooding destruction and degradation of habitat	A	Ongoing	None
Drought destruction and degradation of habitat	A	Ongoing	None
Climate change degradation or loss of habitat	A	Ongoing	None
Predation and herbivory by rodents	C	Ongoing	Partial, rodent control in 1 managed area
Predation and herbivory by invertebrates—Slugs	C	Ongoing	Partial, slug control at 1 managed area

Synthesis:
Currently there are no wild individuals of *Cyanea pinnatifida* remaining. Nearly 100 individuals were reintroduced and around 50 survive. Three reintroduction areas are fenced to protect them from feral ungulates and two have some nonnative invasive plant control. One population has rodent control and slug/snail control. Seed collection from reintroduced individuals, propagation, and translocation are ongoing; however, no recruitment is reported. The last wild plant and all reintroduced individuals (including crosses) are represented in seed collections, micropropagation, and by nursery plants.

Stabilizing (interim), and downlisting and delisting criteria are provided in the Recovery Plan for the O‘ahu Plants (USFWS 1998) and preventing extinction targets have been added and criteria 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.

Cyanea pinnatifida 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 this species have not been met. Genetic representation is complete for the last known wild individual (Table 1). All reintroduced individuals are represented in collections (Table 1). There are no populations totaling at least 50 reproducing individuals and recruitment is not reported (Table 1). Two translocated populations have management for nonnative invasive plants, and one has rodent and slug/snail control (Table 2). The effects of climate change, landslides and flooding, and drought, are not addressed. Therefore, *Cyanea pinnatifida* 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—Monitor reintroduced populations and conduct thorough surveys of all suitable habitat within historic range of *Cyanea pinnatifida* if surveys are still needed to possibly find more wild individuals.
- Ungulate monitoring and control—Continue to construct and maintain exclosures to protect reintroduced populations from the negative impacts of habitat degradation and browsing by feral ungulates.
- Nonnative invasive plant monitoring and control—Continue control of established ecosystem-altering nonnative invasive plant species, and those that compete with *C. pinnatifida*.
- Climate change adaptation strategy—Assess the modeled effects of climate change on the viability of this species and use to determine future landscape needed for its recovery.
- Predator and herbivore monitoring and control—
    - Continue to implement effective control methods for rodents at all populations.
    - Continue to implement effective methods for control of slugs/snails.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- Reintroduction and translocation—Continue to augment reintroduced populations and establish new populations in suitable habitat within historical range that is being managed for known threats to this species.
- Biology and reproductive research—Continue to conduct crossing experiments implementing a breeding plan to increase genetic variability in reintroduced populations.

- Build resiliency, redundancy, and representation—Increase species' viability through habitat restoration, threat control, and reintroduction and translocation to reduce impacts of landslides, flooding, and drought.
- Alliance and partnership development—Continue to work with ANRPO and the Native Ecosystems Protection & Management program and other partners and land managers to implement ecosystem-level restoration and management to benefit this species.

References:

[ANRPO] Army Natural Resources Program on Oʻahu. 2023a. 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.

[ANRPO] 2023b. 2023 Status report for the Mākua and Oʻahu Implementation Plans. Prepared by Army Natural Resources Program, Oʻahu, Office of the Vice President for Innovation and Research, University of Hawaiʻi. 255 pp., appendices, 534 pp.

[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.

[Oʻahu NEPM Nursery] Oʻahu Native Ecosystems Protection and Management Nursery. 2020. 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.

Oahu Rare Plant Facility. 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.

[PRPF] Pahole Rare Plant Facility. 2019. 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] Plant Extinction Prevention Program. 2021. Plant Extinction Prevention Program fiscal year 2021 interim performance report (October 1, 2020-September 30, 2021), Cooperative Agreement F19AC00532 (Interim report), U.S. Fish and

Wildlife Service CFDA Program #15.657 Endangered Species Conservation—Recovery Implementation Funds, University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 46 pp.

[PEPP] 2022. Plant Extinction Prevention Program fiscal year 2022 interim performance report (October 1, 2021-September 30, 2022), Cooperative Agreement F19AC00532 (Interim report), U.S. Fish and Wildlife Service CFDA Program #15.657 Endangered Species Conservation—Recovery Implementation Funds, University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 50 pp.

[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 Hawai‘i at Mānoa, 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] 2007. *Cyanea pinnatifida* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/1096.pdf.*

[USFWS] 2012. *Cyanea pinnatifida* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/2115.pdf.*

[USFWS] 2019. *Cyanea pinnatifida* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/2840.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 *Cyanea pinnatifida* (hāhā)

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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