

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. 2008. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 70 species in Idaho, Montana, Oregon, Washington, and the Pacific Islands. Federal Register 73(83):23264-23266.

Lead Region/Field Office:

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

Name of Reviewer(s):

Marie Bruegmann, Pacific Islands Fish and Wildlife Office, Plant Recovery Coordinator
Marilet A. Zablan, Pacific Islands Fish and Wildlife Office, Assistant Field Supervisor for Endangered Species
Jeff Newman, Pacific Islands Fish and Wildlife Office, Acting Deputy Field Supervisor

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 April 29, 2008. The review was based on the final critical habitat designation for *Cyanea koolauensis* and other species from the island of Oahu (USFWS 2003b), as well as a review of current, available information. The National Tropical Botanical Garden provided an initial draft of portions of the review and recommendations for conservation actions needed prior to the next five-year review. The evaluation of Samuel Aruch, biological consultant, was reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Assistant Field Supervisor for Endangered Species and Acting Deputy Field Supervisor before submission to the Field Supervisor for approval.

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).

Application of the 1996 Distinct Population Segment (DPS) Policy:

This Policy does not apply to plants.

Review Analysis:

Please refer to the final critical habitat designation for *Cyanea koolauensis* published in the Federal Register on June 17, 2003 (USFWS 2003b) for a complete review of the species' status (including biology and habitat), threats, and management efforts. No new threats and no significant new information regarding the species biological status have

come to light since listing to warrant a change in the Federal listing status of *C. koolauensis*.

Cyanea koolauensis was known historically from 27 populations scattered throughout the Koolau Mountains on Oahu (USFWS 1996). Eighteen populations totaling 101 to 104 individuals were known from the Aiea Ridge trail (2 individuals), Halawa (3), Kalahao (3 to 5), Kalihi-Nuuanu Ridge (1), Lulumahu (6), Manana Trail (1), Niu and Wailupe (6), Waialae Nui Ridge (2), Waimalu (2), Kawainui-Kaipapau-Kawailoa (35), upper Helemano (7), lower Helemano- Opaepala (4), Poamoho (4), Kawaiiki-Kawainui (4), Kawailoa trail (10), North Kaukonahua (1), South Kaukonahua (9), and Malaekahana-Waimea summit (1 to 2). Populations of *C. koolauensis* are declining, and the locations are small and widely dispersed (USFWS 2003a).

Forty-two populations totaling fewer than 80 individuals were known in 2006. Approximately 75 percent of these are found on Army lands, including three of the Oahu actions areas: Kahuku Training Area, Kawailoa Training Area, and Schofield Barracks (U.S. Army 2006). One to two individuals were found on the Waimea-Malaekahana Summit Ridge at about 605 m (1,980 ft) elevation in the Kahuku Training action area. Seven populations totaling 65 individuals were in the Kawailoa Training action area. They are found at Kawainui-Kaipapau-Kawailoa (35), upper Helemano (7), lower Helemano-Opaepala (4), Poamoho(4), Kawaiiki-Kawainui (4), Kawailoa trail (10), and north Kaukonahua (1). Nine individuals in one population were found at south Kaukonahua in the Schofield Barracks action area.

Other occurrences were at Sacred Falls State Park, in the Kaipapau Forest Reserve, and Kahuku Forest Reserve, occupied by 46 individuals; Ewa Forest Reserve and Waiahole Forest Reserve, containing a portion of Eleao Summit with four individuals; Honolulu Watershed Forest Reserve containing a portion of Konahuanui Summit and Manoa Falls which had ten individuals (USFWS 2003b). On private and State land in the Honolulu Watershed Forest Reserve, which contains a portion of Kaaui Crater, Kainawaaunui Summit, Palikea Summit, and Puu Lanipo, there were seven individuals of *Cyanea koolauensis* (USFWS 2003b). Botanists from the National Tropical Botanical Garden have observed *C. koolauensis* on Wailupe Ridge, east of Wiliwilinui Ridge, in July 2006, at 765 meters (2,510 feet), perhaps the most easterly location for the species (Tangalin 2008), and at Opaepala Stream, below the Peahinaia Trail, at 616 meters (2,020 feet) elevation, in October 2001, with three mature individuals and one immature individual (Perlman 2008).

In 2008, *Cyanea koolauensis* was known from 139 individuals in 7 populations (US Army 2008). There are 51 mature individuals, 25 immature individuals, and 6 seedlings at Kaipapau, Koloa and Kawainui. Six mature and 2 immature individuals are found on Kamananui-Kawainui ridge. Kaukonahua contains 11 mature and 1 immature individuals. Three mature and 4 immature individuals are found at Kawaiiki. Three mature and 1 immature individuals are found in lower Opaepala. Opaepala to Helemano contains 10 mature individuals, and Poamoho contains 12 mature individuals. One

mature individual is found in Waiawa to Waimano, the only population not within Army training areas.

All *Cyanea koolauensis* occurrences are found along the summit of the Koolau Mountains, from the Waimea-Malaekahana Ridge to Hawaii Loa Ridge. Currently, the U.S. Army (2009) reports 160 individuals in 10 populations: Kaipapau, Koloa and Kawainui 57 mature, 25 immature; Kamananui-Kawainui Rindge 6 mature, two immature; Kawaiiki 14 mature, two immature; Lower Opaepala three mature, one immature; Opaepala to Halemano 14 mature, five immature; Poamoho 12 mature; Halawa, Kalawa-Kalauao Ridge, Lulumahu, Waialae Nui, and Waimalu gone; Waiawa to Waimano three mature; and Wailupe one mature. The additional individuals reported in 2009 are due to more intensive surveys of the known populations (U.S. Army 2009).

Cyanea koolauensis occurs in gulch bottoms, on gulch slopes, and on ridge tops in *Metrosideros polymorpha* (ohia) - *Dicranopteris linearis* (uluhe) wet forest with associated native plant species including *Acacia koa* (koa), *Alyxia stellata* (maile), *Antidesma platyphyllum* (hame), *Bidens macrocarpa*. (kookoolau), *Bobea elatior* (akakea), *Broussaisia arguta* (kanawao), *Cibotium* sp.(hapuu), *Chamaesyce clusiifolia* (akoko), *Clermontia oblongifolia* (oha wai), *C. persicifolia* (oha wai), *Cyrtandra paludosa* (moa), *Diplopterygium pinnatum* (uluhe lau nui), *Dubautia* sp. (naenae), *Freycinetia arborea* (ieie), *Hesperomannia arborescens* (no common name [NCN]), *Kadua affinis* (manono), *Labordia sessilis* (kamakahala), *L. tinifolia* (kamakahala), *Machaerina angustifolia* (uki), *Melicope clusiifolia* (kolokolo mokihana), *M. hosake* (Honolulu melicope), *M. rotundifolia* (alani), *Metrosideros macrocarpa* (ohia), *M. tremuloides* (lehua ahihi), *Myrsine emarginata*, *M. fosbergii*, *M. pukooensis* (kolea), *Pittosporum* sp.(hoawa), *Pritchardia martii* (loulou hiwa), *Psychotria mariniana* (kopiko), *Sadleria* sp.(amau), *Scaevola gaudichaudiana* (naupaka kuahiwi), *S. mollis*. (naupaka kuahiwi), *Syzygium sandwicensis* (ohia ha), *Tetraplasandra gymnocarpa* (ohe ohe), *T. oahuensis* (ohe mauka), *Wikstroemia oahuensis* (akia), and *Zanthoxylum oahuense* (ae) (Perlman 2008; U.S. Army 2008; USFWS 2003b).

Threats to *Cyanea koolauensis* include habitat destruction by feral pigs (*Sus scrofa*) (Factor A); floods, trampling by hikers and military training; trail clearing; fire, entirely or partly related to Army activities; and competition with invasive introduced plant species (Factor E). These plant species include *Clidemia hirta* (Koster's curse), *Heliocarpus popayanensis* (moho), *Psidium cattleianum* (strawberry guava), and *Pterolepis glomerata* (no common name [NCN]) (U.S. Army 2006; USFWS 2003a, b). In addition, predation by rats (*Rattus rattus*) and an unidentified slug species have been observed (Perlman 2008, U.S. Army 2008) (Factor C). Climate change may also pose a threat to *C. koolauensis* (Factors A and E). However, current climate change models do not allow us to predict specifically what those effects, and their extent, would be for this species.

Conservation measures that have been taken include construction of a fence in the Kawailoa Training Area at Helemano, adjacent to the existing Opaepala fence, which together will protect 95 hectares (234 acres) of habitat. Other Federally listed endangered

species protected by the Opaepala-Helemanu fences include: *Achatinella lila* (Oahu treesnail), *A. sowerbyana* (Oahu treesnail), *Chamaesyce rockii* (akoko), *Cyanea st.-johnii* (haha), *Cyrtandra viridiflora* (haiwale), *Phyllostegia hirsuta* (NCN), and *Viola oahuensis* (NCN) (U.S. Army 2005, 2006).

National Tropical Botanical Garden has 795 seeds in storage (National Tropical Botanical Garden 2009). The Helemanu to Opaepala population is partially fenced (U.S. Army 2008).

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 perennial (fewer than 10 years), or a long-lived perennial. *Cyanea koolauensis* is a short-lived perennial, and to be considered stable, the taxon must be managed to control threats (*e.g.*, fenced) and 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 interim stabilization goals for this species have not been met (see Table 1), as only one population has more than 50 mature individuals and all threats are not being managed. Therefore, *Cyanea koolauensis* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Construct fences around all known populations of *Cyanea koolauensis* to eliminate negative impacts from feral pigs and trampling.
- In areas where fencing is not feasible, control or removal of pigs should be implemented.
- Minimize the threat of trampling by educating each set of new U.S. Army soldiers to avoid trampling endangered species.
- Establish long-term conservation trend analysis (ITAM) plots to monitor the impacts of foot traffic.
- Establish signage to identify areas that are off limits due to the presence of federally listed species.
- Control invasive introduced plant species in the vicinity of all known populations of *Cyanea koolauensis*.
- Collect full genetic representation of *C. koolauensis* for *ex situ* propagation

- Control rat populations in the vicinity of all known populations of *C. koolauensis* and across the broader landscape.
- Prioritize conservation actions for populations that have only a few remaining individuals.
- Conduct surveys to locate *C. koolauensis* within and outside the military action areas.
- Threats of fire associated with Army training activities should be managed so that uncontrolled fires are unlikely to occur.
- Work with Hawaii Division of Forestry and Wildlife and Hawaii State Parks to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

References:

National Tropical Botanical Garden. 2009. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. National Tropical Botanical Garden, Lawai, Hawaii. Unpublished.

Perlman, S. 2008. *Cyanea koolauensis*. National Tropical Botanical Garden, Kalaheo, Hawaii. Unpublished.

Tangalin, N. 2008. *Cyanea koolauensis*. National Tropical Botanical Garden, Kalaheo, Hawaii. Unpublished.

[U.S. Army] U.S. Army Environmental Center. 2006. Installation summaries from the FY 2005 survey of threatened and endangered species on Army lands. Aberdeen Proving Ground, Maryland. Unpublished.

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[U.S. Army] U.S. Army Garrison. 2006. 2006 status reports for the Makua implementation plan and the draft Oahu implementation plan. U.S. Army Garrison, Directorate of Public Works Environmental Division. Schofield Barracks, Hawaii. 534 pages.

[U.S. Army] U.S. Army Garrison. 2008. Final implementation plan for Oahu training areas: Schofield Barracks Military Reservation, Schofield Barracks East Range, Kawaihoa Training Area, Kahuku Training Area, and Dillingham Military Reservation. U. S. Army Garrison, Hawaii, Directorate of Public Works Environmental Division. Schofield Barracks, Hawaii. 624 pages.

[U.S. Army] U.S. Army Garrison. 2009. 2009 status reports for the Makua and Oahu implementation plans. U.S. Army Garrison, Directorate of Public Works Environmental Division. Schofield Barracks, Hawaii. 711 pages.

[USFWS] U.S. Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants; determination of endangered status for twenty-five plant species from the island of Oahu, Hawaii; final rule. Federal Register 62(198):53089-53108.

[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. 2003a. Biological opinion of the U.S. Fish and Wildlife Service for routine military training and transformation of the 2nd Brigade 25th Infantry Division (lights). U.S. Fish and Wildlife Service, Honolulu, Hawaii. Unpublished. 351 pages.

[USFWS] U.S. Fish and Wildlife Service. 2003b. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 101 plant species from the island of Oahu, Hawaii; final rule. Federal Register 68 (116):35949-35998. 49 pages.

Table 1. Status of *Cyanea koolauensis* from listing through 5-year review.

Date	No. wild indivs	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1996 (listing)	<50	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	<80	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3populations with 50 mature individuals each	No
2003 (critical habitat)	<80	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2009 (5-year review)	160	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Partially

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

 **Field Supervisor, Pacific Islands Fish and Wildlife Office**



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