

## **5-YEAR REVIEW**

Short Form Summary

**Species Reviewed:** *Bidens wiebkei* (kookoolau)

**Current Classification:** Endangered

**Federal Register Notice 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.

**Lead Region/Field Office:**

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawaii

**Name of Reviewer(s):**

Marie Bruegmann, Plant Recovery Coordinator, PIFWO

Jess Newton, Recovery Program Lead, PIFWO

Assistant Field Supervisor for Endangered Species, PIFWO

**Methodology used to complete this 5-year 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 *Bidens wiebkei* and other species from the island of Molokai (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 Recovery Program Lead and the Assistant Field Supervisor for Endangered Species before submission to the Field Supervisor for approval.

**Background:**

For information regarding the species listing history and other facts, please refer to the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database for threatened and endangered species ([http://ecos.fws.gov/tess\\_public](http://ecos.fws.gov/tess_public)).

**Application of the 1996 Distinct Population Segment (DPS) Policy:**

This Policy does not apply to plants.

**Review Analysis:**

Please refer to the final critical habitat designations for *Bidens wiebkei* published in the Federal Register on March 18, 2003 (USFWS 2003) for a complete review of the species' status (including biology and habitat), threats, and management efforts. No new threats and no significant new information regarding the species biological status have come to light since listing to warrant a change in the Federal listing status of *B. wiebkei*.

At the time of listing in 1992 there were 5 populations of no more than 60 total individuals of *Bidens wiebkei* (USFWS 1992). Currently, there are at least 7 populations with as many as 500 individuals on East Molokai.

Ken Wood and Steve Perlman of the National Tropical Botanical Garden observed several hundred individuals of *Bidens wiebkei* in 1991 above Halawa Valley at Lamaloa Gulch, west of Halawa and Halawaiki at 250 meters (820 feet) elevation (Wood 2009). This population was revisited in 1993. Perlman and Natalia Tangalin of the National Tropical Botanical Garden observed over 200 individuals at 244 meters (800 feet) elevation in 2006 (Perlman 2009).

In 1997, J. Rohrer and J. Lau observed one plant on a steep slope in Kawela Gulch at approximately 930 meters (3,050 feet) elevation (Hawaii Biodiversity and Mapping Program 2009). In 2002, Wood observed 10 individuals also on southeast Molokai in a small headwater drainage of Kumueli, the second gulch west of Kumueli Camp, at 1,050 meters (3,445 feet) elevation. The East Molokai Watershed Partnership is the land manager for this area (H. Oppenheimer, pers. comm. 2009; Wood 2009; Wood and Perlman 2002).

In 2005 and 2006, several botanists visited a population of *Bidens wiebkei* on the southern slope of Puu Kolekole. Between 10 and 20 individuals were observed in 2005 at 1,128 meters (3,700 feet) elevation and 25 individuals in 2006 at 1,158 meters (3,800 feet) elevation (Perlman 2009).

West of Wailua on the east end of the island, on private land, two colonies of *Bidens wiebkei* occur about 100 meters apart, each containing about 20 individuals ranging from seedlings to mature plants. It is possible that more individuals occur from there to Halawa, although none were found during field work for Puu O Hoku Ranch, the major landowner, in 2006 and 2007 (H. Oppenheimer, pers. comm. 2009).

In October 2009, Oppenheimer and Perlman saw several hundred plants during an aerial reconnaissance survey beginning on the windward sea cliffs east of Papalua Gulch to just above Puahaunui. This occurrence is located much further west than the known populations located near Halawa, Halawa Iki, and Lamaloa on the plateau lands (H. Oppenheimer, pers. comm. 2009).

In general the habitat of *Bidens wiebkei* is *Metrosideros polymorpha* (ohia) dominated mesic shrublands and forests at 250 to 1,050 meters (820 to 3,450 feet) elevation. Other associated native plant species include *Antidesma* sp. (hame), *Nestegis sandwicensis* (olopua), *Pisonia* sp. (papala kepau), and *Scaevola gaudichaudii* (naupaka kuahiwi) (USFWS1996).

The habitat at Lamaloa Gulch; west of Halawa and Halawaiki is degraded *Metrosideros polymorpha* – *Leptecophylla tameiameiae* (pukiawe) – *Dodonaea viscosa* (aalii) shrubland on rolling hills and sea cliffs with *Heteropogon contortus* (pili grass),

*Osteomeles anthyllidifolia* (ulei), *Psydrax odorata* (alahee), *Sphenomeris chinensis* (palaa), and *Wikstroemia oahuensis* (akia) (Perlman 2009; Wood 2009).

At Kumueli the habitat is *Metrosideros polymorpha* riparian mesic to wet forest associated with *Boehmeria grandis* (akolea), *Clermontia kakeana* (haha), *Cyrtandra grayi* (keokeo haiwale), *Dicranopteris linearis* (uluhe), *Diplazium sandwichianum* (pohole), *Diplopterygium pinnatum* (uluhe lau nui), *Dodonaea viscosa*, *Dubautia plantaginea* (naenae), *Eragrostis grandis* (lovegrass), *Kadua acuminata* (pilo), *Leptecophylla tameiameia*, *Lobelia hypoleuca* (kuhiaikamo owahie), *Lysimachia hillebrandii* (kolokolo lehua), *Machaerina angustifolia* (uki), *Myrsine lessertiana* (kolea lau nui), *Nestegis sandwicensis*, *Peperomia cookiana* (ala ala wai nui), *P. latifolia* (ala ala wai nui), *Perrottetia sandwicensis* (olomea), *Pipturus albidus* (mamake), *Pleomele auwahiensis* (hala pepe), *Sadleria cyatheoides* (amau), *S. pallida* (amau ii), *Selaginella arbuscula* (lepelepe a moa), *Sphenomeris chinensis*, *Tectaria gaudichaudii* (iwa iwa lau nui), *Tetraplasandra oahuensis* (ohe mauka), and *Urera glabra* (opuhe) (Wood 2009; Wood and Perlman 2002).

Habitat at Puu Kolekole is *Metrosideros polymorpha* – *Leptecophylla tameiameia* shrubland with *Cibotium* sp. (hapuu), *Coprosma* sp.(pilo), *Dodonaea viscosa*, *Dubautia linearis* (naenae), *Lysimachia remyi* (no common name), *Pipturus albidus*, *Psydrax odorata*, *Sadleria* sp., and *Sphenomeris chinensis* (Perlman 2009).

Threats to *Bidens wiebkei* are feral ungulates, including pigs (*Sus scrofa*), goats (*Capra hircus*), and deer (*Axis axis*), which degrade the habitat (Listing Factors A and D). In addition, invasive introduced plant species that alter the habitat and compete for resources include *Buddleia asiatica* (dogtail), *Acacia confusa* (Formosan koa), *Ageratum conyzoides* (billygoat weed), *Ageratina riparia* (spreading mist flower), *Andropogon virginicus* (broomsedge), *Axonopus fissifolius* (narrow-leaved carpetgrass), *Chamaecrista nictitans* (partridge pea), *Christella dentata* (downy wood fern), *Drymaria cordata* (white snow), *Hypochoeris radicata* (hairy cat's ear), *Lantana camara* (lantana), *Melinis minutiflora* (molasses grass), *Pluchea carolinensis* (fleabane), *Rubus rosifolius* (thimbleberry), *Sacciolepis indica* (Glenwood grass), *Schinus terebinthifolius* (Christmas berry), and *Setaria parviflora* (yellow foxtail) (Listing Factor A and E). Habitat degradation also contributes to landslides in the steeper areas (Listing Factor E) (Perlman 2009; Wood 2009).

At Halawa and Makakupaia, within the Molokai Forest Reserve, *Melinis minutiflora* creates a fire hazard (Listing Factor E) (USFWS 1996). Part of the Makakupaia area burned in a fire in September 2009 (Kubota 2009).

Rats (*Rattus* spp.) are believed to be predators of this species (Listing Factor C) (Wood and Perlman 2002). Spittle bugs (species unknown) have been observed on other native species of *Bidens* (Listing Factor C) (H. Oppenheimer, pers. comm. 2009). Climate change may also pose a threat to this species (Listing Factors A and E). 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.

Waimea Valley Arboretum has three plants from one founder from Molokai (Waimea Valley Arboretum 2009). The National Tropical Botanical Garden has 2,890 seeds in storage from collections at Puu Kolekole, Halawa, Kamaloa Gulch, and Kumueli (National Tropical Botanical Garden 2009). Bill Garnett has recently outplanted this species near Puu Kolekole (H. Oppenheimer, pers. comm. 2009).

In 2009, one million dollars in funds from the federal Department of Interior's Cooperative Endangered Species Conservation Fund will be used on Molokai, to help acquire a perpetual conservation easement over 248 hectares (614 acres) of strategic watershed on the eastern end of the island. The property has several federally listed threatened or endangered species as well as critical habitat in and around the proposed easement area. Among federally listed species that will benefit from this protection are *Bidens wiebkei* (kookoolau), *Canavalia molokaiensis* (awikiwiki), *Hibiscus arnottianus* ssp. *immaculatus* (kokio keokeo), *Brighamia rockii* (puaala), *Cyanea dunbariae* (haha), *Gardenia brighamii* (nanu), *Pritchardia munroi* (loulu), and *Phyllostegia hispida* (USFWS 2009; C. Rowland, USFWS, pers. comm. 2010).

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Molokai plant cluster (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. *Bidens wiebkei* 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 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.

The interim stabilization goals for this species have not been met as only 2 populations have more than 50 individuals (Table 1) and all threats have not been managed (Table 2). Therefore, *Bidens wiebkei* meets the definition of endangered as it remains in danger of extinction throughout its range.

#### **Recommendations for Future Actions:**

- Fence to exclude feral ungulates.
- Control introduced invasive plant species.
- Collect seed from all seven populations for genetic storage and reintroduction.
- Propagate for augmentation of smaller wild populations when threats are abated.

- Work with 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.

## References:

- Hawaii Biodiversity and Mapping Program. 2009. Program database. Hawaii Biodiversity and Mapping Program, Honolulu, Hawaii. Access on March 1, 2010.
- Kubota, G. 2009. Molokai's burn at 7,800 acres and growing; fire threatens preserve, forest lands; a stubborn blaze has spread toward an area holding unique plants and rare birds. Star Bulletin, Honolulu, Hawaii. September 1, 2009.
- National Tropical Botanical Garden. 2009. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. National Tropical Botanical Garden, Kalaheo, Hawaii. 16 pages. Unpublished.
- Perlman, S. 2009. *Bidens wiebkei*. National Tropical Botanical Garden, Kalaheo, Hawaii. 2 pages. Unpublished.
- [USFWS] U.S. Fish and Wildlife Service. 1992. Endangered and threatened wildlife and plants; determination of threatened or endangered status for 16 plants from the island of Molokai, Hawaii; final rule. Federal Register 57(196):46325-46340.
- [USFWS] U.S. Fish and Wildlife Service. 1996. Recovery plan for the Molokai plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 143 pages.
- [USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designations and nondesignations of critical habitat for 42 plant species from the island of Molokai, Hawaii; final rule. Federal Register 68(52):12982-13141.
- [USFWS] U.S. Fish and Wildlife Service. 2009. Press release: Fish and Wildlife Service provides \$1 million in land acquisition funds to Hawaii. Honolulu, Hawaii. April 17, 2009.
- Waimea Valley Arboretum. 2009. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Waimea Valley Arboretum, Waimea, Hawaii. 16 pages. Unpublished.
- Wood, K.R. 2009. Notes on *Bidens wiebkei*. National Tropical Botanical Garden, Kalaheo, Hawaii. 2 pages. Unpublished.

Wood, K.R., and S. Perlman. 2002. Personal observations of the Kumueli-Wawaia region Molokai, Hawaii. Including a checklist of vascular plants. Special report prepared for The Nature Conservancy of Hawaii. National Tropical Botanical Garden, Kalaheo, Hawaii. 17 pages. Unpublished.

**Personal Communications:**

Oppenheimer, Hank. 2009. Maui Nui Island Coordinator, Plant Extinction Prevention Program, Lahaina, Hawaii. E-mail to Margaret A. Clark, National Tropical Botanical Garden, dated October 14, 2009. Subject: *Bidens weibkei*.

Rowland, Craig. 2010. U.S. Fish and Wildlife Service. E-mail to Marie Brugemann, U.S Fish and Wildlife Service dated April 16, 2010. Subject: RE: Additional information on status of Molokai easement.

**Table 1. Status of *Bidens wiebkei* 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>
1992 (listing)	60	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1996 (recovery plan)	>100	Unknown	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	200	Unknown	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2010 (5-year review)	>500	Unknown	All threats managed in all 3 populations	No (Table 2)
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially: Lamaloa Gulch 200 individuals, above Puahaunui several 100 individuals

**Table 2. Threats to *Bidens wiebkei*.**

<b>Threat</b>	<b>Listing factor</b>	<b>Current Status</b>	<b>Conservation/ Management Efforts</b>
Ungulates – habitat modification and herbivory	A, D	Ongoing	No
Rats – herbivory	C	Ongoing	No
Spittlebugs – herbivory	C	Ongoing	No
Landslides	A, E	Ongoing	No
Invasive introduced plants	A, E	Ongoing	No
Climate change	A, E	Increasing	No



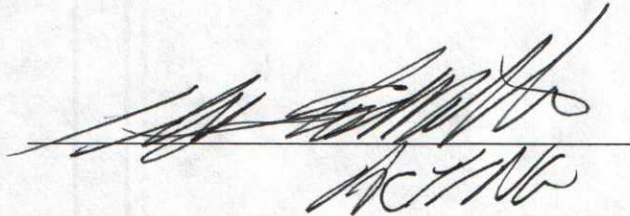
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SIGNATURE PAGE for 5-YEAR REVIEW of *Bidens wiebkei* (kookoolau)

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

Field Supervisor, Pacific Islands Fish and Wildlife Office

  
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Date   8/2/11