5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Labordia triflora* (kamakahala)

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 *Labordia triflora* (USFWS 2008). 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 *Labordia triflora* published on January 18, 2008 (available at http://ecos.fws.gov/docs/five_year_review/doc1846.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 *L. triflora.*

This short-lived perennial shrub or small tree is endangered and occurs only on the island of Molokai (USFWS 2008). The current status and trends for *Labordia triflora* are provided in the tables below.

New status information:

- In 2010, there were two populations containing three wild individuals on Molokai (Plant Extinction Prevention Program [PEPP] 2010).
- In 2011, there were three wild mature individuals and 22 immature reintroduced individuals on Molokai (PEPP 2011).
- In 2012, there were two populations containing four wild individuals (3 mature and 1 immature) on Molokai (PEPP 2012).
- As of August 12, 2012, there were two wild individuals remaining out of the six individuals reported at Kua Gulch (PEPP 2013).
- The proposed listing and critical habitat rule for Maui Nui identified four locations containing a total of 20 wild individuals on Molokai (USFWS 2012).

Overall, *L. triflora* has decreased from 11 individuals reported in the previous 5-year review to approximately 4 wild individuals (3 mature and 1 immature) (PEPP 2012). This decrease in the number of wild individuals and conflicting status information from what was reported in the 2012 proposed rule (USFWS 2012) is related to the best available information at the time of this review from the PEPP reports. Unfortunately, the 2012 PEPP annual reports only provides status information for two of the four wild populations as identified in the proposed rule and the 2013 PEPP annual reports only provides status information for one of the four wild populations. The total number of wild mature individuals reported in this review is based on the 2012 PEPP annual report.

New threats:

- Landslides and flooding destruction or degradation of habitat – Landslides and flooding is reported as a threat to this species and has resulted in loss of individuals of *L. triflora* in Kua Valley on Molokai (PEPP 2010).
- Slug herbivory – Herbivory by slugs (unidentified species) has been reported as a severe threat to remote populations of *L. triflora* (PEPP 2010, 2011, 2012, 2013).
- 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 *L. triflora* is highly vulnerable to the impacts of climate change and is noted as the ten most vulnerable plant species to climate change. Furthermore, *L. triflora* was identified as a "wink-out" species, defined as a species that is projected to lose more than 99 percent of its current climate envelope (areas that contain the full range of climate conditions under which the species is known to occur) by 2100. Therefore, additional management actions are urgently needed to conserve this taxon into the future.

New management actions:

- Captive propagation for genetic storage and reintroduction
    - The Harold L. Lyon Arboretum's Seed Conservation Laboratory (2013a) reported containing more than 1,000 seeds of *L. triflora* in genetic storage.

    - There is a single propagule of *L. triflora* in genetic storage at the Harold L. Lyon Arboretum Micropropagation Laboratory (2013b).
    - The Plant Extinction Prevention Program collected seeds from *L. triflora* in Kua Gulch (PEPP 2013).
    - The National Tropical Botanical Gardens (2013) contains an unspecified amount of seeds for *L. triflora* in genetic storage.
    - The Olinda Rare Plant Facility (2013) reported 19 individuals of *L. triflora* propagated at its nursery.
- Reintroduction / translocation
    - Forty individuals of *L. triflora* were outplanted at Kolekole (PEPP 2010).
    - In November 2012, seven individuals were outplanted (PEPP 2013). These individuals have not met maturity and are not provided in Table 1 below.
- Surveys / inventories – The Plant Extinction Prevention Program conducted surveys for *L. triflora* in Kua Gulch (PEPP 2010, 2013) and Kapualei Ranch (PEPP 2010).
- Population viability monitoring and analysis
    - The Plant Extinction Prevention Program (2010, 2011, 2012, 2013) monitored the reintroduced individuals of *L. triflora* at Snail Meadow.
    - The wild population at Kua Gulch was monitored by PEPP (2011, 2013).
- Listing and critical habitat designation – A single occupied and unoccupied unit of critical habitat for *L. triflora* was proposed in the lowland mesic ecosystem on Molokai (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. *Labordia triflora* is a short-lived perennial, and to be considered stable, 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 Molokai where they now occur or occurred historically. 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 being sufficiently managed throughout its range (Table 2). Therefore, *Labordia triflora* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
- Ungulate monitoring and control – Fence remaining populations of *L. triflora* to protect against feral ungulates.
- Captive propagation for genetic storage and reintroduction
    - Continue collection of genetic resources for storage, propagation, and reintroduction into protected suitable habitat within historical range.

    - Evaluate genetic resources currently in storage to determine the need to place additional genetic resources in long-term storage due to this species' vulnerability to climate change.
- Reintroduction / translocation – Reintroduce individuals into suitable habitat within the current and historical range in areas where threats are managed.
- Predator / herbivore monitoring and control – Control slugs and rodents within the vicinity of all known *L. triflora* populations.
- Surveys / inventories – Survey the geographical and historical range of *L. triflora* to assess the status of known populations and possible additional populations.
- Invasive plants monitoring and control – Control invasive introduced plants within the vicinity of *L. triflora* populations.
- Climate change adaptation strategy – Research the suitability of habitat for reintroducing this species in the future due to the impacts of climate change. Develop a strategy for preventing the extinction of this species if no suitable habitat is predicted in the future.
- Population viability monitoring and analysis – Study populations to determine viable population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats to increase natural regeneration in the wild.
- 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 *Labordia triflora* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1999 (listing)	10	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2002 (recovery plan)	10	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	10	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2008 (5-yr review)	11	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2012 (critical habitat – proposed)	20 (mature individuals not identified)	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)	3	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

Table 2. Threats *Labordia triflora* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates –degradation of habitat, browsing, and trampling	A, C, D, E	Ongoing	None
Invasive introduced plants	A, E	Ongoing	None
Landslides and flooding	A	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

References:

See previous 5-year review for a full list of references (USFWS 2008). 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. 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.

[PEPP] Plant Extinction Prevention Program. 2013. Annual report for Plant Extinction Prevention Program, Fiscal Year 2013 (July 1, 2012-June 30, 2013). 207 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. 2008. *Labordia triflora* 5-year review short form summary. Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii. 6 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 *Labordia triflora* (kamakahala)

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:_____

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

Marie M. Bruegmann Date 2014-06-02