*Hedyotis parvula*
**(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:** *Hedyotis parvula* (No common name)

## TABLE OF CONTENTS

# 5-YEAR REVIEW
# *Hedyotis parvula* (No common name)

## 1.0 GENERAL INFORMATION

### 1.1 Reviewers

**Lead Regional Office**:
Region 1, Jesse D'Elia, Chief, Division of Recovery, (503) 231-2071

**Lead Field Office**:
Pacific Islands Fish and Wildlife Office, Gina Shultz, Assistant Field Supervisor for Endangered Species, (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 (PIFWO) of the U.S. Fish and Wildlife Service (USFWS) between June 2006 and June 2007. The Hawaii Biodiversity and Mapping Program provided most of the updated information on the current status of *Hedyotis parvula*. They also provided recommendations for conservation actions that may be needed prior to the next five-year review. The evaluation of the lead PIFWO biologist was reviewed by the Plant Recovery Coordinator. These comments were incorporated into the draft five-year review. The document was then reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species before final approval.

### 1.3 Background:

#### 1.3.1 FR Notice citation announcing initiation of this review:
USFWS. 2006. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 70 species in Idaho, Oregon, Washington, Hawaii, and Guam. Federal Register 71(69):18345-18348.

### 1.3.2 Listing history

Original Listing
**FR notice:** USFWS. 1991. Determination of endangered status for 26 plants from the Wainae Mountains, island of Oahu, Hawaii; final rule. Federal Register 56(209):55770-55786.
**Date listed:** October 29, 2991
**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 or nondesignation of critical habitat for 101 plant species from the island of Oahu, HI: final rule. Federal Register 68(116):35949-36406.

Critical habitat was designated for *Hedyotis parvula* in four units totaling 540 hectares (1,333 acres) on Oahu. This designation includes habitat on state and private lands (USFWS 2003).

### 1.3.4 Review History:

Species status review [FY 2006 Recovery Data Call (September 2006)]: Declining

**Recovery achieved:**
1 (0-25%) (FY 2006 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**: Recovery plan for the Oahu plants. 1997. U.S. Fish and Wildlife Service, Portland, Oregon. 270+ pages.
**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*
__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?**

_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. Factors B (overutilization for commercial, recreational, scientific, or educational purposes) and C (disease or predation) are not known to be threats 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. *Hedyotis parvula* is a short-lived perennial, and to be considered stable, 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. 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 *Hedyotis parvula* 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 *Hedyotis parvula* 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

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 I.C.5 ("Associated Rulemakings") and in section II.D ("Synthesis") below, which also includes any new information about the status and threats of the species.

**Status of *Hedyotis parvula* from listing through 5-year review.**

| Date | No. wild inds | No. outplanted | Stability Criteria | Stability Criteria Completed? |
|---|---|---|---|---|
| 1991 – listing | 0 | 0 | All threats managed in all 3 populations | No |
| | | | Complete genetic storage | No |
| | | | 3 populations with 50 mature individuals each | No |
| 1998 – recovery plan | 220-235 | 0 | All threats managed in all 3 populations | No |
| | | | Complete genetic storage | Partially |
| | | | 3 populations with 50 mature individuals each | Partially |
| 2003 – critical habitat | 247 | 0 | All threats managed in all 3 populations | No |
| | | | Complete genetic storage | Partially |
| | | | 3 pops with 50 mature individuals each | Partially |
| 2007 – 5-yr review | 263 | 0 | All threats managed | Partially |
| | | | Complete genetic storage | Partially |
| | | | 3 pops with 50 mature individuals each | The two extant populations exceeded 50 inds |

### 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**:

**2.3.1.4 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

*Kadua parvula* was originally described by Gray in 1859. Fosberg moved all Hawaiian species to the genus *Hedyotis*, resulting in the name of the species at the time of listing as *H. parvula* (Wagner *et al.* 1999; USFWS 1991). A more recent treatment of the Hawaiian species by Terrell *et al.* (2005) moved Hawaiian species back into the genus *Kadua*, and the currently recognized taxonomic name for the species is *Kadua parvula*, with no change in the overall range of the species as listed.

*Kadua parvula* is known historically from the central and southern Waianae Mountains, from Makaleha Valley to Nanakuli Valley (Wagner *et al.* 1999). At the time the recovery plan was published, *K. parvula* was known from four populations totaling 220 to 235 individuals on Federally-owned land. Currently, two populations are known from Ohikilolo Ridge, located within the U.S. Army's Makua Military Reservation; and Halona, located on state and federally owned lands and are composed of at least 207 mature and 56 immature individuals (U.S. Army 2006).

*Kadua parvula* typically grows on cliff faces or on exposed rocky ridges. The vegetation in these areas is mesic, usually short and sparse, and includes native herbs, grasses, sedges, and shrubs (Makua Implementation Team 2003).

The primary threats to *Kadua parvula* are habitat degradation and predation by feral goats and pigs (Factors A and D); competition from invasive introduced plants (*Ageratina riparia*, *Erigeron karvinskianus*, *Grevillea robusta*, *Melinus minutiflora*, *Rubus argutus*, and *Schinus terebinthifolius*) (Factor E); fire (Factor E); impacts from military activities (Factor E); and stochastic extinction due to small population numbers (Factor E) (U.S. Army 2006; USFWS 1998). Feral goats and pigs not only degrade the habitat of *K. parvula*, but also cause harm to the plants by feeding on them, trampling them, or uprooting them in search of invertebrate food (Factor A) (USFWS 1998 and 2003).

A fence completed in 2000 runs along Ohikilolo Ridge, preventing feral ungulates from entering Makua Valley from the adjacent valleys of Makaha and Keaau. It is believed that feral goats have been eradicated from *K. parvula* habitat on Ohikilolo Ridge. There are no current ungulate threats to the *K. parvula* plants in Halona. However, a goat population located in the Puukaua area north of Halona needs to be prevented from expanding southward. A fence scheduled to be constructed by the U.S. Army in Central and East Makaleha will protect the Makaleha managed/reintroduced population from feral ungulates (U.S. Army 2006).

The U.S. Army is addressing the threat from the small number of populations and small population sizes through partnering with many organizations and agencies to propagate this species for both genetic storage and reintroduction (Makua Implementation Team 2003; U.S. Army 2006).

In addition, the two extant *Kadua parvula* populations are scheduled to be managed for interim stability, as defined in the recovery criteria, by the U.S. Army, including the populations at Ohikilolo Ridge and Halona. Halona's southern subpopulation, which is the larger of the two Halona subpopulations, will be fully managed for stability, while plants in the northern subpopulation will be collected for genetic storage. A third population to be managed for interim stability by the U.S. Army will be in Makaleha Valley, which is in the windward northern Waianae Mountains and is owned by the state of Hawaii. *K. parvula* was known to persist in Makaleha Valley as recently as 1985 (Hawaii Biodiversity and Mapping Program 2006), and it is possible that new plants will be found in the valley. If no new wild plants are located, a reintroduced population will be established in the valley for management. The target goals for each of the populations to be managed by the U.S. Army are 50 mature, reproducing individuals (U.S. Army 2006).

The stabilization and recovery goals for this species have not been met, as only two populations are known and not all threats are being managed. Therefore, *Kadua parvula* meets the definition of endangered as it remains in danger of extinction throughout all of its range.

## 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:

- Complete genetic storage for both extant populations.
- Survey suitable habitat within historical range, especially in Makaleha Valley.
- Complete interim stability measures identified in the U.S. Army's Draft Oahu Implementation Plan.
- Study *Kadua parvula* 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.
- Update the listed entity on 50 CFR 17 to match the currently recognized taxonomy.

## 5.0 REFERENCES:

Hawaii Biodiversity and Mapping Program. 2006. Program Database. Unpublished, Honolulu

Makua Implementation Team. 2003. Implementation plan for the Makua Military Reservation, island of Oahu.

Terrell, E.E., H.E. Robinson, W.L. Wagner, and D.H. Lorence. 2005. Resurrection of genus *Kadua* for Hawaiian Hedyotidonae (Rubiaceae), with emphasis on seed and fruit characters and notes on South Pacific species. Systematic Botany 30(4):818-833.

[U.S. Army] U.S. Army Garrison, Hawaii. 2006. 2006 Status reports for the Makua implementation plan, island of Oahu.

[USFWS] U.S. Fish and Wildlife Service. 1991. Determination of endangered status for 26 plants from the Waianae Mountains, island of Oahu, Hawaii final rule. Federal Register 56(209):55770-55786.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants, Portland, Oregon. 130+ pages.

[USFWS] U.S. Fish and Wildlife Service. 2003. 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.

Wagner, W.L., D. Herbst, and S.H. Sohmer. 1999. Manual of the flowering plants of Hawai`i, Revised Edition. University of Hawai`i Press, Bishop Museum Press, Special Publication. 97:1-1918.

**Signature Page**
**U.S. FISH AND WILDLIFE SERVICE**
5-YEAR REVIEW of *Hedyotis parvula* (No common name)

**Current Classification**: E

**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**:
Marilet A. Zablan, Recovery Program Leader and Acting Assistant Field Supervisor for Endangered Species, June 24, 2007
Marie Bruegmann, Plant Recovery Coordinator, May 8 and 24, and June 29, 2007
Joy Hiromasa, Fish and Wildlife Biologist, April 17, 2007

Approve Patrick Leonard Date 1/18/08
**Lead Field Supervisor, Fish and Wildlife Service**