5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Viola lanaiensis* (no common name)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2021. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 77 Species in Oregon, Washington, Idaho, and Hawaii. Federal Register 86(120): 33726–33728, June 25, 2021.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

Name of Reviewer:

Daniel Adamski, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator/Acting Recovery 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 2022. The review was based on a review of current, available information since the last 5-year review for *Viola lanaiensis* (USFWS 2018). The evaluation by Daniel Adamski, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator/Acting Recovery 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/ecp/species/394*).

Review Analysis:

Please refer to the previous 5-year reviews for *Viola lanaiensis* published in the Federal Register on October 23, 2018 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/2668.pdf*) and August 28, 2012 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1957.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 *V. lanaiensis.*

This short-lived perennial woody herb or subshrub in the Violaceae (African violet) family is endangered and is known from the islands of Lāna‘i and Maui. The status and trends for *Viola lanaiensis* are provided in the tables below.

New Status Information:

- Currently, there are 3 wild populations on Lānaʻi totaling 23 total individuals, 18 mature and 5 immature plants, and 5 wild populations on Maui totaling approximately 300 individuals, approximately 200 mature and 100 immature plants (PEPP 2022). There is one reintroduced population on Maui with 26 total plants, 12 mature, and 14 immature individuals (PEPP 2018). There is also one reintroduced population on Lānaʻi totaling 8 individuals (PEPP 2018).
- Currently, there are approximately 6 founder lines represented in *ex situ* storage and propagation collections.
    - Lyon Arboretum Seed Conservation laboratory reports approximately 2,740 seeds in storage representing 5 founder lines (Lyon Arboretum 2022).
    - National Tropical Botanical Garden (NTGB) reports 19 seeds in storage representing one founder (NTGB 2022).
    - There are no reported propagules of *Viola lanaiensis* in storage at Lyon Arboretum Micropropagation Laboratory (Lyon Arboretum 2022).
    - Olinda Rare Plant Facility (ORPF) reports 23 individual plants in cultivation representing 6 founders (ORPF 2023).

New Threats:

- Predation and herbivory by rats— Predation and herbivory by rats is noted to be a threat to *Viola lanaiensis* on Maui (PEPP 2022).
- Treefall— Treefall is noted to be a threat to *Viola lanaiensis* on Maui (PEPP 2022).

New Management Actions:

- Monitoring and surveys—The Plant Extinction Prevention Program (PEPP) surveys for new populations and monitors known populations of *Viola lanaiensis* on Lānaʻi and Maui (PEPP 2022).
- Ungulate monitoring and management—Fencing is monitored and repaired as needed at two populations on Maui (PEPP 2022).
- Invasive nonnative plant management—PEPP monitors and controls nonnative plants at all occurrences of *Viola lanaiensis* (PEPP 2020; PEPP 2022).
- Fire management—Following a 2022 fire on Maui, PEPP monitored three populations and reported no damage to any of the approximately 300 total individuals (PEPP 2022).
- Collection and propagation for genetic storage and reintroduction—
    - PEPP reported the collection of 1 capsule from 1 individual each at 2 separate populations on Maui, containing an unknown number of seeds (PEPP 2022).

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

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1991 (listing)	<200	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2012 (5-year review)	<20	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2018 (5-year review)	ca 300 (Lānaʻi) ca 300 (Maui)	56	All threats managed in all 3 populations	Partially
			Reproduction (i.e., viable seeds, seedlings, saplings) at all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Yes
2023 (5-year review)	323	34	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially

			Natural reproduction at all 3 populations	No
			3 populations with 50 mature individuals	Partially

* 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 *Viola lanaiensis* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, two fenced populations
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plant control around all populations
Drought destruction and degradation of habitat	A	Ongoing	None
Climate change degradation or loss of habitat, including hurricanes	A	Ongoing	None
Degradation and destruction by fire	A	Ongoing	None
Degradation and destruction by landslides	A	Ongoing	None
Nonnative bird predation	A	Ongoing	None
Predation and herbivory by feral ungulates	C	Ongoing	Partial, two fenced populations
Predation and herbivory by rats	C	Ongoing	None
Predation and herbivory by invertebrates—Slugs	C	Ongoing	None
Treefall	E	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, propagation and seed storage efforts are ongoing

Synthesis:
Currently there are approximately 323 wild individuals of *Viola lanaiensis*, 218 mature and 105 immature plants, on the islands of Lānaʻi and Maui. All individuals are provided

protection by nonnative plant control and some individuals are protected from ungulates by fencing. Seed collections, propagation, and outplanting are ongoing.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Recovery Plan for the Molokaʻi Plant Cluster (USFWS 1996) and have been updated according to the draft revised recovery objective guidelines developed by the Hawaiʻi 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 lanaiensis is a short-lived perennial woody herb or subshrub. 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 that are well managed. In addition, a minimum of a total of three populations should be documented on Lānaʻi and Maui where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Genetic storage is not complete (Table 1), there are only two populations totaling at least 50 individuals, however, there are no populations naturally reproducing, and all threats are not being managed (Table 1, Table 2). Therefore, *Viola lanaiensis* meets the definition of Endangered it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
Herbivory and predation by rats and treefall are noted as no threats, however, no significant new information regarding the species' biological status has been reported since the last 5-year review in 2018. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2023.

- Surveys and monitoring—Survey for additional populations of *Viola lanaiensis* in areas of potentially suitable habitat.
- Ungulate monitoring and control—Continue to maintain fenced exclosures and construct new fences to protect individuals from the negative impacts of browsing by ungulates.
- Invasive nonnative plant monitoring and control—Continue control of established ecosystem-altering nonnative invasive plant species, and those that compete with *Viola lanaiensis* within and around all wild and translocated populations.

- Fire prevention and control—Continue to develop and implement fire prevention management plans and monitor populations after fire occurrence.
- Climate change adaptation strategy—Research suitability of habitat for viability of species, including where to conduct translocations in the future due to the impacts of climate change, including increasing temperatures, periods between rain events, and frequency and intensity of hurricanes. Additional management actions may be needed, such as locating microsites that overlap with current and future climate envelopes for translocation efforts.
- Predator and herbivore monitoring and control—Determine and implement effective methods for rodents and slugs around wild and translocated populations.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- Build resiliency, redundancy, and representation — Increase species' viability through habitat restoration, threat control, and reintroduction and translocation. Continue reintroduction into suitable habitat that is being managed for known threats to this species to reduce impacts of erosion, treefall, flooding, and hurricanes.
- Alliance and partnership development—Continue to work with partners and other land managers in planning and implementation of ecosystem-level restoration and management to benefit this species.

References:

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

Lyon Arboretum. 2022. 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, Hawai‘i.

[NTBG] National Tropical Botanical Garden. 2022. 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, Hawai‘i.

[ORPF] Olinda Rare Plant Facility. 2023. 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, Hawai‘i.

[PEPP] Plant Extinction Prevention Program. 2018. Plant Extinction Prevention Program, fiscal year 2018 interim performance report (October 1, 2017-September 30, 2018) cooperative agreement F14AC00174, US Fish and Wildlife Service CFDA Program #15.657, Endangered species conservation—recovery implementation

funds, University of Hawaii at Manoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 49 pp.

[PEPP] 2020. Plant Extinction Prevention Program final report (October 1, 2018-September 30, 2019), U.S. Fish and Wildlife Service Coast Program, Catalog of Federal Domestic Assistance (CFDA) # 15.630, Award #F17AC00452, Pacific Cooperative Studies Unit, University of Hawaii, Honolulu. 26 pp.

[PEPP] 2022. Plant Extinction Prevention Program fiscal year 2022 interim performance report (October 1, 2021-September 30, 2022), Cooperative Agreement F19AC00532 (Interim report), U.S. Fish and Wildlife Service CFDA Program #15.657 Endangered Species Conservation—Recovery Implementation Funds, University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 50 pp.

[USFWS] U.S. Fish and Wildlife Service. 1996. Recovery plan for the Moloka‘i plant cluster (Hawai‘i). Portland. 143 pp.

[USFWS] 2012. *Viola lanaiensis* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/1957.pdf.*

[USFWS] 2018. *Viola lanaiensis* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/2668.pdf*.

[USFWS] 2021. Endangered and Threatened wildlife and plants; initiation of 5-year status reviews for 77 Species in Oregon, Washington, Idaho, and Hawaii. Federal Register 86(120): 33726–33728, June 25, 2021.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Viola lanaiensis* (common name)

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**

LAUREN WEISENBERGER

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