Ochrosia kilaueaensis
(Holei)

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: *Ochrosia kilaueaensis* (Holei)

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5-YEAR REVIEW
Ochrosia kilaueaensis (Holei)

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, Loyal Mehrhoff, 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 of the U.S. Fish and Wildlife Service (USFWS), beginning on April 8, 2010. The review was based on final critical habitat non-designation for *Ochrosia kilaueaensis* and designation for other species from the island of Hawaii (USFWS 2003), as well as a review of current, available information. The Bernice Pauahi Bishop Museum 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 Samuel Aruch, biological consultant, was reviewed by a recovery biologist and the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species 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] U.S. Fish and Wildlife Service. 2010. Endangered and threatened wildlife and plants; 5-year review status of 69 species in Idaho, Washington, Hawaii, Guam, and the Commonwealth

of the Northern Mariana Islands. Federal Register 75(67):17947-17950.

1.3.2 Listing history

Original Listing
FR notice: USFWS. 1994. Endangered and threatened wildlife and plants; determination of endangered or threatened status for 21 plants from the island of Hawaii, State of Hawaii; final rule. Federal Register 59(43):10305-10325.
Date listed: July, 21, 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. 2003. Endangered and threatened wildlife and plants; final designation and nondesignation of critical habitat for 46 plant species from the island of Hawaii, Hawaii; final rule. Federal Register 68(127):39624-39761.

No critical habitat was designated for *Ochrosia kilaueaensis* because it was assumed to be no longer extant in the wild and designation would be of no benefit to the species. As justification, USFWS cited that it was last observed in the wild in 1927, in an area now a part of Hawaii Volcanoes National Park; and no viable genetic material is known to exist, leaving no possibility of using propagation materials for restoration efforts (USFWS 2003).

1.3.4 Review History:

Species status review [FY 2010 Recovery Data Call (August 2010)]: Captivity (no known seed storage or propagation at the time of this 5-year review)

Recovery achieved:
1 (0-25%) (FY 2007 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. 1996. Recovery plan for the Big Island plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 176 pages + appendices.
Date issued: September 26, 1996
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 (Listing Factors A, B, C, D, and E) affecting this species is presented in Section 2.3.2 and Table 2.

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Big Island plant cluster (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Ochrosia kilaueaensis* is a long-lived perennial, and to be considered stabilized in the interim, which is the first step in recovering the species, 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 the island of Hawaii (Big Island). 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 *Ochrosia kilaueaensis* should be documented on the island of Hawaii. 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 *Ochrosia kilaueaensis* should be documented on the island of Hawaii. 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

2.3.1 Biology and Habitat

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

No life history information is currently available for this species (USFWS 1996).

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:

Wagner *et al*. (1999) called *Ochrosia kilaueaensis* rare, citing that it was known only from Puuwaawaa and Kipuka Puaulu, and not collected at the latter site since 1927. Since Kipuka Puaulu was a well-known (and well-traveled) locality, the authors surmised that *O. kilaueaensis* was probably extinct there. An intensive survey of the kipuka in 1992 found no plants (USFWS 1996). At Puuwaawaa, there appears to be some disagreement about the last recorded sighting of the species. In 1994, when *O. kilaueaensis* became federally listed, one extant population at Puuwaawaa on State-owned land was thought to exist, consisting of an unknown number of individuals (USFWS 1994). This appears to corroborate a later report (USFWS 1996) that the Puuwaawaa population was last collected by P. Quentin Tomich on an unknown date, consisting of an unknown number of individuals, if any. Biographical information reveals that Tomich settled in Hawaii in 1959 and still resides on the Big Island (http://www.perspectivesonhamakua.com/), and his collection was almost certainly made after 1959. On the other hand, J. Giffin (Division of Fish and Wildlife) in 1995 stated that the last known observation of the population was in the

1940s (USFWS 1996; Hawaii Biodiversity and Mapping Program 2010).

In 2010, *Ochrosia kilaueaensis* was reported as last seen in 1927 (USFWS 2010). Kealii Bio (Hawaii Island Plant Extinction Prevention Program, pers. comm. 2010) has surveyed its historical range and habitats and has yet to find it; he believes it is more than likely extinct. Bio also indicated there are areas that have not been fully explored, stating "These areas are not user friendly with the vegetation (thick invasive weeds and trees) and with the cracks and holes covered by uluhe (a native fern, *Dicranopteris linearis*) as well."

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

No new information.

2.3.1.4 Taxonomic classification or changes in nomenclature:

Ochrosia kilaueaensis is a large tree in the dogbane family (Apocynaceae) endemic to Hawaii Island, first described by H. St. John in 1978 from material collected by C. Skottsberg at Kipuka Puaulu, Kilauea, in 1922. Another species described in the same paper by St. John was collected by J. F. Rock from Puuwaawaa, North Kona, in 1909, which St. John named *O. konaensis* (St. John 1978). Wagner *et al*. (1999) later combined these two species, subsuming *O. konaensis* as a synonym of *O. kilaueaensis*. These localities remain to this day the only ones where the species has been seen and collected.

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.):

This species has not been observed in the wild since at least the 1940s (see section 2.3.1.2 above).

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

The typical habitat of *Ochrosia kilaueaensis* is described as

Acacia koa (koa) and *Metrosideros polymorpha* (ohia) or *Diospyros sandwicensis* (lama) dominated montane mesic forest between 670 and 1,220 meters (2,200 and 4,000 feet)in elevation (USFWS 1994, 1996). Associated taxa include *Gardenia brighamii* (nanu), *Psychotria hawaiiensis* (kopiko), *Nothocestrum* (aiea), and *Colubrina oppositifolia* (kauila) (USFWS 1994, 1996).

2.3.1.7 Other:

No new information.

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:

Threats:

- Ungulate degradation of habitat – Feral goats (*Capra hircus*), disturb the substrate and understory, thus providing ample sites for weedy adventives (USFWS 1994, 1996).
- Established ecosystem-altering invasive plant species degradation of habitat – *Pennisetum setaceum* (fountain grass) (USFWS 1994, 1996).

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

Threats:

- Collecting – This species was most likely threatened by human impacts such as unrestricted collecting for scientific or horticultural purposes in the past (USFWS 1994, 1996).

2.3.2.3 Disease or predation:

Threats:

- Rodent predation or herbivory – This species, if still extant, is threatened by fruit herbivory by rats (*Rattus* spp.) (USFWS 1994, 1996).

2.3.2.4 Inadequacy of existing regulatory mechanisms:

No new information.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

Threats:

- Ungulate trampling – Feral goats (USFWS 1994, 1996)
- Fire (USFWS 1994, 1996)
- Low numbers (USFWS 1994, 1996)
- Inbreeding depression (USFWS 1994, 1996)
- Climate change may also pose a threat to this species. However, current climate change analyses in the Pacific Islands lack sufficient spatial resolution to make predictions on impacts to this species. The Pacific Islands Climate Change Cooperative (PICCC) has currently funded climate modeling that will help resolve these spatial limitations. We anticipate high spatial resolution climate outputs by 2013.

Current conservation efforts:

- Captive propagation for genetic storage and reintroduction – National Tropical Botanical Garden (2006) reported a single seed in genetic storage, but has not subsequently reported it on their annual controlled propagation report to the USFWS. Lyon Arboretum reported no seed in genetic storage (Harold L. Lyon Arboretum 2010).

2.4 Synthesis

The interim stabilization goals for this species have not been met as there are currently no known individuals in the wild (Table 1) and not all threats are being managed (Table 2). Additional surveys are needed to confirm whether the species is extinct. Therefore, *Ochrosia kilaueaensis* meets the definition of endangered as it remains in danger of extinction throughout its range.

Table 1. Status of *Ochrosia kilaueaensis* from listing through 5-year review.

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1994 (listing)	0	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
1996 (recovery plan)	0	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
2003(5-year review)	0	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
2012 (5-year review)	0	0	All threats managed in all 3 populations	No (see Table 2)
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No

Table 2. Threats to *Ochrosia kilaueaensis* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat, trampling	A, D, E	Ongoing	No
Established ecosystem-altering invasive plant species degradation of habitat	A	Ongoing	No
Collecting	B	Ongoing	No
Rodent predation or herbivory	C	Ongoing	No
Fire	E	Ongoing	No
Low numbers	E	Ongoing	No
Inbreeding depression	E	Ongoing	No
Climate change	A, E	Increasing	No

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:

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:

RECOMMENDATIONS FOR FUTURE ACTIONS

- Surveys / inventories – A thorough survey of Kipuka Puaulu and Puuwaawaa where *Ochrosia kilaueaensis* was last observed should be undertaken to determine the status of the species.
- Captive propagation for genetic storage and reintroduction – If the species is rediscovered, genetic material for *ex situ* storage should be collected.
- Ungulate exclosures – If the species is rediscovered, construct fenced exclosures to protect the population from feral goats.

5.0 REFERENCES

Harold L. Lyon Arboretum. 2010. Seed bank inventory. Honolulu, Hawaii. Microsoft Access database. Unpublished.

Hawaii Biodiversity and Mapping Program. 2010. Element occurrence records: *Ochrosia kilaueaensis*. 4 pages. Unpublished.

National Tropical Botanical Garden. 2006. Controlled propagation report to U.S. Fish and Wildlife Service. Kalaheo, Hawaii. Unpublished.

St. John, H. 1978. *Ochrosia* (Apocynaceae) of the Hawaiian Islands, Hawaiian plant studies 79. Phytologia 40:90-97.

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[USFWS] U.S. Fish and Wildlife Service. 2010. Rare plant tracking database. Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii. Unpublished.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999. Manual of the flowering plants of Hawaii, revised edition. University of Hawaii Press and Bishop Museum

Press, Honolulu, Hawaii. Bishop Museum Special Publications 97. 1,919 pages.

Personal communications:

Bio, Kealii. 2010. Hawaii Island Coordinator, Plant Extinction Prevention Program, Hilo, Hawaii. Email to Clyde Imada, Bishop Museum, dated September 2010. Subject: *Ochrosia kilaueaensis*.

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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: _____

Review Conducted By:
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Date 8/28/2012