5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Viola chamissoniana* subsp. *chamissoniana* (pāmakani)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

Lead Region/Field Office:

Region 1/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 2018. The review was based on a review of current, available information since the last 5-year review for *Viola chamissoniana* subsp. *chamissoniana* (USFWS 2013). The evaluation completed 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 *Viola chamissoniana* subsp. *chamissoniana* published in the Federal Register on January 18, 2008, and August 15, 2013 (available at *https://ecos.fws.gov/docs/five_year_review/doc1785.pdf* and *https://ecos.fws.gov/docs/five_year_review/doc4193.pdf*) for a complete review of the species' status, threats, and management efforts. 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 *V. chamissoniana* subsp. *chamissoniana*.

This short-lived perennial shrub in the Violaceae (violet) family is endangered and endemic to O‘ahu. The current status and trends for *Viola chamissoniana* subsp. *chamissoniana* are provided in the tables below.

New Status Information:

- Currently, there are eight populations of *Viola chamissoniana* subsp. *chamissoniana* throughout the Waiʻanae mountains of Oʻahu, totaling approximately 200 mature and 300 immature wild individuals (Army Natural Resources Program-Oʻahu (ANRP) 2018). The are two additional occurences of 44 individuals at Puʻukūmakaliʻi and 50 individuals at Keaʻau; however, they have not been observed or reported on since 2004, and their current status is unknown.
- In 2012, 11 critical habitat units were designated in two ecosystems (lowland mesic and dry cliff) for *Viola chamissoniana* subsp. *chamissoniana* in the Waiʻanae mountains of Oʻahu (6,555 acres, 2,653 hectares) (77 FR 57648, September 18, 2012).

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 Hawaiʻi 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 *Viola chamissoniana*, on the species level, is vulnerable to the impacts of climate change, with a vulnerability score of 0.375 (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 this taxon into the future, such as locating key microsites that overlap with current and future climate envelopes for outplanting efforts.

New Management Actions:

- Captive propagation for genetic storage and reintroduction—
  - Lyon Arboretum Micropropagation Laboratory reports 158 explants in storage representing two individuals at Hālona, five individuals Puʻuhapapa, two individuals from Puʻukūmakaliʻi and five individuals from Makaleha (Lyon Arboretum 2018).
  - The ANRP reports propagation of 155 individuals representing 28 wild individuals from populations at Hālona, Makaleha, Puʻuhapapa, and Puʻukūmakaliʻi (U.S. Army 2018).

Synthesis:

Currently there are fewer than 300 mature individuals and 300 immature individuals of *Viola chamissoniana* subsp. *chamissoniana* in the Waiʻanae mountains of Oʻahu. A landscape-based assessment of climate change vulnerability for native plants of Hawaiʻi using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *V. chamissoniana* is vulnerable to the effects of climate change. Collection and propagation are ongoing. Ungulate fencing protects individuals of *V. chamissoniana* subsp. *chamissoniana* at ʻŌhikilolo and Mākaha.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the O‘ahu Plants (USFWS 1998), 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.

Viola chamissoniana subsp. *chamissoniana* is a short-lived perennial shrub. To prevent extinction, which is the first step 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 O‘ahu where they now occur or occurred historically and each of these populations must be naturally reproducing (*i.e.,* viable seeds, seedlings, saplings) and increasing in number, with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Only one population totals more than 50 mature individuals. There is partial genetic representation for five populations (all less than 50 percent) and not all threats are managed (Table 1, Table 2). Therefore, *Viola chamissoniana* subsp. *chamissoniana* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
Other than the new data on this taxon's vulnerability to climate change, we are not aware of any new threats. There is no significant new information regarding the species’ biological status since the last 5-year review in 2013. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2019.

- Ungulate monitoring and control—Complete construction, maintain, and monitor ungulate exclosures for each population to protect plants from the impacts of feral ungulates.
- Invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *Viola chamissoniana* subsp. *chamissoniana* at all populations.
- Fire management—Implement fire management plans and coordinate fire response efforts.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use to determine future landscape needed for the recovery of the species.

- Captive propagation for genetic storage and reintroduction—Continue cuttings and seed collections from tagged wild and outplanted individuals, keeping close track of the maternal source for use in *ex situ* propagation.
- Reintroduction—Augment and establish new populations and determine which reintroduction sites have the highest likelihood of success.
- Genetic research—Assess genetic variability within extant populations.
- Population viability research—Study *Viola chamissoniana* subsp. *chamissoniana* 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—Initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

Table 1. Status and trends of *Viola chamissoniana* subsp. *chamissoniana* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1996 (listing)	14	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	No
1998 (recovery plan)	257	0	All threats managed in all three populations	No
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
2003 (critical habitat)	59	0	All threats managed in all three populations	No
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2008 (5-year review)	637 mature 23 immature	0	All threats managed in all three populations	Partially

			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
2012 (critical habitat)	600+	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
2013 (5-year review)	671 mature 54 immature	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2019 (5-year review)	<300 mature <300 immature	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Reproduction (*i.e.* viable seeds, seedlings) at all three populations	No

			Three populations with 50 mature individuals each	Partially, one population >50 individuals

* 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 after Preventing Extinction).

Table 2. Threats to *Viola chamissoniana* subsp. *chamissoniana* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate destruction and degradation of habitat	A	Ongoing	Partial, fencing at two sites
Degradation of habitat by established ecosystem-altering invasive plant species	A	Ongoing	Partial, one area managed at a large scale
Landslides destruction and degradation of habitat	A	Ongoing	None
Fire destruction and degradation of habitat	A	Ongoing	Partial, fire management plan and coordinated response efforts
Climate change degradation or loss of habitat	A	Ongoing	None
Ungulate predation and herbivory	C	Ongoing	Partial, fencing at two sites
Competition with established invasive plant species	E	Ongoing	Partial, one area managed at a large scale
Small population size and decline in numbers	E	Ongoing	Partial, collection and propagation

References:
See previous 5-year reviews for a full list of references (USFWS 2008, 2013). Only references for new information are provided below.

[ANRP] Army Natural Resource Program-O‘ahu. 2018. 2018 status report for the Makua and Oahu implementation plans. 217 pp.

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. 134 pp.

[HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.

Lyon Arboretum. 2018. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

[U.S. Army] U.S. Army, Environmental Division. 2018. Report to the U.S. Fish and Wildlife Service for Oahu Army Natural Resource Program, Permit: TES-043638, Reporting period January 1, 2018-December 31, 2018. 16 pp.

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; Endangered status for 23 species on Oahu and designation of critical habitat for 124 species; final rule. Department of the Interior, Federal Register 77 (181): 57648–57862, September 18, 2012.

[USFWS] 2013. *Viola chamissoniana* subsp. *chamissoniana* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc4193.pdf.*

[USFWS] 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

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SIGNATURE PAGE for 5-YEAR REVIEW of *Viola chamissoniana* subsp. *chamissoniana* (pāmakani)

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**

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