

Dubautia plantaginea ssp. *magnifolia*
(Na‘ena‘e)

**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: *Dubautia plantaginea* ssp. *magnifolia* (Na‘ena‘e)

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5-YEAR REVIEW
***Dubautia plantaginea* ssp. *magnifolia* (Na‘ena‘e)**

1.0 GENERAL INFORMATION

1.1 Reviewers:

Lead Regional Office:

Region 1, Endangered Species Program, Division of Recovery, Sarah Hall, (503) 231-6868

Lead Field Office:

Pacific Islands Fish and Wildlife Office, Mary M. Abrams, Field Supervisor, (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 of the U.S. Fish and Wildlife Service (USFWS), beginning in June 2016. The review was based on the final rule listing this species; the final critical habitat designation; the recovery outline; peer reviewed scientific publications; unpublished field observations by the USFWS, State of Hawaii, and other experienced biologists; unpublished survey reports; notes and communications from other qualified biologists; as well as a review of current, available information. The evaluation of Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Gregory Koob, Conservation and Restoration Team Manager.

1.3 Background:

1.3.1 Federal Register (FR) Notice citation announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2015. Endangered and threatened wildlife and plants; 5-year status reviews of 133 species in Hawaii, Oregon, Idaho, and Washington. Federal Register 80(30): 8100-8103.

1.3.2 Listing history:

Original Listing

FR notice: USFWS. 2010a. Endangered and threatened wildlife and plants; determination of endangered status for 48 species on Kauai and designation of critical habitat, final rule. Federal Register 75(70): 18960–19165.

Date listed: April 13, 2010

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:

N/A

1.3.4 Review History:

This is the first 5-year review for this species. *Dubautia plantaginea* ssp. *magnifolia* is a shrub or small tree that was listed as endangered, with designation of critical habitat, on April 13, 2010 (USFWS 2010a). The recovery outline for *D. plantaginea* ssp. *magnifolia* is included in the recovery outline for the Kauai Ecosystem, published in 2010 (USFWS 2010b). A draft recovery plan is in preparation.

1.3.5 Species' Recovery Priority Number at start of this 5-year review:

At the start of the 5-year review, the Recovery Priority Number proposed for *Dubautia plantaginea* ssp. *magnifolia* is 3 (using the USFWS scale of 1 to 18), based on the high degree of threat, a high potential for recovery with threats that are well understood and easily alleviated, and its status as a subspecies (USFWS 2010b).

1.3.6 Current Recovery Plan or Outline:

Name of plan or outline: USFWS. 2010b. Recovery outline for the Kauai ecosystem. U.S. Fish and Wildlife Service, Portland, Oregon. 43 pages.

Date issued: June 17, 2010

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

No

2.1.2 Is the species under review listed as a DPS?

Yes

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

No

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

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?

Yes

No

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

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, B, C, D, and E) affecting this species is presented in section 2.3.2.

The recovery plan is currently being drafted. However, the Hawaii and Pacific Plants Recovery Coordinating Committee (HPPRCC) has outlined the actions and goals for stages leading towards recovery (2011). These stages are described below.

Current information is lacking for many Hawaiian plant species on the status of the species and their habitats, breeding systems, genetics, and propagule storage options. The following downlisting and delisting criteria for plants have therefore been adopted from the revised recovery objective guidelines developed by the HPPRCC (2011). Many of the Hawaiian plant species are at very low numbers, so USFWS also developed criteria for avoiding imminent extinction and an interim stage before downlisting, based on the recommendations of the HPPRCC, to assist in tracking progress toward the ultimate goal of recovery. These criteria are assessed on a species-by-species basis, especially as additional information becomes available.

In general, long-lived perennials are those taxa either known or believed to have life spans greater than 10 years; short-lived perennials are those known or believed to have life spans greater than one year but less than 10 years; and annuals are those known or believed to have life spans less than or equal to one year. When it is unknown whether a species is long- or short-lived, USFWS has erred on the side of caution and considered the species short-lived. This will be revised as more is learned about the life histories of these species. A species with a narrow extant range is one currently known from one or two adjacent gulches or ridges within the same mountain range. Some species have historically been known from only one population. For these species, given the limited information known of their habitat requirements, the number of mature individuals needed to prevent extinction was doubled within the known population rather than expanding the known range of the species for preventing extinction and the interim stage. Obligate outcrossers are those species that either have male and female flowers on separate plants or otherwise require cross-pollination to fertilize seeds, and therefore require equal numbers of individuals contributing to reproduction as males and females, doubling the number of mature individuals. Species that reproduce vegetatively may reproduce sexually only on occasion, resulting in the majority of the genetic variation being between populations, therefore requiring additional populations. Species that have a tendency to fluctuate in number from year to year require a larger number of mature individuals on average to allow for decline in years of extreme habitat conditions and recuperation in numbers in years of more normal conditions.

Preventing Extinction

To prevent extinction of *Dubautia plantaginea* ssp. *magnifolia* (a short-lived shrub or small tree with a narrow range) the species needs a minimum of three populations consisting of 100 mature individuals per population. In addition to achieving the numbers of reproducing individuals, all major threats must be controlled in the immediate vicinity of the populations, each population must show evidence of some stage of natural reproduction (*i.e.*, viable seeds or seedlings), and 50 mature individuals from each of three populations, or less if fewer than 50 remain, must be represented in an *ex situ* collection that is secure and well managed.

This recovery objective has not been met (see Table 1).

Interim Stage

To meet the interim stage of recovery of *Dubautia plantaginea* ssp. *magnifolia*, 300 mature individuals are needed in each of three populations and all major threats must be controlled around the populations designated for recovery at this stage. There should also be demonstrated regeneration of seedlings and growth to at least sapling stage for woody species and documented replacement regeneration within each of the target populations. The populations must be adequately represented in an *ex situ* collection as defined in the Center for Plant Conservation's guidelines (Guerrant *et al.* 2004). Adequate monitoring must be in place and conducted to assess individual plant survival, population trends, trends of major limiting factors, and response of major limiting factors to management.

This recovery objective has not been met (see Table 1).

Downlisting Criteria

In addition to achieving 5 to 10 populations with 500 mature individuals per population and all of the goals of the interim stage, all target populations must be stable, secure, and naturally reproducing for a minimum of 10 years. Species-specific management actions are not ruled out. Downlisting should not be considered until an adequate population viability analysis (PVA) has been conducted to assess needed numbers more accurately based on current management and monitoring data collected at regular intervals determined by demographic parameters of the species, although they should only be one of the factors used in making a decision to downlist. Information necessary for the PVA that should be available through monitoring (ideally annually) includes: major limiting factors, breeding system, population structure and density, and proven management methods for major threats.

This recovery objective has not been met (see Table 1).

Delisting Criteria

In addition to achieving 5 to 10 populations with 500 mature individuals per population and all of the goals of the interim and downlisting stages, all target populations must be stable, secure, naturally reproducing, and within secure and viable habitats for a minimum of 20 years. Species-specific management actions must no longer be necessary, but ecosystem-wide management actions are not ruled out if there are long-term agreements in place to continue management. These numbers are initial targets, but may be revised upward as additional information is available, including adequate PVAs for individual species based on current management and monitoring data collected at regular intervals determined by demographic parameters of the species, although they should only be one of the factors used in making a decision to delist. Genetic analyses should be conducted to ensure that adequate genetic representation is present within and among populations compared to the initial variation assessed in the interim stage. Numbers need to be considered on a species-by-species basis.

This recovery objective has not been met (see Table 1).

2.3 Updated Information and Current Species Status

2.3.1 Biology and Habitat

2.3.1.1 New information on the species' biology and life history:

Little is known about the life history of *Dubautia plantaginea* ssp. *magnifolia*. This subspecies flowers primarily from August through December (Carr 1999; NTBG 2008a, 2011, 2012, 2014a-b). *Dubautia plantaginea* ssp. *magnifolia* occasionally hybridizes in the wild with *D. microcephala* (Carr 1985). Its pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (USFWS 2010a).

Dubautia plantaginea ssp. *magnifolia*, a member of the sunflower family (Asteraceae), is a shrub or small tree up to 7 meters (23 feet) tall; stems glabrous (smooth), occasionally sparsely strigose (with stiff flat hairs). Leaves are opposite, oblong-lanceolate (longer than wide; either with parallel sides or with widest point below the middle), 8 to 26 centimeters (cm) (3.2 to 10 inches (in)) long, 0.7 to 4.5 cm (0.3 to 1.8 in) wide, glabrous, with toothed margins. Flower heads are up to 500 or more in panicle inflorescences (branched, with flowers maturing from the bottom up), 6 to 30 cm (2.4 to 12 in) long, 6 to 30 cm (2.4 to 12 in) wide, and yellowish to purple with age. Achenes (dry fruiting capsules) are 2.5 to 4 millimeters (mm) (0.1 to 0.2 in) long. This subspecies differs in that it has firmly connate bracts (fused leaf-like structures at the base of the flower) of a false involucre (whorl of bracts) in a single series that are 5.5 to 6.5 mm (0.2 to 0.3 in) long (Carr 1999).

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:

Historically, *Dubautia plantaginea* ssp. *magnifolia* was known from two populations less than 3.2 kilometers (2 miles) apart in bog habitat in the Alakai Wilderness Preserve and the Na Pali-Kona FR on Kauai (HBMP 2010). It is suspected that *D. plantaginea* ssp. *magnifolia* evolved relatively recently and never had a wide historic distribution on Kauai (Carr 1985). In 1992, the year that Hurricane Iniki struck Kauai, the only known population of a few hundred individuals at Blue Hole, at the headwaters of the Wailua River, was greatly reduced. In 1996, however, the population was estimated to again be a few hundred individuals (HBMP 2010).

A collection made in 1987 from the cliffs at the headwaters of the north fork of the Wailua River appears to be a dwarf form of *Dubautia plantaginea* ssp. *magnifolia*, which is otherwise known only from two collections, probably both from Waialae Stream near Kaholuamanu (Carr 1999). However, as more collections of the Kauai taxon from Wailua River were made, a broader range of plant sizes were noted (Carr 1999). Another dwarf form of *D. plantaginea* ssp. *magnifolia* with smaller leaves and simpler inflorescences was collected at Blue Hole, one of the original sites for the species (Carr 1999). All of these forms are considered to be *D. plantaginea* ssp. *magnifolia*, totaling four locations for this taxon.

Currently, there are approximately 100 individuals in the Blue Hole population (NTBG 2014a, 2015a), though estimates were higher for this population (200 individuals) in Flynn (2016), with approximately 60 additional individuals in the three other locations (Flynn 2016).

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

No new information.

2.3.1.4 Taxonomic classification or changes in nomenclature:

This species was first described by Sherff (1933) as *Dubautia magnifolia* from a type specimen collected at Waialae Stream on Kauai by Rock in 1911. In the monograph of Hawaiian Madiinae (Asteraceae), Carr considered this entity to be a subspecies of the more common *D. plantaginea* (Carr 1985) and renamed the species as *Dubautia plantaginea* ssp. *magnifolia*. *Dubautia plantaginea* ssp. *magnifolia* is recognized as a

distinct taxon in Carr (1999), the most recently accepted Hawaiian plant taxonomy.

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.):

See section 2.3.1.2 above for spatial distribution of the species.

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

Typical habitat for this species includes wet cliff and wet forest and shrubland between 617 and 914 meters (2,024 and 3,000 feet) elevation (NTBG 2008, 2012, 2014a-c, 2015a; TNCH 2007). At Wainiha (Blue Hole), *Dubautia plantaginea* ssp. *magnifolia* is typically found in montane bog and lowland wet forest with associated native plant species including *Bidens* spp. (kookoolau), *Bobea* spp. (ahakea), *Cyanea asarifolia* (haha), *Cyrtandra* spp. (haiwale), *Gunnera kauaiensis* (ape ape), *Kadua elatior* (awiwi), *Machaerina* spp. (uki), *Metrosideros* spp. (ohia), *Perrottetia sandwicensis* (olomea), *Plantago* spp. (laukahi kuahiwi), and various ferns (HBMP 2010). At the Waikoko occurrence, the associated native plant species include *Cheirodendron* spp. (olapa), *Dubautia* spp. (naenae), *Cyrtandra* spp., *Isachne* spp. (ohe), *Kadua centranthoides* (no common name), *K. elatior* (awiwi), *K. foggiana* (NCN), *Melicope* spp. (alani), *Machaerina* spp. (uki), *Pipturus* spp. (mamaki), *Psychotria* spp. (kopiko), with the ferns *Asplenium* spp., *Cyclosorus* spp., *Deparia* spp., and *Microlepia* spp. (NTBG 2008).

2.3.1.7 Other:

N/A

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 (Factor A):

Ungulate degradation of habitat—Feral pigs (*Sus scrofa*) modify and degrade habitat by disturbing and destroying vegetative cover, trampling plants and seedlings, reducing or eliminating plant regeneration by damaging seeds and seedlings, and increasing erosion by creating large areas of bare soil (Loope 1998; van Riper and van Riper 1982). Feral pigs and evidence of their activities have been observed at both occurrences of

Dubautia plantaginea ssp. *magnifolia* (NTBG 2008, 2014a-b, 2015a).

Established ecosystem-altering invasive plant modification and degradation of habitat—Invasive introduced plant species modify habitats occupied by native plant species by changing the availability of light, altering soil-water regimes, modifying nutrient cycling, and changing the fire characteristics of the native plant community (Cuddihy and Stone 1990). Habitat modification and destruction by invasive introduced plants negatively affects *Dubautia plantaginea* ssp. *magnifolia* at both locations. The nonnative plants with the greatest impacts include *Ageratina adenophora* (Maui pamakani), *Buddleja asiatica* (dog tail), *Clidemia hirta* (Koster's curse), *Cyathea cooperi*, *Cyperus meyenianus* (NCN), *Erigeron karvinskianus* (daisy fleabane), *Hedychium gardnerianum* (kahili ginger), *Juncus planifolius* (bog rush), *Passiflora edulis* (passion fruit), *Psidium cattleianum* (strawberry guava), *Psidium guajava* (common guava), *Rubus rosifolius* (thimbleberry), *Sphaeropteris cooperi* (Australian tree fern), and *Tibouchina herbacea* (glorybush) (HBMP 2010; NTBG 2008, 2014a-c, 2015a).

Landslides and flooding destruction or degradation of habitat—The only known individuals of *Dubautia plantaginea* ssp. *magnifolia* occur on or near cliffs. Erosion associated with this habitat, and resulting from the activities of feral ungulates, can have a significant effect on small populations (HBMP 2010; NTBG 2008, 2014c).

Hurricanes—Loss and degradation of habitat—In November 1982, Hurricane Iwa struck the Hawaiian Islands, with wind gusts exceeding 100 miles per hour (mph) (161 kilometers per hour (kph)), causing extensive damage, especially on the islands of Niihau, Kauai, and Oahu (Businger 1998). In September 1992, Hurricane Iniki, a category 4 hurricane with maximum sustained wind speeds recorded at 140 mph (225 kph), passed directly over the island of Kauai. Many forest trees were destroyed (Perlman 1992), which opened the canopy and facilitated the invasion of nonnative plants (Kitayama and Mueller-Dombois 1995). A destructive hurricane holds the potential of driving a localized endemic species to extinction in a single event. Hurricanes pose an ongoing and ever-present threat because they can happen at any time, although their occurrence is not predictable. Tropical cyclone frequency and intensity are projected to change as a result of climate change over the next 100 to 200 years (Vecchi and Soden 2007; Emanuel *et al.* 2008; Yu *et al.* 2010). In the central Pacific, modeling projects an increase of up to two additional tropical cyclones per year in the main Hawaiian Islands by 2100 (Murakami *et al.* 2013).

Climate change loss or degradation of habitat—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. This assessment was not conducted specifically for *Dubautia plantaginea* ssp. *magnifolia* (it was conducted only on the species level; *Dubautia plantaginea*, 0.17). However, it was concluded that the Hawaiian Asteraceae (with a vulnerability score of 0.455; on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change) is the ninth most vulnerable family in Hawaii. Therefore, additional management actions are needed to conserve this taxon into the future.

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes (Factor B):

Not a threat.

2.3.2.3 Disease or predation (Factor C):

Rodent predation or herbivory—Herbivory by rats is noted to be a threat to *Dubautia plantaginea* ssp. *magnifolia* at the Wainiha population (HBMP 2010; NTBG 2014a-b, 2015a). Rats eat virtually every part of plants and at every stage: fleshy fruits, seeds, flowers, stems, leaves, shoot, seedlings, and roots (Russell 1980; Cuddihy and Stone 1990). The effects on plants range from reduced vigor and decreased reproduction to mortality of individuals and complete lack of recruitment.

2.3.2.4 Inadequacy of existing regulatory mechanisms (Factor D):

Lack of adequate hunting regulations—Current and historic habitat of *Dubautia plantaginea* ssp. *magnifolia* is within State hunting areas. Public hunting areas are not fenced and game mammals have unrestricted access to most areas across the landscape, regardless of underlying land use designation; therefore, any unfenced populations are at risk (DLNR 2010).

Lack of adequate biosecurity legislation—Invasion of the State of Hawaii by invasive nonnative plant species, and destruction of habitat and competition by nonnative plants are threats to *Dubautia plantaginea* ssp. *magnifolia*. Pest species have caused the extinction of native species, the destruction of native forests, and the spread of disease. The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, is authorized to prevent the introduction or dissemination of animal and plant pests on all ships, aircraft, and their cargo and baggage arriving in the U.S. and its territories; however, pest species continue to enter the State. In addition, Federal import regulations

do not address many species that could be pests in Hawaii (CGAPS 2009; Ikuma *et al.* 2002).

2.3.2.5 Other natural or manmade factors affecting its continued existence (Factor E):

Stochastic events—Reduced viability due to low numbers—Small, isolated populations often exhibit reduced levels of genetic variability, which diminishes the species’ capacity to adapt and respond to environmental changes, thereby lessening the probability of long-term persistence (Barrett and Kohn 1991; Newman and Pilson 1997). The problems associated with small population size and vulnerability to random demographic fluctuations or natural catastrophes are further magnified by synergistic interactions with other threats, such as anthropogenic impacts like habitat loss from human development or predation by nonnative species. *Dubautia plantaginea* ssp. *magnifolia* is only known from only two occurrences (HBMP 2010; NTBG 2008, 2015a).

Hybridization impacts—*Dubautia plantaginea* ssp. *magnifolia* occasionally hybridizes in the wild with *D. microcephala* (Carr 1999).

Current Management Actions:

Captive propagation for genetic storage and reintroduction—In 2014, over 2,000 seeds were collected from Blue Hole and are being stored at the NTBG seed bank. The number of plants represented in these collections is unknown. Thirteen plants were propagated and outplanted on the grounds of the McBryde Garden (NTBG 2015b).

Table 1. Status and trends of *Dubautia plantaginea* ssp. *magnifolia* from listing through 5-year review.

Date	No. wild individuals	No. outplanted	Preventing Extinction Criteria identified by HPPRCC	Preventing Extinction Criteria Completed?
2010 (listing and critical habitat)	100	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 100 mature individuals each	No
2016 (5-year review)	160	0	All threats managed in	No

review)			all three populations	
			Reproduction (<i>i.e.</i> , viable seeds, seedlings) at all three populations	Unknown
			Complete genetic storage	Partially
			Three populations with 100 mature individuals each	Partially

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

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate degradation of habitat	A	Ongoing	None
Established ecosystem-altering invasive plant modification and degradation of habitat	A	Ongoing	None
Landslides and flooding destruction or degradation of habitat	A	Ongoing	None
Hurricane destruction and degradation of habitat	A	Ongoing	None
Rodent predation or herbivory	C	Ongoing	None
Inadequacy of existing regulatory mechanisms—Lack of adequate hunting regulations	D	Ongoing	None
Inadequacy of existing regulatory mechanisms—Lack of adequate biosecurity legislation	D	Ongoing	None
Stochastic events—Reduced viability due to low numbers	E	Ongoing	None

2.4 Synthesis

Dubautia plantaginea ssp. *magnifolia* persists at four locations, totaling approximately 160 individuals. Seeds are in storage and individuals are planted as living collections.

Preventing extinction, interim stabilization, downlisting, and delisting objectives are provided in HPPRCC's Revised Recovery Objective Guidelines (2011). To prevent extinction, which is the first step in recovering the species, the taxon must be managed to

control threats (*e.g.*, fenced) and have 50 individuals from each of three populations represented in an *ex situ* (at other than the plant’s natural location, such as a nursery or arboretum) collection. In addition, a minimum of three populations should be documented on Kauai where they now occur or occurred historically and each of these populations must be naturally reproducing (*i.e.*, viable seeds, seedlings, or saplings), with a minimum of 100 mature individuals per population.

The preventing extinction goals for this species have not been met (Table 1), there is little *ex situ* genetic representation, only one population with 50 individuals and all threats are not being sufficiently managed throughout the range of the species (Table 2). Therefore, *Dubautia plantaginea* ssp. *magnifolia* meets the definition of endangered as it remains in danger of extinction throughout its range.

3.0 RESULTS

3.1 Recommended Classification:

- Downlist to Threatened
- Uplist to Endangered
- Delist
 - Extinction
 - Recovery
 - Original data for classification in error
- 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

- Surveys and inventories—Survey for populations of *Dubautia plantaginea* subsp. *magnifolia* in areas of suitable habitat.
- Ungulate monitoring and control—Construct and maintain small-scale fenced exclosures around all populations to prevent imminent extinction. Protect all occurrences against disturbances from feral ungulates.
- Invasive plant monitoring and control—Control invasive nonnative plant species around all populations.

- Rodent predation or herbivory—Implement effective control methods for rats.
- Captive propagation for genetic storage and reintroduction—Collect seeds from all individuals for genetic storage and conduct propagation for reintroduction.
- Reintroduction and translocation—Reintroduce individuals into suitable habitat within historic range that is being managed for known threats to this species.
- Stochastic events—Build resilience and redundancy—Increase numbers of populations and individuals scattered through historic range to reduce impacts from landslides and storms.
- Population biology research—Study *Dubautia plantaginea* ssp. *magnifolia* populations to determine viable population size and structure, geographical distribution, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- Based on the recovery criteria above, consider development of a recovery plan.

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U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Dubautia plantaginea* ssp.
***magnifolia* (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

Appropriate Listing/Reclassification Priority Number, if applicable: _____

For Field Supervisor, Pacific Islands Fish and Wildlife Office
