

*Schiedea lydgatei*  
(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 lydgatei* / no common name

### TABLE OF CONTENTS

<b>1.0</b>	<b>GENERAL INFORMATION</b> .....	<b>3</b>
1.1	Reviewers .....	3
1.2	Methodology used to complete the review:.....	3
1.3	Background: .....	4
<b>2.0</b>	<b>REVIEW ANALYSIS</b> .....	<b>5</b>
2.1	Application of the 1996 Distinct Population Segment (DPS) policy .....	5
2.2	Recovery Criteria.....	5
2.3	Updated Information and Current Species Status .....	7
2.4	Synthesis.....	11
<b>3.0</b>	<b>RESULTS</b> .....	<b>14</b>
3.1	Recommended Classification:.....	14
3.2	New Recovery Priority Number: .....	14
3.3	Listing and Reclassification Priority Number: .....	14
<b>4.0</b>	<b>RECOMMENDATIONS FOR FUTURE ACTIONS</b> .....	<b>15</b>
<b>5.0</b>	<b>REFERENCES</b> .....	<b>15</b>
	Signature Page.....	18

**5-YEAR REVIEW**  
***Schiedea lydgatei* (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 lydgatei* and other species from the island of Molokai (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 endangered or threatened status for 16 plants from the island of Molokai, Hawaii; final rule. Federal Register 57(196):46325-46340.

**Date listed:** October 8, 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; final designations and nondesignations of critical habitat for 42 plant species from the island of Molokai, Hawaii; final rule. Federal Register 68(52):12982-13141.

Critical habitat was designated for *Schiedea lydgatei* in two units totaling 424 hectares (1048 acres) on the island of Molokai. This designation includes habitat on State and private lands (USFWS 2003).

#### 1.3.4 Review History:

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

##### **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:

8

**1.3.6 Current Recovery Plan or Outline**

**Name of plan or outline:** U.S. Fish and Wildlife Service. 1996. Recovery plan for the Molokai plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 143 pages.

**Date issued:** September 26, 1996.

**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 Molokai plant cluster recovery plan (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Schiedea lydgatei* 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 Molokai, 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 is only one confirmed population 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 lydgatei* 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 lydgatei* 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 short-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 lydgatei* has a hermaphroditic breeding system, which is rare among dry habitat adapted *Schiedea* species (Weller and Sakai 2010). A study of outcrossing and pollination biology on the maintenance of hermaphroditism in *S. lydgatei* found that both wind and native moths in the family Pyralidae are responsible for its pollination. Outcrossing rates were generally high, especially in years when many plants flowered during the same time period. High outcrossing rates and substantial inbreeding depression indicated that at present females would not be favored in the population. Pollination by both wind and insects is consistent with the hypothesis that hermaphroditism is the result of a relatively recent reversal, as the ancestor of *S. lydgatei* was probably wind pollinated and gynodioecious, with few females. A shift from wind to predominately insect pollination on Molokai may have resulted in increased outcrossing rates and prevented the expression of high inbreeding depression among progeny of hermaphrodites, a condition that would select against females and favor a reversal

to hermaphroditism. Because few females were likely to have been present in ancestral populations that colonized Molokai, the founder effect is another potential explanation for loss of females. In either case, current high levels of outcrossing prevent re-establishment of females in populations of *S. lydgatei* (Norman *et al.* 1997).

**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:**

Approximately 50 individuals of *Schiedea lydgatei* were observed in an unnamed gulch to the east of Kawela, west of Makolelau, along cliffs in the gulch to east of the jeep road up to Kolekole Cabin in 2009 at 799 meters (2,620 feet) elevation (Perlman 2010).

*Schiedea lydgatei* was seen below Puu Kolekole; west of Makolelau in 1993, at 770 meters (2,526 feet) elevation and in 1997 at 838 to 853 meters (2,750 to 2,800 feet) elevation (Wood 2010).

Up to 1,000 scattered individuals were previously observed at Makolelau Gulch in 1987 at 671 to 792 meters (2,200-2,600 feet) elevation (Perlman 2010), in 1992 at 713 to 792 meters (2,340 to 2,600 feet) elevation (Perlman 2010), and in 1993 at 731 meters (2,400 feet) elevation (Perlman 2010), but no current reports are available.

Previously 100s of individuals of *Schiedea lydgatei* were observed by the forestry gate on Makakupaia Road to Kamiloloa, on a turn-off past Kaunakakai Boy Scout Camp, and these are believed to have burned in the 2009 fire on Molokai (Perlman 2010). They were seen there in 1991 at 770 meters (2,526 feet) elevation (Wood 2010).

Over 100 individuals are known from one population on Kawela Homeowners association lands (Oppenheimer 2010a; Plant Extinction Prevention Program 2009).

As of 2010, there are at least 200 individuals in 5 populations located between Kawela and Malolelau Gulch on Molokai



(Oppenheimer 2010a).

**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.

**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.

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

*Schiedea lydgatei* occurs in *Dodonaea viscosa* (aalii) – *Leptecophylla tameiameia* (pukiawe) shrubland with *Alyxia stellata* (maile), *Bidens menziesii* (kookoolau), *Diospyros sandwicensis* (lama), *Dubautia linearis* (naenae), *Kadua affinis* (manono), *Lipochaeta rockii* (nehe), *Lysimachia remyi* (no common name [NCN]), *Melicope hawaiiensis* (mokihana kukae moa), *Metrosideros polymorpha* (ohia), *Myrsine lanaiense* (kolea), *Neraudia sericea* (NCN), *Osteomeles anthyllidifolia* (ulei), *Pittosporum argentifolium* (hoawa), *Pleomele auwahiensis* (hala pepe), *Sicyos* sp. (anunu), *Sida fallax* (ilima), *Silene lanceolata* (NCN), *Sophora chrysophylla* (mamane), *Streblus pendulinus* (aiai), and *Wikstroemia* sp. (akia) (Perlman 2010; Wood 2010).

**2.3.1.6 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 habitat of *Schiedea lydgatei* include fire, feral goats (*Capra hircus*), and invasive introduced plant species including *Ageratina adenophora* (sticky snakeroot), *Erechtites valerianifolia* (fireweed), *Grevillea robusta* (silk oak), *Lantana camara* (lantana), *Melinis minutiflora* (molasses grass), and *Pinus* spp. (pine) (Perlman 2010; Wood 2010).

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

Not a threat.

### **2.3.2.3 Disease or predation:**

Rats (*Ratus sp.*), slugs (unidentified species), and feral goats (*Capra hircus*) are reported to consume vegetative or floral parts of this species (Perlman 2010; Wood 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 lydgatei* 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.

Seeds were collected in 2009 from approximately twenty

individuals of *Schiedea lydgatei* within the Kawela population. Seeds were divided between: storage at the National Center for Genetic Resource Preservation at Ft. Collins, Colorado; for long-term storage at the National Park Service; and for storage and propagation at the National Tropical Botanical Garden for reintroductions on Molokai (Perlman 2010). The University of California at Irvine has 10 propagules in storage (University of California, Irvine 2010). The Center for Conservation Research and Training Seed Storage Laboratory (2009) has 195 seeds in storage. This species is also propagated at the National Park Service nursery on Molokai (B. Garnett, Wiliwili Rare Plant Nursery, pers. comm. 2009).

The East Molokai Watershed Partnership maintains a fence and conducts feral ungulate control, which is one of the most important management actions being taken for this species and its habitat (Oppenheimer 2010b).

In 2009, one million dollars in funds from the federal Department of Interior's Cooperative Endangered Species Conservation Fund was designated for use on Molokai, to help acquire a perpetual conservation easement over 248 hectares (614 acres) of strategic watershed on the eastern end of the island. The property has several federally listed threatened or endangered species as well as critical habitat in and around the proposed easement area. Federally listed species that will benefit from this protection are *Cyanea mannii* (haha), *Canavalia molokaiensis* (awikiwiki), *Hibiscus arnottianus* ssp. *immaculatus* (kokio keokeo), *Brighamia rockii* (puaala), *Cyanea dunbariae* (haha), *Gardenia brighamii* (nanu), *Pritchardia munroi* (loulou), and *Phyllostegia hispida* (USFWS 2009; C. Rowland, USFWS, pers. comm. 2010). This action may also benefit this species.

## 2.4 Synthesis

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Molokai plant cluster (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. *Schiedea lydgatei* 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 is only a single known population containing more than 50 individuals (Table 1) and all threats are not managed (Table 2). Therefore, *Schiedea lydgatei* meets the definition of endangered as it remains in danger of extinction throughout its range.

**Table 1. Status of *Schiedea lydgatei* 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>
1992 (listing)	>8000	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1996 (recovery plan)	>8000	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	1000	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2010 (5-year review)	200	0	All threats managed in all 3 populations	Partially (Table 2)
			Complete genetic storage	Partially

			3 populations with 50 mature individuals each	Partially: 1 population of 50, others not seen within last 15+ years
--	--	--	---	--

**Table 2. Threats to *Schiedea lydgatei*.**

<b>Threat</b>	<b>Listing factor</b>	<b>Current Status</b>	<b>Conservation/ Management Efforts</b>
Ungulates – habitat modification and herbivory	A, C, D	Ongoing	Partially: one population is partially fenced and ungulates controlled
Rats – herbivory	C	Ongoing	No
Slugs – herbivory	C	Ongoing	No
Invasive introduced plants	A, E	Ongoing	No
Fire	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**

- Survey areas where *Schiedea lydgatei* have been reported to establish current status of the species.
- Monitor known populations and continue collection of seeds or cuttings for genetic storage and reintroduction.
- Research methods to increase and maintain numbers of female individuals within populations.
- Completely fence existing populations to provide protection from the negative impacts of feral ungulates.
- Control invasive introduced plant species around known populations.
- Control rats in the vicinity of these populations.
- Develop and implement methods to control introduced slugs.
- Propagate to augment the existing populations.
- Establish additional populations within protected suitable habitat.
- Develop and implement a wildfire management plan.
- Work with East Molokai Watershed Partnership Program, Hawaii 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 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**

- Center for Conservation Research and Training Seed Storage Laboratory. 2009. Micropropagation database. University of Hawaii at Manoa. Unpublished.
- Norman, J.K., Weller, S. P., and A. Sakai. 1997. Pollination biology and outcrossing rates in hermaphroditic *Schiedea lydgatei* (Caryophyllaceae). American Journal of Botany 84(5):641-648.

- Oppenheimer, H. 2010a. Maui Nui Plant Extinction Prevention Program status report on *Schiedea lydgatei*. Lahaina, Hawaii. Unpublished data.
- Oppenheimer, H. 2010b. *Schiedea lydgatei* 5-year review edits and comments. Plant Extinction Prevention Program, Lahaina, Hawaii. 5 pages. Unpublished.
- Perlman, S. 2009. *Schiedea lydgatei*. National Tropical Botanical Garden, Kalaheo, Hawaii. 2pages. Unpublished.
- Plant Extinction Prevention Program. 2009. Annual report for Plant Extinction Prevention Program to the U.S. Fish and Wildlife Service. 120 pages. Unpublished.
- University of California, Irvine. 2010. 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. 1996. Recovery plan for the Molokai plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 143 pages.
- [USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designations and nondesignations of critical habitat for 42 plant species from the island of Molokai, Hawaii; final rule. Federal Register 68(52):12982-13141.
- [USFWS] U.S. Fish and Wildlife Service. 2009. Press release: Fish and Wildlife Service provides \$1 million in land acquisition funds to Hawaii. Honolulu, Hawaii. April 17, 2009.
- Weller, S. and A. Sakai. 2010. Phylogenetic tables of *Schiedea*. Unpublished presentation.
- Wood, K.R. 2010. Notes on *Schiedea lydgatei*. National Tropical Botanical Garden, Kalaheo, Hawaii. 2 pages. Unpublished.

**Personal Communications:**

- Garnett, Bill. 2009. Wiliwili Rare Plant Nursery, Molokai. Personal interview conducted by Margaret Clark, National Tropical Botanical Garden. November 22, 2009.
- Rowland, Craig. 2010. Conservation Partnerships Program Coordinator, U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office. E-mail to Marie



Bruegmann, U.S Fish and Wildlife Service, dated April 16, 2010. Subject:  
Additional information on status of Molokai easement.

**Signature Page**  
**U.S. FISH AND WILDLIFE SERVICE**  
**5-YEAR REVIEW of *Schiedea lydgatei* (no common name)**

Pre-1996 DPS listing still considered a listable entity?   N/A  

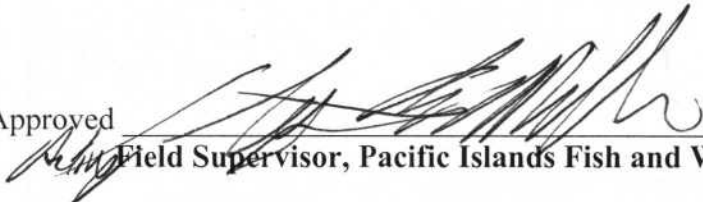
Recommendation resulting from the 5-year review:

- 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

Approved  Date   SEP 20 2011    
Field Supervisor, Pacific Islands Fish and Wildlife Office