

Schiedea hookeri
(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 hookeri*/ no common name

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5-YEAR REVIEW
***Schiedea hookeri* (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 hookeri* and other species from the islands of Maui and Oahu (USFWS 2003a, b) 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. 1996. Endangered and threatened wildlife and plants; determination of endangered or threatened status for fourteen plant taxa from the Hawaiian Islands, Hawaii; final rule. Federal Register 61(198):53108-53124.

Date listed: October 10, 1996

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. 2003a. 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.

USFWS. 2003b. Endangered and threatened wildlife and plants; final designations or nondesignations of critical habitat for 101 plant species from the island of Oahu, Hawaii; final rule. Federal Register 68(116):35949-36406.

Critical habitat was not designated for *Schiedea hookeri* on the island of Maui (USFWS 2003a). Critical habitat was designated for *Schiedea hookeri* in a single unit totaling 1,544 hectares (3,815 acres) on the island of Oahu. This designation includes habitat on State, Federal, and private lands (USFWS 2003b).

1.3.4 Review History:

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

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:

5

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: U.S. Fish and Wildlife Service. 1999.

Recovery plan for multi-island plants. U.S. Fish and Wildlife Service, Portland, Oregon. 206 pages + appendices.

Date issued: July 10, 1999.

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 multi-island plant recovery plan (USFWS 1999), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Schiedea hookeri* is a long-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 islands where they now occur or occurred historically. Each of these

populations must be naturally reproducing and increasing in number, with a minimum of 25 mature individuals per population.

This recovery objective has been met. There are more than three populations of *Schiedea hookeri* containing more than 25 mature individuals per population.

For downlisting, a total of five to seven populations of *Schiedea hookeri* 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 100 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 hookeri* 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 100 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

2.3.1 Biology and Habitat

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

Reproduction from seeds under field conditions has been reported only in Kaluakauila on Oahu (USFWS 2007). *Schiedea hookeri* is a hermaphroditic species (Weller and Sakai 2010). It is an outcrossing species, probably pollinated by insects. Mature fruits have been observed during the months of June and August, but seed dispersal mechanisms are unknown. This species varies considerably throughout its range in its potential for vegetative (clonal) growth and spread. Upright plants are located at one site, for example, and show little clonal potential, whereas decumbent plants located at another site tend to exhibit

clonal growth by nodal rooting. Plant longevity is probably less than 10 years (USFWS 2007).

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 hookeri is endemic to Oahu's Waianae Mountains. Apparently both the number of populations and numbers of individuals (in most of these populations) have increased in the last decade (USFWS 2007), yet this increase in numbers may simply reflect an increase in field surveys within the species range. One observation made in the 1800s on East Maui by Lydgate was attributed to this species; however this site has never been revisited (Hawaii Biodiversity and Mapping Program 2009). When the species was listed in 1996, 11 populations totaling 220 to 330 individuals were known. Currently, there are more than 18 populations totaling an estimated 502 individuals known on Federal, State, City/County, and private lands, including 128 individuals within the Makua Military Reservation and five individuals within the Schofield Barracks Military Reservation (USFWS 2007).

Four mature individuals were observed in 1999 in Kaluakauila Gulch at 366 to 396 meters (1,200 to 1,300 feet) elevation. In 2006, 50 individuals were observed in a survey of the Kaluakauila Management Unit of Makua Military Reservation (Hawaii Biodiversity and Mapping Program 2009; USFWS 2007).

Three mature individuals were observed in 2000 in Kaluaa Gulch/Honouliuli Preserve, at the north fork of South Waieli Gulch, at 725 meters (2,380 feet) elevation (Hawaii Biodiversity and Mapping Program 2009). Fifty mature individuals were seen in 2002 growing in a mat 10 x 15 meters (33 x 49 feet) wide, at Ekahanui Gulch in the Honouliuli Preserve at 634 meters (2,080 feet) elevation (Hawaii Biodiversity and Mapping Program 2009). In Kaluaa to Ekahanui 60 individuals were seen in 2003, 100 in 2005, and two in 2006 (USFWS 2007).

In Mikilua, between Kolekole Pass and Puu Hapapa, 20 individuals were seen in 2004 at 622 meters (2,040 feet)

elevation (Hawaii Biodiversity and Mapping Program 2009), and in 2003, 10 individuals were known from Kolekole/Puu Hapapa (USFWS 2007).

Thirty individuals were known to occur in Puu Kaua's west side, on a steep ridge just south of Puu Kaua, in Lualualei at 853 to 899 meters (2,800 to 2,950 feet) elevation in 2004; 7 individuals at 655 meters (2,149 feet) elevation; and 5 individuals at 762 meters (2,500 feet) elevation on a north facing cliff along the ridge, just to the north of Puu Kaua (Hawaii Biodiversity and Mapping Program 2009; Wood 2010). Fifty individuals were seen at Puu Kaua in 2006 (USFWS 2007).

Two individuals were observed in Makaha at 549 meters (1,800 feet) elevation in 2000 (Hawaii Biodiversity and Mapping Program 2009). One hundred individuals were seen scattered in the back of Makaha Gulch at 792 meters (2,600 feet) elevation in 2000, and an unknown number of individuals were also observed in 2000 at 841 to 853 meters (2,760 to 2,800 feet) elevation (Hawaii Biodiversity and Mapping Program 2009; Perlman 2010). The U.S. Army knew of 4 individuals in Makua/Makaha Ridge in 2003, 5 individuals in 2005, and 17 in 2006 (USFWS 2007). In 2006, four individuals were known to Army staff in Ohikilolo (USFWS 2007). Ten individuals were known from Kamaileunu Ridge, Makaha side, at about 817 to 853 meters (2,680 to 2,800 feet) elevation (Hawaii Biodiversity and Mapping Program 2009), and 11 individuals were known from Kamaileunu Ridge in 2003 (USFWS 2007)

Forty individuals were estimated in 1998 in Waianae Kai, north of Puu Kawiwi, at 689 to 719 meters (2,260 to 2,360 feet) elevation (Hawaii Biodiversity and Mapping Program 2009). In 1999, five mature individuals were seen north of Puu Kawiwi, at 753 meters (2,470 feet) in the Waianae Kai Forest Reserve, on the Makaha side of the dividing ridge, west of Waianae Kai, and south of Pinnacle Peaks (Hawaii Biodiversity and Mapping Program 2009; Wood 2010). North of Puu Kawiwi, and in Waianae Kai, four individuals were observed at 640 meters (2,100 feet) elevation in 1999 (Hawaii Biodiversity and Mapping Program 2009). One hundred-fifty individuals were observed in a survey of Waianae Kai/ Waianae Kai Ridge in 2006 (USFWS 2007).

Twenty individuals were seen in 2000 at Kahanahaiki, in the Makua Military Reservation, at 442 to 488 meters (1,450 to 1,600 feet) elevation (Hawaii Biodiversity and Mapping Program 2009); 20 individuals were observed there in 2006 (USFWS 2007).

In Keaau, 12 individuals were observed in an estimated patch that was 2 by 3 meters (7 by 10 feet) across at 799 meters (2,620 feet) in 2002 and the same patch of individuals were revisited in 2006 (Hawaii Biodiversity and Mapping Program 2009; USFWS 2007).

Ten individuals were observed at Palikea Gulch from 280 to 293 meters (920 to 960 feet) elevation in 2000 (Hawaii Biodiversity and Mapping Program 2009). Ten mature individuals were estimated to exist within a 200 square meter (2,153 square foot) area in Palikea Gulch in the Waialua District, on the eastern fork below and north of Puu Pane, at 533 meters (1,750 feet) elevation in 2000. Ken Wood believes these individuals could possibly be hybrids between *S. hookeri* and *S. pubescens* (Hawaii Biodiversity and Mapping Program 2009; Wood 2010). In 2006, 20 individuals of *S. hookeri* were known from Palikea (USFWS 2007).

Ten mature individuals were seen in Alaiheihe Gulch at 427 meters (1,400 feet) elevation in 2003 (Hawaii Biodiversity and Mapping Program 2009).

About 20 plants were seen in a 10 square meter (108 square foot) area at Lualualei, accessed via the Kolekole Contour Trail, at 661 meters (2,170 feet) elevation in 2004 (Wood 2010).

Between Mt. Kaala and Puu Kalena in 1999 at 939 meters (3,080 feet) elevation a flowering specimen was vouchered (Perlman 2010). Fifty individuals were observed in the Lower Kaala Natural Area Reserve in a 2006 survey (USFWS 2007). Three individuals were known from North Waieli in 2006 (USFWS 2007).

In 2006 the staff of U.S. Army estimated 420 known individuals in 18 populations within U.S. Army management areas, with another 82 individuals known to exist outside of their purview (USFWS 2007).

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

A series of self-pollination experiments, including within-population crosses and crosses among populations, demonstrated that *Schiedea hookeri* has moderately strong inbreeding depression. This could result in reduced reproductive vigor, and eventually lead to the decline of the species (USFWS 2007).

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):

Schiedea hookeri grows in diverse mesic or dry lowland forests, which are often dominated by invasive introduced tree species (see below section 2.3.2.1) or by native tree species such as *Metrosideros polymorpha* (ohia), *Diospyros sandwicensis* (lama), *D. hillebrandii* (lama), and/or *Sapindus oahuensis* (lonomea). Associated native plant species include *Acacia koa* (koa), *Alectryon macrococcus* (mahoe), *Alyxia stellata* (maile), *Antidesma platyphylla* (hame), *A. pulvinatum* (hame), *Artemisia australis* (hinahina kuahiwi), *Bidens torta* (kookoolau), *Bobea elatior* (ahakea lau nui), *B. sandwicensis* (ahakea), *Carex meyenii* (no common name [NCN]), *C. wahuensis* (NCN), *Euphorbia celastroides* (akoko), *E. multiformis* (akoko), *Charpentiera tomentosa* (papala), *Cocculus orbiculatus* (hue hue), *Coprosma longifolia* (pilo), *Cyanea calycina* (haha), *C. lanceolata* (haha), *Dianella sandwicensis* (uki uki), *Diellia falcata* (NCN), *Dodonaea viscosa* (aalii), *Doodia kunthiana* (okupukupu), *Dryopteris sandwicensis* (NCN), *Dubautia sherffiana* (naenae), *Elaeocarpus bifidus* (kalia), *Embelia*

pacifica (kilioe), *Eragrostis fosbergii* (lovegrass), *E. grandis* (lovegrass), *E. variabilis* (kawelu), *Eugenia reinwardtiana* (nioi), *Freycinetia arborea* (ie ie), *Gardenia mannii* (nanu), *Gouania meyenii* (NCN), *Hibiscus arnottianus* (kokio keokeo), *Kadua acuminata* (au), *Kadua cordata* subsp. *remyi* (kopa), *Labordia tinifolia* (kamakahala), *Lepidium arbuscula* (NCN), *Leptecophylla tameiameiae* (pukiawe), *Lipochaeta lobata* subsp. *leptophylla* (nehe), *Lobelia niihauensis* (NCN), *L. yuccoides* (panaunau), *Lysimachia hillebrandii* (kolokolo lehua), *Melanthera tenuis* (nehe), *Melicope makahae* (alani), *M. peduncularis* (alani), *Microlepia strigosa* (palapalai), *Morinda trimeria* (noni kauhiwi), *Myrsine lanaiensis* (kolea), *M. lessertiana* (kolea lau nui), *M. sandwicensis* (kolea lau lii), *Neraudia melastomifolia* (maaloa), *Nototrichium humile* (kului), *Osteomeles anthyllidifolia* (ulei), *Panicum beecheyi* (NCN), *Peperomia tetraphylla* (ala ala wai nui), *Pilea peploides* (NCN), *Pipturus albidus* (mamake), *Pisonia sandwicensis* (papala kepau), *Pittosporum confertiflorum* (hoawa), *Platydesma cornuta* var. *decurrens* (NCN), *Pleomele forbesii* (halapepe), *P. halapepe* (halapepe), *Polypodium pellucidum* (ae lau nui), *Pouteria sandwicensis* (alaa), *Psychotria hathewayi* (kopiko), *P. mariniana* (kopiko), *Psydrax odorata* (alahee), *Rauvolfia sandwicensis* (hao), *Rhynchospora sclerioides* (kuolohia), *Rumex albescens* (huahuako), *Schiedea ligustrina* (NCN), *S. mannii* (NCN), *Sida fallax* (ilima), *Sophora chrysophylla* (mamane), *Stenogyne kaalae* (NCN), *Urera glabra* (opuhe), *Viola chamissoniana* (pamakani), *Zanthoxylum dipetalum* (kawau), and *Zanthoxylum kauaense* (heae) (Hawaii Biodiversity and Mapping Program 2009; Perlman 2010; USFWS 2007; Wood 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:

Direct consumption by feral goats (*Capra hircus*) has been reported from Lualualei, Keaau, and Kamaileunu. Goats and pigs (*Sus scrofa*) degrade the habitat of *Schiedea hookeri* in

Makaha, Puu Pane, Puu Kaua, and Waianae Kai. Pigs are a huge problem in the Palikea and Alaiheihe areas (Hawaii Biodiversity and Mapping Program 2009; Wood 2010).

Landslides and erosion are a threat in Waianae Kai (Hawaii Biodiversity and Mapping Program 2009; Wood 2010).

Many of the populations of *Schiedea hookeri* are in areas where invasive species are predominant. Invasive introduced plants which degrade the habitat for *Schiedea hookeri* include *Adiantum hispidulum* (rough maidenhair fern), *Ageratina adenophora* (sticky snakeroot), *A. riparia* (spreading mist flower), *Aira caryophyllea* (silver hairgrass), *Aleurites moluccana* (kukui), *Blechnum appendiculatum* (NCN), *Bryophyllum pinnatum* (airplant), *Chrysophyllum oliviforme* (NCN), *Clidemia hirta* (Koster's curse), *Erigeron karvinskianus* (daisy fleabane), *Grevillea robusta* (silk oak), *Heliocarpus popayanensis* (white moho), *Hyptis pectinata* (comb hyptis), *Lantana camara* (lantana), *Leucaena leucocephala* (haole koa), *Melia azedarach* (pride of India), *Melinis minutiflora* (molasses grass), *Paspalum conjugatum* (Hilo grass), *Urochloa maximum* (Guinea grass), *Passiflora suberosa* (corksystem passionflower), *Pimenta dioica* (allspice), *Psidium cattleianum* (strawberry guava), *P. guajava* (common guava), *Rubus rosifolius* (thimbleberry), *Schinus terebinthifolius* (Christmas berry), *Sonchus oleraceus* (sow thistle), *Stachytarpheta dichotoma* (blue rattail), *Syzygium cumini* (Java plum), *Christella parasitica* (NCN), *Toona ciliata* (cedar), *Vulpia bromoides* (brome fescue), and *Youngia japonica* (hawksbeard) (Hawaii Biodiversity and Mapping Program 2009; Wood 2010).

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

Not a threat.

2.3.2.3 Disease or predation:

Schiedea hookeri is vulnerable to herbivory by introduced slugs and snails of various species. Seedlings from other *Schiedea* species that occur in mesic or wet sites are apparently consumed by introduced slugs and snails. One study noted that seedling mortality for the related species *S. obovata* doubled when exposed to slug herbivory (USFWS 2007). Rats (*Rattus* spp.)

are a threat to most populations containing *S. hookeri* (Perlman 2010).

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 discussed in section 2.3.2.1 above are also a threat to *Schiedea hookeri* because they compete 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.

Fire is a threat to most populations in the Waianae Mountains (Perlman 2010). Fire from military training-related activities is considered a risk in the Kaluakauila, Kahanahaiki, Keaau, Ohikilolo, and North Mohiakea management units (USFWS 2007). Fire burned areas are located adjacent to the Kahanahaiki population (Hawaii Biodiversity and Mapping Program 2009).

The Kaluakauila population of *Schiedea hookeri* is within a fenced ungulate-proof enclosure; the other three populations located in military action areas are not fenced, and none of the populations are actively managed by the Army (USFWS 2007).

Waimea Valley Arboretum has 43 plants growing in their nursery from 20 founders (Waimea Valley Arboretum 2009). Steve Weller of the University of California, Irvine has 15 propagules from the Waianae Kai source population in storage (University of California, Irvine 2010).

2.4 Synthesis

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for multi-island plants (USFWS 1999), based on whether the species is an

annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. *Schiedea hookeri* is a long-lived perennial, and to be considered for downlisting, which is the second 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 five to seven 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 100 mature individuals per population.

The downlisting goals for this species has not been met as only one out of at least 18 known populations contains more than 100 individuals (Table 1) and all threats have not been managed (Table 2). Therefore, *Schiedea hookeri* meets the definition of endangered as it remains in danger of extinction throughout its range.

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

| Date | No. wild indivs | No. outplanted | Downlisting Criteria identified in Recovery Plan | Downlisting Criteria Completed? |
|----------------------------|------------------------|-----------------------|---|--|
| 1996 (listing) | 220-330 | 0 | All threats managed in all 5-7 populations | No |
| | | | Complete genetic storage | No |
| | | | 5-7 populations with 100 mature individuals each | No |
| 1999 (recovery plan) | 220-330 | Unknown | All threats managed in all 5-7 populations | Partially |
| | | | Complete genetic storage | Partially |
| | | | 5-7 populations with 100 mature individuals each | No |
| 2003 (critical habitat) | 328-378 | Unknown | All threats managed in all 5-7 populations | Partially |
| | | | Complete genetic storage | Partially |
| | | | 5-7 populations with 100 mature individuals each | No |
| 2010 (5-year review) | >500 | Unknown | All threats managed in all 5-7 populations | Partially (Table 2) |
| | | | Complete genetic storage | Partially |
| | | | 5-7 populations with 100 mature individuals each | No: 150 individuals in Waianae Kai; only population with more than 100 individuals |

Table 2. Threats to *Schiedea hookeri*.

| Threat | Listing factor | Current Status | Conservation/ Management Efforts |
|--|-----------------------|-----------------------|---|
| Ungulates – habitat modification and herbivory | A, C, D | Ongoing | Partially: Kaluakauila population of <i>Schiedea hookeri</i> is within a fenced ungulate-proof enclosure. |
| Rats – herbivory | C | Ongoing | No |
| Introduced snails – herbivory | C | Ongoing | No |
| Slugs – herbivory | C | Ongoing | No |
| Fire | E | Ongoing | No |
| Landslides and erosion | A, E | Ongoing | No |
| Invasive introduced plants | A, E | Ongoing | No |
| 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

- Maintain or build fences around existing populations to provide protection from the negative impacts of feral ungulates.
- Collect seeds and/or cuttings from each population for genetic storage and reintroduction.
- Control invasive introduced plant species around known populations.
- Develop and implement methods to control introduced snails and slugs.
- Control rats in the vicinity of these populations.
- Propagate to augment the existing populations.
- Establish additional populations within protected suitable habitat.
- Develop and implement wildfire management plan.
- Work with Hawaii Division of Forestry and Wildlife, U.S. Army, and other land managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.
- Study genetic variation between populations.
- Assess the modeled effects of climate change on this species, and use to determine future landscape needed for the recovery of the species.

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Signature Page
U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Schiedea hookeri* (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:

Chelsie Javar, Fish and Wildlife Biologist
Marie Bruegmann, Plant Recovery Coordinator
Jess Newton, Recovery Program Lead
Assistant Field Supervisor for Endangered Species


Field Supervisor, Pacific Islands Fish and Wildlife Office



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