

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Asplenium dielfalcatum* (no common name)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90): 28031–28034, May 10, 2022.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai'i

Name of Reviewer:

Cheryl Phillipson, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, PIFWO

Megan Laut, Recovery Program Manager, PIFWO

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 (Service) beginning in October 2023. The review was based on a review of current, available information since the last 5-year review for *Asplenium dielfalcatum* (USFWS 2019). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery Program Manager.

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/ecp/species/8198>).

Review Analysis:

Please refer to the previous 5-year reviews for *Asplenium dielfalcatum* published in the Federal Register on August 2, 2011, as *Diellia falcata*, and on September 20, 2019, as *Asplenium dielfalcatum* (available at https://ecos.fws.gov/docs/tess/species_nonpublish/1760.pdf and https://ecos.fws.gov/docs/tess/species_nonpublish/2820.pdf) for a complete review of the species' status, threats, management efforts, and references cited. We are not aware of any significant new information regarding the species' biological status since listing to warrant a change in the Federal listing status of *A. dielfalcatum*.

This short-lived perennial terrestrial fern in the Aspleniaceae (spleenwort) family is endangered and is known from the island of O'ahu. The status and trends for *Asplenium dielfalcatum* are provided in the tables below.

New Status Information:

- In 2019, an estimated 1,000 individuals were reported from 14 subpopulations on O‘ahu (USFWS 2019). There have been known to be seven populations in the Wai‘anae mountains, totaling approximately 117 mature and 76 immature individuals (Army Natural Resources Program on O‘ahu [ANRPO] 2023a). However, many locations have not been surveyed in more than 10 years, so these under-monitored populations may still have individuals but current numbers are unknown. Unfortunately, the previously largest population at Mākaha (700 individuals) has declined significantly, and so we cannot assume populations that haven’t been monitored in over 10 years are extant.
- Currently, there is one founder represented in *ex situ* storage and propagation collections, including spores in storage and explants in tissue culture (Lyon Arboretum 2022).

New Threats:

- None reported.

New Management Actions:

- Monitoring and surveys—
 - Although *Asplenium dielfalcatum* is not a focus species according to the Army’s Implementation Plan, the Army Natural Resources Program on O‘ahu (ANRPO) opportunistically monitors individuals at some management units including lower Mākua, Makaleha West, Kalena-Kumakali‘i, Mākaha, ‘Ēkahanui, Puali‘i North, and Pahole (ANRPO 2020 appendices, pp. 101, 149, 273; 2022 appendices, pp. 187, 277, 304; 2023b appendices, p. 62).
 - In 2019 and 2021, the Plant Extinction Prevention Program (PEPP) reported conducting surveys for *A. dielfalcatum* (PEPP 2019, p. 32; 2021, p. 25).
- Collection and propagation for genetic storage and reintroduction—
 - In 2007, the National Tropical Botanical Garden (NTBG) reported storage of spores collected from an unidentified source and stored at the fern laboratory (NTBG 2022).
 - The Lyon Arboretum Seed Conservation Laboratory reported storage of spores collected in 2003 representing one individual sourced from Kahanahāiki (Lyon Arboretum 2022).

Table 1. Status and trends of *Asplenium dielfalcatum* from listing through current 5-year review. Table 1a shows progress according to Interim Stabilization Goals; Table 1b shows progress according to Preventing Extinction Goals.

Table 1a.

Date	No. wild individuals	No. Outplanted	Downlisting Criteria identified in Recovery Plan	Downlisting Criteria Completed?

1991 (listing)	3,000	0	All threats managed in all 5–7 populations	No
			5–7 populations with 300 mature individuals each	Unknown
			Each population persisting for 5 consecutive years	Unknown
2011 (5-year review)	1,000s	0	All threats managed in all 5–7 populations	No
			5–7 populations with 300 mature individuals each	Unknown
			Each population persisting for 5 consecutive years	Unknown

Table 1b.

Date	No. wild individuals	No. outplanted	*Preventing Extinction Targets identified by HPPRCC	*Preventing Extinction Targets Completed?
2019 (5-year review)	ca 1,000	0	All threats managed in all 3 populations	Partial
			Reproduction (i.e., viable spores, sporelings) at all 3 populations	Partial
			Complete genetic storage	No
			3 populations with 100 mature individuals each	No
2024 (5-year review)	117 mature 76 immature, possibly more	0	All threats managed in all 3 populations	Partial, known individuals occur in exclosures managed for other rare species

			Complete genetic storage	Partial, collections from 1 founder
			Natural reproduction at all 3 populations	None reported
			3 populations with 100 mature individuals each	No

* The Preventing Extinction Stage was established in 2011. Prior to 2011, the Interim Stabilization Stage was the first stage towards recovery (now it is the second stage after Preventing Extinction).

Table 2. Threats to *Asplenium dielfalcatum* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, exclosures managed for other rare species may provide protection
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, exclosures managed for other rare species may provide protection
Fire destruction and degradation of habitat	A	Ongoing	Partial, fire management plan for Army training areas
Degradation and destruction by landslides	A	Ongoing	None
Climate change degradation or loss of habitat	A	Ongoing	None
Predation and herbivory by feral ungulates	C	Ongoing	Partial, exclosures managed for other rare species may provide protection
Predation and herbivory by rodents	C	Ongoing	None
Predation and herbivory by invertebrates—Greenhouse thrips	C	Ongoing	None

Synthesis:

Currently there are seven populations totaling 117 mature and 76 immature wild individuals of *Asplenium dielfalcatum* on O‘ahu based on opportunistic surveys. Individuals occurring in areas managed for other rare plant species may be provided protection by fencing and nonnative plant control. Spore collections and explants are stored at Lyon Arboretum, representing one founder from Mākua.

Stabilizing (interim) and preventing extinction targets, and downlisting, and delisting criteria are provided in the Recovery Plan for the O‘ahu Plants (USFWS 1998) and have been updated according to the draft revised recovery objective guidelines developed by the Hawai‘i and Pacific Plants Recovery Coordinating Committee (HPPRCC 2011). The HPPRCC identifies an additional initial objective, the Preventing Extinction Stage, in addition to the Interim Stabilization, Delisting, and Downlisting objectives. Furthermore, life history traits such as breeding system, population size fluctuation or decline, and reproduction type (sexual or vegetative), have been included in the calculation of goals for the number of populations and reproducing individuals for each stage. The goals for each stage remain grouped by life span defined as annual, short-lived perennial (fewer than 10 years), or long-lived perennial.

Asplenium dielfalcatum is a short-lived terrestrial perennial fern and an obligate outcrosser. To prevent extinction, which is the first milestone in recovering the species, the taxon must be managed to control threats (e.g., fenced) and have 50 individuals (or the total number of individuals if fewer than 50 exist) from each of three populations represented in *ex situ* (secured off-site, such as a nursery or seed bank) collections that are well managed. In addition, a minimum of a total of three populations should be documented on O‘ahu where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable spores, sporelings) with a minimum of 100 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Numbers of wild individuals continue to decline (Table 1). Only a single individual is represented *ex situ* (Table 1). There are no populations totaling at least 100 reproducing individuals, and all threats are not being managed (Table 1, Table 2). Therefore, *Asplenium dielfalcatum* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

No significant new information regarding the species’ biological status has been reported since the last 5-year review in 2019. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2024.

- Surveys and inventories—Conduct surveys of known populations and potentially suitable habitat to determine the current status of the species.
- Ungulate monitoring and control—Continue to maintain fenced exclosures where populations occur and construct new fences to protect any new individuals from the negative impacts of feral ungulates.
- Invasive nonnative plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species and those that compete with *Asplenium dielfalcatum* at all occurrences.
- Fire prevention and control—Continue to develop and implement fire prevention management plans for all areas where *A. dielfalcatum* occurs.

- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use to determine future landscape needed for its recovery.
- Predator and herbivore monitoring and control—Determine and implement effective methods to control rodents and insect pests.
- Captive propagation for genetic storage and reintroduction—Increase collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- Reintroduction and augmentation—Begin translocation of individuals into suitable habitat within historic range that is being managed for known threats to this species.
- Build resiliency, redundancy, and representation—Increase species’ viability through habitat restoration, threat control, and translocation into suitable habitat that is being managed for known threats to this species to reduce impacts of landslides and climate change.
- Alliance and partnership development—Continue to work with partners and other land managers in planning and implementation of ecosystem-level restoration and management to benefit this species.

References:

- [ARNPO] Army Natural Resources Program on O‘ahu. 2020. 2020 Status report for the Mākua and O‘ahu Implementation Plans, appendices. Office of the Vice President for Innovation and Research, University of Hawai‘i. 516 pp.
- [ANRPO] 2022. Status report for the Mākua and O‘ahu Implementation Plans, appendices. Office of the Vice President for Innovation and Research, University of Hawai‘i. 690 pp.
- [ANRPO] 2023a. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.
- [ARNPO] 2023b. 2023 Status report for the Mākua and O‘ahu Implementation Plans, appendices Prepared by Army Natural Resources Program, O‘ahu. Office of the Vice President for Innovation and Research, University of Hawai‘i. 534 pp.
- [HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.
- Lyon Arboretum. 2022. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.
- [NTBG] National Tropical Botanical Garden. 2022. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished

report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.

[PEPP] Plant Extinction Prevention Program. 2019. Plant Extinction Prevention Program, fiscal year 2019 interim performance report (October 1, 2018-September 30, 2019) cooperative agreement F18AC00502 (interim report), F14AC00174 (final report), US Fish and Wildlife Service CFDA Program #15.657, Endangered species conservation—recovery implementation funds, University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 53 pp.

[PEPP] 2021. Plant Extinction Prevention Program fiscal year 2021 interim performance report (October 1, 2020-September 30, 2021), Cooperative Agreement F19AC00532 (Interim report), U.S. Fish and Wildlife Service CFDA Program #15.657 Endangered Species Conservation—Recovery Implementation Funds, University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 46 pp.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery Plan for the Oahu Plants. Portland. 207 pp. + appendices.

[USFWS] 2011. *Diella falcata* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
https://ecos.fws.gov/docs/tess/species_nonpublish/1760.pdf.

[USFWS] 2019. *Asplenium dielfalcatum* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
https://ecos.fws.gov/docs/tess/species_nonpublish/2820.pdf.

[USFWS] 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90): 28031–28034, May 10, 2022.

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SIGNATURE PAGE for 5-YEAR REVIEW of *Asplenium dielfalcatum* (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

For Field Supervisor, Pacific Islands Fish and Wildlife Office

Date_____