

Cyanea copelandii subsp. *copelandii*
(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 copelandii* subsp. *copelandii* (Haha)

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5-YEAR REVIEW
***Cyanea copelandii* subsp. *copelandii* (Haha)**

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:

Region 1, Endangered Species Program, Division of Recovery, Jesse D'Elia, (503) 231-2071

Lead Field Office:

Pacific Islands Fish and Wildlife Office, Loyal Mehrhoff, Field Supervisor, (808) 792-9400

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 of the U.S. Fish and Wildlife Service (USFWS), beginning on April 8, 2010. The review was based on the designation of critical habitat for *Cyanea copelandii* and recovery plan for the Big Island plant cluster (USFWS 2003, 1996), as well as a review of current, available information. The Bernice Pauahi Bishop Museum 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 Sam Aruch, biological consultant, was reviewed by a recovery biologist and the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species 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] U.S. Fish and Wildlife Service. 2010. Endangered and threatened wildlife and plants; 5-year review status of 69 species in Idaho, Washington, Hawaii, Guam, and the Commonwealth

of the Northern Mariana Islands. Federal Register
75(67):17947-17950.

1.3.2 Listing history

Original Listing

FR notice: USFWS. 1994. Endangered and threatened wildlife and plants; determination of endangered or threatened status for 21 plants from the island of Hawaii, State of Hawaii; final rule. Federal Register 59(43):10305-10325.

Date listed: March 4, 1994

Entity listed: Subspecies

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. 2003. Endangered and threatened wildlife and plants; final designation of critical habitat for three plant species from the island of Hawaii, Hawaii; final rule. Federal Register 68(127):39624-39672.

Critical habitat was not designated for *Cyanea copelandii* subsp. *copelandii* in 2003 because it was determined not prudent as the designation would be of no benefit to the species (USFWS 2003).

1.3.4 Review History:

Species status review [FY 2010 Recovery Data Call (August 2010)]:
Declining

Recovery achieved:

1 (0-25%) (FY 2007 Recovery Data Call)

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

2

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: USFWS. 1996. Recovery plan for the Big Island plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 176 pages + appendices. Available online at <http://www.fws.gov/pacificislands/recoveryplans.html>.

Date issued: September 26, 1996

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 (Listing Factors A, B, C, D, and E) affecting this species is presented in Section 2.3.2 and Table 2.

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Big Island plant cluster (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Cyanea copelandii* subsp. *copelandii* is a long-lived perennial, and to be considered stabilized in the interim, which is the first step in recovering the species, 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 the Big Island (Hawaii Island). Each of these populations must be naturally reproducing and increasing in number, with a minimum of 25 mature individuals per population.

This recovery objective has not been met.

For downlisting, a total of five to seven populations of *Cyanea copelandii* subsp. *copelandii* should be documented on the island of Hawaii. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with a minimum of 100 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 copelandii* subsp. *copelandii* should be documented on the island of Hawaii. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with 100 mature individuals per

population. 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

2.3.1 Biology and Habitat

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

This taxon was observed in fruit and flower during December 1914 (Bishop Museum 2011). No other life history information is currently available (USFWS 1996).

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:

Historically, *Cyanea copelandii* subsp. *copelandii* is known from two sites on the southeastern slope of Mauna Loa, near Glenwood. After being collected several times between 1914 and 1918 by Joseph Rock from Glenwood or “23-29 miles” (Bishop Museum 2011), it has since been collected only once, in July 1957, by an unknown collector (Wagner *et al.* 1999; USFWS 1994, 1996, 2003). The collection location is cited as “about 5 mi. from Glenwood toward Mauna Kea” and C. N. Forbes' name is crossed out as the collector; written in pencil on the sheet is “Lindsey *et al.*,” apparently the actual collectors of this voucher (Bishop Museum 2011). One of Rock's collections (*Rock 13138*) describes the taxon as a “plentiful” epiphyte in dense fern forest (Hawaii Biodiversity and Mapping Program 2010). Despite not being seen in over 50 years, there is still hope the species is still extant, especially since its historical habitat on State-owned land is difficult to survey thoroughly because of vegetation density and sometimes treacherous terrain (USFWS 1994, 1996).

In 2010, there were no known individuals or populations of *Cyanea copelandii* subsp. *copelandii* (USFWS 2010). Kealii Bio (Hawaii Island Plant Extinction Prevention Program, pers. comm. 2010) confirmed that the taxon has not been observed in Glenwood or adjacent areas (Wao Kele o Puna, Bryson's/

Leilani Estates). However, a large amount of potential habitat has not been intensively explored because much of it is covered with thickets of invasive plant species, such as *Psidium cattleianum* (Strawberry guava), *Clidemia hirta* (Koster's curse), and *Melastoma candidum* (no common name), and the thick cover of the native fern, *Dicranopteris linearis* (uluhe), conceals dangerous cracks and holes in the ground.

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

The chromosome number for some species of *Cyanea* are $n = 14$, although no counts are known for *Cyanea copelandii* subsp. *copelandii* (Lammers 1988). As currently recognized (Lammers *et al.* 1993), the genus *Cyanea* now includes taxa formerly included in the genus *Rollandia* (Wagner *et al.* 1999).

2.3.1.4 Taxonomic classification or changes in nomenclature:

No new information.

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.):

This species has not been observed since at least the 1950s (see section 2.3.1.2 above).

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

The typical habitat of *Cyanea copelandii* subsp. *copelandii* is montane wet forest dominated by *Cibotium* spp. (hapuu) between 660 and 880 meters (2,200 to 2,900 feet) elevation (Wagner *et al.* 1999; USFWS 1994, 1996; Hawaii Biodiversity and Mapping Program 2010).

2.3.1.7 Other:

No new information.

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

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

Threats:

- Ungulate degradation of habitat – Assuming that *Cyanea copelandii* subsp. *copelandii* remains extant in its known habitats, there are a number of threats to its continued survival. In the past, these have included degradation of the substrate and native vegetation by feral ungulates (USFWS 1994, 1996).
- Established ecosystem-altering invasive plant species degradation of habitat – This species, if still extant, may be threatened by competition from invasive introduced plant species (USFWS 1994, 1996)
 - *Clidemia hirta* (Koster’s curse)
 - *Melastoma candidum* (no common name)
 - *Psidium cattleianum* (strawberry guava)

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

Threats:

- Collecting – Human impacts, such as unrestricted collecting for scientific or horticultural purposes may have been a threat to this species in the past (USFWS 1994, 1996).

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:

Threats:

- Ungulate trampling – Assuming that *Cyanea copelandii* subsp. *copelandii* remains extant in its known habitats,

there are a number of threats to its continued survival. In the past, these have included trampling of the native vegetation by feral ungulates, which also disturb the substrate and understory (USFWS 1994, 1996).

- Low numbers – increased likelihood of stochastic extinction due to changes in demography, the environment, genetics, or other factors (USFWS 1994, 1996; Plant Extinction Prevention Program 2010)
- Climate change may also 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) has currently funded climate modeling that will help resolve these spatial limitations. We anticipate high spatial resolution climate outputs by 2013.

Current conservation efforts:

- Captive propagation for genetic storage and reintroduction – There are no reports of controlled propagation of this species, nor any genetic seed in storage by Harold L. Lyon Arboretum (2011), the Volcano Rare Plant Facility (2011), or National Tropical Botanical Garden (2011).

2.4 Synthesis

The interim stabilization goals for this species have not been met as there are currently no known individuals (Table 1) and not all threats are being managed (Table 2). Additional surveys are needed to confirm whether the species is extant. Therefore, *Cyanea copelandii* subsp. *copelandii* meets the definition of endangered as it remains in danger of extinction throughout its range.

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

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	No

			25 mature individuals each	
1996 (recovery plan)	0	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
2003 (critical habitat)	0	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
2012 (5-year review)	0	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No

Table 2. Threats to *Cyanea copelandii* subsp. *copelandii* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat, trampling	A, E	Ongoing	No
Established ecosystem-altering invasive plant species degradation of habitat	A	Ongoing	No
Collecting	B	(Previous threat)	No
Rodent predation or herbivory – Rats	C	Ongoing	No
Low numbers	E	Ongoing	No
Climate change	A, E	Increasing	No

3.0 RESULTS

3.1 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:

Brief Rationale:

3.3 Listing and Reclassification Priority Number:

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

- Surveys / inventories – A thorough survey of the areas where the last known *Cyanea copelandii* subsp. *copelandii* occurred should be undertaken, focusing on the southeastern slope of Mauna Loa, near Glenwood.
- Captive propagation for genetic storage and reintroduction – If the species is rediscovered, genetic material for *ex situ* maintenance should be collected, and the existing population protected.
- Alliance and partnership development – If the species is rediscovered, work with Hawaii Division of Forestry and Wildlife to initiate planning and contribute to implementation of ecosystem-level restoration and management for sites to reintroduce this species.

5.0 REFERENCES

- Bishop Museum. 2011. Herbarium Pacificum database. Available online at <http://nsdb.bishopmuseum.org/>. Accessed 14 March 2011.
- Harold L. Lyon Arboretum. 2011. Micropropagation inventory. Honolulu, Hawaii. Microsoft Access database. Unpublished.
- Hawaii Biodiversity and Mapping Program. 2010. Element occurrence record: *Cyanea copelandii* subsp. *copelandii*. 4 pages. Unpublished.
- Lammers, T.J. 1988. Chromosome numbers and their systematic implications in Hawaiian Lobelioideae (Campanulaceae). *American Journal of Botany* 75:1130-1134.
- Lammers, T.J., T.J. Givnish and K.J. Sytsma. 1993. Merger of the Hawaiian endemic genera *Cyanea* and *Rollandia* (Campanulaceae: Lobelioideae). *Novon* 3:437-441.
- National Tropical Botanical Garden. 2011. Controlled propagation report to U.S. Fish and Wildlife Service, Kalaheo, Hawaii. Unpublished.
- Plant Extinction Prevention Program. 2010. Annual report for Plant Extinction Prevention Program, fiscal year 2010 (July 1, 2009-June 30, 2010). 122 pages. Unpublished.
- [USFWS] U.S. Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants; determination of endangered or threatened status for 21 plants from the island of Hawaii, State of Hawaii; final rule. *Federal Register* 59(43):10305-10325.

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[USFWS] U.S. Fish and Wildlife Service. 2010. Rare plant tracking database. Honolulu, Hawaii, Pacific Islands Fish and Wildlife Office. 68 pages. Unpublished.

Volcano Rare Plant Facility. 2011. Controlled propagation report to U.S. Fish and Wildlife Service, Volcano, Hawaii. Unpublished.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999. Manual of the flowering plants of Hawaii, revised edition. University of Hawaii Press and Bishop Museum Press, Honolulu, Hawaii. Bishop Museum Special Publications 97. 1,919 pages.

Personal communications:

Bio, Kealii. 2010. Hawaii Island Plant Extinction Prevention Program Coordinator, Plant Extinction Prevention Program, Hilo, Hawaii. Email to Clyde Imada, Bernice Pauahi Bishop Museum, dated September 2010. Subject: *Cyanea copelandii* subsp. *copelandii*.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Cyanea copelandii* subsp. *copelandii* (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
 No Change in listing status

Appropriate Listing/Reclassification Priority Number, if applicable: _____

Review Conducted By:

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