

## **5-YEAR REVIEW**

Short Form Summary

**Species Reviewed:** *Cyanea hamatiflora* ssp. *carlsonii* (Haha)

**Current Classification:** Endangered

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

[USFWS] U.S. Fish and Wildlife Service. 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.

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

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

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

Christian Torres-Santana, Student Trainee Biologist

Marie M. Bruegmann, Plant Recovery Coordinator

Marilet A. Zablan, Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species

Gina Shultz, 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 (PIFWO) of the U.S. Fish and Wildlife Service (USFWS) beginning on March 8, 2007. The review was based on the proposed rule and final critical habitat designation for *Cyanea hamatiflora* ssp. *carlsonii* and other species from the island of Hawaii (USFWS 2002, 2003), as well as a review of current, available information. The Bernice P. Bishop Museum provided an initial draft of portions of the 5-year review and recommendations for conservation actions needed prior to the next five-year review. The evaluation of the status of the species was prepared by our 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.

### **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)).

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

This Policy does not apply to plants.

### **Review Analysis:**

Please refer to the proposed and final rule for critical habitat designation for *Cyanea hamatiflora* ssp. *carlsonii* published in the Federal Register on May 28, 2002, and July 2, 2003, respectively (USFWS 2002, 2003) 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. hamatiflora* ssp. *carlsonii*.

At the time of federal listing, *Cyanea hamatiflora* ssp. *carlsonii* was known to occur at two sites on the island of Hawaii, on the western slope of Hualalai and the southwestern slope of Mauna Loa. These two populations are still extant and are located on privately and State-owned land at Keokea (Olelomoana) and Honuauulu Forest Reserve. At the time of listing the two populations contained approximately 19 individuals (USFWS 1994). The declining Honuauulu population currently has only two mature individuals, and the Olelomoana population contains 12 mature individuals and 3 juvenile individuals (Big Island Plant Extinction Prevention Program 2007; USFWS 2008b). Two subpopulations were planted in 1995 and 1996 within the native range: 45 individuals at Honuauulu Forest Reserve and six at Puu Waawaa (USFWS 1996). In addition two individuals were outplanted in a fenced area in South Kona in 2006 and one in Kipahoe Natural Area Reserve in 2008 (Volcano Rare Plant Facility 2006, 2008). The current status of the outplanted individuals is not known.

Both populations of *Cyanea hamatiflora* ssp. *carlsonii* are located in degraded native *Acacia koa*/*Metrosideros polymorpha* (koa/ohia) montane wet forest at elevations between 4,000 and 5,700 feet (1,220 and 1,740 meters). Associated native plants include *Myoporum sandwicense* (naio), *Kadua* sp. (pilo), and *Zanthoxylum* sp. (ae) (USFWS 1996).

The major threats to *Cyanea hamatiflora* ssp. *carlsonii* are competition from invasive introduced plant species (Factor E), particularly pasture grasses at the Olelomoana population and *Passiflora mollissima* (banana poka) at Honuauulu. These invasive species compete with individuals of *C. hamatiflora* ssp. *carlsonii* for nutrients, water and light (USFWS 1996; Plant Extinction Prevention 2007). Grazing and trampling by cattle (*Bos taurus*) (Factors A, C, and D) continues to be a major threat to the two populations (USFWS 1994). Habitat destruction and damage to the individual plants by feral pigs (*Sus scrofa*) (Factors A, C, and D) are a concern for the Honuauulu population (Plant Extinction Prevention Program 2007). Browsing and trampling of the surrounding habitat by feral goats (*Capra hircus*) (Factors A, C, and D) is also a potential threat (USFWS 1991, 1996, 2008).

Rats (*Rattus* spp.), various alien birds, and various slug species are a potential predation threat to the subspecies (Factor C), with the plant's juicy fruit being a particular target, and thereby reducing the number of juvenile recruits (USFWS 1996, 2008; Plant Extinction Prevention Program 2007). Field botanists have also noted that the mature fruit are being impacted by a unidentified disease that makes the seed non-viable (Factor C) (Plant Extinction Prevention Program 2007). Seeds have also been damaged by an unidentified caterpillar in the past (Factor C) (USFWS 1996).

Extinction due to random environmental events and/or reduced reproductive vigor due to the small number of existing populations and individuals (Factor E) are a concern for *Cyanea hamatiflora* ssp. *carlsonii*. The Olelomoana population occurs on private lands and is unfenced (Plant Extinction Prevention 2007). Species like *C. hamatiflora* ssp. *carlsonii* that are endemic to small portions 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, landslides, flooding and disease outbreaks (Factor E). When considered on their own, the natural processes associated with being a single island endemic do not affect *C. hamatiflora* ssp. *carlsonii* to such a degree that it is threatened or endangered with extinction in the foreseeable future, but these natural processes can exacerbate the threat from anthropogenic factors, such as habitat loss from or predation by introduced species (Factor E) (USFWS 1996).

To safeguard existing genetic material, propagation for genetic storage and reintroduction is occurring at the University of Hawaii's Lyon Arboretum Micropropagation Laboratory and the Volcano Rare Plant Facility (Harold L. Lyon Arboretum Micropropagation Laboratory Database 2007; Volcano Rare Plant Facility 2007, 2008). Two subpopulations were planted in 1995 and 1996 within the native range: 45 individuals at Honualua Forest Reserve and six individuals at Puu Waawaa (USFWS 1996). In addition two individuals were outplanted in a fenced area in south Kona in 2006 and one in Kipahoe Natural Area Reserve in 2008 (Volcano Rare Plant Facility 2006, 2008).

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for plants from the island of Hawaii (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Cyanea hamatiflora* ssp. *carlsonii* is a short-lived perennial, and to be considered stabilized, which is the first step in recovering the species, 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 Hawaii. 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 as only 14 wild and 54 reintroduced individuals remain, (see Table 1). Therefore, *Cyanea hamatiflora* ssp. *carlsonii* meets the definition of endangered as it remains in danger of extinction throughout its range.

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

- Continue collection of genetic resources for storage, future propagation and reintroducing into protected suitable habitat within historical range.
- Control introduced invasive plant species around wild and outplanted plants.

- Construct large-scale fences around all naturally occurring and reintroduced individuals to exclude feral ungulates.
- Control rats around wild and outplanted individuals.
- Collect fruit from any reintroduced individuals that set seed to add to the genetic diversity of the *ex situ* material.
- Initiate planning and contribute to implementation of ecosystem level restoration and management to benefit this species.
- Assess the genetic variability within the two extant populations.
- Study *Cyanea hamatiflora* ssp. *carlsonii* 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.

#### **References:**

Harold L. Lyon Arboretum Micropropagation Laboratory. 2007. MicroPropagation database. University of Hawaii at Manoa. Unpublished.

Plant Extinction Prevention Program. 2007. Big Island Plant Extinction Prevention Program Excel spreadsheet. 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.

[USFWS] U.S. Fish and Wildlife Service. 1996. Recovery plan for the Big Island plant cluster. U.S. Fish and Wildlife Service, Portland, OR. 202+ pages.

[USFWS] U.S. Fish and Wildlife Service. 2002. Endangered and threatened wildlife and plants; designation of critical habitat for plant species from the island of Hawaii, HI; proposed rule. Federal Register 6(102):36968-37106.

[USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designation and nondesignation of critical habitat for 46 plant species from the island of Hawaii, HI; final rule. Federal Register 68(127):39624-39761.

[USFWS] U.S. Fish and Wildlife Service. 2008. Rare plant tracking database. Pacific Islands Fish and Wildlife Office, Honolulu, HI. Accessed on April 28, 2008. Unpublished.

Volcano Rare Plant Facility. 2006. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

Volcano Rare Plant Facility. 2007. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

Volcano Rare Plant Facility. 2008. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

**Table 1. Status of *Cyanea hamatiflora* ssp. *carlsonii* from listing through 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> |
|-------------------------|-----------------------------|-----------------------|---|--------------------------------------|
| 1994 (listing)          | 19                          | Unknown               | All threats managed in all 3 populations              | No                                   |
|                         |                             |                       | Complete genetic storage                              | No                                   |
|                         |                             |                       | 3 populations with 50 mature individuals each         | No                                   |
| 1996 (recovery plan)    | 14                          | 51                    | All threats managed in all 3 populations              | No                                   |
|                         |                             |                       | Complete genetic storage                              | No                                   |
|                         |                             |                       | 3 populations with 50 mature individuals each         | No                                   |
| 2003 (critical habitat) | 14                          | Unknown               | All threats managed in all 3 populations              | No                                   |
|                         |                             |                       | Complete genetic storage                              | No                                   |
|                         |                             |                       | 3 populations with 50 mature individuals each         | No                                   |
| 2008 (5-year review)    | 17                          | 54                    | All threats managed                                   | No                                   |
|                         |                             |                       | Complete genetic storage                              | Partially                            |
|                         |                             |                       | 3 populations with 50 mature individuals each         | No                                   |

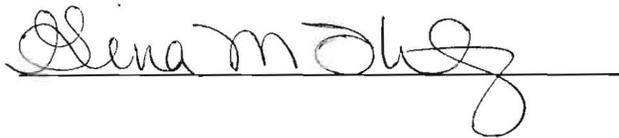
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SIGNATURE PAGE for 5-YEAR REVIEW of *Cyanea hamatiflora* ssp. *carlsonii*

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

Acting Field Supervisor, Pacific Islands Fish and Wildlife Office

  
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Date   21 July 2009