

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. 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):

Michelle Clark, Partners Biologist, PIFWO

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

Marie Brueggemann, Plant Recovery Coordinator, PIFWO

Recovery Program Lead, PIFWO

Kristi Young, Programmatic Deputy Field Supervisor, PIFWO

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 5-year review for *Schiedea kealiae* (USFWS 2010). 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 Partners 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.

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 *Schiedea kealiae* published on August 27, 2010 (available at http://ecos.fws.gov/docs/five_year_review/doc3320.pdf) for a complete review of the species status, threats, and management efforts. No new significant information regarding the species biological status has come to light since listing to warrant a change in the Federal listing status of *S. kealiae*.

This short-lived shrub is endangered and occurs on the island of Oahu. The current status and trends for *Schiedea kealiae* are provided in the tables below.

New status information:

- Several individuals were seen growing above Dillingham Military Reservation on Oahu in 2011. Several plants were observed in the same location in previous years, but the plants had appeared completely dormant or possibly dead previously (S. Weller, University of California, Irvine, pers. comm. 2012).

New threats:

- Climate change - Climate change may 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:

- Captive propagation for genetic storage and reintroduction - The nursery at the University of California, Irvine contains 15 plants of *Schiedea kealiae* for genetic storage and research purposes (University of California, Irvine 2011).

New population biology information

- The floral scents of four Hawaiian *Schiedea* species, including *Schiedea kealiae*, were analyzed for volatile organic compounds (VOC) composition. VOCs play an important role in communication between plants. The VOC profile is similar to that of species pollinated by moths or insects feeding on decaying organic matter. The compounds emitted suggested a transition from insect pollination to wind pollination in the genus (Jurgen *et al.* 2012). The species is considered to be wind pollinated (S. Weller, University of California, Irvine, pers. comm. 2012).

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. *Schiedea kealiae* 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 no population of 50 or more mature individuals exists (Table 1) and all threats are not being sufficiently managed throughout the populations (Table 2). Therefore, *Schiedea kealiae* 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 - Continue collecting material for genetic storage and propagation for reintroduction. Investigate new propagation methods.
- Invertebrate control research - Investigate slug herbivory and appropriate insect control methods.
- Ungulate exclosures - Fence remaining populations to protect them from the impacts of feral ungulates.
- Ecosystem-altering invasive plant species control - Remove competing invasive introduced plant species within fenced areas and maintain those areas free of invasive introduced plants.
- Fire protection – Develop and implement fire prevention plans to protect the most vulnerable populations.
- Population biology research
 - Implement genetic studies to assess the viability of remaining populations.
 - Investigate the causes of reproductive failure and techniques to improve natural recruitment.
- Surveys / inventories – Survey geographical and historical range for a thorough current assessment of the species status.
- Alliance and partnership development - Initiate planning and contribute to implementation of ecosystem level restoration and management to benefit this taxon.
- Threats research – Assess the modeled effects of climate change on this species, and use to determine future landscape needed for the recovery of the species.

Table 1. Status of *Schiedea kealiae* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria 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
1998 (recovery plan)	300-500	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	265-315	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2010 (5-yr review)	Unknown	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2013 (5-yr review)	Unknown	0	All threats managed in all 3 populations	No (see Table 2)
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

Table 2. Threats to *Schiedea kealiae* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat and herbivory	A, C, D	Ongoing	None
Established ecosystem-altering invasive plant species	A, E	Ongoing	None
Drought	A, E	Ongoing	None
Slug herbivory	C	Ongoing	None
Fire	A, E	Ongoing	None
Low numbers	E	Ongoing	Partially
Climate change	A, E	Increasing	None

References:

See previous 5-year review for a full list of references (USFWS 2010). Only references for new information are provided below.

Jurgens, A., M. Bischoff, A.K. Sakai and S.G. Weller. 2012. Floral scent of four Hawaiian *Schiedea* species (Caryophyllaceae). *Biochemical Systematics and Ecology* 45:194–197.

University of California, Irvine. 2011. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. University of California, Irvine, California. 15 pages. Unpublished.

[USFWS] 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] U.S. Fish and Wildlife Service. 2010. *Schiedea kealiae* (ma oli oli) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 8 pages. Available online at http://ecos.fws.gov/docs/five_year_review/doc3320.pdf.

Personal Communications

Weller, Stephen G. 2012. Professor, Ecology and Evolutionary Biology, School of Biological Sciences, University of California, Irvine. E-mail to Margaret Clark, National Tropical Botanical Garden, dated November 13, 2012. Subject: *Schiedea kealiae*, etc

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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
- No Change in listing status

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Date *2013-08-13*