

## **5-YEAR REVIEW**

Short Form Summary

**Species Reviewed:** *Melicope quadrangularis* (alani)

**Current Classification:** Endangered

### **Federal Register Notice announcing initiation of this review:**

[USFWS] U.S. Fish and Wildlife Service. 2008. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 70 species in Idaho, Montana, Oregon, Washington, and the Pacific Islands. Federal Register 73(83):23264-23266.

### **Lead Region/Field Office:**

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

### **Name of Reviewer(s):**

Marie Bruegmann, Pacific Islands Fish and Wildlife Office, Plant Recovery Coordinator  
Marilet A. Zablan, Pacific Islands Fish and Wildlife Office, Assistant Field Supervisor for Endangered Species  
Jeff Newman, Pacific Islands Fish and Wildlife Office, Acting Deputy Field Supervisor

### **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 April 29, 2008. The review was based on the final critical habitat designation for *Melicope quadrangularis* and other species from the island of Kauai (USFWS 2003), as well as a review of current, available information. The National Tropical Botanical Garden provided an initial draft of portions of the review and recommendations for conservation actions needed prior to the next five-year review. The evaluation of Tamara Sherrill, biological consultant, was reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Assistant Field Supervisor for Endangered Species and Acting Deputy Field Supervisor 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](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 the final critical habitat designation for *Melicope quadrangularis* published in the Federal Register on February 27, 2003 (USFWS 2003) for a complete review of the species' status (including biology and habitat), threats, and management efforts. 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 *M. quadrangularis*.

*Melicope quadrangularis* populations have declined so that currently no living individuals are known. The species was discovered by C.N. Forbes in the vicinity of Wahiawa Bog on the island of Kauai in 1909. It was not seen again for 82 years, when it was rediscovered in 1991 by biologists from the National Tropical Botanical Garden during a systematic survey of the upper Wahiawa drainages on the south side of Kauai. Thirteen individual trees were mapped at that time which ranged between 810 to 860 meters (2,650 to 2,820 feet) elevation (Lorence 1991; Wood 2000, 2009). At the time of listing in 1994, these thirteen individuals were presumed alive (USFWS 1994).

Further field surveys were made in 1998 when Ken Wood of the National Tropical Botanical Garden visited the only known location for *Melicope quadrangularis* and found that this population had been apparently destroyed by Hurricane Iniki (Wood 2000). An additional survey for *M. quadrangularis* was carried out on September 28, 2000 with the assistance of the U.S. Fish and Wildlife Service to locate any additional populations or individuals of *M. quadrangularis*, and to assemble ecological information that might assist in its rediscovery. During this later survey no additional trees were found, and at the time of this report there are still no known locations for this species *in situ* (on-site or in the plant's natural location), nor are there any *ex situ* (off-site) collections of seed or plants. Subsequent surveys exploring the surrounding region also have not relocated the species. It is possible that other locations in the forests of that region may still have undiscovered populations and/or individuals of *M. quadrangularis*, and field biologists continue to search for this species when working in this area (Wood 2009).

The Wahiawa region where *Melicope quadrangularis* was rediscovered is a *Metrosideros polymorpha* (ohia) – *Dicranopteris linearis* (uluhe) forest between the peaks of Kapalaoa and Hulua, and below the western ridge that divides Wahiawa from the Hanapepe Valley. This location was severely impacted in 1992 by Hurricane Iniki. Since then, native plant species have declined and invasive introduced plants and animals have increased in the area. This region is characterized by wind-swept ridges of matting ferns, including *Dicranopteris linearis* and *Diplazium pinnatum* (uluhe lau nui) interspersed with dwarfed *Metrosideros polymorpha* and *Syzygium sandwicensis* (ohia ha). Other common native species in the area include *Psychotria hexandra* (kopiko), *Broussaisia arguta* (kanawao), *Kadua affinis* (manono), and *Perrottetia sandwicensis* (olomea), and Hawaiian tree ferns *Cibotium chamissoi* and *C. nealiae* (hapuu) (Wood 2008, 2009).

Visits were made from 1999 to 2008 to several adjacent locations, near the *Melicope quadrangularis* re-discovery site in Wahiawa, which have similar habitats of *Metrosideros polymorpha* lowland wet forest, with windswept ridge vegetation of shrubland and scattered stands of forest, dissected by steep slopes and small adjacent side drainages. Adjacent forest patches had additional associated species including *Cheirodendron fauriei* (lapalapa) *Psychotria mariniana*, *P. wawraea* (kopiko), *Scaevola gaudichaudiana* (naupaka kuahiwi), *Antidesma platyphyllum* (hame), *Melicope feddei* (alani), *M. waialealae* (alani), *Sadleria pallida* (amau),

*Sphenomeris chinensis* (pala), *Machaerina angustifolia* (uki), and *Machaerina mariscoides* (uki) (Wood 2008, 2009).

Introduced species which threaten the habitat in Wahiawa include the following (in their order of greater to lesser threat): pigs (*Sus scrofra*) (Factor A) and invasive introduced plants *Psidium cattleianum* (strawberry guava), *Clidemia hirta* (Koster's curse), *Melastoma septemnerium* (Asian melastome), *Rhodomyrtus tomentosa* (rat berry), *Rubus rosifolius* (thimbleberry), *Axonopus fissifolius* (narrow-leaved carpetgrass), *Cyperus meyenianus* (no common name [NCN]), *Pterolepis glomerata* (NCN), *Stachytarpheta australis* (porterweed), *Oplismenus hirtellus* (basketgrass), *Sacciolepis indica* (Glenwood grass), and *Setaria parviflora* (yellow foxtail) (Factor E) (Wood 2009).

Rats (*Rattus rattus*) and slugs (undetermined species) threaten this *Melicope* species (Factor C) (Wood 2009). Hurricanes may also threaten this species (Factor E). There is no new information regarding the inadequacy of existing regulatory mechanisms for this species (Factor D).

Climate change may also pose a threat to *Melicope quadrangularis* (Factors A and E). However, current climate change models do not allow us to predict specifically what those effects, and their extent, would be for this species.

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Kauai plant cluster (USFWS 1995), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Melicope quadrangularis* is a long-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* collection. In addition, a minimum of three populations should be documented on the island of Kauai. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 25 mature individuals per population.

This species has been rediscovered at least once in the last 82 years and suitable habitat still exists within historical range, indicating that *Melicope quadrangularis* may still exist. The interim stabilization goals for this species have not been met (see Table 1), and therefore, *M. quadrangularis* meets the definition of endangered as it remains in danger of extinction throughout its range.

#### **Recommendations for Future Actions:**

- Conduct surveys within suitable habitat.
- Fence suitable habitat within historical range to protect it from further incursions by pigs.
- Remove introduced invasive plants from the fenced areas.

- Work with Hawaii Division of Forestry and Wildlife and other landowners to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

### References:

- Lorence, D.H. and T. Flynn. 1991. Botanical Survey of the Wahiawa Mountains. Department of Land and Natural Resources, Division of Forestry and Wildlife, Lihue, Hawaii. Unpublished.
- [USFWS] U.S. Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants; determination of endangered or threatened status for 24 plants from the island of Kauai, Hawaii; final rule. Federal Register 59(38):9304-9329.
- [USFWS] U.S. Fish and Wildlife Service. 1995. Recovery plan for the Kauai plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 270 pages.
- [USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 95 plant species from the islands of Kauai and Niihau, Hawaii; final rule. Federal Register 68(39):9116-9479.
- Wood, K.R. 2000. Three *Melicope* survey: *Melicope degeneri*, *Melicope knudsenii* and *Melicope quadrangularis* biogeographical research and conservation. National Tropical Botanical Garden, Kalaheo, Hawaii. 19 pages. Unpublished.
- Wood, K.R. 2008. Checklist of vascular plant taxa of Wahiawa, Kauai, Hawaii (610-1010 M). National Tropical Botanical Garden, Kalaheo, Hawaii. 23 pages. Unpublished.
- Wood, K.R. 2009. Further notes on *Melicope quadrangularis* (Rutaceae), Kauai, Hawaii. National Tropical Botanical Garden, Kalaheo, Hawaii. 6 pages. Unpublished.

**Table 1. Status of *Melicope quadrangularis* from listing through 5-year review.**

<b>Date</b>	<b>No. wild indivs.</b>	<b>No. outplanted</b>	<b>Stability Criteria identified in Recovery Plan</b>	<b>Stability Criteria Completed?</b>
1994 (listing)	13	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
1995 (recovery plan)	13	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
2003 (critical habitat)	0	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
2009 (5-year review)	0	0	All threats managed	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No

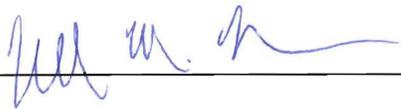
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SIGNATURE PAGE for 5-YEAR REVIEW of *Melicope quadrangularis* (alani)

**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

<sup>102</sup> **Field Supervisor, Pacific Islands Fish and Wildlife Office**

  
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Date   AUG 27 2010