

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyanea procera* (hāhā)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2021. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 77 Species in Oregon, Washington, Idaho, and Hawaii. Federal Register 86(120): 33726–33728, June 25, 2021.

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 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) beginning in October 2022. The review was based on a review of current, available information since the last 5-year review for *Cyanea procera* (USFWS 2018). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery 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 (<http://ecos.fws.gov/ecp/species/4935>).

Review Analysis:

Please refer to the previous 5-year reviews for *Cyanea procera* published in the Federal Register on January 18, 2008, March 12, 2014, and October 22, 2018 (available at https://ecos.fws.gov/docs/tess/species_nonpublish/1148.pdf, https://ecos.fws.gov/docs/tess/species_nonpublish/2185.pdf, and https://ecos.fws.gov/docs/tess/species_nonpublish/2628.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. procera*.

This short-lived perennial shrub in the Campanulaceae (bellflower) family is endangered and is endemic to Moloka‘i. The status and trends for *Cyanea procera* are provided in the tables below.

New Status Information:

- In 2016, six individuals of *Cyanea procera* were discovered during an aerial survey of Wailau Valley; however, this area is not fenced (Bakutis et al. 2020). By 2020, one of the two known wild individuals of *C. procera* at Kawela had died with two new immature plants and four seedlings found nearby (Plant Extinction Prevention Program [PEPP] 2020, pp. 18–19). Currently, there are total of seven wild plants in two populations on Moloka‘i (Coelho and Purdy 2020a; Bakutis et al. 2016). Since the last 5-year review, more than 900 individuals of *C. procera* were propagated and translocated to seven locations with almost half surviving (Bakutis et al. 2018; Coelho and Purdy 2019; Coelho and Pali 2018; Pali and Coelho 2018; 2018b, 2018c).
- Currently, there are seven founders (wild plants) represented in *ex situ* storage and propagation.

New Threats:

- None reported.

New Management Actions:

- Monitoring and surveys—The Moloka‘i Plant Extinction Prevention Program (MoPEPP) monitors the wild and translocated populations of *Cyanea procera* (Bakutis et al. 2018; Coelho and Purdy 2019; Coelho and Purdy 2020a, 2020b, 2020c, 2020d; Pali and Coelho 2018; Bakutis et al. 2016; Coelho 2019; PEPP 2018, pp. 18–19).
- Ungulate monitoring and control—MoPEPP constructs strategic fencing and monitors and inspects exclosures (Bakutis et al. 2019; PEPP 2021, p. 7). The Nature Conservancy (TNC) also manages feral pigs and two fenced populations at Kawela in Kamakou Preserve have not been impacted by feral pigs for four years (PEPP 2018, pp. 18–19, 2021 pp. 13–14, 2022, p. 14).
- Invasive nonnative plant monitoring and control—TNC manages and removes nonnative invasive plants at the wild and reintroduced populations of *C. procera* at Kawela, within Kamakou Preserve (PEPP 2018, pp. 18–19; 2021 pp. 13–14, 2022, p. 14).
- Collection and propagation for genetic storage and translocation—
 - MoPEPP collects fruit for storage and propagation at several rare plant facilities (Bakutis et al. 2020).
 - In 2021 to 2022, the Lyon Arboretum Micropropagation Laboratory reported storage of 77 explants representing one founder at Kawela and 32 explants representing two founders at Wailau (Lyon Arboretum 2022). Four founders at Kawela are represented by 3,735 seeds, and 3 founders from Wailau are represented by 1,670 seeds in storage (Lyon Arboretum 2022).
 - In 2023, the Olinda Rare Plant Facility (ORPF) reported storage of two plants representing two founders at Kawela, and 357 plants representing three founders from Wailau (ORPF 2023).
- Translocation and augmentation—Since 2015, 573 individuals of *C. procera* were translocated to four sites at Kawela with approximately 500 currently surviving (PEPP 2021, pp. 13–14; Coelho and Purdy 2020b, 2020c, 2020d, 2020e). In 2018,

125 individuals were translocated to a fenced area at Pu‘uali‘i (Bakutis et al. 2018). From 2016 to 2018, 157 individuals were translocated within the Waikolu fence at Hanalilolilo (Coelho and Purdy 2019a). Also in 2018, 48 individuals were translocated to the Pēpē‘ōpae stream area within the Kamakou Preserve fence (Coelho 2018).

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

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1992 (listing)	4	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2008 (5-year review)	1	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2014 (5-year review)	2	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2018 (5-year review)	7	>600	All threats managed in all 3 populations	Partially, ungulate and nonnative plant management at Kamakou

			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	No
			Complete genetic storage	Partially, over 80 percent of founders represented
			3 populations with 50 mature individuals each	Yes
2023 (5-year review)	7–9	>900, ca 50 percent survival	All threats managed in all 3 populations	Partially, fencing and nonnative plant management
			Complete genetic storage	Nearly complete (1 more founder from Wailau needed)
			Natural reproduction at all 3 populations	Partially, reproduction observed at translocations
			3 populations with 50 mature individuals each	Yes, but populations not stable

* 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 procera* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, 1 wild and 7 translocated populations fenced
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, invasive nonnative plants managed at Kamakou Preserve
Landslides and erosion 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	None
Predation and herbivory by invertebrates	C	Ongoing	None
Inadequacy of regulatory mechanisms—lack of adequate hunting regulations	D	Ongoing	Partial, nearly all populations fenced
Reduced viability due to small populations	E	Ongoing	Partial, seed storage, propagation, translocation efforts are ongoing

Synthesis:

Currently there are seven to nine wild individuals of *Cyanea procera* in two populations on Moloka‘i. Genetic representation is nearly complete; however, one wild individual at Wailau is not represented in collections. More than 900 individuals have been translocated since the last 5-year review and these populations are moderately successful, with seed production and natural recruitment observed. One wild and seven translocated populations are fenced. Nonnative invasive plants are controlled in Kamakou Preserve.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Recovery Plan for the Moloka‘i Plant Cluster (USFWS 1996) and have been 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 procera 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 Moloka'i where they now occur or occurred historically. 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. All but one founder is represented in collections and propagation (Table 1). The seven translocated populations are moderately successful with viable seed production and some natural recruitment; however, the populations are not stable, with approximately 50 percent survival. Most plants are within exclosures with some ungulate and nonnative plant control but not all threats are being managed including landslides and erosion, predation and herbivory by rodents and invertebrates, and the lack of hunting regulations (Table 2). Therefore, *Cyanea procera* 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 2018. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2023.

- Surveys and monitoring—Continue to survey for additional populations in areas of potentially suitable habitat and monitor known populations of *Cyanea procera*
- Ungulate monitoring and control—Continue to construct and maintain exclosures to protect individuals from the negative impacts of habitat destruction and degradation, and herbivory, by feral ungulates.
- Invasive nonnative plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species within and around all wild and translocated populations of *C. procera*.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species to determine future landscape required for its recovery.
- Predator and herbivore monitoring and control—
 - Implement effective control methods for rodents at the wild and translocated populations.
 - Develop and implement effective control methods for invertebrates at all populations.
 - Identify unknown invertebrate damaging flowers and fruit of *C. procera* and develop and implement effective control methods if necessary.
- Captive propagation for genetic storage and reintroduction—
 - Continue collection and propagation efforts for maintenance of genetic stock and for translocation.

- Evaluate genetic resources currently in storage to determine the need for and effectiveness of long-term storage due to this species' vulnerability to climate change.
- Translocation and augmentation—Continue to translocate individuals into suitable habitat within historic range that is being managed for known threats to this species.
- Build resiliency, redundancy, and representation—Increase numbers of populations and individuals throughout historic range to reduce impacts of landslides and erosion, predation, and reduced viability.
- 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 taxon.

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U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Cyanea procera* (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 _____