

Isodendron laurifolium
(Aupaka)

**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: *Isodendrion laurifolium* (Aupaka)

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5-YEAR REVIEW
Isodendrion laurifolium/Aupaka

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:

Region 1, Endangered Species Program, Division of Recovery, Jesse D'Elia,
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Lead Field Office:

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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) beginning on March 8, 2007. The Bernice P. Bishop Museum provided most of the updated information on the current status of *Isodendrion laurifolium*. The evaluation of the status of the species was prepared by the lead PIFWO biologist and reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species, and 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. 2007. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 71 species in Oregon, Hawaii, Commonwealth of the Northern Mariana Islands, and Territory of Guam. Federal Register 72(45):10547-10550.

1.3.2 Listing history

Original Listing

FR notice: USFWS. 1996. Endangered and threatened wildlife and plants; determination of endangered or threatened status for fourteen plant taxa from the Hawaiian Islands; final rule. Federal Register 61(198):53108-53124.

Date listed: October 10, 1996

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 nondesignation of critical habitat for 95 plant species from the islands of Kauai and Niihau, HI; final rule. Federal Register 68(39):9116-9479.

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

Critical habitat was designated for *Isodendron laurifolium* in three units totaling 955 hectares (2,362 acres) on Oahu and two units totaling 801 hectares (1,979 acres) on Kauai. This designation includes habitat on State and private lands (USFWS 2003a, b).

1.3.4 Review History:

Species status review (FY 2008 Recovery Data Call [September 2008]):
Declining

Recovery achieved:

1 (0-25%) (FY 2008 Recovery Data Call)

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

8

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: Recovery plan for the multi-island plants. U.S. Fish and Wildlife Service, Portland, Oregon. 206 pages, plus appendices.

Date issued: July 10, 1999

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 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 (Factors A, D, and E) affecting this species is presented in section 2.4. Factor B (overutilization for commercial, recreational, scientific, or educational purposes) and Factor C (diseases or predation) are not known to be a threat to this species.

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Multi-Island plants (USFWS 1999), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Isodendron laurifolium* is a short-lived perennial, and to be considered stable, 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 Oahu and Kauai where they now occur or occurred historically. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

This recovery objective has been partially met.

For downlisting, a total of five to seven populations of *Isodendron laurifolium* should be documented on Oahu and Kauai 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 300 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 *Isodendron laurifolium* should be documented on Oahu and Kauai 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 300 mature individuals per population for short-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 1.3.3 ("Associated Rulemakings") and in section 2.4 ("Synthesis") below, which also includes any new information about the status and threats of the species.

Table 1. Status of *Isodendrion laurifolium* from listing through 5-year review.

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1996 (listing)	190-210	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1999 (recovery plan)	190-210	1	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	164-177	unknown	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Unknown
2008 (5-year review)	164-177	0	All threats managed	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially

2.3.1 Biology and Habitat [see note in section 2.3]

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) [see note in section 2.3]

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

Isodendron laurifolium is a short-lived perennial shrub historically known from scattered locations on Kauai and the Koolau and Waianae Mountains on Oahu. At the time the species was federally listed as endangered, it was known on Kauai from

eight populations totaling 130 to 140 individuals and on Oahu from six populations totaling 60 to 70 individuals, resulting in a grand total of 14 populations comprising 190 to 210 individuals (USFWS 1996, 1999).

The critical habitat designation reported a total of 18 occurrences totaling 164 to 177 individuals on both islands, a decrease of 26 to 33 individuals (USFWS 2003a, b). Kauai had 13 occurrences with 142 to 154 individuals, occurring on State-owned land within the Alakai Wilderness Preserve, Kuia Natural Area Reserve, and Na Pali-Kona and Puu Ka Pele Forest Reserves in the following locations: Paaiki, Poopooiki, Kawaiula Valley, Mahanaloa Valley, Makaha Valley, Haeleele Valley, Hipalau Valley, Kawaiiki Valley and Kaluahaulu Ridge (USFWS 2003a). The richest Kauai location is in Waialae, just south of Kaluahaulu Ridge Trail, where about 50 plants were noted in 2006 (K. Wood, National Tropical Botanical Garden, pers. comm. 2008). In 2006, K. Wood (pers. comm. 2008) discovered a new individual on Kauai in the Huna region of Kalalau Valley, in a deep narrow box canyon. Five occurrences totaling between 22 and 23 individuals were reported from Oahu on State, City and County, and private lands in the Waianae Mountains in Makaha, East Makaleha Valley, Waianae Kai, Kaawa Gulch, and Kaumokunui Gulch (USFWS 2003b).

Specimen vouchers at Bernice P. Bishop Museum (C. Imada, Bernice P. Bishop Museum, pers. comm. 2008), the herbarium database at the National Tropical Botanical Garden (2008), and data from Hawaii Biodiversity and Mapping Program (2007) reveal the following phenological patterns: on Kauai, flowering specimens were noted from February through April, July through September, and November to December; fruiting specimens were noted in February, March, May, July through September, and November to December. On Oahu, flowering was noted from February to March, May to June, August, and October; fruiting was noted in February and May.

The primary threats to *Isodendrion laurifolium* on Kauai are habitat degradation by feral goats (*Capra hircus*), feral pigs (*Sus scrofa*), black-tailed or mule deer (*Odocoileus hemionus*) (Factors A and D); competition with introduced invasive plant species such as: *Psidium cattleianum* (strawberry guava), *Rubus rosifolius* (thimbleberry), *Lantana camara* (lantana), *Grevillea robusta* (silky oak), *Kalanchoe pinnata* (air plant) and *Erigeron karvinskianus* (daisy fleabane) (Factor E). The primary threats to *Isodendrion laurifolium* on Oahu are habitat degradation by feral goats and pigs (Factors A and D); competition with introduced invasive plant species such as *Psidium cattleianum*, *Schinus terebinthifolius* (Christmasberry), *Aleurites moluccana* (kukui), *Cordyline fruticosa* (ti), *Grevillea robusta*, and *Toona ciliata* (Australian red cedar) (Factor E); and a potential threat from military activities (Factor E) (USFWS 1996, 1999, 2003a, b, 2007; K. Wood, pers. comm. 2008).

Four percent (6 hectares [153 acres]) of designated statewide critical habitat for *Isodendrion laurifolium* (see 1.3.3) occurred on the northeastern perimeter of the Makua action area, and is part of a larger critical habitat totaling 616 hectares (1,524 acres) and harboring 19 individuals of *I. laurifolium* (USFWS 2003b). A major

source of concern in such environments is the strong potential for fire caused by military training activity. The habitat, however, is rated in the “low” to “very low” fire risk zone. Furthermore, 71 percent of the Army critical habitat lands are in management units that are fenced or have fencing planned, with planned ungulate, rat, and invasive introduced plant control, and restoration with native plant species. The reduction of fire-stimulating introduced plant species will reduce the risk of wildfires. These threat abatement practices will enhance the conservation value of the critical habitat (USFWS 2007). In addition, fence maintenance is ongoing for 22 individuals at Kahoaloha Valley on Kauai (USFWS 2008).

The Center for Conservation Research and Training Seed Storage Facility had one seed in storage, which was sown with unknown results (2007). There are no other available records of current propagation efforts. One individual each was reportedly planted in Hawaii Division of Forestry and Wildlife exclosures on Kauai in Mahanaloa and Paaiki Valleys (USFWS 1999), but their current status is unknown. In cultivation, the self-pollinating flowers produce viable seed within a year, and fallen seeds germinate readily (Lilleeng-Rosenberger 2005).

The stabilization goals for this species have not been met as only one population has more than 50 individuals, not all threats are being managed and it is not represented adequately in *ex situ* (see Table 1). Therefore, *Isodendrion laurifolium* 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: N/A

Brief Rationale:

3.3 Listing and Reclassification Priority Number: N/A

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 collection of fruit and plant material to increase the *ex situ* stocks of the species.
- Construct enclosure fences to protect individuals from the adverse impacts of feral ungulates, and eradicate invasive introduced plant species within the enclosures.
- Establish *ex situ* populations within protected habitats.
- Augment current natural populations to increase numbers of individuals.
- Survey geographical and historical range for a thorough current assessment of the species.
- Initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.
- Assess genetic variability within extant populations.
- Study *Isodendrion laurifolium* 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

- Center for Conservation Research and Training Seed Storage Facility. 2007. Seed conservation lab database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.
- Hawaii Biodiversity and Mapping Program. 2007. Program Database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.
- Lilleeng-Rosenberger, K.E. 2005. Growing Hawaii's Native Plants. Mutual Publishing, Honolulu, Hawaii. 416 pages.
- National Tropical Botanical Garden. 2008. Herbarium database; National Tropical Botanical Garden, Kalaheo, Hawaii. Available online at <<http://ntbg.org/herbarium>>. Accessed 10 March 2008.
- [USFWS] U.S. Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants; determination of endangered or threatened status for fourteen plant taxa from the Hawaiian Islands; final rule. Federal Register 61(198):53108-53124.
- [USFWS] U.S. Fish and Wildlife Service. 1999. Recovery plan for the multi-island plants. U.S. Fish and Wildlife Service, Portland, OR. 206 pages + appendices.

[USFWS] U.S. Fish and Wildlife Service. 2003a. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 95 plant species from the islands of Kauai and Niihau, HI; final rule. Federal Register 68(39):9116-9479.

[USFWS] U.S. Fish and Wildlife Service. 2003b. 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): 35950-36406.

[USFWS] U.S. Fish and Wildlife Service. 2007. Reinitiation of the 1999 Biological Opinion of the U.S. Fish and Wildlife Service for U.S. Army military training at Makua Military Reservation, island of Oahu. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 2008. Rare plant tracking database. Pacific Islands Fish and Wildlife Office, Honolulu, HI. Accessed on April 28, 2008. Unpublished.

Personal communications:

Wood, Ken. 2008. Research Botanist, National Tropical Botanical Garden. Email communication to Bernice P. Bishop Museum in June 2008.

Imada, C. Research Specialist, Bernice P. Bishop Museum. Email communication to C. Torres-Santana (USFWS) on June 30, 2008.

Signature Page
U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Isodendrion laurifolium* (Aupaka)

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:

Christian Torres-Santana, Student Trainee Biologist
Marie Bruegmann, Plant Recovery Coordinator
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Approved  Date 21 July 2009
Acting Field Supervisor, Pacific Islands Fish and Wildlife Office