5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyanea st.-johnii* (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 st.-johnii* (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 st.-johnii* 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/1097.pdf, https://ecos.fws.gov/docs/tess/species_nonpublish/2114.pdf,* and *https://ecos.fws.gov/docs/tess/sepcies_nonpublish/2841.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. st.-johnii*.

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 st.-johnii* are provided in the tables below.

New Status Information:

- Currently, there are 41 mature and 10 immature individuals in 9 populations in the Koʻolau mountains of Oʻahu, though approximately half of those individuals have not been monitored in the last 10 to 20 years (Army Natural Resources Program on Oʻahu [ANRPO] 2023; Plant Extinction Prevention Program [PEPP] 2019–2023).
- Currently, 16 founders from 8 populations (Waiāhole, Waimano, Waiawa, Helemano, Koloa, Hālawa, Moanalua, and Waimānalo [Hawaiʻi Loa]) are represented in *ex situ* storage and propagation from collections including more than 6,500 seeds in seed banks, 106 explants in tissue culture, and 139 seedlings in a nursery (ANRPO 2023; Lyon Arboretum 2022; Oʻahu Native Ecosystems Protection & Management [NEPM] Rare Plant Nursery 2020; PEPP 2019–2023). There are 12 mature individuals reintroduced at Waimano, and 9 mature plants augmenting wild plants at Hālawa (PEPP 2019–2023).

New Threats:

- None reported.

New Management Actions:

  - Monitoring and surveys—The Plant Extinction Prevention Program (PEPP) monitors populations and exclosures for *Cyanea st.-johnii* (PEPP 2020, p. 26; PEPP 2021, pp. 7, 18; PEPP 2022, p. 18). In 2021, PEPP discovered seven new plants (PEPP 2021, p. 18).
- Rodent control—PEPP conducted rodent control for *C. st.-johnii* (PEPP 2021, pp. 7, 18).
- Collection and propagation for genetic storage and reintroduction—
  - The ANRPO reported collection and storage of 7,556 seeds representing 17 founders in 5 populations (Waimano, Waiawa, Helemano, Hālawa, and Waimānalo (Hawaiʻi Loa) (ANRPO 2023).
  - From 2021 to 2022, the Lyon Arboretum Micropropagation Laboratory reported storage of 90 explants representing two founders at Waimano, one founder at Waiawa, and one founder at Helemano (Lyon Arboretum 2022). From 2005 to 2013, the Lyon Arboretum Seed Conservation Laboratory reported storage of 6,134 seeds representing 12 founders from five populations at Waiawa, Waimano, Koloa, Hālawa, and Waimānalo (Hawaiʻi Loa) (Lyon Arboretum 2022).
  - In 2023, the Oʻahu Rare Plant Nursery reported propagation of two plants at the Waimano facility representing one founder at Hālawa, and propagation of 14 plants at the NEPM facility representing two founders from Waimano and one founder at Waiawa (Oʻahu RPF 2023). From 2007 to 2019, the State's NEPM Program reported propagation of 139 seedlings representing two founders at Waimano, one founder at Hālawa, and one founder at Helemano (Oʻahu NEPM Nursery 2020).
  - In 2022, PEPP reported collection of plant material for propagation (PEPP 2022, p. 18).
- Reintroduction and augmentation—

- Reintroduction history per the ANRPO shows that founders from five populations were used to establish one reintroduction site and augment one wild site at Waimano and Hālawa, with 62 individuals outplanted (ANRPO 2023). An additional 12 mature plants have since been added to Waimano and 9 mature plants to Hālawa. Currently there are 9 plants remaining at Hālawa and 11 at Waimano (PEPP 2019–2023).

- Cryopreservation research—The Lyon Arboretum's Hawaiian Rare Plant Program received funding for cryopreservation research for endangered Hawaiian plant taxa beginning in 2020 (Lyon Arboretum-Hawaiian Rare Plant Program 2022). The project focuses on expanding germplasm banking capacity and establishing cryopreservation protocols for plant species that cannot be stored long-term in conventional seed storage (at -18°C). In 2021, research for *Cyanea st.-johnii* was initiated with 18 propagules; however, multiplication or cryopreservation protocols have yet to be established for this species (Lyon Arboretum–Hawaiian Rare Plant Program 2022).

Table 1. Status and trends of *Cyanea st.-johnii* 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)	40–50	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)	70	0	All threats managed in all 3 populations	Partial
			Complete genetic storage	Partial
			3 populations with 50 mature individuals each	No
2012 (5-year review)	48	0	All threats managed in all 3 populations	Partial
			Complete genetic storage	Partial

			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)	55	ca 100; 60 remain	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)	41 mature 10 immature	21 additional planted; 20 added	All threats managed in all 3 populations	Partial, 3 fenced areas, 1 augmented population fenced
			Complete genetic storage	Partial, 16 founders from 8 populations
			Natural reproduction at all 3 populations	No
			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 st.-johnii* 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, 4 areas fenced
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	Partial, nonnative plant control in at least 1 area
Climate change degradation or loss of habitat	A	Ongoing	None
Predation and herbivory by rodents	C	Ongoing	Partial, rodent control in 1 managed area
Lack of adequate hunting regulations	D	Ongoing	Partial, 4 fenced areas
Reduced viability due to small populations	E	Ongoing	Partial, seed collection, propagation, and translocation
Trampling and human activity	E	Ongoing	None

Synthesis:
Currently there are estimated to be 41 mature and 10 immature wild individuals of *Cyanea st.-johnii* in 9 populations, however half of the individuals have not been monitored in the last 10 t0 20 years. Twety-one additional individuals were reintroduced over the last 5 years, and 20 individuals are currently extant at these two sites. Three areas with wild plants are fenced to protect them from feral ungulates and one augmented population is fenced. One population has rodent control. Seed collection, propagation, and translocation are ongoing; however, no recruitment is reported. Sixteen wild founders from eight populations are represented in collections. Twelve founders from five populations are represented in two reintroduced populations. Cryopreservation research is ongoing for this species.

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 st.-johnii 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 incomplete (Table 1). There are no populations totaling at least 50 reproducing individuals and recruitment is not reported (Table 1). The effects of climate change and human activities are not addressed (Table 2). Therefore, *Cyanea st.-johnii* 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 extant populations and conduct surveys throughout suitable habitat within historic range of *Cyanea st.-johnii* to possibly find more wild individuals.
- Ungulate monitoring and control—Continue to construct and maintain exclosures to protect populations from the negative impacts of habitat degradation and browsing by feral ungulates, especially for 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 *Cyanea st.-johnii*.
- 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.
    - 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.
    - Assess genetic variability within the extant populations and develop a plan for conserving species’ genetic diversity in *ex situ* and reintroduced populations.
- Reintroduction and translocation—Continue to reintroduce and augment populations in suitable habitat within historical range that is being managed for known threats to this species.

- Cryopreservation research—Continue to conduct cryopreservation experiments to determine methodology to improve seed storage capability.
- Outreach and education—Develop and implement effective measures to reduce the impact of hiking and trail maintenance.
- 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. 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.

Lyon Arboretum—Hawaiian Rare Plant Program. 2022. Cryopreservation of Endangered Hawaiian plant taxa. US Fish and Wildlife Service-Pacific West Region, CDFA Program 15.657, F20AC00218-0000, October 1, 2020-September 30, 2021. 8 pp.

[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.

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of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 70 pp.

[PEPP] 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.

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[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 st.-johnii* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/1097.pdf.*

[USFWS] 2012. *Cyanea st.-johnii* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/2114.pdf.*

[USFWS] 2019. *Cyanea st.-johnii* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/2841.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 st.-johnii* (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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