

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Cyanea undulata* (hāhā)

**Current Classification:** Endangered

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

[USFWS] U.S. Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 129 Species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85(48): 14240–14243, March 11, 2020.

### **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 or USFWS) beginning in October 2021. The review was based on a review of current, available information since the last 5-year review for *Cyanea undulata* (USFWS 2017). 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 (<https://ecos.fws.gov/ecp/species/276>).

### **Review Analysis:**

Please refer to the previous 5-year reviews for *Cyanea undulata* published in the Federal Register on January 18, 2008, and September 13, 2017 (available at [https://ecos.fws.gov/docs/tess/species\\_nonpublish/1149.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/1149.pdf) and [https://ecos.fws.gov/docs/tess/species\\_nonpublish/2424.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/2424.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. undulata*.

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

New Status Information:

- In 2017, there were three individuals in the Hulē‘ia-Wahiawa area, and in 2019 the ‘Ili‘ili‘ula small drainage area was resurveyed to find four surviving plants. At ‘Iole-Waiahi there were also four surviving plants (Plant Extinction Prevention Program [PEPP] 2020). One plant occurred at Hulē‘ia-Kapalaoa in 2020. In addition, one mature individual, one immature individual, and one seedling were located on the cliffs above Kanaele Bog in 2017.

New Threats:

- None reported.

New Management Actions:

- Surveys and monitoring—Surveys to relocate plants at ‘Ili‘ili‘ula and ‘Iole-Waiahi were conducted in 2019 (PEPP 2020).
- Collection and captive propagation—Lyon Arboretum Micropropagation Laboratory reported 131 explants in a collection representing one founder at ‘Ili‘ili‘ula and 243 explants representing one founder from Wahiawa (Lyon Arboretum 2022). The Arboretum’s Seed Conservation Laboratory reported one collection of 49 seeds from 2007 representing one founder from Wahiawa (different founder than the explants), a collection of 64 seeds from 2011 representing one founder from Hulē‘ia, and a collection of 8,419 seeds in 2021 representing one founder from ‘Ili‘ili‘ula (same founder as the explants) (Lyon Arboretum 2022).

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

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1991 (listing)	3–4	0	Nonnative invasive plant species controlled	No
			Protected from feral pigs	No
			Protected from seed predators	No
			3 populations with 250 mature individuals each	No
			Complete genetic storage	No
1994 (recovery plan)	5 mature 23 immature	0	Nonnative invasive plant species controlled	No

			Protected from feral pigs	No
			Protected from seed predators	No
			3 populations with 250 mature individuals each	No
			Complete genetic storage	No
2003 (critical habitat)	28	0	Nonnative invasive plant species controlled	No
			Protected from feral pigs	No
			Protected from seed predators	No
			3 populations with 250 mature individuals each	No
			Complete genetic storage	Unknown
2008 (5-year review)	1 mature 1 immature	0	Nonnative invasive plant species controlled	No
			Protected from feral pigs	Partially
			Protected from seed predators	No
			3 populations with 250 mature individuals each	No
			Complete genetic storage	Yes
<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>
2017 (5-year review)	19	0	All threats managed in all 3 populations	No

			Complete genetic storage	Partially
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	No
			3 populations with 100 mature individuals each	No
2022 (5-year review)	14	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially, 4 founders from 3
			Natural reproduction at all 3 populations	Partial, seedling at 1 site
			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 undulata* and ongoing conservation efforts.**

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat and herbivory by feral ungulates	A, C	Ongoing	Partial, small exclosures
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plant control at exclosures
Flooding and landslide degradation and destruction	A	Ongoing	None
Climate change degradation and destruction of habitat, including hurricanes	A	Ongoing	None
Predation and herbivory by rodents	C	Ongoing	None
Predation and herbivory by invertebrates—slugs	C	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, seed storage and propagation

**Synthesis:**

Currently there are 14 wild individuals of *Cyanea undulata* on Kauaʻi. Reintroduced individuals are protected from feral ungulates by fencing. Some nonnative plant control is conducted in the fenced area. In addition, collection and storage of seeds and propagation are ongoing with four founders from three populations represented by explants and seeds.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Kauaʻi Islandwide Recovery Plan (USFWS 2021) and have been 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 undulata* 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 three populations should be documented on Kauaʻi where the species occurs or occurred historically and these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 50 mature, reproducing individuals.

The preventing extinction goals for this species have not been met. Currently, there are 15 wild individuals and one seedling (Table 1). Four founders from three populations are represented in collections. However, all threats are not being managed (Table 1, Table 2). Therefore, *Cyanea undulata* meets the definition of Endangered as it remains in danger of extinction throughout its range.

**Recommendations for Future Actions:**

No new threats and no significant new information regarding the species' biological status have been reported since the last 5-year review in 2017. Thus, the following recommendations for future actions are reiterated or updated for the 5-year review for 2022.

- Surveys and inventories—Continue to survey for populations of *Cyanea undulata* in areas of potentially suitable habitat.
- Ungulate monitoring and control—
  - Protect remaining wild individuals against browsing and disturbance from feral ungulates to prevent imminent extinction.
  - Continue to construct and maintain exclosures and strategic fencing around all populations.

- Nonnative invasive plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species and those that compete with *C. undulata* at all wild and reintroduced populations.
- Climate change adaptation strategy—Research suitability of habitat for viability of species, including where to conduct translocations in the future due to impacts of climate change.
- Predator and herbivore monitoring and control—
  - Continue to implement effective control measures for feral pigs and rats.
  - Develop and implement effective control methods for slugs.
- Captive propagation for genetic storage and reintroduction—Continue to collect material for genetic storage and propagation for reintroduction. Maintain viable *ex situ* collections.
- Reintroduction and augmentation—Reintroduce individuals into protected suitable habitat.
- Build resiliency and redundancy—Increase numbers of individuals and populations through historic range to reduce impacts of landslides, low numbers, and hurricanes.
- Population biology research—Study *Cyanea undulata* populations to determine viable population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- Alliance and partnership development—Continue to work with partners and other land managers in planning and implementation of ecosystem-level restoration and management to benefit this species.

## References:

- [HPPRCC] Hawai‘i 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.
- [PEPP] Plant Extinction Prevention Program. 2020. Plant Extinction Prevention Program FY 2017 Annual Report (Oct 1, 2016-Sep 30, 2017), Coop Agreement: F14A00174, U.S. Fish and Wildlife Service CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, 235 pp.
- [USFWS] U.S. Fish and Wildlife Service. 2008. *Cyanea undulata* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [https://ecos.fws.gov/docs/tess/species\\_nonpublish/1149.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/1149.pdf).

[USFWS] 2017. *Cyanea undulata* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.  
[https://ecos.fws.gov/docs/tess/species\\_nonpublish/2424.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/2424.pdf).

[USFWS] 2020. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 129 Species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85(48): 14240–14243, March 11, 2020.

[USFWS] 2021. Kaua'i Islandwide Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR. 65 pp. + appendices.

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

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

\_\_\_\_\_ Date \_\_\_\_\_