

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Labordia lydgatei* (Kamakahala)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2007. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 71 species in Oregon, Hawaii, Commonwealth of the Northern Mariana Islands, and territory of Guam. Federal Register 72(45):10547-10550.

Lead Region/Field Office:

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

Name of Reviewer(s):

Christian Torres-Santana, Pacific Islands Fish and Wildlife Office, Student Trainee Biologist
Marie Bruegmann, Pacific Islands Fish and Wildlife Office, Plant Recovery Coordinator
Marilet A. Zablan, Pacific Islands Fish and Wildlife Office, Recovery Program Leader and acting Assistant Field Supervisor for Endangered Species

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 on March 8, 2007. The review was based on the final critical habitat designation for *Labordia lydgatei* and other species from the island of Kauai, as well as a review of current, available information (USFWS 2003). The Bernice P. Bishop Museum provided an initial draft of portions of the five-year review. The evaluation of the lead PIFWO biologist was reviewed by the Plant Recovery Coordinator and these comments were incorporated into the draft five-year review. The evaluation of the status of the species was prepared by our lead PIFWO biologist and reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and acting 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).

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 designation for *Labordia lydgatei* published in the Federal Register on February 27, 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 *L. lydgatei*.

This short-lived perennial shrub or small tree was first collected in the early 1900s in the Wahiawa Mountains, Kauai, described in 1916 by C.N. Forbes, and has always been very rare. At the time *Labordia lydgatei* was federally listed as endangered in 1991, it was known only from five collections, and the single known extant population totaled three individuals in a tributary of Wahiawa Stream (USFWS 1991). Further surveys resulted in 23 known individuals in four localities in the Wahiawa drainage (20 individuals), Waioli Stream Valley (2 individuals), and Makaleha Mountains (1 individual) (USFWS 1994). In the 2003 rule designating critical habitat, we reported six populations containing 37 individuals located on State (Lihue-Koloa and Halelea Forest Reserves) and privately owned lands at Pali Eleele, Waioli Valley, Leleiwi, Lumahai Valley, and Kapalaoa. As of 2005, numbers were similar, with five populations containing 29 individuals (USFWS 2008).

Little is known about the life history of *Labordia lydgatei*. Motley and Carr (1998) examined flowers of 13 of the 16 Hawaiian endemic species of *Labordia* to confirm that they are functionally dioecious (containing both male and female parts but only one of those parts is fertile). Thus, male and female plants must be in close proximity to each other to effect pollination, a problem for rare taxa with fragmented populations. Observation from herbarium vouchers at Bernice P. Bishop Museum (C. Imada, Bernice P. Bishop Museum, pers. comm. 2008), National Tropical Botanical Garden (2008a), and database records from the Hawaii Biodiversity and Mapping Program (2007) noted flowering in all months between April and October; fruiting specimens were noted from March and May through September.

The major threats to *Labordia lydgatei* include competition from invasive introduced plants species such as *Clidemia hirta* (Koster's curse) and *Rubus rosifolius* (thimbleberry) (Factor E); and habitat degradation by feral pigs (*Sus scrofa*) and goats (*Capra hircus*) (Factors A and D). Other threats include potential seed predation by rats (*Rattus* spp.) (Factor C); naturally occurring events, such as landslides and erosion (Factor E); lack of dispersal or pollination agents (Factor E); reduced germination (Factor E); and restricted population size (Factor E) (USFWS 1991, 1994, 2003, 2008; Hawaii Biodiversity and Mapping Program 2007).

In addition to all of the other threats, species such as *Labordia lydgatei* that are endemic to small portions of a single island are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by random demographic fluctuations and localized catastrophes such as hurricanes, landslides, flooding and disease outbreaks (Factor E). When considered on their own, the natural processes associated with being a single island endemic do not affect *L. lydgatei* to such a degree that it is threatened or endangered with extinction in the foreseeable future, but these natural processes can exacerbate the threat from anthropogenic factors, such as habitat loss from or predation by introduced species (Factor E) (USFWS 1994).

To safeguard existing genetic material, propagation for genetic storage and reintroduction is occurring at various institutions. The National Tropical Botanical Garden (2008b) houses 716 seeds in storage and has outplanted six individuals in the Kokee area. The Harold L. Lyon Arboretum Micropropagation Laboratory (2008) has five different accessions.

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Wahiawa plant cluster, including *Cyanea undulata*, *Dubautia pauciflora*, *Hesperomannia lydgatei*, *Labordia lydgatei*, and *Viola helenae*. *Labordia lydgatei* is the rarest plant addressed in the recovery plan, and to be considered stabilized, which is the first step in recovering the species, existing populations must be free of competition with introduced invasive plant species and protected from feral pigs and seed predators. The individuals must be able to complete their entire life cycle within the area. To meet this objective, the species must be managed to control threats (*e.g.*, fenced and introduced invasive plant species controlled) and as many genotypes as possible from within populations must be collected and placed in genetic storage as well as growing in safe off-site locations (USFWS 1994).

The stabilization goals for this species have not been met as there are only 29 known individuals and not all threats have been managed (see Table 1). Therefore, *Labordia lydgatei* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Construct enclosure fences to protect individuals from the activities of feral pigs, and eradicate introduced invasive plant species within the enclosures.
- Continue collection of genetic resources for storage, future propagation, and reintroduction into protected suitable habitat within historical range.
- Enhance current natural populations to increase numbers of individuals.
- Work with the Kauai Watershed Alliance to continue and expand ecosystem-level management of the Wahiawa Bog area and to initiate planning and contribute to implementation of ecosystem level restoration and management to benefit this species in the Makaleha area.
- Survey geographical and historical range for a thorough current assessment of the status of the species.
- Assess genetic variability within extant and *ex situ* individuals.
- Study *Labordia lydgatei* populations with regard to population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.

References:

- Hawaii Biodiversity and Mapping Program. 2007. Program Database. University of Hawaii, Center for Conservation, Research and Training. Unpublished.
- Lilleeng-Rosenberger, K.E. 2005. Growing Hawaii's native plants. Mutual Publishing, Honolulu, HI. 416 pages.

Harold L. Lyon Arboretum Micropropagation Laboratory. 2007. Micropropagation database. University of Hawaii at Manoa. Unpublished.

Motley, T.J. and G.D. Carr. 1998. Artificial hybridization in the Hawaiian endemic genus *Labordia* (Loganiaceae). *American Journal of Botany* 85(5):654-660.

National Tropical Botanical Garden. 2008a. Herbarium database; National Tropical Botanical Garden, Kalaheo, Hawaii. Available online at <<http://ntbg.org/herbarium>>. Accessed 10 March 2008.

National Tropical Botanical Garden. 2008b. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 1991. Endangered and threatened wildlife and plants; determination of endangered status for five plants from the Wahiawa Drainage Basin. *Federal Register* 56(183):47695-47700.

[USFWS] U.S. Fish and Wildlife Service. 1994. Recovery plan for the Wahiawa plant cluster: *Cyanea undulata*, *Dubautia pauciflorula*, *Hesperomannia lydgatei*, *Labordia lydgatei*, and *Viola helenae*. U.S. Fish and Wildlife Service, Portland, OR. 55 pages + 3 pages of appendix.

[USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 95 plant species from the islands of Kauai and Niihau, HI; final rule. *Federal Register* 68(39):9116-9479.

[USFWS] U.S. Fish and Wildlife Service. 2008. Rare plant tracking database. Pacific Islands Fish and Wildlife Office, Honolulu, HI. Accessed on April 28, 2008. Unpublished.

Personal communications:

Imada, Clyde. 2008. Research Specialist, Department of Natural Science/Botany, Bernice P. Bishop Museum, email communication to C. Torres-Santana (USFWS) on June 30, 2008.

Table 1. Status of *Labordia lydgatei* from listing through 5-year review.

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1991 – listing	5	0	Free of introduced invasive plant species	No
			Protected from feral pigs	No
			Protected from seed predators	No
			Complete life cycles within its range	No
			Complete genetic storage	No
1994 – recovery plan	23	0	Free of introduced invasive plant species	No
			Protected from feral pigs	No
			Protected from seed predators	No
			Complete life cycles within its range	Unknown
			Complete genetic storage	Partially
2003 – critical habitat	37	0	Free of introduced invasive plant species	No
			Protected from feral pigs	No
			Protected from seed predators	No
			Complete life cycles within its range	Unknown
			Complete genetic storage	Partially
2008 – 5-yr review	29	1	Free of introduced invasive plant species	No
			Protected from feral pigs	No
			Protected from seed predators	No
			Complete life cycles within its range	Unknown
			Complete genetic storage	Partially

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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
- No Change in listing status

Acting Field Supervisor, Pacific Islands Fish and Wildlife Office

Patrick Souza

Date 6/2/09