# 5-YEAR REVIEW

Short Form Summary

**Species Reviewed**: *Cyanea truncata* (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 truncata* (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/876*).

**Review Analysis:**

Please refer to the previous 5-year reviews for *Cyanea truncata* published in the Federal Register on August 2, 2007, August 28, 2012, and September 20, 2019 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1099.pdf, https://ecos.fws.gov/docs/tess/species_nonpublish/2112.pdf,* and *https://ecos.fws.gov/docs/tess/sepcies_nonpublish/2843.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. truncata*.

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 truncata* are provided in the tables below.

New Status Information:

- Only four founders from two wild populations (three from Kahana and one from Hanaimoa) were collected from prior to the extirpation of the last known wild individuals of *Cyanea truncata* by 2019. Currently, there are four reintroduced populations in the Koʻolau mountains of Oʻahu at Kaluanui, Kahana, Hakipuʻu, and Makaua, totaling approximately 37 individuals. The population at Kīpapa (12 immature) has not been observed since 2016 (Plant Extinction Prevention Program [PEPP] 2019–2023).
- The last known wild individuals are represented in *ex situ* storage and propagation. Collections and propagules from the reintroduced individuals include more than 34,000 seeds in seed banks, 967 explants in tissue culture, 36 apical samples, 36 cuttings, 766 seedlings, and 179 plants in a nursery (Lyon Arboretum 2022; Oʻahu Native Ecosystems Protection & Management [NEPM] Rare Plant Nursery 2020; Pahole Rare Plant Facility [PRPF] 2019). Currently, there are approximately 50 individuals reintroduced at Kaluanui, Kahana, Makaua, Hakipuʻu, and Kīpapa (Pahole Rare Plant Facility [PRPF] 2019; Lee 2022, p. 34; NEPM Nursery 2020; PEPP 2019–2023).

New Threats:

- None reported.

New Management Actions:

- Monitoring and surveys—
  - The Plant Extinction Prevention Program (PEPP) monitors populations of *Cyanea truncata* (PEPP 2020, pp. 22, 26).
  - The Kualoa Ranch Land Stewardship Program received 2-years of funding (with a management commitment for 5 years) from the Partners for Fish and Wildlife program in 2022 for monitoring, habitat restoration, and reintroduction of *C. truncata* and four other listed native plant species (Lee 2022, p. 40).
- Ungulate monitoring and control—Reintroduced populations of *C. truncata* on Kualoa Ranch lands are within exclosures to provide protection from trampling and herbivory by feral pigs and cattle (Lee 2022, p. 22).
- Nonnative invasive plant control—
  - In 2021–2022, PEPP reported nonnative plant control at one or more reintroductions of *C. truncata* (PEPP 2020, p. 26).
  - Goals of the funded restoration project on Kualoa Ranch includes improvement of 80 acres of lowland mesic forest ecosystem by removal of invasive nonnative plants (Lee 2022, p. 40).
- Rodent control—
  - PEPP conducts rodent control in a fenced reintroduction area (PEPP 2020, p. 26).
  - The Kualoa Ranch Stewardship Program controls rats at reintroduction sites (Lee 2022, p. 34).
- Nonnative slug/snail control—

    - PEPP conducts slug control in a fenced reintroduction area (PEPP 2020, p. 26).
    - The Kualoa Ranch Stewardship Program conducts slug control at reintroduction sites (Lee 2022, p. 34).
- Collection and propagation for genetic storage and reintroduction—
    - From 2021 to 2022, the Lyon Arboretum Micropropagation Laboratory reported propagation and storage of 967 explants representing six individuals from one reintroduction at Makaua and two populations at Kahana (Lyon Arboretum 2022). In 2009 and 2012, the Lyon Arboretum Seed Conservation Laboratory reported storage of 623 seeds representing the last two wild plants at Makaua and Hanaimoa (Lyon Arboretum 2022). From 2005 to 2021, more than 34,000 seeds were stored representing six founders at two reintroduced populations (Lyon Arboretum 2022).
    - In 2023, the Oʻahu Rare Plant Nursery reported propagation at the Pahole Rare Plant Facility [PRPF] of five plants representing two founders at Kahana; one plant propagated at Waimano Nursery representing a third founder at Kahana and 10 plants representing at least one founder at Hakipuʻu (Oʻahu RPF 2023). The State's NEPM Program reported collection of material for propagation including 47 seeds, 36 apical samples, 36 cuttings, and production of 536 seedlings all representing four founders at Kahana and 230 seedlings representing two founders at Makaua (Oʻahu NEPM Nursery 2020). Between 2004 and 2014, approximately 84 propagated plants from various sources were sent out (Oʻahu NEPM Nursery 2020).
    - The PRPF reported propagation of 79 individuals for outplanting at various sites on Oʻahu including Mānoa, Nuʻuanu, Nānākuli, Mākaha, Pia Valley, and 22 plants for Kaluanui (PRPF 2019).
    - In 2022, PEPP reported collection of fruit from plants at an unspecified location (PEPP 2022, p. 18).
    - The Kualoa Ranch Stewardship Program collected seeds from the last wild plants that are used for propagation and outplanting (Lee 2022, p. 34).
- Reintroduction and augmentation—
    - Five plants were added to a reintroduction site on Kualoa Ranch property in 2022. Recruits were observed near an older outplant (but later died), so this site was selected for monthly slug and rat control to enhance recruitment (Lee 2022, p. 34). The goal of reintroduction of 50 to 100 individuals overall is part of the ranch stewardship project (Lee 2022, p. 41).
    - In 2020, PEPP reported reintroduction of 21 individuals to a reintroduction site (PEPP 2022, p. 26).
- Public outreach—The Stewardship Program of Kualoa Ranch plans to use one reintroduction site for public outreach as a demonstration of endangered species management (the site of the last remaining wild individuals of *C. truncata* that are now extirpated) (Lee 2022, pp. 34, 41).

**Table 1. Status and trends of *Cyanea truncata* 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)** | 0 | 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)** | 3 | 0 | All threats managed in all 3 populations | Partially |
| | | | Complete genetic storage | Partially |
| | | | 3 populations with 50 mature individuals each | No |
| **2012 (5-year review)** | 2 | 33 | 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)** | 0 | ca 100 | All threats managed in all 3 populations | Partial |
| | | | Complete genetic storage | Yes |

| | | | | |
|---|---|---|---|---|
| | | | Reproduction (i.e., viable seeds, seedlings) at all 3 populations | No |
| | | | 3 populations with 50 mature individuals each | No |
| **2024 (5-year review)** | 0 | ca 50 | All threats managed in all 3 populations | Partial, 4 reintroduced populations fenced |
| | | | Complete genetic storage | Yes |
| | | | Natural reproduction at all 3 populations | Partial, recruitment at 1 reintroduced population |
| | | | 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 truncata* and ongoing conservation efforts**.

| Threat | Listing factor | Current Status | Conservation/ Management Efforts |
|---|---|---|---|
| Degradation and destruction of habitat and herbivory by feral ungulates | A, E | Ongoing | Partial, 4 fenced reintroduction sites |
| Established ecosystem altering invasive plant species degradation of habitat and competition | A, E | Ongoing | Partial, nonnative plants controlled at reintroduction sites |
| Drought 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 | Partial, rodent control in 4 managed areas |
| Predation and herbivory by invertebrates—Slugs | C | Ongoing | Partial, slug control at 4 managed areas |
| Reduced viability due to low numbers | E | Ongoing | Partial, captive propagation for genetic storage and reintroduction ongoing |

**Synthesis:**
Currently there are no wild individuals of *Cyanea truncata* remaining. There are approximately 50 reintroduced individuals in addition to previous outplantings of more than 100 individuals. Four reintroduction areas are fenced to protect them from feral ungulates and three have some nonnative invasive plant control. One population has rodent control and slug/snail control. Seed collection from reintroduced individuals, propagation, and reintroduction are ongoing. Recruitment is reported at one site. The last wild plant and all reintroduced individuals are represented in *ex situ* seed collections, micropropagation, cuttings, and by nursery seedlings and plants.

Stabilizing (interim), and downlisting and delisting criteria are provided in the Recovery Plan for the O‘ahu Plants (USFWS 1998) and preventing extinction targets have been added and criteria 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 truncata* 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 O‘ahu 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 complete for the last known wild individuals (Table 1). All reintroduced individuals are represented in collections (Table 1). However, there are no populations totaling at least 50 reproducing individuals and recruitment is reported at only one location (Table 1). Four translocated populations have management for nonnative invasive plants, and three have rodent and slug/snail control (Table 2). The effects of climate change and drought are not addressed. Therefore, *Cyanea truncata* 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—Monitoring reintroductions and conduct surveys of suitable habitat within historical range of *Cyanea truncata* to determine if any wild individuals exist.
- Ungulate monitoring and control—Continue to construct and maintain exclosures to protect 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 *C. truncata* at all populations.
- 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—
    - Continue to implement effective control methods for rodents at all populations.
    - Continue to implement effective methods for control of slugs/snails.
- Captive propagation for genetic storage and reintroduction—
    - Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- Assess genetic variability within reintroduced populations and implement a breeding plan for conserving the species' genetic diversity. Reintroduction and translocation—Continue to augment reintroduced populations and establish new populations in suitable habitat within historical range that is being managed for known threats to this species.
- Population biology research—Study *C. truncata* populations with regard to population size and structure, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- Build resiliency, redundancy, and representation—Increase species' viability through habitat restoration, threat control, and reintroduction and translocation to reduce impacts of drought and climate change.
- Alliance and partnership development—Continue to work with the Native Ecosystems Protection & Management program and other partners and land managers to implement ecosystem-level restoration and management to benefit this species.

**References:**

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

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Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.

[O‘ahu NEPM Nursery] O‘ahu Native Ecosystems Protection & Management Rare Plant 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, Hawai‘i.

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[PRPF] Pahole Rare Plant Facility. 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.

[PEPP] Plant Extinction Prevention Program. 2020. Plant Extinction Prevention Program fiscal year 2020 interim performance report (October 1, 2019-September 30, 2020), Cooperative Agreement F18AC00502 (Interim report), F19AC00532 (Interim report), U.S. Fish and Wildlife Service CFDA Program #15.657 Endangered Species Conservation—Recovery Implementation Funds, University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 70 pp.

[PEPP] 2022. Plant Extinction Prevention Program fiscal year 2022 interim performance report (October 1, 2021-September 30, 2022), Cooperative Agreement F19AC00532 (Interim report), U.S. Fish and Wildlife Service CFDA Program #15.657 Endangered Species Conservation—Recovery Implementation Funds, University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 50 pp.

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

[USFWS] 2007. *Cyanea truncata* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc/1099.pdf.*

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

MEGAN LAUT

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