

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Astelia waialealae* (pa'iniu)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 129 Species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85(48): 14240–14243, March 11, 2020.

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 2021. The review was based on a review of current, available information since the last 5-year review for *Astelia waialealae* (USFWS 2017). 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 (<https://ecos.fws.gov/ecp/species/6880>).

Review Analysis:

Please refer to the previous 5-year review for *Astelia waialealae* published in the Federal Register on September 13, 2017 (available at https://ecos.fws.gov/docs/tess/species_nonpublish/2412.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 *A. waialealae*.

This short-lived perennial herb in the Asteliaceae (astelia) family is endangered and is known from the island of Kaua'i. The status and trends for *Astelia waialealae* are provided in the tables below.

New Status Information:

- Currently, *Astelia waialealae* is known from six to seven wild individuals in three locations in the summit bogs of Kaua‘i (Perlman 2019; Kishida and Perlman 2018a, b).

New Threats:

- Environmental contaminants—Plants were observed to be in very poor condition and in 2017 soil samples were taken to determine the level of zinc present, likely originating from fencing used to protect the plants from herbivory by deer (Kishida and Perlman 2017a, b).

New Management Actions:

- Monitoring and surveys—The Plant Extinction Prevention Program (PEPP) continues to monitor individuals of *Astelia waialealae* in the summit bogs of Kaua‘i (PEPP 2016, 2017; Perlman 2019; Kishida and Perlman 2018a, b).
- Ungulate monitoring and management—Fencing is monitored and maintained at Circle Bog, Sincock Bog 1, and USGS Bog (Sincock Bog 4) (PEPP 2016, 2017; Kishida and Perlman 2017b).
- Invasive nonnative plant management—PEPP controls invasive nonnative plants at the bog exclosures (Kishida et al. 2018).
- Control of environmental contaminants—Small metal cages were removed or replaced with plastic ones and the soil was treated with bone meal and limestone to remove zinc (Kishida and Perlman 2017b; Perlman 2018; Kishida and Perlman 2018a, b).

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

Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2010 (listing and critical habitat)	16	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 100 mature individuals each	No
2017 (5-year review)	11	0	All threats managed in all 3 populations	Partially

			Complete genetic storage	No
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Unknown
			3 populations with 100 mature individuals each	No
2022 (5-year review)	6–7	0	All threats managed in all 3 populations	Partially, all within exclosures
			Complete genetic storage	No
			Natural reproduction at all 3 populations	No
			3 populations with 100 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 *Astelia waialealae* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, plants within exclosures
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plant control within exclosures
Climate change degradation or loss of habitat, including hurricanes	A	Ongoing	None
Degradation and destruction by fire	A	Ongoing	None
Predation and herbivory by feral ungulates	C	Ongoing	Partial, plants within exclosures
Inadequacy of existing regulatory mechanisms—lack of adequate hunting regulations	D	Ongoing	Partial, plants within exclosures

Loss of mutualists— pollinators	E	Ongoing	None
Environmental contaminants	E	Ongoing	Partial, metal cages removed and soil treated to remove zinc
Reduced viability due to low numbers	E	Ongoing	None

Synthesis:

Currently there are six to seven wild individuals of *Astelia waialealae* on Kaua‘i. Individuals are provided protection by fencing and nonnative plant control. Possible soil contamination by zinc is being addressed by metal cage removal and soil treatments.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Kaua‘i Islandwide Recovery Plan (USFWS 2021) 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.

Astelia waialealae is a short-lived perennial herb and an obligate outcrosser. 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 Kaua‘i where this species now occurs or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 100 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. There are no populations totaling 100 mature reproducing individuals, and genetic storage is incomplete. All threats are not being managed, although possible zinc contamination is being addressed (Table 1, Table 2). The population continues to decline. Therefore, *Astelia waialealae* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

Contamination of the soil by zinc from metal cages is observed as a new threat; however, no significant new information regarding the species’ biological status has been reported

since the last 5-year review in 2017. Thus, the following recommendations for future actions are added, reiterated, or updated for the 5-year review for 2022.

- Surveys and inventories—Survey for populations of *Astelia waialealae* in areas of potentially suitable habitat.
- Ungulate monitoring and control—Continue to maintain exclosures to protect individuals from the negative impacts of browsing and trampling by ungulates.
- Invasive nonnative plant monitoring and control—Continue control of established ecosystem-altering nonnative invasive plant species, and those that compete with *A. waialealae*.
- Fire prevention and control—Develop and distribute information for the general public regarding use of fire in sensitive areas.
- Climate change adaptation strategy—Research suitability of habitat for reintroduction of this species in the future due to the impacts of climate change.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts when materials are available for maintenance of genetic stock and for reintroduction.
- Reintroduction and augmentation—Reintroduce individuals into suitable habitat within historic range that is being managed for known threats to this species to build resiliency and redundancy to reduce impacts of hurricanes.
- Population biology research—Study *A. waialealae* populations to determine viable population size and structure, geographical distribution, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- 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.

Kishida, W. and S. Perlman. 2017a. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Astelia waialealae*, Pacific Islands Fish and Wildlife Office.

Kishida, W. and S. Perlman. 2017b. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp.

- + appendices. BioPacifica database record for *Astelia waialealae*, Pacific Islands Fish and Wildlife Office.
- Kishida, W. and S. Perlman. 2018a. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Astelia waialealae*, Pacific Islands Fish and Wildlife Office.
- Kishida, W. and S. Perlman. 2018b. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Astelia waialealae*, Pacific Islands Fish and Wildlife Office.
- Kishida, W., S. Perlman, and K. Cassel. 2018c. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Astelia waialealae*, Pacific Islands Fish and Wildlife Office.
- Perlman, S. 2019. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Astelia waialealae*, Pacific Islands Fish and Wildlife Office.
- [PEPP] Plant Extinction Prevention Program. 2016. Plant Extinction Prevention Program FY 2016 annual report (Oct 1, 2015-Sep 30, 2016), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F14AC00174, December 24, 2016, UH Mānoa, PCSU, PEPP. 237 pp.
- [PEPP] 2017. Plant Extinction Prevention Program FY 2017 Annual Report (Oct 1, 2016-Sep 30, 2017), Coop Agreement: F14A00174, U.S. Fish and Wildlife Service CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds. 235 pp.

- [USFWS] U.S. Fish and Wildlife Service. 2017. *Astelia waialealae* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. https://ecos.fws.gov/docs/five_year_review/doc2412.pdf.
- [USFWS] 2020. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 129 Species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85(48): 14240–14243, March 11, 2020.
- [USFWS] 2021. Kaua'i Islandwide Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR. 65 pp. + appendices.

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SIGNATURE PAGE for 5-YEAR REVIEW of *Astelia waialealae* (pa'iniu)

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

For Field Supervisor, Pacific Islands Fish and Wildlife Office

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