

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Sicyos albus* (‘ānunu)

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:

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 2019. The review was based on a review of current, available information since the last 5-year review for *Sicyos albus* (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 *Sicyos albus* published in the Federal Register on August 28, 2012 (available at https://ecos.fws.gov/docs/five_year_review/doc4059.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 *S. albus*.

This short-lived annual vine in the Cucurbitaceae (gourd) family is endangered and found on the island of Hawai‘i. The current status and trends for *Sicyos albus* are provided in the tables below.

New Status Information:

- This species was listed as endangered as *Sicyos alba* in 1996 (61 FR 53137, October 10, 1996). The most recent update to the Manual of Flowering Plants of Hawai‘i (Wagner *et al.* 2012, p. 30) corrected the specific epithet to *albus*, to make it consistent with the gender of the genus name, *Sicyos*. The new combination for this species is *Sicyos albus* in the most recent taxonomic treatment in the Checklist of the Hawaiian Flora (Smithsonian 2020, in litt.). In 2015, we published a technical correction for this species and amended the List of Endangered and Threatened Plants at CFR section 17.12 (80 FR 35860, June 23, 2015). Therefore, we will refer to this species as *S. albus* in this 5-year review.
- At the time of the 5-year review in 2012 there were five individuals of *Sicyos albus* remaining. Between 2012 and 2016, numbers of mature individuals ranged from five to as many as 15 with many seedlings (Plant Extinction Prevention Program (PEPP) 2015, 2016). In 2016, the ‘Ōla‘a Tract at Hawai‘i Volcanoes National Park (HVNP) where this species previously occurred was surveyed but no plants were found (PEPP 2016). It is not unusual for the number of individuals of an annual species to fluctuate from year-to-year. Currently, there are two mature individuals with one seedling in the Koa management unit in HVNP (PEPP 2018).

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 *Sicyos albus* is vulnerable to the impacts of climate change, with a vulnerability score of 0.307 (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—In 2015 and 2016, field surveys to monitor and confirm the status of populations were conducted in HVNP (PEPP 2015, 2016).
- Ungulate monitoring and control—In 2018, the Plant Extinction Prevention Program (PEPP) added deer mesh to a pig enclosure to protect *Sicyos albus* from herbivory and seedling trampling by deer (PEPP 2018).
- Captive propagation for genetic storage and reintroduction—In 2016 and 2017, the Volcano Rare Plant Facility (VRPF) reported four plants in inventory representing one founder at ‘Ōla‘a, but currently do not have plants in their inventory of this species (VRPF 2013–2019).

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1996 (listing)	21	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 100 mature individuals each	No
1998 (recovery plan)	21	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 100 mature individuals each	No
2003 (critical habitat)	ca 30	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 100 mature individuals each	No
2012 (5-year review)	5	16	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 100 mature individuals each	Partially
Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2020 (5-year review)	2 mature	0	All threats managed in all 3 populations	Partially, wild population is fenced

			Complete genetic storage	No
			Reproduction (i.e. viable seeds, seedlings) at all 3 populations	Partially, at 1 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 *Sicyos albus* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate destruction and degradation of habitat and herbivory	A	Ongoing	Partial, exclosure at Koa unit with deer mesh added
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	Partial, some nonnative plant control at HVNP
Lava flow destruction and degradation of habitat	A	Potential	None
Climate change degradation and loss of habitat	A	Ongoing	None
Ungulate predation and herbivory	C	Ongoing	Partial, exclosure at Koa unit with deer mesh added
Lack of adequate hunting regulations	D	Ongoing	Partial, exclosure at Koa unit with deer mesh added
Hiking and trail maintenance	E	Ongoing	Partial, exclosure constructed
Low numbers	E	Ongoing	Partial, collection and propagation

Synthesis:

Currently, two wild individuals and a seedling remain within Hawai‘i Volcanoes National Park on the island of Hawai‘i. 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 *Sicyos albus* is vulnerable to the effects of climate change. Monitoring and collections are ongoing. No reintroductions have been reported since the last 5-year review. The wild population is provided protection from feral ungulates by fencing and ungulate control at HVNP. Natural recruitment has been reported.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Addendum to the Recovery Plan for the Big Island Plant Cluster (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.

Sicyos albus is a short-lived annual 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 that are well managed. 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.

The preventing extinction goals for this species have not been met. Currently, only two wild mature individuals are known. The status of individuals reintroduced in 2012 is unknown. Genetic representation is incomplete (Table 1). In addition, all threats are not being managed (Table 1, Table 2). Therefore, *Sicyos albus* 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 reiterated for the 5-year review for 2020.

- Surveys and inventories—Continue to conduct thorough surveys of all historical and suitable habitat for occurrences.
- Ungulate monitoring and control—Continue to construct and maintain fenced enclosures to protect individuals from the negative impacts of habitat destruction and degradation, and browsing and trampling by ungulates.

- Established ecosystem-altering invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *Sicyos albus* at all populations.
- Habitat protection—Develop and implement effective measures to reduce the impacts of hiking and trail maintenance.
- 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 collection and propagation efforts for maintenance of genetic stock and for reintroduction.
 - Track maternal source of propagative materials for use in *ex situ* propagation.
 - Continue to utilize at least three different facilities for seed storage and propagation.
- Reintroduction and translocation—Determine optimal sites for reintroduction and recruitment success, including areas less likely to be impacted by volcanic activity, and continue to reintroduce individuals into these areas that are managed for known threats.
- Population biology research—
 - Study the reproductive biology of *S. albus* to determine best management practices.
 - Conduct pollination studies regarding use of hand-pollination techniques to enhance reproductive success.
- Alliance and partnership development—Continue to work with the Hawai‘i Volcanoes National Park, the Hawai‘i Division of Forestry and Wildlife, and other partners and land managers in planning and 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 Hawai‘i at Hilo, Hawai‘i. 134 pp.
- [HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.
- [PEPP] Plant Extinction Prevention Program. 2015. Annual report fiscal year 2015 (July 1, 2014-June 30, 2015). 179 pp.
- [PEPP] 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] 2018. 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, Hawai‘i. 192 pp.
- Smithsonian Institution. 2020, in litt., Flora of the Hawaiian Islands checklist. *Sicyos albus*, <https://naturalhistory.2.si.edu/botany/hawaiianflora>.
- [USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Big Island plant cluster, 1998. Portland. 80 pp. + appendices.
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https://ecos.fws.gov/docs/five_year_review/doc4059.pdf.
- [USFWS] 2015. Endangered and threatened wildlife and plants; technical corrections for 54 wildlife and plant species on the list of Endangered and Threatened Wildlife and Plants. 80 FR 35860, June 23, 2015.
- [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.
- [VRPF] Volcano Rare Plant Facility. 2013-2019. Summary of reports 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.
- Wagner, W.L., D.R. Herbst, N. Khan, and T. Flynn. 2012. Hawaiian vascular plant updates: a supplement to the Manual of the Flowering Plants of Hawai‘i and Hawai‘i’s Ferns and Fern Allies. 126 pp.

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SIGNATURE PAGE for 5-YEAR REVIEW of *Sicyos albus* ('ānunu)

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

_____ Date _____