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. 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 st.-johnii* (USFWS 2012). 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*).

Review Analysis:

Please refer to the previous 5-year reviews for *Cyanea st.-johnii* published in the Federal Register on August 7, 2007 and August 28, 2012 (available at *https://ecos.fws.gov/docs/five_year_review/doc1130.pdf* and *https://ecos.fws.gov/docs/five_year_review/doc4254.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. st.-johnii*.

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

New Status Information:

- Currently, there are eight small and widely scattered populations totaling approximately 55 individuals from Kaluanui to the Waimanalo-Hawai‘i Loa summit along the Ko‘olau mountain summit ridges (U.S. Army 2018; PEPP 2010, 2011, 2012, 2014, 2015, 2016). This is a decline in numbers since the last 5-year review in 2012 (70 individuals).
- In 2012, 14 critical habitat units were designated in two ecosystems (lowland wet and wet cliff) for *Cyanea st.-johnii* 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 st.-johnii* is extremely vulnerable to the impacts of climate change, with a vulnerability score of 0.962 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). In addition, this species is classified as a “wink-out” species. “Wink-out” species are those with no future climate envelope meaning that no projected suitable climate areas exist for the species to persist in the future. Therefore, additional management actions are needed to conserve this taxon into the future, such as ensuring that adequate viable genetic storage is maintained, identifying suitable microsites where climate change effects are anticipated to occur more slowly, and considering suitable habitat in areas outside of its known range.

New Management Actions:

- Surveys, inventories, and monitoring—Staff of the Army’s Natural Resources Program-O‘ahu (ANRP) (until 2013), the Plant Extinction Prevention Program (PEPP), and the State of Hawai‘i Division of Forestry and Wildlife (DOFAW), monitor the status of known populations of *Cyanea st.-johnii* (U.S. Army Garrison Hawai‘i 2010; PEPP 2010, 2011, 2012, 2014, 2015, 2016).
- Ungulate monitoring and control—The ANRP completed construction of an exclosure at Waimano that provides protection for three wild and many reintroduced individuals of *Cyanea st.-johnii* (ANRP 2018). The occurrences at Kaluanui and Helemano are fenced (ANRP 2018). In 2011, PEPP assisted the ANRP and the Department of Transportation with the construction of an exclosure at Hālawa (PEPP 2011).
- Captive propagation for genetic storage and reintroduction—
    - Lyon Arboretum Micropropagation Laboratory reports 74 propagules in storage representing five individual from three populations of *Cyanea st.-johnii* (Waiawa, Waimano, and Helemano) (Lyon Arboretum 2018). The Lyon Seed Conservation Laboratory reports storage of an additional 525 seeds from the Waimanalo summit population (Lyon Arboretum 2018).

    - The ANRP reports two plants in the nursery representing one individual at the Waimanalo summit, and almost 8,000 seeds in storage representing 18 individuals from five populations (Waimano, Waimanalo summit, Waiawa, Helemano, and Hālawa (U.S. Army 2018).
- Reintroduction—Reintroduction is ongoing, with approximately 100 individuals outplanted at two locations. Currently, there are 31 outplanted individuals remaining at Waimano and 29 outplanted individuals remaining at Hālawa (PEPP 2019; U.S. Army 2018). These reintroductions represent 15 individuals from five populations.

Synthesis:
Currently there are approximately 55 individuals of *Cyanea st.-johnii* in eight populations in the Koʻolau mountains. A landscape-based assessment of climate change vulnerability for native plants of Hawaiʻi using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *C. st.-johnii* is extremely vulnerable to the effects of climate change. Individuals may be provided protection from ungulates and nonnative plants by fencing (four areas) and nonnative plant control in managed areas. Thousands of seeds, over 100 propagules, and 60 reintroduced individuals represent many founders from the more accessible populations.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the Oʻahu Plants (USFWS 1998), 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 st.-johnii 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 three populations should be documented on Oʻahu 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). Although much progress has been made and genetic representation is high and primary threats are being managed in three fenced areas (Table 2), there are no populations of 50 mature

reproducing individuals (Table 1). Therefore, *Cyanea st.-johnii* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
Other than the new data on this taxon's vulnerability to climate change, we are not aware of any new threats. There is no significant new information regarding the species' biological status since the last 5-year review in 2012. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2019.

- Surveys and monitoring—Survey suitable habitat where *Cyanea st.-johnii* was historically seen.
- Ungulate monitoring and control—Continue to construct and maintain fenced exclosures to protect individuals from the negative impacts of habitat degradation and browsing by feral pigs, especially at the southern Koʻolau population.
- Invasive plant monitoring and control—Continue to control 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 this species and use to determine future landscape needed for the recovery of the species.
- Predator and herbivore control—Control slug and rat populations in the vicinity of all known populations of *Cyanea st.-johnii*.
- 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 *ex situ* and reintroduced populations.
- Reintroduction and translocation—Establish new populations or augment existing populations that are managed for current threats.
- Outreach and education—Develop and implement effective measures to reduce the impact of hiking and trail maintenance.
- Alliance and partnership development—Work with the U.S. Army, the Hawaiʻi Division of Forestry and Wildlife, and other land managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

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

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 three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	No
1998 (recovery plan)	40–50	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	No
2003 (critical habitat)	57	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2007 (5-year review)	70	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2012 (5-year review)	48	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially

			Three populations with 50 mature individuals each	No
2012 (critical habitat)	70	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2019 (5-year review)	55	ca 100; 60 remain	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Reproduction (*i.e.* viable seeds, seedlings) at all three populations	No
			Three 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 after Preventing Extinction).

Table 2. Threats to *Cyanea st.-johnii* 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*
Climate change degradation or loss of habitat	A	Ongoing	Partial, three management areas*
Ungulate predation or herbivory	C	Ongoing	Partial, three management areas fenced*
Herbivory by rats and slugs	C	Ongoing	Partial, three management areas*
Lack of adequate hunting regulations	D	Ongoing	None
Reduced viability due to small populations	E	Ongoing	Partial, seed collection, propagation, and reintroduction is ongoing
Competition with invasive nonnative plants	E	Ongoing	Partial, three management areas*
Trampling and human activity	E	Ongoing	None

* U.S. Army Garrison 2010

References:

See previous 5-year reviews for a full list of references (USFWS 2007, 2012). Only references for new information are provided below.

[ANRP] Army Natural Resources Program-Oʻahu. 2018. 2018 status report for the Mākua and Oʻahu implementation plans. 217 pp.

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] Hawaiʻi and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.

Lyon Arboretum 2018. Report on controlled propagation of listed and candidate 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.

[PEPP] Plant Extinction Prevention Program. 2010. PEPP annual report fiscal year 2010 (July 1, 2009-June 30, 2010). 121 pp.

[PEPP] 2011. PEPP annual report fiscal year 2011 (July 1, 2010-June 30, 2011). 200 pp.

[PEPP] 2012. PEPP annual report fiscal year 2012 (July 1, 2011-June 30, 2012). 169 pp.

[PEPP] 2014. PEPP annual report fiscal year 2014 (July 1, 2013-June 30, 2014). 185 pp.

[PEPP] 2015. PEPP annual report fiscal year 2015 (July 1, 2014-June 30, 2015). 179 pp.

[PEPP] 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, Coop Agreement F14AC00174, December 24, 2016, UH Manoa, PCSU, PEPP. 237 pp.

[PEPP] 2019. Interim report fiscal year 2019 (October 1, 2018-September 30, 2019). 569 pp.

[U.S. Army] U.S. Army, Environmental Division. 2018. Report to the U.S. Fish and Wildlife Service for Oahu Army Natural Resource 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] 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/doc4254.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.

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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