

*Caesalpinia kavaiensis*  
(uhiuhi)

**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: *Caesalpinia kawaiensis* (uhiuhi)

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**5-YEAR REVIEW**  
*Caesalpinia kavaiensis* / (uhiuhi)

**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 29, 2008. The review was based on the recovery plan for *Caesalpinia kavaiensis* and *Kokia drynarioides* (USFWS 1994), as well as a review of current, available information. The National Tropical Botanical Garden 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 Tamara Sherrill, biological consultant, was reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Assistant Field Supervisor for Endangered Species and Acting 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. 2008. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 70 species in Idaho, Montana, Oregon, Washington, and the Pacific Islands. Federal Register 73(83):23264-23266.

### 1.3.2 Listing history

Original Listing

**FR notice:** USFWS. 1986. Endangered and threatened wildlife and plants; determination of endangered status for *Mezoneuron kawaiense* (Uhiuhi). Federal Register 51(130):24672-24675.

**Date listed:** July 8, 1986

**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 rule makings :

Critical habitat was not designated for *Caesalpinia kawaiensis* in 1986 when the species was listed as endangered because publication would serve to increase collection and vandalism (USFWS 1986).

### 1.3.4 Review History:

Species status review [FY 2009 Recovery Data Call (August 2009)]:

Declining

### Recovery achieved:

1 (0-25%) (FY 2007 Recovery Data Call – this is the last year this was reported)

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

2

### 1.3.6 Current Recovery Plan or Outline

**Name of plan or outline:**

Recovery plan for *Caesalpinia kawaiensis* and *Kokia drynarioides*. U.S. Fish and Wildlife Service, Portland, Oregon. 88 pages + appendix.

**Date issued:** May 6, 1994.

**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*

*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 criteria?**

*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, B, C, D, and E) affecting this species is presented in section 2.4.

Stabilizing and downlisting objectives are provided in the recovery plan for *Caesalpinia kawaiiensis* and *Kokia drynarioides* (USFWS 1994). For *Caesalpinia kawaiiensis* to be considered stabilized, which is the first step in recovering the species, the taxon must be managed to control threats (*i.e.*, fenced and protected from fire) to protect the few remaining trees in the wild. In addition, the environmental factors which prevent this species' regeneration and dispersal must be addressed. This includes region-wide invasive plant control, feral ungulate control, and insect control.

This recovery objective has not been met.

For downlisting, major threats to the species must be observed to be greatly reduced. Regeneration must be at a rate adequate to replace individuals lost from the population and preserve long term genetic diversity. Recovery must proceed for the time needed to provide demographic data to conduct a population viability analysis, approximately 13 years. The minimum habitat area needed to give a high probability for survival for the species for the next 200 years must be determined through a review of environmental dynamics and human activities in the habitat, and the current habitat should be secured in perpetuity. Management practices necessary to protect the protected habitat should be implemented. In addition, a total of three populations of 100 individuals of *Caesalpinia kawaiiensis* should be documented in North Kona, Hawaii; Oahu; Lanai; Kauai; and Maui.

This recovery objective has not been met.

No delisting criteria were identified in the recovery plan for this species.

**2.3 Updated Information and Current Species Status**

In addition to the status summary table below, information on the species' status and threats is included in section 2.4 ("Synthesis") below, which also includes any new information about the status and threats of the species.

**Table 1. Status of *Caesalpinia kavaiensis* from listing through 5-year review.**

<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>Downlisting Criteria identified in Recovery Plan</b>	<b>Stabilization Criteria Completed?</b>
1986 – listing	>50	0	Regeneration adequate to replace individuals lost from population for at least 13 years	No
			Minimum habitat determined, current habitat secured and protected	No
			3 populations with 100 mature individuals each	No
1994 – recovery plan	>80	17	Regeneration adequate to replace individuals lost from population for at least 13 years	Partially
			Minimum habitat determined, current habitat secured and protected	Partially
			3 populations with 100 mature individuals each	No
2009 – 5-year review	70-80	149	Regeneration adequate to replace individuals lost from population for at least 13 years	Partially
			Minimum habitat determined, current habitat secured and protected	Partially
			3 populations with 100 mature individuals each	No

### **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**

*Caesalpinia kavaiensis* has been extirpated from many historical locations on the major Hawaiian Islands. These include a number of locations on Oahu in the Koolau and Waianae Mountains, several locations on western Kauai, several in the Kona area of the island of Hawaii, one on West Maui, and in Kaupo Gap and Ulupalakua, on East Maui (Hawaii Biodiversity and Mapping Program 2009). The location of the only known plant on Lanai was visited by Hank Oppenheimer and Ken Wood in 2006 without successfully relocating this species (Hawaii Department of Land and Natural Resources 2007). All wild trees on Kauai appear to be gone (Hawaii Biodiversity and Mapping Program 2009).

At the time of listing in 1986, three populations containing fewer than 50 individuals were known on the islands of Hawaii, Oahu, and Kauai. When the recovery plan was written in 1994, a single tree each on Lanai and Kauai and fewer than 80 individuals on Oahu and Hawaii islands were known. Currently, there are seven populations containing fewer than 80 individuals on Hawaii and Oahu islands. There are only a few adult individuals of *Caesalpinia kavaiensis* remaining on Oahu. Ken Wood of the National Tropical Botanical Garden observed one weak tree in 1998 at Puu Pane. At Makaha, old dead wood from a tree which died in the 1990s was seen by Joel Lau in 2002. One dying tree in East Makaleha Gulch was seen in 1998. Lau also observed one mature tree, nearly dead, and five dead trees in Mt. Kaala Natural Area Reserve, in Kaimuhole Gulch, in 2003 (Hawaii Biodiversity and Mapping Program 2009). Individuals at sites in Waianae Kai, Palikea Gulch, and Kaimuhole Gulch are now all dead (M. Keir, U.S. Army, pers. comm. 2009).

In 2007, a population at Manuwai was visited by Plant Extinction Prevention Program staff, and one mature individual and five seedlings were observed. Surveying throughout the larger area was done, but no additional plants were found (Hawaii Department of Land and Natural Resources 2007). Two other sites with live trees and some occasional, short-lived seedlings are found in the west and east branches of East Makaleha. The total number of mature individuals on Oahu is now six (M. Keir, pers. comm. 2009).

On the island of Hawaii, three mature reintroduced individuals and some seedlings remain in the Kaupulehu preserve area above Mamalahoa Highway (W. Brawner, Kaupulehu Preserve, pers. comm. 2008; Carter 2008; D. Lorence, National Tropical Botanical Garden, pers. comm. 2009); two old wild individuals grow in the larger reserve area below the highway (Carter 2008). About 42 individuals were visited by Hawaii Division of Forestry and Wildlife staff within the Puu Waa Waa Forest Reserve and Puu Anahulu Game Management Area between late 2003 and early 2006 (Hawaii Department of Land and Natural Resources 2008). There were 15 individuals growing at Kealakehe in the Kona area in 2008 (M. Bruegmann, USFWS, pers. comm. 2008). This brings the State-wide number of wild individuals to somewhere between 70 and 80 individuals in four or five populations.

On Oahu, *Caesalpinia kavaiensis* grows in open *Metrosideros polymorpha* (ohia) - *Diospyros sandwicensis* (lama) forest with *Alyxia stellata* (maile), *Antidesma pulvinatum* (hame), *Bobea sandwicensis* (ahakea), *Diospyros hillebrandii* (lama), *Dodonaea viscosa* (aalii), *Erythrina sandwicensis* (wiliwili), *Eugenia reinwardtiana* (nioi), *Hibiscus arnottianus* (kokio keokeo), *Melicope peduncularis* (alani), *Microlepia strigosa* (papala kepau), *Nestegis sandwicensis* (olopua), *Pisonia sandwicensis* (alaa), *Pouteria sandwicensis* (alaa), *Psychotria mariniana* (kopiko), *Psydrax odorata* (alahee), *Rauvolfia sandwicensis* (hao), and *Sapindus oahuensis* (lonomea) (Hawaii Biodiversity and Mapping Program 2009).

On the island of Hawaii, *Caesalpinia kavaiensis* grows in lowland dry forest with *Reynoldsia sandwicensis* (ohe), *Erythrina sandwicensis* (wiliwili), *Capparis*

*sandwichiana* (maiapilo), *Diospyros sandwicensis*, *Kokia drynarioides* (kokia), *Myrsine* sp. (kolea), *Colubrina oppositifolia* (kauila), *Nothocestrum breviflorum* (aeia), *Nototrichium sandwicense* (kului), *Psydrax odorata*, *Pleomele hawaiiensis* (halapepe), *Myoporum sandwicense* (naio), and *Xylosma hawaiiense* (ae) (Hawaii Biodiversity and Mapping Program 2009; National Tropical Botanical Garden 2009a).

On Kauai, *Caesalpinia kawaiiensis* grew in xeric *Diospyros sandwicensis* - *Erythrina sandwicensis* forest with *Diospyros hillebrandii*, *Flueggea neowawraea* (mehamehame), and *Sapindus oahuensis* (Hawaii Biodiversity and Mapping Program 2009).

On Oahu, pig (*Sus scrofa*) damage include rooting up seedlings (Factor A) (Hawaii Department of Land and Natural Resources 2007). Severe goat (*Capra hircus*) damage is also a threat (Factor A) (Hawaii Biodiversity and Mapping Program 2009). Competition from invasive introduced plant species (Factor E) include *Pennisetum setaceum* (fountain grass), *Acacia confusa* (Formosa koa), *Ageratina riparia* (Hamakua pamakani), *Aleurites moluccana* (kukui), *Grevillea robusta* (silk oak), *Blechnum appendiculatum* (no common name), *Clidemia hirta* (Koster's curse), *Melia azedarach* (pride of India), *Pimenta dioica* (allspice), *Psidium cattleianum* (strawberry guava), *Syzygium cumini* (Java plum), *Schinus terebinthifolius* (Christmas berry), and *Toona ciliata* (Australian red cedar) (Hawaii Biodiversity and Mapping Program 2009; National Tropical Botanical Garden 2009a).

On the island of Hawaii, feral ungulates including cattle (*Bos taurus*) (Factor A) and invasive introduced plant species (Factor E), particularly fountain grass (*Pennisetum setaceum*) which increase the risk of wildfires (Factor E), and *Schinus terebinthifolius*, *Bidens pilosa* (Spanish needle), *Bidens alba* (beggartick), *Senecio madagascariensis* (fireweed), *Lophospermum erubescens* (larger roving sailor), *Asclepias physocarpa* (balloon plant), *Grevillea robusta*, *Lantana camara* (lantana), and *Leucaena leucocephala* (haole koa) are severe threats (Hawaii Biodiversity and Mapping Program 2009; National Tropical Botanical Garden 2009a).

On Kauai, the habitat has been severely degraded by goats (*Capra hircus*) and pigs (Factor A), and the areas where *Caesalpinia kawaiiensis* grew are dominated by invasive introduced vegetation including *Psidium cattleianum* and *Grevillea robusta*.

Rats (*Rattus rattus*) ate seeds from trees on Lanai (Factor C). Black twig borer (*Xylosandrus compactus*) is also a major pest of *Caesalpinia* (Factor C) on all islands (Hawaii Biodiversity and Mapping Program 2009).

Climate change may also pose a threat to *Caesalpinia kawaiiensis* (Factors A and E). However, current climate change models do not allow us to predict specifically what those effects, and their extent, would be for this species.

There are currently a total of 149 reintroduced individuals on Kauai and Hawaii islands in four different managed natural areas, and several *ex situ* (off-site) collections across the state. Seed conservation collections of several hundred seeds at the Center for Conservation Research and Training Seed Storage Facility on Oahu currently represent a number of wild populations from Oahu, Hawaii, and Lanai (Center for Conservation Research and Training Seed Storage Facility 2008). The National Tropical Botanical Garden has a number of accessions of seed collected from 1990 through 2006, almost all from Puu Waa Waa (National Tropical Botanical Garden 2009b). Three individuals were reintroduced at Kaupulehu Preserve in 2007-2008, and four outplanted at the National Tropical Botanical Garden in 2008-2009 (National Tropical Botanical Garden 2008). Volcano Rare Plant Facility has more than 1,000 seeds from four locations including Puu Waa Waa, Kaupulehu, Waikoloa, and Amy Greenwell Botanical Garden (Volcano Rare Plant Facility 2009).

Oahu Plant Extinction Prevention Program staff have collected seed from the last mature individual at Manuwai, and saved two seedlings which remained under a dead tree, after others were dug up by pigs. They were transferred to Lyon Arboretum Nursery. The seedlings' survival is extremely important as this is the only genetic material from a dead tree that is one of only six individuals on Oahu (Hawaii Department of Land and Natural Resources 2007).

A habitat conservation plan on the island of Hawaii is being developed to: 1) protect as many remnant endangered plants as practicable within the Puu Waa Waa Forest Reserve and the Puu Anahulu Game Management Area, and 2) mitigate for impacts to any species for which destruction by game animals is documented by creating one or more offsite self sustaining populations (S. Fretz, Hawaii Division of Forestry and Wildlife, pers. comm. 2008). The Dryland Forest Working Group has been reintroducing *Caesalpinia kavaiensis* in the Kaupulehu area below the highway. A total of 161 individuals were reintroduced from 1999 to 2006, of which 110 individuals survive in 2008. In addition, small groupings of *C. kavaiensis* seedlings were found near long fallen, dead individuals, likely sprouting from very old seeds originating from the dead trees after responding to rains of the past three years. Other seedlings were found in the range of the two wild mature, very old individuals. A total of 18 seedlings were observed. Only two of the 18 seedlings were found in range of mature reintroduced individuals (Carter 2008).

The Hawaii Division of Forestry and Wildlife on Kauai has reintroduced 32 plants in the Kahoaloha Valley (Lapa) and Kauhao exclosures (M. Wysong, Division of Forestry and Wildlife, pers. comm. 2009). Their nursery has 60 seeds (Kauai Division of Forestry and Wildlife 2008).

Volcano Rare Plant Facility has grown four individuals which were reintroduced at the Puu Waa Waa Natural Area Reserve (Volcano Rare Plant Facility 2008). Maui Nui Botanical Garden has 22 plants grown from a cultivated individual which came from the last Lanai plant (Maui Nui Botanical Gardens 2009). Amy Greenwell Botanical Garden has seeds from 23 different wild individuals (B. Kiyabu, Amy

Greenwell Ethnobotanical Garden, pers. comm. 2009). The Waimea Valley Arboretum on Oahu has eight trees growing at the arboretum that originated from three wild trees on Oahu and Hawaii (Waimea Valley Arboretum 2009). Also on Oahu, the Pahole Rare Plant Facility has 33 plants (Pahole Rare Plant Facility 2008). The species has been successfully tissue cultured (cloned) from seed on Oahu (Harold L. Lyon Arboretum 2009).

*Caesalpinia kawaiensis* has declined to the extent that it is wild primarily only on the island of Hawaii. It has not been able to reproduce very successfully in the wild, because of the habitat disturbances caused by ungulates, invasive introduced plants and fire, and being eaten by goats, deer (*Axis axis*), and the black twig borer. Individuals observed in the wild are often senescent adults with a few seedlings. It is being propagated and reintroduced as well as outplanted in *ex situ* locations, and with good management these reintroductions and *ex situ* populations may be successful.

The delisting goals for this species have not been met as there are about 80 wild individuals with about 30 existing as seedlings (27 percent of the population), and 149 reintroduced individuals remain. None of the populations contains more than 100 mature individuals. In addition, minimum needed habitat has not been determined, and not all current habitat is secured or being managed (see Table 1). Therefore, *Caesalpinia kawaiensis* meets the definition of endangered as it remains in danger of extinction throughout its range.

### 3.0 RESULTS

#### 3.3 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

- Continue seed storage of representatives from as many populations as possible.
- Continue propagation and reintroduction.
- Fence all remaining wild individuals against ungulate threats.
- Control introduced invasive plant species in all exclosures at least twice a year.
- Determine and implement methods to treat black twig borer infestations.
- Develop and implement fire management plans for all populations.
- Work with Hawaii Division of Forestry and Wildlife and other land managers or land owners to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

#### 5.0 REFERENCES

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### **Personal communications**

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Bruegmann, Marie M. 2008. Plant Recovery Coordinator, U.S. Fish and Wildlife Service, Honolulu, Hawaii. E-mail to Margaret Clark, National Tropical Botanical Garden, dated December 31, 2008. Subject: *Caesalpinia kavaiensis* statistics.

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- Keir, Matthew. 2009. Natural Resources Management Coordinator, U.S. Army Garrison Hawaii. E-mail to Margaret Clark, National Tropical Botanical Garden, dated January 5, 2009. Subject: *Caesalpinia kawaiensis*.
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- Wysong, Michael. 2009. Natural Area Reserve Manager, Division of Forestry and Wildlife, Department of Land and Natural Resources, Lihue, Hawaii. E-mail to Margaret Clark, National Tropical Botanical Garden, dated December 9, 2009. Subject: *Caesalpinia kawaiensis* outplantings on Kauai.

**Signature Page**  
**U.S. FISH AND WILDLIFE SERVICE**  
**5-YEAR REVIEW of *Caesalpinia kavaiensis* (uhiuhi)**

**Current Classification:** \_\_\_\_\_ E \_\_\_\_\_

**Recommendation resulting from the 5-Year Review:**

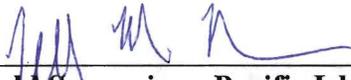
- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

**Appropriate Listing/Reclassification Priority Number, if applicable:** \_\_\_\_\_

**Review Conducted By:**

Marie Bruegmann, Plant Recovery Coordinator  
Marilet A. Zablan, Assistant Field Supervisor for Endangered Species  
Jeff Newman, Acting Deputy Field Supervisor

Approved

  
for \_\_\_\_\_

Date **AUG 27 2010**

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