

## **5-YEAR REVIEW**

### Short Form Summary

**Species Reviewed:** *Cyanea koolauensis* (haha)

**Current Classification:** Endangered

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

[USFWS] U.S. Fish and Wildlife Service. 2010. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 58 species in Washington, Oregon, California, and Hawaii. Federal Register 75(226):71726-71729.

#### **Lead Region/Field Office:**

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawaii

#### **Name of Reviewer(s):**

Vickie Caraway, Plant Biologist, PIFWO

Daniel Clark, Oahu, Kauai, Northwest Hawaiian and American Samoa Islands Team Manager, PIFWO

Marie Brueggemann, Plant Recovery Coordinator, PIFWO  
Recovery Program Lead, PIFWO

Kristi Young, Programmatic Deputy Field Supervisor, PIFWO

#### **Methodology used to complete this 5-year review:**

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS), beginning on January 31, 2012. The review was based on a review of current, available information since the last 5-year review for *Cyanea koolauensis* (USFWS 2010). The National Tropical Botanical Garden provided an initial draft of portions of the five-year review and recommendations for conservation actions needed prior to the next five-year review. The document was reviewed by the Plant Biologist, Islands Team Manager, and Plant Recovery Coordinator, followed by the Recovery Program Lead. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor.

#### **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 koolauensis* published on August 27, 2010 (available at [http://ecos.fws.gov/docs/five\\_year\\_review/doc3291.pdf](http://ecos.fws.gov/docs/five_year_review/doc3291.pdf)) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species' biological status has come to light since listing to warrant a change in the Federal listing status of *Cyanea koolauensis*.

This short-lived perennial shrub is endangered and occurs on the island of Oahu. The current status and trends for *Cyanea koolauensis* are provided in the tables below.

New status information:

- *Cyanea koolauensis* is known from at least 40 different locations documented by the Oahu Army Natural Resource Program (2011) with most populations having only one or two individuals. The Kaipapau, Koloa and Kawainui areas have a combined total of 86 individuals, Kaukonahua has 16, and Opaepala to Helemano has 21 (U.S. Army Garrison 2011).
- A single new individual was observed in the Koolau Mountains off the Manana Trail, in August 2011 (Perlman 2011).
- In a 2010 survey, five healthy mature, vegetative plants were noted just off the crest of a flattened ridge in the Oahu Forest National Wildlife Refuge at 725 meters (2,380 feet) elevation (Imada *et al* 2011).

In 2011, 124 individuals of *Cyanea koolauensis* were found on Oahu (U.S. Army Garrison 2011), a decline from 160 in the last five-year review.

New threats:

- Climate change - Climate change may pose a threat to this species. However, current climate change analyses in the Pacific Islands lack sufficient spatial resolution to make predictions on impacts to this species. The Pacific Islands Climate Change Cooperative (PICCC) funded climate modeling that will help resolve these spatial limitations. High spatial resolution climate outputs are expected to be available sometime in 2013.

New management actions:

- Threat control research - Quantified research demonstrated significant invertebrate impact on survival of *Cyanea* species (Joe and Daehler 2008). State of Hawaii permitted use of the pesticide Sluggo was obtained in 2012 allowing for control and eradication of slugs in natural areas. Prior to having the ability to use Sluggo in the State of Hawaii, existing slug control methods (*e.g.* traps baited with beer, copper barriers) were highly labor intensive and of limited efficacy (Joe 2011).
- Threats monitoring and control - Rat predation is being addressed by developing more effective methods for rat control (Mosher *et al.* 2010).
- Ungulate exclosures- Control of ungulates has been partially achieved, in the Opaepala to Helemano population through fence construction (U.S. Army Garrison 2011).
- Captive propagation for genetic storage and reintroduction
  - Harold L. Lyon Arboretum (2012) has approximately 14,238 *Cyanea koolauensis* seeds in storage and 11 individuals are *in vitro*.

**Synthesis:**

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for plants from the island of Oahu (USFWS 1998), based on whether the species is an annual, a short-lived shrub (fewer than 10 years), or a long-lived perennial. *Cyanea koolauensis* is a short-lived perennial. For this species to be considered stable, the threats

to the taxon must be controlled (*e.g.*, fenced) and *C. koolauensis* must be represented in an *ex situ* (at other than the plant's natural location, such as a nursery or arboretum) collection. In addition, a minimum of three populations should be documented on the island of Oahu. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

The stabilization goals for this species have not been met, since three populations of 50 or more mature individuals do not exist (Table 1) and all threats are not being sufficiently managed throughout all of the populations (Table 2). Therefore, *Cyanea koolauensis* meets the definition of endangered as it remains in danger of extinction throughout its range.

#### **Recommendations for Future Actions:**

- Ungulate enclosures - Construct fences around all known populations of *Cyanea koolauensis* to eliminate negative impacts from feral pigs.
- Outreach and education - Minimize the threat of trampling by educating military personnel to avoid trampling endangered species, and provide signage to identify areas that are off limits due to the presence of federally listed species.
- Monitoring threat control - Establish long-term conservation trend analysis plots to monitor the impacts of foot traffic.
- Ecosystem-altering invasive plant species control - Control invasive introduced plant species in the vicinity of all known populations of *Cyanea koolauensis* and maintain those areas free of invasive introduced plants.
- Captive propagation for genetic storage and reintroduction - Collect full genetic representation of *Cyanea koolauensis* for *ex situ* propagation.
- Predator / herbivore control - Control slug and rat populations in the vicinity of all known populations of *Cyanea koolauensis*.
- Surveys / inventories - Conduct surveys for *Cyanea koolauensis* within and outside the military action areas.
- Fire protection - Army training activities should be appropriately planned and managed so that uncontrolled fires are unlikely to occur and wildland fires are effectively suppressed to prevent impacts to *C. koolauensis* in the event they occur.
- Alliance and partnership development - Initiate planning and contribute to implementation of ecosystem-level management and restoration to benefit this species.

**Table 1. Status and trends of *Cyanea koolauensis* (Haha) from listing through current 5-year review.**

| <b>Date</b>             | <b>No. wild individuals</b> | <b>No. outplanted</b> | <b>Stability Criteria identified in Recovery Plan</b> | <b>Stability Criteria Completed?</b> |
|-------------------------|-----------------------------|-----------------------|---|--------------------------------------|
| 1996 (listing)          | <50                         | 0                     | All threats managed in all populations                | No                                   |
|                         |                             |                       | Complete genetic storage                              | No                                   |
|                         |                             |                       | 3 populations with 50 mature individuals each         | No                                   |
| 1998 (recovery plan)    | <80                         |                       | All threats managed in populations                    | No                                   |
|                         |                             |                       | Complete genetic storage                              | No                                   |
|                         |                             |                       | 3 populations with 50 mature individuals each         | No                                   |
| 2003 (critical habitat) | <80                         | 0                     | All threats managed in all populations                | No                                   |
|                         |                             |                       | Complete genetic storage                              | No                                   |
|                         |                             |                       | 3 populations with 50 mature individuals each         | No                                   |
| 2010 (5-yr review)      | 160                         | 0                     | All threats managed in populations                    | No                                   |
|                         |                             |                       | Complete genetic storage                              | No                                   |
|                         |                             |                       | 3 populations with 50 mature individuals each         | Partially                            |
| 2013 (5-yr review)      | 124                         | 0                     | All threats managed in populations                    | No                                   |
|                         |                             |                       | Complete genetic storage                              | No                                   |
|                         |                             |                       | 3 populations with 50 mature individuals each         | Partially                            |

**Table 2. Status of threats to *Cyanea koolauensis* (Haha) and ongoing conservation efforts**

| <b>Threat</b>                                     | <b>Listing factor</b> | <b>Current Status</b> | <b>Conservation/ Management Efforts</b> |
|---|-----------------------|-----------------------|---|
| Ungulates – habitat modification                  | A, C, D, E            | Ongoing               | Partially                               |
| Herbivory by rats and slugs                       | C                     | Ongoing               | Partially                               |
| Floods  | A, E                  | Ongoing               | Unknown                                 |
| Trampling by hikers and military personnel        | E                     | Ongoing               | Unknown                                 |
| Fire – habitat modification and plant destruction | A, E                  | Ongoing               | Partially                               |
| Invasive introduced plants                        | A, E                  | Ongoing               | Partially                               |
| Climate change                                    | A, E                  | Increasing            | None                                    |

**References:**

See previous 5-year review for a full list of references (USFWS 2010). Only references for new information are provided below.

Harold L. Lyon Arboretum. 2012. Micropropagation and seed storage databases. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Imada, C., P. Clifford, and J.Q.C. Lau. 2011. 2010 Rare plant survey, Oahu Forest National Wildlife Refuge, Waipio, Oahu. Bishop Museum Technical Report 55. Honolulu, Hawaii. 92 pages.

Joe, S.M., and C.C. Daehler. 2008. Invasive slugs as under-appreciated obstacles to rare plant restoration: evidence from the Hawaiian Islands. *Biological Invasions* 10(2):245-255.

Joe, Stephanie. 2011. Registration of Sluggo for rare plant restoration: an effective new tool for slug control. 2011 Hawaii Conservation Conference ; island ecosystems: the year of the forest; abstract book. Available online at [http://hawaiiconservation.org/files/content/activities/hawaii\\_conservation\\_conference/abstract\\_book\\_final\\_edited.pdf](http://hawaiiconservation.org/files/content/activities/hawaii_conservation_conference/abstract_book_final_edited.pdf). Accessed December 30, 2011.

Mosher, Stephen M., J.L. Rohrer, V. Costello, M.D. Burt, M. Keir, J. Beachy, H.K. Kawelo and M. Mansker. 2010. Rat control for the protection of endangered birds, plants, and tree snails on the island of Oahu, Hawaii. Pages 14-17 in R.M. Timm and K.A. Fagerstone, (editors). *Proceedings of the 24th vertebrate pest conference*. University of California, Davis, California.

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Perlman, S. 2011. *Cyanea koolauensis*. National Tropical Botanical Garden, Kalaheo, Hawaii. 1 page. Unpublished.

U.S. Army Garrison. 2011. Status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 269 pages. Available online at <[http://manoa.hawaii.edu/hpicesu/DPW/2011\\_YER/default.htm](http://manoa.hawaii.edu/hpicesu/DPW/2011_YER/default.htm)>.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 270 + pages.

[USFWS] U.S. Fish and Wildlife Service. 2010. *Cyanea koolauensis* (haha) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 10 pages. Available online at <[http://ecos.fws.gov/docs/five\\_year\\_review/doc3291.pdf](http://ecos.fws.gov/docs/five_year_review/doc3291.pdf)>.

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

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

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