Schiedea adamantis
(Diamond Head schiedea)

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 adamantis* (Diamond Head schiedea)

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5-YEAR REVIEW
Schiedea adamantis (Diamond Head schiedea)

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:
Region 1, Jesse D'Elia, Chief, Division of Recovery, (503) 231-2071

Lead Field Office:
Pacific Islands Fish and Wildlife Office, Gina Shultz, Assistant Field Supervisor for Endangered Species, (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 (PIFWO) of the U.S. Fish and Wildlife Service (USFWS) between June 2006 and September 2007. The Hawaii Biodiversity and Mapping Program provided most of the updated information on the current status of *Schiedea adamantis*. They also provided recommendations for conservation actions that may be needed prior to the next five-year review. The evaluation of the Plant Recovery Coordinator was reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species before final approval.

1.3 Background:

1.3.1 FR Notice citation announcing initiation of this review:
USFWS. 2006. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 70 species in Idaho, Oregon, Washington, Hawaii, and Guam. Federal Register 71(69):18345-18348.

1.3.2 Listing history

Original Listing
FR notice: USFWS. 1984. Endangered and threatened wildlife and plants; final rule to list *Bidens cuneata* and *Schiedea adamantis* as endangered species. Federal Register 49(34):6099-6102.

Date listed: February 17, 1984
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:

Critical habitat was not designated for *Schiedea adamantis* at the time of listing because the only known population was adjacent to a trail used by hikers. Inadvertent or deliberate damage to or destruction of this small population could result from vandalism or curiosity generated by publication of critical habitat descriptions, which would pinpoint their exact localities, thus making them more vulnerable and increasing enforcement problems. So few individuals of this species remain that any damage to or destruction of this small population would seriously jeopardize their survival (USFWS 1984).

1.3.4 Review History:

Species status review [FY 2006 Recovery Data Call (September 2006))]: Improving

Recovery achieved:
1 (0-25%) (FY 2006 Recovery Data Call)

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

2

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: Recovery plan for *Schiedea adamantis*. 1994. U.S. Fish and Wildlife Service, Portland, Oregon. 457 pages.
Date issued: February 2, 1994
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*
__X__ *No*

2.1.2 Is the species under review listed as a DPS?

____ *Yes*
__X_ *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*
__X_ *No*

2.2 Recovery Criteria

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

__X_ *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?

__X_ *Yes*
____ *No*

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

__*X*__ *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 (FactorsC and E) affecting this species is presented in section 2.4. Factors B (overutilization for commercial, recreational, scientific, or educational purposes), C (disease or predation), and D (inadequacy of existing regulatory mechanisms) are not known to be threats to this species.

Downlisting, and delisting objectives are provided in the recovery plan for this species (USFWS 1994).

For downlisting, the current population should be increased to at least 500 reproductive plants and two more populations of at least 500 reproductive plants should be established. All populations should be naturally reproducing as indicated by the presence of varied age classes ranging from seedlings to mature, reproducing adults, and should remain at these numbers for a minimum of ten years.

This recovery objective has not been met.

For delisting, at least five populations should be established, each with a minimum 10-year average of at least 500 reproductive plants. All populations should be naturally reproducing as indicated by the presence of varied age classes ranging from seedlings to mature, reproducing adults.

This recovery objective has not been met.

2.3 Updated Information and Current Species Status

In addition to the status summary table below, information on the species' status and threats was included in section 2.4 ("Synthesis") below, which also includes any new information about the status and threats of the species.

Status of *Schiedea adamantis* from listing through 5-year review.

Date	No. wild inds	No. outplanted	Downlisting	Stability Criteria Completed?
1984 – listing	ca 78	0	3 populations with 500 mature individuals each	No
			All age classes present	No
			Minimum of 10 years at these levels	No
1994 – recovery plan	244	0	3 populations with 500 mature individuals each	No
			All age classes present	No

Date	No. wild inds	No. outplanted	Downlisting	Stability Criteria Completed?
			Minimum of 10 years at these levels	No
2007 – 5-yr review	6	ca 80	3 populations with 500 mature individuals each	No
			All age classes present	No
			Minimum of 10 years at these levels	No

2.3.1 Biology and Habitat

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

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:

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

2.3.1.4 Taxonomic classification or changes in nomenclature:

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.):

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

2.3.1.7 Other:

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:

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

2.3.2.3 Disease or predation:

2.3.2.4 Inadequacy of existing regulatory mechanisms:

2.3.2.5 Other natural or manmade factors affecting its continued existence:

2.4 Synthesis

At the time of listing, *Schiedea adamantis* was known from one population totaling approximately 78 individuals (USFWS 1984). In December 2005, three vegetative plants in healthy condition were relocated in the natural population. In April 2006, two new individuals were rediscovered in the natural population. All individuals in the natural and outplanted populations were healthy and in flower and fruit. In May 2006, another new individual was located in the natural population. All plants were healthy with a few flowers and immature and mature fruit. The natural population is now limited to six individuals. The outplanted population is in moderately healthy condition with approximately 80 individuals (Oahu Plant Extinction Prevention Program 2007).

Schiedea adamantis occurs in an area characterized by pronounced seasonal drought, with otherwise generally dry conditions. Annual rainfall is 50 to 76 centimeters (20 to 30 inches) with only 5 to 10 centimeters (2 to 4 inches) falling during the summer months. Most rain falls in brief winter torrents and runoff down the steeply inclined slopes is extensive, with subsequent erosion. Otherwise available soil moisture is very limited throughout the year. The *S. adamantis* location is subjected to the desiccating effects of prevailing wind, particularly during the summer when the northeastern trade winds are most pronounced. This seasonal drought is further enhanced by insolation and warm temperatures (USFWS 1994). Associated species that have been noted are *Lipochaeta lobata* var. *lobata* (nehe), *Eragrostis variabilis* (kawelu), *Chamaesyce degeneri* (akoko), and *Sida fallax* (ilima) (National Tropical Botanical Garden 2007, USFWS 1994).

The major threats to *Schiedea adamantis* include fire (Factor E), invasive introduced plant species (Factor E), disturbances by hikers (Factor E), and drought (Factor E). Fire could easily result in the extinction of *S. adamantis*, not only through the immediate destruction of established plants and propagules, but also by initiating a secondary succession of alien vegetation in which the *S. adamantis* might be excluded. The dominant invasive introduced plant species in the area is *Leucaena leucocephala* (koa haole) (Factor E) (National Tropical Botanical Garden 2007). *Schiedea adamantis* occurs in exactly the areas through which a trail passes. Several effects caused by hikers combine to cause habitat deterioration: soil compaction, promotion of erosion, trampling of plants, and dislodging of rocks (Factor E). Thrips are considered to be a pest of this *Schiedea* species, particularly in greenhouse conditions. Thrips spread the spotted wilt virus, which causes the leaves to curl and the inflorescences to abort before setting seed and may cause the death of the plants (Factor C) (USFWS 1994).

In addition to all of the other threats, species like *Schiedea adamantis* that are endemic to small portions of a single island are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals

by random demographic fluctuations and localized catastrophes such as hurricanes and disease outbreaks (Factor E). When considered on their own, the natural processes associated with being a single island endemic do not affect *S. adamantis* to such a degree that it is threatened or endangered with extinction in the foreseeable future, but these natural processes can exacerbate the threat from anthropogenic factors, such as habitat loss for human development or predation by alien species (USFWS 1994).

The Hawaii Army National Guard conducted a large outplanting a few years ago, and approximately 80 individuals still survive. Seeds were collected extensively from 1987 to 1996 by Dr. Stephen Weller of the University of California, Irvine, in cooperation with the National Tropical Botanical Garden and were propagated for extensive studies. Seeds have been collected, stored, and propagated at Harold L. Lyon Arboretum Micropropagation Laboratory from the natural and outplanted populations since 1998 (N. Sugii, Harold L. Lyon Arboretum Micropropagation Laboratory, pers. comm. 2007). Weller and Sakai have established that seeds normally require a six to nine month dormancy period. Seeds are shed in the early spring, lie dormant during the dry summer, and germinate with the onset of the following rainy season (USFWS 1994). At this time, 25 individuals are in propagation at Harold L. Lyon Arboretum Micropropagation Laboratory, a small number of seeds are in storage from the natural population, and 38,250 seeds are in storage from the 80 outplanted individuals (Oahu Plant Extinction Prevention Program 2007).

The stabilization and recovery goals for this species have not been met, as only one population has numbers at interim stability, and not all of the threats are being managed in any of populations. Therefore, *Schiedea adamantis* meets the definition of endangered as it remains in danger of extinction throughout its range.

3.0 RESULTS

3.1 Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
__X__ 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 seed collection for *ex situ* genetic storage and reintroduction.
- Control introduced invasive plant species around wild and outplanted plants.
- Establish additional reintroduced populations.
- Examine the efficacy of watering wild individuals during times of extreme drought.
- Study *Schiedea adamantis* 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.

5.0 REFERENCES:

National Tropical Botanical Garden. 2007. Provenance report for accessions 900715, 900716, 950378. Unpublished.

Oahu Plant Extinction Prevention Program. 2007. Section 6 Annual Performance Report. Prepared for U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 2003. 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):35950-35993.

[USFWS] U.S. Fish and Wildlife Service. 1994. Recovery plan for *Schiedea adamantis*. Portland, Oregon. 55 pages.

[USFWS] U.S. Fish and Wildlife Service. 1984. Endangered and threatened wildlife and plants; final rule to list Bidens cuneata and Schiedea adamantis as endangered species. Federal Register 49(34):6099-6102.

Personal Communications:

Sugii, Nellie. 2007. Researcher, Harold L. Lyon Arboretum Micropropagation Laboratory. Personal communication with National Tropical Botanical Garden. 2007.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Schiedea adamantis* (Diamond Head schiedea)

Current Classification: E

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
__X__ No change needed

Appropriate Listing/Reclassification Priority Number, if applicable:_____

Review Conducted By:
Marilet A. Zablan, Recovery Program Leader and Acting Assistant Field Supervisor for Endangered Species, October 30, 2007
Marie Bruegmann, Plant Recovery Coordinator, September 5, 2007

Approve _____ Date 1/18/08
Lead Field Supervisor, Fish and Wildlife Service