

## **5-YEAR REVIEW**

Short Form Summary

**Species Reviewed:** *Alsinidendron trinerve* (no common name)

**Current Classification:** Endangered

### **FR Notice announcing initiation of this review:**

[USFWS] U.S. Fish and Wildlife Service. 2007. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 71 species in Oregon, Hawaii, Commonwealth of the Northern Mariana Islands, and Territory of Guam. Federal Register 72(45):10547-10550.

### **Lead Region/Field Office:**

Region 1/Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii

### **Name of Reviewer(s):**

Christian Torres-Santana, Student Trainee Biologist

Marie Bruegmann, Plant Recovery Coordinator

Marilet A. Zablan, Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species

Gina Shultz, Deputy Field Supervisor

### **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 (USFWS) beginning on March 8, 2007. The review was based on the critical habitat designation for *Alsinidendron trinerve* and other species from the island of Oahu (USFWS 2002, 2003a), as well as a review of current, available information. The Bernice P. Bishop Museum provided an initial draft of portions of the 5-year review and recommendations for conservation actions needed prior to the next five-year review. The evaluation of the status of the species was prepared by our lead PIFWO biologist and reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species, and Deputy Field Supervisor, before submission to the Field Supervisor for approval.

### **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)).

### **Application of the 1996 Distinct Population Segment (DPS) Policy:**

This Policy does not apply to plants.

### **Review Analysis:**

Please refer to the proposed and final critical habitat designation for *Alsinidendron trinerve* published in the Federal Register on May 28, 2002 and June 17, 2003 respectively (USFWS 2002, 2003a) for a complete review of the species' status (including biology and habitat), threats, and management efforts. No new threats and no significant new information regarding the species biological status have come to light since listing to warrant a change in the Federal listing status of *A. trinerve*.

At the time of listing, two populations with a total of eight *Alsinidendron trinerve* individuals were known, all within the small area of the wet montane forest in the Waianae Mountain range on the island of Oahu (USFWS 1991). Due to extensive invasive introduced plant species, eradication and pig control efforts at Mt. Kaala, and the subsequent discovery of new individuals, the number of individuals within the one known population has increased to 169 mature and 206 immature individuals, and 322 seedlings within one wide-spread population (U.S. Army 2006, 2007).

Recent information on the species biology suggests that *Alsinidendron trinerve* exhibits cleistogamy, a breeding system in which permanently closed flowers are produced that are always self-fertilized. The calyces (modified leaves) develop into dark fleshy orbs, presumably for bird dispersal (Wagner *et al.* 2005). However, little else is known about seed dispersal agents, longevity, specific environmental requirements, and limiting factors (USFWS 1998, 2003a, b).

Based on molecular and morphological data, Wagner *et al.* (2005) concluded that *Alsinidendron* formed a monophyletic group within *Schiedea*, and should therefore be subsumed into the Hawaiian endemic genus *Schiedea*. As such, the synonym *Schiedea trinervis* was reestablished as the recognized species name. Henceforth for this report, this species will be referred to as *Schiedea trinervis*.

The major threats to *Schiedea trinervis* are degradation and loss of habitat caused by feral pigs (*Sus scrofa*) and feral goats (*Capra hircus*) (Factors A and D). The Kalena to East Makaleha subpopulation is protected from the negative effects of pigs by a fence that surrounds the Mt. Kaala summit, but it does not prevent goat ingress, since they can jump over the fence. Competition from invasive introduced plant species (Factor E) is another major threat, competing for light, space and water resources. The most serious invasive introduced plant species impacting *S. trinervis* include *Hedychium gardenarium* (kahihi ginger), *Psidium cattleianum* (strawberry guava), *Kalanchoe pinnata* (airplant), *Buddleia asiatica* (butterfly bush), *Clidemia hirta* (Koster's curse), and *Rubus argutus* (prickly Florida blackberry). Trampling and collection by humans along trails threaten the species (Factor E) (USFWS 1991, 1998, 2003a, b; Wagner *et al.* 1999; Wagner *et al.* 2005; U.S. Army 2006, 2007). Predation by various species of introduced slugs is presumed to occur, as it is also a limiting factor causing a significant mortality for the closely related *Schiedea obovata*, which is also endangered (U.S. Army 2006, 2007; Joe and Daehler 2008). In addition, military training activities potentially threaten the remaining individuals as more than 95 percent of the extant populations are found within the Army's action area (U.S. Army 2006).

The U.S. Army is currently controlling *Hedychium gardenarium* and *Psidium cattleianum*, the most significant invasive plants threatening *Schiedea trinervis*. Most of the *S. trinervis* on Mt. Kaala occur within an enclosure fence that prevents ingress by feral pigs but not goats (U.S. Army 2006, 2007).

To safeguard existing genetic material, propagation for genetic storage and reintroduction is occurring at the University of Hawaii's Lyon Arboretum Micropropagation Laboratory (2007) and the National Tropical Botanical Garden (2007). Seeds are also in storage for research on species biology and breeding systems at the University of California at Irvine (University of California at Irvine 2006). Plants are easily propagated from seed, and laboratory germination takes from three weeks to 12 months (Yoshinaga 2001). There is no decrease in viability after more than six years of temperature-controlled dry storage. Fresh seeds may initially be slow to germinate due to dormancy but typically have high viability (more than 75 percent). Seedlings have also been established in tissue culture from seeds, and these seedlings have been propagated in a greenhouse (U.S. Army 2006, 2007). Six mature and 37 immature individuals have been outplanted (U.S. Army 2007). There are over 20,000 seeds from 35 wild plants in storage (U.S. Army 2006).

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 trinervis* is a short-lived perennial, and to be considered stabilized, which is the first step in recovering the species, 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 only one population of 169 mature individuals exists and not all threats are being managed (see Table 1). Therefore, *Schiedea trinervis* meets the definition of endangered as it remains in danger of extinction throughout its range.

#### **Recommendations for Future Actions:**

- Complete collection of fruit from wild and any reintroduced individuals that set seed to add to the genetic diversity of the *ex situ* material.
- Control introduced invasive plant species around wild and outplanted plants.
- Construct large-scale fences around the entire population and reintroduced individuals to control feral ungulates.
- Continue reintroducing individuals into protected suitable habitat within historical range.

- Investigate techniques to improve natural recruitment, including the development of an effective slug control method.
- Assess genetic variability within the one extant population.
- Determine if it is possible to restore lowland shrub habitat on the highly developed and degraded Ewa Plain.
- Study *Schiedea trinervis* populations with regard to population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- Update the listed entity on 50 CFR 17 to match the currently recognized taxonomy.

#### **References:**

Harold L. Lyon Arboretum Micropropagation Laboratory. 2007. Micropropagation Database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Joe, S., and C.C. Daehler. 2008. Invasive slugs as under-appreciated obstacles to rare plant restoration: evidence from the Hawaiian Islands. *Biological Invasions* 10(2):245-155.

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- Yoshinaga, A. 2001. Seed storage practices for native Hawaiian plants: An On-Line Manual. Center for Conservation Research and Training, University of Hawaii, Honolulu, Hawaii. 30 pages. Available online at <[http://www.hawaiiconservation.org/\\_library/documents/seed%20storage%20manual.pdf](http://www.hawaiiconservation.org/_library/documents/seed%20storage%20manual.pdf)>. Downloaded 2 February 2008.

**Table 1. Status of *Alsinidendron trinerve* from listing through 5-year review.**

<b>Date</b>	<b>No. wild indivs</b>	<b>No. outplanted</b>	<b>Stability Criteria identified in Recovery Plan</b>	<b>Stability Criteria Completed?</b>
1991 (listing)	8	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	108	40-45	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2003 (critical habitat)	18-34	unknown	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2008 (5-year review)	697	43	All threats managed	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially

**U.S. FISH AND WILDLIFE SERVICE**  
SIGNATURE PAGE for 5-YEAR REVIEW of *Alsinidendron trinerve*

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 Field Supervisor, Pacific Islands Fish and Wildlife Office**



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