Cyrtandra giffardii
(Haiwale)

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 giffardii* (Haiwale)

TABLE OF CONTENTS

5-YEAR REVIEW
Cyrtandra giffardii (Haiwale)

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 8, 2010. The review was based on the designation of critical habitat for *Cyrtandra giffardii* and the Big Island plant cluster recovery plan (USFWS 2003, 1996), as well as a review of current, available information. The Bernice Pauahi Bishop Museum 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 a recovery biologist and the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader 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. 2010. Endangered and threatened wildlife and plants; 5-year review status of 69 species in Idaho, Washington, Hawaii, Guam, and the Commonwealth of the Northern Mariana Islands. Federal Register 75(67):17947-17950.

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: 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. 2003. 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.

Critical habitat was designated for *Cyrtandra giffardii* in three units totaling 6,320 hectares (15,617 acres) on Hawaii Island. These designations include habitat on State and Federal lands (USFWS 2003).

1.3.4 Review History:

Species status review [FY 2011 Recovery Data Call (August 2011)]: Declining

Recovery achieved:
1 (0-25%) (FY 2007 Recovery Data Call)

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: USFWS. 1996. Recovery plan for the Big Island plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 202+ pages. Available online at <http://www.fws.gov/pacificislands/recoveryplans.html>.
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, B, C, D, and E) affecting this species is presented in Section 2.3.2 and Table 2.

Stabilizing, downlisting, and delisting objectives are provided in the Big Island plant cluster recovery plan (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. *Cyrtandra giffardii* is a short-lived perennial, and to be considered for stabilization, 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* (off-site) 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 50 mature individuals per population.

This recovery objective has not been met.

For downlisting, a total of five to seven populations of *Cyrtandra giffardii* should be documented on the island of Hawaii. 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 giffardii* should be documented on the island of Hawaii. 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

2.3.1 Biology and Habitat

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

Cyrtandra giffardii is a short-lived perennial species (USFWS 1996) that hybridizes with other members of the genus (Wagner *et al*. 1999; Smith *et al*. 1996). Some specimens may represent hybrids between *C. giffardii* and *C. platyphylla* (Bishop Museum 2011). *Cyrtandra giffardii* also may hybridize with *C. tintinnabula*, a single specimen (Bishop Museum 2011) of which was named *C. trite* by St. John (1987). Flowering and fruiting have been noted in the Olaa Forest of Hawaii Volcanoes National Park in July and from January through February (Pratt and Abbott 1997).

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:

Cyrtandra giffardii has been collected in three general areas, including the Laupahoehoe Natural Area Reserve, the Kulani/Stainback Highway area, and Puu Makaala Natural Area Reserve (Wagner *et al*. 1999; Pratt and Abbott 1997). At the time of its listing (USFWS 1994), the species was known from less than 100 individuals.

The 1996 recovery plan reported a total of eleven populations for *Cyrtandra giffardii* having in excess of 1,000 individuals (USFWS 1996). Among various reports that summarize the numbers for populations and species, USFWS (1996) most fully documented the number of individuals, populations, and specific localities of known extant at the time and historical populations.

Pratt and Abbott (1997) summarized the work of surveys carried out between 1992 and 1994, when a total of 91 fertile individuals of *Cyrtandra giffardii* were seen along a series of

transects in Olaa Forest of Hawaii Volcanoes National Park, although more (infertile specimens) probably were present, but were not included in the counts (Pratt and Abbott 1997). Plants of various age categories were noted (Pratt and Abbott 1997). Individuals of *C. giffardii* were concentrated in the Koa Unit (55 individuals) and Ag Unit (27 individuals), and a few individuals were noted within the Puu Unit exclosure. A total of 32 additional individuals were found in 1994 in three areas between transects, and Pratt and Abbott (1997) indicated "many more individuals certainly occur" in the non-surveyed areas nearby. Their summary statement at the time was that *C. giffardii* was "flourishing" in the fenced, pig-free exclosures in the eastern part of Olaa Forest (Pratt and Abbott 1997).

Marie Bruegmann of the Pacific Islands Fish and Wildlife Office (pers. comm. 1998) reported a single, non-fertile individual, which was observed somewhere between 700 and 900 meters off of the road at Kilau Stream in Laupahoehoe Natural Area Reserve.

At the time that critical habitat was proposed, *Cyrtandra giffardii* was known from seven populations with less than 500 total individuals near Puu Makaala, Stainback Highway, Kilau Stream in Laupahoehoe Natural Area Reserve, and in Hawaii Volcanoes National Park on State, Federal, and privately owned lands (USFWS 2002).

In September 2007, in the Koa Unit of Hawaii Volcanoes National Park, four individuals were seen at a site where approximately 12 individuals had been seen previously (Plant Extinction Prevention Program 2008). The Plant Extinction Prevention Program (2008) reported only a single individual seen at Laupahoehoe Natural Area Reserve in early March 2008, at a site where higher numbers of individuals had been known historically.

The most current information indicates only two populations totaling less than 112 individuals, less than 100 of which occur in Laupahoehoe Natural Area Reserve, and approximately 12 individuals in Hawaii Volcanoes National Park's Koa Unit (USFWS 2010).

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

Smith *et al*. (1996) used randomly amplified polymorphic DNA markers to study hybridization in the genus in Hawaii, although the study did not include *Cyrtandra giffardii*. Cronk *et al*. (2005) determined that the members of Pacific *Cyrtandra* are monophyletic, suggesting strongly a single origin into the Pacific region. Fourteen of the approximately 53 species of *Cyrtandra* in Hawaii were included in the study, although *C. giffardii* was not included. The Hawaiian species were also monophyletic, but were not the most recently evolved clade within the genus (Cronk *et al*. 2005).

2.3.1.4 Taxonomic classification or changes in nomenclature:

Cyrtandra giffardii is a small shrubby tree from the African violet family (Gesneriaceae) (Wagner *et al*. 1999). It was originally described by Rock (1919) based on specimens collected in 1911 near the "Volcano House" at Kilauea (USFWS 1994, 1996; Pratt and Abbott 1997). Wagner *et al*. (1999) reported that the species might be extirpated at the type locality, and that the species had no taxonomic synonyms (Wagner *et al*. 1999).

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.):

No new information.

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

Cyrtandra giffardii is known historically from the northeastern slopes of Mauna Kea near Kilau Stream south to the eastern slopes of Mauna Loa in the vicinity of Kilauea (USFWS 1994, 1996; Pratt and Abbott 1997). The confirmed historical elevation range is 654 to 1,440 meters (2,146 to 4,723 feet) (USFWS 2003), typically in wet montane forest or lowland wet forest dominated by tree ferns of the genus *Cibotium* (hapuu) (USFWS 1996, 2003). Native species associated with *C. giffardii* include *Cibotium* spp., *Metrosideros polymorpha* (ohia), *Acacia koa* (koa), *Astelia menziesiana* (painiu), *Diplazium sandwichianum* (hoio), species of *Kadua*, *Perrottetia*

sandwicensis (olomea), and other members of the genus *Cyrtandra* (USFWS 1996). In particular, the range of *C. giffardii* overlaps considerably with that of *C. tintinnabula*, which is also an endangered species (USFWS 2003). The soils from which *C. giffardii* is known include tropofolists, lithic tropofolists, typic hydrandepts, and hydric dystrandepts (Hawaii Biodiversity and Mapping Program 2010).

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:

Threats:

- Ungulate degradation of habitat – Destructive activities by feral pigs (*Sus scrofa*) (USFWS 1994, 1996, 2003; Pratt and Abbott 1997; Plant Extinction Prevention Program 2008)
- Established ecosystem-altering invasive plant species degradation of habitat (USFWS 1994, 1996, 2003; Pratt and Abbott 1997; Plant Extinction Prevention Program 2008)
    - *Andropogon virginicus* (broomsedge)
    - *Clidemia hirta* (Koster's curse)
    - *Psidium cattleianum* (strawberry guava)
    - *Rubus ellipticus* (yellow Himalayan raspberry)

Current conservation efforts:

- Ungulate exclosure:
    - Pratt and Abbott (1997) reported that between 1992 and 1994 *Cytrandra giffardii* was "flourishing" in the fenced exclosure in the eastern part of Olaa Forest.
    - At the time that critical habitat was proposed, all of the Koa Unit was fenced, parts of Puu Unit of the Olaa Tract were fenced (USFWS 2002).
- Ungulate control:

- Between 1992 and 1994, the fenced exclosure in the eastern part of Olaa Forest containing *Cytrandra giffardii* was considered pig-free (Pratt and Abbott 1997).
- At the time that critical habitat was proposed, the Koa Unit and parts of Puu Unit of the Olaa Tract that were fenced were considered pig-free (USFWS 2002).

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

None reported.

2.3.2.3 Disease or predation:

None reported.

2.3.2.4 Inadequacy of existing regulatory mechanisms:

Threats:

- Lack of adequate hunting regulation in areas with ungulates – The lack of adequate ungulate control and the existence of established hunting programs in areas where *Cyrtandra giffardii* occurs outside of the National Park Service continue to threaten this species.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

Threats:

- Established invasive plant species competition (USFWS 1994, 1996, 2003; Pratt and Abbott 1997; Plant Extinction Prevention Program 2008)
  - *Setaria palmifolia* (palmgrass)
- Human disturbance – Due to the proximity of recreational trails or roads near existing populations (USFWS 1994, 1996, 2003; Pratt and Abbott 1997; Plant Extinction Prevention Program 2008)
- Low numbers – increased likelihood of stochastic extinction due to changes in demography, the environment, genetics, or other factors (USFWS 1994,

1996, 2003; Pratt and Abbott 1997; Plant Extinction Prevention Program 2008)

- Climate change may 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.

Current conservation efforts:

- Captive propagation for genetic storage and reintroduction:
  - Early attempts to propagate *Cyrtandra giffardii* at the Volcano Rare Plant Facility were not successful (USFWS 1996).
  - Bruegmann (pers. comm. 1998) reported that Rick Warshauer collected at least one cutting from *C. giffardii*, which was given to the Volcano Rare Plant Facility. It is unknown how long the cutting(s) survived.
  - In 2006, three accessions of *C. giffardii* were received by the Plant Extinction Prevention Program (2007) for further propagation.
  - In 2009, the Plant Extinction Prevention Program (2009) estimated over 50 individuals remaining *ex situ*, but acknowledged it was difficult to obtain exact estimates.
  - Volcano Rare Plant Facility (2009, 2008, 2007, 2006) totals were: 2009, 8 individuals in controlled propagation and a single plant in controlled propagation from Laupahoehoe; 2008, 9 individuals in controlled propagation from Laupahoehoe; 2007, 14 individuals in controlled propagation; 2006, 14 individuals in controlled propagation.
  - Hawaii Volcanoes National Park (2011) reported five individuals in genetic storage collected from Olaa Forest.
- Reintroduction / translocation implementation:

- In 2006, 50 individuals were reintroduced in Hakalau Conservation Partners and Umikoa Ranch and, in 2007 three individuals were reintroduced into Laupahoehoe Natural Area Reserve (Volcano Rare Plant Facility 2006).
- The Volcano Rare Plant Facility (2011) reported a single individual reintroduced into Laupahoehoe Natural Area Reserve.
- Hawaii Volcanoes National Park (2011) reported 76 individuals were reintroduced near Thurston lava tube from seeds collected from Olaa Forest.

2.4 Synthesis

The interim stabilization goals for this species have not been met, as only a single population of *Cyrtandra giffardii* contains more than 50 wild mature individuals at Laupahoehoe Natural Area Reserve (Table 1), and all threats are not being managed (Table 2). Therefore, *C. giffardii* meets the definition of endangered as it remains in danger of extinction throughout its range.

Table 1. Status of *Cyrtandra giffardii* from listing through 5-year review.

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1994 (listing)	<100	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1996 (recovery plan)	>1,000	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Partially
2003 (critical habitat)	>246	0	All threats managed in all 3 populations	Partially
			Complete genetic	No

			storage	
			3 populations with 50 mature individuals each	Partially
2012 (5-year review)	<112	77	All threats managed in all 3 populations	Partially (see Table 2)
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially

Table 2. Threats to *Cyrtandra giffardii* and ongoing conservation efforts.

Threat	**Listing factor**	**Current Status**	**Conservation/ Management Efforts**
Ungulates – Degradation of habitat	A, D	Ongoing	Partially: Ungulate exclosures and control at Olaa Forest Tract
Established ecosystem-altering invasive plant species	A	Ongoing	No
Established invasive plant species competition	E	Ongoing	No
Human disturbance	E	Ongoing	No
Low numbers	E	Ongoing	Partially: Captive propagation for genetic storage, reintroduction and reintroduction / translocation implementation, and monitoring
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

- Captive propagation for genetic storage and reintroduction:
  - Determine experimentally whether the species can be propagated vegetatively from leaves.
  - Continue to collect seeds from all existing populations and send to at least two or three different venues for propagation.
    - Propagate the species *ex situ* in at least two or three separate venues.
- Reintroduction / translocation implementation – Continue to reintroduce the species back into its known historical range.
- Ecosystem-altering invasive plant species control – Control invasive introduced plant species within fenced exclosures.
- Ungulate exclosures – Continue to construct pig-proof fences around each population and monitor the fences for any signs of breaching.
- Ungulate control – Continue to protect all populations against disturbances from feral ungulates.
- Surveys / inventories – Resurvey the historical range of the species to determine if previously unknown or newly reestablished populations exist.
- Population biology research – Carry out field studies to determine what agents pollinate the flowers and disperse the seeds of this species.
- Genetic research:
  - Carry out DNA studies using microsatellites or other genetic markers to assess the relative level of genetic diversity remaining within the species.
  - Carry out a thorough inventory of genetic resources currently on hand and determine which parts of the historical range (if any) are not represented.

For any such populations not yet sampled for their genetic resources, obtain cuttings or seed material to maintain the genetic diversity of the species.

- Alliance and partnership development – Work with the National Park Service, Hawaii Division of Forestry and Wildlife, and other land managers to continue implementation of ecosystem-level restoration and management to benefit this species.
- Threats research – Assess the modeled effects of climate change on this species, and use to determine future landscape needed for the recovery of the species.

5.0 REFERENCES

Bishop Museum. 2011. Herbarium Pacificum database. Available online at <http://nsdb.bishopmuseum.org/>. Accessed 14 March 2011.

Cronk, Q.C.B., M. Kiehn, W.L. Wagner, and J.F. Smith. 2005. Evolution of *Cyrtandra* (Gesneriaceae) in the Pacific Ocean: the origin of a supertramp clade. American journal of botany 96:1017-1024.

Hawaii Biodiversity and Mapping Program. 2010. Element occurrence records for *Cyrtandra giffardii* through 31 March 2010. 12 pages. Unpublished.

Hawaii Volcanoes National Park. 2011. Controlled propagation report to U.S. Fish and Wildlife Service. Unpublished.

Plant Extinction Prevention Program. 2007. Section 6 annual performance report for endangered plant restoration and enhancement - plant extinction prevention (formerly Genetic Safety Net), fiscal year 2007 (July 1, 2006–June 30, 2007). 65 pages. Unpublished.

Plant Extinction Prevention Program. 2008. Section 6 annual performance report for endangered plant restoration and enhancement – plant extinction prevention program (formerly Genetic Safety Net), fiscal year 2008 (July 1, 2007-June 30, 2008). 113 pages. Unpublished.

Plant Extinction Prevention Program. 2009. Annual report for plant extinction prevention program, fiscal year 2009 (July 1, 2008-June 30, 2009). 118 pages. Unpublished.

Pratt, L.W., and L.L. Abbott. 1997. Rare plants within managed units of Olaa Forest, Hawaii Volcanoes National Park. Technical Report 115. Pacific Islands Research Center, U.S. Geological Survey – Biological Resources Division. 78 pages.

Rock, J.F. 1919. Cyrtandreae Hawaiienses, sect. *Microcalyces* Hillebr. American Journal of Botany 6:203-216.

Smith, J.F., C.C. Burke, and W.L. Wagner. 1996. Interspecific hybridization in natural populations of *Cyrtandra* (*Gesneriaceae*) on the Hawaiian Islands: evidence from RAPD markers. Plant Systematics and Evolution 200:61-77.

St. John, H. 1987. Diagnoses of *Cyrtandra* species (Gesneriaceae) section *Schizocalyces*. Hawaiian plant studies 157. Phytologia 63:494-503.

[USFWS] U.S. Fish and Wildlife Service. 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.

[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. Available online at <http://www.fws.gov/pacificislands/recoveryplans.html>.

USFWS] U.S. Fish and Wildlife Service. 2002. Endangered and threatened wildlife and plants; designations of critical habitat for plant species from the Island of Hawaii, Hawaii; proposed rule. Federal Register 67(102):36968-37106.

[USFWS] U.S. Fish and Wildlife Service. 2003. 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] U.S. Fish and Wildlife Service. 2010. Rare plant tracking database. Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii. Unpublished.

Volcano Rare Plant Facility. 2006. Controlled propagation report to U.S. Fish and Wildlife Service. Volcano, Hawaii. Unpublished.

Volcano Rare Plant Facility. 2007. Controlled propagation report to U.S. Fish and Wildlife Service. Volcano, Hawaii. Unpublished.

Volcano Rare Plant Facility. 2008. Controlled propagation report to U.S. Fish and Wildlife Service. Volcano, Hawaii. Unpublished.

Volcano Rare Plant Facility. 2009. Controlled propagation report to U.S. Fish and Wildlife Service. Volcano, Hawaii. Unpublished.

Volcano Rare Plant Facility. 2011. Controlled propagation report to U.S. Fish and Wildlife Service. Volcano, Hawaii. Unpublished.

Wagner, W.L., D.R. Herbst and S.H. Sohmer. 1999. Manual of the flowering plants of Hawaii, revised edition. University of Hawaii and Bishop Museum Press, Honolulu. 1,918 pages.

Personal Communications:

Bruegmann, Marie M. 1998. Plant Recovery Coordinator, U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, memorandum to "Big Island Team, Pittman-Robertson Team", Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii, dated May 3, 1998. Subject: BRD detail trip report.

Signature Page
U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Cyrtandra giffardii* (Haiwale)

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, Endangered Species Recovery Program Leader
Assistant Field Supervisor for Endangered Species

Field Supervisor, Pacific Islands Fish and Wildlife Office

for

Jess Newton

Date 8/28/2012