

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyanea crispa* (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 58 species in Washington, Oregon, California, and Hawaii. Federal Register 75(226):71726-71729.

Lead Region/Field Office:

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

Name of Reviewer(s):

Vickie Caraway, Plant Biologist, PIFWO

Dan Clark, Oahu, Kauai, Northwest Hawaiian and American Samoa Islands Team Manager, PIFWO

Marie Brueggemann, Plant Recovery Coordinator, PIFWO
Recovery Program Lead, PIFWO

Kristi Young, Programmatic Deputy Field Supervisor, 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 January 31, 2012. The review was based on a review of current, available information since the last five-year review for *Cyanea crispa* (USFWS 2009). The National Tropical Botanical Garden provided an initial draft of portions of the five-year review and recommendations for conservation actions needed prior to the next five-year review. The document was reviewed by the Plant Biologist, Plant Recovery Coordinator, Islands Team Manager, and Plant Recovery Coordinator, followed by the Recovery Program Lead. It was then reviewed and approved by the Programmatic Deputy Field Supervisor.

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 crispa* published on April 8, 2009 (available at http://ecos.fws.gov/docs/five_year_review/doc2459.pdf) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species biological status has come to light since listing to warrant a change in the Federal listing status of *C. crispa*.

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

New status information:

In 2012, the Oahu Army Natural Resource Program (OANRP) staff reported a total of 20 mature individuals, 22 immature individuals, and three immature reintroduced individuals occurring in nine separate sites: Aihualama (1 mature), Makuaua (1 mature, 7 immature), Crispa Rock KLO-A (2 mature, 2 immature); Helemano (3 reintroduced immature); Kahana-Makaua (7 mature, 7 immature); Radio Snail Grid (1 immature); Crispa Rock PAP-B (1 immature); Wailupe Gulch (6 mature, 1 immature), and Kawaiiki (3 mature and 3 immature) (OANRP 2012; M. Keir, OANRP, pers. comm. 2012). No information was available concerning other populations because the sites have not been surveyed in recent years.

The last five-year review included a report of a total of 118 individuals, including estimates made in 2005 by Joel Lau, some of which have since been updated by the Army (USFWS 2009; M. Keir, pers. comm. 2012), indicating that the species has declined.

New threats:

- Climate change - Climate change may 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) funded climate modeling that will help resolve these spatial limitations. High spatial resolution climate outputs are expected to be available in 2013.

New management actions:

- Reintroduction / translocation - Three individuals reintroduced in the Helemano fenced enclosure in February 2007 remain surviving (U.S. Army Garrison 2011; M. Keir, pers. comm. 2012).
- Captive propagation for genetic storage and reintroduction
 - Small amounts of seeds from two populations are represented in genetic storage (U.S. Army Garrison 2011).
 - Two 1992 seed collections are in storage at the National Tropical Botanical Garden (NTBG) (M. Clark, NTBG, pers. comm. 2012).
 - In 2012, the Harold L. Lyon Arboretum (2012) had approximately 673 *Cyanea crispa* seeds in seed storage and 23 individuals in micropropagation storage.
- Captive propagation protocol development - For propagation in tissue culture, the best results were obtained following refrigeration, with intact fruit, and bleach sterilization (Sugii 2011).
- Invertebrate control research – Quantified research demonstrated significant invertebrate impact on survival of *Cyanea* species (Joe and Daehler 2008). State of Hawaii permitted use of the pesticide “Sluggo,” a pesticide, was obtained in 2012 allowing for control and eradication of slugs in natural areas. Prior to having the ability to use Sluggo in the State of Hawaii, existing slug control

methods (e.g. traps baited with beer, copper barriers) were highly labor intensive and of limited efficacy (Joe 2011).

- Predator / herbivore control – Rat predation is being addressed by developing more effective methods for rat control in areas where endangered species occur (Mosher *et al.* 2010).

Synthesis:

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 ten years), or a long-lived perennial. *Cyanea crispa* 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* (off-site) collection. In addition, a minimum of three populations should be documented on the island of Oahu. 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 stabilization goals for this species have not been met, as populations of 50 or more mature individuals do not exist (Table 1) and threats are not being managed throughout all of the populations (Table 2). Therefore, *Cyanea crispa* meets the definition of endangered, as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Surveys / inventories - Survey the geographical and historical range of *Cyanea crispa* to assess status of known populations and possible additional populations.
- Captive propagation for genetic storage and reintroduction - Collect seeds from any reintroduced individuals that set seed to add to the genetic diversity of the *ex situ* material.
- Ungulate exclosures - Continue construction of exclosure fences to protect individuals from the adverse effects of feral pigs
- Ecosystem-altering invasive plant species control - Eradicate introduced invasive plant species within ungulate exclosures and maintain the exclosures free of introduced invasive plants.
- Herbivory control - Continue implementation of rat and slug control methods.
- Genetic research
 - Assess genetic variability within extant populations.
 - Develop a plan for conserving the species' genetic diversity in *ex situ* collections and in reintroduced populations.
- Reintroduction / translocation implementation – Augment current natural populations to increase numbers of individuals.
- Population biology research - Study *Cyanea crispa* 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.
- Population monitoring - Continue monitoring outplanted individuals in Helemano.

- Alliance and partnership development - Initiate planning and contribute to implementation of ecosystem-level management and restoration to benefit this species.

Table 1. Status and trends of *Cyanea crispa* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1994 (listing)	29	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	40	1	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	56	unknown	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2009 (5-yr review)	118	3	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			All threats managed in all 3 populations	No
2013 (5-yr review)	42	3	All threats managed in all 3 populations	Partially (Table 2)
			Complete genetic storage	No
			Naturally reproducing, stable, and increasing in number	No

Table 2. Status of threats to *Cyanea crispa* and ongoing conservation

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – habitat modification and herbivory	A, C, D, E	Ongoing	Partially
Human trampling, hikers and military training activity	E	Ongoing	Partially
Rats - herbivory	C	Ongoing	Partially
Snails and slugs - herbivory	C	Ongoing	Partially
Fire – habitat modification and plant destruction	A, E	Ongoing	Partially
Invasive introduced plants	A, E	Ongoing	Partially
Small population vulnerable to stochastic events	E	Ongoing	No
Climate change	A, E	Increasing	No

References:

See previous 5-year review for a full list of references (USFWS 2009). Only references for new information are provided below.

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U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Cyanea crispa* (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

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