

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Melicope degeneri* (alani)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 129 Species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85(48): 14240–14243, March 11, 2020.

Lead Region/Field Office:

Interior Region 12/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, Conservation & Restoration Team 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 or USFWS) beginning in October 2021. The review was based on a review of current, available information since the last 5-year review for *Melicope degeneri* (USFWS 2017). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Conservation and Restoration Team 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 (<https://ecos.fws.gov/ecp/species/5968>).

Review Analysis:

Please refer to the previous 5-year review for *Melicope degeneri* published in the Federal Register on September 16, 2017 (available at:[://ecos.fws.gov/docs/tess/species_nonpublish/2472.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/2472.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 *M. degeneri*.

This long-lived perennial shrub in the Rutaceae (rue or citrus) family is listed as endangered and is known from the island of Kaua‘i. The status and trends for the two subspecies of *Melicope degeneri* are provided in the tables below.

New Status Information:

- There are approximately 50 wild individuals of *Melicope degeneri* at seven locations on Kaua‘i, including the recent discovery of approximately 20 individuals at Mōhihi valley (Nagendra 2018, pp. 5–6, 16).

New Threats:

- None reported.

New Management Actions:

- Surveys and monitoring—The Plant Extinction Prevention Program (PEPP) and the National Tropical Botanical Garden (NTBG) monitor and survey for populations of *Melicope degeneri* on Kaua‘i (Nagendra 2018; PEPP 2017, 2018, 2020).
- Ungulate monitoring and management—Wainiha is fenced (managed by The Nature Conservancy) and Hono o Nā Pali Natural Area Reserve (NAR) (managed by the State) received funding for strategic fencing. The exclosures will protect four populations of *M. degeneri*.
- Collection and propagation—
 - In 2016, PEPP reported collection of seeds representing two founders at Hanakāpī‘ai (PEPP 2017).
 - In 2021, NTBG reported propagation and storage of two individuals representing one founder at Hanakoa (NTBG 2021).
- Reintroduction and augmentation—In 2015, four individuals of *M. degeneri* were outplanted within a fenced area in Limahuli Preserve. This reintroduction is monitored twice a year and in 2018, three out of the four individuals survived (Nagendra 2018, p. 5; NTBG 2019).

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

Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2010 (listing and critical habitat)	22–23	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
2017 (5-year review)	52	0	All threats managed in all 3 populations	No

			Complete genetic storage	Partially
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Unknown
			3 populations with 25 mature individuals each	No
2022 (5-year review)	ca 50	4, 3 surviving	All threats managed in all 3 populations	Partially, 1 reintroduced population in exclosure at Wainiha
			Complete genetic storage	Partially, at least one founder represented
			Natural reproduction at all 3 populations	Unknown
			3 populations with 25 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 *Melicope degeneri* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, 1 reintroduced population in exclosures at Wainiha
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	Partial, exclosures are managed
Landslide and flooding destruction or degradation of habitat	A	Ongoing	None
Climate change degradation and destruction of habitat, including hurricanes	A	Ongoing	None
Rodent predation and herbivory	C	Ongoing	None

Inadequacy of existing regulatory mechanisms—lack of adequate hunting and biosecurity legislation	D	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, collection, propagation and reintroduction

Synthesis:

Currently, there are approximately 50 wild individuals of *Melicope degeneri* at seven locations on Kaua‘i. There are some collection and propagation efforts, and a few individuals were reintroduced to a managed enclosure. One reintroduced subpopulation is within a fenced and managed area, and three wild populations are within a NAR that has funding for strategic fencing.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Kaua‘i Islandwide Recovery Plan (USFWS 2021) 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.

Melicope degeneri is a long-lived perennial shrub. 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 Kaua‘i where this species now occurs or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 25 mature, reproducing individuals per population.

The preventing extinction goals for *Melicope degeneri* have not been met. There are approximately 50 wild individuals in widely separated areas (Table 1). There are small collections of seeds and propagules (Table 1). Three very small wild populations are within an area proposed for fencing. Four individuals were reintroduced into an enclosure with three individuals currently surviving (Table 1, Table 2). The populations are susceptible other threats, including ungulate and rodent predation, nonnative plant competition, and landslides (Table 2). Therefore, *M. degeneri* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

No new threats and no significant new information regarding the species' biological status have been reported since the last 5-year review in 2017. Thus, the following recommendations for future actions are reiterated or updated for the 5-year review for 2022.

- Surveys and inventories—Continue to survey for populations of *Melicope degeneri* in areas of potentially suitable habitat and monitor known populations to determine their current status.
- Ungulate monitoring and control—Continue to construct and maintain exclosures to protect all occurrences from habitat disturbance by feral ungulates.
- Nonnative invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species and those that compete with *M. degeneri* at all populations.
- Predator and herbivore monitoring and control—Implement effective control measures for rats at all populations.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock.
- Reintroduction and augmentation—Continue to reintroduce individuals into protected suitable habitat within historic range that is being managed for known threats to this species.
- Build resiliency and redundancy—Increase numbers of individuals and populations through historic range to reduce impacts of climate change, landslides, and hurricanes, as well as reduced viability due to low numbers of individuals per population.
- Population biology research—Study *M. degeneri* populations to determine viable population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- 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:

[HPPRCC] Hawai'i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.

Nagendra, U. 2018. Limahuli Preserve rare plant restoration project, National Tropical Botanical Garden, FWS Agreement #F13AC00504, September 30, 2014-October 30, 2018. 16 pp.

[NTBG] National Tropical Botanical Garden. 2019. 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] 2021. 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 2017. Plant Extinction Prevention Program FY 2017 annual report (Oct 1, 2016-Sep 30, 2017), Coop Agreement: F14A00174, U.S. Fish and Wildlife Service CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds. 235 pp.

[PEPP] 2018. Plant Extinction Prevention Program, fiscal year 2018 interim performance report (October 1, 2017-September 30, 2018) cooperative agreement F18AC00502, US Fish and Wildlife Service CFDA Program #15.657, Endangered species conservation—recovery implementation funds, University of Hawaii at Manoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 49 pp.

[PEPP] 2020. Plant Extinction Prevention Program, fiscal year 2020 interim performance report (October 1, 2019-September 30, 2020) cooperative agreement F18AC00502 (interim report), F19AC00532 (interim report), US Fish and Wildlife Service CFDA Program #15.657, Endangered species conservation—recovery implementation funds, University of Hawaii at Manoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 70 pp.

[USFWS] 2017. *Melicope degeneri* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
https://ecos.fws.gov/docs/tess/species_nonpublish/2472.pdf.

[USFWS] 2020. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 129 Species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85(48): 14240–14243, March 11, 2020.

[USFWS] 2021. Kaua‘i Islandwide Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR. 65 pp. + appendices.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Melicope degeneri* (alani)

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

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