

5-YEAR REVIEW

Short Form Summary

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

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):

Jiny Kim, Fish and Wildlife Biologist, PIFWO

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

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Recovery Program Lead, PIFWO

Kristi Young, Programmatic Deputy Field Supervisor, PIFWO

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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 *Viola chamissoniana* subsp. *chamissoniana* (pamakani) (USFWS 2008). 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 Fish and Wildlife Biologist, Islands Team Manager, and Plant Recovery Coordinator, followed by the Recovery Program Lead. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor 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 *Viola chamissoniana* subsp. *chamissoniana* published on January 18, 2008 (available at http://ecos.fws.gov/docs/five_year_review/doc1785.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 *V. chamissoniana* subsp. *chamissoniana*.

This short-lived shrub is endangered and occurs on Oahu. The current status and trends for *Viola chamissoniana* subsp. *chamissoniana* are provided in the tables below.

New status information:

- As of 2011, Ohikilolo in Makua Military Reservation had 403 mature and 22 immature individuals and one seedling (Oahu Army Natural Resources Program [OANRP] 2012c)
- Makaha had 59 mature and 12 immature individuals and Puu Hapapa had eight mature and six immature individuals (OANRP 2012c).
- As of 2008 Makaleha had 34 mature individuals and one immature individual.

At the time of the last 5 year review a total of 637 mature and 23 immature individuals were known in eight populations. At present 671 mature and 54 immature individuals and one seedling are known in nine populations (OANRP 2012c).

New threats:

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

New management actions:

- Ungulate exclosures: Two populations at Ohikilolo and Puu Kumakalii were reported to be ungulate free in 2012. Another population in Makaha is considered partially ungulate free (U.S. Army Garrison 2011, 2012).
- Ecosystem-altering invasive plant species control - OANRP has an extensive and organized weed monitoring and eradication program which is now managed by area and not by rare species. Incipient as well as established introduced invasive plants are being managed throughout the areas where rare plant taxa occur. New techniques are being explored to manage weeds in hard to reach areas such as on cliffs (U.S. Army Garrison 2012).
- Captive propagation for genetic storage and reintroduction
 - Seed collection for storage and propagation has been a major challenge. Most sites are accessible only by rope, seed pods do not hold seeds long, and dehisce soon after maturity. To overcome these difficulties, the Oahu Army Natural Resources Program collected cuttings from wild plants and established a living collection in the nursery. This collection has been used to develop propagation, pollination, and seed collection techniques. In 2007, OANRP made significant progress toward larger scale seed production (U.S. Army Garrison 2007).
 - OANRP has 191 individual plants in the nursery and has complete seed storage for 41 individuals from four different populations (OANRP 2012a, b).

- The Harold L. Lyon Arboretum (2012) has 150 plants from apical cuttings taken in 2004 in micropropagation.
- Population viability monitoring - A new population of *Viola chamissoniana* subsp. *chamissoniana* was discovered in Central Makaleha in 2007 (U.S. Army Garrison 2007).

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 10 years), or a long-lived perennial.

Viola chamissoniana subsp. *chamissoniana* 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 stabilization goals for this species have not been met, as only two populations of 50 or more mature individuals exist (Table 1) and not all threats are currently managed throughout all populations (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:

- Captive propagation for genetic storage and reintroduction - Collect cuttings or seed from tagged individuals, keeping close track of the maternal source for use in *ex situ* propagation.
- Ungulate exclosures - Complete construction, maintain, and monitor ungulate-proof exclosures around each population.
- Ecosystem-altering invasive plant species control - Control invasive introduced plant species around all populations.
- Fire protection - Develop and implement fire management plans for all wild and reintroduced populations.
- Alliance and partnership development - Initiate planning and contribute to implementation of ecosystem-level management and restoration to benefit this species.
- Genetic research - Assess genetic variability within extant populations.
- Population viability research - Research *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.

Threats research - Assess the modeled effects of climate change on this species, and use the results to determine future landscape needed for the recovery of the 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 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	257	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2003 (critical habitat)	59	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2008 (5-yr review)	662	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2013 (5-yr review)	671 mature, 54 immature, one seedling – total 726	0	All threats managed in all 3 populations	Partially (see Table 2)
			Complete genetic storage	Partially
			3 populations with 50 mature individuals	Partially, 2 populations

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
			each	

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

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat and herbivory by goats	A, C, D	Ongoing	Partially: fencing protects some, but not all populations
Established ecosystem-altering invasive plant species	A, E	Ongoing	Partially – only Ohikilolo. Management recorded by management area, not species specific.
Fire from military training activity	A, E	Ongoing	No - risk at Halona, Ohikilolo Ridge, and Puu Kumakalii
Landslides	A, E	Ongoing	No
Low numbers of individuals vulnerable to random demographic shifts and stochastic weather related events	E	Ongoing	Partially: genetic storage, propagation for reintroduction
Climate change	A, E	Increasing	No

References:

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

Harold L. Lyon Arboretum. 2012. Micropropagation database and seed storage databases. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

[OANRP] Oahu Army Natural Resources Program. 2012a. Army nursery inventory summary. 1 page. Unpublished.

[OANRP] Oahu Army Natural Resources Program. 2012b. Genetic storage summary. 7 pages. Unpublished.

[OANRP] Oahu Army Natural Resources Program. 2012c. Oahu implementation plan - population unit status: *Viola chamissoniana* subsp. *chamissoniana*. 1 page. Unpublished.

- U.S. Army Garrison. 2007. 2007 status reports for the Makua implementation plan and the draft Oahu implementation plan. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 719 pages. Available online at http://manoa.hawaii.edu/hpicesu/DPW/2007_YER/YER_2007_edited.pdf.
- U.S. Army Garrison. 2010. 2010 status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 588 pages. Available online at <http://manoa.hawaii.edu/hpicesu/DPW/2010_YER/2010_YER_Edited.pdf>.
- U.S. Army Garrison. 2011. 2011 status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 269 pages. Available online at <http://manoa.hawaii.edu/hpicesu/DPW/2011_YER/2011_YER_Edited.pdf>.
- U.S. Army Garrison. 2012. 2012 status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 232 pages. Available online at http://manoa.hawaii.edu/hpicesu/DPW/2012_YER/2012_YER.pdf.
- [USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. Portland, Oregon. 207 pages + appendices.
- [USFWS] U.S. Fish and Wildlife Service. 2008. *Viola chamissoniana* subsp. *chamissoniana* (no common name) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 26 pages. Available online at < http://ecos.fws.gov/docs/five_year_review/doc1785.pdf >.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Viola chamissoniana* subsp.
chamissoniana (pamakani)

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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