

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Alsinidendron lychnoides* (kuawawaenuhu)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2008. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 70 species in Idaho, Montana, Oregon, Washington, and the Pacific Islands. Federal Register 73(83):23264-23266.

Lead Region/Field Office:

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

Name of Reviewer(s):

Marie Bruegmann, Pacific Islands Fish and Wildlife Office, Plant Recovery Coordinator
Marilet A. Zablan, Pacific Islands Fish and Wildlife Office, Assistant Field Supervisor for Endangered Species
Jeff Newman, Pacific Islands Fish and Wildlife Office, Acting Deputy Field Supervisor

Methodology used to complete this 5-year review:

This review was conducted by staff the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS), beginning on April 29, 2008. The review was based on the final critical habitat designation for *Alsinidendron lychnoides* and other species from the island of Kauai (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 Assistant Field Supervisor for Endangered Species and Acting 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).

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

This Policy does not apply to plants.

Review Analysis:

Please refer to the final critical habitat designation for *Alsinidendron lychnoides* published in the Federal Register on February 23, 2003 (USFWS 2003) 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. lychnoides*.

At the time of listing, 50-100 individuals were known (USFWS 1996). In 2003, there were four populations of *Alsinidendron lychnoides* with a total of eight individuals in the Alakai Swamp, on the Mohihi-Waialae Trail, at Keanapuka, and at Pihea (USFWS 2003). At the present time 7 populations are known. Five individuals are on the Kalalau Rim, 2 on the Alakai-Pihea Connector Trail, 3 on the north fork of Kawaikoi, 5 at Waiakoali, 10 are in the west population and 5 in the east population of Mohihi-Waialae Trail, and 5 are on Laau Ridge, for a total of 35 known individuals (Wood 2009).

In 1994, 5 individuals of *Alsinidendron lychnoides* were seen in the upper Mohihi drainage along the stream at 1,250 to 1,280 meters (4,100 to 4,200 feet) elevation (Wood 2009). Eight individuals were seen in 1995 on the banks of Mohihi Stream at 1,183 meters (3,880 feet) elevation (Perlman 2008). In 1996, 5 individuals were seen on Waikoali Stream's north fork, above Mohihi Road at 1,076 meters (3,530 feet) elevation (Wood 2009). In May 2004, 10 individuals were seen off the Mohihi-Waialae Trail in Kokee at 1,231 meters (4,040 feet) elevation (National Tropical Botanical Garden 2008; Wood 2009). In April 2005, 3 patches were seen in a subgulch at 1,099 meters (3,570 feet) elevation off of the Mohihi-Waialae Trail in Kokee, sprawling over fallen logs and on the ground (Tangalin 2009). In 2008, 1 individual was seen in this same area (National Tropical Botanical Garden 2009a).

Between Keanapuka and Alealau on north side of Kalalau rim in February 1992, 5 individuals were seen at elevations between 1,170 and 1,250 meters (3,839 and 4,101 feet) (National Tropical Botanical Garden 2008; Perlman 2008; Wood 2009). On Kohua Ridge, 100 meters (328 feet) off the Waialae-Waialeale Trail, at 1,201 meters (3,940 feet) elevation, 1 individual was seen in January 1995 (Perlman 2008). Five individuals were seen on Laau Ridge crest, a plateau region north of Puu Kamana, south of Kamakeanu, east of the Puwainui Falls of Wainiha Valley, and west of Lumahai Valley at elevations between 1,158 and 1,317 meters (3,800 and 4,320 feet) in February 2000 (Perlman 2008; Wood 2009).

At Pihea, on the connector trail between the Pihea Trail and the Alakai Swamp Trail at 1,158 to 1,213 meters (3,799 to 3,980 feet) elevation, 2 to 3 individuals were seen throughout the years from 1990 to 1999 (Perlman 2008; Wood 2009). On the Alakai Swamp Trail to the second bog, on the northern fork of Kawaikoi Stream, heading off the trail 30 degrees northeast, 3 individuals of *Schiedea lychnoides* were observed in 1992 growing on a vertical bank where the stream oxbows at 1,189 meters (3,900 feet) elevation (Wood 2009).

Alsinidendron was recognized as distinct from *Schiedea* since it was first described in 1866 by Mann, until recent phylogenetic analyses led taxonomists to conclude it should be subsumed into the genus *Schiedea* (Wagner *et al.* 2005). Therefore, we will refer to the taxon as *Schiedea lychnoides* throughout the remainder of this review.

Schiedea lychnoides is most likely pollinated by nectar-eating birds as it produces abundant nectar, and has open, showy flowers typical of bird-pollinated flowers. *Schiedea lychnoides* produces seeds that remain in the capsule after maturation and are released as the capsules gradually disintegrate (Wagner *et al.* 2005).

Schiedea lychnoides grows on steep riparian clay or silty soil banks, often along streams, in montane wet forests dominated by *Metrosideros polymorpha* (ohia) – *Cheirodendron* spp. (olapa) or in *M. polymorpha* – *Dicranopteris linearis* (uluhe) habitat. It has a trailing growth habit, spreading on the ground or sprawling over other forest plants at elevations between 828 and 1,344 meters (2,715 and 4,408 feet) (USFWS 2003; Wagner *et al.* 2005).

The Mohihi habitat is *Metrosideros polymorpha* – *Dicranopteris linearis* wet montane forest with associated native plants including *Asplenium acuminatum* (lola), *A. contiguum* var. *hirtulum* (no common name [NCN]), *A. hobdyi* (NCN), *A. polyodon* (punana manu), *A. schizophyllum* (NCN), *Athyrium microphyllum* (akolea), *Broussaisia arguta* (kanawao), *Cheirodendron trigynum* (olapa), *Cibotium glaucum* (hapuu), *Coniogramme pilosa* (loulu), *Coprosma* sp. (pilo), *Cyanea hirtella* (haha), *C. leptostegia* (haha lua), *Cyrtandra longifolia* (haiwale), *Dianella sandwicensis* (uki uki), *Dodonaea viscosa* (aalii), *Dryopteris crinalis* (palapalai aumakua), *Dubautia* spp. (naenae), *Freycinetia arborea* (ie ie), *Gahnia beecheyi* (NCN), *Ilex anomala* (kawau), *Joinvillea ascendens* subsp. *ascendens* (ohe), *Kadua affinis* (manono), *K. cordata* subsp. *waimeae* (kopa), *Korthalsella* sp. (hulumoa), *Leptecophylla tameiameiae* (pukiaawe), *Melicope anisata* (mokihana), *M. clusiifolia* (kukaemoa), *M. ovata* (alani), *Myrsine alyxifolia* (kolea), *Phytolacca sandwicensis* (popolo ku mai, pokeberry), *Pleomele aurea* (hala pepe), *Poa sandwicensis* (NCN), *Sadleria pallida* (amau ii), *Smilax melastomifolia* (pioi), *Sticherus owwhyensis* (uluhe), *Syzygium sandwicensis* (oha ha), *Vaccinium calycinum* (ohelo), *Viola wailenalena* (NCN), *Wikstroemia furcata* (akia), and *W. oahuensis* (akia) (National Tropical Botanical Garden 2008; Tangalin 2009; Wood 2009).

On Kalalau Rim, *Schiedea lychnoides* is seen in *Metrosideros polymorpha* - *Dicranopteris linearis* mixed montane wet forest trailing and sprawling with *Smilax* over the uluhe with sedges, grasses and bryophytes. Epiphytes are common in the shrub layer. Associated native plants include *Cheirodendron* spp., *Coprosma* spp., *Cyperus* spp. (ahu awa), *Cyrtandra kauaiensis* (ulunahale), *Dicranopteris linearis* (uluhe), *Dubautia* spp., *Elaeocarpus bifidus* (kalia), *Perrottetia sandwicensis* (olomea), *Sadleria* spp. (amau or apuu), *Trematolobelia kauaiensis* (kolii), and *Vaccinium* spp. (ohelo) (National Tropical Botanical Garden 2008; Wood 2009). The Alakai Swamp-Pihea Trail habitat is *Metrosideros polymorpha* montane wet forest with *Alyxia stellata* (maile), *Carex* spp. (NCN), *Cheirodendron* spp., *Cibotium* spp. (hapuu), *Clermontia fauriei* (haha aiakamanu), *Elaeocarpus bifidus*, *Elaphoglossum* spp. (hoe a Maui), *Kadua affinis*, *Labordia waialealae* (kamakahala lau lii), *Melicope clusiifolia*, and *Vaccinium calycinum* (Wood 2009).

Laa Ridge plateau spans north toward Kamakeanu from the southern point of Puu Kamaha for approximately 4 kilometers (2.5 miles). At its widest point the plateau is 700

meters (2,300 feet) east to west. Both to the north and south of the plateau there is a very narrow ridge that geographically isolates the plateau. Several small drainages and ridges dissect the plateau. Thick mosses cover both the ground and shrubs. The habitat is *Metrosideros polymorpha* – *Cheirodendron trygynum* montane wet forest with *Metrosideros polymorpha* var. *glaberrima* (ohia) and *M. polymorpha* var. *dieteri* (ohia), *Broussaisia arguta*, *Cheirodendron platyphyllum* subsp. *kauaiense* (olapa), several other species of *Cheirodendron*, *Clermontia fauriei*, *Dubautia laxa* subsp. *hirsuta* (naenae pua melemele), *Ilex anomala*, *Kadua affinis*, *Lobelia kauaiensis* (pue), *Melicope clusiifolia*, *M. feddei* (alani), *M. wawraeana* (alani), *Myrsine lessertiana* (kolea lau nui), *M. wawraea* (kolea), *Nertera granadensis* (makole), *Peperomia hesperomannii* (ala ala wai nui), *Perrottetia sandwicensis*, *Stenogyne purpurea* (NCN), *Syzygium sandwicensis*, *Trematolobelia kauaiensis*, and *Vaccinium calycinum*. Less common species include *Bidens forbesii* subsp. *forbesii* (kookoolau), *Coprosma kauensis* (koi), *Cyanea* cf. *sylvestris* (haha), *Cyrtandra longifolia* (haiwale), *Gunnera kauaiensis* (haha), *Labordia hirtella* (kamakahala), *Labordia waialealae*, *Peperomia cookiana* and *P. macraeana* (ala ala wai nui), *Phyllostegia electra* (NCN), *Pipturus albidus* (waimea), *P. ruber* (mamake), *Pittosporum gayanum* (hoawa), *Psychotria mariniana* (kopiko), *Touchardia latifolia* (olona), and *Vaccinium dentatum* (ohelo). Ferns include *Adenophorus epigaeus* (NCN), *A. hymenophylloides* (palai huna), *A. tamariscinus* (wahine noho mauna), *Asplenium contiguum* (NCN), *Athyrium microphyllum*, *Cibotium glaucum*, *C. menziesii* (hapuu pulu), *Dicranopteris linearis*, *Diplazium sandwichianum*, *Diplopterygium pinnatum* (uluhe lau nui), *Dryopteris glabra* (kilau), *Elaphoglossum crassifolium* (hoe a Maui), *E. crassicaule* (hoe a Maui), *Lycopodiella cernua* (hulu iole), *Lycopodium venustum* (NCN), *Microlepia strigosa* (palapalai), *Sadleria cyatheoides* (amau), *S. pallida*, *S. squarrosa* (apuu), *Sphaerocionium lanceolatum* (palai hinahina), and *Sticherus owhyhensis*. Less common ferns are *Adenophorus abietinus* (NCN), *A. tripinnatifidus* (NCN), *Arachniodes insularis* (NCN), *Asplenium insiticium* (pipii lau manamana), *A. normale* (NCN), *Blechnum appendiculatum* (NCN), *Callistopteris baldwinii* (NCN), *Dryopteris crinalis*, *D. unidentata* (akole), *Grammitis baldwinii* (NCN), *G. hookeri* (makue lau lii), *G. tenella* (kolokolo), *Huperzia erubescens* (NCN), *H. serrata* (NCN), *Lellingeria saffordii* (kihe), *Lepisorus thunbergianus* (pakahakaha), *Marattia douglasii* (pala), *Mecodium recurvum* (ohia ku), *Sphenomeris chinensis* (palaa), *Psilotum complanatum* (moa), *P. nudum* (oo moa), *Sadleria wagneriana* (amau mau), *Schizaea robusta* (oalii), and *Vandenboschia cyrtotheca* (NCN). Monocots include common sedges and grasses such as *Carex alligata* and *C. kauaiensis* (NCN), *Deschampsia nubigena* (hairgrass), *Gahnia vitiensis* subsp. *kauaiensis* (NCN), and *Machaerina angustifolia* (uki). Other monocots related to Liliaceae include: *Astelia argyrocoma* (painiu) and *Smilax melastomifolia* (Palmer 2003; Wood 2009).

On Waikoali stream, at the head of the north fork above Mohihi Road, *Schiedea lychnoides* grows in *Metrosideros polymorpha* wet forest with *Cheirodendron* sp., *Claoxylon sandwicensis* (laukea), *Dicranopteris linearis*, *Elaphoglossum* sp., *Eurya sandwicensis* (anini), *Perrottetia sandwicensis*, *Poa siphonoglossa* (NCN), *Pritchardia minor* (loulu), *Psychotria mariniana*, *Scaevola glabra* (ohe naupaka), *Syzygium sandwicense*, and *Tetraplasandra waimeae* (ohe kiko ola) (Wood 2009).

The major threats to this species are competition from invasive introduced plant species such as *Ageratum conyzoides* (billygoat weed), *Andropogon virginicus* (broomsedge), *Conyza bonariensis* (hairy horseweed), *Cyperus meyenianus* (NCN), *Emilia fosbergii* (Flora's paintbrush), *Erechtites valerianifolia* (fireweed daisy), *Erigeron karvinskianus* (daisy fleabane), *Hedychium gardnerianum* (Kahili ginger), *Juncus planifolius* (bog rush), *Passiflora tarminiana* (banana poka), *Sacciolepis indica* (Glenwood grass), *Schizachyrium condensatum* (beardgrass), *Rubus argutus* (prickly Florida blackberry), *R. rosifolius* (thimbleberry), and *Youngia japonica* (oriental hawksbeard) (Factor E). Other threats include habitat degradation by feral pigs (*Sus scrofa*) and goats (*Capra hircus*) (Factors A and C); trampling by humans (Factor E); risk of extinction from naturally occurring events, such as landslides or hurricanes; and reduced reproductive vigor due to the small number of extant individuals (Factor E) (National Tropical Botanical Garden 2008; Tangalin 2009; USFWS 2003; Wood 2009). Rats (*Rattus* spp.) have been mentioned as a threat to this species (Factor C) (Tangalin 2009). Climate change may also pose a threat to *Schiedea lychnoides* (Factors A and E). However, current climate change models do not allow us to predict specifically what those effects, and their extent, would be for this species.

In addition to all of the other threats, species like *Schiedea lychnoides* 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, landslides, flooding, and disease outbreaks (Factor E). The effects of these processes on this single-island endemic are exacerbated by anthropogenic threats, such as habitat loss for human development or predation by introduced species (Factor E) (USFWS 1998).

To safeguard existing genetic material, propagation for genetic storage and reintroduction is occurring at the National Tropical Botanical Garden. There are approximately 200 plants of *Schiedea lychnoides* growing in the nursery and approximately 48,765 seeds are in storage (National Tropical Botanical Garden 2009b). Some *Schiedea lychnoides* individuals were planted out on the Alakai connector trail by the Hawaii Division of Forestry and Wildlife (Perlman 2008).

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan titled "Kauai II: Addendum to the recovery plan for the Kauai plant cluster" for plants from the island of Kauai (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Schiedea lychnoides* is a short-lived perennial, and to be considered stable, 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 Kauai. 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 (see Table 1), as no population has more than 50 mature individuals and all threats are not being managed.

Therefore, *Schiedea lychnoides* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Fence wild populations to prevent trampling and uprooting disturbances from feral ungulates.
- Collect seed and/or cuttings from all known populations.
- Determine how to stabilize cliff areas where goats have degraded habitat.
- Augment existing populations once habitat is protected.
- Remove invasive introduced plants in the immediate vicinity of *Schiedea lychnoides* populations.
- Work with Hawaii Division of Forestry and Wildlife and Hawaii State Parks to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.
- Update the listed entity on 50 CFR 17 to match the currently recognized taxonomy.

References:

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

Date	No. wild indivs.	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1996 (listing)	50-100	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	50-100	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	8	Unknown	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2009 (5-year review)	35	Unknown	All threats managed	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

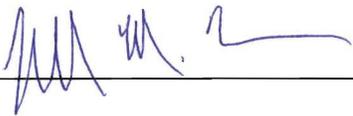
U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Alsinidendron lychnoides*
(kuawawaenuhu)

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

for **Field Supervisor, Pacific Islands Fish and Wildlife Office**



Date AUG 27 2010