5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyanea copelandii* subsp. *haleakalaensis* (haha)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2009. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 103 species in Hawaii. Federal Register 74(49):11130-11133.

Lead Region/Field Office:

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

Name of Reviewer(s):

Marie Bruegmann, Plant Recovery Coordinator, PIFWO
Jess Newton, Recovery Program Lead, PIFWO
Assistant Field Supervisor for Endangered Species, PIFWO

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 March 16, 2009. The review was based on final critical habitat designations for *Cyanea copelandii* subsp. *haleakalaensis* and other species from the island of Maui (USFWS 2003) 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 Recovery Program Lead and the Assistant Field Supervisor for Endangered Species 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 designations for *Cyanea copelandii* subsp. *haleakalaensis* published in the Federal Register on May 14, 2003 (USFWS 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. copelandii* subsp. *haleakalaensis*.

At the time of listing in 1999, there were 235 known individuals of *Cyanea copelandii* subsp. *haleakalaensis* (USFWS 1999). Currently, there are 25 widely distributed populations containing more than 300 individuals in East Maui (Bily *et al.* 2008).

Cyanea copelandii subsp. *haleakalaensis* is endemic to East Maui. It was known from approximately 200 individuals in several populations around Haiku Uka, the ridge above Kuhiwa Valley, Kipahulu, and Hanawi. It was also known historically from Waikamoi to Kipahulu. In addition, a survey in 2007 observed 16 subpopulations with a total of around 100 individuals along the banks of streams in the Piinaau drainage in Koolau Gap and the headwater drainages of Wailua Nui, Wailua Iki, and Kopiliula (Bily *et al.* 2008). At this same location in the east Piinaau drainages, *Cyanea copelandii* subsp. *haleakalaensis* was also observed in 2007 at 878 meters (2,880 feet) and 884 meters (2,900 feet) elevations, where it was rare but scattered throughout the area (Wood 2009). In Hana District in 2007, in the Koolau Forest Reserve, *Cyanea copelandii* subsp. *haleakalaensis* was observed to be common along a large drainage of Wailua Nui west, and in small drainages with flowing water in headwaters above Waiokamilo and Kano Stream at 1,158 meters (3,800 feet) elevation (Wood 2009). Several clumps were also seen in the west fork of Wailua Iki on stream banks at 1,113 meters (3,650 feet) elevation, and 10 individuals were observed in a boulder strewn area at 1,097 meters (3,600 feet) elevation (Wood 2009). In the Lower Waikamoi area, *Cyanea copelandii* subsp. *haleakalaensis* was observed at 994 meters (3,260 feet) elevation in 1992, and in 2007, about 50 individuals were seen in the same area at 899 meters (2,950 feet) elevation (Oppenheimer 2009; Perlman 2009).

In Kipahulu Valley, East Maui, on Palikea Stream, scattered plants were observed on stream banks at 945 meters (3,100 feet) elevation in 1994 (Perlman 2009). In 2004, Haleakala National Park staff found two new populations of *Cyanea copelandii* subsp. *haleakalaensis* at 869 meters (2,850 feet) and 951 meters (3,120 feet) elevations on the Lower Shelf of Kipahulu (Haleakala National Park Resource Management, Vegetation Management 2004). An additional individual was found in 2005 on the Upper Shelf at 1,006 meters (3,300 feet) elevation (Haleakala National Park Resource Management, Vegetation Management 2005). In 2007, an additional population of *Cyanea copelandii* subsp. *haleakalaensis* was located in Kipahulu Valley at 975 meters (3,200 feet) elevation (Haleakala National Park Resource Management, Vegetation Management 2007). In 2009, on Palikea Stream, in the Delta Camp region, 10 to 20 individuals were observed in the general region at 914 meters (3,000 feet) elevation during a three-day survey (Wood 2009). Two populations of *Cyanea copelandii* subsp. *haleakalaensis* have also been identified in Kaapahu within the Haleakala National Park (Welton and Haus 2008). Oppenheimer observed several small populations with about 20 plants in Kipahulu Valley along the central pali (cliff) stream in the Lower Shelf area in 2004 (Oppenheimer 2009). In 2010, Haleakala National Park staff estimated 300 to 400 individuals occurring in the Park (USFWS 2010).

The fruits of *Cyanea copelandii* subsp. *haleakalaensis* are able to float and disperse via stream flow (Oppenheimer 2009).

In lower Waikamoi, the habitat is *Metrosideros polymorpha* (ohia) montane wet forest with *Broussaisia arguta* (kanawao), *Cheirodendron trigynum* (olapa), *Cibotium* spp. (hapuu), *Clermontia arborescens* (oha wai nui), *C. kakeana* (haha), *Coprosma pubens* (pilo), *Cyanea mceldowneyi* (haha), *Cyrtandra grayana* (keokeo haiwale), *Diplazium sandwichianum* (pohole), *Ilex anomala* (kawau), *Labordia hedyosmifolia* (kamakahala), *Myrsine lessertiana* (kolea lau nui), *Nothocestrum longifolium* (aiea), *Perrottetia sandwicensis* (waimea), *Psychotria* sp. (kopiko), *Touchardia latifolia* (olona), and *Vaccinium* sp. (ohelo) (Perlman 2009).

In Kipahulu Valley, the Palikea Stream habitat is *Acacia koa* (koa) – *Metrosideros polymorpha* montane wet forest with sections of *Dicranopteris linearis* (uluhe) fernland, with associated native species including *Bidens campylotheca* subsp. *pentamera* (kookoolau), *Broussaisia arguta*, *Cheirodendron trigynum*, *Cibotium* spp., *Clermontia arborescens*, *C. kakeana*, *Coprosma pubens*, *Cyrtandra grayana*, *C. spathulata* (keokeo haiwale), *Diplazium sandwichianum*, *Freycinetia arborea* (ie ie), *Ilex anomala*, *Labordia hedyosmifolia*, *Kadua affinis* (manono), *Machaerina angustifolia* (uki), *Melicope ovalis* (alani), *M. volcanica* (alani kuahiwi), *Myrsine lessertiana*, *Nothocestrum longifolium*, *Perrottetia sandwicensis*, *Pipturus* sp. (mamake), *Psychotria* sp., *Rubus hawaiiensis* (akala), *Touchardia latifolia*, and *Vaccinium* sp. (Perlman 2009).

At Koolau Gap, in the east Piinaau drainages of Keanae Valley, the habitat is *Metrosideros polymorpha* forest with *Broussaisia arguta*, *Cheirodendron trigynum*, *Coprosma ochracea* (pilo), *Clermontia arborescens* subsp. *waihiae*, *Cyrtandra grayi* (keokeo haiwale), *C. paludosa* (moa), *C. platyphylla* (ilihia), *Kadua affinis*, *Perrottetia sandwicensis*, and *Rubus hawaiensis* (Wood, 2009). Associated ferns include *Amauropelta globulifera* (palapalai Kamapuaa), *Christella* sp., *Dicranopteris linearis*, *Diplazium* sp., *Diplopterygium pinnatum* (uluhe lau nui), and *Pneumatopteris* sp. (laukahi) (Bily *et al.* 2008).

In the Wailua Nui region's headwaters above Waiokamilo and Kano Stream, the habitat is *Metrosideros polymorpha – Cheirodendron trigynum – Dicranopteris linearis* montane wet forest, with *Clermontia arborescens*, *Coprosma* spp., *Cyrtandra* spp., *Kadua affinis*, *Myrsine* spp. (kolea), *Perrottetia sandwicensis*, *Peperomia* spp. (ala ala wai nui), and *Pipturus albidus* (mamake) with a rich moss and fern understory (Wood 2009).

In the West Wailua Iki region, the habitat is *Metrosideros polymorpha – Cheirodendron trigynum –Dicranopteris linearis w*et forest dissected by riparian vegetation, associated with *Broussaisia argutus*, *Cheirodendron* sp., *Cibotium* sp., *Clermontia* sp., *Pipturus* sp., and *Sadleria* sp. (amau) (Wood 2009).

Threats to this species include feral pigs (*Sus scrofa*) which degrade habitat at most sites, although little pig damage was observed at the Wailua Nui region. Invasive introduced plant species that degrade habitat and compete with *Cyanea copelandii* subsp. *haleakalaensis* include *Ageratina adenophora* (sticky snakeroot), *Axonopus fissifolius* (carpetgrass), *Clidemia hirta* (Koster's curse), *Cortaderia jubata* (pampas grass), *Hedychium flavescens* (yellow ginger), *H. gardnerianum* (Kahili ginger), *Hypochoeris*

radicata (hairy cat's ear), *Juncus planifolius* (rush), *Paspalum conjugatum* (Hilo grass), *P. urvillei* (vasey grass), *Pluchea carolinensis* (sourbush), *Prunella vulgaris* (selfheal), *Psidium cattleianum* (strawberry guava), *Rhynchospora caduca* (beak rush), *Rubus argutus* (blackberry), *Setaria palmifolia* (palmgrass), *Rubus rosifolius* (thimbleberry), and *Tibouchina herbacea* (glorybush) (Oppenheimer 2009; Perlman 2009; Wood 2009). Flooding and landslides are also a threat to *Cyanea copelandii* subsp. *haleakalaensis* (Oppenheimer 2009).

Seed predation by rats (*Rattus* spp.) and consumption of leaves and stems by slugs (unidentified species) and mongoose (*Herpestes javanicus*) are threats to *Cyanea copelandii* subsp. *haleakalaensis* (Perlman 2009; USFWS 2002; Wood 2009).

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.

Cuttings of this taxon have been collected and propagation was attempted by the Harold L. Lyon Arboretum, although none of the cuttings existed as of April 2001 (USFWS 2002). About twenty cuttings and six fruits from the Kipahulu Lower Shelf area were planted in the Haleakala nursery in 2004 (Haleakala National Park Resource Management, Vegetation Management 2004), and in 2005 five individuals were growing in the nursery collected from the Upper Shelf area of Kipahulu (Haleakala National Park Resource Management, Vegetation Management 2005). In 2006, 14 individuals were reintroduced in the Kipahulu Upper Shelf area at 914 to 1,000 meters (3,000 to 3,280 feet) elevation (Haleakala National Park Resource Management, Vegetation Management 2006). Eight individuals were reintroduced in Kipahulu in 2007 (Haleakala National Park Resource Management, Vegetation Management 2007). In 2008, Haleakala National Park had 16 individuals growing in the nursery representing 12 founders from Kipahulu (Haleakala National Park 2008). Currently, Haleakala National Park has 7 individuals growing in their nursery and 8 individuals were reintroduced in 2009 (Haleakala National Park 2010). Oppenheimer collected seeds from several plants on private lands in 2006 for storage at the Center for Conservation Research and Training Seed Storage Facility (Oppenheimer 2009). Currently, the Center for Conservation Research and Training Seed Storage Facility (2009) has 6,985 seeds in storage. The Lyon Arboretum Micropropagation Laboratory has 109 propagules of plants in storage (Harold L. Lyon Arboretum Micropropagation Laboratory 2009).

The current focus of the East Maui Watershed Partnership Program includes control of *Miconia calvescens* (in concert with the Maui Invasive Species Committee), fencing, and removal of feral pigs across the upper elevations of the watershed above 1,065 to 1,220 meters (3,500 to 4,000 feet) (USFWS 2002).

Stabilizing, downlisting, and delisting objectives are provided in the addendum to the recovery plan for the Multi-island plants (USFWS 2002), based on whether the species is

an annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. *Cyanea copelandii* subsp. *haleakalaensis* 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* (off-site) collection. In addition, a minimum of three populations should be documented on islands where they now occur or occurred historically. For the species to be considered stable, 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. Although, there are more than 300 individuals in Haleakala National Park, no population contains more than 50 mature individuals (Table 1), and all threats are not being managed (Table 2). Therefore, *Cyanea copelandii* subsp. *haleakalaensis* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Fence all populations to provide protection against the negative impacts of feral ungulates.
- Maintain adequate genetic stock for populations outside the National Park, as well as those in the Park boundaries.
- Control invasive introduced plant species in all populations.
- Control rats in the vicinity of these populations.
- Develop and implement an effective method of slug control.
- Propagate for reintroduction augmentation.
- Conduct a thorough survey throughout the current and historical range of the species to determine the current status.
- Work with Hawaii Division of Forestry and Wildlife, National Park Service, East Maui Watershed Partnership Program, and other land managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

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

Date	No. wild indivs	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1999 (listing)	235	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2002 (recovery plan)	204	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	204	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2010 (5-year review)	300	30	All threats managed in all 3 populations	Partially (Table 2)
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

Table 2. Threats to *Cyanea copelandii* subsp. *haleakalaensis* habitat.

Threat	**Listing factor**	**Current Status**	**Conservation/ Management Efforts**
Ungulates – habitat modification and herbivory	A, D	Ongoing	Partially: fencing and removal of pigs in East Maui populations
Rats – herbivory	C	Ongoing	No
Slugs – herbivory	C	Ongoing	No
Mongoose – herbivory	C	Ongoing	No
Invasive introduced plants	A, E	Ongoing	Partially: only controlling *Miconia calvescens*
Landslides and flooding	A, E	Ongoing	No
Climate change	A, E	Increasing	No

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SIGNATURE PAGE for 5-YEAR REVIEW of *Cyanea copelandii* subsp. *haleakalaensis* (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
__X__ No Change in listing status

Field Supervisor, Pacific Islands Fish and Wildlife Office

_____ Date 8/24/11