5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Bidens amplectens* (koʻokoʻolau)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90): 28031–28034, May 10, 2022.

Lead Region/Field Office:

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

Name of Reviewer:

Cheryl Phillipson, Biologist, PIFWO
Lauren Weisenberger, Plant Recovery Coordinator, PIFWO
Megan Laut, Recovery Program Manager, PIFWO

Methodology used to complete this 5-year review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (Service) beginning in October 2023. The review was based on a review of current, available information since the last 5-year review for *Bidens amplectens* (USFWS 2019). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery Program Manager.

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/ecp/species/6313*).

Review Analysis:

Please refer to the previous 5-year review for *Bidens amplectens* published in the Federal Register on August 30, 2019 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/2781.pdf*) for a complete review of the species' status, threats, management efforts, and references cited. We are not aware of any significant new information regarding the species' biological status since listing to warrant a change in the Federal listing status of *B. amplectens*.

This short-lived facultatively annual herb in the Asteraceae (sunflower) family is endangered and is known from the island of Oʻahu. The status and trends for *Bidens amplectens* are provided in the tables below.

New Status Information:

- Currently, there are 6 populations at Manini, Kuaokalā, Keālia, Kapuna, Pahole, and Keawapilau totaling 36 mature and 58 immature individuals, with more than 100 seedlings (Plant Extinction Prevention Program [PEPP] 2019–2023; USFWS 2018). The largest of these populations is on land managed by the U.S. Air Force with 18 mature and 38 immature individuals (USFWS 2018).
- Currently, there are approximately six populations and 43 founders (Manini, two founders; Ka‘ena, 15 founders; Kapuna, nine founders; Keālia, 14 founders; Pahole, one founder; and Keawapilau, two founders) represented in *ex situ* storage and propagation collections, including seeds in seed banks and plants in a nursery.

New Threats:

- None reported.

New Management Actions:

- Monitoring and surveys—The State monitors individuals of *Bidens amplectens* occurring along the Keālia Trail and plants within the Army's management unit Haili to Keālia 1 (Army Natural Resources on O‘ahu [ANRPO] 2021, p. 208).
- Invasive nonnative plant management—PEPP conducted nonnative plant control at the translocation area at Keālia (PEPP 2020, p. 36).
- Collection and propagation for genetic storage and reintroduction—
    - In 2020, the State Native Ecosystem Protection and Management (NEPM) program reported propagation and storage at the Waimano nursery of one plant sourced from Mokulē‘ia, one plant sourced from Kapuna, and 14 plants representing three founders from Keālia (O‘ahu Rare Plant Nursery 2020). In 2023, NEPM reported storage of 15,962 seeds representing 14 founders from Keālia (O‘ahu Rare Plant Nursery 2023).
    - In 2019, the Pahole rare plant facility (Pahole RPF) reported propagation of four plants representing one founder at Pahole, and one plant representing one founder at Kapuna (Pahole RPF 2019). In 2020, one plant was propagated representing one founder at Keālia (Pahole RPF 2020).
    - In 1996, the National Tropical Botanical Garden (NTBG) stored 500 seeds representing at least one founder from Keālia (NTBG 2022).
    - Between 2012 and 2021, the Lyon Arboretum Seed Conservation Laboratory reported storage of 27,693 seeds representing 26 wild founders from all populations of *B. amplectens* (Lyon Arboretum 2022). Also stored are 25,825 seeds representing seven founders from two reintroduced populations (Lyon Arboretum 2022).
    - One individual was translocated as a living collection at Koko Crater Botanical Garden in 2019 but died in 2020 (PEPP 2019–2023).
- Reintroduction/Augmentation—
    - In 2020, 112 individuals were translocated to Keālia but by 2023 all plants had died (PEPP 2020, p. 11).
    - In 2020, there were seven reintroduced plants at Ka‘ena (PEPP 2019–2023).

Table 1. Status and trends of *Bidens amplectens* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	*Preventing Extinction Targets identified by HPPRCC	*Preventing Extinction Targets Completed?
2012 (listing)	<1,000	10–15	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 100 mature individuals each	No
2019 (5-year review)	<500	363	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 100 mature individuals each	Partially, 1 wild and 1 reintroduced population >100 individuals
2024 (5-year review)	36 mature 58 immature	119; 7 remain	All threats managed in all 3 populations	Partially (see Table 2)
			Complete genetic storage	Partially, 6 populations represented (26 total founders), 4 populations complete

			Natural reproduction at all 3 populations	Partially, recruitment observed at 2 populations
			3 populations with 100 mature individuals each	No

* The Preventing Extinction Stage was established in 2011. Prior to 2011, the Interim Stabilization Stage was the first stage towards recovery (now it is the second stage after Preventing Extinction).

Table 2. Threats to *Bidens amplectens* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plant management at 1 population
Fire destruction and degradation of habitat	A	Ongoing	None
Climate change degradation or loss of habitat	A	Ongoing	None
Predation and herbivory by feral ungulates	C	Ongoing	Partial, 1 population fenced
Predation and herbivory by rodents	C	Ongoing	None
Stochastic events—Hybridization	E	Ongoing	Partial, seed collection, propagation, and reintroduction efforts ongoing

Synthesis:
Currently there are 36 mature and 58 immature wild individuals of *Bidens amplectens* on O‘ahu. One population is provided protection by fencing and nonnative plant control. Seed collections, propagation, and outplanting are ongoing. Four out of six populations have complete genetic representation (Ka‘ena, Kapuna, Pahole, and Keawapilau). Approximately 36 to 50 founders are represented in seed collections and propagation/nursery storage. More than 100 individuals were reintroduced but only seven currently remain. Recruitment is observed at two populations.

Stabilizing (interim) and preventing extinction targets, and downlisting, and delisting criteria are recommended based on the draft revised recovery objective guidelines developed by the Hawai‘i and Pacific Plants Recovery Coordinating Committee (HPPRCC 2011). The HPPRCC identifies an additional initial objective, the Preventing Extinction Stage, in addition to the Interim Stabilization, Delisting, and Downlisting

objectives. Furthermore, life history traits such as breeding system, population size fluctuation or decline, and reproduction type (sexual or vegetative), have been included in the calculation of goals for the number of populations and reproducing individuals for each stage. The goals for each stage remain grouped by life span defined as annual, short-lived perennial (fewer than 10 years), or long-lived perennial.

Bidens amplectens is a short-lived facultative annual (can have annual or perennial populations) herb. To prevent extinction, which is the first milestone in recovering the species, the taxon must be managed to control threats (e.g., fenced) and have 50 individuals (or the total number of individuals if fewer than 50 exist) from each of three populations represented in *ex situ* (secured off-site, such as a nursery or seed bank) collections that are well managed. In addition, a minimum of a total of three populations should be documented on O‘ahu where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 100 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Populations and numbers of wild individuals continue to decline. Although genetic storage is almost complete for four of six populations (Table 1), there are no single populations totaling at least 100 reproducing individuals, and all threats are not being managed (Table 1, Table 2). Therefore, *Bidens amplectens* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
No significant new information regarding the species’ biological status has been reported since the last 5-year review in 2019. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2024.

- Surveys and inventories—
  - Continue surveys for populations of *Bidens amplectens* in areas of potentially suitable habitat.
  - Continue to determine suitable locations for reintroductions.
- Invasive nonnative plant monitoring and control—Continue control of established ecosystem-altering nonnative invasive plant species, and those that compete with *B. amplectens*.
- Fire monitoring and control—Develop and implement fire prevention management plans for all wild and translocated populations.
- Climate change adaptation strategy—Research suitability of habitat for viability of species, including assessment of areas to use translocations in the future due to the impacts of climate change.
- Predator and herbivore monitoring and control—
  - Construct ungulate exclosures or strategic fencing at all populations of *B. amplectens* to protect this species from predation and herbivory.
  - Determine and implement effective methods to control rodents.

- Captive propagation for genetic storage and reintroduction—Continue and maintain collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- Build resiliency, redundancy, and representation—Increase species' viability through habitat restoration, threat control, and continue reintroduction and translocation into suitable habitat that is being managed for known threats to this species to reduce impacts of hybridization and climate change.
- Genetic research—Conduct genetic studies to determine genetic variation within and between populations and possible effects of hybridization and plan an effective breeding program.
- Alliance and partnership development—Continue to work with partners and other land managers in planning and implementation of ecosystem-level restoration and management to benefit this species.

References:

[ANRPO] Army Natural Resources Program of Oʻahu. 2021. 2021 Status report for the Mākua and Oʻahu Implementation Plans. Office of the Vice President for Innovation and Research, University of Hawaiʻi. 207 pp. + appendices.

[HPPRCC] Hawaiʻi and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.

Lyon Arboretum. 2022. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi.

[NTBG] National Tropical Botanical Garden. 2022. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi.

Oʻahu Rare Plant Nursery. 2020. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi.

Oʻahu Rare Plant Nursery. 2023. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaiʻi.

[Pahole RPF] Pahole Rare Plant Facility. 2019. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished

report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.

[Pahole RPF] 2020. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.

[PEPP] Plant Extinction Prevention Program. 2020. Plant Extinction Prevention Program fiscal year 2020 interim performance report (October 1, 2019-September 30, 2020), Cooperative Agreement F18AC00502 (Interim report), F19AC00532 (Interim report), U.S. Fish and Wildlife Service CFDA Program #15.657 Endangered Species Conservation—Recovery Implementation Funds, University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 70 pp.

[PEPP] 2019–2023. Plant Extinction Prevention Program fiscal years 2019 to 2023 interim performance report (October 1, 2018-September 30, 2023). U.S. Fish and Wildlife Service CFDA Program $15.657 Endangered Species Conservation—Recovery Implementation Funds, Cooperative Agreement: F18AC00502 (Final performance report), University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit. 105 pp. + database.

[USFWS] U.S. Fish and Wildlife Service. 2018. Survey for *Bidens amplectens* at Keālia, 13 NOV 2018.

[USFWS] 2019. *Bidens amplectens* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/2781.pdf*.

[USFWS] 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90): 28031–28034, May 10, 2022.

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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 Reclassify from Endangered to Threatened status
_____ No Change in listing status

For **Field Supervisor, Pacific Islands Fish and Wildlife Office**

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