

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Clermontia peleana* (‘oha wai)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2013. Endangered and threatened wildlife and plants; Initiation of 5-year status reviews of 44 species in Oregon, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 78(24):8185-8187.

Lead Region/Field Office:

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

Name of Reviewer(s):

Chelsie Javar-Salas, Plant Biologist, PIFWO

Marie Bruegmann, Plant Recovery Coordinator, 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 March 4, 2013. The review was based on a review of current, available information since the last 5-year review for *Clermontia peleana* (USFWS 2008). The evaluation by Chelsie Javar-Salas, Plant Biologist, was reviewed by the Plant Recovery Coordinator. It was subsequently 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 at: http://ecos.fws.gov/tess_public.

Review Analysis:

Please refer to the previous 5-year review for *Clermontia peleana* published on January 18, 2008 (available at: http://ecos.fws.gov/docs/five_year_review/doc1769.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. peleana*.

This short-lived perennial epiphytic (on *Acacia koa*, *Cheirodendron trigynum*, *Cibotium* spp., and *Metrosideros polymorpha*) shrub or tree in the bellflower family (Campanulaceae) is endangered. There are two subspecies: *C. peleana* ssp. *peleana* known from the Island of Hawaii and *C. peleana* ssp. *singuliflora* known from east Maui and Hawaii Island (Lammers 1999). The status and trends for *C. peleana* are provided in the tables below.

New status information:

Clermontia peleana ssp. *peleana*

In 2009, there were four wild mature and two wild immature individuals in a single population in Hilo Forest Reserve (Plant Extinction Prevention Program [PEPP] 2009). In 2015, five wild plants remained (J. VanDeMark, PEPP, pers. comm. 2014).

There are five outplanted populations of *Clermontia peleana* ssp. *peleana* containing approximately 3,155 individuals at: Hakalau Forest National Wildlife Refuge (257 individuals), Hawaii Volcanoes National Park (144 individuals) and at the Kahuku Unit (320 individuals), Kulani Area (34 individuals), and Kilauea Forest (2,400 individuals) (PEPP 2009, 2010, 2011; Hawaii Volcanoes National Park 2010, 2011, 2014; Volcano Rare Plant Facility 2013).

Clermontia peleana ssp. *singuliflora*

Clermontia peleana ssp. *singuliflora* was last seen in 1920 on east Maui (Hawaii Biodiversity Mapping Program 2008) and was recently rediscovered on Parker Ranch lands on Hawaii Island in 2010 (The Nature Conservancy 2010). More than 30 individuals were found. The discovery was made during a survey for rare tree snails when they came across a native *Clermontia* plant that they could not identify in the field (The Nature Conservancy 2010). Photographs of the plant were sent to Dr. Thomas Lammers, a recognized *Clermontia* specialist at the University of Wisconsin Oshkosh, who identified the plant as *Clermontia peleana* subsp. *singuliflora*. In 2014, 7 wild individuals and 168 outplanted individuals were observed (PEPP 2014).

Overall, the numbers of individuals have increased for both subspecies due to systematic and concentrated survey efforts. *Clermontia peleana* ssp. *singuliflora* was rediscovered in the wild and there are seven individuals and 168 outplanted individuals. The number of wild individuals for *C. peleana* subsp. *peleana* has increased from none wild individuals reported in the previous 5-year review to five wild individuals. There are five populations containing approximately 3,155 reintroduced individuals of *C. peleana* subsp. *peleana* (PEPP 2009, 2010, 2011; Hawaii Volcanoes National Park 2010, 2011, 2014; Volcano Rare Plant Facility 2013).

New threats:

- Climate change destruction or degradation of habitat – Fortini *et al.* (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawaii using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. The assessment by Fortini *et al.* (2013) concluded that *Clermontia peleana* is minimally vulnerable to the impacts of climate change.

New management actions:

Clermontia peleana subsp. *peleana*

- Surveys / inventories

- A survey of the wild population in the Hilo Forest Reserve discovered one new individual near the known population (PEPP 2009). Another survey was done in 2012, but no individuals were found (PEPP 2013).
- Another survey was conducted at Hakalau Forest National Wildlife Refuge (NWR); no new individuals were discovered (PEPP 2009).
- Surveys were conducted in the Upper Waiakea Forest Reserve, Upper Keauhou Forest, and Hilo Forest Reserve in 2013; no individuals were found (State of Hawaii Department of Land and Natural Resources 2014).
- Ungulate monitoring and control
 - A new 10-acre fenced enclosure was constructed near an existing 5-acre enclosure in the Upper Waiakea Forest Reserve. The enclosure will benefit from the reintroduction of the following species *Argyroxiphium kauense*, *Clermontia peleana* subsp. *peleana*, *Cyanea platyphylla*, *Cyanea shipmanii*, and *Fragaria chiloensis* (PEPP 2009).
- Captive propagation for genetic storage and reintroduction
 - Five air layers were established on three of the four wild individuals in the Hilo Forest Reserve (PEPP 2010).
 - The Volcano Rare Plant Facility (2013) has 39 plants propagated in their nursery representing three collections. The Facility propagated 281 plants for outplantings next year. Meanwhile, 175 individuals were outplanted at Puu Makaala (5), Kulani (9), Hawaii Volcanoes National Park (47), and Kilauea Forest (114) in 2013.
 - In 2014, the Volcano Rare Plant Facility (2014) had 14 plants propagated in their nursery. The Facility propagated 423 plants for outplantings next year. Meanwhile, a total of 254 individuals were outplanted at Kulani (20) and Hawaii Volcanoes National Park Kahuku Unit (234).
 - The use of air layering for species collection purposes was researched using nursery stock plants at the Volcano Rare Plant Facility (PEPP 2009).
- Reintroduction / translocation
 - In 2008, 300 individuals were reintroduced within three sites at Hakalau Forest NWF (PEPP 2009).
 - In 2009, 42 seedlings were reintroduced within the Thurston Special Ecological Area (Hawaii Volcanoes National Park 2010). In 2010, 87 seedlings were added to the Thurston site. By November 2010, 94.3 percent of the total reintroduced individuals were still alive (7 to 12 months post planting). In 2011, 23 seedlings were planted (Hawaii Volcanoes National Park 2011). In January 2013, 83.6 percent of the seedlings were alive (22.3 to 38.8 months post planting) (Hawaii Volcanoes National Park 2013). All of the seedlings outplanted were F1 generation propagated from individuals outplanted in Olaa.
 - In 2012, 38 seedlings from a single founder were reintroduced in the Kahuku Unit enclosure (Hawaii Volcanoes National Park 2013). Survival was high (97 percent) four months post planting. An additional 47 were reintroduced in February 2013. In 2013, survival remained high at 93 percent 5.5 to 17 months post planting. An additional 100 seedlings were reintroduced in August 2013. In 2014, an additional 135 individuals of *C. peleana* subsp. *peleana* were outplanted

- at the same site (Hawaii Volcanoes National Park 2014). All plants were propagated at the Volcano Rare Plant Facility.
- Population viability monitoring and analysis
 - Previously outplanted individuals of *C. peleana* subsp. *peleana* were monitored for reports of high mortality due to predation by slugs or potential damage from rat (*Rattus* sp.) and kalij pheasant (*Lophura leucomelanos*) at Puu Kipu (PEPP 2009).
 - In 2010, the wild population was monitored and investigated to determine the possibility of establishing air layers to use as collection material (PEPP 2010)
 - More than 80 percent of the 300 individuals outplanted at Hakalau Forest National Wildlife Refuge in 2008 are surviving (PEPP 2010).
 - The wild population was monitored and air layers were checked to determine if they were ready to be collected (PEPP 2011).
 - Of the 25 individuals reintroduced at Hakalau Forest National Wildlife Refuge, around 70 percent remained as of 2010 (PEPP 2011).
 - Three of the five reintroduced sites in the Kilauea Area reported 80 percent survival for the 3,000 individuals reintroduced (PEPP 2011).
 - The wild population was monitored (PEPP 2012, 2013, 2014).
 - Alliance and partnership development – Hawaii Volcanoes National Park (2013) is partnering with the Hawaii Island Plant Extinction Prevention Program and the Hawaiian Silversword Foundation to implement large scale recovery efforts for *C. peleana* to prevent this species from extinction. The partnership will help to provide additional seedlings for reintroduction. All seven founders have been propagated by seeds or airlayers and are under cultivation at the Volcano Rare Plant Facility.

Clermontia peleana subsp. *singuliflora*

- Captive propagation for genetic storage and reintroduction
 - The Volcano Rare Plant Facility (2013) has 21 plants propagated in their nursery. The Facility propagated 161 individuals for reintroduction by the Kohala Watershed Partnership in 2013.
 - The Volcano Rare Plant Facility (2014) has 15 plants propagated in their nursery.
- Population viability monitoring and analysis – In 2014, the wild and reintroduced population was monitored (PEPP 2014).
- Listing and critical habitat designation – A single unit of critical habitat for *C. peleana* was proposed in the lowland wet ecosystem on Maui (USFWS 2012). The final rule for critical habitat designations has not been published at the time of this review.

Synthesis:

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for Big Island plant cluster (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Clermontia peleana* 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 Hawaii Island, and, if possible,

at least one other island where it now occurs or where it occurred historically. 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 been partially met, as there are four reintroduced populations containing more than 50 mature individuals per population (Table 1). However, there are less than 10 mature individuals known in the wild for each subspecies (Table 1). In addition, all threats are not being sufficiently managed throughout all of the populations (Table 2). Therefore, *Clermontia peleana* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Surveys / inventories – Survey geographical and historical range for a current assessment of the species’ status.
- Captive propagation for genetic storage and reintroduction – Continue collection of genetic resources for storage, propagation, and reintroduction into protected suitable habitat within historical range.
- Ungulate monitoring and control – Maintain existing exclosures and monitor for potential incursions.
- Invasive plant monitoring and control – Eradicate invasive introduced plants within ungulate exclosures and maintain exclosures free of invasive plants.
- Population viability monitoring and analysis – Continue monitoring wild and reintroduced individuals.
- Climate change adaptation strategy – Research the suitability of habitat for reintroducing this species in the future due to the impacts of climate change.
- Alliance and partnership development – Initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this taxon.

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

Date	No. wild indivs	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1994 (listing)	8	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	8	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	0	12	All threats managed in all 3 populations	No
			Complete genetic storage	Yes
			3 populations with 50 mature individuals each	No
2008 (5-yr review)	0	144	All threats managed in all 3 populations	Partially
			Complete genetic storage	Yes
			3 populations with 50 mature individuals each	No
2015 (5-yr review)	subsp. <i>peleana</i> -5; subsp. <i>singuliflora</i> -7	subsp. <i>peleana</i> -3,155; subsp. <i>singuliflora</i> -168	All threats managed in all 3 populations	Partially
			Complete genetic storage	Yes
			3 populations with 50 mature individuals each	Yes

Table 2. Threats to *Clermontia peleana* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – degradation of habitat and herbivory	A, C, D, E	Ongoing	Yes, all reintroductions are in fenced areas
Invasive introduced plants	A, E	Ongoing	None
Slug herbivory	C	Ongoing	None
Rodent predation or herbivory – rats	C	Ongoing	None
Low numbers	E	Ongoing	Yes, captive propagation for genetic storage and reintroduction
Climate change	A, E	Increasing	None

References:

See previous 5-year review for a full list of references (USFWS 2008). Only references for new information are provided below.

Fortini, L., J. Price, J. Jacobi, A. Vorsino, J. Burgett, K. Brinck, F. Amidon, S. Miller, S. Gon II, G. Koob, and E. Paxton. 2013. A landscape-based assessment of climate change vulnerability for all native Hawaiian plants. Technical report HCSU-044. Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hawaii. 141 pages.

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Hawaii Volcanoes National Park. 2014. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

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Lammers, T. 1999. Campanulaceae, bellflower family. Pages 420-489 in Wagner, W.L., D.R. Herbst, and S.H. Sohmer (editors), Manual of the flowering plants of

- Hawaii, revised edition. University of Hawaii Press, Bishop Museum Press, Honolulu.
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- State of Hawaii Department of Land and Natural Resources. 2014. Department of Land and Natural Resources, Division of Forestry and Wildlife, Section 6 annual performance report for plant restoration and enhancement, threatened, endangered, candidate, and species of concern outplanting, Hawaii. July 1, 2013 – June 30, 2014. 4 pages. Unpublished.
- The Nature Conservancy. 2010. Membership newsletter, fall 2010, volume 34, number 2. Available online at <
<http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/hawaii/publications/2010-winter-newsletter-pdf.pdf>>. Accessed 20 May 2015.
- [USFWS] U.S. Fish and Wildlife Service. 1996. Recovery plan for the Big Island plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 202+ pages.

[USFWS] U.S. Fish and Wildlife Service. 2008. *Clermontia peleana* 5-year review short form summary. Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii. 6 pages.

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; listing 38 species on Molokai, Lanai, and Maui as endangered and designating critical habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 species; proposed rule. Federal Register 77(112):34464-34775.

Volcano Rare Plant Facility. 2013. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

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Personal communication:

VanDeMark, Joshua R. 2014. Hawaii Island Coordinator, Plant Extinction Prevention Program. E-mail to Donna Ball, Pacific Islands Fish and Wildlife Office, dated September 26, 2014. Subject: status updates.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Clermontia peleana* ('oha wai)

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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Date 2015-07-21