

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Polyscias gymnocarpa* ('ohe'ohe)

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 *Polyscias gymnocarpa* (as *Tetraplasandra gymnocarpa*) (USFWS 2011). 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 review for *Polyscias gymnocarpa* published in the Federal Register on September 20, 2011 (available at https://ecos.fws.gov/docs/five_year_review/doc3876.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 *P. gymnocarpa*.

This long-lived perennial tree in the Araliaceae (ginseng) family is endangered and endemic to O'ahu. The current status and trends for *Polyscias gymnocarpa* are provided in the tables below.

New Status Information:

- The most current observation for this species was in 2012 at Manana trail in the Ko‘olau mountains of O‘ahu (one individual) (Army Natural Resources Program-O‘ahu (ANRP) 2018). Four other individuals have been seen at two sites (two plants each) in Kaluanui since 2009. Based on observations of additional populations that have not been monitored since 1993 to 2005, there are several populations at 11 locations estimating 63 individuals (U.S. Army 2018).
- In 2012, 18 critical habitat units in three ecosystems (lowland mesic, lowland wet, and wet cliff) were designated for *Polyscias gymnocarpa* in the Ko‘olau mountains of O‘ahu (32,023 ac, 12,958 ha) (77 FR 57648, September 18, 2012).
- In 2015, the Service published a technical correction for this and other plant and wildlife species, recognizing the taxonomic change from *Tetraplasandra gymnocarpa* to *Polyscias gymnocarpa* (80 FR 35860, June 23, 2015). The taxonomic change does not affect the range or endangered status of this species.

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 *Polyscias gymnocarpa* is highly vulnerable to the impacts of climate change, with a vulnerability score of 0.695 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, additional management actions are 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:

- In 2013, Lyon Arboretum Seedbank Laboratory reported collection of 12 fruit which were tested for viability (not stored). Viability was fifty percent. (Lyon Arboretum 2018, in litt.).
- Three plants were reintroduced at Poamoho; however, none survived (Ching 2019, in litt.).
- Some plants are protected from feral ungulates by fences constructed and maintained by State of Hawai‘i Department of Land and Natural Resources - Division of Forestry and Wildlife (Kaluanui and Poamoho North).

Synthesis:

Currently there are 68 wild individuals of *Polyscias gymnocarpa* in the Ko‘olau mountains of O‘ahu, though the two largest populations have not been monitored since the early 2000’s and only five individuals have been monitored over the last ten years. 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 *P. gymnocarpa* is highly vulnerable to the effects of climate

change. There have been no *ex situ* collections of this species since 2013. Currently, there are no collections, reintroductions, or other management actions for this species.

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.

Polyscias gymnocarpa is a long-lived perennial tree. 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 25 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. There is only one location totaling more than 25 mature individuals, but was last monitored in 2003. There is no *ex situ* genetic representation for this species, and very few threats are managed (feral ungulates are managed in two locations) (Table 1, Table 2). Therefore, *P. gymnocarpa* 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 except for the additional data on the species vulnerability to climate change. There is no significant new information regarding the species’ biological status since the last 5-year review in 2011. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2019.

- Surveys and inventories—Conduct thorough surveys of suitable habitat where *Polyscias gymnocarpa* currently and historically occurred for a thorough assessment of the species.
- Ungulate monitoring and control—Construct large-scale fencing around all naturally occurring and any reintroduced individuals to provide protection from the negative impacts of feral ungulates.

- Invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *Polyscias gymnocarpa* at all reintroduced populations.
- 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.
- Rodent predation and herbivory—Implement effective control methods for rats at all populations.
- Invertebrate predation—Develop and implement control methods for the two-spotted leafhopper.
- Captive propagation—Collect material for storage and propagation.
- Reintroduction—Propagate to establish new populations and augment existing populations.
- Alliance and partnership development—Work with the U.S. Army Natural Resources Program, the Division of Forestry and Wildlife, and other land managers to contribute to implementation of ecosystem-level restoration and management to benefit this species.

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1994 (listing)	<40	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 25 mature individuals each	No
1998 (recovery plan)	<200	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 25 mature individuals each	Unknown
2003 (critical habitat)	<100	Unknown	All threats managed in all three populations	No
			Complete genetic storage	Unknown
			Three populations with 25 mature individuals each	No
2011 (5-year review)	92	0	All threats managed in all three populations	Partially
			Complete genetic storage	No
			Three populations with 25 mature individuals each	Partially, one population >25
2012 (critical habitat)	~40	0	All threats managed in all three populations	No
			Complete genetic storage	No

			Three populations with 25 mature individuals each	No
Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2019 (5-year review)	68	3, none survived	All threats managed in all three populations	Partially
			Complete genetic storage	No
			Reproduction (<i>i.e.</i> viable seeds, seedlings) at all three populations	No
			Three populations with 25 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 *Polyscias gymnocarpa* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate destruction and degradation of habitat	A	Ongoing	Partial, two locations fenced, and two more fences planned
Degradation of habitat by established ecosystem-altering invasive plant species	A	Ongoing	None
Climate change degradation or loss of habitat	A	Ongoing	None
Ungulate predation and herbivory	C	Ongoing	None
Rodent predation and herbivory	C	Ongoing	None
Invertebrate predation	C	Ongoing	None
Competition with established invasive plant species	E	Ongoing	None
Low numbers	E	Ongoing	Partial, some seed collection

References:

See previous 5-year reviews for a full list of references (USFWS 2009, 2013). Only references for new information are provided below.

Ching, S. 2019, in litt. Email regarding status of *Polyscias gymnocarpa*. 27 AUG 2019.

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.

Lyon Arboretum 2018, in litt., Report on controlled propagation of listed and candidate 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, Hawaii.

- [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. 2011. *Polyscias gymnocarpa* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. https://ecos.fws.gov/docs/five_year_review/doc3876.pdf.
- [USFWS] 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] 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. Federal Register 80 (12) FR 35860–35869, June 23, 2015.
- [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
- X No Change in listing status

For Field Supervisor, Pacific Islands Fish and Wildlife Office

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