

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyanea shipmanii* (hāhā)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. Federal Register 88(83): 20088–20092, May 7, 2018.

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) beginning in October 2019. The review was based on a review of current, available information since the last 5-year review for *Cyanea shipmanii* (USFWS 2015). 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 (http://ecos.fws.gov/tess_public).

Review Analysis:

Please refer to the previous 5-year reviews for *Cyanea shipmanii* published in the Federal Register on July 21, 2009 and August 3, 2015 (available at https://ecos.fws.gov/docs/five_year_review/doc2463.pdf and https://ecos.fws.gov/docs/five_year_review/doc4550.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. shipmanii*.

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

New Status Information:

- Currently, there are seven mature and six immature wild individuals in four populations on the island of Hawai‘i (PEPP 2019). Three of these populations are in enclosures to protect them from habitat destruction and predation by feral ungulates.

New Threats:

- Climate change loss or degradation of habitat—Climate change may pose a threat to this species. Fortini *et al.* (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawai‘i using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. This assessment concluded that *Cyanea shipmanii* is highly vulnerable to the impacts of climate change, with a vulnerability score of 0.8 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). In addition, the assessment classified *C. shipmanii* as a “wink-out” species. “Wink-out” species are those with no future climate envelope. No projected suitable climate areas exist for the species to persist into the future. Therefore, additional management actions may be needed to conserve this taxon, such as identifying suitable microsites where climate change is anticipated to occur more slowly and considering suitable habitat in areas outside of its known range

New Management Actions:

- Surveys and inventories—The Plant Extinction Prevention Program (PEPP) surveys for and monitors populations of *Cyanea shipmanii* (PEPP 2016, 2019). In 2016, PEPP reported that three new individuals were found.
- Ungulate monitoring and control—PEPP constructed a 10-acre enclosure at Hakalau Forest National Wildlife Refuge (NWR), for planting of *C. shipmanii* and other endangered plants (PEPP 2016). Two 18.6 m² (200 ft²) enclosures were constructed at Waiākea Upper and Kīpuka ‘Āinahou (PEPP 2016). A 10.5-hectare (26-acre) unit bordering Hakalau Forest NWR was constructed by PEPP in coordination with the State’s Natural Areas Reserve’s and Division of Forestry and Wildlife’s staff.
- Captive propagation for genetic storage and reintroduction—
 - The Lyon Arboretum Micropropagation Laboratory reports propagation of 398 explants representing three founders from Kūlani and Makahanaloa, between 2017 and 2019. Between 2016 and 2018, the Lyon Arboretum Seed Laboratory placed nearly 30,000 seeds in storage representing six founders from Makahanaloa, ‘Āinahou, Pi‘ihonua South, and Waiākea Upper (Lyon Arboretum 2019).
 - Hawaii Volcanoes National Park (HAVO) reports propagation and storage of 170 plants (from populations at Kahuku East and Pi‘ihonua South), and storage of 283,500 seeds representing plants from Kahuku East, Waiākea Upper, ‘Āinahou, and Pi‘ihonua South (HAVO 2019).

- The Volcano Rare Plant Facility (VRPF) reports propagation of 295 plants representing 2 founders from Hilo Forest Reserve; one plant from Ka‘u; 35 plants from Kīpuka Kipimana (representing two founders), one plant from Pu‘u Kīpū, and a living collection of 12 plants representing 3 founders from Upper Waiākea Forest Reserve (VRPF 2019).
- Hakalau Forest National Wildlife Refuge reports propagation of 2,093 plants in total up to 2017 (HFNWR 2018).
- Reintroduction and translocation—
 - The VRPF reports 575 plants (Hilo FR source) sent out for reintroduction at Kūlani and Laupāhoehoe; one plant (Ka‘u source) sent out for planting at Kahuku East; 35 plants (Kīpuka Kipimana source) sent out for planting at Kūlani; one plant (Pu‘u Kīpū source) sent out for planting at Kūlani; and 381 plants (Upper Waiākea FR source) sent out for planting at Kūlani and Laupāhoehoe (VRPR 2019).
 - Hakalau Forest NWR reports reintroduction of 216 plants representing three individuals (HFNWR 2018). From 1999 through 2019, 5,323 plants have been outplanted at the refuge. Survivorship is unknown (HFNWR 2020).
 - In 2017, PEPP estimated 520 outplants at the Pu‘u Kīpū (397 mature individuals) and Kīpuka Kipimana (25 mature and 98 immature plus two seedlings naturally recruiting) reintroductions have survived. There is no update on survival at any other sites (PEPP 2019).

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1994 (listing)	1 mature, < 50 total	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1996 (recovery plan)	<10	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

2003 (critical habitat)	12	117	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2009 (5-year review)	4	434	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2015 (5-year review)	8, only 1 mature	763	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2020 (5-year review)	7 mature 6 immature	>520	All threats managed in all 3 populations	Partially
			Complete genetic storage	Yes
			Reproduction (<i>i.e.</i> viable seeds, seedlings) at all 3 populations	Yes
			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 shipmanii* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate degradation of habitat	A	Ongoing	Partial, 3 wild and 7 reintroduced populations fenced (some small exclosures only immediately enclosing plants)
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plant control at most populations
Climate change degradation or loss of habitat	A	Ongoing	None
Ungulate predation or herbivory	C	Ongoing	Yes, plants are inside fences
Rodent predation or herbivory	C	Ongoing	None
Invertebrate predation or herbivory	C	Ongoing	None
Lack of adequate hunting regulations	D	Ongoing	Partial, 3 wild populations and 11 reintroduced subpopulations are fenced
Reduced viability due to low numbers	E	Ongoing	Partial, seed collection, propagation, and reintroduction

Synthesis:

Currently there are seven mature and six immature wild individuals of *Cyanea shipmanii* on the island of Hawai‘i. A landscape-based assessment of climate change vulnerability for native plants of Hawai‘i using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *C. shipmanii* is highly vulnerable to the effects of climate change, and is a “wink-out” species. Three wild and 11 planted populations of *C. shipmanii* are provided protection from feral ungulates by fencing. Seed collection, propagation, and reintroduction are ongoing. Approximately 3,500 individuals have been planted over the past five years at 11 sites; recruitment of two seedlings was documented at one site. State, Federal and private partnerships work in coordination to provide conservation benefits for *C. shipmanii*.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the Big Island 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 shipmanii 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. In addition, a minimum of three populations should be documented on the island of Hawai‘i where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings, saplings), with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Although at least one reintroduction has over 50 mature individuals, mature outplanted individuals are not included in the population structure, but rather only mature plants at wild populations or mature plants from filial generations at reintroductions. To date, only two seedlings have been seen recruiting at a reintroduction, and this is not the one with over 50 mature individuals (Table 1). Genetic storage is complete (Table 1), but all threats are not being managed (Table 1, Table 2). Therefore, *Cyanea shipmanii* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

We are not aware of any new threats or other significant new information regarding the species’ biological status since the last 5-year review in 2015. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2020.

- Surveys and inventories—Continue to survey suitable habitat and historical range for a thorough assessment of the species’ status.
- Ungulate monitoring and control—Continue to maintain existing fences and fence remaining populations to protect individuals from the negative impacts of feral ungulates.
- Invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species and those that compete with *C. shipmanii* within exclosures.
- Climate change adaptation strategy—Research the suitability of habitat for reintroducing this species in the future due to the impacts of climate change.

As *C. shipmanii* is likely to “wink-out” by 2100, ensure that adequate viable genetic material is stored.

- Predator and herbivore monitoring and control—Implement effective control methods for rodents and slugs.
- Captive propagation for genetic storage and reintroduction—
 - Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
 - Evaluate genetic resources currently in storage to determine the need to store additional materials due to this species’ high vulnerability to climate change.
- Reintroduction and translocation—Continue to reintroduce individuals into suitable habitat within historic range that is being managed for known threats to build resiliency and redundancy.
- Alliance and partnership development—Continue to work with partners in planning and implementation of ecosystem-level restoration and management to benefit this species.

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- Fortini, L., J. Price, J. Jacobi, A. Vorsino, J. Burgett, K. Brinck, F. Amidon, S. Miller, S. Gon II, G. Koob, and E. Paxton. 2013. A landscape-based assessment of climate change vulnerability for all native Hawaiian plants. Technical report HCSU-044. Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hawaii. 134 pp.
- [HFNWR] Hakalau Forest National Wildlife Refuge. 2018. 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, Hawaii.
- [HFNWR] Hakalau Forest National Wildlife Refuge. 2020. Hakalau Forest National Wildlife Refuge FY19 Annual Report for Endangered Plant Propagation and Outplanting, Nēnē Monitoring and Forest Bird Banding, USFWS Regional Blanket Permit no. TE090350-8m subpermit no. HFNWF-8. Submitted by Steve Kendall and Baron Horiuchi, HFNWR Complex, Hilo, Hawai‘i. 11 pp.
- [HAVO] Hawai‘i Volcanoes National Park. 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, Hawaii.
- [HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.
- [PEPP] Plant Extinction Prevention Program. 2016. Plant Extinction Prevention Program FY 2016 Annual Report (Oct 1, 2015-Sep 30, 2016), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds,

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- [USFWS] 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. 88 FR 20088, May 7, 2018.
- [VRPF] 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, Hawai‘i.

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SIGNATURE PAGE for 5-YEAR REVIEW of *Cyanea shipmanii* (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 _____