Colubrina oppositifolia
(kauila)

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: *Colubrina oppositifolia* / kauila

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5-YEAR REVIEW
Colubrina oppositifolia (kauila)

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 March 16, 2009. The review was based on final critical habitat designations for *Colubrina oppositifolia* and other species from the islands of Maui, Hawaii, and Oahu (USFWS 2003a,b,c) 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 Recovery Program Lead 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. 2009. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 103 species in Hawaii. Federal Register 74(49):11130-11133.

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: March 4, 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; designation of critical habitat for 60 plant species from the islands of Maui and Kahoolawe, Hawaii; final rule. Federal Register 68(93):25934-26165.

USFWS. 2003b. 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.

USFWS. 2003c. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 101 plant species from the island of Oahu, Hawaii; final rule. Federal Register 68(116):35949-35998.

Critical habitat was designated for *Colubrina oppositifolia* in one unit totaling 739 hectares (1,827 acres) on Maui (USFWS 2003a), one unit totaling 766 hectares (1,894 acres) on Oahu (USFWS 2003c), and two units totaling 4,621 hectares (11,452 acres) on Hawaii island (USFWS 2003b). These designations include habitat on State and private lands.

1.3.4 Review History:

Species status review [FY 2010 Recovery Data Call (September 2010)]: Improving

Recovery achieved:
1 (0-25%) (FY 2007 Recovery Data Call – most recent year reported)

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 Big Island plant cluster
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, C, D, and E) affecting this species is presented in section 2.3.2 and Table 2. Listing 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 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. *Colubrina oppositifolia* is a long-lived perennial, and to be considered stabilized, 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 islands where they now occur 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 *Colubrina oppositifolia* should be documented on islands where they now occur 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 *Colubrina oppositifolia* should be documented on islands where they now occur 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

2.3.1 Biology and Habitat

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

Seed production in *Colubrina oppositifolia* is very low for trees in South Kona on Hawaii Island, but the cause is unclear (Nick Agorastos, Department of Land and Natural Resources, pers. comm. 2009).

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:

On Oahu, there are at least 26 and perhaps as many as 60 individuals of *Colubrina oppositifolia* remaining, all in the northern Waianae Mountains. They are grouped in about five gulches, but were likely once contiguous over a large area. No recruitment has been observed at the site (Ane Bakutis, Plant Extinction Prevention Program, pers. comm. 2009; Susan

Ching-Harbin, Plant Extinction Prevention Program, pers. comm. 2009). In the Makaleha Valley, four live individuals and five dead trees were observed in 2002 at 418 to 439 meters (1,370 to 1,440 feet) elevation (Hawaii Biodiversity and Mapping Program 2009). In 2007, 14 individuals were observed by Steve Perlman with Ane Bakutis, in the Hina West branch of Central Makaleha, on a north facing slope at 351 meters (1,150 feet) elevation and a few individuals were observed at 335 meters (1,100 feet) elevation (Perlman 2009). A few live individuals and some dead trees were also seen on east facing slopes at 381 meters (1,250 feet) elevation by Bakutis, Perlman, and Joel Lau, of the Hawaii Biodiversity and Mapping Program. They also reported seeing 5 individuals at 442 meters (1,450 feet) elevation, and 5 to 10 individuals in a separate area (Perlman 2009). Later that year, they saw several scattered individuals at 411 meters (1,350 feet) elevation and more individuals at 402 meters (1,320 feet) elevation (Perlman 2009). Fifteen to 20 individuals were seen in Manuwai Valley in 1986, and in 2003 Joel Lau saw some individuals at 396 to 488 meters (1,300 to 1,600 feet) elevation (Hawaii Biodiversity and Mapping Program 2009; Perlman 2009). Three live and two dead individuals were also observed by Lau in 2003 at 427 meters (1,400 feet) elevation, in Kaumoku Iki Gulch (Hawaii Biodiversity and Mapping Program 2009).

On the island of Hawaii, *Colubrina oppositifolia* has been known from the North Kona and South Kona Districts. At Kaupulehu in North Kona, at 520 meters (1,706 feet) elevation, there are several hundred individuals still on Kamehameha Schools land. Most are in poor condition with only a few appearing healthy (Michael Donoho, Hawaii Division of Forestry and Wildlife, pers. comm. 2009). Most trees are still producing viable seeds, and some regeneration is occurring (N. Agorastos, pers. comm. 2009; Yvonne Carter, Kaupulehu Preserve, pers. comm. 2009; M. Donoho, pers. comm. 2009). At Puu Waawaa in North Kona, the Habitat Conservation Plan (HCP) field crew counted nearly 800 individuals a few years ago; this was just a sampling of the entire population. Recent reconnaissance from the road revealed several hundred *Colubrina* individuals that were not indicated on the HCP survey maps. Therefore, a current estimate on the number of individuals of *C. oppositifolia* at Puu Waawaa is between 1,200 and 1,500 and possibly more (M. Donoho, pers. comm. 2009).

In South Kona, *Colubrina oppositifolia* was seen at Kapua at 213 to 381 meters (700 to 1,250 feet) elevation where 24 individuals were reported in 1994 by Winona Char. Ten to 15 individuals were also observed in Kau, in the Manuka Natural Area Reserve, at 293 to 305 meters (960 to 1,000 feet) elevation and 1 individual was observed at Kamaoa-Puueo at 317 meters (1,040 feet) elevation in 1991 (Hawaii Biodiversity and Mapping Program 2009). Currently, less than 50 wild trees remain in South Kona (N. Agorastos, pers. comm. 2009).

On West Maui near Honokowai Gulch, by the Kapunakea fence, Joel Lau observed a single individual in poor health due to black twig borer (*Xylosandrus compactus*) damage at 500 meters (1,640 feet) elevation. In 2008, Steve Perlman and Hank Oppenheimer found two individuals, each 3.6-meters (12-feet) in height. Both individuals occurred midway down a south facing slope, and are side branches which became the new trunks after the original trunk was damaged, either due to erosion or a treefall event. One tree is located 6 meters (20 feet) inside the fence (Hawaii Biodiversity and Mapping Program 2009; Perlman 2009), and another tree is located below Eucalyptus Camp, on a south facing slope at 585 meters (1,920 feet) elevation (Hawaii Biodiversity and Mapping Program 2009; Hank Oppenheimer, Plant Extinction Prevention Program, pers. comm. 2009; Perlman 2009).

The species is found on Oahu, Maui, and Hawaii, and currently totals probably less than 2,000 individuals in 11 populations. Around three-quarters of the statewide total number of individuals are found in a single population on Hawaii island at Puu Waawaa. Another several hundred are in a North Kona population, and less than 50 individuals exist in three populations at South Kona. Oahu has at least 26 individuals in five populations, and Maui has only two individuals in a single population.

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

Colubrina oppositifolia and *Alphitonia ponderosa*, two rare species in the Rhamnaceae family, were examined using random amplified polymorphic DNA (RAPD) markers to determine the genetic structure of the populations and the amount of variation

relative to other native Hawaiian species. It was found that variation in both species is lower than with other Hawaiian species that have been studied. Larger populations contained the highest levels of genetic diversity and smaller populations generally the least. Populations on separate islands were distinct, as were the North and South Kona populations of *C. oppositifolia* on the island of Hawaii. The majority of the variation in both species was found within, rather than among, populations. Overall genetic variation in these species may thus not be severely impacted in the immediate future if at least some population recruitment occurs. However, little recruitment was seen within the current populations, probably because of predation by the black twig borer (Kwon and Morden 2002).

2.3.1.4 Taxonomic classification or changes in nomenclature:

No new information.

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.):

Colubrina oppositifolia is known from Oahu, Maui, and Hawaii Island. Historical populations are known from the central and southern Waianae Mountains on Oahu, and from the Kohala Mountains; on western, southwestern, and southern slopes of Mauna Loa; and on northern slopes of Hualalai on Hawaii Island. It was discovered on Maui in the 1990s (USFWS 1996). In 1996, it was reported from four locations on Hawaii Island in the districts of Kau and North Kona, with 200 to 300 individuals total, one individual at Kapunakea Preserve on Maui, and one individual in the Waianae Mountains of Oahu (USFWS 1996). Since 1996, a single population containing two individuals is known from West Maui, five populations containing at least 26 individuals are known from the Waianae Mountains of Oahu and five populations containing more than 1,200 individuals are known from the west side of the island of Hawaii.

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

Colubrina oppositifolia habitat on Oahu is *Diospyros sandwicensis* (lama) – *Metrosideros polymorpha* (ohia) mesic forest with associated native species including *Alectryon macrococcus* (mahoe), *Alyxia stellata* (maile), *Antidesma pulvinatum* (hame), *Bobea sandwicensis* (akahea), *Caesalpinia kavaiensis* (uhi uhi), *Chamaesyce multiformis* (akoko), *Claoxylon sandwicense* (poola), *Coprosma foliosa* (pilo), *Diplazium sandwichianum* (hoio), *Eugenia reinwardtiana* (nioi), *Myrsine lessertiana* (kolea lau nui), *Nestegis sandwicensis* (olopua), *Ochrosia compta* (holei), *Pisonia sandwicensis* (papala kepau), *Pittosporum glabrum* (hoawa), *Pouteria sandwicensis* (alaa), *Pritchardia kaalae* (loulu), *Psychotria hathewayi*, *P. hexandra* (kopiko), *Psydrax odorata* (alahee), *Rauvolfia sandwicensis* (hao), *Reynoldsia sandwicensis* (ohe makai), and *Sapindus oahuensis* (aulu) (Hawaii Biodiversity and Mapping Program 2009; National Tropical Botanical Garden 2010a; Perlman 2009; Wood 2009).

Colubrina oppositifolia occurs on West Maui in degraded dry forest with associated native species including *Diospyros sandwicensis*, *Metrosideros polymorpha*, *Dodonaea viscosa* (aalii), *Leptecophylla tameiameiae* (pukiawe), *Osteomeles anthyllidifolia* (ulei), and *Wikstroemia* sp. (akia) (H. Oppenheimer, pers. comm. 2009; Perlman 2009).

On the island of Hawaii, *Colubrina oppositifolia* occurs in *Diospyros sandwicensis – Metrosideros polymorpha* dry forest habitat on aa lava with the native species *Antidesma pulvinatum*, *Bobea timonioides* (akahea), *Caesalpinia kavaiensis*, *Chenopodium oahuense* (aheahea), *Erythrina sandwicensis* (wiliwili), *Kokia drynarioides* (kokio), *Myoporum sandwicensis* (naio), *Nephrolepis* sp. (kupukupu), *Nestegis sandwicensis*, *Nototrichium sandwicense* (kului), *Nothocestrum breviflorum* (aeia), *Peperomia* sp. (ala ala wai nui), *Pleomele hawaiiensis* (hala pepe), *Pouteria sandwicensis*, *Psychotria* sp., *Psydrax odorata*, *Rauvolfia* sp., *Reynoldsia sandwicensis*, *Santalum paniculatum* (iliahi), and *Sophora chrysophylla* (mamane)

(Hawaii Biodiversity and Mapping Program 2009; National Tropical Botanical Garden 2010a; Perlman 2009; Wood 2009).

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:

On West Maui, feral pig (*Sus scrofa*) activity is light and under management by the West Maui Mountains Watershed Partnership Program. Invasive introduced plants which alter the habitat and compete with *C. oppositifolia* are *Aleurites moluccana* (candlenut), *Melinis minutiflora* (molasses grass), *Schinus terebinthifolius* (Christmasberry), *Psidium cattleianum* (strawberry guava), *P. guajava* (common guava), *Lantana camera* (lantana), *Juniperus bermudiana* (Bermuda juniper), and *Grevillea robusta* (silk oak) (Hawaii Biodiversity and Mapping Program 2009; H. Oppenheimer, pers. comm. 2009).

Colubrina oppositifolia occurs on the island of Hawaii in habitat degraded by invasive introduced plant species including *Pennisetum setaceum* (fountain grass), *Grevillea robusta*, *Urochloa maxima* (Guinea grass), *Sigesbeckia orientalis* (small yellow crown-beard), *Leucaena leucocephala* (haole koa), *Schinus terebinthifolius*, *Lantana camara*, *Bidens pilosa* (Spanish needle), *B. alba* (beggartick), *Senecio madagascariensis* (fireweed), *Lophospermum erubescens* (larger roving sailor), and *Asclepias physocarpa* (balloon plant) (N. Agorastos, pers. comm. 2009; M. Donoho, pers. comm. 2009; Hawaii Biodiversity and Mapping Program 2009; National Tropical Botanical Garden 2010b; Perlman 2009; Wood 2009).

On Oahu, threats include feral ungulates including pigs and goats (*Capra hircus*), and invasive introduced plant species which degrade the habitat and compete for resources, including *Adiantum hispidulum* (rough maidenhair fern), *Ageratina riparia* (spreading mist flower), *Aleurites moluccana*, *Blechnum appendiculatum* (no common name), *Clidemia hirta* (Koster's curse), *Grevillea robusta*, *Oplismenus hirtellus* (basketgrass),

Psidium cattleianum, *Schinus terebinthifolius*, *Syzygium cumini* (Java plum), and *Toona ciliata* (cedar) (Hawaii Biodiversity and Mapping Program 2009; Perlman 2009; Wood 2009).

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

Not a threat.

2.3.2.3 Disease or predation:

Colubrina oppositifolia on all islands have suffered severe damage from the black twig borer (*Xylosandrus compactus*) (Hawaii Biodiversity and Mapping Program 2009; H. Oppenheimer, pers. comm. 2009). On Oahu, direct damage to the species from rats (*Rattus* spp.), slugs (unidentified species), pigs, and goats has been reported (Perlman 2009). On the island of Hawaii, threats include grazing by domestic livestock, feral ungulates, and rats (N. Agorastos, pers. comm. 2009; M. Donoho, pers. comm. 2009).

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:

On West Maui, threats to *Colubrina oppositifolia* are fire and erosion. Threats from invasive introduced plants described in section 2.3.2.1., which are adjacent to the Forest Reserve boundary within the groves of *Eucalyptus* sp., a genus that uproots easily in wind and has the potential to fall on individuals of *C. oppositifolia* (Hawaii Biodiversity and Mapping Program 2009; H. Oppenheimer, pers. comm. 2009).

On Hawaii Island, *Pennisetum setaceum* increases the threat from fire (Cabin *et al.* 2004).

On Oahu, threats to *Colubrina oppositifolia* include drought and conversion of land to agriculture (Hawaii Biodiversity and Mapping Program 2009; Perlman 2009; Wood 2009).

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.

Conservation efforts for this species have been implemented on Oahu, Hawaii, and Maui. On Oahu, plants representing 33 wild individuals of *Colubrina oppositifolia* are being grown at the Department of Land and Natural Resources Pahole Nursery (Pahole Rare Plant Facility 2009). The Plant Extinction Prevention Program collected cuttings from about 25 individuals on Oahu. A reintroduction effort is underway within Pahole Natural Area Reserve utilizing these cuttings (S. Ching-Harbin, pers. comm. 2009). When reintroduced, the rooted cuttings have been observed in flower, but have rarely produced fruit. They are managed by the State Department of Land and Natural Resources and the Plant Extinction Prevention Program. All reintroduced individuals are reported to have heavy twig borer damage (A. Bakutis, pers. comm. 2009).

On Hawaii Island, plants have been grown at the Volcano Rare Plant Facility on the island of Hawaii (Volcano Rare Plant Facility 2009). Kaupulehu has several dozen reintroduced plants that are protected and doing well (M. Donoho, pers. comm. 2009). The National Tropical Botanical Garden has a few individuals outplanted in its McBryde Garden on Kauai, and at Kaupulehu Preserve in the North Kona District (National Tropical Botanical Garden 2010b).

On Maui, both wild individuals have produced limited seeds in some years, which have been collected and are both represented in *ex situ* (off-site) collections. Three seedlings were reintroduced into Kapunakea, one remains at Maui Nui Botanical Garden and seedlings are growing at Lyon Arboretum (H. Oppenheimer, pers. comm. 2009). The seedling at Maui Nui Botanical Gardens produced more than 70 seed capsules in 2010 that were placed into long-term storage, and two air layers were created (Maui Nui Botanical Gardens 2009; Tamara Sherrill, Maui Nui Botanical Gardens, pers. comm. 2010).

2.4 Synthesis

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 ten years), or a long-lived perennial. *Colubrina oppositifolia* is a long-lived perennial, and to be considered stabilized, which is the first step in recovering the species, the taxon must be managed to control threats (*e.g.*, fenced) and be represented in an *ex situ* collection. In addition, a minimum of three populations should be documented on islands where they now occur or occurred historically. For the species to be considered stable, each of these populations must be naturally reproducing and increasing in number, with a minimum of 25 mature individuals per population.

The interim stabilization goals for this species have not been met. While there are less than 2,000 individuals in 11 populations statewide, most are in a single population, and only this and one other population have more than 25 individuals (Table 1). In addition, all threats are not being managed (Table 2). Therefore, *Colubrina oppositifolia* meets the definition of endangered as it remains in danger of extinction throughout its range.

Table 1. Status of *Colubrina oppositifolia* from listing through 5-year review.

Date	No. wild indivs	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1994 (listing)	279-299	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	Unknown
1996 (recovery plan)	300	64	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Yes
2003 (critical habitat)	<563	Unknown	All threats managed in all 3 populations	No
			Complete genetic storage	Unknown
			3 populations with 25 mature individuals each	Unknown
2010 (5-year review)	<2,000	several dozen	All threats managed in all 3 populations	Partially (Table 2)
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially: Puu Waawaa <1,500 individuals, Kaupulehu several 100, rest of populations less than 25

Table 2. Threats to *Colubrina oppositifolia*.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – habitat modification and herbivory	A, C, D	Ongoing	Partially: Puu Waawaa, Kaupulehu, and Pahole fenced
Rats – herbivory	C	Ongoing	Partially: some rodent control on Oahu and at Kaupulehu
Slugs – herbivory	C	Ongoing	No
Black twig borer	C	Ongoing	No
Fire	E	Ongoing	No
Drought	E	Ongoing	No
Invasive introduced plants	A, E	Ongoing	Partially: weed control in 70 acres at Kaupulehu and some at Puu Waawaa population
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:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Fence to exclude ungulates from known populations.
- Eradicate invasive introduced plants, particularly *Pennisetum setaceum*, from known populations.
- Collect material for genetic storage and propagation for reintroduction from all existing populations.
- Continue efforts to register an effective control method for black twig borer.
- Control rats in the vicinity of these populations.
- Develop and implement methods to control slugs.
- Work with Hawaii Division of Forestry and Wildlife, West Maui Mountains Watershed Partnership Program, and Hawaii State Parks to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.
- Assess the modeled effects of climate change on this species, and use to determine future landscape needed for the recovery of the species.

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Signature Page
U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Colubrina oppositifolia* (kauila)

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:
Chelsie Javar, Fish and Wildlife Biologist
Marie Bruegmann, Plant Recovery Coordinator
Jess Newton, Recovery Program Lead
Assistant Field Supervisor for Endangered Species

Field Supervisor, Pacific Islands Fish and Wildlife Office

_____ Date 8/2/11
ACTING