

Eugenia koolauensis
(Nioi)

**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: *Eugenia koolauensis* (Nioi)

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5-YEAR REVIEW
***Eugenia koolauensis* (Nioi)**

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:

Region 1, Jesse D'Elia, Chief, Division of Recovery, (503) 231-2071

Lead Field Office:

Pacific Islands Fish and Wildlife Office, Gina Shultz, Assistant Field Supervisor for Endangered Species, (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) between June 2006 and June 2007. The Hawaii Biodiversity and Mapping Program provided most of the updated information on the current status of *Eugenia koolauensis*. They also provided recommendations for conservation actions that may be needed prior to the next five-year review. The evaluation of the lead PIFWO biologist was reviewed by the Plant Recovery Coordinator. These comments were incorporated into the draft five-year review. The document was then reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species before final approval.

1.3 Background:

1.3.1 FR Notice citation announcing initiation of this review:

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.

1.3.2 Listing history

Original Listing

FR notice: USFWS. 1994. Endangered status for 11 plants from Koolau Mountain Range, island of Oahu, HI; final rule. Federal Register 59(59):14482-14493.

Date listed: March 28, 1994

Entity listed: Species

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. 2003a. Endangered and threatened wildlife and plants: final designation or nondesignations of critical habitat for 101 plant species from the island of Oahu, HI: final rule. Federal Register 68(116):35950-36406.

USFWS. 2003b. Endangered and threatened wildlife and plants: final designation or nondesignations of critical habitat for 42 plant species from the island of Molokai, HI: final rule. Federal Register 68(52):12982-13141.

Critical habitat was designated for *Eugenia koolauensis* in five units totaling 385 hectares (952 acres) on Oahu and one unit of 471 hectares (1,164 acres) on Molokai. This designation includes habitat on state and private lands (USFWS 2003a and b)

1.3.4 Review History:

Species status review [FY 2006 Recovery Data Call (September 2006)]:
Declining

Recovery achieved:

1 (0-25%) (FY 2006 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: Recovery plan for the Oahu plants. 1998. U.S. Fish and Wildlife Service, Portland, Oregon. 362+ pages

Date issued: August 10, 1998

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
 No

2.1.2 Is the species under review listed as a DPS?

Yes
 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
 No

2.2 Recovery Criteria

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

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?

Yes

No

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

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 recovery plan for Oahu plants (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Eugenia koolauensis* 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* (off-site) collection. In addition, a minimum of three populations should be documented on Oahu and at least one other island where the species now occurs or occurred historically. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 25 mature individuals per population.

This recovery objective has not been met.

For downlisting, a total of five to seven populations of *Eugenia koolauensis* should be documented on Oahu and at least one other island where it now occurs or occurred historically. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with a minimum of 100 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 *Eugenia koolauensis* should be documented on Oahu and at least one other island where it now occurs or occurred historically. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with 100 mature individuals per population for long-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 I.C.5 ("Associated Rulemakings") and in section II.D ("Synthesis") below, which also includes any new information about the status and threats of the species.

Table 1. Status of *Eugenia koolauensis* from listing through 5-year review.

Date	No. wild inds	No. outplanted	Stability Criteria	Stability Criteria Completed?
1994 – listing	Fewer than 60	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
1998 – recovery plan	Fewer than 220	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Yes
2003 – critical habitat	Fewer than 70	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	No
2007 – 5-yr review	2,166	0	All threats managed all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Yes

2.3.1 Biology and Habitat

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)

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:

2.3.2.5 Other natural or manmade factors affecting its continued existence:

2.4 Synthesis

Eugenia koolauensis has been recorded from the islands of Oahu and Molokai. However, this species has not been observed on Molokai since 1920 (Hawaii Biodiversity and Mapping Program 2006). On Oahu, the specie is found in both the Koolau and Waianae Mountains. Currently, there are three mature individuals and 2 seedlings in two populations occurring at the Palikea and Kaimuhole Gulches in the Waianae Mountains. At least 261 mature individuals, 225 immature individuals, and 1,675 seedlings occur in 11 populations within the Kooalu Mountains range. The number of individuals in the Aimuu Gulch

population are not currently known (U.S. Army 2006; Hawaii Biodiversity and Mapping Program 2006; J. Lau, Hawaii Biodiversity and Mapping Program, pers. comm. 2006). The total number of wild individuals is approximately 2,166 plants in 13 populations.

Eugenia koolauensis occurs in dry to mesic forests, usually on gulch slopes. In the Koolau Mountains the species occurs in dryish mesic forests dominated by *Metrosideros polymorpha* (ohia lehua) and/or *Diospyros sandwicensis* (lama). The currently known plants in the Waianae Mountains are located in dry forests dominated by *Diospyros sandwicensis*, *Erythrina sandwicensis* (wiliwili), and/or *Sapindus oahuensis* (lonomea). On Maunaloa, Molokai, the original dry forest vegetation has been largely destroyed, and there are no detailed descriptions of its original composition. However, the dry forest of Maunaloa was possibly dominated by *Erythrina sandwicensis*, which is today perhaps the most common of the remnant native trees on Maunaloa, although it is being heavily impacted by an introduced gall wasp (U.S. Army 2005).

Eugenia koolauensis is one of only two species of *Eugenia* native to Hawaii. The other is *E. reinwardtiana*, which occurs naturally in Hawaii as well as through much of the tropical Pacific Ocean. *Eugenia reinwardtiana* is a rare plant in Hawaii, except for parts of the northern Waianae Mountains where it can be fairly common. The two *Eugenia* species intergrade to some degree in both the Koolau and Waianae Mountains. In the Koolau Mountains, a morphologically intermediate *Eugenia* population has been observed in the northern part of the mountain range. In Palikea and Kaimuhole Gulches where *E. koolauensis* is currently known in the Waianae Mountains, *E. reinwardtiana* is also present in the same gulches. However, *E. koolauensis* occurs in the lower, drier parts of the gulches, while *E. reinwardtiana* occurs further inland, with a zone of intergradation between them (J. Lau. pers. comm. 2006).

Habitat degradation by feral pigs is considered one of the major threats to *Eugenia koolauensis* throughout its range (Factors A and D). In the Waianae Mountains, the species is also threatened by feral goats (Factors A and D) and fire (Factor E). In the Kahuku Training Area and its vicinity, *E. koolauensis* is additionally threatened by foot and motorcycle traffic (Factor E), fire (Factor E), and by military training (Factor E). Competition from invasive introduced plant species is also a major threat throughout its range (Factor E) and genetic swamping by a non-native *Eugenia* stock may be a threat as well (Factor E). Currently, the gravest threat to the survival of *E. koolauensis* is believed to be the recent arrival of a non-native rust disease, *Puccinia psidii* in Hawaii (Factor C). The rust most commonly affects a host plant's young shoots. In *E. koolauensis*, the infected young growth has been observed to eventually die, and the infected plant may become defoliated. To date the rust has been observed in five populations and no attempts to control the rust disease have been undertaken (U.S. Army 2005 and 2006, J. Lau, pers. comm. 2007).

Currently, three populations of *Eugenia koolauensis* are planned to be managed for stability by the U.S. Army, as defined in the recovery criteria. The rest of the populations will be collected from for genetic storage. The three populations of *E. koolauensis* scheduled for management are located in the Kahuku Training Area and they have been fenced, and weeding and fuels management to prevent fire are ongoing. A portion of the *E. koolauensis* population in Kaleleiki Gulch has also been fenced and is being weeded by the Hawaii State Division of Forestry and Wildlife. Control of invasive weed species has also been initiated and propagation for genetic storage and reintroduction is also ongoing. The fencing, fuels management to prevent fire, weed control and ungulate control for some of the *E. koolauensis* populations, along with propagation efforts, helps ameliorate some of the threats to this species (U.S. Army 2006). Propagation for genetic storage and reintroduction is occurring in the Army's baseyard, the University of Hawaii's Lyon Arboretum Micropropagation and Seed Storage Laboratories, National Tropical Botanical Garden, the state of Hawaii's Division of Forestry and Wildlife's Pahole Rare Plant Facility, and at Waimea Valley Park. These organizations and agencies are working together to store genetic material long-term against stochastic events and to supply the Army with plants for reintroductions (U.S. Army 2005; Makua Implementation Team 2003). However, additional work is still needed to stabilize this species and efforts to control new threats, like the non-native rust disease, need to be undertaken.

Though recovery efforts for this species are underway, the stabilization and recovery goals for this species have not been met at this time, and this species is highly threatened by the ohia rust for which there is currently no effective treatment. Therefore, *Eugenia koolauensis* 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*
- No change is needed**

3.2 New Recovery Priority Number:

Brief Rationale:

3.3 Listing and Reclassification Priority Number:

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

- Collect propagules of *Eugenia koolauensis* from the Waianae Mountains for cultivation as soon as possible, because there is no material currently safeguarded in *ex situ* collections; only a few plants have been found, and they are likely to be highly threatened by the rust disease *Puccinia psidii*; these plants are far from the populations in the Koolau Mountains, and are thus possibly genetically distinct; and since they grow in a drier habitat than any of the Koolau plants they may be uniquely adapted for growing in drier conditions.
- Research the effects and impacts of the rust disease *Puccinia psidii* on *Eugenia koolauensis* and investigate potential control methods.
- Prohibit importation of ornamental species in the family Myrtaceae to prohibit the accidental introduction of additional strains of the *Puccinia psidii* rust.
- Fence known populations to prevent damage from ungulates.
- Search for additional populations of *Eugenia koolauensis* on Molokai, particularly in poorly surveyed potential habitat on East Molokai.
- Search for new individuals of *Eugenia koolauensis* in the Waianae Mountains.
- Research intergradation between *Eugenia koolauensis* and *Eugenia reinwardtiana* and study their taxonomic relationship.
- Eliminate plantings *Eugenia koolauensis* habitat of potentially invasive non-native species of *Eugenia* to prevent their hybridization with *Eugenia koolauensis*.
- Study *Eugenia koolauensis* 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

Hawaii Biodiversity and Mapping Program. 2006. Database. Unpublished, Honolulu.

Makua Implementation Team. 2003. Implementation Plan for the Makua Military Reservation, Island of Oahu. Prepared for U.S. Army Garrison, Hawaii, Unpublished

[U.S. Army] U.S. Army Garrison, Hawaii. 2005. Draft Implementation Plan for O`ahu Training Areas: Schofield Barracks Military Reservation, Schofield Barracks East Range, Kawaihoa Training Area, and Kahuku Training Area. Unpublished

[U.S. Army] U.S. Army Garrison, Hawaii. 2006. 2006 Status Reports for the Makua Implementation Plan and the Draft O`ahu Implementation Plan. Unpublished

[USFWS] U.S. Fish and Wildlife Service. 1994. Endangered status for 11 plants from Koolau Mountain Range, island of Oahu, HI; final rule. Federal Register 59(59):14482- 14493.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages, plus appendices.

[USFWS] U.S. Fish and Wildlife Service. 2003a. Endangered and threatened wildlife and plants; final designations or nondesignations of critical habitat for 101 plant species from the island of Oahu, HI; final rule. Federal Register 68(116): 35949-35998.

[USFWS] U.S. Fish and Wildlife Service. 2003b. Endangered and threatened wildlife and plants; final designation or nondesignations of critical habitat for 42 plant species from the island of Molokai, HI; final rule. Federal Register 68(52):12982-13141.

Personal communications:

Lau, Joel Q.C., 2006 and 2007. Botanical Specialist, Hawaii Biodiversity and Mapping Program, Honolulu, Hawaii.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Eugenia koolauensis* (Nioi)

Current Classification: _____ E _____

Recommendation resulting from the 5-Year Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: _____

Review Conducted By:

Marilet A. Zablan, Recovery Program Leader and Acting Assistant Field Supervisor for Endangered Species, June 24, 2007

Marie Brueggemann, Plant Recovery Coordinator, June 5 and 29, 2007

Fred Amidon, Fish and Wildlife Biologist, May 4, 2007

Approve  Date 1/19/08
Lead Field Supervisor, Fish and Wildlife Service