# *Cyanea st.-johnii*
# (Haha)

## 5-Year Review
## Summary and Evaluation

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

# 5-YEAR REVIEW
# *Cyanea st.-johnii* (Haha)

## I. GENERAL INFORMATION

### A. Methodology used to complete the review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the Fish and Wildlife Service between July 2005 and June 2006. The Hawaii Biodiversity and Mapping Program was contracted to provide updated information on the current status of *Cyanea st.-johnii*. They also provided recommendations for future actions that may be needed prior to the next 5-year review. The evaluation of the lead PIFWO biologist was reviewed by the Plant Recovery Coordinator, whose comments were incorporated into the draft 5-year Review. The draft 5-year Review was then reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species before PIFWO submission to the Regional Office.

### B. Reviewers

**Lead Region:** Region 1

**Lead Field Office:** Pacific Islands Fish and Wildlife Office

### C. Background

#### 1. FR Notice citation announcing initiation of this review:

July 6, 2005. Endangered and Threatened Wildlife and Plants; Initiation of 5-year Reviews (of 33 species in Region 1). 70 FR 38972-38975.

#### 2. Species status:

Stable (FY 2006 Recovery Data Call)

#### 3. Recovery achieved:

1, meaning 0 - 25 percent of the identified recovery objectives for *Cyanea st.-johnii* have been achieved (FY 2006 Recovery Data Call)

#### 4. Listing history

Original Listing

FR notice: 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. *Federal Register* 61(198): 53089-53108.
Date listed: October 10, 1996
Entity listed: Species
Classification: Endangered

Revised Listing, if applicable
N/A

**5. Associated actions:**
Critical habitat was designated for *Cyanea st.-johnii* in two units totaling 2,057 acres (832 hectares) on Oahu (U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designations or nondesignations of critical habitat for 101 plant species from the island of Oahu, Hawaii. *Federal Register* 68(116): 35950-36406).

**6. Review History:** Just the original listing, designation of critical habitat, and recovery plan development actions.

**7. Species' Recovery Priority Number at start of review:** 5, meaning a species with a high degree of threat and a low recovery potential.

**8. Recovery Plan or Outline**

Name of plan: Recovery Plan for the Oahu Plants. 1998. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pp. plus appendices.
Date issued: August 10, 1998
Dates of previous revisions: N/A
Some of the actions outlined in the Recovery Plan have been initiated but not completed (*e.g.*, construct exclosures to protect populations from feral pigs; control nonnative plants within fenced exclosures). Some recovery actions will require long-term commitments (*e.g.*, maintenance of exclosure fences; weed and rat control) or may only be necessary intermittently (*e.g.*, provide protection against trampling by hikers).

## II. REVIEW ANALYSIS

### A. Application of the 1996 Distinct Population Segment (DPS) Policy
This Policy does not apply to plant species.

### B. Recovery Criteria
**1. Does the species have a final, approved recovery plan?**
__X__ *Yes*
*No*

**2. Does the recovery plan contain recovery (i.e., downlisting or delisting) criteria?**
__X__ *Yes*
*No*

3. **Adequacy of recovery criteria.**

a. **Do the recovery criteria reflect the best available (i.e., most up-to-date) information on the biology of the species and its habitat?**

__X__ *Yes*

____ *No*

b. **Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and there is no new information to consider regarding existing or new threats)?**

__X__ *Yes*

*No*

4. **List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors* are addressed by that criterion. If any of the 5-listing factors are not relevant to this species, please note that here**

The threats (Factors A, C, and E) affecting this species are discussed in detail in section II.D. Factors B and D are not considered a threat to this species.

Stabilizing, downlisting, and delisting objectives are provided in the Recovery Plan for Oahu Plants (Service 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Cyanea st.-johnii* is a short-lived perennial, and to be considered stable, this species must be managed to control threats (e.g. fenced) (Factors A, C, and E) and be represented in an *ex situ* collection. In addition, a minimum of three populations should be documented on the island of Oahu where the species now occurs or occurred historically. 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 not been met.

For downlisting, a total of five to seven populations of *Cyanea st.-johnii* should be documented on the island of Oahu where it now occurs or occurred historically. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats (Factors A, C, and E), with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of 5 consecutive years before downlisting is considered.

This recovery objective has not been met.

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A)Present or threatened destruction, modification or curtailment of its habitat or range;
B) Overutilization for commercial, recreational, scientific, or educational purposes;
C) Disease or predation;
D) Inadqequacy of existing regulatory mechanisms;
E) Other natural or manmade factors affecting its continued existence.

For delisting, a total of 8 to 10 populations of *Cyanea st.-johnii* should be documented on the island of Oahu where it now occurs or occurred historically. Each of these populations must be naturally reproducing, stable, or increasing in number, and secure from threats (Factors A, C, and E), with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of 5 consecutive years before delisting is considered.

This recovery objective has not been met.

## C. Synthesis

*Cyanea st.-johnii* is endemic to the island of Oahu, and was historically known from 11 populations in the central and southern Koolau mountains. In 1996 there were approximately 50 individuals in 5 populations along the central and southern Koolau summit. In 2003, 57 individuals were known in 7 occurrences at locations including the Waimano to Aiea summit trail, the summit crest between Manana and Kipapa trails, between Aiea and Halawa trails, the summit trail at Poamoho, and along the Wailupe to Waimanalo summit ridge (68 FR 35950). Currently there are 70 known individuals at Helemano Gulch, the Waiahole to Waiawa summit ridge, Waimano ridge, the Waihee to Waimalu summit ridge, the Ahuimanu-Halawa-Iolekaa summit ridge, and the Wailupe toWaimanalo summit ridge (U.S. Army 2005; A. Bakutis, Oahu Genetic Safety Net Program, pers. comm. 2006; J. Lau, Hawaii Biodiversity and Mapping Program, pers. comm. 2006). It is expected that additional populations will be discovered with further surveys for the species, as the Koolau summit areas are seldom visited by botanists due to remoteness, steep terrain, and the often inclement weather conditions (J. Lau, pers. comm. 2006).

Habitat degradation by feral pigs (*Sus scrofa*) is considered one of the major threats to *Cyanea st.-johnii* (Factor A) (Service 1998, 2003; U.S. Army 2005). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. The pig is originally native to Europe, northern Africa, Asia Minor, and Asia. European pigs became feral and invaded forested areas, especially wet and mesic forests and dry areas at high elevations. Feral pigs are currently present on Oahu and inhabit rain forests and grasslands. While rooting in the ground in search of the invertebrates and plant material they eat, feral pigs disturb and destroy vegetative cover, trample plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil and cause erosion, especially on slopes. Alien plant seeds are dispersed on their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these plants to establish. Feral pigs are the primary vector in the spread of many introduced plant species (Smith 1985; Stone 1985; Medeiros *et al.* 1986; Scott *et al.* 1986; Tomich 1986; Cuddihy and Stone 1990; Wagner *et al.* 1999a). Under the terms of the 2003 U.S. Fish and Wildlife Service's Biological Opinion for Routine Military Training on the island of Oahu, and the subsequent 2005 Draft Implementation Plan for Oahu Training Areas, the Army began fencing individuals of this species (Service 2003; U.S. Army 2005). To date, the Army has chosen three population units that encompass a large portion of the geographic and historical range of *Cyanea st.-johnii* at Helemano Gulch, the Waiahole-Waiawa summit ridge area, and the

Ahuimanu-Halawa-Iolekaa summit ridge. Fence construction to protect the Helemano Gulch population is underway and is expected to be completed in September 2006 (U.S. Army 2005).

Competition with and habitat degradation by invasive nonnative plant species is a major threat to *Cyanea st.-johnii* (Factors A and E). At the time of listing, the primary invasive nonnative plant species impacting *C. st.-johnii* was *Clidemia hirta* (Koster's curse) (61 FR 53092). When the Recovery Plan was published in 1998, the primary invasive nonnative plant species impacting *C. st.-johnii* included *Clidemia hirta*, *Axonopus fissifolius* (narrow-leaved carpetgrass), and *Sacciolepis indica* (Glenwood grass) (Service 1998). Currently, *Andropogon virginicus* (broomsedge) and *Psidium cattleianum* (strawberry guava) threaten *C. st.-johnii* in addition to those species previously mentioned (U.S. Army 2005). The Army will manage fenced populations of *C. st.-johnii* and conduct nonnative plant control (U.S. Army 2005).

Trampling by hikers has been identified as threat to the species, as the plants are sometimes located next to ridge top trails (Factor B) (Service 1998, 2003; 68 FR 35950). Trampling by participants of military training activities is a possible threat to the Helemano Gulch population in the Kawailoa Training Area, however, the threat is low since this population is in a remote area (U.S. Army 2005).

Feral pigs not only degrade the habitat of *Cyanea st.-johnii*, but also cause harm to the plants by feeding on them, trampling them, or uprooting them in search of invertebrate food (Factor C) (Service 1998, 2003; Army 2005; 68 FR 35950). Conservation measures have been initiated to reduce the threat of predation by feral pigs at fenced areas managed by the Army (U.S. Army 2005).

*Cyanea st.-johnii* is subject to rat (Factor C) (*Rattus* spp.) predation. Rats occur on all the main Hawaiian Islands around human habitations, in cultivated fields, and in dry to wet forests (Tomich 1986). Rats are known to eat the fruit and strip the bark of some native plants, particularly fruits of plants in the bellflower (Campanulaceae) family with fleshy stems and fruits (Wagner *et al.* 1995; Tomich 1986; Cuddihy and Stone 1990). Rats are controlled at Army-managed fenced areas by use of rat bait stations and snap traps (U.S. Army 2005).

Introduced slugs also pose a threat to *Cyanea st.-johnii* (Factor C) (Service 1998, 2003). Slugs feed on seedlings, stems, and fruit, thereby reducing the vigor of the plants and limiting regeneration (Service 1998). Field experiments conducted by Alvin Yoshinaga and Curt Daehler demonstrated that slugs could reduce the survival of *Cyanea* spp. seedlings by as much as 80 percent. Graduate student Stephanie Joe has been recently been hired by the Army as a Natural Resources Research Specialist, and included among her duties is the investigation of control of slug herbivory. Her research on slug impacts on *Cyanea* seedlings has revealed similar levels of mortality, approximately 53 percent (Joe 2006).

In addition to all of the other threats, species like *Cyanea st.-johnii* that are endemic to a small portion of a single island are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by random demographic fluctuations and localized catastrophes such as hurricanes and disease outbreaks (Factor E). The Army, in conjunction with the Oahu Genetic Safety Net Program, is addressing the threat to this

species from the small number of populations and small population sizes through genetic storage and propagation for eventual reintroduction of *C. st.-johnii* into its historical range. Propagation is occurring in the Army's baseyard and at the University of Hawaii's Lyon Arboretum (U.S. Army 2005; Service 2005). Genetic storage collections are being made and used as propagule sources for reintroductions and population augmentations. The target goals for each population in the wild are 50 mature, reproducing individuals, although outplantings have not yet been conducted (U.S. Army 2005). Some populations of *C. st.-johnii* will not be fenced, but will be managed for the collection of material for genetic storage conducted (U.S. Army 2005).

The recovery plan goals for genetic storage and stabilization of *Cyanea st.-johnii* have not been met and, therefore, *C. st.-johnii* meets the definition of endangered as it remains in danger of extinction throughout all of its range.

## III. RESULTS

### A. Recommended Classification:

____ **Yes, downlist to Threatened**
____ **Yes, uplist to Endangered**
____ **Yes, delist**
__X__ **No, no change is needed**

### B. New Recovery Priority Number __N/A__

## IV. RECOMMENDATIONS FOR FUTURE ACTIONS

- Search for new populations of *Cyanea st.-johnii*.
- Study *Cyanea st.-johnii* 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.
- Fence all populations of *Cyanea st.-johnii* and conduct weed control at fenced areas.

## V. REFERENCES

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**EXPERTS CONSULTED**

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

Current Classification __Endangered__

Recommendation resulting from the 5-Year Review

**Downlist to Threatened**
**Uplist to Endangered**
**Delist**
X **No change is needed**

Appropriate Listing/Reclassification Priority Number __N/A__

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