5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Colubrina oppositifolia* (kauila)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2013. Endangered and threatened wildlife and plants; Initiation of 5-year status reviews of 44 species in Oregon, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 78(24):8185-8187.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

Name of Reviewer(s):

Chelsie Javar-Salas, Plant Biologist, PIFWO

Marie Bruegmann, Plant Recovery Coordinator, PIFWO

Kristi Young, Programmatic Deputy Field Supervisor, PIFWO

Methodology used to complete this 5-year 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 4, 2013. The review was based on a review of current, available information since the last 5-year review for *Colubrina oppositifolia* (USFWS 2011). The evaluation by Chelsie Javar-Salas, Plant Biologist, was reviewed by the Plant Recovery Coordinator. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor.

Background:

For information regarding the species listing history and other facts, please refer to the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database for threatened and endangered species at: *http://ecos.fws.gov/tess_public*.

Review Analysis:

Please refer to the previous 5-year review for *Colubrina oppositifolia* published on August 2, 2011 (available at: *https://ecos.fws.gov/docs/five_year_review/doc3823.pdf*) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species' biological status has come to light since listing to warrant a change in the Federal listing status of *C. oppositifolia*.

This long-lived perennial tree in the buckthorn family (Rhamnaceae) is endangered and known from the islands of Oahu, Maui, and Hawaii (USFWS 1996). The status and trends for *Colubrina oppositifolia* are provided in the tables below.

New status information:

On Maui and Oahu, *Colubrina oppositifolia* is categorized as Rare on Island (ROI) and is monitored by the Plant Extinction Prevention Program [PEPP]. On Hawaii Island, the numbers exceed 50 individuals in the wild and, thus; this species is not a priority.

On Maui, there are two wild mature individuals located within the Nature Conservancy's Kapunakea Preserve (PEPP 2011).

On Oahu, there are 54 mature wild individuals and 40 reintroduced immature individuals of *Colubrina oppositifolia* (PEPP 2011). An additional four individuals of *C. oppositifolia* were reintroduced in 2013 on Oahu (PEPP 2014).

On Hawaii Island, surveys conducted between 2003 and 2007 at Puu Waawaa discovered 1,190 individual records of *Colubrina oppositifolia* on State owned lands (State of Hawaii Department of Land and Natural Resources [DLNR] 2015a). In 2011, a survey conducted in the same area and in an area not previously surveyed led to the discovery of an additional 19 individuals of *C. oppositifolia* (DLNR 2015b). The current status at Puu Waawa'a is however, difficult to determine since none of the trees were tagged in the original survey and trees could have been recounted in the 2011 survey. Therefore, the total number of individuals at Puu Waawaa ranges from 1,190 to 1,209. A total 370 individuals were reintroduced at Puu Waawaa between 2013 and 2015 (DLNR 2014a). In North Kona, there are 29 reintroduced individuals on privately owned land (J. Wagner, Future Forests Nursery and Hawaii Forest Initiative, pers. comm. 2015). The status of *C. oppositifolia* in South Kona, Kaupulehu, and Kau is unknown. However, in 2014, a single individual of *C. oppositifolia* was reintroduced at Manuka Natural Area Reserve System on Hawaii Island (DLNR 2013).

There are around seven populations containing at least 54 mature wild individuals and 44 reintroduced immature individuals of *Colubrina oppositifolia* on Oahu (PEPP 2011, 2012, 2014) and one population containing two wild mature individuals on Maui (PEPP 2011). There are approximately two to five populations containing 1,190 to 1,209 wild individuals and 400 reintroduced individuals are known from the island of Hawaii (DLNR 2013, 2014a, 2015a, 2015b; J. Wagner, pers. comm. 2015).

Overall, the numbers of individuals have remained decreased from the approximately 2,000 individuals reported in the previous 5-year review, to approximately 1,646 to 1,665 individuals in 2015. However, this decline in the number of individuals is reflective of the fact that we did not receive current status reports from the populations remaining in Kaupulehu, South Kona, and Kau on Hawaii Island.

New management actions:

- Surveys / inventories
  - In 2011, a survey at Puu Waawaa discovered 19 mature wild individuals of *C. oppositifolia* (DLNR 2015b).
  - A survey was completed around the single known individual on Maui, no new individuals were discovered (PEPP 2013).
- Ungulate monitoring and control
  - Fenced exclosures at Puu Waawaa were monitored for the presence of ungulates (DLNR 2014b).

- On Oahu, the Palawai fence was monitored for the presence of ungulates and any damages by fallen trees (PEPP 2014).

- Invasive plant monitoring and control
  - Weed control is ongoing at the Kapunakea Preserve at both the wild and reintroduced populations (PEPP 2010).
  - At Puu Waawaa, weeds were removed around outplants which included *Cenchrus setaceus* (fountain grass), *Lantana camara* (lantana), *Ricinus communis* (castor bean), and *Chenopodium murale* (nettleleaf goosefoot) (DLNR 2014b). Small invasive tree seedlings were also removed including *Grevillea robusta* (silver oak), *Schinus molle* (pepper tree), *Olea europaea* subsp. *europaea* (European olive), and *Jacaranda mimosifolia* (Jacaranda) (DLNR 2014b).
- Captive propagation for genetic storage
  - The Volcano Rare Plant Facility (2014) has more than 3,500 seeds in storage from Puu Waawaa. The Facility propagated 75 individuals for outplanting at Puu Waawaa in 2014. The Facility has 166 plants growing in their nursery.
  - The Lyon Arboretum's Seed Conservation Laboratory (2014) has 7,604 seeds from four accessions in storage.
  - The National Tropical Botanical Garden (2014) has more than 1,100 seeds from North Kona and 5 seeds from Oahu in storage.
  - The Maui Nui Botanical Gardens (2014) has a single plant in their garden, 67 seeds in storage, and 3 cuttings representing the Kapunakea population.
  - The Olinda Rare Plant Facility (2014) has two plants growing in their nursery.
  - The Pahole Rare Plant Facility (2014) has 193 plants growing in their nursery.
  - The Waimea Valley (2014) has 10 plants in their garden representing a collection from Oahu.
- Reintroduction / translocation
  - In 2013, 63 individuals of *C. oppositifolia* were reintroduced at Puu Waawaa (DLNR 2014a). In 2014, an additional 306 individuals were reintroduced. In 2015, a single individual was reintroduced.
  - In 2014, a single individual of *C. oppositifolia* was reintroduced at Manuka Natural Area Reserve System on Hawaii Island (DLNR 2013).
  - On Oahu, four individuals of *C. oppositifolia* were reintroduced in 2013 (PEPP 2014).
- Population viability monitoring and analysis
  - Eight previously outplanted individuals of *C. oppositifolia* were monitored at Puu Waawaa in 2012 (DLNR 2014a). *Colubrina oppositifolia* outplanted at Puu Waawaa in 2013 was monitored for growth rates, threats, health, and vigor (DLNR 2014b).
  - In July, September, and October of 2009 and in June 2010, the three reintroduced individuals at Kapunakea Preserve were watered to alleviate the effects of drought (PEPP 2010).
  - The wild and reintroduction sites at Kapunakea were monitored in 2011 (PEPP 2012). The reintroduction site previously contained three plants; none of the plants was relocated in 2011. The wild site contained two mature individuals and both trees were relocated in 2011.

- The single wild population was monitored in 2013 (PEPP 2014). Cuttings were collected from a single individual and delivered to the Olinda Rare Plant Facility for propagation.
- In 2010, two populations containing 20 plants were monitored in the Waianae Mountains (PEPP 2011).

- Listing and critical habitat designation – Six units of critical habitat for *C. oppositifolia* were proposed in the lowland dry and lowland mesic ecosystems on Maui (USFWS 2012). The final rule for critical habitat designations has not been published at the time of this review.
- Climate change adaptation strategy – Fortini *et al*. (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawaii using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. The assessment by Fortini *et al*. (2013) concluded that *C. oppositifolia* is minimally vulnerable to the impacts of climate change.

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 1,300 individuals in approximately 10 to 13 populations statewide, most of the wild individuals are found within a single population at Puu Waawaa and this is the only population containing more than 25 mature individuals (Table 1). In addition, all threats are not being sufficiently managed throughout all of the populations (Table 2). Therefore, *Colubrina oppositifolia* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
- Surveys / inventories – Survey geographical and historical range for a current assessment of the species' status.
- Captive propagation for genetic storage and reintroduction – Continue collection of genetic resources for storage, propagation, and reintroduction into protected suitable habitat within historical range.
- Ungulate monitoring and control – Maintain existing exclosures and monitor for potential incursions.
- Invasive plant monitoring and control – Eradicate invasive introduced plants within ungulate exclosures and maintain exclosures free of invasive plants.

- Population viability monitoring and analysis – Continue monitoring wild and outplanted individuals.
- Fire monitoring and control – Develop and implement a fire management plan at the existing exclosures.
- Alliance and partnership development – Initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this taxon.

Table 1. Status and trends of *Colubrina oppositifolia* from listing through current 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
2011 (5-yr review)	<2,000	Several dozen	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially
2012 (critical habitat - proposed)	2 (Maui only)	n/a	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2015 (5-yr review)	1,246-1,265	ca 474	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially

Table 2. Threats to *Colubrina oppositifolia* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – degradation of habitat and herbivory	A, C, D, E	Ongoing	Partially, Puʻu Waʻawaʻa, Kaupulehu, and Pahole are fenced
Invasive introduced plants	A, E	Ongoing	Partially, weeds controlled at Kapunakea and Puʻu Waʻawaʻa
Invertebrate predation or herbivory – black twig borer	C	Ongoing	None
Slug herbivory	C	Ongoing	None
Rodent predation or herbivory – rats	C	Ongoing	None
Fire	E	Ongoing	None
Drought	E	Ongoing	None
Climate change	A, E	Increasing	None

References:

See previous 5-year review for a full list of references (USFWS 2011). Only references for new information are provided below.

Fortini, L., J. Price, J. Jacobi, A. Vorsino, J. Burgett, K. Brinck, F. Amidon, S. Miller, S. Gon II, G. Koob, and E. Paxton. 2013. A landscape-based assessment of climate change vulnerability for all native Hawaiian plants. Technical report HCSU-044. Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hawaii. 141 pages.

Harold L. Lyon Arboretum Seed Conservation Laboratory. 2014. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Seed storage Microsoft Access database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Maui Nui Botanical Gardens. 2014. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

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Pahole Rare Plant Facility. 2014. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Microsoft Access database. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2010. Plant Extinction Prevention Program annual report, fiscal year 2010 (July 1, 2009-June 30, 2010). Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

[PEPP] Plant Extinction Prevention Program. 2011. Plant Extinction Prevention Program annual report, fiscal year 2013 (July 1, 2010-June 30, 2011). Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

[PEPP] Plant Extinction Prevention Program. 2012. Plant Extinction Prevention Program annual report, fiscal year 2013 (July 1, 2011-June 30, 2012). Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

[PEPP] Plant Extinction Prevention Program. 2013. Plant Extinction Prevention Program annual report, fiscal year 2013 (July 1, 2012-June 30, 2013). Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

[PEPP] Plant Extinction Prevention Program. 2014. Plant Extinction Prevention Program annual report, fiscal year 2014 (July 1, 2013-June 30, 2014). Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

[DLNR] State of Hawaii Department of Land and Natural Resources. 2013. Department of Land and Natural Resources, Division of Forestry and Wildlife, Section 6 annual performance report for plant habitat management, Natural Area Reserves, Hawai‘i. July 1, 2012 – June 30, 2013. 9 pages. Unpublished.

[DLNR] State of Hawaii Department of Land and Natural Resources. 2014a. Department of Land and Natural Resources, Division of Forestry and Wildlife, master outplant dataset. Microsoft Excel worksheet. Unpublished data submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

[DLNR] State of Hawaii Department of Land and Natural Resources. 2014b. Department of Land and Natural Resources, Division of Forestry and Wildlife, Section 6 annual performance report for plant restoration and enhancement, threatened, endangered, candidate, and species of concern outplanting, Hawaii (dry and mesic forest restoration). July 1, 2013 – June 30, 2014. 11 pages. Unpublished.

[DLNR] State of Hawaii Department of Land and Natural Resources. 2015a. Department of Land and Natural Resources, Division of Forestry and Wildlife, 2003-2007 botanical survey data updated 16 April 2015. Microsoft Excel worksheet. Unpublished data submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

[DLNR] State of Hawaii Department of Land and Natural Resources. 2015b. Department of Land and Natural Resources, Division of Forestry and Wildlife, 2011 botanical survey data updated 16 April 2015. Microsoft Excel worksheet. Unpublished data submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

[USFWS] U.S. Fish and Wildlife Service. 1996. Recovery plan for the Big Island plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 202 pages + appendices.

[USFWS] U.S. Fish and Wildlife Service. 2011. *Colubrina oppositifolia* 5-year review summary and evaluation. Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii. 21 pages.

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; listing 38 species on Molokai, Lanai, and Maui as endangered and designating critical habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 species; proposed rule. Federal Register 77(112):34464-34775.

Volcano Rare Plant Facility. 2014. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

Waimea Valley. 2014. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

Personal communication:

Wagner, Jill. 2015. Owner and Biological Services Consultant, Future Forests Nursery and Hawaii Forest Initiative. E-mail to Chelsie Javar-Salas, Pacific Islands Fish and Wildlife Office, dated February 14, 2015. Subject: Request for info for 5-year reviews.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 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:_____

for **Programmatic Deputy Field Supervisor, Pacific Islands Fish and Wildlife Office**

Maine M Bruegman Date 2015-07-23