5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyanea grimesiana* subsp. *obatae* (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 Bruegmann, Plant Recovery Coordinator, PIFWO
Jess Newton, Recovery Program Leader, 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 April 8, 2010. The review was based on a review of current, available information since the last 5-year review for *Cyanea grimesiana* subsp. *obatae* (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 grimesiana* subsp. *obatae* published on August 2, 2007 (available online at http://ecos.fws.gov/docs/five_year_review/doc1128.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 new information regarding the species biological status have come to light since listing to warrant a change in the Federal listing status of *Cyanea grimesiana* subsp. *obatae*.

This short-lived perennial shrub is endangered and occurs only on the island of Oahu (USFWS 1998). The current status and trends for *Cyanea grimesiana* subsp. *obatae* 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:
  - In 2007, an ungulate proof fence was constructed around a population of *Cyanea grimesiana* subsp. *obatae* in Palikea (U.S. Army Garrison 2007).
  - In 2008, ungulate proof fences were completed at Puu Palikea and Ekahanui population units which will include additional habitat for reintroductions of *Cyanea grimesiana* subsp. *obatae* (U.S. Army Garrison 2008).
  - In 2008, a large scale management unit fence was completed by staff of the Oahu Natural Area Reserve System in the Kapuna and Keawapilau portion of the Pahole to West Makaleha population unit (U.S. Army Garrison 2008).
  - In 2009, the management unit fences at Central Kaluaa, Makaha, Palikea (South Palawai) were completed (U.S. Army Garrison 2009).
- Ungulate control:
  - In 2009, the management unit fences at Central Kaluaa, Makaha, Palikea (South Palawai) were considered feral pig-free (*Sus scrofa*) (U.S. Army Garrison 2009).
  - In 2010, ungulates were controlled by staff of the Oahu Army Natural Resources Program at all population units containing individuals of *Cyanea grimesiana* subsp. *obatae* (U.S. Army Garrison 2010).
- Ecosystem-altering invasive plant species control:
  - In 2007, control of invasive plant species continued at all sites except Palikea Gulch (U.S. Army Garrison 2007).
  - In 2010, weeds were controlled at the Pahole to West Makaleha population unit, Central Kaluaa, the north branch of South Ekahanui, and Palikea (south Palawai) population units (U.S. Army Garrison 2010).

- Captive propagation protocol development – Seeds from *Cyanea grimesiana* subsp. *obatae* were sent to the National Center for Genetic Resource Preservation in Colorado for -150 degrees Celsius (lN2) seed storage testing (U.S. Army Garrison 2008).
- Captive propagation for genetic storage and reintroduction:
    - In 2008, mature, viable seed was collected from the last (fifth) Pahole founder individual of *Cyanea grimesiana* subsp. *obatae* that is represented at the Pahole reintroduction site (U.S. Army Garrison 2008). Seeds were propagated for use in future reintroductions at the Pahole reintroduction site (U.S. Army Garrison 2008).
    - In 2010, there were three propagules of *Cyanea grimesiana* subsp. *obatae* at the Pahole Rare Plant Facility (2010).
    - In 2010, the National Tropical Botanical Garden (2010) had 3,750 seeds of this species in storage.
    - In 2010, the Lyon Arboretum (Harold L. Lyon Arboretum 2010) had 267 individuals of *Cyanea grimesiana* subsp. *obata*e in micropropagation.
    - In 2010, there were 20 individuals of *Cyanea grimesiana* subsp. *obatae* growing at the U.S. Army Garrison nursery, five individuals in micropropagation, and approximately 260 seeds in storage at the U.S. Army's seed laboratory (U.S. Army Garrison 2010). All available founders from the Makaha, Central Kaluaa, South Kaluaa, South Ekahanui, and Pahole to West Makaleha population units are now represented in genetic storage (U.S. Army Garrison 2010).
- Reintroduction / translocation site selection – In 2007, the U.S. Army Garrison identified three reintroduction sites for *Cyanea grimesiana* subsp. *obatae* within the Palikea, Central and North Kaluaa, and the north branch of South Ekahanui population units (U.S. Army Garrison 2007).
- Reintroduction / translocation implementation:
    - In 2007, nine individuals of *Cyanea grimesiana* subsp. *obatae* were reintroduced at a new site in North Kaluaa (U.S. Army Garrison 2007).
    - In 2009, three individuals were reintroduced into the West Makaleha population unit (U.S. Army Garrison 2009).
    - In 2009 and 2010, reintroductions of *Cyanea grimesiana* subsp. *obatae* continued at South Ekahanui, Pahole to West Makaleha, and Central and South Kaluaa population units (U.S. Army Garrison 2009, 2010); exact numbers were not provided.
- Reintroduced / translocated population management and monitoring:
    - In 2007, natural recruitment of reintroduced individuals was not observed at the reintroduction sites at North and Central Kaluaa, Palikea, and the north branch of South Ekahanui (U.S. Army Garrison 2007).

- In 2009, staff of the Oahu Army Natural Resources Program reported that reintroduced individuals of *Cyanea grimesiana* subsp. *obatae* in the Central Kaluaa population unit continued to decline despite the inclusion of supplemental reintroductions (U.S. Army Garrison 2009). Since 2004, only 50 reintroduced individuals of *C. grimesiana* subsp. *obatae* remained displaying a 33 percent survivorship. Slug damage and herbivory was documented as the common cause of death for individuals at Central Kaluaa (U.S. Army Garrison 2009).
- In 2010, reintroduced individuals at Palikea (South Palawai) population unit were observed in flower, increasing the number of mature individuals (U.S. Army Garrison 2010).

- Predator / herbivore control:
  - In 2010, rats (*Rattus* sp.) were controlled at the Pahole to West Makaleha, central and south Kaluaa, and at the north branch of south Ekahanui and Palikea (South Palawai) population units (U.S. Army Garrison 2010).
  - In 2010 at the Pahole to West Makaleha population unit, rat control grids were set up to protect individuals of *Cyanea grimesiana* subsp. *obatae* (U.S. Army Garrison 2010).
- Threats research:
  - In 2007, staff of the U.S. Army Garrison conducted research to develop methods to control slugs (U.S. Army Garrison 2007).
  - In 2010, surveys were conducted for slugs at wild and reintroduced sites by staff of U.S. Army Garrison (2010).

Synthesis:

As of 2010, the current wild population of *Cyanea grimesiana* subsp. *obatae* was located at Pahole to West Makaleha (five mature, 6 immature, and 4 seedlings), Palikea gulch (a single immature individual), Central Kaluaa (a single mature and immature individual), Mahaka (a single mature individual), and at the Palikea (South Palawai) population units (11 mature, 23 immature, and a single seedling) (U.S. Army Garrison 2010). The total population including reintroduced and wild individuals of *C. grimesiana* subsp. *obatae* at the following population units were as follows: Pahole to West Makaleha population unit had 40 mature, 15 immature, and 4 seedlings; Central Kaluaa had 24 mature and 17 immature individuals; Palikea (South Palawai) had 97 mature, 30 immature, and a single seedling; and Makaha had a single seedling (U.S. Army Garrison 2010). In total, there are approximately 18 wild mature and 161 reintroduced mature individuals, 31 wild immature and 67 reintroduced immature individuals, and 5 wild seedlings of *C. grimesiana* subsp. *obatae*.

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 grimesiana* subsp. *obatae* 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 only been partially met, as there is only a single population at Palikea (South Palawai) containing 50 or more mature individuals (Table 1) and all threats are only being partially managed (Table 2). Therefore, *Cyanea grimesiana* subsp. *obatae* 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 – Conduct thorough surveys of appropriate habitat in historical locations to determine the current status of *Cyanea grimesiana* subsp. *obatae*.
- 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.
- Fire protection – Develop and implement a fire management plan for all populations of *Cyanea grimesiana* subsp. *obatae*.

- Invertebrate control research – Conduct studies to determine the effects of the two-spotted leaf hopper on populations of *Cyanea grimesiana* subsp. *obatae*. If research identifies that control is necessary, develop and implement effective control techniques.
- Population viability monitoring – Study *Cyanea grimesiana* subsp. *obatae* populations with regard to population size and structure, geographical distribution, flowering cycles, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- Alliance and partnership development – Work with the U.S. Army and other land managers to continue planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

Table 1. Status of *Cyanea grimesiana* subsp. *obatae* from listing through current 5-year review.

Date	No. wild indivs	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1994 (listing)	~18	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	13	19	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	16	unknown	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2007 (5-year review)	24	401	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2012 (5-yr review)	~18 (wild); 161 (reintroduced)	67	All threats managed in all 3 populations	Partially (see Table 2)
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially

Table 2. Threats to *Cyanea grimesiana* subsp. *obatae* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat and herbivory	A, C, D	Ongoing	Partially: Ungulates controlled at all sites by the U.S. Army
Established ecosystem-altering invasive plant species	A	Ongoing	Partially: Weeds controlled at all sites by U.S. Army
Rodent predation or herbivory – Rats	C	Ongoing	Partially: Rats controlled at Pahole to west Makaleha, Central Kaluaa, South Kaluaa, and at the north branch of South Ekahanui and Palikea (South Palawai) population units by U.S. Army
Invertebrate predation or herbivory – Two-spotted leaf hopper	C	Ongoing	No
Slug herbivory	C	Ongoing	Partially: Populations monitored for slugs by U.S. Army
Fire	E	Ongoing	No
Established invasive plant species competition	E	Ongoing	Partially: Weeds controlled at all sites by U.S. Army
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.

Harold L. Lyon Arboretum. 2010. Micropropagation database. Honolulu, Hawaii. Unpublished.

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Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 611 pages. Available online at <http://manoa.hawaii.edu/hpicesu/dpw_mit.htm>.

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[USFWS] U.S. Fish and Wildlife Service. 2007. *Cyanea grimesiana* subsp. *obatae* (no common name) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu. 9 pages. Available online at <http://ecos.fws.gov/docs/five_year_review/doc1128.pdf>.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Cyanea grimesiana* subsp. *obatae* (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

Appropriate Listing/Reclassification Priority Number, if applicable:_____

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