

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Schiedea kaalae* (no common name)

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 five-year review for *Schiedea kaalae* (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 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](http://ecos.fws.gov/tess_public)).

### **Review Analysis:**

Please refer to the previous 5-year review for *Schiedea kaalae* (published on January 18, 2008 (available at [http://ecos.fws.gov/docs/five\\_year\\_review/doc1804.pdf](http://ecos.fws.gov/docs/five_year_review/doc1804.pdf)) for a complete review of the species status, threats, and management efforts. No new significant new information regarding the species' biological status has come to light since listing to warrant a change in the Federal listing status of *S. kaalae*.

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

New status information:

- In 2012, the Pahole population contained 72 mature individuals, 70 of which were originally reintroduced, 12 immature individuals, and one seedling. The Kaluaa to Waieli population contained 205 mature individuals and two immature individuals, all originally reintroduced. The Maakauu population contained ten mature wild individuals. The South Ekahanui population contained 100 mature individuals, ten of which were wild. The Kahana population contained eight mature and one immature individuals and one seedling. North Palawai contained no plants, and Makaua (in the Koolau Mountains) contained seven mature and 27 immature individuals (only one of which was originally wild) (Oahu Army Natural Resources Program [OANRP] 2012c).
- Total numbers of individuals for all ten populations are 402 mature and 42 immature individuals and two seedlings. Of these, 29 individuals are wild, and the rest are reintroduced. This is a decrease in the number of wild individuals, but a substantial increase of the total number of individuals because of augmentation (OANRP 2012c). Over 1,400 individuals were reintroduced, but the survival is not optimal, and little regeneration is observed (U.S. Army Garrison 2010).

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:

- Ungulate exclosures - Three populations are ungulate free: Pahole, South Ekahanui and Kaluaa to Waieli (U.S. Army Garrison 2010). Maakua is partially protected from ungulates (U.S. Army Garrison 2011).
- Ecosystem-altering invasive plant species control - The Kaluaa to Waieli population at Gulch 3 and Gulch 1 were identified as priorities for weed control efforts (U.S. Army Garrison 2011).
- Invertebrate control research
  - Research by Joe (2006) indicated that invasive slugs negatively impacted the regeneration of *Schiedea* species.
  - Sluggo was registered for use by the Hawaii Department of Agriculture (U.S. Army Garrison 2010) for control of slugs and nonnative snails in forested areas for the protection of native, threatened, and endangered plants of Hawaii. However, since native snails also exist in areas where threatened and endangered plants occur, additional research is needed to find a control method that can be used in areas where native snail species co-occur with listed plants to prevent non-target species effects of treatment.
- Captive propagation for genetic storage and reintroduction

- In 2012, OANRP had 35 wild individuals which had complete genetic collections, and their nursery on Oahu contained 287 individuals of *Schiedea kaalae* (Oahu Army Natural Resources Program 2012a, b).
- The Harold L. Lyon Arboretum (2012) had five small accessions of *Schiedea kaalae* totaling a little over 100 seeds in seed storage and a total of 1,185 plants in micropropagation.
- Pahole Rare Plant Facility (2012) had 34 plants in their nursery in 2012.
- Reintroduction / translocation - Sites for reintroduction are identified and a detailed plan is in place to implement this plan. Reintroductions have begun in Kaluaa and Waieli, Maakua, Pahole (2) and South Ekahanui. Monitoring of these sites is ongoing (U.S. Army Garrison 2011).
- Population biology research - Due to a continued decline in the plants at the in situ sites and very little recruitment at reintroduction sites despite years of outplanting, OANRP reevaluated the original recommendations to keep stock from each mountain range separate and to favor the use of local stock. Results of research comparing the success of selfed and out crossed progeny indicate that offspring are least fit when they are from selfed seed, and they are most fit when parent populations are as far apart as possible (different mountain ranges) (U.S. Army Garrison 2011).

#### **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 kaalae* 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. There are three populations with over 50 mature individuals each, but the other stabilization criteria have not been met.

For downlisting, a total of five to seven populations of *Schiedea kaalae* should be documented on Oahu where it now occurs or occurred historically. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of five consecutive years before downlisting is considered.

The downlisting goals for this species have not been met, since no populations have 300 or more mature individuals (Table 1), and all threats are not being sufficiently managed throughout the populations (Table 2). Therefore, *Schiedea kaalae* 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 collection of cuttings or seed from tagged individuals, keeping close track of the maternal source for use in *ex situ* propagation.
- Reintroduction / translocation– Continue to reintroduce the species back into its known historical range.
- Invertebrate control research – Continue to investigate slug predation and appropriate control methods.
- Ungulate exclosures - Fence remaining populations to protect them from the impacts of feral ungulates. Ecosystem-altering invasive plant species control – Control invasive introduced plant species around all populations.
- Population biology research
  - Continue to implement genetic studies to assess the viability of remaining populations.
  - Continue to investigate the causes of reproductive failure and techniques to improve natural recruitment
- Alliance and partnership development - Initiate planning and contribute to implementation of ecosystem level restoration and management to benefit this taxon.
- Genetic research – Continue to assess genetic variability within extant populations.
- 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 kaalae* from listing through current 5-year review.**

<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>Downlisting Criteria identified in Recovery Plan</b>	<b>Downlisting Criteria Completed?</b>
1991 (listing)	<100	0	All threats managed in all 5-7 populations	No
			Complete genetic storage	No
			5-7 populations with 300 mature individuals each	No
1998 (recovery plan)	13	0	All threats managed in all 5-7 populations	Partially
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	No
2003 (critical habitat)	49	Unknown	All threats managed in all 5-7 populations	No
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	No
2008 (5-yr review)	40	193	All threats managed in all 5-7 populations	Partially
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	No
2013 (5-yr review)	28 mature, one immature – total 29	374 mature, 41 immature and two seedlings – total 417	All threats managed in all 5-7 populations	Partially (see Table 2)
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	No

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

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat and herbivory	A, C, D	Ongoing	Mostly ungulate free (3 of 4 populations)
Established ecosystem-altering invasive plant species	A, E	Ongoing	Partially
Slugs - herbivory in the nursery and field	C	Ongoing	Partially
Low numbers	E	Ongoing	Partially: Captive propagation and genetic storage, reintroduction / translocation implementation, and monitoring
Climate change	A, E	Increasing	None

**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 and seed storage databases. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Joe, Stephanie M. 2006. Impact of alien slugs on native plant seedlings in a diverse mesic forest, Oahu, Hawaii, and a study of slug food plant preferences; Thesis submitted to the Graduate Division of the University of Hawaii in partial fulfillment of the requirements for the Degree of Master of Science in Botanical Sciences. 95 pages. Available online at <http://scholarspace.manoa.hawaii.edu/handle/10125/14955>. Accessed December 30, 2011.

Oahu Army Natural Resources Program. 2012a. Genetic storage summary. 7 pages. Unpublished.

Oahu Army Natural Resources Program. 2012b. Army nursery inventory summary, *Schiedea kaalae*. 1 page. Unpublished.

Oahu Army Natural Resources Program. 2012c. Oahu implementation plan - population unit status; *Schiedea kaalae*. 1 page. Unpublished.

Pahole Rare Plant Facility. 2012. Controlled Propagation Report to U.S. Fish and Wildlife Service. Harold L. Lyon Arboretum, University of Hawaii, Honolulu, Hawaii. 15 pages. Unpublished.

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](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](http://manoa.hawaii.edu/hpicesu/DPW/2011_YER/2011_YER_Edited.pdf)>.

[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. 2008. *Schiedea kaalae* (no common name) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 12 pages. Available online at <[http://ecos.fws.gov/docs/five\\_year\\_review/doc1804.pdf](http://ecos.fws.gov/docs/five_year_review/doc1804.pdf)>.

U.S. FISH AND WILDLIFE SERVICE

SIGNATURE PAGE for 5-YEAR REVIEW of *Schiedea kaalae* (no 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
- No Change in listing status

acting deputy

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