5-YEAR REVIEW

Short Form Summary

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

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

Lead Region/Field Office:

Region 1/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 2018. The review was based on a review of current, available information since the last 5-year review for *Schiedea trinervis* (USFWS 2012). The evaluation completed 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 (*http://ecos.fws.gov/tess_public*).

Review Analysis:

Please refer to the previous 5-year reviews for *Schiedea trinervis* (as *Alsinidendron trinerve*) published in the Federal Register on July 21, 2009 and August 13, 2013 (available at *https://ecos.fws.gov/docs/five_year_review/doc2425.pdf* and *https://ecos.fws.gov/docs/five_year_review/doc4239.pdf*) for a complete review of the species' status, threats, and management efforts. 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. trinervis*.

This short-lived perennial subshrub in the Caryophyllaceae (carnation) family is endangered and endemic to O‘ahu. The current status and trends for *Schiedea trinervis* are provided in the tables below.

New Status Information:

- Currently there are approximately 300 mature and 350 immature individuals of *Schiedea trinervis* in one population (from East Makaleha to Puʻu Kalena) in the Waiʻanae mountains of Oʻahu. No observations have been made since 2015 (Army Natural Resources Program-Oʻahu (ANRP) 2018).
- In 2012, we recognized and published the new combination for *Alsinidendron trinerve*, following the treatment by Wagner *et al.* (2005) and updating the listed entity on 50 CFR 17 to match the currently recognized taxonomy, *Schiedea trinervis* (77 FR 57648, September 18, 2010).
- In 2012, 14 critical habitat units were designated in three ecosystems (montane wet, wet cliff and dry cliff) for *Schiedea trinervis* in the Waiʻanae mountains of Oʻahu (2,126 acres, 861 hectares) (77 FR 57648, September 18, 2012).

New Threats:

- Climate change loss or degradation of habitat—Climate change may pose a threat to this species. Fortini *et al.* (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawaiʻi using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. The assessment by Fortini *et al.* (2013) concluded that *Schiedea trinervis* is highly vulnerable to the impacts of climate change, with a vulnerability score of 0.81 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, additional management actions may be needed to conserve this taxon into the future, such as locating key microsites that overlap with current and future climate envelopes for outplanting efforts.

New Management Actions:

- Ungulate control—The ANRP reports ungulates are controlled by fencing at East Makaleha to Puʻu Kalena (ANRP 2018).
- Nonnative invasive plant control—The ANRP reports nonnative plant control is ongoing at East Makaleha to Puʻu Kalena (ANRP 2018).
- Captive propagation for genetic storage and reintroduction—
    - The ANRP reports that the population from East Makaleha to Puʻu Kalena has met its goals of genetic representation in collections with 90 wild plants represented in the ANRP seed bank (ANRP 2018).
    - Since the last 5-year review in 2013, the Lyon Seed Micropropagation Laboratory reports 119 explants total representing both individuals at the Makaleha and Kaʻala subpopulations. The Lyon Seed Conservation Laboratory reports storage of more than 1,000 seeds representing at least one individual from Kaʻala.
- Reintroductions—None (U.S. Army 2018).

Synthesis:
Currently there are approximately 300 mature individuals and 350 immature individuals of *Schiedea trinervis* in the Waiʻanae mountains of Oʻahu. A landscape-based assessment of climate change vulnerability for native plants of Hawaiʻi using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *S. trinervis* is highly vulnerable to the effects of climate change. Fruit collections for seed storage and micropropagation are ongoing. Some nonnative plant control is conducted.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the Oʻahu Plants (USFWS 1998), 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.

Schiedea trinervis is a short-lived perennial subshrub. Due to its narrow endemic range and only one population, the species should be evaluated on the subpopulation level. To prevent extinction, which is the first step 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 subpopulations represented in *ex situ* (secured off-site, such as a nursery or seed bank) collections. In addition, a minimum of three subpopulations should be documented on Oʻahu where they now occur or occurred historically and each of these populations must be naturally reproducing (*i.e.,* viable seeds, seedlings, saplings) and increasing in number, with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Genetic representation is not complete, as only 90 wild plants are represented and another 60 are in need of collection. There is only one subpopulation of at least 50 mature, reproducing individuals, and at this time we are unsure whether all of the threats are being managed. There may be a second subpopulation totaling at least 50 mature, reproducing individuals; however, it has not been observed for more than 10 years (Table 1, Table 2). Therefore, *S. trinervis* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
Other than the new data on this taxon's vulnerability to climate change, we are not aware of any new threats. There is no significant new information regarding the species' biological status since the last 5-year review in 2013. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2019.

- Surveys and inventories—Continue to survey geographical and historical range for a thorough assessment of the species' status.
- Ungulate monitoring and control—Continue to fence and monitor wild and reintroduced populations to protect plants from impacts of feral ungulates.
- Invasive plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species, and those that compete with *Schiedea trinervis* at all wild and reintroduced population.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use to determine future landscape needed for the recovery of the species.
- Invertebrate control—Implement effective slug and nonnative snail control at all wild and reintroduced populations.
- Captive propagation for genetic storage and reintroduction—Continue seed collection for genetic storage and propagation for reintroduction.
- Reintroduction—Continue to establish new populations and augment existing populations, keeping close track of maternal source used for *ex situ* propagation.
- Population biology research—
    - Study populations of *Schiedea trinervis* with regard to population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
    - Determine if additional populations should be established or if this species can be recovered as one large population.
    - Assess the genetic variability within the population.
- Alliance and partnership development—Continue to work with the ANRP, the Hawai‘i Division of Forestry and Wildlife, and other land managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this taxon.

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1991 (listing)	8	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	No
1998 (recovery plan)	108	40–45	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
2003 (critical habitat)	18–34	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2009 (5-year review)	169	43	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No, only one population
2012 (critical habitat)	192	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially

			Three populations with 50 mature individuals each	No
2013 (5-year review)	200	0	All threats managed in all three populations	Partially
			Complete genetic storage	Yes
			Three populations with 50 mature individuals each	Partially, only one population
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2019 (5-year review)	ca 300 mature	0	All threats managed in all three populations	Partially
			Complete genetic storage	Yes
			Reproduction (*i.e.* viable seeds, seedlings) at all three populations	Partially, at one population
			Three populations with 50 mature individuals each	Partially, one population > 50

* 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 after Preventing Extinction).

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

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate destruction and degradation of habitat	A	Ongoing	Partial, Ka‘ala fence is incomplete
Degradation of habitat by established ecosystem-altering invasive plant species	A	Ongoing	Partial, nonnative plant management in one area
Climate change degradation or loss of habitat	A	Ongoing	None
Invertebrate predation and herbivory	C	Ongoing	None
Competition with established invasive plant species	E	Ongoing	Partial, nonnative plant management in one area
Military training activities	E	Ongoing	Partial, fencing at three subpopulations

References:

See previous 5-year reviews for a full list of references (USFWS 2009, 2013). Only references for new information are provided below.

[ANRP] Army Natural Resources Program-O‘ahu. 2018. 2018 status report for the Makua and Oahu implementation plans. 217 pp.

Fortini, L., J. Price, J. Jacobi, A. Vorsino, J. Burgett, K. Brinck, F. Amidon, S. Miller, S. Gon II, G. Koob, and E. Paxton. 2013. A landscape-based assessment of climate change vulnerability for all native Hawaiian plants. Technical report HCSU-044. Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hawaii. 134 pp.

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

Lyon Arboretum. 2018. 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, Hawaii.

[U.S. Army] U.S. Army, Environmental Division. 2018. Report to the U.S. Fish and Wildlife Service for Oahu Army Natural Resource Program, Permit: TES-043638, Reporting period January 1, 2018-December 31, 2018. 16 pp.

[USFWS] U.S. Fish and Wildlife Service. 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. *Alsinidendron trinerve* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc4239.pdf.*

[USFWS] 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

Wagner, W.L., S.G. Weller, and A.K. Sakai. 2005. Monograph of *Schiedea* (Caryophyllaceae-Alsinoideae). Systematic Botany Monographs, The American Society of Plant Taxonomists, C. Anderson (ed.), Ann Arbor. 169 pp.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Schiedea trinervis* (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
X No Change in listing status

For **Field Supervisor, Pacific Islands Fish and Wildlife Office**

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