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Guam-21 Orchid SAP

Guam -21 Orchid Species Action Plan Y3

Prepared by Island Eco Services for

NAVFAC Marianas

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TUBEROLABIUM GUAMENSE
MONITORING PLAN

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BACKGROUND

This monitoring plan is the third objective of the U.S. Fish and Wildlife Service and Department of Defense Recovery and Sustainment Partnership Initiative *Tuberolabium guamense* Action Plan. The first two objectives are to (1) establish a *T. guamense* inter-agency working group and (2) conduct *T. guamense* surveys.

The working group consists of members from various agencies on Guam and the CNMI including CNMI Division of Fish and Wildlife (DFW), CNMI Department of Land and Natural Resources (DLNR) - Rota Forestry, Guam Department of Agriculture (DoAg) - Division of Aquatic and Wildlife Resources (DAWR), Guam DoAG – Forestry, Naval Facilities Engineering Systems Command (NAVFAC) – Headquarters, Marine Corps Base Camp Blaz (MCBCB), EV Core, and Naval Base Guam (NBG), University of Guam – Cooperative Extension, Center for Island Sustainability, and Guam Plant Extinction Prevention Program, United States Fish and Wildlife Service (USFWS), and United States Marine Corps Headquarters.

GOALS

The goals of this plan are to identify the *T. guamense* populations in its known range in Guam and Rota for monitoring, describe the protocols and frequency to be used for monitoring, identify threats and knowledge gaps, and propose ways to implement the actions in this plan.

CONSERVATION STATUS

Tuberolabium guamense (*T. guamense*) was listed as threatened by the United States Fish and Wildlife Service (USFWS) on October 1, 2015. According to the USFWS, a species listed as threatened is defined as any species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Threatened species are protected by the take prohibitions of section 9, consistent with any protective regulations finalized under section 4(d) of the ESA (https://ipac.ecosphere.fws.gov/status/list).

RECOVERY STRATEGY

The Draft Recovery Plan for 23 Species in the Mariana Islands outlined recovery strategies for 14 plants listed. These strategies are:

→ Surveys

→ Seed collection and genetic storage

→ Habitat protection

→ Invasive species control

→ Propagation and outplanting

→ Micropropagation and the development of ex situ populations

→ Detecting and mitigating disease

→ Monitor genetics

SPECIES DESCRIPTION AND ECOLOGY

DESCRIPTION

T. guamense is an epiphytic orchid in the family Orchidaceae. The leaves are ovate to oblong, 13 x 1.5 cm (5 to 0.6 in), leathery in texture with a smooth edge and lacking a petiole. The leaves grow out of conspicuous roots, which elevate the plant above tree trunks on which it grows.

DISTRIBUTION

T. guamense is endemic to the Mariana Islands, specifically Guam and Rota, and historically from Tinian and Aguiguan (USFWS 2022). At the time of the listing in 2015 there was one occurrence with a single individual documented for Guam and six occurrences on Rota with a total of 239 individuals but estimated to be as high as 14,600 individuals (80 FR 59423, 2015).

Population has been defined as a having at least 1,000-meters between a group of *T. guamense*. A population size can range from 10 individuals to thousands of individuals. The most recent surveys (Table 1 and Figures 1-2) indicate there were 4 populations in southern Guam with 12,647 individuals, 5 populations in northern Guam with 14,020 plants. Approximately 123 acres were surveyed on Rota during June and July 2023. A total of 4,907 *T. guamense* (3,214 mature, 1,693 immature) were observed and recorded throughout the Mt. Sabana area.

Table 1. Total population count of *Tuberolabium guamnese* on Guam and Rota as of July 2023.

Population	Immature	Mature	Total Count
Bolanos 1	5,630	8,225	13,855
Bolanos 2	390	248	638
Bolanos 3	2	3	5
Mati Pt	3,752	6,166	9,918
Yigo Raceway	353	3,221	3,574
Yigo near Mormon temple	58	81	139
Umatac	1,218	1,465	2,683
Rota	1,685	3,201	4,886
AAFB Area 1 near HMU	1,623	2,880	4,503
AAFB Area 2			3,963
Andy South 1			12
Andy South 2			39
AAFB NWF near HMU/MSA	8,734	15,644	24,378
Inside the HMU			280
MCBCB Forest Enhancement Area			13,474
Translocated (Forest Enhancement Area)	58	49	107
Translocated (MCBCB)	281	1,721	1,993

MCBCB 1 (at translocation site)			1,257
MCBCB 2 (near Haputo)			163
MCBCB Translocated (near Haputo)			276
NAVMAG Area 1	116	220	336
NAVMAG Area 2	976	1,504	2,480
NAVMAG Area 3	1,849	3,611	5,460
NAVMAG Area 4	609	4,215	4,824
		Total:	**99,243**
		Total Off-DOD Lands:	**35,698**
		Total DOD Lands:	**63,545**

HABITAT AND ECOLOGY

T. guamense are typically found in Vitex, Ravine, and Limestone Forests (JRM, 2021).

Common host tree species on Guam to include *Eugenia reinwardtiana*, *Aglaia mariannensis*, *Elaeocarpus joga*, *Ficus prolixa*, *Ochrosia oppositifolia*, *Meiogyne cylindrocarpa*, *Vitex parviflora*, *Drypetes dolichocarpa*, *Premna obtusifloia*, *Morinda citrifolia*, *Hibiscus tiliaceus*, *Jasminum marianum*, *Spathodea campanulata*, *Triphasia trifolia*, *Leucaena leucocephala*, *Ixora triantha*, *Syzgium thompsonii*, *Cynometra ramiflora*, and *Pandanus tectorius*. *T. guamense* was found on seven species of host plants, all of which are native species on Rota and include: *Hernandia labyrinthica*, *Elaeocarpus joga*, *Pipturus argenteus*, *Ficus prolixa*, *Macaranga thompsonii*, *Premna obtusifolia* and *Pisonia umbellifera* (Zarones et al., 2015).

THREATS

T. guamense are susceptible to direct and indirect threats. These include:

→ Herbivory and habitat degradation by ungulates

→ Competition with invasive plants

→ Storm events & climate change

→ Wildfires

→ Human development

→ Predation by slugs

SURVEY, MONITORING AND RESEARCH

Monitoring of *T. guamense* populations will improve understanding of the ecology and population trends of the species.

POPULATION SURVEY

The number of plots per population will be determined based on USFS "Optimal Monitoring of Rare Plant Populations II" which suggests plot size should produce a mean frequency between 30-70%. The number and arrangement of plots will be spread over as large an area as possible. Study sites, not individual plots, will be marked and resampled. Plots will be rectangular in shape.

Frequency of monitoring will start with quarterly monitoring until life cycle is understood and seasonality of reproduction is well documented and then move to less frequent monitoring that targets reproductive periods. All populations will be monitored within a five year period at least once.

→ Data to be collected: count of individuals (mature/immature), reproductive stage (flowering/fruiting/vegetative), vigor (healthy, moderate, poor), recruitment (immature count, number of immature that matured, new phorophytes with *T. guamense* that were not present at last visit), phorophyte species, DBH of phorophyte, height of orchid (each individual? Highest individual? Median height?), location (GPS)

→ Document current habitat characteristics to be used as baseline for habitat monitoring (common features observed such as: associated tree species, overstory canopy height, moss or lichen presence, light levels (need to determine how to standardize measure of light to account for cloudy days or seasonal leaf drop in some phorophytes), etc.)

Outputs from monitoring: population estimates, population structure, distribution based on height or phorophyte species

MONITORING OF HOST TREES

Monitor potential host trees that do not have orchids. Trees will be visually checked to see if/ when they are colonized by new *T. guamense* to document the movement of populations (shrink, swell, or shift). This monitoring will also document the surrounding habitat and buffer areas between known populations. Monitoring of potential host trees will occur within 30 meters of the known populations. Possibly a specific number of plants per phorophyte species in the area (i.e. 5 Pandanus, 5 Areca, 5 Vitex). This monitoring will happen simultaneously with the population survey above.

→ Data to be collected: (DBH, phorophyte species, presence/absence of *T. guamense*, GPS)

HABITAT MONITORING AND THREATS

Changes in habitat or threats can indicate or even be the cause of population increases or decreases. This section includes what factors will be monitored. This monitoring should take place annually at as many populations as possible and be done by traversing at least 10% of the known occupied area including an area with high densities of orchids.

→ Document any changes in habitat seen during monitoring or after known disturbances (typhoon, development, etc)

→ Document new threats, if any

→ Suitable seed collection methods and methods for establishing new populations via translocation. To include ID of mycorrhizal fungi associated with Tuberolabium.

→ Measure humidity levels, temperature, light intensity, etc.

→ Determine health of host trees; termite infestation, rots, fungus, etc.

→ Document and identify pollinators that frequent the flower of *T. guamense.*

GENETIC MONITORING

Genetic analysis of each known population will be done concurrently with monitoring events to document genetic diversity and create a baseline for the genetic representation that is to be maintained as described in the USFWS recovery plan. There is currently no published literature on genetics of this species. When genetics are determined it will help guide actions to conserve plants both *in situ* and *ex situ*.

KNOWLEDGE GAPS

Many of the monitoring actions mentioned above will benefit from additional research. This section lists topics where current knowledge is lacking. Funding projects that fill these knowledge gaps will benefit the implementation of this monitoring plan.

→ Genetics

→ Life cycle

Pollinator (camera traps, self pollination?)

→ Seed distribution (sticky traps or imaging)

Fitness of recruits comparing native and non-native phorophytes

→ Mycorrhiza

→ Protocols for lab or nursery propagated plants (potentially using a mycorrhizal

inoculant) Predation by slugs or snails

→ Disease

IMPLEMENTATION

Implementation of this monitoring plan will require:

→ information identified in actions, plans, and other relevant documents to inform land planning and management

→ allocation of adequate resources to undertake the actions specified in the monitoring plan

→ collaboration with state agencies, non-government organizations, universities, etc.

→ collaboration with the community, where relevant, to assist with monitoring and other on-ground actions, and to help raise community awareness of conservation issues. Particularly the Guam Habitat Conservation Plan (HCP)

ACKNOWLEDGEMENTS

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MAPS

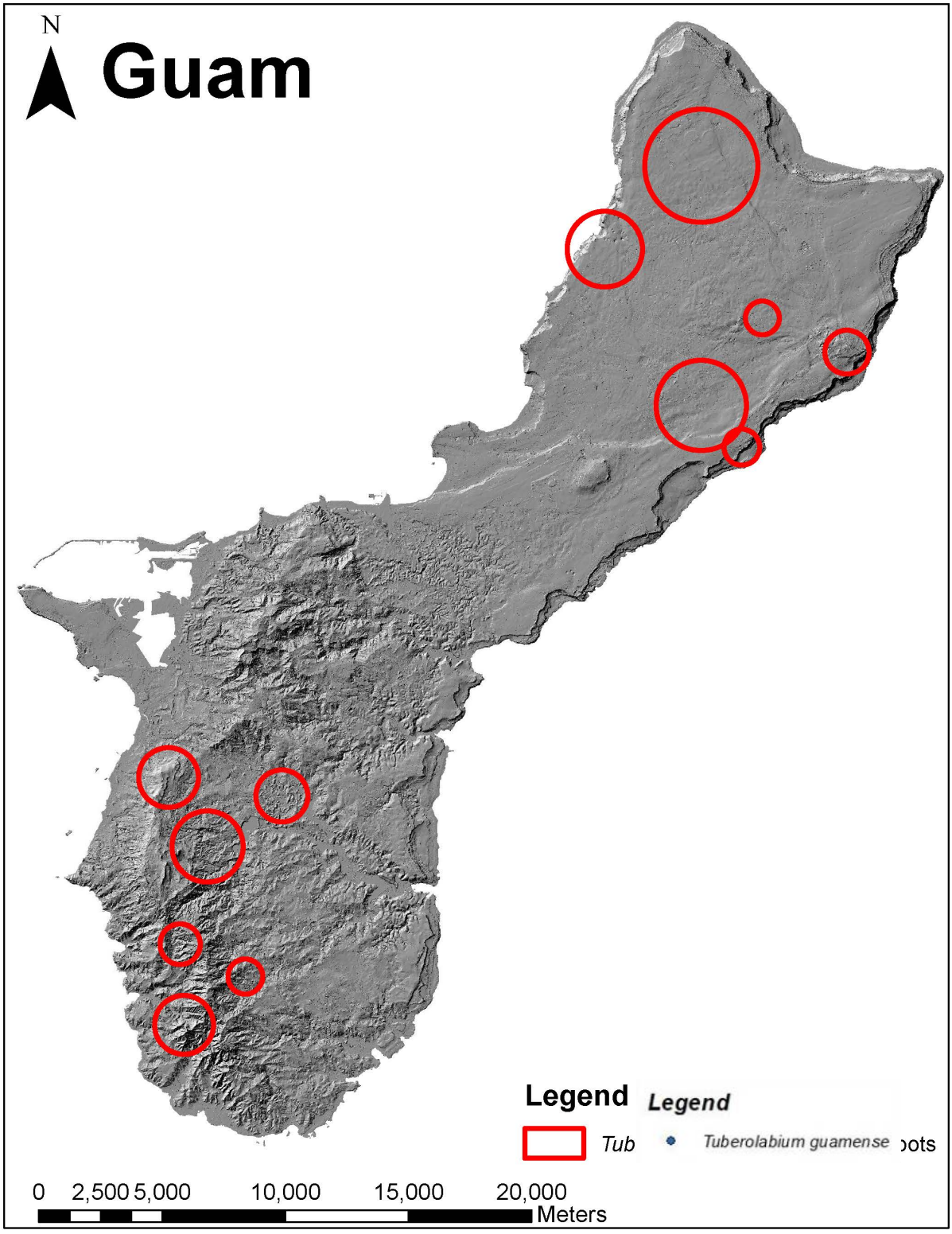

Figure 1. *Tuberolabium guamense* on Guam. Locations have been skewed and generalized to protect the integrity of the sites.

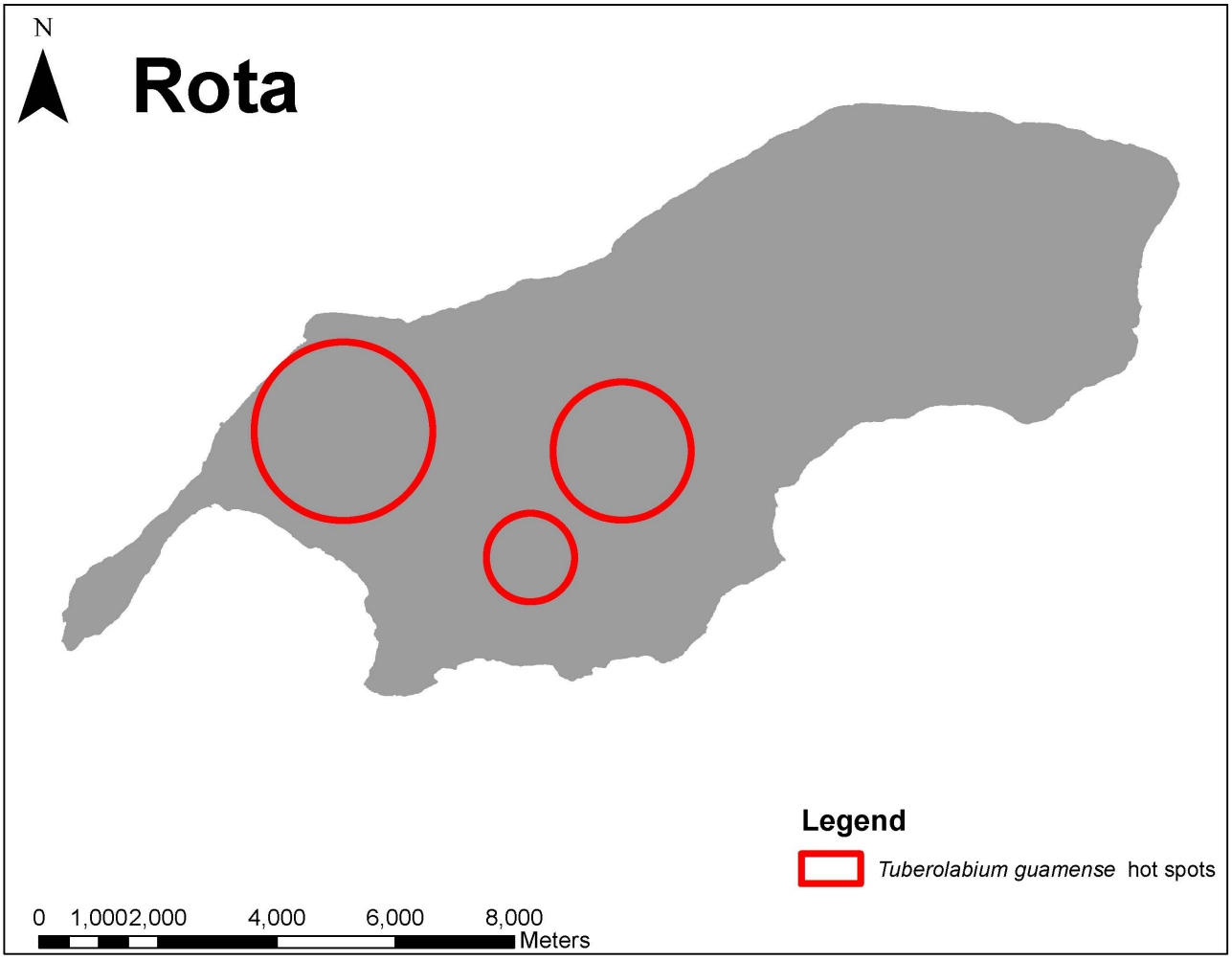

Figure 2. Map depicting generalized locations of T. guamense on Rota. Locations have been skewed and generalized to protect the integrity of the site.