

*Viola oahuensis*  
(no common name)

**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: *Viola oahuensis* / no common name

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**5-YEAR REVIEW**  
***Viola oahuensis* (no common name)**

**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 March 16, 2009. The review was based on final critical habitat designations for *Viola oahuensis* and other species from the island of Oahu (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 Tamara Sherrill, biological consultant, was reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Lead 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] U.S. Fish and Wildlife Service. 2009. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 103 species in Hawaii. Federal Register 74(49):11130-11133.

#### 1.3.2 Listing history

##### Original Listing

**FR notice:** USFWS. 1996. Endangered and threatened wildlife and plants; determination of endangered status for twenty-five plant species from the island of Oahu, Hawaii; final rule. Federal Register 61(198):53089-53108.

**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 designations or nondesignations of critical habitat for 101 plant species from the island of Oahu, Hawaii; final rule. Federal Register 68(116):35949-36406.

Critical habitat was designated for *Viola oahuensis* in two units totaling 974 hectares (2,411 acres) on Oahu. These designations include habitat on State, Federal, and private lands (USFWS 2003).

#### 1.3.4 Review History:

Species status review [FY 2010 Recovery Data Call (September 2010)]:  
Declining

##### **Recovery achieved:**

1 (0-25%) (FY 2007 Recovery Data Call – most recent year reported)

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

**1.3.6 Current Recovery Plan or Outline**

**Name of plan or outline:** U.S. Fish and Wildlife Service. 1998. Recovery plan for Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages plus appendices.

**Date issued:** August 10, 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*

*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?**

*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, C, D, and E) affecting this species is presented in section 2.3.2 and Table 2. Listing 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 recovery plan for Oahu plants (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Viola oahuensis* 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* (off-site) collection. In addition, a minimum of three populations should be documented on Oahu. 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 *Viola oahuensis* should be documented on Oahu. 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 *Viola oahuensis* should be documented on Oahu. 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**

No new information.

### **2.3.1 Biology and Habitat**

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

No new information.

#### **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:**

*Viola oahuensis* is endemic to the Koolau Mountain range of Oahu (USFWS 1996). The species occurs on or near the summit ridges. Historically, *V. oahuensis* was known from 17 populations scattered over the northern and central parts of the range. Only a few populations were ever known in the southern part of the Koolau Mountains. Recorded elevations for the species range from 415 to 960 meters (1,360 to 3,150 feet) (U.S. Army Garrison 2008).

In 1998 when the recovery plan was written, eight populations totaling fewer than 180 individuals were still extant. These were located from the Kawainui-Koloa summit divide to the Waimalu-Koolaupoko divide over a 20 kilometers (12 miles)

distance. Two of those populations contained 50 to 100 individuals, and the rest contained fewer than ten individuals (USFWS 1998).

Two populations at the Koolau summit between Manana and Kipapa contained 50 to 100 individuals in 1998 (USFWS 1998). In 2000, Steve Perlman, Ken Wood, and Bill Garnett saw two plants in flower at Manana Trail summit at 655 meters (2,150 feet) elevation (Perlman 2010). In 2007, Steve Perlman and Ane Bakutis saw about 35 individuals in the same area at 792 meters (2,600 feet) elevation (Perlman 2010).

At least five populations are found on military and private land, including land leased for the Kawaihoa Training Area, but only one of these populations contains more than 50 mature individuals. Four populations at the Kawanui-Koloa summit divide had fewer than 10 individuals each in 1998 (USFWS 1998). In 2010, Koloa had 31 mature, 8 immature, and 6 seedlings, a decrease of 5 individuals since 2008 (U.S. Army Garrison 2008, 2010). One population at Kahana-South Kaukonahua had fewer than 10 individuals in 1998 (USFWS 1998). By 2008, Kaukonahua had 25 mature individuals (U.S. Army Garrison 2008, 2010). In 2008, Kamananui had one mature individual and Kawaiiki had 13 mature individuals; most populations were not updated in 2010 (U.S. Army Garrison 2008, 2010). Recent surveys in Helemano and Opaepala have greatly increased the number of individuals known from this area. Most of the known individuals are within Opaepala and Helemano, which had 163 mature, 146 immature, and 22 seedlings in 2010 (U.S. Army Garrison 2010). The numbers have changed very little from 2008 to 2010, but no monitoring was done from 2008 to 2009 and only two populations on military lands were monitored from 2009 to 2010. The Army believes the number of known individuals will greatly increase with additional surveys in other nearby areas. Koloa and Kaukonahua will also likely have higher numbers of known individuals when more thorough surveys are conducted (U.S. Army Garrison 2008). By 2010, a total of 233 mature, 163 immature, and 39 seedling individuals were known on Army lands in five sprawling populations (U.S. Army Garrison 2008, 2009, 2010).

The Army also tracks this species outside of military lands. At Ahuimanu-Halawa Summit Ridge, 20 mature individuals were



known in 2005. Five individuals were known in 2005 in Konahuanui, 20 from the Waiahole/Waiawa Summit Ridge, and 50 from Waimalu to Kahaluu Summit. By 2008, all populations were reported with zero individuals except for the Waiahole/Waiawa Summit Ridge (one individual) and Waimalu to Kahaluu Summit (50 individuals) (U.S. Army Garrison 2008). Steve Perlman of the National Tropical Botanical Garden saw three individuals at Kawaiiki, on Bloody Finger Hill, at 725 meters (2,380 feet) elevation in 2007 (Perlman 2010). Currently, there are a total of about 54 individuals in three locations outside military lands, with one population containing at least 50 individuals (Perlman 2010; U.S. Army Garrison 2010).

In summary, a total of 287 mature individuals of *Viola oahuensis* currently exist in approximately 11 sprawling populations on both military and non-military lands, with 82 percent of the individuals located on military lands.

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

*Viola oahuensis* and *V. kauaensis* have been recorded growing together in a small bog on the summit ridge between Kaipapau and Kawainui Gulches (Fosberg and Hosaka 1938 in U.S. Army Garrison 2008). The potential for hybridization between *V. oahuensis* and *V. kauaensis* is not known. Given that the Oahu *V. kauaensis* may represent an extremely rare taxon, if any reintroductions or augmentations of *V. oahuensis* are carried out, they should be located away from any *V. kauaensis* populations, to minimize the chance of unintended hybridization between the two species (U.S. Army Garrison 2008).

**2.3.1.4 Taxonomic classification or changes in nomenclature:**

No new information.

**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.):**

See section 2.1.3.2.

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

*Viola oahuensis* is known mostly from wet, windswept areas. The vegetation in these locations is often shrubland, bog vegetation, or bog-like vegetation, or sometimes scrubby forest adjacent to such locations. The species' habitat is most often *Metrosideros polymorpha* (ohia) – *Dicranopteris linearis* (uluhe) lowland wet forest with associated native species such as *Anoectochilus sandvicensis* (jewel orchid), *Antidesma platyphyllum* (hame), *Bidens macrocarpa* (kookoolau), *Bobea elatior* (ahakea lau nui), *Broussaisia arguta* (kanawao keokeo), *Cheirodendron* sp. (olapa), *Cibotium chamissoi* (hapuu), *Clermontia oblongifolia* (ha wai), *C. persicifolia* (ha wai), *Coprosma longifolia* (pilo), *Cyanea humboldtiana* (haha), *C. st.-johnii* (haha), *Diplopterygium pinnatum* (uluhe lau nui), *Dubautia laxa* (naenae pua melemele), *Euphorbia rockii* (akoko), *Freycinetia arborea* (ie ie), *Gardenia remyi* (nanu), *Ilex anomala* (kawau), *Kadua centranthoides* (no common name [NCN]), *K. fosbergii* (manono), *Labordia hosakana* (kamakahala), *L. sessilis* (kamakahala), *L. waiolani* (kamakahala), *Lobelia gaudichaudii* subsp. *koolauensis* (NCN), *L. oahuensis* (NCN), *Machaerina angustifolia* (uki), *Melicope clusiifolia* (kolokolo mokihana), *M. hiiakae* (alani), *M. hosakae* (alani), *Metrosideros rugosa* (lehua papa), *Myrsine juddii* (kolea), *M. sandwicensis* (kolea lau nui), *Nertera granadensis* (makole), *Nothoperanema rubiginosa* (NCN), *Perrottetia sandwicensis* (olomea), *Phyllostegia lantanoides* (NCN), *Pittosporum confertiflorum* (hoawa), *Pritchardia martii* (loulu hiwa), *Psychotria fauriei* (NCN), *P. mariniana* (kopiko), *Sadleria* sp. (amauu, apuu), *Scaevola mollis* (naupaka), *Syzygium sandwicensis* (ohia ha), *Tetraplasandra oahuensis* (ohe mauka), *Trematolobelia singularis* (NCN), *Wikstroemia oahuensis* (akia), and *Zanthoxylum* sp. (ae) (U.S. Army Garrison 2008, 2009, 2010; National Tropical Botanical Garden 2010; Wood 2010).

The Peahinaia summit area is described as *Metrosideros polymorpha* – *Cheirodendron* sp. lowland wet forest with occasional groves of *Pritchardia martii*, and other associated native species including *Anoectochilus sandvicensis*, *Bidens*

*macrocarpa*, *Dicranopteris linearis*, *Diplopterygium pinnatum*, *Dubautia laxa*, *Kadua fosbergii*, *Melicope clusiifolia*, and *M. hosakae* (Wood 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:**

Feral pigs (*Sus scrofa*), which degrade habitat by digging up vegetation while rooting for food, are a threat to all remaining locations of this species, but the Helemano/Opaoula and Kawaiiki area fences have been built with the intention of excluding them (U.S. Army Garrison 2008, 2010). *Axonopus fissifolius* (NCN), *Clidemia hirta* (Koster's curse), *Psidium cattleianum* (strawberry guava), *Pterolepis glomerata* (NCN), and *Rubus rosifolius* (thimbleberry) are among the invasive introduced plants which degrade the habitat for *Viola oahuensis* and compete for resources (Wood 2010).

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

Not a threat.

**2.3.2.3 Disease or predation:**

Rats (*Rattus* sp.) and slugs (unidentified species) have been reported to consume the leaves and seeds of this species (Perlman 2010).

**2.3.2.4 Inadequacy of existing regulatory mechanisms:**

Not a threat.

**2.3.2.5 Other natural or manmade factors affecting its continued existence:**

The introduced invasive plant species discussed in section 2.3.2.1 above are also a threat to *Viola oahuensis* because they compete with the species for water, light, and nutrients.

Climate change may also 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 has currently funded climate modeling that will help resolve these spatial limitations. We anticipate high spatial resolution climate outputs by 2013.

The Helemano/Opaepa and Kawaiiki populations are fenced, but the Koloa and Kaukonahua populations are not. The Army will survey prior to the construction of the fences in Koloa and South Kaukonahua to include as many individuals as possible within the fenced areas. All the known individuals in the Koloa population unit will be protected within a proposed fence. The Kaukonahua population will not be fully included in a contiguous fence, but individuals that fall outside the proposed fence lines will have seed collections to be used for seed storage and augmentation within fenced areas if necessary. Rats have been partially controlled in the Koloa population unit (U.S. Army Garrison 2010). The Army intends to collect seed or other propagules for long-term genetic storage but not for propagation and reintroduction of this species (U.S. Army Garrison 2008, 2009, 2010).

## 2.4 Synthesis

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Oahu plants (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. *Viola oahuensis* 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) and be represented in an *ex situ* (off-site) collection. In addition, a minimum of three populations should be documented on Oahu. 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.

The interim stabilization goals for this species have not been met. Only two populations have 50 or more mature individuals (Table 1), and all threats are

not being managed (Table 2). Therefore, *Viola oahuensis* meets the definition of endangered as it remains in danger of extinction throughout its range.

**Table 1. Status of *Viola oahuensis* from listing through 5-year review.**

<b>Date</b>	<b>No. wild indivs</b>	<b>No. outplanted</b>	<b>Stability Criteria identified in Recovery Plan</b>	<b>Stability Criteria Completed?</b>
1996 (listing)	<180	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Unknown
1998 (recovery plan)	<180	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	<200	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2010 (5-year review)	287	0	All threats managed in all 3 populations	Partially (Table 2)
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Partially: Opaeha and Helemano with 163 mature individuals, Koloa 51 mature individuals

**Table 2. Threats to *Viola oahuensis*.**

<b>Threat</b>	<b>Listing factor</b>	<b>Current Status</b>	<b>Conservation/ Management Efforts</b>
Ungulates – habitat modification and herbivory	A, C, D	Ongoing	Partially: Helemano/Opaepala and Kawaiiki populations are fenced
Rats – herbivory	C	Ongoing	Partially: rats controlled at Koloa
Slugs – herbivory	C	Ongoing	No
Invasive introduced plants	A, E	Ongoing	No
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*

**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

- Collect seeds from as many wild individuals as possible for seed storage and testing, especially from those located outside managed populations on Army lands.
- Continue to survey for new plants in the Koloa population area and the Kaukonahua population area.
- Prioritize for surveys of populations with historical records, but few or no known plants.
- Control rats in the vicinity of these populations.
- Develop and implement methods to control slugs.
- Fence all known populations to provide protection from the negative impacts of feral ungulates.
- Control invasive introduced plant species around all known populations.
- Work with U.S. Army, Hawaii Division of Forestry and Wildlife and other land managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.
- 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

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**Signature Page**  
**U.S. FISH AND WILDLIFE SERVICE**  
**5-YEAR REVIEW of *Viola oahuensis* (no common name)**

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
- No Change in listing status

Appropriate Listing/Reclassification Priority Number, if applicable: \_\_\_\_\_

**Review Conducted By:**

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Date   SEP 20 2011