Cyrtandra cyaneoides
(mapele)

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: *Cyrtandra cyaneoides* (mapele)

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5-YEAR REVIEW
Cyrtandra cyaneoides/ (mapele)

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 final critical habitat designation for *Cyrtandra cyaneoides* and other species from the island of Kauai and Niihau (USFWS 2003), 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 Samuel Aruch, 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 status 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. 1996. Endangered and threatened wildlife and plants; determination of endangered or threatened status for 24 plants from the island of Kauai, Hawaii; final rule. Federal Register 61(198):53070-53089.
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 rule makings:

USFWS. 2003. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 95 plant species from the islands of Kauai and Niihau, Hawaii; final rule. Federal Register 68(39):9116-9479.

Critical habitat was designated for *Cyrtandra cyaneoides* in three units totaling 2,342 hectares (3,303 acres) on the island of Kauai. These designations includes habitat on State and private lands (USFWS 2003).

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: Kauai II: Addendum to the recovery plan for the Kauai plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 140 pages.

Date issued: August 23, 1998.
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 (Factors A, C, D, and E) affecting this species is presented in section 2.4. 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 addendum to the recovery plan for the Kauai plant cluster (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Cyrtandra cyaneoides* is a short-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* (at other than the plant's natural location, such as a nursery or arboretum) collection. In addition, a minimum of three populations should be documented on 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.

There are eleven known populations with 800 individuals of *Cyrtandra cyaneoides*. Three populations have 50 or more individuals, but all threats have not been managed for this species and genetic storage is not yet complete.

For downlisting, a total of five to seven populations of *Cyrtandra cyaneoides* 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 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 *Cyrtandra cyaneoides* 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 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 *Cyrtandra cyaneoides* from listing through 5-year review.

Date	No. wild individuals	No. outplanted	Downlisting Criteria identified in Recovery Plan	Downlisting Criteria Completed?
1996 (listing)	350-400	0	All threats managed in all 5-7 populations	No
			Complete genetic storage	Unknown
			5-7 populations with 300 mature individuals each	No
			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for five consecutive years	Unknown
1998 (recovery plan)	350-400	0	All threats managed in all 5-7 populations	No
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	No
2003 (critical habitat)	354-454	0	All threats managed in all 5-7 populations	No
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	No
			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for five consecutive years	Unknown

2008 (5-year review)	800	0	All threats managed in all 5-7 populations	No
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	No
			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for five consecutive years	Unknown

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

In 1996, there were five populations of *Cyrtandra cyaneoides* with an estimated number of 550 to 1,220 individuals (USFWS 1998). In 2003, that estimate had decreased to 354 to 454 individuals (USFWS 2003).

In 2003, five populations were identified: 50 to 100 individuals at Namolokama above Lumahai Valley; 1 individual on the Makaleha Plateau; more than 300 individuals in Wainiha Valley; 1 individual in upper Waioli Valley; and an unknown number of individuals in Koaie Canyon, for a total of between 350 and 400 plants. Botanists from the National Tropical Botanical Garden have since found several more populations in addition to historical locations, making the total less than 800 individuals in 11 populations at Waialae, Hanakoa, Wainiha below Laau, the eastern and western upper reaches of Wainiha, Lumahai, Waioli, Namolokama, Makaleha, Koaie, and Kawaikoi (see paragraphs below).

In December 2006, Natalia Tangalin of National Tropical Botanical Garden and Katie Cassel of Kokee Resource Conservation Program observed about 20 individuals up a small side drainage gulch or dry river bed off the Waialae Trail to the southeast, beyond the Waialae cabin. Plants were up to 4 meters (12 feet) tall and single stemmed, growing along the gulch, in flower with immature fruit (Tangalin 2008).

In January 2007, Steve Perlman of National Tropical Botanical Garden observed one individual in upper Hanakoa Valley, below Pihea at 1,082 meters (3,550 feet) elevation, near a stream, with no flower or fruit (Perlman 2008).

In the Wainiha Valley, 20 to 50 individuals were observed from 1993 to 1999 at several locations from 549 to 732 meters (1,880 to 2,400 feet) elevation. Plants were located in or close to running water (Perlman 2008). In 2000, Perlman observed 40 to50 individuals at three locations on Laau Ridge in the back of Wainiha Valley, 61 meters (200 feet) below the cliff, at 1,213 meters (3,980 feet) elevation (Perlman 2008). In a survey during 2000, Ken Wood of National Tropical Botanical Garden observed 10 individuals in the first drainage on the southwest side of Wainiha where the plateau turns into a narrow dividing ridge (Wood 2000). In June and September 2008, Wood observed about 500

individuals in two locations in the upper east fork of Wainiha, at 747 meters (2,450 feet) elevation (Wood 2008).

In 2000, Perlman also observed *Cyrtandra cyaneoides* at two spots in a steep drainage of Lumahai Valley at 1,122 meters (3,680 feet) elevation (Perlman 2008). One individual was seen in 1992 in the back of Waioli Valley near the waterfalls, along a stream at 747 meters (2,450 feet) elevation (Lorence and Flynn 1993a; Perlman 2008). At Namolokama, Halelea Forest Reserve, on a plateau above the Waioli Valley at 1,100 to 1,350 meters (3,940 to 4,060 feet) elevation, 40 to100 individuals were seen from 1988 to 1993 (Perlman 2008; Wood 2008). *Cyrtandra cyaneoides* was observed during a 2000 survey in the steep, shaded talus drainage of the south-western slopes of Namolokama which drop into Lumahai Valley (Wood 2000). In the Makaleha Mountains one individual was observed in 1992 (Hawaii Biodiversity and Mapping Program 2008; Lorence and Flynn 1993b).

In the Alakai Swamp, by the Koaie Canyon gauging station, on the second stream to the north, up the river, three individuals were seen at 1,158 meters (3,800 feet) elevation in June 1995 (Wood 2008). On Kawaikoi Stream's upper eastern fork of western branch at 1,158 meters (3,800 feet) elevation, in September 2000, Wood noted two mature and two immature individuals (Hawaii Biodiversity and Mapping Program 2008).

Hawaiian species of *Cyrtandra* form a monophyletic group, probably as a result of a single colonization via bird dispersal over a huge distance, from a single common ancestor. The evolution of fleshy fruit within *Cyrtandra* may be an adaptation for this type of colonization. Pacific Island species are often endemic to a single island (Cronk *et al.* 2005).

Associated native species include *Bidens* spp.(kookoolau), *Boehmeria grandis* (akolea), *Coprosma* spp.(pilo), *Cyanea* spp. (haha), *Cyrtandra longifolia* (haiwale), *C. kauaiensis* (ulunahele), *C. limahuliensis* (haiwale), *Diplazium sandwichianum* (hoio), *Freycinetia arborea* (ie ie), *Gunnera kauaiensis* (ape ape), *Kadua affinis* (manono), *Kadua tryblium* (no common name [NCN]), *Machaerina* spp. (uki), *Melicope clusiifolia* (kukaemoa), *M. puberula* (alani), *Perrottetia sandwicensis* (olomea), *Pipturus* spp.(mamake), *Psychotria* spp. (kopiko), *Pritchardia* spp. (loulu), and *Stenogyne purpurea* (NCN) (USFWS 2003; Wood 2000).

In the back of Wainiha Valley, below Hinalele, *Cyrtandra cyaneoides* grows in two areas of *Metrosideros polymorpha* (ohia) wet forest with 40 to 60 percent closed canopy, the other with closed canopy that is rich in terrestrial and epiphytic ferns and bryophytes (mosses, liverworts, and hornworts) understory. It grows with mixed wet forest associates including *Antidesma platyphylla* (hame), *Bidens* spp. (kookoolau), *Bobea* sp.(ahakea), *Broussaisia arguta* (kanawao), *Coprosma* sp. (pilo), *Cyanea* spp.(haha), *Cyrtandra limahuliensis* (haiwale), *C. oenobarba* (haiwale), *C. pickeringii* (haiwale), *Dubautia* spp. (naenae), *Kadua* spp.(NCN),

Labordia spp. (kamakahala), *Perrottetia sandwicensis* (olomea), *Pipturus* sp. (mamake), *Psychotria* spp. (kopiko), *Tetraplasandra kavaiensis* (oheohe), and *T. oahuensis* (ohe mauka), preferring natural seeps, saturated stream walls, and flowing springs (Wood 2008).

The area at Namolokama Mountain is *Metrosideros polymorpha* montane wet mixed community with sedges, grasses, and bryophytes. Epiphytes are common in the shrub layer. Associated species include *Anoectochilus sandwicensis* (jewel orchid), *Bidens* sp. (kookoolau), *Cheirodendron* sp. (papala), *Cyanea* sp. (haha), *Cyrtandra* sp. (haiwale), *Coprosma* sp. (pilo), *Dubautia* sp. (naenae), *Eurya sandwicensis* (anini), *Gunnera* sp. (ape ape), *Kadua* sp. (NCN), *Lagenifera* sp. (howaiaulu), *Melicope cruciata* (alani), *Myrsine petiolata* (kolea), *Peperomia* sp. (ala ala wai nui), *Pipturus albidus* (mamake), *Plantago* sp. (laukahi), *Psychotria* sp. (kopiko), and numerous fern species (Wood 2000, 2008).

In Kawaikoi, associated species include *Broussaisia arguta* (kanawao), *Cyrtandra kauaiensis* (ulunahele), *C. longifolia* (haiwale), *Dicranopteris linearis* (uluhe), *Melicope clusiifolia* (kukaemoa), and *M. puberula* (alani). Ferns are common in the understory (Hawaii Biodiversity and Mapping Program 2008).

In the Alakai Swamp, Koaie Canyon, by the Koaie gauging station, and up the second stream to the north, the habitat is *Metrosideros polymorpha* wet forest with associated species including *Cheirodendron* spp. (papala), *Ilex anomala* (aiea), *Cibotium* sp. (hapuu), *Dicranopteris linearis* (uluhe), *Cyrtandra* sp. (haiwale), *Sadleria* sp. (apuu or amau), and *Broussaisia arguta* (kanawao) (Wood 2008).

The threats to *Cyrtandra cyaneoides* are competition with invasive introduced plant species including *Clidemia hirta* (Koster's curse), *Hedychium gardnerianum* (kahili ginger), *Juncus planifolius* (rush), *Erigeron karvinskianus* (daisy fleabane), *Sphaeropteris cooperi* (Australian tree fern), *Psidium guajava* (common guava), *Deparia petersenii* (NCN), *Drymaria cordata* (pipili), *Paspalum conjugatum* (Hilo grass), and *Rubus rosifolius* (thimbleberry) (Factor E). The other major threat to this species is habitat degradation by feral pigs (*Sus scrofa*) (Factors A and D) (USFWS 2003; Wood 2008). Tangalin reports seeing lots of insect chewing damage in the internal leaves and shoot tips of *Cyrtandra cyaneoides* during a visit to Waialae (Factor C) (Tangalin 2008). Predation of seeds by rats (*Rattus* spp.) has also been noted (USFWS 2003). Climate change may also pose a threat to *C. cyaneoides* (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 1,300 seeds in storage at the National Tropical Botanical Garden and an additional 5,000 seeds have been propagated (National Tropical Botanical Garden 2009).

The downlisting goals for this species have not been met (see Table 1), as only one of 11 populations has more than 300 mature individuals and all threats are not being managed. Therefore, *Cyrtandra cyaneoides* 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*
__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 wild populations to exclude the negative impacts from ungulates.
- Continue to collect seeds for adequate genetic storage.
- Implement research needed for the propagation of the species.
- Identify suitable habitat for reintroductions
- Survey to determine the current status of the species.
- Work with Hawaii Division of Forestry and Wildlife and other landowners to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

5.0 REFERENCES

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Signature Page
U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Cyrtandra cyaneoides/* (mapele)

Current Classification: _____T_____

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
__X_ 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 _____ Date AUG 2 7 2010
for **Field Supervisor, Pacific Islands Fish and Wildlife Office**