

5-YEAR REVIEW

Short Form Summary

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

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. Federal Register 88(83): 20088–20092, May 7, 2018.

Lead Region/Field Office:

Interior Region 12/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

Name of Reviewer:

Cheryl Phillipson, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, PIFWO

Megan Laut, Conservation & Restoration Team Manager, PIFWO

Methodology used to complete this 5-year review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (Service) beginning in October 2019. The review was based on a review of current, available information since the last 5-year review for *Clermontia peleana* (USFWS 2015). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Conservation and Restoration Team Manager.

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 reviews for *Clermontia peleana* published in the Federal Register on January 18, 2008 and July 21, 2015 (available at https://ecos.fws.gov/docs/five_year_review/doc1769.pdf and https://ecos.fws.gov/docs/five_year_review/doc4538.pdf) for a complete review of the species’ status, threats, management efforts, and references cited. We are not aware of any significant new information regarding the species’ biological status since listing to warrant a change in the Federal listing status of *C. peleana*.

This short-lived perennial shrub or tree (sometimes epiphytic) in the Campanulaceae (bellflower) family is endangered. There are two subspecies: *Clermontia peleana* subsp. *peleana* (island of Hawai‘i) and *C. peleana* subsp. *singuliflora* (island of Hawai‘i (extant)

and east Maui (extirpated)). The status and trends for *C. peleana* are provided in the tables below.

New Status Information:

Clermontia peleana subsp. *peleana*

- Currently, there are approximately 10 wild individuals in two areas at Pi‘ihonua on the island of Hawai‘i (PEPP 2019). More than 1,000 individuals have been planted in 10 populations since the 5-year review in 2015 (PEPP 2019).

Clermontia peleana subsp. *singuliflora*

- Currently, there are approximately six mature and 26 immature wild plants in the Kohala area on the island of Hawai‘i (PEPP 2019). More than 300 individuals have been planted in two populations since the 5-year review in 2015 (PEPP 2019).
- In 2016, one critical habitat was designated on east Maui for *C. peleana* subsp. *singuliflora* in the lowland wet ecosystem (6,507 ha; 16,079 ac) (81 FR 17790).

New Threats:

- Climate change loss or degradation of habitat—Climate change may pose a threat to this species. Fortini *et al.* (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawai‘i 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) was not conducted at the subspecies level for *Clermontia peleana*; however, the assessment concluded that the species is vulnerable to the impacts of climate change, with a vulnerability score of 0.252 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, additional management actions may be needed to conserve *C. peleana* into the future, such as locating key microsites that overlap with current and future climate envelopes for outplanting efforts.

New Management Actions:

- Surveys and inventories—The Plant Extinction Prevention Program (PEPP) reports surveying for new populations and monitoring of wild and planted populations at Pi‘ihonua (North and South), ‘O‘ōkala, Waiākea Lower, Umauma-Honohina, and Kahuku (PEPP 2015, 2016).
- Ungulate monitoring and control—
 - Hawai‘i Volcanoes National Park implements ungulate control and regular inspection and maintenance protocols for all fences to preclude ungulate ingress (Hawai‘i Silversword Foundation 2017). The Nāhuku area is now free of ungulates.
- Invasive plant monitoring and control—
 - Hawai‘i Volcanoes National Park controls invasive nonnative plants, especially those with potential to transform native ecosystems, in key areas of the Park (HSF 2017). The Park also follows strict sanitation

protocols for field vehicles and gear to prevent further spread of invasive nonnative plants. The Park's efforts have reduced invasive nonnative plants within Nāhuku to very low numbers.

- Captive propagation for genetic storage and reintroduction—
 - The Hawaiian Silversword Foundation (HSF) conducts a managed breeding program for *Clermontia peleana* subsp. *peleana* (HSF 2017). As hand pollination in the field is technically challenging, HSF is using air-layering of wild plants to produce propagules for reintroduction and hand pollination of plants grown in the greenhouse.
 - Hawai'i Volcanoes National Park (HAVO) reports propagation of 10 plants (subsp. *peleana*) from Waiākea representing two founders (HAVO 2019).
 - The Volcano Rare Plant Facility propagates both subspecies. For *Clermontia peleana* subsp. *peleana*: in 2015, the Volcano Rare Plant Facility (VRPF) reported eight plants in their living collection, 464 plants in propagation, and 265 plants that left the facility for reintroduction. In 2017, there were 12 plants in their living collection, and 213 plants for reintroduction. In 2019, there were 11 plants in the living collection, 171 in propagation, and 295 that left for reintroduction at Kahuku. For *Clermontia peleana* subsp. *singuliflora*: from 2015-2019 VRPF reported 15 plants in their living collection from six founders in Kohala. In 2019, an additional 41 plants were being propagated for reintroduction, and another 26 were reintroduced (VRPF 2015, 2017, 2019).
 - PEPP reports collection of fruit from plants at Pi'ihonua North for storage and propagation (PEPP 2017).
- Reintroduction and translocation—
 - The HSF reports reintroduction of *Clermontia peleana* subsp. *peleana* at two sites within Hawai'i Volcanoes National Park (HSF 2017). At Kahuku, HSF planted 697 immature plants between 2013 and 2016, representing five maternal founders. Survivorship exceeds 85 percent with some plants more than 2 m (6.6 ft) in height. Flowering has been observed twice in this reintroduction, in 2016 (one plant), and again in 2017 (six plants). At Nāhuku, HSF planted 110 seedlings between 2009 and 2011, representing the first maternal founder at this site. In 2015, HSF planted an additional 203 immature plants from five additional founders. Survivorship exceeds 85 percent, with some plants more than 3 m (9.8 ft) in height. No plants have been observed flowering (HSF 2017). HSF plans on planting seedlings representing the seventh (last known) founder in the next two years.
 - HAVO reports planting 149 plants (subsp. *peleana*) at Kahuku representing one individual from Waiākea, and planting six individuals, also at Kahuku, representing a second individual from Waiākea (HAVO 2019).
- Alliance and partnership development—Landscape restoration efforts implemented through the Three Mountain Alliance, a Federal, State, and private watershed partnership, may provide an expansion of protected (fenced and

managed) habitat for a larger number of reintroduced individuals of *C. peleana* subsp. *peleana* (HSF 2017).

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1994 (listing)	8, subsp. <i>peleana</i>	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1996 (recovery plan)	8, subsp. <i>peleana</i>	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, subsp. <i>peleana</i>	All threats managed in all 3 populations	No
			Complete genetic storage	Yes
			3 populations with 50 mature individuals each	No
2008 (5-year review)	1, subsp. <i>peleana</i>	144, subsp. <i>peleana</i>	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially, no regeneration

2015 (5-year review)	5, subsp. <i>peleana</i> 7, subsp. <i>singuliflora</i>	3,155, subsp. <i>peleana</i> ; 168, subsp. <i>singuliflora</i>	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Yes, no regeneration
Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2020 (5-year review)	ca 10, subsp. <i>peleana</i> ; ca 32, subsp. <i>singuliflora</i>	>1,000, subsp. <i>peleana</i> ; 302, subsp. <i>singuliflora</i>	All threats managed in all 3 populations	Partially, wild and 7 reintroduced populations fenced
			Complete genetic storage	Yes
			Reproduction (<i>i.e.</i> viable seeds, seedlings) at all 3 populations	No
			3 populations with 50 mature individuals each	No

* The Preventing Extinction Stage was established in 2011. Prior to 2011, the Interim Stabilization Stage was the first stage towards recovery (now it is the second stage after Preventing Extinction).

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

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate degradation of habitat	A	Ongoing	Partial, wild and 7 reintroduced populations fenced
Established ecosystem altering invasive plant	A	Ongoing	Partial, nonnative plant control at most populations

species degradation of habitat			
Climate change degradation or loss of habitat	A	Ongoing	None
Ungulate predation or herbivory	C	Ongoing	Partial, wild and 7 reintroduced populations fenced
Rodent predation or herbivory	C	Ongoing	None
Invertebrate predation or herbivory	C	Ongoing	None
Reduced viability due to low numbers and inbreeding effects	E	Ongoing	Partial, breeding program, hand pollination ongoing

Synthesis:

Currently there are 10 wild individuals of *Clermontia peleana* subsp. *peleana*, and six mature and 26 immature wild individuals of *C. peleana* subsp. *singuliflora* on the island of Hawai‘i. A landscape-based assessment of climate change vulnerability for native plants of Hawai‘i using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *C. peleana* is vulnerable to the effects of climate change. Seven populations of *C. peleana* are provided protection from feral ungulates by fencing. Nonnative plants are controlled at planting sites. Seed collection, propagation within a breeding program, and reintroduction are ongoing for both subspecies. More than 1,000 subsp. *peleana*, and more than 300 subsp. *singuliflora*, have been planted over the past five years; however, there is no natural reproduction observed and no regeneration. Hand pollination and air-layering techniques are used to improve propagation results. State, Federal and private partnerships work in coordination to provide conservation benefits for *C. peleana*.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the Big Island Plant Cluster (USFWS 1996), and have been updated according to the draft revised recovery objective guidelines developed by the Hawai‘i and Pacific Plants Recovery Coordinating Committee (HPPRCC 2011). The HPPRCC identifies an additional initial objective, the Preventing Extinction Stage, in addition to the Interim Stabilization, Delisting, and Downlisting objectives. Furthermore, life history traits such as breeding system, population size fluctuation or decline, and reproduction type (sexual or vegetative), have been included in the calculation of goals for the number of populations and reproducing individuals for each stage. The goals for each stage remain grouped by life span defined as annual, short-lived perennial (fewer than 10 years), or long-lived perennial.

Clermontia peleana is a short-lived perennial, sometimes epiphytic, shrub or tree. To prevent extinction, which is the first milestone in recovering the species, the taxon must be managed to control threats (e.g., fenced) and have 50 individuals (or the total number

of individuals if fewer than 50 exist) from each of three populations represented in *ex situ* (secured off-site, such as a nursery or seed bank) collections. In addition, a minimum of three populations should be documented on the islands of Hawai‘i and Maui where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings, saplings), with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Although there have been over 1,300 individuals reintroduced, mature outplanted individuals are not included in the population structure, but rather only mature plants at wild populations or mature plants from filial generations at reintroductions. There are no wild populations totaling at least 50 reproducing individuals. And while genetic storage goals are complete for both subspecies (Table 1), not all threats are not being managed (Table 1, Table 2). Therefore, *Clermontia peleana* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

We are not aware of any new threats or other significant new information regarding the species’ biological status since the last 5-year review in 2015. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2020.

- Surveys and inventories—Continue to survey suitable habitat and historical ranges of both subspecies for a thorough assessment of their status.
- Ungulate monitoring and control—Fence all known populations and continue to maintain fenced exclosures to protect individuals from the negative impacts of ungulates.
- Invasive plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species, and those that compete with both subspecies.
- Climate change adaptation strategy—Assess the modeled effects of climate change on these species and use to determine future landscape needed for their recovery.
- Predator and herbivore monitoring and control—Implement effective control methods for rodents and slugs.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- Reintroduction and translocation—Continue to reintroduce individuals into suitable habitat within historic range that is being managed for known threats to these subspecies to build resiliency and redundancy to reduce impacts of loss of viability.
- Population biology research—
 - Continue controlled breeding program for both subspecies.
 - Investigate techniques to improve natural recruitment.

- Alliance and partnership development—Continue to work with partners in planning and implementation of ecosystem-level restoration and management to benefit these subspecies.

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U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Clermontia peleana* ('ōhā 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
- X No Change in listing status

For Field Supervisor, Pacific Islands Fish and Wildlife Office

_____ Date _____