

Schiedea haleakalensis
(no common name)

**5-Year Review
Summary and Evaluation**

**U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawaii**

5-YEAR REVIEW

Species reviewed: *Schiedea haleakalensis*/ no common name

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5-YEAR REVIEW
***Schiedea haleakalensis* (no common name)**

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:

Region 1, Endangered Species Program, Division of Recovery, Jesse D'Elia, (503) 231-2071

Lead Field Office:

Pacific Islands Fish and Wildlife Office, Loyal Mehrhoff, Field Supervisor, (808) 792-9400

Cooperating Field Office(s):

N/A

Cooperating Regional Office(s):

N/A

1.2 Methodology used to complete the 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 March 16, 2009. The review was based on final critical habitat designations for *Schiedea haleakalensis* and other species from the island of Maui (USFWS 2003) as well as a review of current, available information. The National Tropical Botanical Garden provided an initial draft of portions of the review and recommendations for conservation actions needed prior to the next five-year review. The evaluation of Samuel Aruch, biological consultant, was reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Lead and the Assistant Field Supervisor for Endangered Species before submission to the Deputy Field Supervisor for approval.

1.3 Background:

1.3.1 Federal Register (FR) Notice citation announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2009. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 103 species in Hawaii. Federal Register 74(49):11130-11133.

1.3.2 Listing history

Original Listing

FR notice: USFWS. 1992. Endangered and threatened wildlife and plants; determination of threatened or endangered status for 15 plants from the island of Maui, Hawaii; final rule. Federal Register 57(95):20772-20788.

Date listed: May 15, 1992

Entity listed: Species

Classification: Endangered

Revised Listing, if applicable

FR notice: N/A

Date listed: N/A

Entity listed: N/A

Classification: N/A

1.3.3 Associated rulemakings:

USFWS. 2003. Endangered and threatened wildlife and plants; designation of critical habitat for 60 plant species from the islands of Maui and Kahoolawe, Hawaii; final rule. Federal Register 68(93):25934-26165.

Critical habitat was designated for *Schiedea haleakalensis* in two units totaling 103 hectares (253 acres) on the island of Maui. This designation includes habitat on federal lands (USFWS 2003).

1.3.4 Review History:

Species status review [FY 2010 Recovery Data Call (September 2010)]: Improving

Recovery achieved:

1 (0-25%) (FY 2007 Recovery Data Call – most recent year reported)

1.3.5 Species' Recovery Priority Number at start of this 5-year review:

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: U.S. Fish and Wildlife Service. 1997. Recovery plan for the Maui plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 130 pages + appendices.

Date issued: July 29, 1997.

Dates of previous revisions, if applicable: N/A

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

Yes

No

2.1.2 Is the species under review listed as a DPS?

Yes

No

2.1.3 Was the DPS listed prior to 1996?

Yes

No

2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?

Yes

No

2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?

Yes

No

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?

Yes

No

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

Yes

No

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?

Yes

No

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

Yes

No

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:

A synthesis of the threats (Listing Factors A, C, D, and E) affecting this species is presented in section 2.3.2 and Table 2. Listing Factor B (overutilization for commercial, recreational, scientific, or educational purposes) is not known to be a threat to this species.

Stabilizing, downlisting, and delisting objectives are provided in the Maui plant cluster recovery plan (USFWS 1997), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Schiedea haleakalensis* 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, weeding, etc.) and be represented in an *ex situ* (off-site) collection. In addition, a minimum of three populations should be documented on Maui, and if possible, at least one other island where they now occur or occurred historically. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

There are only two confirmed populations containing more than 50 individuals and all threats have not been managed. This recovery objective has not been met.

For downlisting, a total of five to seven populations of *Schiedea haleakalensis* should be documented on islands where they now occur 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.

This recovery objective has not been met.

For delisting, a total of eight to ten populations of *Schiedea haleakalensis* should be documented on islands where they now occur or occurred historically. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with 300 mature individuals per population for long-lived perennials. Each population should persist at this level for a minimum of five consecutive years before delisting is considered.

This recovery objective has not been met.

2.3 Updated Information and Current Species Status

No new information.

2.3.1 Biology and Habitat

2.3.1.1 New information on the species' biology and life history:

Schiedea haleakalensis is among a few of the 33 species of the genus *Schiedea* in Hawaii which are adapted to dry habitats, and which are also dioecious (containing male and female flowers on separate plants) in their breeding system (Weller and Sakai 2010).

2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

Schiedea haleakalensis is endemic to the cliffs of Haleakala National Park on the island of Maui. It has only been reported from two populations: the cliffs on the west side of Kaupo Gap

at 1,798 to 2,316 meters (5,900 to 7,600 feet) elevation, and from within the rim of Haleakala Crater between Kalahaku Pali and Holua Cabin at 2,195 to 2,560 meters (7,200 to 8,400 feet) elevation (Hawaii Biodiversity and Mapping Program 2009). In 1991, about five individuals were seen in Kaupo Gap at 1,957 to 2,103 meters (6,420 to 6,900 feet) elevation (Perlman 2010). In 1998, 50 to 100 individuals were known from the two populations, with an estimated 100 to 300 individuals. The inaccessibility of their habitat makes a complete survey logistically difficult (Medeiros *et al.* 1998). Between 2001 and 2003, 8 individuals were located at the Haleakala Park – Kaupo Gap population and 17 individuals were known from the Holua population. Between 2006 and 2008, 17 more individuals were located at the Holua population (Haleakala National Park Resource Management and Vegetation Management 2008; Welton 2010).

As of 2010, the total population of *Schiedea haleakalensis* is 42 known individuals and an estimated 150 to 350 individuals located in two populations.

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

No new information.

2.3.1.4 Taxonomic classification or changes in nomenclature:

No new information

2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g., corrections to the historical range, change in distribution of the species within its historic range, etc.):

See section 2.3.1.2 above.

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

At Kaupo Gap in Haleakala National Park *Schiedea haleakalensis* occurs in *Leptecophylla tameiameiae* (pukiawe) subalpine dry shrubland with *Artemisia mauiensis* (hinahina), *Bidens micrantha* var. *kalahala* (kookoolau), *Deschampsia nubigena* (hairgrass), *Dubautia menziesii* (naenae), *Metrosideros polymorpha* (ohia), *Plantago princeps* var. *laxiflora* (laukahi kuahiwi), *Sadleria cyatheoides* (amau), *Sanicula sandwicensis* (no common name [NCN]), *Sophora chrysophylla* (mamane), *Tetramolopium humile* (NCN), and *Vaccinium reticulatum* (ohelo) (Perlman 2010; Welton 2010).

2.3.1.7 Other:

No new information.

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

Threats that modify the species habitat include feral goats (*Capra hircus*) and introduced invasive plant species which degrade the habitat. One of the most serious introduced invasive plant species that threatens the species habitat is *Holcus lanatus* (Velvetgrass) (Perlman 2010).

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

Not a threat.

2.3.2.3 Disease or predation:

Rats (*Rattus* spp.) and slugs (unidentified species) have been noted to consume vegetative or floral parts of *Schiedea haleakalensis* (Medeiros *et al.* 1998; Perlman 2010). In Hawaii, the Argentine ant (*Linepethima humile*) poses a direct threat to native arthropods at higher elevations, and an indirect threat to *S. haleakalensis*, which is dependent on native invertebrates for pollination (Medeiros *et al.* 1998).

2.3.2.4 Inadequacy of existing regulatory mechanisms:

No new information.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

The introduced invasive plant species, *Holcus lanatus*, discussed in section 2.3.2.1 above is also a threat to *Schiedea haleakalensis* because it competes with the species for water, light, and nutrients.

Climate change may also 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 has currently funded climate modeling that will help resolve these spatial limitations. We anticipate high spatial resolution climate outputs by 2013.

Schiedea haleakalensis is being monitored by the Plant Extinction Prevention Program. Their plan for this species is to continue to attempt to collect seeds for genetic storage and reintroduction, and propagate and reintroduce the species into protected areas within suitable habitat (State of Hawaii Department of Land and Natural Resources 2007, 2008).

In 2005, Haleakala National Park staff collected 55 seeds from two individuals located in Haleakala Crater, and in 2006 they collected 55 seeds from 7 individuals in the crater and reintroduced 10 individuals in the crater at 2,616 meters (7,090 feet) elevation. In 2007, staff collected 60 seeds from three individuals and four cuttings from a single individual located in Holua. No individuals of *Schiedea haleakalensis* were reintroduced in 2007. In 2008, nine new individuals were mapped in the crater and 225 seeds were collected from five of the nine individuals and placed in storage at the National Park. In 2008, 33 individuals were reintroduced from their nursery into the crater. Overall reintroduction success has been poor to fair (Haleakala National Park Resource Management and Vegetation Management 2005, 2006, 2007, 2008).

Seeds produced in cultivation by Dr. Steve Weller at the University of California at Irvine were given to Haleakala National Park for propagation. These seeds are descended from a single wild individual (State of Hawaii Department of Land

and Natural Resources 2008), however, staff from Haleakala National Park has been able to collect seeds from other wild individuals preventing the gene pool of reintroduced individuals from decreasing. Currently Haleakala National Park has 59 propagules, descended from 5 individuals growing in their nursery (Haleakala National Park 2010). Dr. Steve Weller at the University of California at Irvine has three propagules descended from a single individual growing in his nursery (University of California-Irvine 2009).

Habitat within Haleakala National Park is fenced and feral ungulates are being managed (USFWS 1997).

2.4 Synthesis

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Maui plant cluster (USFWS 1997), based on whether the species is an annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. *Schiedea haleakalensis* 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* (off-site) collection. In addition, a minimum of three populations should be documented on islands where they now occur or occurred historically. For the species to be considered stable, each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

The interim stabilization goals for this species have not been met as there are only two known populations containing more than 50 individuals (Table 1) and all threats have not been managed (Table 2). Therefore, *Schiedea haleakalensis* meets the definition of endangered as it remains in danger of extinction throughout its range.

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

| Date | No. wild indivs | No. outplanted | Stability Criteria identified in Recovery Plan | Stability Criteria Completed? |
|----------------------------|------------------------|-----------------------|---|--------------------------------------|
| 1992 (listing) | 100-200 | 0 | All threats managed in all 3 populations | No |
| | | | Complete genetic storage | No |
| | | | 3 populations with 50 mature individuals each | No |
| 1997 (recovery plan) | 100-200 | 0 | All threats managed in all 3 populations | Partially |
| | | | Complete genetic storage | Partially |
| | | | 3 populations with 50 mature individuals each | No |
| 2003 (critical habitat) | 100-200 | 0 | All threats managed in all 3 populations | Partially |
| | | | Complete genetic storage | Partially |
| | | | 3 populations with 50 mature individuals each | No |
| 2010 (5-year review) | 150-350 | 65 | All threats managed in all 3 populations | Partially (Table 2) |
| | | | Complete genetic storage | Partially |
| | | | 3 populations with 50 mature individuals each | Partially: only 2 populations known |

Table 2. Threats to *Schiedea haleakalensis*.

| Threat | Listing factor | Current Status | Conservation/ Management Efforts |
|--|-----------------------|-----------------------|--|
| Ungulates – habitat modification and herbivory | A, C, D | Ongoing | Yes: both populations fenced and ungulates being managed |
| Ants – predation on pollinators | C | Ongoing | No |
| Rats – herbivory | C | Ongoing | No |
| Slugs – herbivory | C | Ongoing | No |
| Invasive introduced plants | A, E | Ongoing | Partially: plants have been reintroduced into weed controlled areas with limited success |
| Climate change | A, E | Increasing | No |

3.0 RESULTS

3.1 Recommended Classification:

Downlist to Threatened

Uplist to Endangered

Delist

Extinction

Recovery

Original data for classification in error

No change is needed

3.2 New Recovery Priority Number:

Brief Rationale:

3.3 Listing and Reclassification Priority Number:

Reclassification (from Threatened to Endangered) Priority Number: _____

Reclassification (from Endangered to Threatened) Priority Number: _____

Delisting (regardless of current classification) Priority Number: _____

Brief Rationale:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Continue to collect seeds and other propagules for genetic storage and reintroduction.
- Maintain the fences around existing populations to provide protection from the negative impacts of feral ungulates.
- Control invasive introduced species around known populations.
- Survey areas where *Schiedea haleakalensis* has been reported to determine current status of the species.
- Develop and implement methods to control slugs and ants.
- Control rats in the vicinity of these populations.
- Propagate to augment the existing populations.
- Research limiting factors to reintroduction success and possible solutions.
- Establish additional populations within protected suitable habitat.
- Work with the National Park Service, Plant Extinction Prevention Program, and other land managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.
- Assess the modeled effects of climate change on this species, and use to determine future landscape needed for the recovery of the species.

5.0 REFERENCES

- Haleakala National Park. 2010. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Makawao, Hawaii. Unpublished.
- Haleakala National Park Resource Management and Vegetation Management. 2005. Annual report for threatened and endangered species permit TE-014497-10 Unpublished report submitted to U.S. Fish and Wildlife Service, Honolulu, Hawaii. 7 pages.
- Haleakala National Park Resource Management and Vegetation Management. 2006. Annual report for threatened and endangered species permit TE-014497-10.

- Unpublished report submitted to U.S. Fish and Wildlife Service, Honolulu, Hawaii. 5 pages.
- Haleakala National Park Resource Management and Vegetation Management. 2007. Annual report for threatened and endangered species permit TE-014497-10. Unpublished report submitted to U.S. Fish and Wildlife Service, Honolulu, Hawaii. 4 pages.
- Haleakala National Park Resource Management and Vegetation Management. 2008. Annual report for threatened and endangered species permit TE-014497-10. Unpublished report submitted to U.S. Fish and Wildlife Service, Honolulu, Hawaii. 4 pages.
- Hawaii Biodiversity and Mapping Program. 2009. Program database. Hawaii Biodiversity and Mapping Program, Honolulu, Hawaii.
- Medeiros, A.C., L.L. Loope, and C.G. Chimera. 1998. Flowering plants and gymnosperms of Haleakala National Park; technical report 10. Unpublished report, submitted to Haleakala National Park. 181 pages.
- Perlman, S. 2010. *Schiedea haleakalensis*. National Tropical Botanical Garden, Kalaheo, Hawaii. 1 page. Unpublished.
- State of Hawaii Department of Land and Natural Resources. 2007. Statewide endangered plant program Endangered Species Act - Section 6. Unpublished report submitted to the U.S. Fish and Wildlife Service, Honolulu, Hawaii. 65 pages.
- State of Hawaii Department of Land and Natural Resources. 2008. Statewide endangered plant program Endangered Species Act - Section 6. Unpublished report submitted to the U.S. Fish and Wildlife Service, Honolulu, Hawaii. 88 pages.
- University of California-Irvine. 2009. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. University of California, Irvine, California. Unpublished.
- [USFWS] U.S. Fish and Wildlife Service. 1997. Recovery plan for the Maui plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 130 pages + appendices.
- [USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; designation of critical habitat for 60 plant species from the islands

of Maui and Kahoolawe, Hawaii; final rule. Federal Register 68(93):25934-26165.

Weller, S. and A. Sakai. 2010. Phylogenetic tables of *Schiedea*. Unpublished presentation.

Welton, P. 2010. *Schiedea haleakalensis* 5 year review edits and comments. Haleakala National Park, Makawao, Hawaii. 5 pages. Unpublished.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Schiedea haleakalensis* (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

Appropriate Listing/Reclassification Priority Number, if applicable: _____

Review Conducted By:

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Date SEP 20 2011