Remya mauiensis
(Maui remya)

5-Year Review
Summary and Evaluation

U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawaii

5-YEAR REVIEW

Species reviewed: *Remya mauiensis* (Maui remya)

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5-YEAR REVIEW
Remya mauiensis (Maui remya)

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:
Region 1, Endangered Species Program, Division of Recovery, Jesse D'Elia, (503) 231-2071

Lead Field Office:
Pacific Islands Fish and Wildlife Office, Gina Shultz, Deputy Field Supervisor, (808) 792-9400

Cooperating Field Office(s):
N/A

Cooperating Regional Office(s):
N/A

1.2 Methodology used to complete the review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (USFWS) beginning on March 8, 2007. The Bernice P. Bishop Museum provided most of the updated information on the current status of *Remya mauiensis* along with recommendations for conservation actions needed prior to the next 5-year review. The evaluation of the status of the species was prepared by the lead PIFWO biologist and reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species, and Deputy Field Supervisor, before submission to the Field Supervisor for approval.

1.3 Background:

1.3.1 Federal Register (FR) Notice citation announcing initiation of this review:

USFWS. 2007. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 71 species in Oregon, Hawaii, Commonwealth of the Northern Mariana Islands, and Territory of Guam. Federal Register 72(45):10547-10550

1.3.2 Listing history

Original Listing
FR notice: USFWS. 1991. Endangered and threatened wildlife and plants; determination of status for three species of *Remya*, a genus of Hawaiian plants; final rule. Federal Register 56(9):1450-1454.
Date listed: January 14, 1991
Entity listed: Subspecies
Classification: Endangered

Revised Listing, if applicable
FR notice: N/A
Date listed: N/A
Entity listed: N/A
Classification: N/A

1.3.3 Associated rulemakings:

USFWS. 2003. Endangered and threatened wildlife and plants; designation of critical habitat for 60 plant species from the islands of Maui and Kahoolawe, HI; final rule. Federal Register 68(93):25934-26165.

Critical habitat was designated for *Remya mauiensis* in four units totaling 828 hectares (2,048 acres) on Maui. This designation includes habitat on State and private lands (USFWS 2003).

1.3.4 Review History:

Species status review [FY 2008 Recovery Data Call (September 2008)]: Decling

Recovery achieved:
1 (0-25%) (FY 2008 Recovery Data Call)

1.3.5 Species' Recovery Priority Number at start of this 5-year review:

5

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: USFWS. 1997. Recovery plan for the Maui plant cluster. USFWS, Portland, OR. 130 pages + appendices.
Date issued: June 19, 1997
Dates of previous revisions, if applicable: N/A

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

_____ ***Yes***
__X__ ***No***

2.1.2 Is the species under review listed as a DPS?

____ ***Yes***
__X_ ***No***

2.1.3 Was the DPS listed prior to 1996?

____ ***Yes***
____ ***No***

2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?

____ ***Yes***
____ ***No***

2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?

____ ***Yes***
____ ***No***

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?

____ ***Yes***
__X_ ***No***

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

__X_ ***Yes***
____ ***No***

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?

__X_ ***Yes***
____ ***No***

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

__X_ ***Yes***
____ ***No***

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:

A synthesis of the threats (Factors A, C, D, and E) affecting this species is presented in section 2.4. Factor B (overutilization for commercial, recreational, scientific, or educational purposes) is not known to be a threat to this species.

Stabilizing, downlisting, and delisting objectives are provided in the addendum to 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. *Remya mauiensis* is a short-lived perennial, and to be considered stabilized, which is the first step for recovery, the taxon must be managed to control threats (*e.g.*, fenced, weeding, etc.) and be represented in an *ex situ* (off-site) collection. In addition, a minimum of three populations should be documented on Maui. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

This recovery objective has not been met completely, as genetic storage is not complete and the threats are not all being managed.

For downlisting, a total of five to seven populations of *Remya mauiensis* should be documented on Maui. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of five consecutive years before downlisting is considered.

This recovery objective has not been met.

For delisting, a total of eight to ten populations of *Remya mauiensis* should be documented on Maui. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with 300 mature individuals per population for short-lived perennials. Each population should persist at this level for a minimum of five consecutive years before delisting is considered.

This recovery objective has not been met.

2.3 Updated Information and Current Species Status

In addition to the status summary table below, information on the species' status and threats was included in the final critical habitat rule referenced above in

section 1.3.3 (“Associated Rulemakings”) and in section 2.4 (“Synthesis”) below, which also includes any new information about the status and threats of the species.

Table 1. Status of *Remya mauiensis* (Maui remya) from listing through 5-year review.

Date	No. wild individuals	No. outplanted	Downlisting Criteria identified in Recovery Plan	Downlisting Criteria Completed?
1991 (listing)	9	0	5-7 populations with minimum of 300 mature individuals each	No
			Populations naturally reproducing, stable and increasing in numbers	No
			Populations secure from threats	Partially
			Populations persisting for minimum of 5 years	No
1997 (recovery plan)	9	0	5-7 populations with minimum of 300 mature individuals each	No
			Populations naturally reproducing, stable and increasing in numbers	No
			Populations secure from threats	Partially
			Populations persisting for minimum of 5 years	No
2003 (critical habitat)	21	0	5-7 populations with minimum of 300 mature individuals each	No
			Populations naturally reproducing, stable and increasing in numbers	No
			Populations secure from threats	Partially
			Populations persisting for minimum of 5 years	No
2008 (5-year review)	at least 320	0	5-7 populations with minimum of 300 mature individuals each	No
			Populations naturally reproducing, stable and increasing in numbers	Partially
			Populations secure from threats	Partially
			Populations persisting for minimum of 5 years	No

2.3.1 Biology and Habitat [see note in section 2.3]

2.3.1.1 New information on the species’ biology and life history:

2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family

size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

2.3.1.4 Taxonomic classification or changes in nomenclature:

2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

2.3.1.7 Other:

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms) [see note in section 2.3]

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

2.3.2.3 Disease or predation:

2.3.2.4 Inadequacy of existing regulatory mechanisms:

2.3.2.4 Other natural or manmade factors affecting its continued existence:

2.4 Synthesis

At the time of Federal listing, two populations of *Remya mauiensis* were known on adjacent ridges in West Maui (Manawainui), totaling nine individuals (USFWS 1991). About six populations totaling at least 320 individuals are now recognized as a result of more surveys and discovered populations (Wood 2005; Plant Extinction Prevention Program 2006, 2007a, b, 2008; H. Oppenheimer, Maui Nui Coordinator, Plant Extinction Prevention Program, pers. comm. 2008a, b; USFWS 2008). The populations include: 10 individuals in Manawainui; five individuals in Papalaua Gulch; 12 in Ukumehame; three in Kanaha Valley and three others on the Manowaiopae-Kauaula Divide, both in the Panaewa Section of the West Maui Natural Area Reserve; and at least 28 individuals in Pohakea Gulch. New populations were discovered from 2006 to 2008 consisting of approximately 159

individuals in Kauaula Valley; and a further 100 individuals in adjacent Puehuehunui (Plant Extinction Prevention Program 2006, 2007a, 2008; H. Oppenheimer, pers. comm. 2008b; USFWS 2008).

Because of the sprawling habit of this species, and the often dense growth of the surrounding vegetation, it is difficult to determine the exact number of individuals (USFWS 2003), and further populations may be discovered. The distribution of the species has now expanded to include Manawainui, Papalaua Gulch, Ukumehame, Pohakea Gulch, Kahana Valley, Puehuehunui, Manowaiopae-Kauaula Divide, and Kauaula Valley, all located in West Maui (Wood 2005; Plant Extinction Prevention Program 2006, 2007a, b, 2008; USFWS 2008).

Remya mauiensis grows mostly on steep, north or northeast-facing slopes in mixed mesophytic forests or *Metrosideros polymorpha* (ohia) montane wet and mesic forests in West Maui (USFWS 2003; H. Oppenheimer, pers. comm. 2008a).

Competition with invasive introduced plant species is considered one of the major threats (Factor E) to the habitat and populations of *Remya mauiensis*. Invasive introduced plants species such as *Melinus minutiflora* (molasses grass), *M. repens* (Natal redtop), *Buddleia asiatica* (white butterfly bush), *Oplismenus hirtellus* (basketgrass), *Ageratina adenophora* (Maui pamakani), *A. riparia* (hamakua pamakani), *Grevillea robusta* (silk-oak), *Lantana camara* (lantana), *Rubus rosifolius* (thimbleberry), *Adiantum hispidulum* (rosy maidenhair fern), and *Erigeron karvinskianus* (daisy fleabane) threaten most populations (USFWS 2003; Wood 2005; Plant Extinction Prevention Program 2006, 2007a, b; H. Oppenheimer, pers. comm. 2008a). The Pohakea population is also threatened by *Schinus terebinthifolius* (Christmas berry) and *Psidium cattleianum* (strawberry guava) and the Ukumehame population is threatened by *Tibouchina herbacea* (glorybush) (Wood 2005).

Fire remains a threat to the populations of *Remya mauiensis* and the surrounding habitat (Factor E). A large fire in February 2007 threatened the largest population of this species in Kauaula Valley (Plant Extinction Prevention Program 2007a). Although fires control efforts are in effect by Wailuku Water Company and West Maui Mountain Watershed Partnership (H. Oppenheimer, pers. comm. 2008a), wildfire control is very difficult in the areas where *R. mauiensis* grows.

Habitat degradation and trampling of plants by feral cattle (*Bos taurus*) and goats (*Capra hircus*) also threaten the species, and the habitat of the Ukumehame population is threatened by the activities of feral pigs (*Sus scrofa*) (Factor A, C, and D) (USFWS 1991, 1997, 2003, 2008; Wood 2005). Many of the remaining individuals and populations are found growing in areas relatively inaccessible to browsing cattle, goats and pigs, and for the time being, axis deer (*Axis axis*), which are present in West Maui near Pohakea Gulch. Unidentified species of spittle bugs have been documented to affect the Ukumehame population (Plant Extinction Prevention Program 2007a). The loss of reproductive vigor may threaten smaller populations of *Remya mauiensis* due to the limited number of existing individuals

(USFWS 1997, 2003; Wood 2005).

Our knowledge of the number of populations and individuals of *Remya mauiensis* has increased considerably since the species' listing as endangered in 1991, largely as a result of increased intensity of field surveys targeting the species (Plant Extinction Prevention Program 2007a). The populations remain threatened by feral ungulates and invasive introduced plant species, and a single environmental disturbance, such as fire, could eliminate a significant number of individuals. Two populations are found within an exclosure (Manawainui Plant Sanctuary), with the Pohakea population showing no sign of ungulate activity (Plant Extinction Prevention Program 2007b). Seeds from the recently discovered Kauaula Valley and Puehuehu Nui populations have been sent to Harold L. Lyon Arboretum for storage (H. Oppenheimer, pers. comm. 2008a). Harold L. Lyon Arboretum Micropropagation Laboratory (2002) and the Center for Conservation, Research and Training Seed Storage Laboratory (2008) have 8,096 seeds from three populations, and two individuals in micropropagation for genetic storage. The National Tropical Botanical Garden (2008) houses 6,325 seeds from a single individual from the Puehuehu Nui population. Maui Nui Botanical Garden (2008) houses two seeds from the Kauula Valley population in storage, and Honolulu Botanic Gardens (2008) has a single individual in genetic storage representing Manawanui Gulch.

The downlisting goals for this species have not been met, as none of the populations is comprised of over 300 mature individuals, not all threats are being managed in all populations, and the higher numbers of individuals have only been discovered in the last two years (see Table 1). Therefore, *Remya mauiensis* meets the definition of endangered as it remains in danger of extinction throughout its range.

3.0 RESULTS

3.1 Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
__X_ No change is needed

3.2 New Recovery Priority Number: N/A

Brief Rationale:

3.3 Listing and Reclassification Priority Number: N/A

Reclassification (from Threatened to Endangered) Priority Number: ____
Reclassification (from Endangered to Threatened) Priority Number: ____
Delisting (regardless of current classification) Priority Number: ____

Brief Rationale:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Continue collection of genetic material for storage and future reintroductions, if needed.

- Construct exclosure fences to protect unfenced individuals from the negative impacts of feral pigs, goats and cattle, and eradicate introduced invasive plant species within the exclosures.

- Work with the West Maui Mountains Watershed Partnership to continue ecosystem-level restoration and management to benefit this species.

- Assess genetic variability within extant population.

- Continue surveying geographical and historical range for a thorough current assessment of the status of the species.

- Study *Remya mauiensis* populations with regard to population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.

5.0 REFERENCES:

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Honolulu Botanic Gardens. 2008. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

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Personal communications:

Oppenheimer, Hank. 2008a. Maui Nui Coordinator, Plant Extinction Prevention Program. Communication to Bernice P. Bishop Museum, June 2008.

Oppenheimer, Hank. 2008b. Maui Nui Coordinator, Plant Extinction Prevention Program. Email communication to Bernice P. Bishop Museum, February 15, 2008.

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U.S. FISH AND WILDLIFE SERVICE

5-YEAR REVIEW of *Remya mauiensis* (Maui remya)

Current Classification: _____E_____

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
__X_ No change needed

Appropriate Listing/Reclassification Priority Number, if applicable:_____

Review Conducted By:

Christian Torres-Santana, Student Trainee Biologist
Marie Bruegmann, Plant Recovery Coordinator
Marilet A. Zablan, Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species
Gina Shultz, Deputy Field Supervisor

Approved _____ Date 23 July 2009

Acting **Field Supervisor, Pacific Islands Fish and Wildlife Office**