

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Pteris lidgatei* (No common name)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2007. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 71 species in Oregon, Hawaii, Commonwealth of the Northern Mariana Islands, and territory of Guam. Federal Register 72(45):10547-10550.

Lead Region/Field Office:

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

Name of Reviewer(s):

Christian Torres-Santana, Pacific Islands Fish and Wildlife Office, Student Trainee Biologist
Marie Bruegmann, Pacific Islands Fish and Wildlife Office, Plant Recovery Coordinator
Marilet A. Zablan, Pacific Islands Fish and Wildlife Office, Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species

Methodology used to complete this 5-year 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) on March 8, 2007. The review was based on the critical habitat designation for *Pteris lidgatei* and other species from the island of Oahu (USFWS 2003), as well as a review of current, available information. The Bernice P. Bishop Museum provided an initial draft of portions of the five-year review and they also provided recommendations for conservation actions needed prior to the next five-year review. The evaluation of the status of the species was prepared by our lead PIFWO biologist and reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species 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 our final rules designating critical habitat for a complete review of *Pteris lidgatei* status (including biology and habitat) and threats, and management efforts. Critical habitat was designated on the islands of Molokai, Maui, and Oahu and published in the Federal Register on March 18, May 14, and June 17, 2003, respectively (USFWS 2003a, b, c). 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 *P. lidgatei*.

Historically, the distribution of *Pteris lidgatei* ranged from the Koolau Mountains on Oahu to West Maui and Molokai. At the time of Federal listing, only two populations on Oahu and one on Maui, totaling 26 individuals, had been reported within the past 50 years (USFWS 1994). In 2003, there were an estimated 33 individuals in 11 populations occurring on Oahu and Maui. The population on Molokai was considered extirpated as it had not been seen since 1912 (Wagner *et al.* 1999; USFWS 2003a; Palmer 2003). A population of six mature and two immature individuals was rediscovered on private land on Molokai during a 2007 survey. This population was found in Kumueli Gulch, growing on a mossy vertical wall along a stream bank and overflow channel (Plant Extinction Prevention Program 2007; Oppenheimer 2008).

By 2003, nine populations totaling fewer than 50 mature individuals were known on Oahu, Maui, and Molokai, and a few additional individuals were occasionally found, largely as a result of more thorough botanical surveys. On Oahu, 25 individuals were found in six populations: 3 individuals in Kawainui, 3 individuals in Kawaiiki, 1 individual in North Kaukonahua, 14 individuals in South Kaukonahua, 1 individual in Kaluanui, and 3 individuals in Waimano (USFWS 2003d). In 2007, four populations totaling 16 individuals were reported: 1 immature individual in Kawainui, 3 mature individuals in Kawaiiki, 2 mature and 2 immature individuals in Helemano, 6 mature individuals in South Kauhonahua, and 2 immature individuals in Waimano (U.S. Army 2007). No individuals were reported in the North Kuakonahua and Kaluanui populations.

The current status of the Kahakuloa and Kauaula populations on Maui is not known as they have not been visited in 10 years (Plant Extinction Prevention Program 2007). Previous reports documented 12 individuals at Kauaula Valley and 8 at Kahakuloa Stream (USFWS 2003b; U.S. Army 2006). The Kauaula Valley population is believed to have been destroyed by a landslide (Plant Extinction Prevention Program 2007; Oppenheimer 2008). Seven individuals are in Honolulu Valley in Maui Land and Pineapple Company's Puu Kukui Preserve, but they have not been monitored since 1998-1999 (H. Oppenheimer, Maui Nui Coordinator, Plant Extinction Prevention Program, pers. comm. 2008).

In total, *Pteris lidgatei* is currently known from 51 individuals in eight populations, although the Maui populations have not been recently surveyed. There are 16 individuals in four populations on Oahu, 27 individuals in three populations on Maui, and 8 individuals in one population on Molokai.

Individuals may remain immature for longer than ten years (U.S. Army 2006). Little else is known about the reproductive cycles, longevity, specific environmental requirements and limiting factors for *Pteris lidgatei* (USFWS 1994, 1998, 2003a, b, c, d).

Populations of *Pteris lidgatei* continue to be threatened by habitat alteration from trampling by feral pigs (*Sus scrofa*) (Factors A and D) and competition from introduced invasive plant species (Factor E). Invasive plant species on Oahu include *Clidemia hirta* (Koster's curse), *Argeratina riparia* (Hamakua pamakani), *Christella parasitica* (no common name), *Psidium cattleianum* (strawberry guava), *Paspalum conjugatum* (Hilo grass), *Pterolepis glomerata* (false meadowbeauty), and *Sacciolepis indica* (glenwood grass) (USFWS 2003c, d). On Maui,

invasive plants include *A. adenophora* (Maui pamakani), *C. hirta*, and *Tibouchina herbacea* (glorybush) (USFWS 2003b). On Molokai, the main invasive plant species are *Adiantum raddianum* (Maidenhair fern) and *Blechnum appendiculatum* (palm fern) (H. Oppenheimer, pers. comm. 2008).

U.S. Army training activities present a risk of fire (Factor E), the transport and establishment of introduced invasive plant species (Factor E), and trampling from foot traffic (Factor E), but these are considered relatively low risks (USFWS 2003d). *Pteris lidgatei* may be at risk of extinction caused by stochastic natural events such as hurricanes and landslides (Factor E) (USFWS 1994, 1998, 2003a, b, c, d, 2008).

The storage of genetic material of the species is limited and the species has not been successfully propagated (U.S. Army 2007). An unknown number of spores are being housed at the National Tropical Botanical Garden (2008), but their viability is unknown. Two individuals representing the south Kaukonahua population are housed at the Harold L. Lyon Arboretum Micropropagation Laboratory (2008). However, a proper propagation technique has not yet been developed.

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for four species of Hawaiian ferns (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. To be considered stabilized, which is the first step in recovering the species, *Pteris lidgatei* must be managed to control threats (*e.g.*, fenced, weeded) and be represented in an *ex situ* (off-site) collection. In addition, at least 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 numbers, with a minimum of 50 mature individuals per population (minimum of 150 mature plants).

The stabilization goals for this species have not been met (see Table 1), as none of the populations contain 50 mature individuals and most of the threats are not being managed. Therefore, *Pteris lidgatei* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Continue collection of genetic material for genetic storage and future reintroduction efforts.
- Construct enclosure fences to protect individuals from the adverse impacts of feral pigs, and eradicate introduced invasive plant species within the enclosures.
- Develop propagation methods for the species.
- Enhance current natural populations with appropriate genetic individuals once propagation methods are in place.

- Initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.
- Survey geographical and historical range for a thorough current assessment of the species, especially on Maui.
- Assess genetic variability within known extant populations.
- Study *Pteris lidgatei* populations with regard to population size and structure, geographical distribution, breeding systems, growth rates of individuals, longevity, specific environmental requirements, limiting factors, and threats.

References:

- Harold L. Lyon Arboretum Micropropagation Laboratory. 2008. Micropropagation database. University of Hawaii at Manoa, Honolulu, HI. Unpublished.
- National Tropical Botanical Garden. 2008. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.
- Oppenheimer, H. 2008. New Hawaiian plant records for 2007. Bishop Museum Occasional Papers 100:22-38.
- Palmer, D.D. 2003. Hawaii's ferns and fern allies. University of Hawaii Press, Honolulu. 324 pages.
- Plant Extinction Prevention Program. 2007. Section 6 Annual Performance Report for Endangered Plant Restoration and Enhancement - Plant Extinction Prevention (formerly Genetic Safety Net), Fiscal Year 2007 (July 1, 2006 – June 30, 2007). Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife. 65 pages. Unpublished.
- [U.S. Army] U.S. Army Garrison. 2006. 2006 Status reports for the Makua Implementation Plan and the draft Oahu Implementation Plan. U.S. Army Garrison, Directorate of Public Works, Environmental Division, Schofield Barracks, Hawaii. Unpublished.
- [U.S. Army] U.S. Army Garrison. 2007. 2007 Status reports for the Makua Implementation Plan and the draft Oahu Implementation Plan. U.S. Army Garrison, Directorate of Public Works, Environmental Division, Schofield Barracks, Hawaii. Unpublished.
- [USFWS] U.S. Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants; endangered status for four ferns from the Hawaiian Islands; final rule. Federal Register 59(185):49025-49032.
- [USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for four species of Hawaiian ferns. U.S. Fish and Wildlife Service, Portland, OR. 78 pages.

[USFWS] U.S. Fish and Wildlife Service. 2003a. 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. 2003b. Endangered and threatened wildlife and plants; designation of critical habitat for 60 plant species from the Islands of Maui and Kahoolawe, HI; final rule. Federal Register 68(93):25934-26165.

[USFWS] U.S. Fish and Wildlife Service. 2003c. Endangered and threatened wildlife and plants: final designation or nondesignation of critical habitat for 101 plant species from the island of Oahu, HI: final rule. Federal Register 68(116):35949-35998.

[USFWS] U.S. Fish and Wildlife Service. 2003d. Biological Opinion of the U.S. Fish and Wildlife Service for routine military training and transformation of the 2nd Brigade 25th Infantry Division (Light), U.S. Army installations, island of Oahu. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 2008. Rare plant tracking database. Pacific Islands Fish and Wildlife Office, Honolulu, HI. Accessed on April 28, 2008. Unpublished.

Wagner, W.L., Bruegmann, M.M., Herbst, D.M., and Lau, C.Q.C. 1999. Hawaiian vascular plants at risk. Bishop Museum Occasional Papers 60:1-58.

Personal communications:

Oppenheimer, Hank. 2008. Maui Nui Coordinator, Plant Extinction Prevention Program. Personal communication to Bernice P. Bishop Museum, June 2008.

Table 1. Status of *Pteris lidgatei* from listing through 5-year review.

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1994 – listing	26	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 – recovery plan	33	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2003 – critical habitat	37	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2008 – 5-yr review	51	0	All threats managed	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

