

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Hibiscadelphus giffardianus* (Hau kuahiwi) and
Melicope zahlbruckneri (Alani)

Current Classification: Endangered

FR Notice announcing initiation of this review:

U.S. Fish and Wildlife Service (USFWS). 2006. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 70 species in Idaho, Oregon, Washington, Hawaii, and Guam. Federal Register 71(69):18345-18348.

Lead Region/Field Office:

Region 1

Pacific Islands Fish and Wildlife Office, Gina Shultz, Assistant Field Supervisor
Endangered Species

Name of Reviewer(s):

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

Methodology used to complete this 5-year review:

This review was based on the final critical habitat designation for *Hibiscadelphus giffardianus* and *Melicope zahlbruckneri* and other species from the island of Hawaii, as well as a review of current, available information. The National Tropical Botanical Garden, subcontracted by the Hawaii Biodiversity and Mapping Program, provided an initial draft of portions of the 5-year review.

Background:

For information regarding the species listing history and other facts, please refer to the Threatened and Endangered Species System (TESS) which is part of the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database.

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 *Hibiscadelphus giffardianus* and *Melicope zahlbruckneri* published in the Federal Register on July 2, 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 *H. giffardianus* and *M. zahlbruckneri*.

At the time of listing, *Hibiscadelphus giffardianus* was extinct in the wild and known only from 11 reintroduced individuals at Kipuka Puauulu, in Hawaii Volcanoes National Park. *Melicope zahlbruckneri* was known from 30 to 35 individuals, also in Kipuka Puauulu (USFWS 1996). Currently, *H. giffardianus* is known from three outplanting sites and additional outplantings are planned. The current numbers are: 180 mature and 90 immature individuals at Kipuka Puauulu; 177 out of 200 individuals survive from an outplanting made in 2000 as part of a small mammal toxicant project in adjacent Kipuka Ki; and an additional outplanting, with unknown numbers, at Kipuka Aiea. Many of the trees are flowering and fruiting. The total number of *H. giffardianus* individuals is over 350 mature and 90 immature individuals. *Melicope zahlbruckneri* is currently known from 25 mature naturally occurring individuals and a few saplings in Kipuka Puauulu and four immature individuals outplanted in nearby Kipuka Ki (Big Island Plant Extinction Program 2006). In addition, several trees were found in the Laupahoehoe Natural Area Reserve, near Kilau Stream, in 1991, but actual numbers are not known (Perlman 2007).

The major threats to *Hibiscadelphus giffardianus* and *Melicope zahlbruckneri* in the past were habitat degradation and predation by cattle (*Bos taurus*) and feral pigs (*Sus scrofa*) (Factors A, C, and D). These threats have been controlled by Hawaii Volcanoes National Park, and all naturally occurring and outplanted individuals are within fenced areas, except for the Laupahoehoe population of *M. zahlbruckneri*. Current threats include competition from invasive introduced plant species (Factor E), including *Ehrharta stipoides* (meadow ricegrass), *Paspalum conjugatum* (Hilo grass), *Paspalum dilatatum* (dallis grass), *Psidium cattleianum* (strawberry guava), and *Hedychium* sp. (ginger); fire (Factor E); rats (*Rattus rattus*) that strip the bark, eat seeds, and chew holes in the flowers for nectar (Factor C); and Japanese white-eye birds (*Zosterops japonicus*) that rob nectar (Factor C). *Melicope zahlbruckneri* is also threatened by two-spotted leafhoppers and slugs (Factor C) (Lorence and Wagner 1995; Baker and Allen 1977; USFWS 1996; Big Island Plant Extinction Prevention Program 2006).

In addition to all of the other threats, species like *Hibiscadelphus giffardianus* and *Melicope zahlbruckneri* that are endemic to small portions of a single island are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by random demographic fluctuations and localized catastrophes such as hurricanes and volcanic activity (Factor E). When considered on their own, the natural processes associated with being a single island endemic do not affect *H. giffardianus* and *M. zahlbruckneri* to such a degree that it is threatened or endangered with extinction in the foreseeable future, but these natural processes can exacerbate the threat from anthropogenic factors, such as habitat loss for human development or predation by alien species (Factor E) (USFWS 1996).

The Volcanoes Rare Plant Facility has three trees of *Hibiscadelphus giffardianus* that are used for propagation purposes. The source seeds for these trees were collected in 1994 from Kipuka Puauulu (P. Moriyasu, Volcano Rare Plant Facility, pers. comm. 2006). U.S. Geological Survey Biological Resources Discipline is doing seed germination trials on *H. giffardianus*. Phenology and fruit production are being followed in an attempt to identify pollinators and evaluate the role of rat predation. Propagating *Melicope* species is

difficult, particularly seed germination. Additionally, fruit tends to be damaged and destroyed by rats, while cuttings have a low success rate (Big Island Plant Extinction Prevention Program 2006). In 2004, 100 cuttings of *M. zahlbruckneri* resulted in only two individuals which produced root systems. Numerous cuttings from Kipuka Puaulu were sent to Harold L. Lyon Micropropagation Laboratory in 2002 with some success (N. Sugii, Harold L. Lyon Micropropagation Laboratory, pers. comm. 2007; P. Moriyasu, pers. comm. 2007). At the Kipuka Ki outplanting, U.S. Geological Survey Biological Resources Discipline have also been following the phenology and reproduction of *M. zahlbruckneri* as well, and will try hand pollination to assist seed production and perhaps improve germination rates (Big Island Plant Extinction Prevention Program 2007).

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for plants from the island of Hawaii (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Hibiscadelphus giffardianus* and *Melicope zahlbruckneri* are long-lived perennials, and to be considered stable, each 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 the island of Hawaii for each taxon. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 25 mature individuals per population.

The stabilization goals for this species have not been met (see Tables 1 and 2), as only two populations of *Hibiscadelphus hualalaiensis* and one population of *Melicope zahlbruckneri* have 25 or more mature individuals. Therefore, *H. hualalaiensis* and *M. zahlbruckneri* meet the definition of endangered as they remain in danger of extinction throughout its range.

Recommendations for Future Actions:

- Collect fruit from reintroduced individuals of *Hibiscadelphus giffardianus* that set seed to add to the genetic diversity of the *ex situ* material.
- Test propagation methods for *Melicope zahlbruckneri*.
- Continue reintroducing individuals into protected suitable habitat.
- Continue invasive plant species control around existing populations.
- Continue research on phenology and fruit production, identification of pollinators, seed germination, and the role of rat predation.

References:

- Baker, J. K. and S. Allen. 1977. Hybrid *Hibiscadelphus* (Malvaceae) in the Hawaiian Islands, USA. *Pacific Science* 31(3):285-292.
- Big Island Plant Extinction Prevention Program. 2006. Database. Unpublished.
- Harold L. Lyon Arboretum Micropropagation Laboratory. 2007. Database. Unpublished.
- Lorence, D.H. and W.L. Wagner. 1995. Another new, nearly extinct species of *Hibiscadelphus* (Malvaceae) from the Hawaiian Islands. *Novon* 5(2):183-187.
- Perlman, S. 2007. National Tropical Botanical Garden. summary of field notes for *Melicope zahlbruckneri*. Unpublished.
- [USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants: final designation or nondesignation of critical habitat for 101 plant species from the island of Hawaii, Hawaii: final rule. *Federal Register* 68(116):35949-36406.
- [USFWS] U.S. Fish and Wildlife Service. 1998. Big Island II: Addendum to the recovery plan for the Big Island plant cluster. U.S. Fish and Wildlife Service, Portland, OR. 80 pages + appendices.
- [USFWS] U.S. Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants; determination of endangered or threatened status for 13 plants from the island of Hawaii, state of Hawaii. *Federal Register* 61(198):53137-53153.

Personal Communication:

- Moriyasu, Patty. 2007. Propagator, Volcano Rare Plant Facility. Personal communication to Hawaii Biodiversity and Mapping Program, 2007.
- Sugii, Nellie. 2007. Researcher, Harold L. Lyon Micropropagation Laboratory. Personal communication with National Tropical Botanical Garden, 2007.

Table 1. Status of *Hibiscadelphus giffardianus* from listing through 5-year review.

Date	No. wild indivs	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1996 – listing	0	11	All threats managed in all 3 populations	No
			Complete genetic storage	Yes
			3 populations with 25 mature individuals each	No
1998 – recovery plan	0	30	All threats managed in all 3 populations	Mostly
			Complete genetic storage	Yes
			3 populations with 25 mature individuals each	No
2003 – critical habitat	0	100	All threats managed in all 3 populations	Mostly
			Complete genetic storage	Yes
			3 populations with 25 mature individuals each	No
2007 – 5-yr review	0	440	All threats managed	Mostly
			Complete genetic storage	Yes
			3 populations with 25 mature individuals each	Partially, 2 populations over 25 individuals

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

Date	No. wild indivs	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1996 – listing	30-35	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	Partially
1998 – recovery plan	Ca 40-45	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially
2003 – critical habitat	30-45		All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially
2007 – 5-yr review	Ca 35	4	All threats managed	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially, 1 population with 25 mature individuals

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SIGNATURE PAGE for 5-YEAR REVIEW on *Hibiscadelphus giffardianus* and
Melicope zahlbruckneri

Pre-1996 DPS listing still considered a listable entity? N/A

Recommendation resulting from the 5-year review for *Hibiscadelphus giffardianus*:

- Delisting
- Reclassify from Endangered to Threatened status
- Reclassify from Threatened to Endangered status
- No Change in listing status

Recommendation resulting from the 5-year review for *Melicope zahlbruckneri*:

- Delisting
- Reclassify from Endangered to Threatened status
- Reclassify from Threatened to Endangered status
- No Change in listing status

Field Supervisor, Fish and Wildlife Service

Approve Patricia [Signature]

Date 1/13/08