

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Sanicula mariversa* (no common name)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

Lead Region/Field Office:

Region 1/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 2018. The review was based on a review of current, available information since the last 5-year review for *Sanicula mariversa* (USFWS 2013). The evaluation completed 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 reviews for *Sanicula mariversa* published in the Federal Register on January 18, 2008 and August 22, 2013 (available at https://ecos.fws.gov/docs/five_year_review/doc1799.pdf and https://ecos.fws.gov/docs/five_year_review/doc4269.pdf) for a complete review of the species' status, threats, and management efforts. 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 *S. mariversa*.

This short-lived perennial monocarpic erect herb in the Apiaceae (parsley) family is endangered and endemic to O‘ahu. The current status and trends for *Sanicula mariversa* are provided in the tables below.

New Status Information:

- Currently there are 31 mature individuals of *Sanicula mariversa* in one population in the Wai‘anae mountains (Army Natural Resources Program-O‘ahu (ANRP) 2018). There are 322 immature individuals at three populations.
- In 2012, 11 critical habitat units were designated in two ecosystems (lowland mesic and lowland dry) in the Wai‘anae mountains on O‘ahu (77 FR 57648, September 18, 2012).

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 *Sanicula mariversa* is extremely vulnerable to the impacts of climate change, with a vulnerability score of 0.968 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). In addition, this species has no overlap between current and future climate envelopes, and is unlikely to tolerate expected changes in climate at its current location. This means that this species must persist within suitable microrefugia, or move to newly available climate-compatible areas to avoid extinction. Therefore, additional management actions may be needed to conserve this taxon into the future, such as identifying suitable microsites where climate change is anticipated to occur more slowly and considering suitable habitat in areas outside of its known range.

New Management Actions:

- Ungulate control—The Army Natural Resources Program-O‘ahu (ANRP) undertakes stabilization and management of endangered species to fulfill the requirements of the 2003 and 2008 Biological Opinions for U.S. Army activities in the Mākua and O‘ahu training areas (U.S. Army Garrison Hawai‘i 2010). Ungulate fencing at Kamaile‘unu and Pu‘u Kawiwi are completed, and Keaau-Mākaha has a partial fence in place (ANRP 2018). These areas are currently ungulate-free.
- Nonnative plant control—Nonnative plants are controlled by the ANRP in the ‘Ōhikilolo and Keaau management areas (ANRP 2018).
- Captive propagation for genetic storage and reintroduction—
 - The ANRP reports collection and storage of more than 13,500 seeds from three populations representing 238 individuals (ANRP 2018).
 - There are 172 wild individuals from four populations represented in genetic storage as stored seeds (ANRP 2018).
- Reintroduction—The ANRP attempted reintroduction of more than 230 individuals at three sites; approximately half survive (ANRP 2018).

Synthesis:

Currently there are 31 mature and several hundred immature individuals of *Sanicula mariversa* in the Wai‘anae mountains of O‘ahu. 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 *S. mariversa* is extremely vulnerable to the effects of climate change. Collection, propagation, and reintroductions are ongoing. Three areas are fenced and managed for ungulates and two areas are managed for removal of nonnative plants.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the O‘ahu Plants (USFWS 1998), 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). 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.

Sanicula mariversa is a short-lived perennial herb, deciduous, and monocarpic. 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 (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 O‘ahu where they now occur or occurred historically and each of these populations must be naturally reproducing (*i.e.*, viable seeds, seedlings, saplings) and increasing in number, with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Genetic representation is nearly complete; however, there are no populations of 50 mature individuals and not all threats are managed (Table 1, Table 2). Therefore, *S. mariversa* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

Other than the new data on this taxon's vulnerability to climate change, we are not aware of any new threats. There is no significant new information regarding the species' biological status since the last 5-year review in 2013. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2019.

- Ungulate monitoring and control—Continue to monitor fencing regularly to detect ungulate incursion.

- Invasive plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species, and those that compete with *Sanicula maritima* at all wild and reintroduced populations.
- Site and habitat protection—Develop and implement measures to reduce the impact of erosion and site visitation.
- Fire management—Implement fire management plans and coordinate fire response efforts.
- 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.
- Captive propagation for genetic storage and reintroduction—Continue seed collection from tagged individuals, recording the maternal source for *ex situ* propagation and send seed to at least two separate facilities for propagation and storage.
- Reintroduction—Continue to establish new populations and augment existing populations.
- Population biology research—
 - Assess the genetic variability within extant populations.
 - Continue life history research to determine the best sites and methods for reintroduction.
- Alliance and partnership development—Continue to work with the ANRP, the Division of Forestry and Wildlife, Honolulu Board of Water Supply, and other land managers to contribute to implementation of ecosystem-level restoration and management to benefit this species.

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1991 (listing)	<100	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	No
1998 (recovery plan)	75	Unknown	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2003 (critical habitat)	170	19	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2008 (5-year review)	18	0	All threats managed in all three populations	Partially, two fenced areas
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2012 (critical habitat)	188	0	All threats managed in all three populations	Partially, two fenced areas
			Complete genetic storage	Partially

			Three populations with 50 mature individuals each	No, not all individuals are mature
2013 (5-year review)	30 mature, 642 immature, 41 seedlings	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially, one population 64% complete
			Three populations with 50 mature individuals each	No
Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2019 (5-year review)	31 mature, 322 immature	>230, 132 survive	All threats managed in all three populations	Partially, three fenced areas
			Complete genetic storage	Partially
			Reproduction (<i>i.e.</i> viable seeds, seedlings) at all three populations	Partially
			Three 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 after Preventing Extinction).

Table 2. Threats to *Sanicula mariversa* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate destruction and degradation of habitat	A	Ongoing	Yes, three fenced areas ungulate-free
Degradation of habitat by established ecosystem-altering invasive plant species	A	Ongoing	Partial, two managed areas
Fire destruction and degradation of habitat	A	Ongoing	Partial, fire management plan and coordinated response efforts
Climate change degradation or loss of habitat	A	Ongoing	None
Erosion	A	Ongoing	Partial, fencing deters goats
Ungulate predation and herbivory	C	Ongoing	Yes, three fenced areas
Trampling and over-visitation	E	Ongoing	Partial, three fenced areas
Competition with established invasive plant species	E	Ongoing	Partial, two managed areas
Military training activities	E	Ongoing	Partially, can preclude collections
Low numbers	E	Ongoing	Partial, seed collection, propagation, and reintroduction

References:

See previous 5-year reviews for a full list of references (USFWS 2008, 2013). Only references for new information are provided below.

[ANRP] Army Natural Resource Program-Oahu. 2018. 2018 status report for the Makua and Oahu implementation plans. 217 pp.

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.

[U.S. Army] U.S. Army, Environmental Division. 2018. Report to the U.S. Fish and Wildlife Service for Oahu Army Natural Resource Program, Permit: TES-043638, Reporting period January 1, 2018-December 31, 2018. 16 pp.

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; Endangered status for 23 species on Oahu and designation of critical habitat for 124 species; final rule. Department of the Interior, Federal Register 77 (181): 57648–57862, September 18, 2012.

[USFWS] 2013. *Sanicula maritima* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
https://ecos.fws.gov/docs/five_year_review/doc4269.pdf.

[USFWS] 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

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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

For Field Supervisor, Pacific Islands Fish and Wildlife Office

Date _____