

Chamaesyce deppeana
(Akoko)

**5-Year Review
Summary and Evaluation**

**U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawaii**

5-YEAR REVIEW
***Chamaesyce deppeana* (Akoko)**

I. GENERAL INFORMATION

A. Methodology used to complete the review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the Fish and Wildlife Service between July 2005 and June 2006. The Hawaii Biodiversity and Mapping Program was contracted to provide updated information on the current status and threats to *Chamaesyce deppeana*. They also provided recommendations for future actions that may be needed prior to the next 5-year review. The evaluation of the lead PIFWO biologist was reviewed by the Plant Recovery Coordinator, whose comments were incorporated into the draft 5-year Review. The draft 5-year Review was then reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species before PIFWO submission to the Regional Office.

B. Reviewers

Lead Region: Region 1

Lead Field Office: Pacific Islands Fish and Wildlife Office

C. Background

1. FR Notice citation announcing initiation of this review:

U.S. Fish and Wildlife Service. July 6, 2005. Endangered and Threatened Wildlife and Plants; Initiation of 5-year Reviews (of 33 species in Region 1). 70 FR 38972-38975.

2. Species status:

Improving (FY 2006 Recovery Data Call)

3. Recovery achieved:

1, meaning 0 - 25 percent of the identified recovery objectives for *Chamaesyce deppeana* have been achieved (FY 2006 Recovery Data Call)

4. Listing history

Original Listing

FR notice: U.S. Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants; endangered status for 11 plant species from the Koolau Mountain range, island of Oahu, HI. *Federal Register* 59(59): 14482-14493.
Date listed: March 28, 1994
Entity listed: Species
Classification: Endangered

Revised Listing, if applicable

N/A

5. Associated actions:

Critical habitat was designated for *Chamaesyce deppeana* in two units totaling 87 acres (35 hectares) on Oahu (U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designations or nondesignations of critical habitat for 101 plant species from the island of Oahu, Hawaii. *Federal Register* 68(116): 35949-36406).

6. Review History:

Just the original listing, designation of critical habitat, and recovery plan development actions.

7. Species' Recovery Priority Number at start of review: 5, meaning a species with a high degree of threat and a low recovery potential.

8. Recovery Plan or Outline

Name of plan: Recovery Plan for the Oahu Plants. 1998. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pp. plus appendices.

Date issued: August 10, 1998

Dates of previous revisions: N/A

Some of the actions outlined in the Recovery Plan have been initiated but not completed (e.g., propagation). Some recovery actions will require long-term commitments (e.g., weed control) or may only be necessary intermittently (e.g., provide protection against fire; protect plants from trampling).

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) policy

This Policy does not apply to plant species.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan?

 X Yes
 No

2. Does the recovery plan contain recovery (i.e., downlisting or delisting) criteria?

 X Yes
 No

3. **Adequacy of recovery criteria.**
- a. **Do the recovery criteria reflect the best available (i.e., most up-to-date) information on the biology of the species and its habitat?**
 Yes
 No
- b. **Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and there is no new information to consider regarding existing or new threats)?**
 Yes
 No
4. **List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors* are addressed by that criterion. If any of the 5-listing factors are not relevant to this species, please note that here.**

The threats (Factors A and E) affecting this species are discussed in detail in section II.D. Factors B, C, and D are not considered a threat to this species.

Stabilizing, downlisting, and delisting objectives are provided in the Recovery Plan for Oahu Plants (Service 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Chamaesyce deppeana* is a short-lived perennial, and to be considered stable, this species must be managed to control threats (e.g., weed control) (Factors A, C, and E) and be represented in an *ex situ* collection. In addition, a minimum of three populations should be documented on the island of Oahu where the species now occurs 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 not been met.

For downlisting, a total of five to seven populations of *Chamaesyce deppeana* should be documented on the island of Oahu where it now occurs or occurred historically. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats (Factors A, C, and E), with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of 5 consecutive years before downlisting is considered.

This recovery objective has not been met.

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- A) Present or threatened destruction, modification or curtailment of its habitat or range;
 - B) Overutilization for commercial, recreational, scientific, or educational purposes;
 - C) Disease or predation;
 - D) Inadequacy of existing regulatory mechanisms;
 - E) Other natural or manmade factors affecting its continued existence.

For delisting, a total of 8 to 10 populations should be documented on the island of Oahu where it now occurs or occurred historically. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats (Factors A, C, and E), with 300 mature individuals per population for short-lived perennials. Each population should persist at this level for a minimum of 5 consecutive years before delisting is considered.

This recovery objective has not been met.

C. Synthesis

Historically, *Chamaesyce deppeana* was known only from collections made from southern Oahu in the late 1800s. By 1980, it was thought to be extinct, but in 1986 Joel Lau and Sam Gon of The Nature Conservancy of Hawaii rediscovered *C. deppeana* on State land in the southern ridge of the Koolau mountains of Oahu, at Nuuanu Pali Wayside State Park (Hawaii Heritage Program 1991). The population at that time, and at the time of listing in 1994, numbered from about 50 to 100 individuals. A second native taxon of *Chamaesyce*, *C. multiformis* var. *microphylla*, was not uncommon on the windward side of the ridge. *Chamaesyce multiformis* var. *microphylla* differs from *C. deppeana* in many respects, and the two are easily distinguished from one another, even when observed from afar. An individual of *C. multiformis* var. *microphylla* at this location has been photographically documented (Carlquist 1970). *Chamaesyce multiformis* var. *microphylla* has now almost completely disappeared from the windward side of the ridge. Most of the native *Chamaesyce* there are believed to be *C. deppeana*, with additional plants that appear to represent hybrids between the two *Chamaesyce* taxa. However, this putative hybridization has not been closely studied since all of the *Chamaesyce* plants on the windward side of the ridge are unreachable without the aid of ropes (J. Lau, Hawaii Biodiversity and Mapping Program, pers. comm. 2006). Currently, the actual number of individuals of *C. deppeana* is difficult to determine since they are located on the steep slope, and nearly vertical cliffs. The plants are also small and inconspicuous, and therefore difficult to census even when utilizing binoculars or spotting scopes (J. Lau, pers. comm. 2006). Also, the population is located in the State park, with individuals adjacent to the Pali Lookout, a popular tourist attraction. Human activity involved in surveying these portions of the *C. deppeana* population would expose park visitors to potential rockfalls. Due to the aforementioned reasons, a systematic survey of the entire population has never been attempted. However, based on observations of some of the more easily accessible or clearly visible portions of the population, it is thought that the current number of mature plants is greater than 100 (J. Lau, pers. comm. 2006; S. Perlman, National Tropical Botanical Garden, pers. comm. 2006).

Competition for water, space, light, and nutrients from and habitat degradation by invasive alien plant species is the major threat to *Chamaesyce deppeana* (Factors A and E). At the time of listing, the major nonnative plant species impacting *Chamaesyce deppeana* were *Casuarina equisetifolia* (common ironwood), *Paspalum conjugatum* (Hilo grass), and *Schinus terebinthifolius* (Christmas berry) (59 FR 14482). Currently, *C. deppeana* is subject to the same plant threats, with the addition of the nonnative plant species *Ageratina riparia* (Hamakua

pamakani), *Citharexylum caudatum* (fiddlewood), *Erigeron karvinskianus* (daisy fleabane), *Kalanchoe pinnata* (air plant), *Psidium guajava* (common guava), and *Schefflera actinophylla* (octopus tree) (J. Lau pers. comm. 2006).

Fire is considered a potential threat to *Chamaesyce deppeana*, as this species occurs on windswept slopes in the proximity of Nuuanu Pali Wayside State Park, and *C. deppeana* is not considered fire tolerant (Factors A and E).

Chamaesyce deppeana is threatened by extinction due to stochastic events because of the limited number of individuals and restricted range (Factor E). Species like *C. deppeana* that are endemic to a small portion of a single island are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by random demographic fluctuations and localized catastrophes such as hurricanes and disease outbreaks (Service 1998; 68 FR 35949). *Chamaesyce deppeana* has proven to be easily propagated from cuttings, and a few individuals are under cultivation at the University of Hawaii's Lyon Arboretum and at the Pahole Rare Plant Facility (Service 2005; Nellie Sugii, Lyon Arboretum, pers. comm. 2006).

The stabilization, downlisting, and recovery goals for this species have not been met and, therefore, *Chamaesyce deppeana* meets the definition of endangered as it remains in danger of extinction throughout all of its range.

III. RESULTS

A. Recommended Classification:

- Yes, downlist to Threatened
- Yes, uplist to Endangered
- Yes, delist
- No, no change is needed

B. New Recovery Priority Number N/A

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

- Search for additional populations of *Chamaesyce deppeana*. There is appropriate habitat for the species in the general area of the Nuuanu Pali Wayside State Park that has not been surveyed for the species. Similar habitat also exists elsewhere in the southeastern Koolau mountains, even though the species was not historically recorded from that area (Joel Lau pers. comm. 2006).
- Study the known population of *Chamaesyce deppeana* with regard to population size and structure, geographical distribution, flowering cycles, pollination vectors,

seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats to the species.

- Investigate the reported expansion in the distribution of the *Chamaesyce deppeana* population.
- Confirm the putative hybridization between *Chamaesyce deppeana* and *Chamaesyce multiformis* var. *microphylla*.

V. REFERENCES

Carlquist, S. 1970. Hawaii, a Natural History. Geology, climate, native flora and fauna above the shoreline. The Natural History Press, Garden City, N.Y. 463 pp.

Hawaii Heritage Program. 1991 Hawaii Heritage Program database. Unpublished.

U.S. Fish and Wildlife Service. 1994. Endangered and Threatened Wildlife and Plants; Endangered Status for 11 Plant Species from the Koolau Mountain Range, Island of Oahu, HI. Federal Register 59(59): 14482-14493.

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U.S. Fish and Wildlife Service. 2003. Endangered and Threatened Wildlife and Plants; Final Designations or Nondesignations of Critical Habitat for 101 Plant Species from the Island of Oahu, Hawaii. Federal Register 68(116): 35949-36406.

U.S. Fish and Wildlife Service. 2005. Captive propagation database. Unpublished.

EXPERTS CONSULTED

Lau, Joel. 2006. Hawaii Biodiversity and Mapping Program. Personal communication.

Perlman, Steve. 2006. National Tropical Botanical Garden. Personal communication.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Chamaesyce deppeana* (Akoko)

Current Classification Endangered

Recommendation resulting from the 5-Year Review

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

Appropriate Listing/Reclassification Priority Number N/A

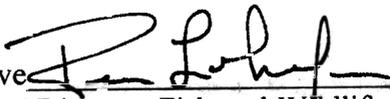
Review Conducted By

Gina Shultz, Assistant Field Supervisor for Endangered Species
Marilet A. Zablan, Recovery Program Leader
Marie Bruegmann, Plant Recovery Coordinator
Cheryl Phillipson, Fish and Wildlife Biologist



Date JUL - 3 2007

Field Supervisor, Fish and Wildlife Service

Approve 

Date Aug 2 2007

Regional Director, Fish and Wildlife Service