

Cyanea acuminata
(Haha)

**5-Year Review
Summary and Evaluation**

**U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawaii**

5-YEAR REVIEW
Species reviewed: *Cyanea acuminata* (Haha)

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5-YEAR REVIEW

Cyanea acuminata/ Haha

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:

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Lead Field Office:

Pacific Islands Fish and Wildlife Office, Gina Shultz, Deputy Field Supervisor,
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Cooperating Field Office(s):

N/A

Cooperating Regional Office(s):

N/A

1.2 Methodology used to complete the review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (USFWS) in fiscal year 2008. The Bernice P. Bishop Museum provided most of the updated information on the current status of *Cyanea acuminata* and also provided recommendations for conservation actions that may be needed prior to the next five-year review. The evaluation of the status of the species was prepared by the lead PIFWO biologist and reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species, and Deputy Field Supervisor, before submission to the Field Supervisor for approval.

1.3 Background:

1.3.1 Federal Register (FR) Notice citation announcing initiation of this review:

USFWS. 2007. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 71 species in Oregon, Hawaii, Commonwealth of the Northern Mariana Islands, and Territory of Guam. Federal Register 72(45):10547-10550.

1.3.2 Listing history

Original Listing

FR notice: USFWS. 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 61(198):53089-53108.

Date listed: October 10, 1996

Entity listed: Species

Classification: Endangered

Revised Listing, if applicable

FR notice: N/A

Date listed: N/A

Entity listed: N/A

Classification: N/A

1.3.3 Associated rulemakings:

USFWS. 2003a. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 101 plant species from the island of Oahu, HI: final rule. Federal Register 68(116):35949-35998.

Critical habitat was designated for *Cyanea acuminata* in two units totaling 2,604 hectares (6,436 acres) on Oahu. This designation includes habitat on State, Federal, and private lands (USFWS 2003a).

1.3.4 Review History:

Species status review: Stable [per FY 2007 Recovery Data Call (September 2007)]

Recovery achieved:

1 (0-25%) [per FY 2007 Recovery Data Call (September 2007)]

1.3.5 Species' Recovery Priority Number at start of this 5-year review:

11

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: Recovery Plan for the Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages, plus appendices.

Date issued: August 10, 1998.

Dates of previous revisions, if applicable: N/A

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

Yes
 No

2.1.2 Is the species under review listed as a DPS?

Yes
 No

2.1.3 Was the DPS listed prior to 1996?

Yes
 No

2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?

Yes
 No

2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?

Yes
 No

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?

Yes
 No

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

Yes
 No

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?

Yes
 No

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

Yes
 No

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:

A synthesis of the threats (Factors A, C, D, and E) affecting this species is presented in section 2.4. Factor B (Overutilization for commercial, recreational, scientific, or educational purposes) is not known to be a threat to this species.

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Oahu plants (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Cyanea acuminata* is a short-lived perennial, and to be considered stable, the taxon must be managed to control threats (e.g., fenced, weeding, etc.) and be represented in an *ex situ* (off-site) collection. In addition, a minimum of three populations should be documented on Oahu. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

This recovery objective has been partially met.

For downlisting, a total of five to seven populations of *Cyanea acuminata* should be documented on Oahu. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of five consecutive years before downlisting is considered.

This recovery objective has not been met.

For delisting, a total of eight to ten populations of *Cyanea acuminata* should be documented on Oahu. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with 300 mature individuals per population for short-lived perennials. Each population should persist at this level for a minimum of five consecutive years before delisting is considered.

This recovery objective has not been met.

2.3 Updated Information and Current Species Status

In addition to the status summary table below, information on the species' status and threats was included in the final critical habitat rule referenced above in section 1.3.3 ("Associated Rulemakings") and in section 2.4 ("Synthesis") below, which also includes any new information about the status and threats of the species.

Table 1. Status of *Cyanea acuminata* (Haha) from listing through 5-year review.

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Downlisting Criteria Completed?
1996 (listing)	< 100	0	All threats managed in all 3 populations	No
			Complete genetic storage	Unknown
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	< 100	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	< 200	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2008 (5-year review)	215-245	0	All threats managed	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

2.3.1 Biology and Habitat [see note in section 2.3]

2.3.1.1 New information on the species' biology and life history:

2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

2.3.1.4 Taxonomic classification or changes in nomenclature:

2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

2.3.1.7 Other:

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms) [see note in section 2.3]

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

No new information.

2.3.2.3 Disease or predation:

2.3.2.4 Inadequacy of existing regulatory mechanisms:

No new information.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

2.4 Synthesis

Historically, *Cyanea acuminata* was known from 31 scattered populations in the Koolau Mountains of Oahu, and at the time of Federal listing as endangered, fewer than 100 plants were known in 15 populations (USFWS 1996). The species' range has been expanded, and now also occurs within the Waianae Mountain range (USFWS 2003a). In 2003, estimates of plant numbers ranged from 172 to 208 individuals in 18 to 20 populations in both the Koolau and Waianae Mountains at East Makaleha (2 individuals), Halemano (6), Kaala (18), Kaalaea (30), Kahana near Puu Kaaumakua (3-4), Kahuku Cabin (1), Kaipapau (40 to 50), Kaluanui and Maakua (12), Kawai Iki (1), Konahuanui (20 to 40), Makaua (3), Pia (4), Poamoho (12 to 17), Pukele (1), Puu Keahiakahoe (3), Puu O Kona (1), south Kaukonahua (5), and Waahila (10) (USFWS 2003a, b). Recent estimates indicate 215 to 245 mature individuals within the 18 populations (USFWS 2007), and J. Lau (Botanical Consultant, pers. comm. 2007) suggests that many more individuals (perhaps

thousands) may be found with thorough botanical surveys of the ecological range of the species.

Feral pigs (*Sus scrofa*) and goats (*Capra hircus*) continue to threaten all known populations and habitat of *Cyanea acuminata* (Factor A, C, and D). Pigs and goats impact the habitat directly and indirectly through their destructive activities by trampling, rooting, and eating native vegetation and introducing invasive species through fecal matter (Factor E) (USFWS 1996, 1998, 2003a, b). Competition from invasive introduced plant species for space, light, nutrients and water is one of the main threats for this species (Factor E). Invasive introduced plants threatening *C. acuminata* include *Ageratina adenophora* (Maui pamakani), *Aleurites moluccana* (kukui), *Clidemia hirta* (Koster's curse), *Cordyline fruticosa* (ti), *Dioscorea* sp. (yam), *Erigeron karvinskianus* (daisy fleabane), *Musa* sp. (banana), *Passiflora suberosa* (wild passionfruit), *Psidium cattleianum* (strawberry guava), *Rubus argutus* (prickly Florida blackberry), and *Schinus terebinthifolius* (Christmas berry) (USFWS 1996, 1998, 2003a, b).

Rats (*Rattus* spp.) and various slug species continue to be a threat to *Cyanea acuminata* due to the potential predation of fruits and fleshy stems (Factor C). With fewer than 250 plants remaining in the wild, the loss of the fruit of any of the plants could prove devastating for the genetic diversity and health of this species (Factor E). Small population numbers may contribute to the reduced reproductive vigor of the remaining individuals (Factor E) (USFWS 1996, 1998, 2003a, b).

There are no known stable populations of greater than 50 mature and reproducing plants (USFWS 2003a, b). In total, 63 to 68 individuals from six populations, representing approximately 37 percent of the known individuals of the species, are found in action areas. Fire (Factor E) and trampling from foot traffic due to military activities (Factor E) continue to be a threat to the species. Identified actions in these areas include dismounted maneuvers, foot reconnaissance, bivouac, helicopter aviation training, and air assault. While *Cyanea acuminata* plants grow in lowland wet forest and shrub habitat and occur in areas that have very low fire-vulnerability rating, the species is at continued risk of fire particularly due to pyrotechnic exercises, blank training exercises, cigarette smoking, cook stoves and fires at bivouac sites, and other accidental or unforeseen ignition sources, especially during times of drought (Factor E) (USFWS 2003b). Invasive plants could be spread within the installation from dismounted and mounted maneuvers, and range construction and maintenance (Factor E). Some invasive introduced plant species can also spread into undisturbed areas once they have become established in a disturbed area. Invasive plant encroachment will also be a possibility after a major disturbance event such as a fire. Because the larger of the only two populations in the Waianae Mountains occur within action areas (ten percent of the total number of individuals), there would be a significant impact to the genetic diversity and range of the species should any of these individuals be lost to a fire (Factor E) (USFWS 2003b) or any other threat.

To safeguard existing genetic material, propagation for genetic storage and reintroduction is occurring at various institutions. The National Tropical Botanical Garden houses 450 seeds of *Cyanea acuminata* in storage (National Tropical Botanical Garden 2007), and Center for Conservation Research and Training Seed Storage Laboratory houses 1,865 seeds from a single accession (Center for Conservation Research and Training Seed Storage Laboratory 2007).

The stabilization goals for this species have not been met as none of the populations have more than 50 mature individuals and the threats are not being managed (see Table 1). Therefore, *Cyanea acuminata* meets the definition of endangered as it remains in danger of extinction throughout its range.

3.0 RESULTS

3.3 Recommended Classification:

Downlist to Threatened

Uplist to Endangered

Delist

Extinction

Recovery

Original data for classification in error

No change is needed

3.2 New Recovery Priority Number: N/A

Brief Rationale:

3.3 Listing and Reclassification Priority Number: N/A

Reclassification (from Threatened to Endangered) Priority Number: _____

Reclassification (from Endangered to Threatened) Priority Number: _____

Delisting (regardless of current classification) Priority Number: _____

Brief Rationale:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Continue collection of genetic resources for storage, future propagation.
- Survey geographical and historical range for a thorough current assessment of the species.
- Construct enclosure fences to protect individuals from the activities of feral ungulates and prevent trampling from foot traffic, and eradicate invasive introduced plant species within the enclosures.

- Determine and implement adequate rat and slug control methods.
- Establish *ex situ* populations within protected habitats.
- Augment current natural populations with appropriate genetic individuals.
- Assess genetic variability within extant populations.
- Study *Cyanea acuminata* populations with regard to population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.

5.0 REFERENCES

Center for Conservation Research and Training Seed Storage Laboratory. 2007. Database. Unpublished.

Harold L. Lyon Arboretum Micropropagation Laboratory. 2007. Database. Unpublished.

National Tropical Botanical Garden. 2007. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

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[USFWS] U.S. Fish and Wildlife Service. 2003b. Biological Opinion of the U.S. Fish and Wildlife Service for routine military training and transformation of the 2nd Brigade 25th Infantry Division (Light), U.S. Army installations, island of Oahu. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 2008. Rare plant tracking database. April 28, 2008. Unpublished.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Cyanea acuminata* (Haha)

Current Classification: _____ E _____

Recommendation resulting from the 5-Year Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: _____

Review Conducted By:

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Approved



Date 21 July 2009

Acting Field Supervisor, Pacific Islands Fish and Wildlife Office