5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyanea koolauensis* (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 koolauensis* (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/7083*).

Review Analysis:

Please refer to the previous 5-year reviews for *Cyanea koolauensis* published in the Federal Register on August 27, 2010, August 9, 2013, and September 20, 2019 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1601.pdf, https://ecos.fws.gov/docs/tess/species_nonpublish/2064.pdf, and https://ecos.fws.gov/docs/tess/sepcies_nonpublish/2838.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. koolauensis*.

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 koolauensis* are provided in the tables below.

New Status Information:

- Currently, 11 small populations in the Koʻolau mountains of Oʻahu total approximately 48 mature and 25 immature wild individuals last observed within the last 10 years. There are an additional 7 locations that had older estimates totaling 80 mature and 33 immature that have not been monitored in the last 10 years and their current estimates are now unknown (Army Natural Resources Program on Oʻahu [ANRPO] 2023a appendices p. 328; Plant Extinction Prevention Program [PEPP] 2019–2023).
- Three populations (eight founders) are represented in *ex situ* storage and propagation collections, including seeds in seed banks and explants in tissue culture (ARNPO 2023b; Lyon Arboretum 2022; Oʻahu Native Ecosystems Protection & Management [NEPM] Nursery 2020).

New Threats:

- None reported.

New Management Actions:

- Monitoring and surveys—The ANRPO manages three populations of *C. koolauensis* for stability and 11 populations for genetic storage purposes. The ANRPO continues to monitor individuals of *Cyanea koolauensis* in the Koʻolau mountains of Oʻahu within the management unit at Koloa (Kaipapaʻu–Koloa–Kawai Nui), at ʻŌpaeʻula–Helemano, Poamoho, and Waiawa–Waimano (ANRPO 2022 appendices, pp. 40, 253, 480; ANRPO 2023a appendices, p. 370).
- Ungulate monitoring and control—ANRPO manages feral ungulates within the management unit at Koloa (Kaipapaʻu–Koloa–Kawai Nui), at ʻŌpaeʻula–Helemano, Poamoho, and Waiawa–Waimano (ANRPO 2022 appendices, p. 522; ANRPO 2023a appendices, p. 370).
- Nonnative invasive plant control—ANRPO conducts nonnative invasive plant control at the Koloa management unit (ANRPO 2022 appendices, pp. 265–266, 522).
- Rodent control—ANRPO conducts rat and small vertebrate control at the Koloa management unit (ANRPO 2022 appendices, pp. 256, 270; ANRPO 2023a appendices, p. 370).
- Slug/nonnative snail control—ANRPO conducts slug control applied quarterly at the Koloa management unit (ANRPO 2022 appendices, p. 256).
- Collection and propagation for genetic storage and reintroduction—
    - The ANRPO makes collections for genetic representation of *Cyanea koolauensis* with the goal of three populations of 50 individuals each. Only two populations (Kaipapaʻu–Koloa–Kawai Nui, and Poamoho) have representation; less than 5 percent each (ANRPO 2023a appendices, p. 412). As of 2023, ANRPO reported collection and storage of 110 seeds representing one founder at Koloa (ANRPO 2023b).
    - In 2021, the Lyon Arboretum Micropropagation Laboratory reported storage of 57 explants representing two founders, one at ʻŌpaeʻula and the second from a cultivated plant. From 2006–2007, the Lyon Arboretum Seed Conservation Laboratory initiated storage of 2,342 seeds representing two

cultivated plants and one founder at Wailupe. More recently, in 2020, 917 seeds were collected and stored representing two founders at ʻŌpaeʻula (Lyon Arboretum 2022).

- The State's NEPM Program reported collection and storage of one fruit and 100 seeds from an unspecified source, and 19 seeds representing two founders at Pia Valley. In 2020, 83 seedlings were propagated representing one cultivated plant, two founders from ʻŌpaeʻula, and one founder at Pia Valley. In addition, 1,345 seeds representing five founders at Pia Valley were submitted to the Seed Conservation Laboratory (Oʻahu NEPM Nursery 2020).

Table 1. Status and trends of *Cyanea koolauensis* 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)	<50	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2010 (5-year review)	160	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Partial
2013 (5-year review)	124	0	All threats managed in all 3 populations	Partial
			Complete genetic storage	Partial
			3 populations with 50 mature individuals each	Partial

Table 1b.

Date	No. wild individuals	No. outplanted	*Preventing Extinction Targets identified by HPPRCC	*Preventing Extinction Targets Completed?
2019 (5-year review)	ca 190	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)	48 mature, 25 immature	0	All threats managed in all 3 populations	Partial, 4 fenced areas
			Complete genetic storage	Partial, representation of 1 founder at Koloa, 2 founders at ʻŌpaeʻula, 5 founders at Pia Valley
			Natural reproduction at all 3 populations	Unknown
			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 koolauensis* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, 4 fenced areas
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	Partial, 4 fenced areas
Flooding destruction and degradation of habitat	A	Ongoing	None
Fire destruction and degradation of habitat	A	Ongoing	Partial, fire management plan implementation for Army training areas
Climate change degradation or loss of habitat	A	Ongoing	None
Predation and herbivory by feral ungulates	C	Ongoing	Partial, 4 fenced areas
Predation and herbivory by rodents	C	Ongoing	Partial, 1 area managed
Predation and herbivory by invertebrates—Slugs and snails	C	Ongoing	Partial, 1 area managed quarterly
Lack of adequate hunting regulations	D	Ongoing	Partial, 4 fenced areas
Reduced viability due to small populations	E	Ongoing	None
Trampling and human activity	E	Ongoing	Partially, 4 fenced areas

Synthesis:
Currently there are approximately 48 mature and 25 immature wild individuals of *Cyanea koolauensis* in many small populations in the Koʻolau mountains of Oʻahu. Several other populations have not been monitored in at least 10 years. Four areas are fenced providing protection from feral ungulates and have some nonnative invasive plant control. One population has rodent or slug/snail control. Seed collections and propagation are ongoing; however, no translocation is reported. Small amounts of recruitment are reported at some subpopulations. At least eight founders from three populations are represented in 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.

Cyanea koolauensis 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. No populations have met genetic representation goals (Table 1). One founder at Koloa, two founders at ‘Ōpae‘ula, and five founders at Pia Valley have seeds or propagules in storage. There are no populations totaling at least 50 reproducing individuals, no recruitment observed, and populations are in decline or not monitored (Table 1, Table 2). There are four fenced areas with some management for nonnative invasive plants, and rodent and slug/snail control are conducted at only one population. Therefore, *Cyanea koolauensis* 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 survey for *Cyanea koolauensis* in historical locations and potentially suitable habitat.
  - Monitor known populations to better determine status of the species, including populations not observed for more than 10 years.
- 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, especially at the southern Ko‘olau populations.
- Nonnative invasive plant monitoring and control—Continue control of established ecosystem-altering nonnative invasive plant species, and those that compete with *C. koolauensis*.
- Fire destruction or degradation of habitat—Continue implementation of fire management plan and develop management plans for the southern Ko‘olau populations.

- 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—
  - Implement control methods for rats at all populations.
  - Determine and implement effective methods for control of slugs/snails at all populations.
- Captive propagation for genetic storage and reintroduction—
  - Continue collection and 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 or augment existing populations of *C. koolauensis* 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 predation/herbivory, wildfires, and human impacts.
- Outreach and education—
  - Minimize the threat of trampling by education of military personnel in avoidance of trampling.
  - Provide signage identifying areas that are occupied by *C. koolauensis* and monitor the impacts of foot traffic.
- Alliance and partnership development—Work with partners to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

References:

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

[ANRPO] 2023b. 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, Hawai‘i.

[O‘ahu NEPM Nursery] O‘ahu 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, Hawai‘i.

[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] 2010. *Cyanea koolauensis* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/1601.pdf.*

[USFWS] 2013. *Cyanea koolauensis* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/2064.pdf.*

[USFWS] 2019. *Cyanea koolauensis* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/2838.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 koolauensis* (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**

MEGAN LAUT Digitally signed by MEGAN LAUT
Date: 2024.07.15 15:25:13 -10'00'

_____ Date_____