5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Bulbophyllum guamense*;
wild onion, siboyas halumtanu (Chamorro name), siboyan halom tano (Carolinian name)

Current Classification: Threatened

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 87(90): 28031–28034, May 10, 2022.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

Name of Reviewer:

Cristian “CJ” Cayanan, Biologist, PIFWO
Lauren Weisenberger, Plant Recovery Coordinator, PIFWO
Megan Laut, Recovery Program 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 2023. The review was based on a review of current, available information since the last 5-year review for *Bulbophyllum guamense* (USFWS 2020, entire). The evaluation by Cristian “CJ” Cayanan, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery Program 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/ecp/species/9753)*.

Review Analysis:

Please refer to the previous 5-year review for *Bulbophyllum guamense* published in the Federal Register on September 29, 2020 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/3131.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 *B. guamense*.

This short-lived perennial epiphytic herb in the Orchidaceae family is threatened and is known from the islands of Guam and Rota. The status and trends for *Bulbophyllum guamense* are provided in the tables below.

New Status Information:

- Currently, there are 13 populations of *Bulbophyllum guamense* through the Mariana Islands, totaling more than 10,000 individuals. There are nine populations on Guam and four populations on Rota (Amidon 2024, in litt., pp. 1-2).
- Currently, two organizations maintain *Bulbophyllum guamense* plants in their nurseries. The Guam Plant Extinction Prevention Program (GPEPP) maintains approximately 60 *B. guamense* plants and 7,206 explants in tissue culture from one population in its nursery and lab (GPEPP 2023, entire). As of August 2023, the University of Guam Center for Island Sustainability (UOG CIS) maintains nine clusters of *B. guamense* in their nursery (Demeulenaere and Fabian 2023, entire).

New Threats:

- None

New Management Actions:

- Habitat protection—In 2020, a Memorandum of Understanding between Joint Region Marianas (JRM) and USFWS outlined a mutual understanding regarding the intentions and future considerations of a Department of Defense (DoD) Readiness and Environmental Protection Integration (REPI) Program to address conservation of upland vegetation communities (USFWS 2020, p. 13). Subsequently, the Guam REPI Habitat Conservation Initiative Implementation Plan 2022 – 2027 was written. The vision of the plan is to advance the conservation, restoration, and enhancement of Guam's limestone forests, ravine forests, and savanna habitats to establish precursory conditions towards improving the baseline status of federally listed threatened and endangered species. The two locations identified in the plan, Taguan and Masso, do not currently contain *Bulbophyllum guamens*e individuals, but could benefit the species once habitat enhancement is complete (NFWF 2022, entire).
- Monitoring and surveys—
    - As part of the 2019 Joint Region Marianas (JRM) Integrated Natural Resources Management Plan (INRMP), surveys for ESA-listed species, including *Bulbophyllum guamense* are ongoing on at Naval Base Guam (NBG) Apra Heights, Tenjo Vista, NBG Main Base, and NBG Naval Munitions Site (NMS) (NAVFAC Marianas 2023, p. 100).
- Ungulate monitoring and management—
    - As of September 1, 2023, a total of approximately 455 acres (184 hectares) have been enclosed through fence construction on NBG administered lands with ungulate removal ongoing within the enclosures (NAVFAC Marianas 2023, pp. 119-124).
    - Approximately 116 acres (47 hectares) of habitat containing native limestone forest, referred to as the Southern Haputo Ecological Reserve Area (ERA), was fenced to exclude ungulates in 2022. The fencing of an additional 168 acres (78 hectares) of the Northern Haputo ERA was ongoing in 2022. Ungulate eradication was due to begin in late 2022 after

the installation of protective measures to safeguard listed snail and butterfly populations (NAVFAC Marianas 2021, pp. 169-170, NAVFAC Marianas 2022, pp. 154-155). Typhoon Mawar hit Guam in May 2023, destroying most of the fences. Prior to the typhoon, ungulate eradication was about 75 percent complete. As of June 2024, ungulates are still being removed and the fences are under contract for repairs (Loerzel 2024, in litt., entire).

- Inadequacy of existing regulatory mechanisms—
    - *Bulbophyllum guamense* is federally protected under the U.S. Endangered Species Act, but it is not protected locally as a Guam or CNMI threatened or endangered species.
    - Guam has three conservation areas covering a total of 4,077 ac (1,650 ha) (GDAWR 2006, p. 39): (1) Anao Conservation Area, (2) Bolanos Conservation Area, and (3) Cotal Conservation Area (GDAWR 2006, p. 39). However, the Draft Master Plan for protection and enforcement of the conservation areas was never formally adopted. One population of approximately 10 *Bulbophyllum guamense* individuals can be found within the Anao Conservation Area (Amidon 2024, in litt., p. 1-2).
    - Rota has four conservation areas designated by the CNMI Department of Land and Natural Resources (Liske-Clark 2015, entire; CNMI DLNR DFW 2024, entire): (1) the Sabana Conservation Area (3,758 ac; 1,521 ha); (2) Liyo, also known as Taipingot or Wedding Cake Mountain Conservation Area (300 ac; 121 ha; Berger et al. 2005, p. 14); the (3) the Mariana Crow Conservation Area (1,097 ac; 444 ha); and (4) I'Chenchon Park Wildlife Conservation Area, also known as the I'Chenchon Bird Sanctuary (815 ac; 330 ha), which is within the boundary of the Mariana Crow Conservation Area. Management of these areas prohibits the take of native plants and animals. However, conservation is not absolute; the Sabana area is also an important agricultural area, collection of medicinal plants is allowed, and the areas are not protected from nonnative mammals where specials permits are required to remove species. All the known populations of *Bulbophyllum guamense* on Rota can be found within the Sabana Conservation Area, totaling approximately 261 *B. guamense* individuals (Amidon 2024, in litt., p. 1-2).
- Collection and propagation for genetic storage and reintroduction—
    - The Guam Plant Extinction Prevention Program (GPEPP) was propagating and outplanting *Bulbophyllum guamense* in 2020 when the GPEPP nursery contained 43 plants; the GPEPP lab contained 9,450 tissue culture explants; and 11 reintroduced plants were observed at the Yigo UOG Research Station (GPEPP 2020, entire). In 2021, GPEPP maintained 30 *B. guamense* plants and 9,450 explants in their nursery and lab with 5 reintroduced plants observed at the Yigo UOG Research Station (GPEPP 2021, entire). In 2022, the GPEPP nursery contained 31 plants and 8,696 explants in their nursery and lab with 0 reintroduced plants observed (GPEPP 2022, entire). In 2023, the GPEPP nursery contained 60 plants and 7,206 explants in their nursery and lab with 0 reintroduced plants observed (GPEPP 2023, entire).

- Post Typhoon Mawar, between July and August 2023, the University of Guam Center for Island Sustainability (UOG CIS) salvaged 15 *Bulbophyllum guamense* clusters from the Habitat Management Unit (HMU) at Anderson Air Force Base (AAFB), Guam. Of the 15 clusters, UOG CIS maintains 9 clusters in its nursery, the other 6 clusters did not survive (Demeulenaere and Fabian 2024, pp. 10–13, Fabian 2024, in litt., entire).

Table 1. Status and trends of *Bulbophyllum guamense* from listing through current 5-year review. Table 1 shows progress according to Preventing Extinction Goals.

Date	No. wild individuals	No. outplanted	*Preventing Extinction Targets identified in Recovery Plan	*Preventing Extinction Targets Completed?
2015 (Listing)	~500	0	All threats managed in all three populations	No
			Reproduction (i.e., viable seeds, seedlings, saplings) at all three populations	Unknown
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Unknown
2020 (5-year review)	~700 (>426 in 5 populations on Guam and >261 in 4 populations on Rota)	0	All threats managed in all three populations	No, a few ungulate exclusion areas planned
			Reproduction (i.e., viable seeds, seedlings, saplings) at all three populations	Unknown
			Complete genetic storage	Partial

			3 populations with 50 mature individuals each	Partial, 1 population has >50 individuals
2024 (5-year review)	>10,000	0 (11 reintroduced but none survived)	All threats managed in all three populations	Partial, some fencing constructed; ungulate removal ongoing
			Natural reproduction in 3 populations	Unknown
			Complete genetic storage	Partial, tissue culture techniques representing one population
			3 populations with 50 mature individuals each	Partial, 3 populations with 50 individuals but maturity unknown

Table 2. Threats to *Bulbophyllum guamense* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Development, military training, and urbanization	A	Ongoing	Partial, development of HCP ongoing, Guam REPI Habitat Conservation Initiative Implementation Plan ongoing
Degradation of habitat by ungulates	A	Ongoing	Partial, some ungulate exclosures have been completed but eradication within is not complete. Additional ungulate exclosures are planned.
Degradation of habitat by established ecosystem altering invasive plant species	A	Ongoing	Partial, JRM INRMP project for vegetation restoration for the Habitat Management Unit (HMU) on AAFB.
Degradation of habitat by Brown tree snake	A	Ongoing	Partial. DoD, USGS, USDA-APHIS, DOI, USFWS, and local

			collaborations to develop and implement BTS control measures
Degradation and destruction of habitat by fire	A	Ongoing	None
Typhoons and climate change degradation or loss of habitat	A	Ongoing	None
Predation by slugs	C	Ongoing	None
Inadequate regulatory mechanisms	D	Ongoing	Partial. Terrestrial conservation areas on Guam and in CNMI but there are no management plans for the areas on Guam and conservation is not absolute in the CNMI.

Synthesis:
Currently there are more than 10,000 wild individuals of *Bulbophyllum guamense* on Guam and Rota, a substantial increase from the estimate in 2020. There are nine populations on Guam and four populations on Rota. Rota has not been surveyed for *B. guamense* since 2015. There are no seeds being stored and only explants in tissue culture from one population are being maintained. A previous outplanting effort was not successful with *B. guamense* individuals not surviving past two years. Some individuals are protected by ungulate fencing and removal.

Threats remain largely uncontrolled with ungulate control partially addressed. Although there is a total of more than 1,000 acres of forested area on Guam fenced to exclude ungulates, complete ungulate removal has not occurred. Approximately 2,700 additional acres of forested areas in many separate parcels are planned to be fenced to exclude ungulates, but only three populations, all found on DoD property, will be partially protected by these fences. However, those three populations contain approximately 95 percent of all *Bulbophyllum guamense* individuals. Other threats, particularly habitat degradation and loss due to fires, development, and invasive species, continue to be uncontrolled and have compounding effects on the long-term resiliency of the species.

Preventing extinction and interim stabilizing targets, and downlisting and delisting criteria are provided in the Recovery Plan of 23 Species in the Mariana Islands (USFWS 2023, entire), and were updated according to the revised recovery objective guidelines developed by the Hawai‘i and Pacific Plants Recovery Coordinating Committee (HPPRCC 2011, entire). The life history traits such as breeding system, species’ life span, 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.

Bulbophyllum guamense is a short-lived perennial epiphytic herb. 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 a total of three populations should be documented on Guam and Rota, where they now occur or occurred historically. 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. Although there are at least three populations with greater than 50 individuals, it is unknown if all three populations contain mature, reproducing individuals. All threats are not being managed. And genetic storage is incomplete (Table 1, Table 2). Therefore, *Bulbophyllum guamense* meets the definition of Threatened as it is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Recommendations for Future Actions:
There has been an increase in total population size since the last 5-year review in 2020. Thus, the following recommendations for future actions are new, updated, or reiterated for the 5-year review for 2024.

- Surveys and inventories—
    - Continue to survey for *Bulbophyllum guamense* in historical locations and potentially suitable habitat that has not been surveyed, particularly on Rota.
    - Regularly monitor known populations to determine population trends.
- Ungulate monitoring and control—Maintain existing fenced exclosures and complete and maintain ungulate removal. Construct new ungulate exclosures, or erect strategic fencing, around naturally occurring *Bulbophyllum guamense* populations to protect this species and associated habitat from feral ungulates. Ungulate removal should occur as quickly as possible after exclosures are constructed to prevent increased damaged to *B. guamense* and habitat due to enclosed animals.
- Invasive nonnative plant monitoring and control— Control established ecosystem-altering nonnative invasive plant species and those that compete with *Bulbophyllum guamense* or modify their habitat.
- Fire prevention and control— Develop and implement fire prevention management plans to help protect *Bulbophyllum guamense* from wildfires.
- Climate change adaptation strategy— Research suitability of habitat in the future due to the impacts of climate change
- Invasive invertebrate research and control— Research the effects of the slug herbivory, if any, on *Bulbophyllum guamense*.
- Captive propagation for genetic storage and reintroduction:
    - Collect and maintain seeds and other propagules for storage and propagation efforts for maintenance of genetic stock.
    - Develop seed propagation protocols.

- Research on species' biological and ecological needs— Research life history and habitat associations to better identify information that will help guide recovery, for example: specific micro-habitat conditions, pollinators, reproduction, etc.
- Alliance and partnership development— Initiate planning and contribute to implementation of ecosystem-level restoration and management, especially between Guam and the CNMI to benefit this taxon.

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U.S. FISH AND WILDLIFE SERVICE

SIGNATURE PAGE for 5-YEAR REVIEW of *Bulbophyllum guamense*, wild onion, siboyas halumtanu (Chamorro name), siboyan halom tano (Carolinian 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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