5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Dubautia plantaginea* ssp. *humilis* (naʻenaʻe)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; 5-year status reviews of 46 species in Idaho, Oregon, Washington, Nevada, Montana, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 77(44):13248-13251.

Lead Region/Field Office:

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

Name of Reviewer(s):

Diane Sether, Ph.D., Fish and Wildlife Biologist, PIFWO
Maui Nui and Hawaii Island Team Manager, PIFWO
Marie Bruegmann, Plant Recovery Coordinator, PIFWO
Recovery Program Lead, PIFWO
Kristi Young, Programmatic Deputy Field Supervisor, 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 6, 2012. The review was based on a review of current, available information since the last 5-year review for *Dubautia plantaginea* ssp. *humilis* (USFWS 2009). The evaluation by Diane Sether, Ph.D., Fish and Wildlife Biologist, was reviewed by the Island Team Manager and the Plant Recovery Coordinator, followed by the Recovery Program Lead. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor.

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).

Review Analysis:

Please refer to the previous 5-year review for *Dubautia plantaginea* ssp. *humilis* published on July 21, 2009 (available at http://ecos.fws.gov/docs/five_year_review/doc2468.pdf) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species' biological status has come to light since listing to warrant a change in the Federal listing status of *D. plantaginea* ssp. *humilis.*

This short-lived perennial shrub or small tree is endangered and currently occurs only on the island of Maui (USFWS 2009). The current status and trends for *Dubautia plantaginea* ssp. *humilis* are provided in the tables below.

New status information:

- The Plant Extinction Prevention Program (PEPP) reported the loss of three *D. plantaginea* ssp. *humilis* from cliff erosion. Those individuals had been used as seed sources for genetic storage and propagation because of their ease of accessibility (PEPP 2010).
- In 2011, the Plant Extinction Prevention Program (2011) observed approximately 35 individuals in Iao Valley, Maui.
- In 2012, the Plant Extinction Prevention Program (2012) observed approximately 30 wild individuals and 9 outplanted *D. plantaginea* ssp. *humilis* on the cliff in Iao Valley.
- The proposed rule for listing and critical habitat for Maui nui stated that *D. plantaginea ssp. humilis* is known from a single location totaling 35 individuals in Iao Valley (USFWS 2012).

Overall, the number of individuals has decreased from the 50 individuals reported for *D. plantaginea* ssp. *humilis* in the previous 5-year review to approximately 30 individuals (PEPP 2012).

New threats:

- Slug herbivory – Herbivory by slugs (unidentified species) is a severe threat to remote populations of *D. plantaginea* ssp. *humilis* (PEPP 2009, 2011, 2012).
- Rodent predation or herbivory – Rats (*Rattus* spp.) are a severe threat to remote populations of *D. plantaginea* ssp. *humilis* (PEPP 2011).
- Invasive species degradation of habitat – Established invasive plant species – Additional invasive introduced plants have been identified as a threat to this species including *Psidium cattleianum* (strawberry guava) and *Schinus terebinthifolius* (Christmasberry) (PEPP 2011).
- Climate change 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 Hawaii 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) concluded that *Dubautia plantaginea* ssp. *humilis* has low vulnerability to the impacts of climate change.

New management actions:

- Captive propagation for genetic storage and reintroduction
    - The Harold L. Lyon Arboretum's Seed Conservation Laboratory (2013a) reported 5,221 seeds of *D. plantaginea* ssp. *humilis* in genetic storage.
    - There are 43 propagules of *D. plantaginea* ssp. *humilis* at the Harold L. Lyon Arboretum Micropropagation Laboratory (2013b).
    - The National Tropical Botanical Garden (2013) reported approximately 2,429 seeds of *D. plantaginea* ssp. *humilis* in genetic storage.
    - The Plant Extinction Prevention Program collected seeds from accessible plants on the lower cliff habitat of West Maui (PEPP 2009).

    - The Olinda Rare Plant Facility (2013) reported an initial number of 20 individuals of *D. plantaginea* ssp. *humilis* and distributed 31 individuals for *ex situ* conservation.
- Reintroduction / translocation – The Plant Extinction Prevention Program outplanted 15 individuals of *D. plantaginea* ssp. *humilis* derived from two parent plants (PEPP 2010). The Olinda Rare Plant Facility provided the 15 plants for outplanting (PEPP 2010).
- Population viability monitoring and analysis
    - The Plant Extinction Prevention Program monitors the population on the cliff in West Maui to identify potential, imminent, and current threats so that they can be addressed accordingly (PEPP 2009, 2010, 2011, 2012).
    - In 2011, the Plant Extinction Prevention Program (2011) observed 11 outplanted individuals surviving out of the 15 individuals outplanted in 2010.
- Invasive plant monitoring and control – Monitoring and weeding occurred around accessible individuals of *D. plantaginea* ssp. *humilis* including control of *Blechnum appendiculatum* (no common name), *Agerantina adenophera* (Maui pamakani), *Erigeron karvinskianus* (daisy fleabane), *Oplismenus hirtellus* (basketgrass), *Paspalum conjugatum* (Hilo grass), and *Rubus rosifolius* (thimbleberry) (PEPP 2011, 2012).
- Listing and critical habitat designation – Four units of occupied and unoccupied areas of critical habitat for *D. plantaginea* ssp. *humilis* were proposed in the wet cliff ecosystem on Maui (USFWS 2012). The final rule for critical habitat designations has not been published at the time of this review.

Synthesis:
Stabilizing, downlisting, and delisting objectives are provided in the addendum to the recovery plan for multi-island plants (USFWS 2002), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Dubautia plantaginea* ssp. *humilis* is a short-lived perennial, and to be considered stabilized, the taxon must be managed to control threats (*e.g.*, fenced) and be represented in an *ex situ* (at other than the plant's natural location, such as a nursery or arboretum) collection. In addition, a minimum total of three populations should be documented on the island of Maui. 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 currently no population of 50 mature individuals exists (Table 1) and all threats are not sufficiently managed throughout its range (Table 2). Management and accessibility of the population and threats is very difficult, due to the steep cliff habitat for which the plants are found. Therefore, *Dubautia plantaginea* ssp. *humilis* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
- Captive propagation for genetic storage and reintroduction – Continue seed collection for *ex situ* genetic storage and reintroduction.

- Reintroduction / translocation – Continue augmenting populations as genetically appropriate individuals become available in nurseries and as habitat is protected.
- Surveys / inventories – Survey geographical and historical range of *D. plantaginea* ssp. *humilis* for a current assessment of the species' status.
- Invasive plant species control – Control invasive introduced plants within the vicinity of *D. plantaginea* ssp. *humilis* populations.
- Predator / herbivore monitoring and control – Control slugs and rodents within the vicinity of all known populations.
- Population viability monitoring and analysis – Continue monitoring wild and outplanted populations.
- Climate change adaptation strategy – Research the suitability of habitat for reintroducing this species in the future due to the impacts of 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* ssp. *humilis* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1999 (listing)	<300	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Partially
2002 (recovery plan)	60-65	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2003 (critical habitat)	60-65	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2009 (5-yr review)	50	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
2012 (critical habitat – proposed)	35	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2014 (5-yr review)	~30	9	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

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

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat and herbivory	A, C, D, E	Ongoing	None
Invasive introduced plants	A, E	Ongoing	Partially, periodic weed control conducted
Landslides and flooding	A	Ongoing	None
Collecting impacts (potential threat)	B	Ongoing	None
Rodent predation or herbivory – rats	C	Ongoing	None
Slug herbivory	C	Ongoing	None
Low numbers	E	Ongoing	Partially, captive propagation for genetic storage and reintroduction
Climate change	A, E	Increasing	None

References:

See previous 5-year review for a full list of references (USFWS 2009). 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. Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hawaii. 141 pages.

Harold L. Lyon Arboretum Micropropagation Laboratory. 2013a. Micropropagation database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Harold L. Lyon Arboretum Seed Conservation Laboratory. 2013b. Seed storage database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

National Tropical Botanical Garden. 2013. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. 30 pages. Unpublished.

Olinda Rare Plant Facility. 2013. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. 5 pages. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2009. Plant Extinction Prevention Program annual report, fiscal year 2009 (July 1, 2008-June 30, 2009). 120 pages. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2010. Plant Extinction Prevention Program annual report, fiscal year 2010 (July 1, 2009-June 30, 2010). 122 pages. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2011. Plant Extinction Prevention Program annual report, fiscal year 2011 (July 1, 2010-June 30, 2011). 200 pages. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2012. Annual report for Plant Extinction Prevention Program, fiscal year 2012 (July 1, 2011-June 30, 2012). 169 pages. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 2002. Addendum to the recovery plan for the multi-island plants. U.S. Fish and Wildlife Service, Portland, Oregon. 125+ viii pages.

[USFWS] U.S. Fish and Wildlife Service. 2009. *Dubautia plantaginea* ssp. *humilis* 5-year review short form summary. Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii. 7 pages.

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; listing 38 species on Molokai, Lanai, and Maui as endangered and designating critical habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 species; proposed rule. Federal Register 77(112):34464-34775.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Dubautia plantaginea* ssp. *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
X No Change in listing status

Appropriate Listing/Reclassification Priority Number, if applicable:_____

Field Supervisor, Pacific Islands Fish and Wildlife Office

Date 2014-06-02