

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyanea truncata* (Haha)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2010. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 69 species in Idaho, Washington, Hawaii, Guam, and the Commonwealth of the Northern Mariana Islands. Federal Register 75(67):17947-17950.

Lead Region/Field Office:

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

Name of Reviewer(s):

Chelsie Javar, Fish and Wildlife Biologist, PIFWO

Marie Brueggemann, Plant Recovery Coordinator, PIFWO

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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 April 8, 2010. The review was based on a review of current, available information since the last 5-year review for *Cyanea truncata* (USFWS 2007). 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 Chelsie Javar, Fish and Wildlife Biologist, was reviewed by 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.

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).

Review Analysis:

Please refer to the previous 5-year review for *Cyanea truncata* published on August 2, 2007 (available at http://ecos.fws.gov/docs/five_year_review/doc1132.pdf) and the recovery plan for Oahu plants (USFWS 1998), for a complete review of the species' status, threats, and management efforts. No new threats or 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. truncata*

This short-lived shrub is endangered and occurs on the island of Oahu (USFWS 1998). The current status and trends for *Cyanea truncata* are provided in the tables below.

New taxonomic information:

None reported.

New threats:

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.

New management actions:

- Ungulate exclosure:
 - The wild population in Kahana is protected by fenced exclosures.
 - In 2006 to 2007, all reintroduced populations were fenced, except for Makaua exclosure A. The fence at Makaua exclosure A was badly damaged by heavy rains that occurred in March 2006 (Plant Extinction Prevention Program 2007). As of March 2008, the fenced exclosure at Makaua was not repaired; however there were no signs of ungulate activity inside the exclosure (Plant Extinction Prevention Program 2008).
 - In December 2007, a fence enclosing about 3.5 hectares (9.0 acres) of wet forest habitat was constructed in Makaua Valley which is known as Makaua exclosure B (Plant Extinction Prevention Program 2007).
 - In the winter of 2007, a fenced exclosure was constructed at Hakipuu on property owned by Kualoa Ranch (Plant Extinction Prevention Program 2007). Later that year, a feral piglet (*Sus scrofa*) entered the fenced exclosure at Hakipuu and destroyed six of the smaller reintroduced individuals of *Cyanea truncata* (Plant Extinction Prevention Program 2007). The fence was retrofitted to prevent future ingress by feral ungulates.
- Ungulate control – In 2006 to 2007, all reintroduced populations were ungulate-free, except for Makaua exclosure A (Plant Extinction Prevention Program 2007).
- Ecosystem-altering invasive plant species control – During 2007 to 2010, weeds were controlled within the fenced exclosures at Kahana Valley, Hakipuu, and Makaua exclosures A and B (Plant Extinction Prevention Program 2010).
- Predator / herbivore control:
 - In 2007, staff of Kualoa Ranch monitored and controlled rats using bait stations located at Hakipuu and Makaua exclosure B (Plant Extinction Prevention Program 2007).

- In 2006, rats were controlled at Kahana by the Plant Extinction Prevention Program (2007).
- The Hakipuu population contains 10 reintroduced individuals of *Cyanea truncata*, which are all descended from the Kahana founder plant number 2.
- Threats monitoring and control – Within the fenced exclosures at Kahana Valley, Hakipuu, and Makaua A and B staff of the Plant Extinction Prevention Program monitored for slugs (Plant Extinction Prevention Program 2010).
- Captive propagation for genetic storage and reintroduction:
 - In 2008, there were 1,086 individuals in storage at the Lyon Arboretum Micropropagation Laboratory (Plant Extinction Prevention Program 2008).
 - In 2008, the Center for Conservation Research and Training Seed Storage Laboratory had 14,386 seeds in storage (Plant Extinction Prevention Program 2008).
 - In 2008, the Pahole Rare Plant Facility had five seedlings growing at their nursery (Plant Extinction Prevention Program 2008).
 - In 2009, there were 14,143 seeds in storage at the Center for Conservation Research and Training Seed Storage Laboratory (2009).
 - In 2010, there were 18,171 seeds of *Cyanea truncata* in storage at the Center for Conservation Research and Training Seed Storage Laboratory (2010).
- Reintroduction / translocation implementation:
 - In February 2007, 12 individuals of *Cyanea truncata* were reintroduced into Makaua exclosure B. In March 2008, an additional four individuals of *C. truncata* were reintroduced into the exclosure (Plant Extinction Prevention Program 2008).
 - In the winter of 2007, 10 individuals of *Cyanea truncata* were reintroduced into the Hakipuu exclosure (Plant Extinction Prevention Program 2008).
- Reintroduced / translocated population management and monitoring:
 - In September of 2006, most of the reintroduced individuals of *Cyanea truncata* at the Makaua exclosure A were in moderate to poor health due to heavy slug damage (Plant Extinction Prevention Program 2007). Mite damage was also observed on two of the reintroduced individuals. In September 2007 and March 2008, most of the reintroduced individuals of *C. truncata* at Makaua exclosure A continued to experience damage by slugs and were in moderate to poor health (Plant Extinction Prevention Program 2008). In 2007, the Makaua exclosure A contained nine reintroduced individuals of *C. truncata* (Plant Extinction Prevention Program 2007). In January 2010, only two reintroduced individuals of *C. truncata* remained within Makaua exclosure A (Plant Extinction Prevention Program 2010).
 - In 2008, staff of the Plant Extinction Prevention Program monitored and collected fruit from the reintroduced population at Kahana Valley on a monthly basis (Plant

- Extinction Prevention Program 2007, 2009). No seedlings were noted at Kahana Valley due to heavy predation by nonnative slugs (Plant Extinction Prevention Program 2008). In August 2008, fruit was collected from the reintroduction site at Kahana (Plant Extinction Prevention Program 2009). In January 2010, only six reintroduced individuals of *Cyanea truncata* remained within the Kahana enclosure (Plant Extinction Prevention Program 2010).
- In 2008, only 2 of the 10 reintroduced individuals of *Cyanea truncata* remained within the Hakipuu enclosure (Plant Extinction Prevention Program 2008). Six of those individuals were destroyed in June 2007 when the small piglet entered the enclosure; the other two individuals were killed as a result of heavy slug damage (Plant Extinction Prevention Program 2008). In October 2009, the Hakipuu enclosure contained four reintroduced individuals of *C. truncata* (Plant Extinction Prevention Program 2010).
 - During May and June 2008, staff of Kualoa Ranch and the Plant Extinction Prevention Program monitored the reintroduced population at Makaua enclosure B (Plant Extinction Prevention Program 2007). Most of the individuals were in good health with a few individuals in moderate condition, slug damage was noted as minimal (Plant Extinction Prevention Program 2008). In January 2010, only seven reintroduced individuals of *Cyanea truncata* remained within Makaua enclosure B (Plant Extinction Prevention Program 2010).
 - Population viability monitoring – In 2008 through 2010, the wild individuals at Kahana Valley were monitored and fruit was collected (Plant Extinction Prevention Program 2009, 2010).

Synthesis:

In 2010, the only wild population of *Cyanea truncata* consisted of two mature individual at Kahana Valley (Plant Extinction Prevention Program 2010). As of 2010, there were four reintroduction sites containing 33 individuals (mature and immature) of *C. truncata* in Kahana Valley: One is located within the same gulch as the wild population in Kahana (12 individuals), one at Makaua enclosure A (10 individuals), one at Makaua enclosure B (7 individuals), and one at Hakipuu (4 individuals) (Plant Extinction Prevention Program 2010).

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for plants from the island of Oahu (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Cyanea truncata* is a short-lived perennial, and to be considered stable, 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 Oahu. 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, as there are no known populations containing more than 50 mature individuals (Table 1) and all threats are only being partially managed throughout all of the populations (Table 2). Therefore, *Cyanea truncata* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Captive propagation for genetic storage and reintroduction:
 - Continue to collect seeds from tagged individuals, keeping close track of the maternal source for use in *ex situ* propagation.
 - Continue to collect seeds from all existing populations and send to at least two or three different venues for propagation.
- Reintroduction / translocation implementation – Continue to reintroduce the species back into its known historical range.
- Ungulate exclosures:
 - Continue to construct fenced exclosures around existing and reintroduced populations to provide protection from feral ungulates.
 - Monitor fenced exclosures for evidence of breaching by feral ungulates.
- Ungulate control – Continue to protect all populations against disturbances from feral ungulates.
- Ecosystem-altering invasive plant species control – Continue to control invasive introduced plant species around all populations.
- Predator / herbivore control – Continue to implement effective control methods for rodents.
- Surveys / inventories – Continue to conduct thorough surveys of all suitable habitats where *Cyanea truncata* was historically seen.
- Threats research:
 - Conduct studies to develop and implement control methods for slugs around all known populations.
 - Assess the modeled effects of climate change on this species, and use to determine future landscape needed for the recovery of the species.
- Population biology research – Study *Cyanea truncata* 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.
- Alliance and partnership development – Work with the Hawaii Division of Forestry and Wildlife, and other land managers to initiate planning and contribute to

implementation of ecosystem-level restoration and management to benefit this species.

Table 1. Trends of *Cyanea truncata* from listing through current 5-year review.

Date	No. wild indivs	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 50 mature individuals each	No
1998(recovery plan)	0	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	1	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2007 (5-yr review)	3	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2012 (5-yr review)	2	~19	All threats managed in all 3 populations	Partially (see Table 2)
			Complete genetic storage	Yes
			3 populations with 50 mature individuals each	No

Table 2. Threats to *Cyanea truncata* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat	A, D	Ongoing	Partially: Both sites at Kahana, Hakipuu, and Makaua B are ungulate-free and fenced; the fence at Makaua A is damaged
Established ecosystem-altering invasive plant species	A	Ongoing	Partially: Weeds controlled at both Kahana sites, Makaua B, and Hakipuu
Rodent predation or herbivory – Rats	C	Ongoing	Partially: Rats controlled at both Kahana sites, Hakipuu, and, Makaua B
Slugs herbivory	C	Ongoing	Partially:
Established invasive plant species competition	E	Ongoing	Partially: Weeds controlled at both Kahana sites, Makaua B, and Hakipuu
Drought	E	Ongoing	No
Low numbers	E	Ongoing	Partially: Captive propagation and genetic storage, reintroduction / translocation implementation, and monitoring
Climate change	A, E	Increasing	No

References:

See previous 5-year review for a full list of references (USFWS 2007). Only references for new information are provided below.

Center for Conservation Research and Training Seed Storage Laboratory. 2010. Seed bank inventory. Honolulu, Hawaii. Microsoft Access database. Unpublished.

Plant Extinction Prevention Program. 2007. Section 6 annual performance report; endangered plant restoration and enhancement - Oahu Plant Extinction Prevention (formerly Genetic Safety Net) Species (EPRE 12), July 1, 2006 to June 30, 2007. 65 pages. Unpublished.

Plant Extinction Prevention Program. 2009. Annual report for Plant Extinction Prevention program, fiscal year 2009 (July 1, 2008-June 30, 2009). 115 pages. Unpublished.

Plant Extinction Prevention Program. 2010. Plant Extinction Prevention Program annual report, fiscal year 2010 (July 1, 2009-June 30, 2010). 122 pages. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages + appendices. Available online at <<http://www.fws.gov/pacificislands/recoveryplans.html>>.

[USFWS] U.S. Fish and Wildlife Service. 2007. *Cyanea truncata* (haha) 5-year review, summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 9 pages. Available online at <http://ecos.fws.gov/docs/five_year_review/doc1132.pdf>.

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

Appropriate Listing/Reclassification Priority Number, if applicable: _____

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