5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Adenophorus periens* (pendant kihi fern)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2013. Endangered and threatened wildlife and plants; Initiation of 5-year status reviews of 44 species in Oregon, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 78(24):8185-8187.

Lead Region/Field Office:

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

Name of Reviewer(s):

Chelsie Javar-Salas, Plant Biologist, PIFWO
Michelle Bogardus, Maui Nui and Hawaii Island Team Manager, PIFWO
Marie Bruegmann, Plant Recovery Coordinator, PIFWO
Kristi Young, Programmatic Deputy Field Supervisor, PIFWO

Methodology used to complete this 5-year 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 4, 2013. The review was based on a review of current, available information since the last 5-year review for *Adenophorus periens* (USFWS 2010). The evaluation by Chelsie Javar-Salas, Plant Biologist, was reviewed by the Island Team Manager and the Plant Recovery Coordinator. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor.

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 at: *http://ecos.fws.gov/tess_public*.

Review Analysis:

Please refer to the previous 5-year review for *Adenophorus periens* published on August 27, 2010 (available at: *http://ecos.fws.gov/docs/five_year_review/doc3289.pdf*) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species' biological status has come to light since listing to warrant a change in the Federal listing status of *A. periens*.

This short-lived perennial is endangered and historically occurred on the islands of Kauai, Oahu, Molokai, Lanai, Maui, and Hawaii (USFWS 1994). Currently, it is only found on the islands of Kauai and Hawaii (Plant Extinction Prevention Program [PEPP] 2015). The status and trends for *Adenophorus periens* are provided in the tables below.

New status information:

In 2012, a single population on Kauai contained 31 wild individuals of *Adenophorus periens* (PEPP 2012). The population on Hawaii Island was monitored but no status information was provided (PEPP 2015).

Based on the best available information provided, the number of individuals has decreased from the approximately 31 to 123 wild individuals reported in the previous 5-year review to approximately 31 wild individuals in 2015.

New threats:

- Climate change destruction or degradation of habitat – Fortini *et al*. (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawaii using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. The assessment by Fortini *et al*. (2013) concluded that *Adenophorus periens* is minimally vulnerable to the impacts of climate change. At the genus level, *Adenophorus* was identified as one of the ten least genera vulnerable to climate change.

New management actions:

- Surveys / inventories – A survey was conducted for new individuals of *A. periens* at Makaleha on Kauai by PEPP (2011).
- Population viability monitoring and analysis – PEPP (2011) monitored the wild population at Makaleha on Kauai. The single individual previously found at the site was not relocated.
- Captive propagation for genetic storage and reintroduction – Spores collected from the islands of Kauai and Hawaii were in storage at the National Tropical Botanical Garden on Kauai in 2013 (National Tropical Botanical Garden 2013). However, in 2014 the spores were no longer in storage at the National Tropical Botanical Garden (2014).
- Listing and critical habitat designation – Three units of critical habitat for *A. periens* were proposed in the montane wet ecosystem on Molokai (USFWS 2012). On Maui, five units of critical habitat in the montane wet ecosystem were proposed. A single unit of critical habitat was proposed on Lanai in the lowland wet ecosystem. The final rule for critical habitat designations was not published at the time of this review.

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 10 years), or a long-lived perennial. *Adenophorus periens* 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 islands 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.

The interim stabilization goals for this species have not been met, as only approximately 31 wild individuals are known (Table 1), and all threats are not being sufficiently managed throughout all of the populations (Table 2). Therefore, *Adenophorus periens* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Captive propagation for genetic storage and reintroduction – Collect genetic resources for storage, propagation, and reintroduction into protected suitable habitat within the species' historical range.
- Invasive plant monitoring and control – Continue control of invasive introduced plant species within the exclosure.
- Ungulate monitoring and control – Maintain existing exclosures and monitor for potential incursions.
- Population viability monitoring and analysis – Continue monitoring wild and outplanted individuals.
- Fire monitoring and control – Develop and implement a fire management plan at the existing exclosure.
- Climate change adaptation strategy – Research the suitability of habitat for reintroducing this species in the future due to the impacts of climate change.
- Alliance and partnership development – Initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this taxon.

Table 1. Status and trends of *Adenophorus periens* from listing through current 5-year review.

Date	No. wild indivs	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1994 (listing)	1,280	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1999 (recovery plan)	1,295-1,330	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	1,000+	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2009 (5-yr review)	51-123	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2012 (critical habitat - proposed)	0 (Maui, Molokai, Lanai)	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2015 (5-yr review)	~31	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No

Table 2. Threats to *Adenophorus periens* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – degradation of habitat and herbivory	A, C, D, E	Ongoing	Partially, fenced on Kauai
Invasive introduced plants	A, E	Ongoing	None
Volcanic activity	E	Ongoing	None
Fire	E	Ongoing	None
Low numbers	E	Ongoing	None
Climate change	A, E	Increasing	None

References:

See previous 5-year review for a full list of references (USFWS 2010). Only references for new information are provided below.

Fortini, L., J. Price, J. Jacobi, A. Vorsino, J. Burgett, K. Brinck, F. Amidon, S. Miller, S. Gon II, G. Koob, and E. Paxton. 2013. A landscape-based assessment of climate change vulnerability for all native Hawaiian plants. Technical report HCSU-044. Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hawaii. 141 pages.

National Tropical Botanical Garden. 2013. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

National Tropical Botanical Garden. 2014. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

Plant Extinction Prevention Program. 2011. Plant Extinction Prevention Program annual report, fiscal year 2011 (July 1, 2010-June 30, 2011). Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

Plant Extinction Prevention Program. 2012. Plant Extinction Prevention Program annual report, fiscal year 2012 (July 1, 2011-June 30, 2012). Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

Plant Extinction Prevention Program. 2015. Plant Extinction Prevention Program progress report, fiscal year 2015, qtr 1-2 (July 1, 2014-December 31, 2014). Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

[USFWS] U.S. Fish and Wildlife Service. 1999. Recovery plan for multi-island plants. U.S. Fish and Wildlife Service, Portland, Oregon. 206 pages + appendices.

[USFWS] U.S. Fish and Wildlife Service. 2010. *Adenophorus periens* 5-year review short form summary. Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii. 8 pages.

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; listing 38 species on Molokai, Lanai, and Maui as endangered and designating critical habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 species; proposed rule. Federal Register 77(112):34464-34775.

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SIGNATURE PAGE for 5-YEAR REVIEW of *Adenophorus periens* (pendant kihi fern)

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
X No Change in listing status

Appropriate Listing/Reclassification Priority Number, if applicable:_____

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

Maria M Bluegmann Date 2015-06-30