5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Schiedea kealiae* (ma‘oli‘oli)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands . Federal Register 87(90): 28031–28034, May 10, 2022.

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, PIFWO
Megan Laut, Recovery Program 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 2023. The review was based on a review of current, available information since the last 5-year review for *Schiedea kealiae* (USFWS 2019). The evaluation by Daniel Adamski, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery Program 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/3679*).

Review Analysis:

Please refer to the previous 5-year reviews for *Schiedea kealiae* published in the Federal Register on August 27, 2010, (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1628.pdf*); August 13, 2013, (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/2097.pdf*), and on September 30, 2019, (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/2894.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 *S. kealiae*.

This short-lived perennial subshrub in the Caryophyllaceae (carnation) family is endangered and is known from the island of O‘ahu. The status and trends for *Schiedea kealiae* are provided in the tables below.

New Status Information:

- Currently, there are at least 155 wild individuals in the Waiʻanae mountains in one population unit at Keālia, their reproductive status is unknown (Togikawa et. al., 2023).
- Currently, there are approximately 22 founder lines represented in *ex situ* storage and propagation collections, including seeds in seed banks and plants in a nursery or living collection (Army Natural Resources Program on Oʻahu [ANRPO] 2023; Lyon Arboretum 2023; Oahu Nursery 2023).

New Threats:

- None

New Management Actions:

- Monitoring and surveys— Plant Extinction Prevention Program (PEPP) monitors individuals of *Schiedea kealiae* in the Waiʻanae mountains of Oʻahu at Keālia (Togikawa et. al., 2023).
- Collection and propagation for genetic storage and reintroduction—
  - ANRPO reports 4,373 seeds in storage representing 11 total founder plants. (ANRPO 2023).
  - Lyon Arboretum Seed Conservation Laboratory reports 7,483 seeds in storage representing 22 founders (Lyon Arboretum 2023).
  - The Oahu Nursery reports three individual plants in propagation, representing one founder (Oahu Nursery 2023).
  - Waimea Garden Nursery reports three individual plants in propagation, representing one founder (Waimea Garden Nursery 2021).

Table 1. Status and trends of *Schiedea kealiae* from listing through current 5-year review. Table 1a shows progress according to Interim Stabilization Goals; Table 1b shows progress according to Preventing Extinction Goals.

Table 1a.

Date	No. wild individuals	No. Outplanted	Stability Goals identified in Recovery Plan	Stability Goals Completed?
1996 (Listing)	300–500	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2010 (5-year review)	Unknown	0	All threats managed in all 3 populations	No

			Complete genetic storage	Partial
			3 populations with 50 mature individuals each	No
2013 (5-year review)	Unknown	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partial
			3 populations with 50 mature individuals each	No

Table 1b.

Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2019 (5-year review)	>150 mature; 100 immature	0	All threats managed in all 3 populations	No
			Reproduction (i.e., viable seeds, seedlings, saplings) at all 3 populations	Partial
			Complete genetic storage	Partial
			3 populations with 50 mature individuals each	Partial, one population >50
2024 (5-year review)	>150	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partial
			Natural reproduction at all 3 populations	Unknown
			3 populations with 50 mature individuals each	Partial, only one population with 155 total plants

* 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 *Schiedea kealiae* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	None
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	None
Fire destruction and degradation of habitat	A	Ongoing	None
Drought	A	Ongoing	None
Climate change degradation or loss of habitat, including hurricanes	A	Ongoing	None
Ungulate predation and herbivory	C	Ongoing	None
Predation and herbivory by invertebrates—Slugs, snails, black twig borer	C	Ongoing	None
Competition with established invasive plant species	E	Ongoing	None
Low numbers	E	Ongoing	Partial, seed collection and propagation

Synthesis:
Currently there are at least 155 wild individuals of *Schiedea kealiae* on O‘ahu, their reproductive status is unknown. Seed collections and propagation are ongoing.

Stabilizing (interim), downlisting, and delisting objectives are 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.

Schiedea kealiae is a short-lived perennial 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 O‘ahu 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. Although genetic storage is partially completed (Table 1), there is only one population totaling at least 50 reproducing individuals, and all threats are not being managed (Table 1, Table 2). Therefore, *Schiedea kealiae* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
No significant new information regarding the species' biological status has been reported since the last 5-year review in 2019. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2024.

- Surveys and monitoring—
  - Monitor extant populations regularly
  - Continue surveys for populations of *Schiedea kealiae* in areas of potentially suitable habitat.
  - Determine suitable locations for reintroductions.
- Ungulate monitoring and control—Construct fenced exclosures to protect individuals from the negative impacts of browsing by ungulates.
- Invasive nonnative plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *S. kealiae*.
- Drought remediation—Protect populations from competition by nonnative plants and fence and remove feral ungulates to prevent further effects of drought such as erosion.
- Site and habitat protection—Develop and implement effective threat control measures to reduce the impact of invasive plants, drought, and invasive invertebrates.
- Fire prevention and control—Develop and implement fire prevention management plans.
- 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 increasing frequency and intensity of hurricanes. Additional

management actions may be needed, such as locating key microsites that overlap with current and future climate envelopes for translocation efforts.

- Predator and herbivore monitoring and control—Determine and implement effective methods to control rats and slugs.
- 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 into suitable habitat that is being managed for known threats to this species to reduce impacts of climate change degradation and nonnative plant competition.
- 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:

[ANRPO] Army Natural Resource Program on Oʻahu. 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, Hawaiʻi.

[HBMP] Hawaii Biodiversity and Mapping Program. 2010. Plant species GIS data and Access database.

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

Lyon Arboretum. 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, Hawaiʻi.

Oahu Nursery. 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, Hawaiʻi.

Togikawa, K., S. Ching-Harbin, K. Ruis, and R. Chang. 2023. Hawaiʻi Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2023: Plant Extinction Prevention Program, FY 2023 Annual Report (Oct 1, 2022-Sep 30, 2023), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F19AC00532 (Interim Report), April 24, 2023, UH Mānoa, PCSU, PEPP. 25 pp.

[U.S. Fish and Wildlife Service] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages, plus appendices.

[USFWS] 2010. *Schiedea kealiae* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc1628.pdf*.

[USFWS] 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. *Schiedea kealiae* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc2097.pdf*.

[USFWS] 2019. *Schiedea kealiae*. 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc2894.pdf*.

[USFWS] 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90): 28031–28034, May 10, 2022.

Waimea Garden Nursery. 2021. 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.

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SIGNATURE PAGE for 5-YEAR REVIEW of *Schiedea kealiae* (ma‘oli‘oli)

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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