5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Gouania vitifolia* (no common name)

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 *Gouania vitifolia* (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 reviews for *Gouania vitifolia* published in the Federal Register on August 2, 2007 and August 28, 2012 (available at *https://ecos.fws.gov/docs/five_year_review/doc1134.pdf* and *https://ecos.fws.gov/docs/five_year_review/doc4250.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 *G. vitifolia*.

This short-lived dioecious perennial vine or climbing shrub in the Rhamnaceae (buckthorn) family is endangered and found on the islands of O‘ahu and Hawai‘i, and is extirpated from Maui. The current status and trends for *Gouania vitifolia* are provided in the tables below.

New Status Information:

- Currently, there are two wild populations, one on Oʻahu in Waiʻanae Kai with one mature and one immature individual, and one on the island of Hawaiʻi in Manukā totaling 13 mature individuals (Plant Extinction Prevention Program (PEPP) 2017, 2019).
- In 2012, 22 critical habitat units in the lowland dry, lowland mesic, lowland wet, and dry cliff ecosystems were designated for *Gouania vitifolia* in the Waiʻanae mountains of Oʻahu (3,432 hectares (ha); 8,479 acres (ac)) (77 FR 57648, September 18, 2012). In 2016, three critical habitat units were designated for *G. vitifolia* on west Maui in the wet cliff ecosystem (1,216 ha; 3,005 ac) (81 FR 17790, March 30. 2016).

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 Hawaiʻi 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 *Gouania vitifolia* is highly vulnerable to the impacts of climate change, with a vulnerability score of 0.577 (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.
- Fire destruction and degradation of habitat—In the 2007 5-year review, fire was considered a potential threat to *Gouania vitifolia*, especially in the drier area of Keaʻau (in the Waiʻanae mountains of Oʻahu) with the predominance of nonnative grasses providing a high fuel load. In August, 2018, a fire likely started by arson burned 2,023 ha (5,000 ac) in the Waiʻanae, Keaʻau, and Mākaha valleys. The fire destroyed plants in two exclosures in the Keaʻau Forest Reserve, impacting the largest wild population and outplanting of *G. vitifolia* and individuals of another endangered plant, *Hibiscus brackenridgei* subsp. *mokuleianus*, which was a major setback for restoration work (Army Natural Resources Program-Oʻahu (ANRP) 2018; U.S. Army 2018, in litt.). Wildfires are also a threat to *G. vitifolia* that occurs with the Manukā Natural Area Reserve (NAR) on the island of Hawaiʻi, especially to the mesic forest area above 1,524-m (5,000-ft) elevation (Three Mountain Alliance (TMA) 2007). This area is one of the most drought-prone regions in the state. Introduced *Pennisetum clandestinum* (kikuyu grass) and *Ehrharta stipoides* (meadow ricegrass) are a wildfire fuel hazard and should be controlled and replaced with native understory species (including ferns, grasses, and shrubs) (TMA 2007).

New Management Actions:

- Surveys and inventories—PEPP and the state's Native Ecosystems Protection & Management (NEPM) division of the Department of Forestry and Wildlife

(DOFAW) survey for and monitor populations of *Gouania vitifolia* in the Waiʻanae mountains of Oʻahu. The wild population on the island of Hawaiʻi within Manukā NAR is monitored by NEPM and PEPP (DLNR-DOFAW 2018; PEPP 2013, 2014, 2015).

- Ungulate monitoring and control—
    - Between 2013 and 2015, PEPP and NEPM surveyed and scoped areas for construction of exclosure fencing to protect a wild population of *Gouania vitifolia* at Keaʻau (PEPP 2013, 2014, 2015). The fence was completed in 2015. In 2018, this area was burned by a wildfire. On the island of Hawaiʻi, the Manukā Mauka 2 fence, proposed in 2013, was completed in 2017 and protects one population (13 individuals) of *G. vitifolia* from destruction and habitat degradation by feral ungulates (DLNR-DOFAW 2018).
    - The ANRP conducts ungulate control at the Keaʻau and Waiʻanae Kai populations (U.S. Army 2019a).
    - The DLNR-DOFAW's report to the 30th Legislature indicates they have "finished the project" to protect 25,550 acres at Manukā NAR on the island of Hawaiʻi (DLNR-DOFAW 2018). Completion of 47.5 kilometers (29.5 miles) of fencing protects the NAR from hooved animals (DLNR-DOFAW 2018).
- Established ecosystem altering invasive plant species degradation of habitat— Nonnative plants are controlled within the exclosures at Keaʻau and Manukā (PEPP 2016, 2017). The DLNR-DOFAW's report to the 30th Legislature indicates that more than 10,522 hectares (ha) (26,000 acres (ac)) at Manukā NAR on the island of Hawaiʻi are protected and that invasive plants are controlled in about a third of the NAR area (2,630 ha; 6,501 ac) (DLNR-DOFAW 2018).
- Captive propagation for genetic storage and reintroduction—
    - The Lyon Arboretum Seedbank Laboratory reports storage of 879 seeds representing seven founders from Keaʻau (Lyon Arboretum 2019).
    - The Pahole Rare Plant Facility (PRPF) reports two refugia plants representing two founders from Waiʻanae Kai (PRPF 2019).
    - The Waimea Arboretum reported three plants in storage representing one wild individual at Keaʻau (Waimea Arboretum 2017).
    - The ANRP reported 100 percent representation of plants at Keaʻau in storage (U.S. Army 2019b). The ANRP reported propagation of 15 plants from six founders at Keaʻau, and two plants from two founders at Waiʻanae Kai (US Army 2019b). ARNP also reports propagation of 93 plants representing 16 founders at Keaʻau. In addition, there are nearly 5,000 seeds in storage representing 64 individuals from Keaʻau (U.S. Army 2019b).
- Reintroduction and translocation—
  In 2014, PEPP planted 67 individuals at Waiʻanae Kai. In 2018 PEPP, planted more than 58 individuals at Keaʻau (PEPP 2014, 2017); however, a fire completely destroyed all individuals at this site. PEPP prepared the burned area for future planting by distributing seeds of more common plants and setting rat

traps to deter seed and seedling predation (PEPP 2019). More reintroductions are planned for 2020 (Ching 2020, in litt.).

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1994 (listing)	>10 (O‘ahu)	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	8 (O‘ahu) 18 (Hawai‘i)	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	44 (O‘ahu) 4 (Hawai‘i)	0	All threats managed in all 3 populations	
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2007 (5-year review)	58–64 (O‘ahu) ca 20 (Hawai‘i)	0	All threats managed in all 3 populations	Partially, fire management plan for O‘ahu, nonnative plant management
			Complete genetic storage	Partially, complete for 1 population

			3 populations with 50 mature individuals each	Partially, 1 population > 50 individuals
2012 (5-yr review)	62 (Oahu) 12 (Hawai‘i)	1 (Hawai‘i)	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2020 (5-year review)	ca 2 (O‘ahu) 13 (Hawai‘i)	0 (~100 planted on O‘ahu)	All threats managed in all 3 populations	Partially, fencing
			Complete genetic storage	Partially
			Reproduction (i.e. viable seeds, seedlings) at all 3 populations	Partially, reproduction at 1 population
			3 populations with 100 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 *Gouania vitifolia* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate degradation of habitat	A	Ongoing	Partial, 2 exclosures
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plant control at 2 populations
Fire			Partial, fire management plan for Oʻahu
Climate change degradation or loss of habitat	A	Ongoing	None
Established invasive plant species competition	C	Ongoing	Partial, nonnative plant control at 2 populations
Reduced viability due to low numbers	E	Ongoing	Partial, seed storage, propagation, and reintroduction efforts are ongoing

Synthesis:
Currently there are two wild individuals on Oʻahu and 13 mature individuals of *Gouania vitifolia* on the island of Hawaiʻi. A landscape-based assessment of climate change vulnerability for native plants of Hawaiʻi using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *G. vitifolia* is highly vulnerable to the effects of climate change. A fire in 2018 destroyed the largest population (Keaʻau, Oʻahu), but more reintroductions are planned. Wild and reintroduced populations are provided protection from feral ungulates by fencing. Seed collection, propagation, and reintroduction are ongoing, but there is no *ex situ* representation of the Hawaiʻi population. The extirpated Keaʻau population and the Waiʻanae Kai population, both on Oʻahu, are represented *ex situ*.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for Oahu Plants (USFWS 1998), and have been updated according to the draft revised recovery objective guidelines developed by the Hawaiʻi 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.

Gouania vitifolia is a short-lived perennial functionally dioecious vine or climbing shrub. 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 islands of Oʻahu, Hawaiʻi, or Maui where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings, saplings), with a minimum of 100 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Although genetic storage is complete for two populations, the currently largest extant population and only population on the island of Hawaiʻi has not met genetic storage goals (Table 1), there are no populations totaling at least 100 reproducing individuals as there are only 15 known individuals, and all threats are not being managed (Table 1, Table 2). Therefore, *Gouania vitifolia* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
Fire has increased from a potential threat (since the previous 5-year review in 2012) to a significant threat since the destruction of the largest wild population on Oʻahu and the likelihood of wildfires occurring on the island of Hawaiʻi. There is no other 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—Conduct thorough surveys of all historical and suitable habitat for new occurrences.
- Ungulate monitoring and control—Continue to construct and maintain fenced exclosures to protect individuals from the negative impacts of browsing by ungulates.
- Invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *Gouania vitifolia*.
- Fire monitoring and control—Establish populations in areas where damage or destruction by fire is less likely. Develop and implement fire prevention management plans and coordinate effective fire suppression efforts, especially for Keaʻau and Manukā NAR.
- 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.
- Reintroduction and translocation—Continue to reintroduce individuals into suitable habitat within historic range that is being managed for known threats

to this species to build resiliency and redundancy to reduce impacts of loss of viability.

- Population biology research—
    - Determine the number of genetically distinct plants in the populations of *Gouania vitifolia*, and the distribution of clones within the populations. Use the results of these analyses to set goals for genetic representation in *ex situ* collections.
    - Study G. vitifolia with regard to population size and structure, geographical distribution, breeding system, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- Alliance and partnership development—Continue to work with partners in planning and implementation of ecosystem-level restoration and management to benefit this species.

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U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Gouania vitifolia* (no common name)

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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