

## 5-YEAR REVIEW

Short Form Summary

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

**Current Classification:** Endangered

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

[USFWS] U.S. Fish and Wildlife Service. 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

### **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, 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 2018. The review was based on a review of current, available information since the last 5-year review for *Cyanea humboldtiana* (USFWS 2011). The evaluation completed 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](http://ecos.fws.gov/tess_public)).

### **Review Analysis:**

Please refer to the previous 5-year review for *Cyanea humboldtiana* published in the Federal Register on August 2, 2011 (available at [https://ecos.fws.gov/docs/five\\_year\\_review/doc8322.pdf](https://ecos.fws.gov/docs/five_year_review/doc8322.pdf)) for a complete review of the species' status, threats, and management efforts. 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. humboldtiana*.

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

#### New Status Information:

- Currently, there are 12 small and widely scattered subpopulations totaling approximately 40 individuals in the Ko‘olau mountains (U.S. Army Garrison Hawai‘i 2010; Lyon Arboretum 2018; U.S. Army 2018; Ching 2019, in litt.).
- In 2012, 14 critical habitat units in two ecosystems (lowland wet and wet cliff) were designated for *Cyanea humboldtiana* in the Ko‘olau mountains of O‘ahu (30,058 ac, 12,162 ha) (77 FR 57648, September 18, 2012).

#### 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. The assessment by Fortini *et al.* (2013) concluded that *Cyanea humboldtiana* is highly vulnerable to the impacts of climate change, with a vulnerability score of 0.636 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, additional management actions are needed to conserve this taxon into the future, such as identifying suitable microsites where climate change effects are anticipated to occur more slowly and considering suitable habitat outside of its known range.

#### New Management Actions:

- Surveys, inventories, and monitoring—Staff of the Hawai‘i Division of Forestry and Wildlife (DOFAW) documents observations of individuals of *Cyanea humboldtiana*; however, only a few populations at Kōnāhuanui, Kōloa, Poamoho, and Mānoa have been observed since the early 2000s (Ching 2019, in litt.).
- Ungulate and invasive plant monitoring and control—The ANRP undertakes stabilization and management of endangered species to fulfill the requirements of the 2003 and 2008 Biological Opinions for U.S. Army activities in the Mākua and O‘ahu training areas (ANRP 2018; USFWS 2003). *Cyanea humboldtiana* is not included in the species for stabilization and management; however, actions including fencing and ungulate control, and nonnative plant control in management units for other species may benefit some occurrences of this taxon in Helemano, Poamoho, and Koloa (U.S. Army Garrison Hawai‘i 2010; U.S. Army 2018).
- Captive propagation for genetic storage and reintroduction—
  - Lyon Arboretum Micropropagation Laboratory reports 304 propagules in storage representing one individual each at Waimano, Koloa, and Pia Valley (Lyon Arboretum 2018, in litt.). The Lyon Seed Conservation Laboratory reports storage of more than 4,000 seeds representing seven individuals from four populations (Pia Valley, Mānoa, Kōnāhuanui, and Poamoho) (Lyon Arboretum 2018).

**Synthesis:**

Currently there are approximately 40 individuals of *Cyanea humboldtiana* in 12 subpopulations in the Ko‘olau mountains. 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. humboldtiana* is highly vulnerable to the effects of climate change. Individuals may be provided protection by fencing and nonnative plant control in managed areas. Thousands of seeds and more than 300 propagules are in storage representing nine individuals.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the O‘ahu Plants (USFWS 1998), 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 humboldtiana* is a short-lived perennial shrub. To prevent extinction, which is the first step 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 six 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, saplings) and increasing in number, with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met (Table 1). There are no mature reproducing populations totaling 50 individuals (Table 2), genetic representation goals have not been met, and threats, if managed, are being managed incidentally for other listed species. Therefore, *Cyanea humboldtiana* 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 additional threats other than the new data on this taxon’s vulnerability to climate change. We are not aware or significant new information regarding the species’ biological status since the last 5-year review in 2011. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2019.

- Surveys and monitoring—Survey known populations and historical habitat to better determine the current status of the species.

- Ungulate monitoring and control—Construct and maintain fenced exclosures to protect individuals from the negative impacts of habitat degradation and browsing by feral pigs, especially at the southern Ko‘olau populations.
- Invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *Cyanea humboldtiana*.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use to determine future landscape needed for the recovery of the species.
- 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 augmented and newly reintroduced populations.
- Reintroduction and translocation—Establish new populations or augment existing populations that are managed for current threats.
- Alliance and partnership development—Work with partners to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

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

<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>Stabilization Criteria identified in Recovery Plan</b>	<b>Stabilization Criteria Completed?</b>
1996 (listing)	100–220	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	Unknown
1998 (recovery plan)	125–225	1	All threats managed in all three populations	No
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2003 (critical habitat)	133–239	unknown	All threats managed in all three populations	No

			Complete genetic storage	Unknown
			Three populations with 50 mature individuals each	Unknown
2011 (5-year review)	22+	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2012 (critical habitat)	160–260	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
<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>
2019 (5-year review)	ca 40	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Reproduction ( <i>i.e.</i> viable seeds, seedlings) at all three populations	No
			Three populations with 50 mature reproducing 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 after Preventing Extinction).

**Table 2. Threats to *Cyanea humboldtiana* and ongoing conservation efforts.**

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate destruction and degradation of habitat	A	Ongoing	Partial, three management areas fenced*
Degradation of habitat by established ecosystem-altering invasive plant species	A	Ongoing	Partial, three management areas fenced*
Climate change degradation or loss of habitat	A	Ongoing	Partial, three management areas fenced*
Ungulate predation or herbivory	C	Ongoing	Partial, three management areas fenced*
Reduced viability due to small populations	E	Ongoing	None
Competition with invasive nonnative plants	E	Ongoing	Partial, three management areas fenced*
Trampling and human activity	E	Ongoing	None

\* U.S. Army Garrison 2010, Ching 2019, in litt.

**References:**

See previous 5-year review for a full list of references (USFWS 2011). Only references for new information are provided below.

[ANRP] Army Natural Resources Program-O‘ahu. 2018. Status report for the Mākua and O‘ahu implementation plans. 217 pp.

Ching, S. 2019, in litt. Email regarding status of *Cyanea humboldtiana* as surveyed by the Hawai‘i Division of Forestry and Wildlife (DOFAW). 29 MAY 2019.

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.

[HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.

Lyon Arboretum. 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.

[U.S. Army] 2018. Report to the U.S. Fish and Wildlife Service for Oahu Army Natural

Resources Program, Permit: TES-043638, Reporting period January 1, 2018-December 31, 2018. 16 pp.

U.S. Army Garrison Hawai‘i. 2010. Integrated natural resources management plan 2010-2014, Island of O‘ahu. 375 pp.

[USFWS] U.S. Fish and Wildlife Service. 2003. Biological opinion of the U.S. Fish and Wildlife Service for routine military training and transformation of the 2<sup>nd</sup> Brigade 25<sup>th</sup> Infantry Division (Light), U.S. Army Installations, Island of Oahu. 356 pp.

[USFWS] 2008. Amendment of the biological opinion of the U.S. Fish and Wildlife Service for military training at Mākua Military Reservation (1-2-2005-F-356). 61 pp.

[USFWS] 2011. *Cyanea humboldtiana* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.  
[https://ecos.fws.gov/docs/five\\_year\\_review/doc8322.pdf](https://ecos.fws.gov/docs/five_year_review/doc8322.pdf).

[USFWS] 2012. Endangered and threatened wildlife and plants; Endangered status for 23 species on Oahu and designation of critical habitat for 124 species; final rule. Department of the Interior, Federal Register 77 (181): 57648–57862, September 18, 2012.

[USFWS] 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

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**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**

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