5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Vicia menziesii* (Hawaiian vetch)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. Federal Register 88(83): 20088–20092, May 7, 2018.

Lead Region/Field Office:

Interior Region 12/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

Name of Reviewer:

Cheryl Phillipson, Biologist, PIFWO
Lauren Weisenberger, Plant Recovery Coordinator, PIFWO
Megan Laut, 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 (Service) beginning in October 2019. The review was based on a review of current, available information since the last 5-year review for *Vicia menziesii* (USFWS 2012). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, 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*).

Review Analysis:

Please refer to the previous 5-year review for *Vicia menziesii* published in the Federal Register on August 28, 2012 (available at *https://ecos.fws.gov/docs/five_year_review/doc4055.pdf*) for a complete review of the species' status, threats, management efforts, and references cited. We are not aware of any significant new information regarding the species' biological status since listing to warrant a change in the Federal listing status of *V. menziesii*.

This short-lived perennial vine in the Fabaceae (pea) family is endangered and found on the island of Hawai‘i. The current status and trends for *Vicia menziesii* are provided in the tables below.

New Status Information:

- Currently there is one population totaling 22 individuals in one population (VanDeMark 2018, in litt. in USFWS 2019).

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) concluded that *Vicia menziesii* is highly vulnerable to the impacts of climate change, with a vulnerability score of 0.295 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, additional management actions may be needed to conserve this taxon into the future, such as locating key microsites that overlap with current and future climate envelopes for outplanting efforts.

New Management Actions:

- Surveys and inventories—Surveys have been conducted for a private landowner and occurrences of *Vicia menziesii* were found at Puu Kūlani, Pu‘ulala‘au, and Puu Kīpū (USFWS 2017, in litt.). The occurrence at Pu‘uwa‘awa‘a has been searched for but not found (PEPP 2015, 2016, 2017).
- Ungulate monitoring and control—The Division of Forestry and Wildlife reported construction of seven small exclosures (0.08 to 0.2 hectares (0.2 to 0.5 acres)) at Ka‘u and Hilo Forest Reserves for *Vicia menziesii* reintroductions (PEPP 2019).
- Established ecosystem altering invasive plant species control—Nonnative plants are controlled within the exclosure at Pu‘uwa‘awa‘a (PEPP 2016).
- Captive propagation for genetic storage and reintroduction—Between 2012 and 2018, the Volcano Rare Plant Facility (VRPF) reported propagation and storage of 54 individuals representing 26 collections and 6 to 26 founders from five locations. Currently, however, there is only one plant in *ex situ* storage in the nursery (VRPF 2012-2019).
- Reintroduction and translocation—Between 2012 and 2019, VRPF reported reintroduction of 18 individuals to Kūlani and 14 individuals to Niaulani representing 11 collections from four locations (VRPF 2012-2019).
- Alliance and partnership development—Beginning in 2017, a private landowner (Kamehameha Schools) and the U.S. Fish and Wildlife Service partnered through a biological opinion for the issuance of a 10(a)(1)(A) Enhancement of Survival Permit in association with a Safe Harbor Agreement, regarding the effects of land management activities in order to provide a net conservation benefit for endangered species. *Vicia menziesii* is one of the endangered species that may be affected, but is not likely to be affected from issuance of this permit, and may benefit from overall minimization of impacts. These activities may include habitat restoration and native plant community outplantings, koa silviculture, and invasive weed control (USFWS 2017, in litt.).

Table 1. Status and trends of *Vicia menziesii* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	Interim Criteria identified in Recovery Plan	Interim Criteria Completed?
1978 (listing)	1974: 150–300 1980: 85	0	All threats managed in all populations	No
			Complete genetic storage	No
			Prevent populations from declining further	No
1984 (recovery plan)	ca 1,500-2,000	0	All threats managed in all populations	No
			Complete genetic storage	No
			Prevent populations from declining further	No
2012 (5-year review)	37	96, 4 survived	All threats managed in all populations	Partially
			Complete genetic storage	Partially
			Prevent populations from declining further	No
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2020 (5-year review)	22	32	All threats managed in all 3 populations	Partially, 1 population fenced, 7 small exclosures constructed

			Complete genetic storage	No
			Reproduction (i.e. viable seeds, seedlings) at all 3 populations	Yes, seedlings at extant population
			3 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 stage after Preventing Extinction).

Table 2. Threats to *Vicia menziesii* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate destruction and degradation of habitat; lack of adequate hunting regulations	A, D	Ongoing	Partial, 1 population fenced, 7 small exclosures constructed
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	Partial, nonnative plant control at one population
Climate change degradation or loss of habitat	A	Ongoing	None
Rodent predation and herbivory	C	Ongoing	None
Invertebrate predation and herbivory	C	Ongoing	Partial, attempted caterpillar control
Reduced viability due to low numbers	E	Ongoing	Partial, collection, propagation and reintroduction
Timber management–Logging	E	Ongoing	Partial, permit agreement

Synthesis:
Currently there are 22 individuals in one population on the island of Hawai‘i. This species remains in continual decline since listing, from hundreds or even thousands of individuals to just a couple dozen. A landscape-based assessment of climate change vulnerability for native plants of Hawai‘i using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *Vicia*

menziesii is vulnerable to the effects of climate change. One population is provided protection from feral ungulates by fencing. Nonnative plants are controlled within the same area. Plants from four extirpated locations and one extant locations have been propagated and reintroduced. The Division of Forestry and Wildlife has constructed seven small exclosures for reintroduction of individuals. Unfortunately, there is currently only a single individual represented in an *ex situ* living collection (nursery), and no seeds in storage.

Stabilizing (interim), downlisting, and delisting objectives were provided in the *Vicia menziesii* Recovery Plan (USFWS 1984) 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) as adopted in the *Vicia menziesii* Recovery Plan Amendment (USFWS 2019). 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.

Vicia menziesii is a short-lived perennial vine. To prevent extinction, which is the first milestone in recovering the species, 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 the island of Hawai‘i where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings), with a minimum of 50 mature, reproducing individuals per population, with all threats controlled.

The preventing extinction goals for this species have not been met. There are no populations totaling at least 50 reproducing individuals, genetic storage goals have not been met, and all threats are not being managed (Table 1, Table 2). Therefore, *Vicia menziesii* 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 species' biological status since the last 5-year review in 2012. Thus, the following recommendations for future actions are added or reiterated for the 5-year review for 2020.

- Surveys and inventories—Survey the historical range of the species for additional individuals or populations and determine the current status of the species.

- Ungulate monitoring and control—Continue to construct and maintain fenced exclosures to protect individuals from the negative impacts of browsing and trampling by ungulates.
- Invasive plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species, and those that compete with *V. menziesii*.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use to determine future landscape needed for the recovery of the species.
- Predator and herbivore control—
    - Implement effective control measures for rodents.
    - Develop and implement effective control measures for caterpillars and other invertebrates.
- Captive propagation for genetic storage and reintroduction—
    - Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
    - Track maternal source for use in *ex situ* propagation.
- Reintroduction and translocation—Continue to determine optimal sites and continue to reintroduce individuals into areas that are being managed for known threats.
- Population biology research—Conduct genetic studies to assess the overall genetic variation among remaining populations and individuals.
- Site, area, and habitat protection—Continue to develop and implement effective management measures to reduce the impacts of timber logging.
- Alliance and partnership development—Continue to work with the Division of Forestry and Wildlife and other managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

References:

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. 134 pp.

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

[PEPP] Plant Extinction Prevention Program. 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] 2019. Plant Extinction Prevention Program, annual recovery subpermit FWSPIFWO-26 report (January 1st, 2018–December 31st 2018), as designated under the U.S. Endangered Species Act. Unpublished report submitted to U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii. 569 pp.

[USFWS] U.S. Fish and Wildlife Service. 1984. *Vicia menziesii* recovery plan. Portland. 54 pp.

[USFWS] U.S. Fish and Wildlife Service. 2007. Reinitiation of the biological opinion of the U.S. Fish and Wildlife Service for military training at Makua Military Reservation. June 22, 2007. Unpublished.

[USFWS] 2012. *Vicia menziesii* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc4055.pdf.*

[USFWS] 2017, in litt. Intra-Service biological opinion and informal consultation on the issuance of a Section 10(a)(1)(A) incidental take permit associated with a Safe Harbor Agreement for Kamehameha Schools Keauhou and Kilauea Forest lands, island of Hawaii, Hawaii. 105 pp.

[USFWS] 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. 88 FR 20088, May 7, 2018.

[USFWS] 2019. *Vicia menziesii* recovery plan amendment. 84 FR 790, January 31, 2019.

[VRPF] Volcano Rare Plant Facility. 2019. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Vicia menziesii* (Hawaiian vetch)

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

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

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