

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Dubautia plantaginea* subsp. *humilis* (na‘ena‘e)

**Current Classification:** Endangered

### **Federal Register Notice announcing initiation of this review:**

[USFWS] U.S. Fish and Wildlife Service. 2016. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 76 species in Hawaii, Oregon, Washington, Montana, and Idaho. Federal Register 81(29): 7571–7573.

### **Lead Region/Field Office:**

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

### **Name of Reviewers:**

Cheryl Phillipson, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, PIFWO

Gregory Koob, Conservation & Restoration Team 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 (USFWS) beginning in August 2017. The review was based on a review of current, available information since the last 5-year review for *Dubautia plantaginea* subsp. *humilis* (USFWS 2014). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Gregory Koob, Conservation and Restoration Team 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/tess\\_public](http://ecos.fws.gov/tess_public)).

### **Review Analysis:**

Please refer to the previous 5-year reviews for *Dubautia plantaginea* subsp. *humilis* published in the Federal Register on July 21, 2009 and June 2, 2014 (available at [http://ecos.fws.gov/docs/five\\_year\\_review/doc2468.pdf](http://ecos.fws.gov/docs/five_year_review/doc2468.pdf) and [https://ecos.fws.gov/docs/five\\_year\\_review/doc4394.pdf](https://ecos.fws.gov/docs/five_year_review/doc4394.pdf)) for a complete review of the subspecies’ status, threats, and management efforts. We are not aware of any significant new information regarding the subspecies’ biological status since listing to warrant a change in the Federal listing status of *Dubautia plantaginea* subsp. *humilis*.

This short-lived perennial dwarfed shrub in the Asteraceae (sunflower) family is endangered and endemic to Maui. The current status and trends for *Dubautia plantaginea* subsp. *humilis* are provided in the tables below.

#### New Status Information:

- In 2014, the only known population totaled approximately 50 individuals. Currently, there are only 22 individuals at this location (PEPP 2017a, b).
- In 2016, three critical habitat units were designated in the wet cliff ecosystem on west Maui for *Dubautia plantaginea* subsp. *humilis* (3,004 ac; 1,216 ha) (81 FR 17790, March 30, 2016).

#### New Threats:

- Climate change loss or degradation of habitat—Climate change may pose a threat to this species. Fortini *et al.* (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawai‘i using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. The assessment by Fortini *et al.* (2013) was conducted at the species level and concluded that *Dubautia plantaginea* is vulnerable to the impacts of climate change, with a vulnerability score of 0.17 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). However, we assume that with the very limited range this subspecies occupies, that its vulnerability may be higher for this subspecies compared to the entire species. Additional management actions may be needed to conserve this taxon into the future.

#### New Management Actions:

- Captive propagation for genetic storage and reintroduction—
  - In 2017, Lyon Arboretum Micropropagation Laboratory reported approximately 62 containers of propagules of *Dubautia plantaginea* subsp. *humilis* in storage. Since the 2014 5-year review, the Lyon Seed Conservation Laboratory reported over 5,000 seeds in storage collected from both the wild site and outplanting at ‘Īao Valley, though most seeds are over 10 years old (Lyon Arboretum 2017).
  - The National Tropical Botanical Garden currently has over 2,000 seeds from at least five founders, but all seeds are at least ten years old and most are over 20 years old (NTBG 2018).
  - Eleven of the 24 founders (45 percent) at ‘Īao Valley have been collected from (PEPP 2017a).
  - The Maui Nui Botanical Garden (MNBG) has hundreds of seeds in storage from plants at ‘Īao Valley (MNBG 2014).
  - The Olinda Rare Plant Facility (ORPF) reported 20 potted plants grown from two individuals in 2013, and additional potted plant from a new individual in 2014, and that a total of 35 potted plants were grown by 2017 (ORPF 2013, 2014, 2017).
  - In 2010, the Plant Extinction Prevention Program (PEPP) reintroduced 15 individuals at ‘Īao Valley and was monitoring the wild population (35 individuals). Between 2010 and 2016 an additional 16 plants were outplanted. By 2016 there were no outplanted plants remaining, and only 22 wild individuals (ORPF 2018, PEPP 2010, 2016, 2017b).

**Synthesis:**

Currently, there are 22 individuals of *Dubautia plantaginea* subsp. *humilis* at 'Īao Valley on west Maui. Seed collection, propagation, and reintroduction efforts are ongoing, though seeds that have been collected are mostly 10- to over 20-years old, and the one outplanting effort has failed. Additional support and partnering are needed to continue these efforts.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Addendum to the Recovery Plan for the Multi-island Plants (USFWS 2002), and have been updated according to 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.

*Dubautia plantaginea* subsp. *humilis* is a short-lived perennial shrub. To prevent extinction, which is the first step in recovering the subspecies, 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. In addition, a minimum of three populations should be documented on west Maui. Each of these populations must be naturally reproducing (*i.e.*, viable seeds, seedlings, saplings) and increasing in number, with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this subspecies have not been met as there are no populations of at least 50 individuals, genetic representation is incomplete (Table 1), and all threats are not being sufficiently managed throughout the range of the subspecies (Table 2). Therefore, *Dubautia plantaginea* subsp. *humilis* meets the definition of Endangered as it remains in danger of extinction throughout its range.

**Recommendations for Future Actions:**

We are not aware of any new threats or significant new information regarding the subspecies' biological status since the last 5-year review in 2014. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2018.

- Population viability and monitoring—Continue to monitor the wild and outplanted populations on west Maui.
- Surveys and inventories—Survey geographical and historical range of *Dubautia plantaginea* subsp. *humilis* for a current assessment of the species' status.

- Ungulate monitoring and control—Construct and maintain strategic exclusion fences to protect *D. plantaginea* subsp. *humilis* from the impacts of feral ungulates.
- Invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species around all populations.
- Predator and herbivore monitoring and control—
  - Implement effective control methods for rodents at wild and reintroduced populations.
  - Develop and implement effective control methods for slugs.
- Captive propagation for genetic storage and reintroduction—Continue collection of genetic resources for storage, propagation, and reintroduction into protected suitable habitat within historical range.
- Reintroduction and translocation—Continue reintroduction of individuals into suitable habitat within historic range that is being managed for known threats to this subspecies.
- Climate change adaptation strategy—Research the suitability of habitat for reintroducing this subspecies in the future due to impacts from climate change.
- Alliance and partnership development—Initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this taxon.

**Table 1. Status and trends of *Dubautia plantaginea* subsp. *humilis* from listing through current 5-year review.**

<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>Stability Criteria identified in Recovery Plan</b>	<b>Stability Criteria Completed?</b>
1999 (listing)	< 300	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	Partially
2002 (recovery plan)	60–65	0	All threats managed in all three populations	No
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
2003 (critical habitat)	60–65	0	All threats managed in all three populations	No
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
2009 (5-year review)	ca 50	0	All threats managed in all three populations	No
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
2014 (5-year review)	30	15	All threats managed in all three populations	No
			Complete genetic storage	Partially

			Three populations with 50 mature individuals each	No
2016 (critical habitat)	35	0	All threats managed in all three populations	No
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2018 (5-year review)	22	0	All threats managed in all three populations	Partially, ungulate and nonnative plant management
			Complete genetic storage	Partially
			Reproduction ( <i>i.e.</i> viable seeds, seedlings) at all three populations	No
			Three populations with 50 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 after Preventing Extinction).

**Table 2. Threats to *Dubautia plantaginea* subsp. *humilis* and ongoing conservation efforts.**

<b>Threat</b>	<b>Listing factor</b>	<b>Current Status</b>	<b>Conservation/ Management Efforts</b>
Ungulate degradation of habitat	A	Ongoing	None
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, periodic weed control
Landslides and flooding loss or modification and destruction of habitat	A	Ongoing	None
Climate change degradation or loss of habitat	A	Ongoing	None
Collecting impacts	B	Potential	None
Ungulate predation or herbivory	C	Ongoing	None
Rodent predation or herbivory	C	Ongoing	None
Invertebrate predation or herbivory	C	Ongoing	None
Stochastic events—Reduced viability due to small populations	E	Ongoing	Partial, seed collection, propagation, and reintroduction ongoing

**References:**

See the previous 5-year reviews for a full list of references (USFWS 2009, 2014). Only references for new information are provided below.

Fortini, L., J. Price, J. Jacobi, A. Vorsino, J. Burgett, K. Brinck, F. Amidon, S. Miller, S. Gon II, G. Koob, and E. Paxton. 2013. A landscape-based assessment of climate change vulnerability for all native Hawaiian plants. Technical report HCSU-044. Hawai‘i Cooperative Studies Unit, University of Hawai‘i at Hilo, Hawai‘i. 134 pp.

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

Lyon Arboretum. 2017. Micropropagation and seed conservation laboratory databases.

[MNBG] Maui Nui Botanical Garden. 2014. Controlled propagation report.

[NTBG] National Tropical Botanical Garden. 2018. Controlled propagation report.

[ORPF] Olinda Rare Plant Facility. 2013. Controlled propagation report.

- [ORPF] 2014. Controlled propagation report.
- [ORPF] 2017. Controlled propagation report.
- [ORPF] 2018. Controlled propagation report.
- [PEPP] Plant Extinction Prevention Program. 2010. PEPP annual report fiscal year 2010 (July 1, 2009-June 30, 2010). 121 pp.
- [PEPP] 2016. Plant Extinction Prevention Program FY 2016 Annual Report (Oct 1, 2015-Sep 30, 2016), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F14AC00174, December 24, 2016, UH Manoa, PCSU, PEPP. 237 pp.
- [PEPP] 2017a. Statewide species totals *ex situ*, Excel table.
- [PEPP] 2017b. PEPP annual report fiscal year 2017 (July 1, 2016-June 30, 2017). 235 pp.
- [USFWS] U.S. Fish and Wildlife Service. 2009. *Dubautia plantaginea* subsp. *humilis* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [http://ecos.fws.gov/docs/five\\_year\\_review/doc2468.pdf](http://ecos.fws.gov/docs/five_year_review/doc2468.pdf).
- [USFWS] 2014. *Dubautia plantaginea* subsp. *humilis* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. [https://ecos.fws.gov/docs/five\\_year\\_review/doc4394.pdf](https://ecos.fws.gov/docs/five_year_review/doc4394.pdf).
- [USFWS] 2016. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 76 species in Hawai‘i, Oregon, Washington, Montana, and Idaho. Federal Register 81(29): 7571–7573, February 12, 2016.
- [USFWS] 2016. Endangered and threatened wildlife and plants; designation and nondesignation of critical habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 species; final rule. Federal Register 81 (61): 17790–18110, March 30, 2016.

**U.S. FISH AND WILDLIFE SERVICE**  
SIGNATURE PAGE for 5-YEAR REVIEW of *Dubautia plantaginea* subsp. *humilis*  
(na'ena'e)

**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

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