

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Melicope pallida* (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 pallida* (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/5969>).

### **Review Analysis:**

Please refer to the previous 5-year reviews for *Melicope pallida* published in the Federal Register on August 27, 2010, and September 16, 2017 (available at [http://ecos.fws.gov/docs/tess/species\\_nonpublish/1661.pdf](http://ecos.fws.gov/docs/tess/species_nonpublish/1661.pdf) and [http://ecos.fws.gov/docs/tess/species\\_nonpublish/2474.pdf](http://ecos.fws.gov/docs/tess/species_nonpublish/2474.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. pallida*.

This long-lived perennial tree 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 *Melicope pallida* are provided in the tables below.

New Status Information:

- There are approximately 40 wild individuals of *Melicope pallida*, most of which occur along the cliffs from Awa‘awapuhi and Honopū to Kalalau on Kaua‘i (Kishida and Perlman 2017; PEPP 2017). A survey of the Kalalau cliffs using drone technology found 20 individuals (Nyberg 2019, in litt., p. 7). Further surveys could reveal more individuals. *Melicope pallida* has not been observed on O‘ahu since the 1970s, although surveys continued in 2009, 2010, and 2017 (USFWS 2017; Ching-Harbin et al. 2010).

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 pallida* on Kaua‘i and O‘ahu (Kishida and Perlman 2017; NTBG 2016a, b, 2017, 2020; Nyberg 2019, in litt.).
- Collection and propagation—In 2016, air-layering attempts were made on at least one wild individual at Honopū (Kishida and Perlman 2016). Leaves were collected for genetic analysis (PEPP 2017).

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

Date	No. wild individuals	No. outplanted	Downlisting Criteria identified by Recovery Plan	Downlisting Criteria Completed?
1994 (listing)	<100 (Kaua‘i) <5 (O‘ahu)	0	All threats managed in all 5–7 populations	No
			Complete genetic storage	No
			5 populations with 300 mature individuals each	No
			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for 5 consecutive years	Unknown
1995 (recovery plan)	157 (Kaua‘i) 0 (O‘ahu)	0	All threats managed in all 5–7 populations	No
			Complete genetic storage	Partially

			5 populations with 300 mature individuals each	No
			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for 5 consecutive years	Unknown
2003 (critical habitat)	181 (Kaua'i) 1 (O'ahu)	0	All threats managed in all 5–7 populations	No
			Complete genetic storage	Partially
			5 populations with 300 mature individuals each	No
			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for 5 consecutive years	Unknown
2010 (5-year review)	217–296 (Kaua'i) Unknown (O'ahu)	0	All threats managed in all 5–7 populations	No
			Complete genetic storage	Partially
			5 populations with 300 mature individuals each	No
			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for 5 consecutive years	Unknown
2012 (O'ahu ecosystem critical habitat)	1?	0	All threats managed in all 5–7 populations	No
			Complete genetic storage	Partially
			5 populations with 300 mature individuals each	No

			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for 5 consecutive years	Unknown
<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>*Preventing Extinction Criteria identified by HPPRCC</b>	<b>*Preventing Extinction Criteria Completed?</b>
2017 (5-year review)	ca 44 observed (Kaua'i) 0 (O'ahu)	1	All threats managed in all 3 populations	No
			Complete genetic storage	Partially, air-layering attempt
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Unknown
			3 populations with 25 mature individuals each	No
2022 (5-year review)	ca 40+ (Kaua'i) 0 (O'ahu)	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			Natural reproduction at all 3 populations	Unknown
			3 populations with 25 mature individuals each	Partially, 1 population >25

\* 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 pallida* and ongoing conservation efforts.**

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat and herbivory by feral ungulates	A, C	Ongoing	None
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	None
Landslide and flooding destruction or degradation of habitat	A	Ongoing	None
Fire destruction and degradation of habitat	A	Ongoing	None
Climate change degradation and destruction of habitat	A	Ongoing	None
Rodent predation and herbivory	C	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, air-layering attempt

**Synthesis:**

Currently, there are approximately 40 observed wild individuals of *Melicope pallida* primarily from Awa‘awapuhi to Kalalau on Kaua‘i. Air-layering attempts for propagation are ongoing.

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 pallida* is a long-lived perennial tree. 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 pallida* have not been met. There are approximately 40 observed wild individuals mostly in one location (Table 1). There are no recent collections of seeds or propagules despite attempts at air-layering (Table 1, Table 2). The population is susceptible to threats including ungulate and rodent herbivory and predation, nonnative plant competition, wildfires, and landslides (Table 2). Numbers of individuals continue to decline. Therefore, *M. pallida* 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 monitoring—Continue to survey for populations of *Melicope pallida* in areas of potentially suitable habitat and monitor known populations to determine their current status.
- Ungulate monitoring and control—Construct and maintain exclosures to protect all occurrences from habitat disturbance and herbivory by feral ungulates.
- Nonnative invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species and those that compete with *M. pallida* at all populations.
- Fire monitoring and control—Develop and implement fire management plans for all wild and reintroduced populations.
- Predator and herbivore monitoring and control—
  - Implement effective control measures for rats at all populations.
  - Determine level of threat of flower damage and nectar robbing by passerine birds and any additional recovery actions required.
- Climate change adaptation strategy—Research suitability of habitat for viability of species, including where to conduct translocations in the future due to impacts of climate change.
- Captive propagation for genetic storage and reintroduction—
  - Continue collection and propagation efforts for maintenance of genetic stock.
  - Determine barriers to seed viability and improve methods used for germination and propagation.
- Build resiliency and redundancy — Increase species' viability through habitat restoration, threat control, and reintroduction and translocation into suitable habitat that is being managed for known threats to this species to reduce impacts of climate change, landslides, and reduced viability due to low numbers of individuals.
- Human interaction monitoring and management—Develop and implement effective measures to reduce the impacts of hikers and trail maintenance.

- 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:

- Ching-Harbin, S. J. Lau, and V. Caraway. 2010. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Melicope pallida*, ALI, Pacific Islands Fish and Wildlife Office.
- [HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.
- Kishida, W. and S. Perlman. 2016. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Melicope pallida*, Pacific Islands Fish and Wildlife Office.
- Kishida, W. and S. Perlman. 2017. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Melicope pallida*, Pacific Islands Fish and Wildlife Office.
- [NTBG] National Tropical Botanical Garden. 2016a. NTBG database herbarium record detail for *Melicope pallida*, PTBG1000070709, 082002, 7 APR 2016.
- [NTBG] 2016b. NTBG database herbarium record detail for *Melicope pallida*, PTBG 100062421, 076454, 6 OCT 2016.
- [NTBG] 2017. NTBG database herbarium record detail for *Melicope pallida*, PTBG1000062690, 076495, 31 JAN 2017.
- [NTBG] 2020. NTBG database herbarium record detail for *Melicope pallida*, PTBG1000081804, 083488, 18 OCT 2020.

- Nyberg, B. 2019, in litt., Endangered surveys using unmanned aerial vehicle. National Tropical Botanical Garden, Kalaheo. 10 pp.
- [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.
- [USFWS] U.S. Fish and Wildlife Service. 2010. *Melicope pallida* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [https://ecos.fws.gov/docs/tess/species\\_nonpublish/1661.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/1661.pdf).
- [USFWS] 2017. *Melicope pallida* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [https://ecos.fws.gov/docs/tess/species\\_nonpublish/2474.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/2474.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. Kauaʻi 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 pallida* (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**

\_\_\_\_\_ Date\_\_\_\_\_