5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyanea grimesiana* ssp. *obatae* (hāhā)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90): 28031–28034, May 10, 2022.

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 Program 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 2023. The review was based on a review of current, available information since the last 5-year review for *Cyanea grimesiana* ssp. *obatae* (USFWS 2019). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery Program 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/1349*).

Review Analysis:

Please refer to the previous 5-year reviews for *Cyanea grimesiana* ssp. *obatae* published in the Federal Register on July 3, 2007, August 28, 2012, and September 20, 2019 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1095.pdf, https://ecos.fws.gov/docs/tess/species_nonpublish/2035.pdf,* and *https://ecos.fws.gov/docs/tess/sepcies_nonpublish/2836.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. grimesiana* ssp. *obatae*.

This short-lived perennial shrub in the Campanulaceae (bellflower) family is endangered and is known from the island of O‘ahu. The status and trends for *Cyanea grimesiana* ssp. *obatae* are provided in the tables below.

New Status Information:

- Currently, three wild populations in the Waiʻanae mountains of Oʻahu (Pahole–West Makaleha, Kaluaʻa, and Palikea-South Pālāwai) total approximately 17 mature and 7 immature wild individuals (Army Natural Resources Program on Oʻahu [ANRPO] 2023a). The known wild plants at ʻĒkahanui had died by 2004 (ANRPO 2022 appendices, p. 609). As of 2022, all management areas totaled more than 800 mature and 389 immature plants (wild and reintroduced) (ANRPO 2022 appendices, p. 612). Currently, there are six reintroduced populations (with 15 sites), totaling approximately 1,000 mature and 550 immature individuals (ANRPO 2023b). Recruitment is noted at all introduction sites at some point in time after planting, but with few individuals surviving to maturity. Most recently, recruits are observed at Makaleha and Palikea (ANRPO 2022 appendices, p. 612).
- Since 2019, 43 founders from six populations (ʻĒkahanui, Kaluaʻa, Makaleha, Pahole, and Palikea-Pālāwai) are represented in *ex situ* storage and propagation collections, including seeds in seed banks, explants in tissue culture, and plants in a nursery (ARNPO 2023b; Lyon Arboretum 2022; Oʻahu Native Ecosystems Protection & Management [NEPM] Rare Plant Nursery 2020). As of 2023, the ANRPO reports that two managed populations have met genetic storage goals (Mākaha and ʻĒkahanui) and three other managed populations (west Makaleha-Pahole, Kaluaʻa, and Palikea-Pālāwai) have 75 percent of founders represented (ANRPO 2023b).

New Threats:

- None reported.

New Management Actions:

- Monitoring and surveys—
  - In 2022, the ANRPO published an updated 5-year status and management plan for *Cyanea grimesiana* ssp. *obatae* (ANRPO 2022 appendix 4-6; ANRPO 2023a appendices, p. 65).
  - The Plant Extinction Prevention Program (PEPP) monitors populations of *C. grimesiana* ssp. *obatae* (PEPP 2019a, p. 170).
- Nonnative invasive plant control—
  - ANRPO conducts nonnative plant control at reintroduction sites (ANRPO 2023a appendices, p. 109).
  - The State's NEPM program conducts nonnative plant control in collaboration with ANRPO at Pahole (PEPP 2019b, p. 19).
- Rodent control—The ANRPO conducts rodent control in several areas where *C. grimesiana* ssp. *obatae* occurs including ʻĒkahanui, Kaluaʻa-Waiʻeli, Makaleha, Mākaha, and Palikea (ANRPO 2020, p. 197, ANRPO 2021, p. 182, and appendices, p. 79; ANRPO 2023a, p. 207, and appendices, p. 105).
- Nonnative slug/snail control—The ANRPO conducts slug control by applying a molluscicide every 6 weeks in some management areas and this action may benefit *C. grimesiana* ssp. *obatae* at ʻĒkahanui, Mākaha, Pahole, Palikea, and Makaleha (ANRPO 2020, p. 205; ANRPO 2021, p. 196). No molluscicides are used in areas where native snails are present.

- Collection and propagation for genetic storage and reintroduction—
  - The ANRPO reported collection and storage of more than 255,000 seeds representing 43 founders at six population sites (ʻĒkahanui, Kaluaʻa, Makaleha, Mākaha, Pahole, and Palikea (ANRPO 2023b). Approximately 400 propagules are in storage representing seven founders from two populations (ʻĒkahanui and Palikea-Pālāwai) (ANRPO 2023b). In addition, ANRPO reported 223 plants in propagation representing 15 founders from five populations (ʻĒkahanui, Kaluaʻa, Makaleha, Pahole, and Palikea) (ANRPO 2023b).
  - In 2021, the Lyon Arboretum Micropropagation Laboratory reported storage of 580 explants representing seven founders from two populations (Palikea and ʻĒkahanui) (Lyon Arboretum 2022). From 2013 to 2014, the Lyon Arboretum Seed Conservation Laboratory reported storage of 360 seeds from plants at Pahole (sourced from two plants at Kapuna) (Lyon Arboretum 2022).
  - The State's NEPM Program reported collection and storage of 90 seeds representing three founders from Palikea and one founder from ʻĒkahanui (Oʻahu NEPM Nursery 2020). In addition, 293 seedlings were propagated representing four founders at Palikea and two founders at ʻĒkahanui (Oʻahu NEPM Nursery 2020).
- Reintroduction and augmentation—
  - At least 12 reintroduction sites are currently monitored, consisting from one to as many as eight new subpopulations (ʻĒkahanui, Kaluaʻa, Makaleha, Mākaha, Pahole, and Palikea) (ANRPO 2023a). Each site may have representation from the same or other population founders to ensure diversity in representation.
  - In 2019, PEPP monitored a reintroduction at Pahole in collaboration with ANRPO (PEPP 2019b, p. 19).
  - In 2020–2021, the ANRPO reported outplanting management areas (Makaleha West and Kaluaʻa-Waiʻeli) with common native plant species to improve habitat conditions for rare plant species (ANRPO 2020, p. 90; ANRPO 2021, p. 80; ANRPO 2023a, p. 91).
  - Recruitment is reported at all reintroduction sites, most recently observed at Makaleha and Palikea, with 21 recruits at Palikea reaching maturity (ANRPO 2022, p. 99, and appendices, p. 618). Two reintroduction sites total more than 50 individuals; however, recruits are not stable (ANRPO 2022 appendices, p. 614).
- Research—In 2016, ANRPO reported progress in a controlled breeding study for *C. grimesiana* ssp. *obatae*. The study centered on comparison of the relative fitness of self-pollinated versus intra- and inter-population crosses. A significant result of this study showed that fruit set was more successful if pollen was used the same day it was collected (ANRPO 2016, p. 92). In 2020, ANRPO reported continued support of this research for further fitness monitoring (ANRPO 2020, p. iv).

Table 1. Status and trends of *Cyanea grimesiana* ssp. *obatae* from listing through current 5-year review. Table 1a shows progress according to Interim Stabilization Goals; Table 1b shows progress according to Preventing Extinction Goals.

Table 1a.

Date	No. wild individuals	No. Outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1994 (listing)	~18	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2007 (5-year review)	24	401	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2012 (5-year review)	54	67	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

Table 1b.

Date	No. wild individuals	No. outplanted	*Preventing Extinction Targets identified by HPPRCC	*Preventing Extinction Targets Completed?
2019 (5-year review)	15–17	>2,500	All threats managed in all 3 populations	Partially

			Complete genetic storage	Close to completion
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Partial
			3 populations with 50 mature individuals each	No
2024 (5-year review)	17 mature 7 immature	1550	All threats managed in all 3 populations	Partial, nonnative plant, rodent, and slug control at 5 populations
			Complete genetic storage	Almost complete; a couple wild individs. to represent
			Natural reproduction at all 3 populations	Partial, recruitment at all reintroduced populations at some point in time
			3 populations with 50 mature individuals each	No, 2 reintroduced populations >50 but recruits 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 grimesiana* ssp. *obatae* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, ungulates controlled at management units
Established ecosystem altering invasive plant	A, E	Ongoing	Partial, nonnative plants controlled at management units

species degradation of habitat and competition			
Fire destruction and degradation of habitat	A	Ongoing	Partial, fire management plan implementation for Army training areas
Climate change degradation or loss of habitat	A	Ongoing	None
Predation and herbivory by rodents	C	Ongoing	Partial, rodent control in 5 management units
Predation and herbivory by invertebrates—Two-spotted leafhopper and slugs	C	Ongoing	Partial, slug control at 5 management units

Synthesis:
Currently there are approximately 17 mature and 7 immature wild individuals of *Cyanea grimesiana* ssp. *obatae* in three populations in the Waiʻanae mountains of Oʻahu. Eight reintroduced populations have some nonnative invasive plant control. Five populations have rodent control and slug/snail control. Seed collection, propagation, and translocation are ongoing. Recruitment is reported but little replacement has been documented and there have not been enough recruits observed to suggest the amount could support stability. At least 43 founders from six populations are represented in seed collections, micropropagation, and by nursery plants.

Stabilizing (interim), and downlisting and delisting criteria are provided in the Recovery Plan for the Oʻahu Plants (USFWS 1998) and preventing extinction targets have been added and criteria 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 grimesiana ssp. *obatae* 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 Oʻahu where they now occur or occurred historically and 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. Genetic representation is nearly complete (Table 1). There are two reintroduced populations totaling at least 50 reproducing individuals, but most of these individuals are outplanted, not recruited (Table 1, Table 2). Five translocated populations have management for nonnative invasive plants, with rodent and slug/snail control. A fire prevention and management plan is in place for Army training areas. The current impact of possible destruction by the two-spotted leafhopper is not reported and the effects of climate change are not addressed. Therefore, *Cyanea grimesiana* ssp. *obatae* 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 2019. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2024.

- Surveys and monitoring—Continue to monitor populations to better determine current status of the species.
- Ungulate monitoring and control—Continue to construct and maintain exclosures to protect individuals and wild and reintroduced populations from the negative impacts of habitat degradation and browsing by feral ungulates.
- Nonnative invasive plant monitoring and control—Continue control of established ecosystem-altering nonnative invasive plant species, and those that compete with *Cyanea grimesiana ssp. obatae*.
- Fire monitoring and control—Continue to implement fire management plan for Army training areas and develop and implement fire management plans for other areas in which *C. grimesiana* ssp. *obatae* occurs.
- Climate change adaptation strategy—Assess the modeled effects of climate change on the viability of this species and use to determine future landscape needed for its recovery.
- Predator and herbivore monitoring and control—
    - Implement control methods for rats at all populations.
    - Continue to implement effective methods for control of slugs/snails.
    - Determine the effects of the two-spotted leafhopper on populations. If research determines that control is necessary, develop and implement effective control techniques.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- Reintroduction and translocation—Continue to augment current natural populations and establish new populations in suitable habitat within historical range that is being managed for know threats to this species.
- Biology and reproductive research—
    - Assess the genetic variability within extant populations and continue to establish new populations conserving genetic diversity.
    - Continue to research pollen viability and effects on reproductive success.

- Build resiliency, redundancy, and representation—Increase species' viability through habitat restoration, threat control, and reintroduction and translocation to reduce impacts of predation and herbivory and climate change.
- Alliance and partnership development—Continue to work with ANRPO and other partners and land managers to implement ecosystem-level restoration and management to benefit this species.

References:

[ANRPO] Army Natural Resources Program on Oʻahu. 2016. Status report for the Mākua and Oʻahu Implementation Plans, Appendix 4. Office of the Vice President for Innovation and Research, University of Hawaiʻi. P. 92.

[ANRPO] 2020. 2020 Status report for the Mākua and Oʻahu Implementation Plans. Office of the Vice President for Innovation and Research, University of Hawaiʻi. 214 pp., appendices 516 pp.

[ANRPO] 2021. 2021 Status report for the Mākua and Oʻahu Implementation Plans. Office of the Vice President for Innovation and Research, University of Hawaiʻi. 214 pp., appendices 516 pp., appendices 623 pp.

[ANRPO] 2022. 2022 Status report for the Mākua and Oʻahu Implementation Plans. Office of the Vice President for Innovation and Research, University of Hawaiʻi. 228 pp., appendices 690 pp.

[ANRPO] 2023a. 2023 Status report for the Mākua and Oʻahu Implementation Plans. Prepared by Army Natural Resources Program, Oʻahu, Office of the Vice President for Innovation and Research, University of Hawaiʻi. 255 pp.

[ANRPO] 2023b. 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, Hawaiʻi.

[HPPRCC] Hawaiʻi 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, Hawaiʻi.

[Oʻahu NEPM Nursery] Oʻahu Native Ecosystems Protection and Management Nursery. 2020. 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, Hawaiʻi.

[PEPP] Plant Extinction Prevention Program. 2019a. Hawai‘i Department of Land and Natural Resources Division of Forestry & Wildlife, rare plant program Section 6 interim performance report grant number F16AF00882, performance period Jul 1, 2018-June 30, 2019. 192 pp.

[PEPP] 2019b. Plant Extinction Prevention Program, fiscal year 2019 interim performance report (October 1, 2018-September 30, 2019) cooperative agreement F18AC00502 (interim report), F14AC00174 (final report), US Fish and Wildlife Service CFDA Program #15.657, Endangered species conservation—recovery implementation funds, University of Hawaii at Manoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 53 pp.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery Plan for the O‘ahu Plants. Portland. 207 pp. + appendices.

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[USFWS] 2012. *Cyanea grimesiana* ssp. *obatae* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/2035.pdf.*

[USFWS] 2019. *Cyanea grimesiana* ssp. *obatae* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/2836.pdf.*

[USFWS] 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90): 28031–28034, May 10, 2022.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Cyanea grimesiana* ssp. *obatae* (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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