

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Melicope mucronulata* (alani)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; 5-year status reviews of 46 species in Idaho, Oregon, Washington, Nevada, Montana, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 77(44):13248-13251.

Lead Region/Field Office:

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

Name of Reviewer(s):

Rachel Rounds, Fish and Wildlife Biologist, PIFWO

Maui Nui and Hawaii Island Team Manager, PIFWO

Marie Brueggemann, Plant Recovery Coordinator, PIFWO

Recovery Program Lead, 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 6, 2012. The review was based on a review of current, available information since the last 5-year review for *Melicope mucronulata* (USFWS 2008). The evaluation by Rachel Rounds, Fish and Wildlife Biologist, was reviewed by the Island Team Manager and the Plant Recovery Coordinator, followed by the Recovery Program Lead. 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 (http://ecos.fws.gov/tess_public).

Review Analysis:

Please refer to the previous 5-year review for *Melicope mucronulata* published on January 18, 2008 (available at http://ecos.fws.gov/docs/five_year_review/doc1850.pdf) for a complete review of the species' status, threats, and management efforts. 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. mucronulata*.

This long-lived perennial is endangered and occurs on the island of Molokai and historically on Maui (USFWS 1997). The current status and trends for *Melicope mucronulata* are provided in the tables below.

New status information:

In 2013, two populations on Molokai contained three mature wild individuals of *Melicope mucronulata* (Plant Extinction Prevention Program [PEPP] 2013). The number of individuals has increased from two individuals since the last 5-year review (USFWS 2008).

New threats:

- Climate change destruction or degradation of habitat – Climate change may pose a threat to this species. 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 *Melicope mucronulata* is highly vulnerable to the impacts of climate change. Therefore, additional management actions are needed to conserve this taxon into the future.

New management actions:

- Ungulate monitoring and control – In 2012, a fence was built around a single population of the *M. mucronulata* by the Plant Extinction Prevention Program, the Natural Area Reserve System, The Nature Conservancy, and the National Park Service (PEPP 2013). The fence has been inspected regularly (PEPP 2013).
- Invasive plant monitoring and control – Weed removal has occurred within the recently completed fenced enclosure (PEPP 2013).
- Population viability monitoring and analysis – The Plant Extinction Prevention Program (2010, 2011, 2012, 2013) monitors the populations on Molokai.
- Captive propagation for genetic storage and reintroduction
 - The Lyon Arboretum’s Seed Conservation Laboratory (2013) has 132 seeds in storage.
 - The Lyon Arboretum’s Micropropagation Laboratory (2013) has 58 propagules in storage.
 - The National Tropical Botanical Garden (2013) has 16 seeds in storage.
 - The Plant Extinction Prevention Program has collected over 120 fruits and six cuttings (PEPP 2010, 2012) and sent 15 seeds to the Lyon Arboretum Seed Conservation Laboratory for storage (PEPP 2013).
- Listing and critical habitat designation – On Maui, critical habitat for *M. mucronulata* is proposed for four unoccupied lowland dry ecosystem units and one unoccupied montane dry ecosystem unit (USFWS 2012). On Molokai, critical habitat for *M. mucronulata* is proposed for one occupied lowland mesic ecosystem unit and one unoccupied montane mesic ecosystem unit (USFWS 2012). The final rule for critical habitat designations has not been published at the time of this review.

Synthesis:

Stabilizing, downlisting, and delisting objectives are provided in the Recovery plan for the Maui plant cluster (USFWS 1997), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Melicope mucronulata* 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* (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 Maui and at least one on Molokai, where the species now occurs or occurred historically. Each of these three populations must be naturally reproducing and increasing in number, with a minimum of 25 mature individuals per population.

The interim stabilization goals for this species have not been met (Table 1), as only two populations of three mature individuals exist, and all threats are not being sufficiently managed throughout its range (Table 2). Therefore, *Melicope mucronulata* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Surveys / inventories – Survey geographical and historical range for a thorough current assessment of the species' status.
- Ungulate monitoring and control
 - Maintain fencing to exclude browsing by goats, pigs, and deer.
 - Fence remaining populations to protect them from impacts of feral ungulates.
- Invasive plant monitoring and control – Continue control of invasive introduced plant species within the enclosure.
- Captive propagation for genetic storage and reintroduction
 - Continue collecting material for genetic storage and propagation for reintroduction.
 - Evaluate genetic resources currently in storage to determine the need to place additional genetic resources in long-term storage due to this species' vulnerability to climate change.
 - Experiment with various propagation methods (air layers, micropropagation, grafting, and cuttings), since seeds are not abundantly produced.
- Predator/herbivore monitoring and control – Control rodents and nonnative predatory insects within the vicinity of all known populations of *M. mucronulata*.
- Fire monitoring and control – Develop and implement a fire management plan for all populations.
- 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 *Melicope mucronulata* from listing through current 5-year review.

Date	No. wild indivs	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1992 (listing)	5	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
1997(recovery plan)	3	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	No
2003 (critical habitat)	3	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	No
2007 (5-yr review)	2	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	No
2012(critical habitat - proposed)	4	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	No
2014 (5-yr review)	3	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	No

Table 2. Threats to *Melicope mucronulata* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – degradation of habitat and herbivory	A, C, D, E	Ongoing	Partially, one population was fenced in 2012
Fire	A, E	Ongoing	None
Invasive introduced plants	A, E	Ongoing	Partially, weed control occurs at the fenced location
Flooding	A	Ongoing	None
Invertebrate herbivory	C	Ongoing	None
Rodent predation or herbivory – rats	C	Ongoing	None
Low numbers	E	Ongoing	Partially, captive propagation for genetic storage and reintroduction
Climate change	A, E	Increasing	None

References:

See previous 5-year review for a full list of references (USFWS 2008). 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.

Harold L. Lyon Arboretum Micropropagation Laboratory. 2013. Micropropagation database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Harold L. Lyon Arboretum Seed Conservation Laboratory. 2013. Seed storage database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

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

[PEPP] Plant Extinction Prevention Program. 2010. Plant Extinction Prevention Program annual report, fiscal year 2010 (July 1, 2009-June 30, 2010). 122 pages. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2011. Plant Extinction Prevention Program annual report, fiscal year 2013 (July 1, 2010-June 30, 2011). 200 pages. Unpublished.

- [PEPP] Plant Extinction Prevention Program. 2012. Plant Extinction Prevention Program annual report, fiscal year 2012 (July 1, 2011-June 30, 2012). 169 pages. Unpublished.
- [PEPP] Plant Extinction Prevention Program. 2013. Plant Extinction Prevention Program annual report, fiscal year 2013 (July 1, 2012-June 30, 2013). 207 pages. Unpublished.
- [USFWS] U.S. Fish and Wildlife Service. 1997. Recovery plan for the Maui plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 130+ pages.
- [USFWS] U.S. Fish and Wildlife Service. 2008. *Melicope mucronulata* 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 13 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.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Melicope mucronulata* (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
- X No Change in listing status

Appropriate Listing/Reclassification Priority Number, if applicable:

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

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Date 2014-03-31