

# Biological Opinion for Asan Springs Water Supply Facility Rehabilitation, Guam



*Guam tree snail.* Photo Credit: USFWS



**December 23, 2022  
(01EPIF00-2022-0089140)**

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## PACIFIC REGION 1

IDAHO, OREGON\*, WASHINGTON,  
AMERICAN SAMOA, GUAM, HAWAII, NORTHERN MARIANA ISLANDS

\*PARTIAL



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Pacific Islands Fish and Wildlife Office  
300 Ala Moana Boulevard, Room 3-122  
Honolulu, Hawaii 96850



In Reply Refer To: 01EPIF00-2022-0089140

December 23, 2022

## Memorandum

To: Barbara Alberti, Superintendent, War in the Pacific National Historic Park

From: Field Supervisor, Pacific Islands Fish and Wildlife Office

Subject: Biological Opinion for Asan Springs Water Supply Facility Rehabilitation, Guam

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed Asan Springs Water Supply Facility Rehabilitation, Guam, and its effects the endangered Guam tree snail (*Partula radiolata*, *alakeha*) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). You requested formal consultation on August 26, 2022. This biological opinion is based on information provided in the September 2022, *Biological Assessment for Asan Springs Water Supply Facility Rehabilitation Guam* enclosed with your request, telephone conversations, field investigations, and other sources of information. A complete record of this consultation is on file at the Pacific Islands Fish and Wildlife Office.

Additionally, you requested our concurrence with your determination the proposed action is “not likely to adversely affect” the threatened Mariana fruit bat (*Pteropus mariannus mariannus*, *fanihi*) pursuant to the ESA. We concur with your determinations for these species. Our concurrence with your determination is detailed in Appendix A of this BO. The National Park Service determined the proposed action is not likely to adversely affect the federally Mariana fruit bat because project construction will not occur when a Mariana fruit bat is within 150-m (492-ft) of the project site. Because project activity will cease if a Mariana fruit bat is detected within 150 m (492 ft) of the project activity, impacts to a bat are expected to be extremely unlikely to occur. Because adverse effects are extremely unlikely to occur, they are **discountable** and therefore not likely to adversely affect the Mariana fruit bat. Additional details are summarized in Appendix A of this biological opinion.

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On July 5, 2022, the U.S. District Court of the Northern District Court of California vacated the 2019 regulations implementing section 7 of the Endangered Species Act (ESA). On September 21, 2022, the Ninth Circuit Court of Appeals granted a request to stay the U.S. District Court of Northern California's July 5, 2022, order that vacated the 2019 ESA regulations. As a result, the 2019 regulations are again in effect, and the Service has relied upon the 2019 regulations in rendering this biological opinion. However, because the outcome of the legal challenges to 2019 ESA Regulations is still unknown, we considered whether our substantive analyses and conclusions in this consultation would have been different if the pre-2019 regulations were applied. Our analysis included the prior definition of "effects of the action," among other prior terms and provisions. We considered all the "direct and indirect effects" and the "interrelated and interdependent activities" when determining the "effects of the action." As a result, we determined the substantive analysis and conclusions would have been the same, irrespective of which regulations applied.

### CONSULTATION HISTORY

September 17, 2018: The Guam Waterworks Authority (GWA) contacted the Service for technical assistance on the Asan Springs Water Supply Rehabilitation project and to request a list of federally endangered or threatened species or critical habitat that may be affected by the project. On October 12, 2018, the PIFWO responded with the requested information and assigned reference number 2019-TA-0006.

March 15, 2021: NPS and GWA (through their consultant) provided a project update and requested an updated species list. On April 15, 2021, the Service responded with the updated species list and assigned reference number 01EPIF00-2021-TA-0269.

September 28, 2021: NPS submitted a biological survey report summarizing the results of the February 2021, biological survey of the project site and requesting an initial coordination meeting.

October 22, 2021: Representatives of the Service, NPS, GWA, and Guam Department of Agriculture held a teleconference to discuss the project overview, the biological survey results, and the next steps for the section 7 consultation. We requested an updated figure to show the limits of vegetation clearing, and GWA requested we provide you with a BA template.

November 30, 2021: The Service, NPS, GWA, and Guam Department of Agriculture held a follow-up meeting discussing the revised figure and basic elements for formal consultation based on anticipated adverse effects to *Partula radiolata*. The NPS and GWA agreed to prepare and submit the initial sections of a BA for Service review prior to submitting a complete BA.

February 9, 2022: NPS submitted a draft of Chapters 1 through 5 of the BA to the Service for review and comment. The Service provided comments on March 25, 2022.

April 19, 2022: representatives of the Service, NPS, and GWA, held a teleconference to discuss one additional comment related to the recommended duration of post-construction snail monitoring. Additionally, NPS, GWA and HDR held a public meeting at the Asan Village Mayor's Office Recreation Center to discuss the general components of the Asan Springs restoration project and answer any related questions from the attendees.

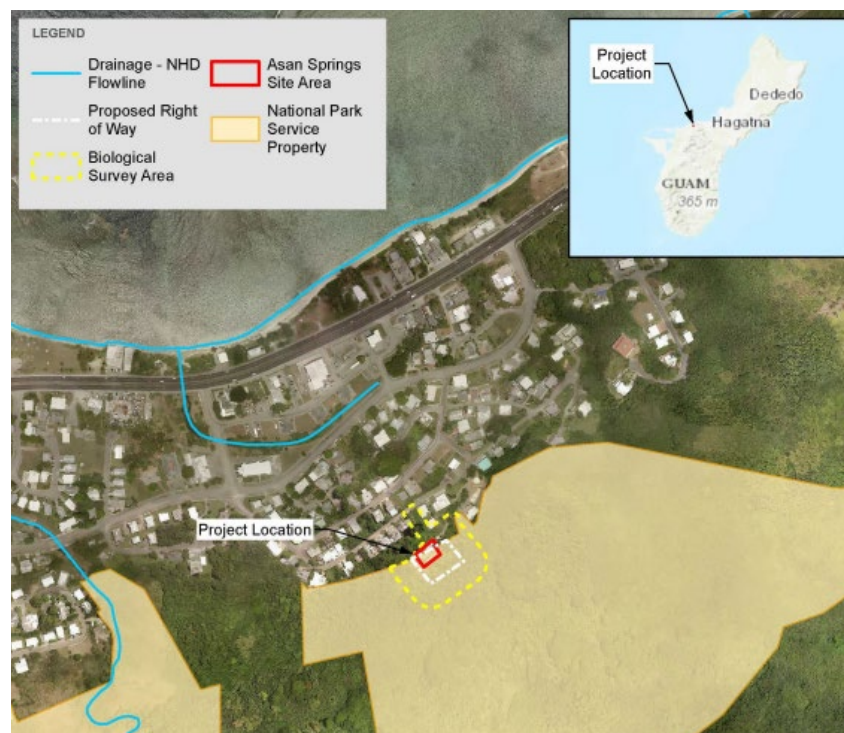
August 26, 2022: NPS sent a request for consultation and Biological Assessment (BA) for Asan Springs Water Supply Facility Rehabilitation; September 27, 2022, the Service confirmed initiation of formal consultation.

September 26, 2022: NPS sent an updated BA to the Service.

## BIOLOGICAL OPINION

### Description of Proposed Action

The proposed water supply facility maintenance project entails vegetation removal and the demolition and replacement of buildings, water facilities, fencing, electrical and transportation infrastructure, and concrete pads and potential disturbance within a 1.38 acre (ac) (0.56 hectare (ha)) previously disturbed Asan Springs Water Supply Facility within and adjacent to National Park Service (NPS) property in Asan, Guam (Figure 1). The project entails refurbishment of an existing facility that supplies water to existing waterlines.



**Figure 1. Asan Springs Water Supply Facilities project location.**

### Site Preparation and Demolition

Prior to any construction activities, the site will be prepared through a combination of vegetation removal and demolition of existing portions of the facility. The construction contractor will clear surface vegetation and “grub” (i.e., remove roots remaining in the soil) approximately 10 feet (ft) (3 meters (m)) beyond the new fence line, where there are no concrete swales, and 20 ft (9 m) beyond the edge of a newly constructed concrete swale, which will be outside of the fence line (Figure 1). Due to the severity of the slope of the areas upgradient of the site facility buildings, vegetation clearing will likely be performed utilizing hand tools, such as a machete, and powered equipment such as a bush cutter. Outside of the steeply sloped areas, vegetation clearing will be likely be performed utilizing machinery such as a front-end loader or backhoe. All vegetation waste will be removed from the site and disposed at a Guam Environmental Protection Agency (GEPA) approved disposal facility. Site preparations will also include activities in advance of clearing and grubbing, such as topographic surveys, which involve minimal vegetation clearing. These activities will follow applicable best management practices (BMPs).

The Asan Springs Water Supply Rehabilitation project will rehabilitate the existing impoundment structure by removing and replacing in-kind the plaster finish that was installed on the original exterior front face wall of the impoundment structure. The structural concrete deficiencies internal of the impoundment structure will be repaired by applying epoxy bonding materials. Additional modifications will be made to the roof structure. The modifications include sealing up unnecessary roof penetrations that were used for pumping operations and adding safety features such as a stainless-steel railing and manhole ladders to access the internal features of the structure.

The proposed water system components will connect to an existing water line located inside of the project site, with no planned modifications to the line outside of the project site that serves the village of Asan. A small area of vegetation will be cleared on Lot 7 for installation of the duct bank and additional vegetation clearing is likely to be done on Lot 7 to create a staging and access area for large vehicles such as concrete trucks.

Due to the lack of as-built information on the original structure, it is currently unknown what original piping may still exist within the site, including underground. Some of these original pipes may be encountered during construction, but it is assumed that they have all been abandoned in place. If further information reveals that these pipes were not properly abandoned, then field modifications will be made to properly abandon these pipes in place.

The following items within the project footprint will be removed during demolition activities:

- The 8-inch-diameter piping that supplies water to the water booster pump station building from the outlet structure
- The chlorine building structure and foundation
- The roof appurtenance at the water booster pump station

- The 8-inch-diameter water line and associated gate valves outside of the pump station building and exiting the project site
- The piping, valves, and concrete box adjacent to the chlorination building
- The water level appurtenance
- Three vents at the water booster pump station
- Asphalt and three concrete pads adjacent to the chlorination building and water booster pump station
- Concrete riprap adjacent to the chlorination building
- The gate and fence surrounding the Asan Springs Water Supply Facility
- An electrical handhole near the fence
- All dirt debris, rock rubble, pipe debris, fence debris, and other debris from the top of the concrete water storage reservoir roof
- All trees and roots that could impact the concrete water storage reservoir

An existing pipe and valve system is partially buried. An existing pipe and valve system is partially buried. It is assumed the pipe system could be connected to a floor drain system in the impoundment structure. The contractor will verify if the pipe and valves were components of the current system prior to its shutdown in 2004. If the components are not connected to the current system, the contractor will remove all remaining pipes and valves.

### Construction

The following facilities will be constructed within essentially the same footprint as the existing Asan Springs Water Supply Facility: A new chlorination building, water lines connecting to the existing 8-inch-diameter water supply line, concrete pads adjacent to the existing water booster pump station, impoundment water line connecting to the existing pump station facility, a new electrical duct bank and wiring within Lot 7, Block 9, an 8-foot-high fence surrounding the facility with access gate off the existing access road and pedestrian gate with concrete stairs leading to the new facilities, and a concrete drainage swale (ditch) surrounding the upgradient limits of the facility, diverting drainage away from the reservoir, with rock riprap at each end of the swales.

### Operations

Once operational, the Asan Springs Water Supply Facility will be regularly monitored and maintained by GWA. Maintenance activities for the facilities will occur entirely within the developed, fenced perimeter with the exception of vegetation maintenance activities. GWA will access the site daily to take water samples, check chlorination feed systems, and perform general maintenance activities. GWA will access the site at approximately weekly intervals to exchange empty chlorine gas cylinders with full chlorine gas cylinders.

Exterior lighting for the facility will be provided through exterior lights attached to the chlorination and the pump buildings. A 20-foot-wide buffer around the concrete swale will be maintained as a low grass through regular mowing. Mowing is expected to be required every month, at a minimum.

#### Project Timelines

##### Operational Periods

Limit routine daytime activities to 30 minutes after sunrise and 30 minutes before sunset.

#### Threatened and Endangered Species Minimization, Avoidance, and Conservation Measures

The following measures will be implemented to minimize or avoid, and conserve the Guam tree snail. These measures include general BMPs and Guam tree snail survey and translocation measures that will be taken should one or more Guam tree snails be detected in the project area.

#### *General Site Best Management Practices*

1. Prior to site entry for site preparation, demolition and construction, or operations, GWA staff and contractors will be trained about proper avoidance measures for protected species, including any pre-disturbance survey requirements, unique flagging used, prohibitions against unauthorized clearing of vegetation, and biosecurity BMPs.
2. GWA will require their construction contractor to follow a biosecurity plan to avoid introduction or spread of new invasive plant or animal species to or from the site. The biosecurity measures are listed in Appendix B.
3. Construction activities will be conducted during the day: between 30 minutes after sunrise and 30 minutes before sunset.
4. Personnel working on site will be prohibited from burning of trash, disposing of excess soil, green waste, or solid and sanitary waste in unauthorized locations, or refueling of vehicles and equipment.
5. Storage of hazardous substance or petroleum products will not occur on-site other than designated areas with proper spill protection.
6. Dust suppression through sprinkling water and/or dust barriers will occur throughout the site when conditions warrant.
7. A line of demarcation will be established and clearly visible along the edge of the vegetation clearing boundary prior to any demolition or construction-related vegetation clearing.
  - a. People and equipment will be prohibited from movement past the line of demarcation into adjacent properties outside of the limits of vegetation clearing. General site access control will be enforced.
8. A dual-purpose physical barrier will be utilized to accomplish work separation from *Partula radiolata* clusters as well as for dust mitigation. These barriers will be free standing (rebar anchored) along the edge of the vegetation clearing boundary. Barriers will be approximately 10 ft (3 m) high. Barrier material proposed is HDPE, PE with UV protection, shade rate of 30-90 percent, weight of 55-240 g/m<sup>2</sup>, high strength, and easy fixing. The barrier will remain until the vegetation clearing, construction of the concrete

swale, installation of the perimeter fence is complete, and any revegetation is re-established. Removal of the barriers will then be completed.

9. To avoid potential impacts to limestone forest plant pollinators and seed dispersers, outdoor lighting will be minimized, and construction work will not occur within 150 m (492 ft) of a Mariana fruit bat roost and when a Mariana fruit bat is seen flying or foraging within 150 m (492 ft) of construction activity, work will pause until the bat has left the area. The GWA will implement a contractor education program to ensure that construction contractor personnel are shown how to identify, respond, and report a Mariana fruit bat sighting. A dusk biomonitor survey will be done by an Authorized Biologist following JRM protocol (USFWS 2009).
10. The qualifications for an Authorized Biologist for the Guam tree snail include the following:
  - a. A bachelor's degree with an emphasis in botany, horticulture, ecology, or a related science
  - b. At least 100 documented hours of experience conducting translocation and monitoring of the species or a closely related species
  - c. Applicant must provide contact information of three references familiar with their work related to number 2 (above)

*Tree Snail Survey, Avoidance, and Translocation Measures:*

GWA and NPS will designate, with the Service's approval, an Authorized Biologist(s) to serve as the environmental compliance monitor with the authority to schedule and perform any required surveys, coordinate installation of any physical avoidance and minimization features (e.g., silt, dust, and snail barriers), coordinate work stoppages/resumptions, conduct awareness training, and complete appropriate reporting. The environmental compliance monitor will be present when planning and conducting ad hoc or updated surveys and installing and removing environmental controls. The environmental compliance monitor will be on site monitoring for the duration of work that includes vegetation clearing or potential vegetation disturbance. The qualifications for the Authorized Biologist for the Guam tree snail are as described above.

The Authorized Biologist(s) will conduct pre-impact tree snail surveys over the biological survey area (see Figure 1) as close as possible but no more than five days prior to the start of any site preparation or demolition and construction activities that require vegetation clearing. If vegetation clearing is localized, the pre-impact survey will be limited to the area within 30 ft (10 m) from the area where the work will occur. Vegetation clearing and construction personnel and equipment access at the Asan Springs Water Supply Facility will be strictly limited to that which is required for project completion and will be marked by a line of demarcation. Vegetation to be removed shall be inspected by the environmental compliance monitor for the presence of federally listed tree snails both one week prior to and the same day immediately prior to clearing activities. Tree snails have not been detected within the project vegetation clearing footprint. However, because tree snail survey detection probability may be low, and tree snails are mobile,

there is a potential for tree snails to be found when vegetation is cut and closely examined during project activities.

If any Guam tree snails are detected in these surveys, the following additional measures will be taken:

- 1.) Where tree snails are observed outside of the vegetation clearing project footprint, specific-colored flagging tape will be used to mark a 30 ft (10 m) buffer around the tree snails and construction personnel will not enter the tree snail buffer area.
- 2.) After all visible tree snails are removed, branches, tree limbs, and vines will be removed manually from areas within 30 ft (10 m) of snail observation using hand tools and small powered equipment such as bush cutters. The limbs will be placed on the ground and searched by the monitor for snails. The green waste will be searched again the next day to ensure all snails are translocated before the green waste is removed. After the second search of green waste, the green waste will be removed from the site and disposed of at a GEPA- approved disposal facility. Immediately following vegetation removal, a biologist will inspect branches, limbs and vines for snails that may not have been visible during ground surveys. Any snails that are found in downed vegetation will be translocated.

*Translocation Methods:* The following translocation methods will be followed to impacts to the tree snails. These have been derived from similar, recent translocation efforts with this species:

- Prior to commencing Guam tree snail translocation, NPS will submit the statement of qualifications to the Service notifying the Service of the selection of an Authorized Biologist, defined above, for tree snail translocation. The Service will review the individual's qualifications and will respond within 30 days with any concerns regarding the Authorized Biologist applicant.
- Prior to vegetation clearing or construction activities, the Authorized Biologist will survey for and assess a tree snail translocation area with up to three release trees near the project site, where Guam tree snails continue to be present. A snail translocation site of approximately 0.50 ac (0.20 ha) that is approximately 150 ft (46 m) to the southeast of the Asan Springs Site; this translocation site is on NPS property, is not planned for future development, and supports an existing population of the Guam tree snail. The Authorized Biologist will conduct a tree snail survey of the translocation site and record the baseline number of individuals detected, the presence of ground shells and/or snails, the host plant that snails are observed on, the condition of overall vegetation density for snail suitability, and signs of tree snail predators.
- Tree snails salvaged from within the vegetation clearing boundary will be collected and will be placed in a 32-ounce plastic ventilated insect cup for holding with no more than 10 tree snails (both juvenile and adult sized) per cup. Each cup will be partially filled with suitable vegetation from the salvage site and moistened with water (bottled water if rainwater is not available) to provide a resting surface for the snails. The tree snail species, GPS location of the home plant, and home plant species will be recorded. Each tree snail salvaged will be marked with a black dot using a non-toxic paint pen.

- Salvaged tree snails will be translocated the same day; no tree snails will be held overnight. Snails will be transported by hand (no vehicles required) to an approved translocation area and placed on a pre-selected recipient tree.
- Salvaged tree snails will be inventoried, then prudently transferred by hand along with its respective vegetation into a second 32-ounce plastic insect cup to allow the tree snails to disperse autonomously. The second cup will be considered as the “release cup” and it will be secured approximately 4.9 ft (1.5 to 2 m) above ground level on the recipient tree using an aluminum craft wire that serves as a bungee to hold the cup in place. Placing translocated snails 4.9 ft (1.5 to 2 ft) above ground level should minimize attraction of Manokwari flatworms in the short-term during release and is the greatest distance easily reached without climbing or use of a ladder.
- If conditions are dry at the time of release, the interior of the release cup may be lightly misted with a spray bottle of water to encourage movement and dispersal from the release cup. The release cup will be perforated to allow drainage in the event of rain and placed in a shaded location.
- Release cup(s) will be checked every day until all snails have left the cup(s), then the cup(s) will be removed.
- Tree snails released at the translocation recipient site will be monitored twice a month during the course of vegetation clearing and for an additional 6 months once vegetation clearing, surface disturbance, and dust-generating activities are complete (as identified in Best Management Practices). Monitoring surveys will follow the methods of Lindstrom and Benedict (2014). A circular quadrat with a diameter of eight meters (50 square meters) centered on the trunk of the recipient tree(s) will constitute the monitoring area. Vegetation in the monitoring area will be searched for one person hour. If necessary, binoculars may be used to observe upper tree canopy areas in the monitoring area. The number of marked and un-marked tree snails will be recorded.
- In addition, the ground in the quadrat will be searched for tree snail ground shells and the number of marked and unmarked ground shells recorded. All ground shells will be removed from the monitoring quadrat when the first salvaged tree snails are released, and ground shells will be removed following each monitoring survey. Shells removed from the quadrat will be deposited within the tree snail population area, but away from the monitoring quadrat. The temperature, humidity, precipitation, and wind speed and direction will also be measured at the start of each monitoring survey.

#### *Guam Tree Snail Project Monitoring Reports:*

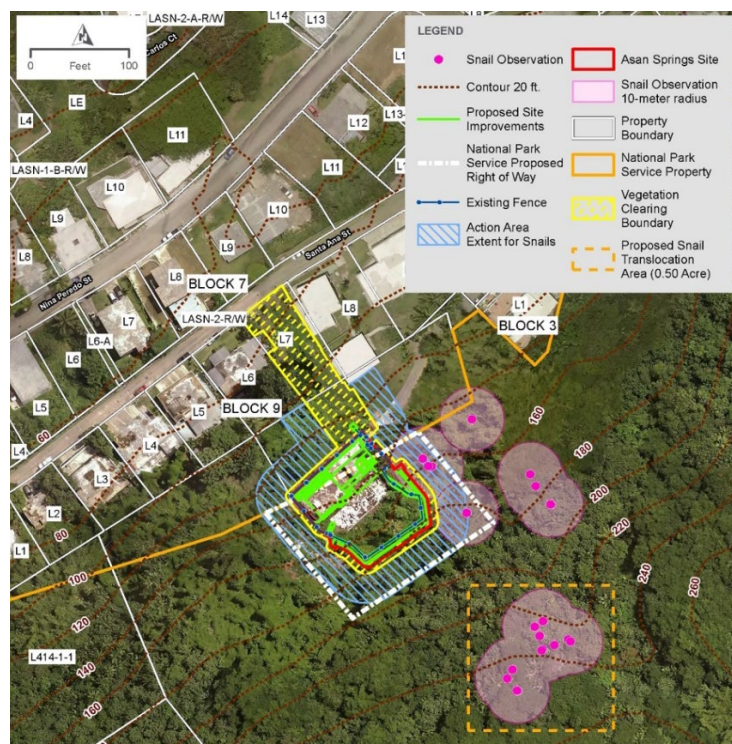
The environmental compliance monitor will provide daily monitoring reports (including photographic record) during activities that involve vegetation clearing or disturbance. Monitoring will include inspection, maintenance, and reinforcement of restrictions when necessary relative to all avoidance measures.

The Authorized Biologist will prepare and NPS will submit a final report of salvage and translocation activities to the Service. The report shall include details on the type of activities

conducted (e.g., salvage, translocation, monitor), photographs, a comparison of baseline and final population numbers at the translocation site, and recommendations or lessons learned.

### Action Area

The action area is defined at (50 CFR 402.02) as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action”. The action area for this Asan Springs Water Supply Facility project is located within the village of Asan, Guam (Figure 1). The action area includes the 0.24 ac (0.1 ha) disturbance footprint, a 30-ft (10 m) buffer around the disturbance footprint, and a 0.5 ac (0.2 ha) nearby tree snail translocation site. All construction work will be confined within the 0.24 ac (0.1 ha) “Vegetation Clearing Boundary” disturbance footprint shown in Figure 2. This project footprint includes the 10 ft (3m) around the perimeter of the fence and 20 ft (9 m) from the edge of the concrete swales of the Asan Springs Site and the full extent of Lot 7.



**Figure 2. Project footprint and adjacent project areas.**

In addition to the project footprint, the action area includes an additional 30 ft (10 m) (0.39 acre) buffer distance beyond the vegetation clearing boundary, where dust disbursement, potential erosion and sedimentation, and edge effects from removal of adjacent vegetation have the potential to affect federally listed snails (referred to as the “Action Area Extent for Snails” in Figure 2). A tree snail translocation site of approximately 0.5 ac (0.2 ha) that is approximately 150 ft (46 m) to the southeast of the Asan Springs project footprint, on NPS property, may also

be used for project activities. This translocation site supports an existing population of the Guam tree snail (see Figure 2) and it would be used for this project's tree snail translocation and monitoring work should tree snails be found within the vegetation clearing boundary. The action area does not extend onto private, developed property on either side of Lot 7.

### **Analytical Framework for the Jeopardy Analysis**

In accordance with regulation (see 84 FR 44976), the jeopardy determination in this Biological Opinion relies on the following four components:

1. The Status of the Species, which evaluates the species' current range-wide condition relative to its reproduction, numbers, and distribution; the factors responsible for that condition; its survival and recovery needs; and explains if the species' current range wide population is likely to persist while retaining the potential for recovery or is not viable;
2. The Environmental Baseline, which evaluates the current condition of the species in the action area relative to its reproduction, numbers, and distribution absent the consequences of the proposed action; the factors responsible for that condition; and the relationship of the action area to the survival and recovery of the species;
3. The Effects of the Action, which evaluates all future consequences to the species that are reasonably certain to be caused by the proposed action, including the consequences of other activities that are caused by the proposed action, and how those impacts are likely to influence the survival and recovery role of the action area for the species; and
4. Cumulative Effects, which evaluates the consequences of future, non-Federal activities reasonably certain to occur in the action area on the species, and how those impacts are likely to influence the survival and recovery role of the action area for the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the consequences of the proposed Federal action in the context of the species' current range wide status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild. The key to making this finding is clearly establishing the role of the action area in the conservation of the species as a whole, and how the effects of the proposed action, taken together with cumulative effects, are likely to alter that role and the continued existence (i.e., survival) of the species.

### **Status of the Species and Environmental Baseline of the Guam Tree Snail**

#### Species Description

The Guam tree snail was federally listed as endangered on October 1, 2015 (80 FR 59423). Critical habitat designation for the species is in preparation. The Guam tree snail is a small land

snail endemic to Guam. The shell is dextral with an obtuse spire and five whorls, and a pale straw color with darker axial rays and brown lines. The peristome is simple, thin, and white. Adult length is 0.5 to 0.8 inches (13 to 19 millimeters), and width 0.3 to 0.5 inches (8 to 12 millimeters) (Smith et al. 2008, p. 4).

The Guam tree snail is part of the Partulidae family, which contains over 120 species distributed throughout the high volcanic islands of the tropical Pacific (Cowie 1992, p. 168). The Guam tree snail was first described as *Bulimus (Partula) radiolatus* in 1846 and later renamed *Partula radiolata* in 1849 (Crampton 1925, p. 34), which remains the accepted taxonomy for the species.

### Life History

Limited information is known about the life history of the Guam tree snail. Partulids are simultaneous hermaphrodites, having both male and female reproductive organs that are functional at the same time, and breeding may occur between unrelated individuals (outbreeding) or by self-fertilization (selfing) (Cowie 1992, p. 174). Land snails of the Partulidae family are generally slow-growing, long-lived, and slow to reproduce, producing between one and 10 eggs or juveniles in the brood pouch which are typically found in different stages of development. The snails subsequently give birth to single young over multiple weeks (Cowie 1992, p. 174; Bick et al. 2018, p. 3). Bick et al. (2018, p. 7) found the Guam tree snail to have higher reproductive activity, both in the wild and in captivity, than its extirpated congeners, with an average clutch size of over 4.12 eggs or juveniles in the brood pouch and a weekly birth rate of 0.172 births per adult, suggesting the species' higher fecundity has enabled its persistence.

The Guam tree snail lives on the undersides of leaves of many different species of large-leaved plants including trees, shrubs, herbaceous plants, and occasionally ferns. The species' preferred habitat is cool, shaded forest with high humidity and reduced air movement that prevents excessive water loss, and surveys have found individuals on both native and introduced plants (Smith et al. 2008, p. 16; Lindstrom and Benedict 2014, p. 26). The Guam tree snail occurs in understory from approximately 3 to 10 feet (1 to 3 meters) above the ground and higher, and frequently in margins of forests or near water sources (Crampton 1925, p. 17; Hopper and Smith 1992, p. 78; Lindstrom and Benedict 2014, p. 31). Increased mobility is associated with Guam tree snails in habitats with greater humidity and precipitation, particularly after typhoon conditions, and less frequently individuals are found on the ground and on rocks (Lindstrom and Benedict 2014, p. 175; DAWR 2019, p. 130; Fiedler 2019, p. 16).

Partulids need live and decaying plant material, as their diet consists of fungi and microalgae (USFWS 2020, p. 4). No clear obligate relationship with any vegetation has been identified for the Guam tree snail. Natural predators, if any, are unknown, but may have included now extinct bird species of Guam (Cowie 1992, p. 174).

### Population Dynamics

The Guam tree snail has historically been the most widespread and frequently encountered partulid in Guam, and one hundred years ago Crampton (1925, p. 36) noted the species occurred

“almost everywhere in the island where suitable vegetation exists.” In Crampton’s study, colony size varied, even among uniform habitats; in the northern half of Guam, the species was more abundant in the west and relatively scarce in the east, while in the southern half of the island it was as abundant in the west as the east. More than 2,000 individuals were collected across 37 sites in the 1920s (Crampton 1925, p. 35–37). In 1989, the Guam tree snail was found at only 9 of 34 of the sites resurveyed, as well as at 7 of 13 new sites surveyed (Hopper and Smith 1992, p. 78).

Sampled Guam tree snail populations have shown a very low degree of genetic heterogeneity, with no discernible colony specific or geographic patterns (Lindstrom and Benedict 2014, p. 27). This indicates that Guam tree snails have a limited ability to move between colonies, or that the sampled colonies had not been isolated long enough to form subpopulations (Lindstrom and Benedict 2014, p. 27).

#### Status and Distribution

At the time of listing in 2015, there were no more than 26 colonies of Guam tree snails known, with between 10 and 150 individuals per colony. In 2020, the Guam tree snail was distributed across Guam at more than 50 locations in populations ranging from a few snails to likely greater than 1,000 individuals, but the colony sizes at specific locations have likely fluctuated over the past century, and a systematic comparison of abundance over time has not been possible (USFWS 2020, p. 5, 10).

Extensive tree snail surveys have been conducted at one of the 50 sites - Haputo Ecological Reserve Area (ERA). Surveyors detected 1,530 (ARC 2019)) Guam tree snails at the Haputo Beach tree snail colony and the number of snails detected at other locations of Haputo ERA are: Pugua Point (31 snails), Double Reef (383 snails), South Haputo (2 snails) (Holland *et al*, 2014, 15-26), and Haputo fence line (30 snails, 0.4 snails/acre (Fiedler *et al*, 2019)). Because the tree snail surveys did not include assessments of tree snail detection probability, there is considerable uncertainty regarding the number of tree snails at this site. Because they would be within easy reach to surveyors, presumably detection probability is quite high for snails in the understory and on the ground while, however, due to limited visibility and backlighting during daytime snail surveys, Guam tree snail detection probability in overstory tree canopies is likely to be very low. No tree snails have been found on the ground at Haputo ERA. Detection probabilities for tree snail surveys is also likely to vary based on the level of search effort per acre searched. Tree snail detection probability can be as high as 39% when searchers spent a lot of effort searching very small areas, and as low as 1% when, such as in 2016, a tree snail is detected and snail presence is confirmed without implementation of a standardized search protocol (Rohrer 2016; Oahu Army tree snail survey information; Olmsted 2017, pers. comm. regarding Andersen South, Guam as cited in Department of the Navy 2017; Gary pers. comm. 2022; and Sischo, pers. comm. 2022). Detection of the approximately 2,000 Guam tree snails at Haputo ERA, with a 1% detection probability would mean there are actually 200,000 Guam tree snails within the surveyed areas of Haputo; a 4% detection probability would mean there are actually 50,000 tree snails. Application of a 39% detection probability would mean there are approximately 5,000

Guam tree snails living in the areas of Haputo ERA where the approximately 2,000 Guam tree snails were detected.

### Threats

The following threats to the Guam tree snail contributed to its listing and continue to impact the ability of the species to recover.

- **Loss or degradation of habitat:** The degradation and loss of primary and other forest habitats from ungulate damage, the encroachment of invasive plants, conversion to agriculture, military activities, and development has substantially diminished the extent of habitat for partulids in Guam (80 FR 59424, October 1, 2015, p. 59447). Changes to the native forest understory particularly limit the persistence and size of extant Guam tree snail populations. Non-native ungulates are known to graze upon the Guam tree snail's preferred home plants and profoundly impact the understory by clearing shrubs and trees, resulting in a drier and hotter microhabitat unsuitable for the species (Smith et al. 2008, p. 16). Invasive plants, such as the legume *Leucaena leucocephala* (tangan-tangan), crowd out native canopy trees, similarly creating a drier, less suitable understory (Hopper and Smith 1992, p. 83).
- **Non-native species predation:** In addition to species of predatory land snails and rats introduced to Guam, the invasive manokwari flatworm (*Platydemus manokwari*) and little fire ant (*Wasmannia auropunctata*) prey on partulids and are capable of causing significant decline in Guam tree snail colonies (Hopper and Smith 1992, p. 82; USFWS 2020, p. 7).
- **Low population numbers:** The low degree of genetic heterogeneity throughout the island (Lindstrom and Benedict 2014, p. 27) increases the vulnerability of the Guam tree snail to extinction and may make the species more vulnerable to the effects of isolation, habitat fragmentation, and stochastic events, including disease and typhoons.
- **Fire:** Fires threaten the native species and ecosystems of Guam, and are both intentionally set (e.g., arson) or caused by altered fire regimes from alien species (80 FR 59424, October 1, 2015, p. 59457). In 2021, a total of 177 wildfires burned approximately 3,624 acres (1476 ha) of land in Guam (FSRD 2022, p. 3).
- **Overutilization:** The collection of snail shells for trade threatens the persistence of the Guam tree snail (80 FR 59424, October 1, 2015, p. 59462).
- **Climate change:** The altered precipitation regimes and increased temperatures expected as a result of global climate change could lead to the loss of native species that comprise Guam's forest communities in which the Guam tree snail occurs. More frequent drought, flood, or typhoon events will affect understory microhabitat and partulid food sources and exacerbate the effects of other threats. Further, damage or destruction of vegetation from typhoons modifies light availability and creates space for invasion by non-native pest and plant species (80 FR 59424, October 1, 2015, p. 59458).

Guam Tree Snail Recovery Criteria

A draft recovery plan for species in the Mariana Islands was published November 13, 2022. The following recovery objectives for the Guam tree snail have been identified in the draft recovery plan and have not yet been met.

To down list the species, there must be at least 10 stable populations in Guam, each with a minimum of 400 individuals distributed across all age classes, and six of the populations must have had more than 400 individuals for three consecutive years. If morphological or genetic analyses show a geographic partitioning of the species, each area supporting a unique entity must host one or more of the 10 populations. Each population must occur in suitable native forest habitat that is protected from development, ungulate-free, and managed for invasive species. If the protected habitat is not free from predators, it should be demonstrated that predation is unlikely to have population-level effects on the Guam tree snail. Biosecurity measures must be in place to prevent the introduction of additional invasive snail predators to Guam.

To delist the species, there must be at least 20 stable populations in Guam, each with a minimum of 400 individuals distributed across all age classes, and 15 of the populations must have had more than 400 individuals for five consecutive years. If morphological or genetic analyses show a geographic partitioning of the species, each area supporting a unique entity must host one or more of the 20 populations. At least five of the populations must occur in areas confirmed to be free of predatory land snails and the manokwari flatworm. Invasive predators in Guam must be eradicated or reduced so long-term population viability of the Guam tree snail can be demonstrated. In addition to the habitat requirements for down listing, the protected habitats must be capable of supporting expansion of the species, positive population growth, and establishment of new populations through natural dispersal. For each protected habitat a management and monitoring plan must be in place, and any necessary agreements to maintain these protections in perpetuity.

*Survival and Recovery Needs*

In order to recover the Guam tree snail, the species needs to be protected throughout its' range from existing threats, and further introductions of injurious species must be prevented. Ungulate control range wide and fencing restoration sites are crucial steps in managing Guam tree snail populations and preserving microhabitat to enable the expansion of existing colonies and reestablishment of historic colonies (Crampton 1925, p. 36; Hopper and Smith 1992, pp. 78–81; USFWS 2020, p. 10). Degraded habitat may require reforestation with native flora to restore the forest structure, e.g., the understory, and further habitat loss and degradation, including wildfires, should be controlled if the Guam tree snail is to recover.

The extent of the manokwari flatworm invasion in Guam should be researched and the development and implementation of control and eradication methods are needed (USFWS 2020, p. 11). Surveying for flatworms and other predators, and quantifying their impacts to the Guam tree snail, should be required prior to translocating individuals for the purpose of reestablishing populations at restoration sites. The feasibility of a captive breeding program for the Guam tree

snail should be evaluated for potential establishment of new colonies, expansion of existing colonies, and reestablishment of historic colony sites, and to prevent possible extinction throughout the species' range (USFWS 2020, p. 11).

Comprehensive studies on the biology and life history of the Guam tree snail are required to identify diet, reproductive output, survival rate, predation risk, and activity patterns, and inform recovery actions. Additionally, the current population size, structure, and island wide distribution of the Guam tree snail should be surveyed. These surveys should also determine the degree of genetic diversity within and among populations to assess geographic connectivity. Individual snails may be tracked to understand the Guam tree snail's activity patterns and ability to disperse (USFWS 2020, p. 11).

#### **Baseline – Status of Guam tree snail in the action area**

Although no Guam tree snails were detected within the 0.24 ac (0.1ha) area where vegetation will be cleared, Guam tree snails are mobile, and they can be dispersed during wind events, so they may move into the project area. Four Guam tree snails were detected within a 0.1 ac (0.04 ha) area within the 30 ft (10 m) buffer surrounding the project footprint and an additional 14 Guam tree snails were found beyond 30 ft (10 m) from the project footprint.

Because project tree snail surveys did not include assessments of tree snail detection probability, there is considerable uncertainty regarding the number of tree snails in the action area. Because they will be within easy reach to surveyors, presumably detection probability is quite high for snails in the understory and on the ground. However, due to limited visibility and backlighting during daytime snail surveys, Guam tree snail detection probability in overstory tree canopies is likely to be very low. Detection probabilities for tree snail surveys is also likely to vary based on the level of search effort per acre searched. Tree snail detection probability can be as high as 39 percent when searchers spent a lot of effort searching very small areas, and as low as 1 percent when, such as in 2016, a tree snail is detected and snail presence is confirmed without implementation of a standardized search protocol (Rohrer 2016; Oahu Army tree snail survey information; Olmsted 2017, pers. comm. regarding Andersen South, Guam as cited in Department of the Navy 2017; Gary pers. comm. 2022; and Sischo, pers. comm. 2022).

Conservative application of the four percent detection probability to the project's survey results indicates that there are an estimated 100 Guam tree snails in the 0.1 ac (0.04 ha) area within the 30 ft (10 m) of the project's vegetation clearing project footprint were the four snails were detected (a density of 100 tree snails per .1 ac (0.04 ha)). Although surveyors did not detect any tree snails within the project footprint or the remaining areas of the buffer area, a conservative application this 100 tree snails per 0.1 ac (0.04 ha) density to the whole 0.24 ac vegetation clearing area would mean that there may be as many as 240 snails within the area where vegetation will be cleared. The 0.5 ac (0.20 ha) translocation site is known to be occupied by Guam tree snails; the population size has not been assessed.

## Effects of the Action

**General Effects:** The project will result in the vegetation removal and this type of project has the potential to cause erosion and dispersal and settling of dust on adjacent vegetation. The project's implementation of dust abatement and erosion minimization measures reduces the potential for dust and erosion to impact vegetation outside the project footprint. Because the project area is previously developed, project-related vegetation clearing and facility reconstruction area not expected to significantly alter the microclimate and wind exposure of the adjacent vegetation. At the translocation site, monitoring activity is not expected to change the structure or function of the existing habitat.

## Beneficial and Adverse Consequences of the Proposed Action on the Guam Tree Snail:

### Species' response to a proposed action

During the proposed water treatment plant restoration activities, it may be necessary to clear vegetation or cause dust to settle on habitat that is occupied by the Guam tree snail. Vegetation clearing, translocation, foot traffic, and construction dust may result in habitat loss and physical disturbance, injury, or mortality of one or more Guam tree snails within a 1.38 ac (0.56 ha) area. Additionally, these Guam tree snails may be disturbed by vibrations from mechanical tools and vehicles used in very close proximity to the tree snails. The project's implementation of dust, erosion, and biosecurity measures reduces the likelihood the project would result in habitat loss, degradation, or modification due to introduction of invasive species, dust, or erosion.

Implementation of dust barriers and biosecurity measures including inspection of all tools and materials, and the application of bleach solution to soles of shoes, make it unlikely that introduction of a new invasive species occurs to change the makeup of the existing habitat. Vibration is not expected to affect the tree snails differently than vibration they experience due to wind movements to the vegetation they are on.

Although no Guam tree snails are known to occur within the project area where vegetation will be cut and removed, an estimated 100 to 240 Guam tree snails may occur within and immediately adjacent to the project footprint. Because the Guam tree snail is a mobile animal and the snails may move into the project site or be dispersed there during wind events prior to project completion, there is a potential for the project to result in the capture and translocation or the injury and death of Guam tree snails. The use of hand tools for cutting in any areas where a Guam tree snail has been detected, and close inspection of cut vegetation for Guam tree snails prior to further treatment of the vegetation, is expected to result in the detection and successful translocation of tree snails that are within the cut vegetation.

There is an unavoidable possibility one or more undetected Guam tree snails may be injured or killed during vegetation cutting activities. Should one or more Guam tree snails occur within the vegetation clearing project footprint, these tree snails may be crushed during the vegetation cutting process by falling vegetation or by trampling by vegetation removal workers. There is a

possibility that as few as zero and as many as 240 Guam tree snails may be captured and translocated. There is an unavoidable chance a subset of these tree snails could be injured or killed by trampling or crushing if they go undetected in both the pre-construction surveys and the more detailed surveys of each piece of vegetation cut during project implementation.

Captured tree snails are expected to be successfully translocated to a location where their survival and reproduction would be comparable to what it would have been in the absence of the proposed action. Grounded and translocated tree snails are expected to move up onto intact vegetation after being moved to the ground as a result of the project. The presence of a population of Guam tree snails at the nearby translocation site provides evidence that that location is suitable habitat to support the Guam tree snail.

The project may result in the injury or death of zero to a small number of Guam tree snails. This would result in small reduction in the Guam tree snail population. The contribution of this small number of Guam tree snails to the local and range-wide Guam tree snail populations is difficult to assess because there is so much uncertainty about the sizes of these populations. The number of tree snails at the 50-plus sites where Guam tree snails have been found is not known. One of these 50-plus populations has been extensively studied (Haputo ERA). Approximately 2,000 Guam tree snails have been detected in surveys at Haputo ERA. Application of the four percent detection probability would mean there are an estimated 50,000 Guam tree snails at that site. The injury or death of a small number of Guam tree snails at the Asan Springs Water Supply project site is not expected to affect the resilience, redundancy, or representation of the Guam tree snail.

### **Cumulative Effects**

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Service is not aware of any future state, tribal, local, or private actions that are reasonably certain to occur within the action area at this time; therefore, no cumulative effects are anticipated.

### **Conclusion**

After reviewing the current status of the Guam tree snail, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Guam tree snail. The Service reached this conclusion based on the following information described in the Effects of the Action section, above.

All of the Guam tree snails within the 0.24 ac (0.1 ha) vegetation clearing footprint will be captured and translocated or injured or killed due to project vegetation clearing activities. No Guam tree snails are currently known to be in the vegetation clearing area. However, there is no

barrier to prevent their dispersal into the project area. The detection rate is expected to be high once the vegetation is cut and can be examined for snails. Although all the Guam tree snails in the area of action may be harassed by human disturbance, translocation and vibrations from mechanical tools and vehicle use and any Guam tree snail trampled by project equipment and pedestrian traffic may be injured or killed, the species will still persist in nearby and distant populations despite the project implementation.

Translocated Guam tree snails are expected to have the same survival rates as they would have had in the absence of the proposed action. The injury or death of a small number of Guam tree snails at the project site is not expected to affect the resilience, redundancy, or representation of the Guam tree snail. For these reasons, project implementation is not likely to appreciably reduce the likelihood of both the survival and recovery of the Guam tree snail in the wild.

### **INCIDENTAL TAKE STATEMENT**

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary and must be undertaken by the United States National Park Service so that they become binding conditions of any grant or permit issued to the [applicant], as appropriate, for the exemption in section 7(o)(2) to apply. The United States National Park Service has a continuing duty to regulate the activity covered by this incidental take statement. If the United States National Park Service (1) fails to assume and implement the terms and conditions or (2) fails to require the (applicant) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the United States National Park Service must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

### **Amount or Extent of Take Anticipated**

Based on our analysis presented in this Biological Opinion, the Service anticipates the following take may occur as a result of the proposed action:

1. The Service anticipates all Guam tree snails within the 0.24 ac (0.1 ha) will be taken in the form of capture during translocation activities or in the form of harm due to injury or death from exposure to crushing or trampling during vegetation clearing activities.

### **Effect of the Take**

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the Guam tree snail in the wild.

### **Reasonable and Prudent Measures**

The Service believes the following reasonable and prudent measure(s) are necessary and appropriate to minimize impacts of incidental take of the Guam tree snail:

1. Ensure that where practicable, field crews salvage any injured, dying, or freshly dead individuals of the Guam tree snail they are made aware of.
2. Monitor and report on the level of take of the Guam tree snail.

### **Terms and Conditions**

In order to be exempt from the prohibitions of section 9 of the Act, the NPS must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

#### *Monitoring and Reporting*

Report to the Pacific Islands Fish and Wildlife Office Field Supervisor in Honolulu Hawaii, the number and locations of any Guam tree snails detected during field work. If practicable include GPS points.

Report to the Pacific Islands Fish and Wildlife Office Field Supervisor in Honolulu Hawaii, all known instances of injury or death of a Guam tree snail. If practicable include GPS points and photos.

#### *Salvage of species*

The National Park Service shall inform the Field Supervisor of the Service's Pacific Islands Fish and Wildlife Office in Honolulu, Hawaii, in writing of take of any federally listed species within three (3) working days. In case of injury or mortality of listed species for which take has occurred, please contact Guam Department of Agriculture, Division of Aquatics and Wildlife Resources (DAWR) at (671) 735-0294. Individuals found with serious injuries that will likely compromise their survival or subject them to undue pain and suffering may be humanely euthanized based on review and approval from a licensed veterinarian or State licensed and/or a federally permitted wildlife rehabilitation facility. Euthanasia must follow American Veterinary Association Guidelines available at <https://www.avma.org/KB/Policies/Documents/euthanasia.pdf>.

Dr. Kevin Malakooti is currently the only veterinarian identified under DAWR's permit to assess and treat listed Threatened and Endangered species in Guam. Dr. Malakooti's clinic number is (671) 637-8387. In the event that an individual is euthanized, PIFWO must be notified within 24 hours at (671) 989-6743 or (808)792-9400.

**Designated Repositories:**

Department of Agriculture, Division of Aquatics and Wildlife Resources, 163 Dairy Road Mangilao, Guam 96913 (telephone: (671) 735-0294).

Bernice Pauahi Bishop Museum, Vertebrate Collection Manager, 1252 Bernice Street, Honolulu, Hawaii 96817 (telephone: (808) 847-3511). If the Bernice Pauahi Bishop Museum does not wish to accession the specimen(s), if sick or injured federally listed species are found, the depository designated to receive specimens of any threatened or endangered species killed is the DAWR. If the DAWR is not able to receive dead specimens, please contact the Bernice Pauahi Bishop Museum, 1525 Bernice Street, Honolulu, Hawaii, 96817 (telephone: 808/547-3511). If the Bernice Pauahi Bishop Museum does not wish to accession the specimens, USDA APHISWS should contact the Service's Division Office of Law Enforcement in Honolulu, Hawaii (telephone: 808/861-8525; fax: 808/861-8515) for instructions on disposition.

Inform the Field Supervisor of the Service's Pacific Islands Fish and Wildlife office in writing within three (3) working days of any injured threatened or endangered species found and the actions taken as well as any disposition of dead listed species. Care must be taken in handling any dead or injured specimens of proposed or listed species to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead or injured specimens does not imply enforcement proceedings pursuant to the ESA. This reporting requirement enables the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective.

The Service believes that no more than 240 Guam tree snails will be incidentally taken as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and

conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of this consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of such taking and review with the Service the need for possible modification of the reasonable and prudent measures.

### **Conservation Recommendations**

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

#### *Conservation Recommendations*

The Service does not offer any additional conservation recommendations as all of our recommendations have been incorporated into the project design.

### **Reinitiation Notice**

This concludes formal consultation on the action(s) outlined in this biological opinion. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) if the amount or extent of taking specified in the incidental take statement is exceeded; (2) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (4) if a new species is listed or critical habitat designated that may be affected by the identified action.

Thank you for your ongoing efforts to conserve threatened and endangered species. If you have any questions concerning this Biological Opinion, please contact Heather Benedict at [heather\\_benedict@fws.gov](mailto:heather_benedict@fws.gov).

Sincerely,

Jacqueline Flores  
Island Team Manager  
Mariana Islands



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### **Abbreviations and Acronyms**

BA - Biological Assessment

BMP - Best Management Practice

CFR - Code of Federal Regulations

DOAG - Guam Department of Agriculture

ESA - Endangered Species Act

FR - Federal Register

GEPA - Guam Environmental Protection Agency

GWA - Guam Waterworks Authority

NEPA - National Environmental Policy Act

NPS - National Park Service

PIFWO - Pacific Island Fish and Wildlife Office

USC - United States Code

USFWS and Service - U.S. Fish and Wildlife Service

## APPENDIX A

### NLAA Concurrence for Mariana Fruit Bat

This appendix details the U.S. Fish and Wildlife Service's (Service) concurrence with your determination the proposed implementation of the Asan Springs Water Supply Facility Rehabilitation project at Asan, Guam, is not likely to adversely affect the threatened Mariana fruit bat (*Pteropus mariannus mariannus*, fanihi) pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). Our analysis is based on information provided in your August 2022, Biological Assessment and email and MS Teams conversations, field investigations, and other information in our records. A complete record of this consultation is on file at the Pacific Islands Fish and Wildlife Office.

#### Project Description:

The proposed action is detailed in the National Park Service's *Final Biological Assessment for Asan Springs Water Supply Facility Rehabilitation*, dated August 2022. Additional minimization and avoidance measures which were incorporated into your project at the recommendation of our office, are detailed within the Project Description body of this Biological Opinion or summarized below.

#### Avoidance and Minimization Measures:

*Mariana Fruit Bat*: Because the action area includes suitable habitat for the Mariana fruit bat, the project design incorporates the Service's standard recommended measures to reduce the likelihood the project may affect this sensitive species. Construction work will not occur within 150 m (492 ft) of a Mariana fruit bat roost and when a Mariana fruit bat is seen flying or foraging within 150 m (492 ft) of construction activity, work will pause until the bat has left the area. The NPS will implement a contractor education program to ensure that construction contractor personnel are shown how to identify, respond, and report a Mariana fruit bat sighting.

Additional pre-construction biomonitor surveys for Mariana fruit bats and bat roost sites will be conducted up to one week prior to the onset of vegetation clearing. Any pause in work beyond seven days in vegetation clearing will trigger additional surveys. These surveys will follow JRM protocols (USFWS 2009).

All construction and maintenance work are expected to occur during daytime hours. Although the NPS does not expect night work to occur the following conservation measures will be implemented should unforeseen night construction or exterior maintenance work be required:

- A dusk biomonitor survey following JRM protocol (USFWS 2009); and
- When installing permanent lights, and if appropriate for antiterrorism force protection or airspace safety criteria, the NPS will use downward facing, shielded or full cut-off lens lights (with the lowest lumens necessary). Properly shielded or

full-cutoff lens illumination can only be seen below the horizontal plane at the fixture height. To avoid vertical glare and illumination of forest habitats, should temporary lighting be needed for nighttime work, only downward-facing, full cutoff-off lens lights or fully-shielded lights will be used.

### **Consequences of the Proposed Action:**

#### Mariana Fruit Bat Biology:

Mariana fruit bats are a large-bodied colonial tree-roosting species. Mariana fruit bats are at their roost during the day and they forage at night on fruits, nectar, pollen, and some leaves from at least 45 different plant species. Colonies established by one or more bats can consist of fewer than 20 individuals or they can grow to over 1,000 individuals (Guilbert and Mullin 2020, p. 1). A day roost may be occupied by one or more bats. Generally maternal colonies are occupied by a harem of bats – a single male with multiple females. Breeding occurs year-round. Bachelor colonies and solitary male bat roosts are also common. The mother bat carries its bat pups until they grow to be too heavy. When these young bats that are not well developed enough to fly on their own, they are left at the maternal roost when the parents forage at night. Non-volant Mariana fruit bats are vulnerable at their day roost and foraging habitat to predation by the brown treesnake, disturbance by the little fire ant (Vanderwoude, pers. comm. 2022; Richardson pers. comm. 2022; and Hawaii Invasive Species Council 2022), and human disturbance and adult bats are vulnerable to harassment from these threats. When the Mariana fruit bat on its day roost is startled or alarmed by disturbance including human scent and noise it takes flight from its roost. Prolonged or severe disturbance results in abandonment of the roost. It can take months for bats to return to an abandoned roost, if they return at all. Because some members of the public still consider the Mariana fruit bat to be a delicacy and a valued gift to persons of importance, these bats are vulnerable to poaching when they are outside of areas that are actively protected by law enforcement.

Although in the recent past, Mariana fruit bats have been sighted at coastal sites north and south of the project site, and inland from the project area, Mariana fruit bats are not known to currently be roosting, feeding or transiting within more than 150 m (492-ft) of the project site.

#### Baseline – Status of Mariana fruit bat in the project area

The action area is residential and frequented by human visitors; no permanent fruit bat colonies occur in central Guam. Mariana fruit bats are infrequently observed roosting and foraging in central Guam and often only for a short duration.

#### Effects of the Action:

Construction activity has the potential to startle or alarm roosting, foraging, and transiting Mariana fruit bats. Such disturbance would be expected to cause abandonment of a breeding,

roost abandonment, abandonment of a foraging site, and avoidance of the construction area. These changes in behavior could reduce the animal's reproductive success or survival. To avoid any such project-related human disturbance to the sensitive bat, the project design incorporates a 150-m (492-ft) stop-work buffer around any roosting, foraging, or transiting Mariana fruit bat.

Because the Mariana fruit bat has not previously been detected within 150 m (492-ft) of the project site and project activity will cease if a Mariana fruit bat is detected within 150 m (492 ft) of the project activity, impacts to the bat are expected to be extremely unlikely to occur. Because adverse effects are extremely unlikely to occur, they are **discountable** and therefore not likely to adversely affect the Mariana fruit bat.

## Conclusion

Based on the proposed action, our analysis indicates consequences of the proposed action, to the Mariana fruit bat is discountable as described above. **The Service therefore concurs with your determination that the Asan Springs Water Supply Facility Rehabilitation project may affect, but is not likely to adversely affect the Mariana fruit bat.** Unless the project description changes, or new information reveals that the proposed project may affect listed species in a manner or to an extent not considered, or a new species is listed or critical habitat designated that may be affected by the proposed action, no further action pursuant to section 7 of the ESA is necessary.

## APPENDIX A, REFERENCES

Guilbert, J. and Mullin, S. 2020. Interim Performance Report Fiscal Year 2020, Pittman and Robertson Wildlife Restoration, Commonwealth of the Northern Mariana Islands, Division of Fish and Wildlife Department of Lands and Natural Resources. 10 pp.

Hawaii Invasive Species Council 2022. Little fire ant. <https://dlnr.hawaii.gov/hisc/info/invasive-species-profiles/little-fire-ant/>

Richardson, M. 2022. Pers. comm. Little fire ant threat to vertebrates and invertebrates discussions with Hawaii Ant Lab regarding need for little fire ant eradication from all Pacific Islands. U.S. Fish and Wildlife Service entomologist. January 13, 2022.

Vanderwoude, C. Personal Communication. Microsoft teams meeting with the Service's entomologist Mike Richardson and biologist Dawn Bruns discussing effects of the little fire ant to listed species in the Pacific Islands. January 13, 2022.

## APPENDIX B

### *Biosecurity Measures*

1. To minimize the risk of introducing harmful species of animals and plants will be adhered to. Implementation of the plan is developed to preclude the movement and establishment of undesirable species. In addition, measures listed here, some of which exceed those in the plan, will be fully implemented:

- All research personnel will read the entirety of the plan prior to going to the work site.
- All observations of nonnative species of concern (e.g., rodents, shrews, predatory flatworms) will be immediately reported to Guam DAWR and USFWS.
- The materials, tools and machinery will be inspected by NWRC research personnel for signs of flatworms, rodent or snake activity and additional biosecurity risks such as seeds prior to loading equipment and personnel. Rodent sign includes droppings, gnawed equipment and wiring and food caches. BTS sign includes snakeskin sheds.
- To the greatest extent possible, equipment will remain on site for the duration of the project to minimize contamination with other sites.
- All waste generated on Cocos will be packed off daily.
- Each technician will maintain a separate set of field clothing and footwear, thoroughly cleaned of all potential seeds or spores, for exclusive use on the work site. Soles of shoes will be sprayed with a diluted bleach solution and scrubbed with a brush prior to entering the site.
- 1.2 WILDLIFE AWARENESS TRAINING
- DAWR personnel will conduct webinar-based and on-site training prior to the commencement of field work in order to provide specific details for wildlife recognition, avoidance measures, and precautions to field personnel.
- Field personnel will be trained (via field orientation conducted by DAWR personnel) to identify endangered species and signs of presence (nests, trails, habitat, etc.).
- DAWR will also conduct regular pre-activity surveys during the course of the field effort, after which they will provide applicable updates to field personnel based on wildlife sightings, nests, weather, etc.
- 2 BIOSECURITY MEASURES FOR INVASIVE SPECIES
- Several invasive species are of primary concern for this project:
- Brown tree snake – There are currently cooperative effort between the USDA-APHIS Wildlife Services, DAWR, U.S. Geological Survey, USFWS, and Iowa State University to brown tree snake. Check equipment before entering the site and follow instructions below if a brown tree snake is found.
- Flatworms- Flatworms are a direct threat to the tree snails and should monitored for and equipment cleaned prior to entering the work site to prevent the spread.
- Rats – Rats remain a potential threat via inadvertent transport from machinery and improper waste collection.
- Coconut rhinoceros beetles – The coconut rhinoceros beetle has been attacking coconut trees on Guam since it was first discovered on the island in 2007.

- Little fire ants – Little fire ants are widespread on Guam and are a potential threat to the work site via inadvertent import from other infested locations.
- 2.1 INITIAL DAWR AND USDA-APHIS INSPECTIONS FOR INVASIVE SPECIES
- All equipment being mobilized to the work site will be thoroughly inspected for brown tree snakes and other invasive species prior to commencing work. This includes heavy equipment, vehicles, small equipment, and personal items (backpacks, bags, buckets, etc.).

## 2.2 PRE-WORK CLEANING AND INSPECTION OF EQUIPMENT, SUPPLIES, AND MACHINERY

- All vehicles, machinery, boots, and equipment will be cleaned, inspected by its user, and found free of mud, dirt, debris, seeds, and invasive species prior to entering the work site.
- Vehicles, machinery, and equipment will be washed by the rental agency before delivery to the project. Project personnel will inspect and confirm it is clean prior to acceptance. Areas of particular concern on vehicles and equipment include bumpers, grills, hood compartments, areas under the battery, wheel wells, undercarriage, cabs, and truck beds, where debris or material may have accumulated.
- The interior and exterior of vehicles, machinery, and equipment will be free of rubbish and food, and vehicle interiors will be vacuumed clean.

## 2.4 GREEN WASTE

To prevent the spread of the coconut rhinoceros beetle (*Oryctes rhinoceros*), green waste or soil should not be transported except to designated waste sites. Designated green waste disposal sites should be managed with coconut rhinoceros beetle traps.

## 2.5 RESPONSE AND REPORTING FOR INVASIVE SPECIES

### 2.5.1 WHAT TO DO IF COCONUT RHINOCEROS BEETLES ARE FOUND

- Contact Guam's Department of Agriculture, Biosecurity Division Invasive Species Hotline at:
  - (671) 475-7378, or o [biosecurity@doag.guam.gov](mailto:biosecurity@doag.guam.gov)
- If green waste is found to be infested, trapping should be used to prevent coconut rhinoceros beetles from spreading and damaging palm trees.
- A gill net with a 1-inch mesh measured knot to knot, made from 0.25-mm nylon monofilament, should be laid over piles of green waste.
- If the green waste site is within or adjacent to chain link fencing, the use of the DeFence trap is recommend. These are simply constructed with a 12-foot piece of tekken netting, folded in half, and secured onto a fence line using zip ties. In the middle of the net, attach a solar powered ultraviolet LED light, and a coconut rhinoceros beetle pheromone lure protected in a red Solo cup. This trap is currently the most effective because it does not require many materials and uses the least amount of space on the property. For more information on coconut rhinoceros beetles, visit <https://dlnr.hawaii.gov/hisc/info/invasive-species-profiles/coconut-rhinoceros-beetle/>.

### 2.5.2 WHAT TO DO IF LITTLE FIRE ANTS ARE FOUND

- Contact Guam's Department of Agriculture, Biosecurity Division Invasive Species Hotline at:
  - (671) 475-7378, or o [biosecurity@doag.guam.gov](mailto:biosecurity@doag.guam.gov)

### 2.5.3 WHAT TO DO IF BROWN TREE SNAKES ARE FOUND

Call (671) 777-HISS (4477) for snake sightings.

- If possible, the field crew will attempt to capture or kill any brown tree snake that is found using the following procedures:
- Place a bucket over the head of the snake and allow a small space for the snake's body to follow the head until the entire snake is underneath the bucket.
- Once the snake is completely under the bucket, press the bucket down and use a heavy weight, such as a cement block, to keep it in place. This method works only on a firm, flat surface.