



Department of Defense Legacy Resource Management Program

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BROWN TREESNAKE INTERDICTION AND PREVENTION OF SPREAD

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BROWN TREESNAKE CONTAINMENT PLAN FOR GUAM

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1.0 INTRODUCTION

The brown treesnake (*Boiga irregularis*, BTS) was accidentally introduced to the island of Guam shortly after World War II. The invasive snake colonized the island at densities reaching 80 individuals per hectare and is directly responsible for the extinction of 9 of 12 native forest birds historically found on Guam. The snake causes several hundred power outages annually, resulting in millions of dollars in damaged equipment, lost productivity, repair costs, and disruptions to the lives of island residents. Considered mildly venomous, BTS frequently enter homes, resulting in bites that send dozens of people (most often children or infants) to emergency rooms for treatment every year (*see* Rodda, G.H. and J.A. Savidge, 2007, Biology and impacts of Pacific Island Invasive Species, 2, *Boiga irregularis*, the Brown Tree Snake (Reptilia: Colubridae), *Pacific Science* 61(3):307-324.).

The BTS is a classic example of a generalist invasive species, occupying virtually all habitats on Guam. The BTS is arboreal and nocturnal in behavior. Primary prey items for BTS include birds, small mammals, and lizards; two super-abundant introduced lizards constitute the bulk of BTS food on Guam today. The cryptic nature of the BTS, coupled with its extreme abundance on Guam, create significant risk of dispersal from the island via civilian and Department of Defense (DoD) transportation networks. Snakes associated with Guam's transportation network have been found in Saipan, Tinian, Rota, Hawaii, and most other major islands in the tropical western Pacific, as well as the continental United States, Diego Garcia, and Spain. Given the role of Guam as the regional shipping hub within Micronesia, the snake presents a serious ecological and economic threat to Hawaii, the Commonwealth of the Northern Mariana Islands (CNMI), and virtually every other island group in the region, as well as subtropical regions of the U.S. mainland. The establishment of BTS in other locations would result in economic and ecological damage similar to that observed on Guam, potentially on a much larger scale (in the case of Hawaii). A recent University of Hawaii study has estimated the economic damages associated with the establishment of BTS in the state of Hawaii would cost between \$29 million and \$405 million annually.

The Federal Government has made considerable annual commitments to preventing the inadvertent spread of BTS via Guam's outbound cargo network. This document summarizes current BTS control methods and strategies, locations of strategic actions for BTS containment on Guam and provides recommendations for improvement of these efforts.

2.0 WILDLIFE SERVICES BTS CONTAINMENT EFFORTS

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS) is currently funded through Joint Region Marianas to prevent the inadvertent spread of BTS via the outbound DoD transportation network from Guam and from the U.S. Department of Interior, Office of Insular Affairs (DoI, OIA), to implement an analogous

containment program in the island's commercial export industry. These activities are complimentary to each other, as many export activities are not mutually exclusive to a given port of exit (e.g., household goods movements that originate on DoD property are moved to commercial warehouses in the Harmon Industrial Park prior to their embarkation off island). Additional BTS containment efforts in the State of Hawaii and the Commonwealth of the Northern Mariana Islands (CNMI) are funded by DoI, OIA. These programs target inbound cargo, both military and civilian, that originate from Guam.

Containment is accomplished through an integration of wildlife damage management methods, incorporating a variety of population management techniques that target BTS populations in and around key cargo processing, staging, consolidation, and embarkation locations on DoD and civilian facilities. These facilities include Andersen Air Force Base, Naval Base Guam, the Guam International Airport, the Port Authority of Guam, and 30 private freight forwarding companies located throughout Guam.

2.1 Project Objective

To reduce the probability of BTS dispersal through the U. S. Department of Defense and civilian transportation networks on Guam.

2.2 Containment Strategies

- 1) Systematically reduce BTS populations around cargo facilities and port environments using snake traps, hand capture, oral toxicants, barriers, and prey base control;
- 2) Conduct canine inspections of outbound cargo resources for any BTS that may have circumvented primary population control measures;
- 3) Educate DoD and civilian personnel on the risks associated with BTS and how to respond to a BTS sighting in cargo;
- 4) Monitor the cargo network and amend control strategies, in coordination with DoD and civilian cooperators, to address changing processes and risks, and;
- 5) Provide guidance on cargo process changes, growth, and facility development to identify problematic BTS containment areas.

Wildlife Services concentrates containment efforts in cargo packing, handling, and staging "bottlenecks", where control activities offer maximum benefit. This targeted approach facilitates the most efficient delivery of resources, while minimizing the geographic scope of the project. Aircraft, ocean-going vessels, and the cargo and materials associated with air and surface transportation are all subjected to varying levels of containment. Priority efforts focus upon commodities that originate on Guam or have been staged on island prior to embarkation, as well as the facilities (i.e., warehouses) that support these activities.

2.3 Regulatory Compliance

Wildlife Services is a cooperative, cost-sharing federal agency, and all agency actions are in compliance with applicable local and federal laws, including the National Environmental Policy Act, the Endangered Species Act, and the Federal Insecticide, Fungicide, and Rodenticide Act. Wildlife Services activities are conducted in compliance with all pertinent installation policies. All budgetary implementation and execution is consistent with appropriate federal and agency regulations. All WS employees are full-time federal employees.

3.0 TOOLS AND TECHNIQUES FOR BTS CONTROL AND CONTAINMENT

Available methods for controlling BTS have been developed and evaluated over the past three decades through dedicated research and operational work. Current methods and strategies represent the best available technology and integration. Wildlife Services works closely with the USDA, National Wildlife Research Center and the U. S. Geologic Survey, to continually evaluate program results and integrate new technology and control strategies, as appropriate. The following sections describe specific operational tools available for BTS control and their implementation as they support BTS containment on Guam.

3.1 Snake Trapping

Brown treesnake traps are the primary control tool used to reduce BTS populations. The traps are modified minnow traps with self-setting flap doors, allowing multiple snake captures within one trap. Each trap contains a live mouse which serves as a lure. The mouse, its food, and water source are enclosed within a separate cage inside trap, which provides protection from snakes and other predators. Traps are situated to provide a secure perimeter, reducing the likelihood of a BTS entering cargo staging or processing facilities. Traps are placed along forest perimeters and security fence lines surrounding warehouses, wharves, and other critical cargo staging, processing, and/or embarkation points, typically at 20 meter intervals. Spacing may be increased in certain circumstances, as staffing resources and/or other logistic constraints dictate. Traps are serviced once weekly (also spot-checked during the week); at each check, any captured snakes are removed, and routine maintenance, including replacement of the food and water source for the mouse contained inside, is conducted. Fabrication of feed blocks, which are replaced weekly, is completed by WS employees and requires substantial staffing input. Wildlife Services fabricates BTS traps at a shop in Yakima, WA.

3.2 Nighttime Fence Line Searches

As BTS traps tend to capture primarily medium-sized BTS, hand capture of snakes is regularly implemented to expand the BTS population targeted by control efforts. Fence lines surrounding all cargo facilities and wharves on base are searched nightly by spotlight for BTS. Snakes that are encountered are removed by hand by WS personnel. When fully functioning, spotlighting activities account for nearly 25% of the total BTS take by WS. Canine handlers, working scheduled night shifts, conduct the majority of spotlighting activities.

3.3 Canine Detector Dog Teams

Prior to departing island, cargo, aircraft, and smaller ocean-going vessels are inspected with specially-trained BTS detector dog teams. Each team consists of a canine and their respective handler that have undergone extensive protocol and validation training. Canine teams conduct inspections for BTS that may have circumvented primary population control measures or stowed in cargo that originated outside snake-controlled areas. Wildlife Services currently employs 15 full time canine teams, based from kennels on Andersen Air Force Base and Naval Base Guam.

The timing of a given inspection is dependent upon the type of cargo or vessel; containerized commodities moving via surface (i.e., household goods, personally-owned vehicles (POV's), etc.) are, at a minimum, inspected during daylight hours on the day containerization is scheduled. Aircraft (including helicopters) are typically inspected within 3 hours of scheduled departure. General freight is inspected on a daily basis, regardless of the scheduled departure date.

Inspections of cargo that is to be containerized are conducted immediately prior to consolidation and containerization. Once a commodity has been placed inside a shipping container, inspection quality (and therefore snake detection probability) is greatly reduced.

3.4 Oral Toxicants

An oral toxicant, acetaminophen, is now registered by the U.S. Environmental Protection Agency for general field use in controlling BTS in Guam and the CNMI. The toxicant, an 80 mg tablet, is administered to BTS via a dead neonate mouse, placed inside a PVC delivery device or delivered aurally. Although operational efforts using toxicants have been relatively limited to date, WS is continuing to refine the application of toxicants and will be expanding their use in support of BTS control and interdiction as available technology improves.

3.5 BTS Barriers

Conceptually, BTS barriers are applied to protect a contained resource or to keep snakes from entering a defined area (an “exclusionary” barrier) or to keep snakes contained inside a defined area, such as a cargo processing point on a recipient island (a “containment” barrier). Barriers used for cargo protection on Guam would be exclusionary in design.

Barriers to block the movement of BTS are considered either permanent or temporary in design. Temporary barriers are constructed of shade cloth, supported by metal rebar inserted into the ground, with PVC pipe providing attachment points for the material to the rebar. Barriers may be utilized as enclosure barriers to prevent BTS from gaining access to a vulnerable area such as a cargo staging area or as enclosure barriers to prevent BTS (if present) from exiting a cargo staging area at a vulnerable site. Temporary barriers are typically employed by WS during large scale DoD exercises such as Tandem Thrust. Permanent barriers to block the movement of BTS have been rigorously tested and are now available for use in both cargo containment and conservation situations. However, their implementation on Guam has been limited by resource availability and institutional reluctance to install the structures.

3.6 Prey Base Control

An abundance of introduced rodents and/or birds in proximity to cargo processing facilities can increase the attractiveness of the area to BTS as well as reduce the efficacy of BTS detector dogs. To address this risk, control measures that reduce the availability of BTS prey are selectively implemented in and around cargo facilities. Anti-coagulant bait is the primary tool used for controlling rodents (including rats and mice) in and around cargo areas. Non-native Eurasian tree sparrows, pigeons, and black drongos in cargo facilities are controlled via shooting and live trapping. Effective management of cargo facilities, including appropriate waste disposal, removal of vegetation in proximity to buildings, and limiting the outdoor storage of materials and equipment, will reduce the attractiveness of a given area to rodents, lizards, and other potential BTS prey species.

3.7 Public Education and Outreach Programs

WS engages in public education and outreach programs primarily designed to target those involved with DoD and civilian transportation, as well as the general public and newly arriving military personnel. This outreach provides increased knowledge and understanding of Wildlife Services’ mission, the BTS problem, and tools available to address BTS control and interdiction.

A variety of informational materials are available through WS, including two BTS awareness/training videos, brochures, fact sheets, and a “Pest Alert” poster. WS conducts regular briefings on BTS to newly arriving Navy members, DoD school groups, and employees of key cargo processing facilities. Nearly 50% of the BTS discovered directly in cargo over the past 10 years have been made by non-WS employees, supporting the importance of on-going awareness training for individuals working in the transportation network.

4.0 LOCATIONS OF PRIMARY CONTAINMENT ACTIVITIES

A combination of trapping, hand capture (spotlighting), toxicant application, and canine inspections for BTS are conducted in and around all cargo staging, storing, and processing facilities targeted by WS cooperative efforts. Depending upon the nature of the cargo process(es) at a respective facility, the integration of methods may vary. Public education efforts are integrated throughout all WS containment activities. This section summarizes the primary ports of exit at which WS works, and identifies key locations for containment activities on each facility.

4.1 Andersen Air Force Base

4.1.1 Andersen AFB Flight line

The Andersen Air Force Base (AFB) flightline supports all military air cargo activity for Guam and is a critical hub for military aircraft movement in the Pacific region. Andersen AFB supports all 4 service branches plus the U. S. Coast Guard. It also serves as cargo staging and consolidation area for deploying and transiting units. Inspections on all outbound items occur continuously; aircraft and cargo can move at anytime of the day and canine inspectors are available when needed. Aircraft are inspected at the start of each business day, if the aircraft departure is scheduled prior to 1800 the same day. Aircraft departing after 1800 are inspected within a 3 hour window prior to departure, as close as possible to departure time as feasible. Cargo staged on the flightline receives regular inspection (at least one per shift) until departure. A final inspection is conducted prior to loading. Trapping, toxicants, and spotlighting are used to control BTS populations on and around the flightline. Aircraft Hangers 1 thru 5, which are used as storage and operational bases for deployed units, are inspected by canine teams as needed.

4.1.2 734 Air Mobility Squadron Cargo Facilities

All outbound and transient military cargo passes through 734 Air Mobility Squadron (AMS) cargo facility or the Cargo Deployment Function Yard (CDF Yard) if items are too large for the cargo yard. Operations can occur around the clock in the facility and yard. Cargo staged in the facility or yard is inspected on a regular basis (at least one per shift) until departure. A final inspection is conducted prior to loading. Traps are placed on the perimeter wall of the cargo facility to intercept BTS in the area.

4.1.3 Transport Management Office Cargo Facility

The Transport Management Office (TMO) cargo containment facility processes military cargo of all descriptions. Inspections are coordinated with TMO management and conducted as required.

4.1.4 Petroleum and Oil Logistics, 36 Maintenance Squadron

This facility provides equipment and fuels for all aircraft using the Andersen AFB Flight Line. Tanker trucks provide fueling services for aircraft on the flight line, as needed. Trapping is done

on the perimeter fencing of the facility as the petroleum products in the tanker trucks are deemed too hazardous for canine inspections.

4.1.5 HSC-25

HSC-25 is the Navy helicopter squadron based on Andersen AFB. Most operations are local, with one aircraft continuously on standby for Search and Rescue (SAR) operations. A daily inspection of the SAR designated aircraft is completed and inspections of other off-island missions are completed as needed. Other Navy units also operate from HSC-25, and inspections are conducted as required.

4.1.6 Northwest Field

Northwest Field supports exercises of various size and scope on an irregular basis. Close coordination with units that train there is necessary as there is no long-term BTS control in the area, thus increasing the risk of BTS departures. Inspections occur on site at Northwest Field during cargo build-ups and may receive further inspections as items are transported to the Andersen AFB flightline for their eventual departure.

4.1.7 Munitions Storage Areas One and Two

Munitions Storage Areas One and Two (MSA One and MSA Two) are the primary storage areas for U. S. Air Force munitions. Munitions destined for transportation off-island and not associated with a bombing mission are inspected prior to loading and departure. The size of shipments vary, but a canine inspection team is always on hand during the loading and to ensure containers are sealed nightly until the final seal is put on the completed container. Coordination and scheduling for inspections are conducted through 36 Munitions Squadron. Wildlife Services has operated a large-scale BTS control project in MSA One for over 10 years; the primary goal of the project is to protect native birds and bats that use MSA One. A secondary benefit of the project is reduced risk of BTS incursion into munitions shipments.

4.1.8 DoD Exercises, Transient Units, and Irregular Movements

An unpredictable amount of irregular export activities, including DOD training exercises, Marine Expeditionary Unit visits, and other cargo movements occur on Andersen AFB property. Typically, containment in support of these events is coordinated through the unit command in charge of the activity. Containment strategies depend upon the scope and duration of the activity, and WS implements appropriate measures (including canine inspection, trapping, education, etc.) based upon the anticipated magnitude of the activity. The risk of BTS incursion is considered when planning locations and processes for cargo staging locations, wash-down sites, and other deployment-related activities.

Materials and supplies from off-island contractors, particularly associated with construction projects, are also subjected to canine inspection and/or other containment activities. These movements are irregular and may originate from a variety of locations around Andersen AFB property. Nearly all of these movements are consolidated in the 734 AMS cargo facility, the CDF Yard, or elsewhere on the Andersen AFB flightline.

4.1.9 Joint inspections transported through Andersen AFB

A significant amount of materials originating from Naval Base Guam are transported as air cargo on U.S. Air Force aircraft departing from Andersen AFB. This cargo includes munitions, mechanical equipment, and support materials for small units such as the Explosive Ordnance Disposal. Cargo typically passes through the 734 AMS Yard or the CDF Yard. All cargo departing from Andersen AFB is inspected by detector dog teams and falls under the jurisdiction of the 36 WGI 32-7004 Brown Treesnake Management.

4.2 Naval Base Guam

4.2.1 Warehouse 9

Warehouse Nine is the primary staging and consolidation facility for cargo and equipment used to re-supply naval vessels, as well as outbound household goods and general cargo. Inspections of all outbound cargo held inside the warehouse are conducted at least once daily, Monday through Friday. Follow-up inspections are conducted as needed, when arriving cargo is scheduled for immediate containerization. Cargo is generally not containerized on weekends and therefore, inspections are not completed on Saturday or Sunday. Larger equipment, to be shipped breakbulk, is staged at various locations around the wharf surrounding Warehouse 9. Shipments of this nature are inspected daily, and immediately prior to planned loading.

4.2.2 POV lot

Military members, including non-Navy personnel, who are changing duty stations, process their outbound personally-owned vehicle (POV) through the POV lot on Navy Main Base. A contractor containerizes the vehicles on site, for commercial surface shipment via the Port Authority of Guam. Inspections of vehicles scheduled for containerization are conducted daily at the POV lot, Monday through Friday, and on weekends as requested by the contractor.

4.2.3 MSC

The Military Sealift Command (MSC) consolidates general support cargo for Naval vessels. Canine inspections of outbound cargo are conducted at MSC daily, Monday through Friday, as needed.

4.2.4 Polaris T-Shed and Building 4450

The T-Shed and Building 4450 at Polaris Point are the primary loading points for cargo destined for the USN Frank Cable. Other vessels, including submarines, receive cargo from Polaris Point facilities, and munitions transported from the Naval Munitions Site (specifically torpedoes) are loaded at Polaris Point. Commodities loaded here are inspected as required, immediately prior to loading.

4.2.5 Naval Housing

Household goods for Navy members and civilian residents are wrapped and crated on-site at the individual residence on all Navy housing installations, as well as in private housing throughout Guam. Three companies, Dewitt, CargoNet, and Pacific Island Movers, are responsible for all household goods moves on DoD property; most crated household goods moves are trucked to commercial warehouses in the Harmon Industrial Park for containerizing, with a small volume of pack-outs moving through Warehouse 9. Wildlife Services obtains daily pack-out schedules directly from Navy Personal Property and conducts canine inspections of household goods

during the packing process, prior to crating. Follow-up inspections on packed crates and the containers that will be packed with military household goods are conducted at the individual commercial warehouses in the Harmon Industrial Park.

4.2.6 Kilo Wharf

Kilo Wharf is the primary loading point for all munitions transported by vessel. Munitions are either consolidated or containerized in the Naval Munitions Site or the Munitions Storage Area at Andersen Air Force Base, or they are staged on pallets at Kilo Wharf for direct on-board loading. Munitions that are consolidated away from Kilo are inspected prior to containerization; those staged at Kilo Wharf are inspected on-site prior to loading. Canine inspections occur as needed, Sunday through Saturday.

4.2.7 X-Ray Wharf

X-Ray Wharf is the primary location for staging and consolidating dry goods and cold storage goods that support Naval vessels. Inspection of dry goods occurs as needed, immediately prior to loading on-board. Because refrigerated commodities are unlikely to support a live BTS, inspections are not conducted on cold storage cargo. Canine inspections are generally conducted as loading is occurring, typically Monday through Friday, but occasionally on weekends as well.

4.2.8 DoD Exercises, Transient Units, and Irregular Movements

An unpredictable amount of irregular export activities, including DoD training exercises, Marine Expeditionary Unit visits, and other cargo movements occur on Navy property. Typically, containment in support of these events is coordinated through the unit command in charge of the activity. Containment strategies depend upon the scope and duration of the activity, and WS implements appropriate measures (including canine inspection, trapping, education, etc.) based upon the anticipated magnitude of the activity. The risk of BTS incursion is considered when planning locations and processes for cargo staging locations, wash-down sites, and other deployment-related activities.

Materials and supplies from off-island originating contractors, particularly associated with construction projects, are also subjected to canine inspection and/or other containment activities. These movements are irregular and may originate from a variety of locations around Navy property.

4.2.10 Joint inspections transported through Andersen AFB

A significant amount of materials originating from COMNAVMAR are transported as air cargo on U.S. Air Force aircraft departing from Andersen AFB. This cargo includes munitions, mechanical equipment, and support materials for small units such as the Explosive Ordnance Disposal. Cargo passes through the Air Mobility Squadron 734th inspection yard or the Cargo Deployment Function Yard. All cargo departing from Andersen AFB is inspected by detector dog teams and falls under the jurisdiction of the 36 WGI 32-7004 Brown Treesnake Management.

4.3 Guam International Airport

The Guam International Airport Cargo Facility is the primary staging and consolidation facility for cargo for outbound general cargo and supports all of the major international airlines that

operate from Guam. Inspections of all outbound cargo held inside the warehouse are conducted at least once daily, Monday through Sunday. Follow up inspections are conducted as needed, when arriving cargo is scheduled for immediate containerization or loading.

Aircraft departing the Guam International Airport are inspected on a continuous basis, with all aircraft heading to high risk destinations targeted. To reduce BTS populations at the airport, and the subsequent risk of incursion into cargo and aircraft, BTS traps encircle the airport perimeter fence and are installed throughout forested environments inside the flight line. Nighttime spotlight searches are conducted nightly.

4.4 Packing and Shipping Companies

General surface freight and civilian household goods moves are handled by approximately 30 private freight forwarding companies located throughout central Guam. These companies American Moving, Lueng Fung, Jae Hoon, Marianas Steamship, Ambyth, Pepsi, CTSI, GTW, Dewitt, J.L. Baker, Black Construction, Triple B Forwarders, Kweks/Guam Couriers, Dick Pacific, DGX, Pacific Island Movers, U.S. Post Office, Micronesia Brokers Inc., FEMA, J.C. Marketing, NAPA, Net Cargo, Triple J Shipping, Foremost, Mid Pac, Duty Free, Conwood, Ambros, Home Depot, and Payless Distribution Center.

General freight is usually consolidated and containerized on-site at each of these freight forwarding companies. A subset of these companies also handles air freight, which is generally consolidated for final shipment at the Won Pat International Cargo Facility. Wildlife Services conducts daily canine inspections, as needed, for both commercial air and surface freight prior to final containerization for shipment. Household goods are wrapped and crated on-site at the individual residence and subsequently trucked to commercial warehouses in the Harmon Industrial Park for containerizing. Wildlife Services obtains daily pack-out schedules and conducts canine inspections of household goods during the packing process, prior to crating. Follow-up inspections on packed crates and the containers are conducted at the individual commercial warehouses in the Harmon Industrial Park. Snake traps are placed inside security fences at all commercial freight forwarding facilities.

4.5 Port Authority of Guam

All commercial surface cargo exported from Guam departs via the Port Authority of Guam (PAG). Most cargo arrives at the port already consolidated and/or containerized, having been handled by the roughly 30 private freight forwarding companies described above. A smaller volume of freight is consolidated on-site at PAG; Personally Owned Vehicles (POVs) are staged at PAG between the main entrance to the PAG Yard and the Port Police Headquarters building and are inspected daily before being loaded. Other miscellaneous freight, including portable gas tanks, containers that are scheduled for departure on the dock near Warehouse #2, and containers within the storage yard are inspected daily. Most outbound freight is staged at Warehouse #2, where palletized and break-bulk items that are destined for shipment off island are processed

Traps at PAG are placed along the chain link fences that encircle and in some cases bisect the active operations area. Snake traps are also placed along the fence on the south side of the container yard, eastward along the fence, encircling the east end of PAG, where excess containers are stored, and newly arrived vehicles are staged before delivery. Where there is

jungle nearby, snake traps have been staggered along the fence with traps that have been placed within the jungle edge.



Figure 1. Map of Andersen Air Force Base, showing locations of primary BTS containment sites. Yellow lines indicate placement of BTS traps and toxicant stations.

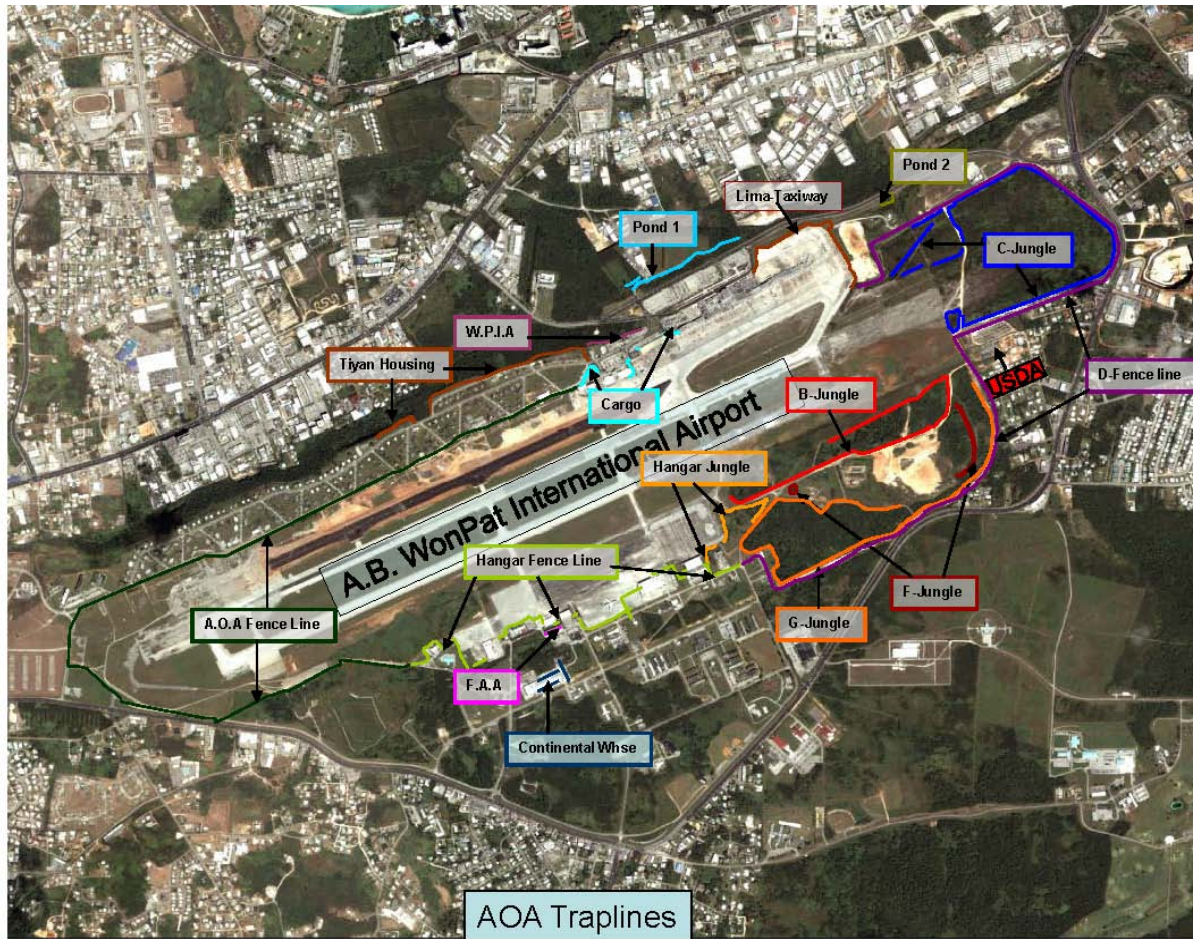


Figure 2. Map of the Guam International Airport, showing locations of key BTS containment sites. Colored lines indicate placement of BTS traps and toxicant devices.

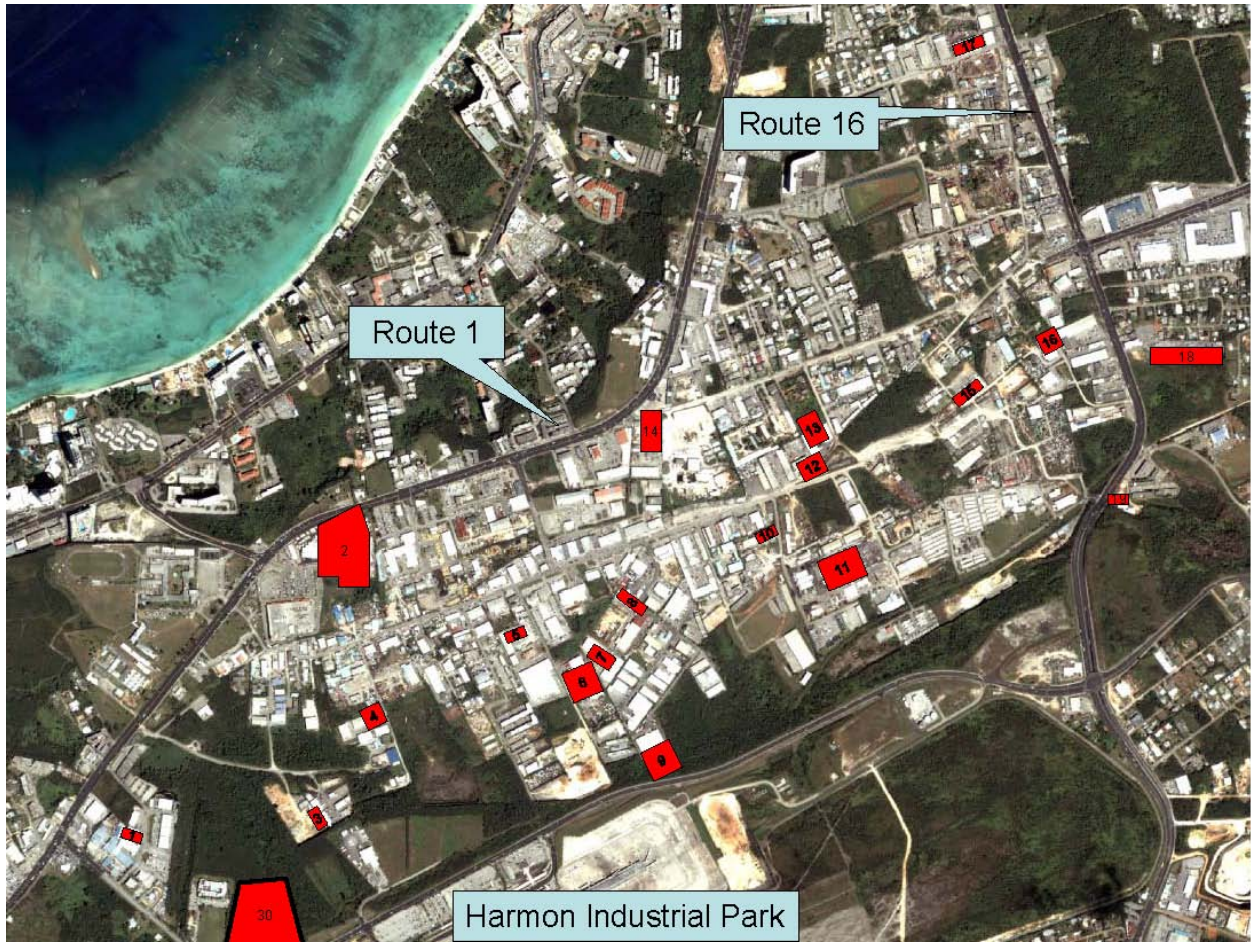


Figure 3. Map of the Harmon Industrial Park, showing locations of commercial freight forwarders that are involved with cargo export. Figure 6 provides a legend for the different location names.



Figure 4. Map of west-central Guam, showing location of several commercial freight forwarders that export cargo. Figure 6 provides a legend for the different location names.

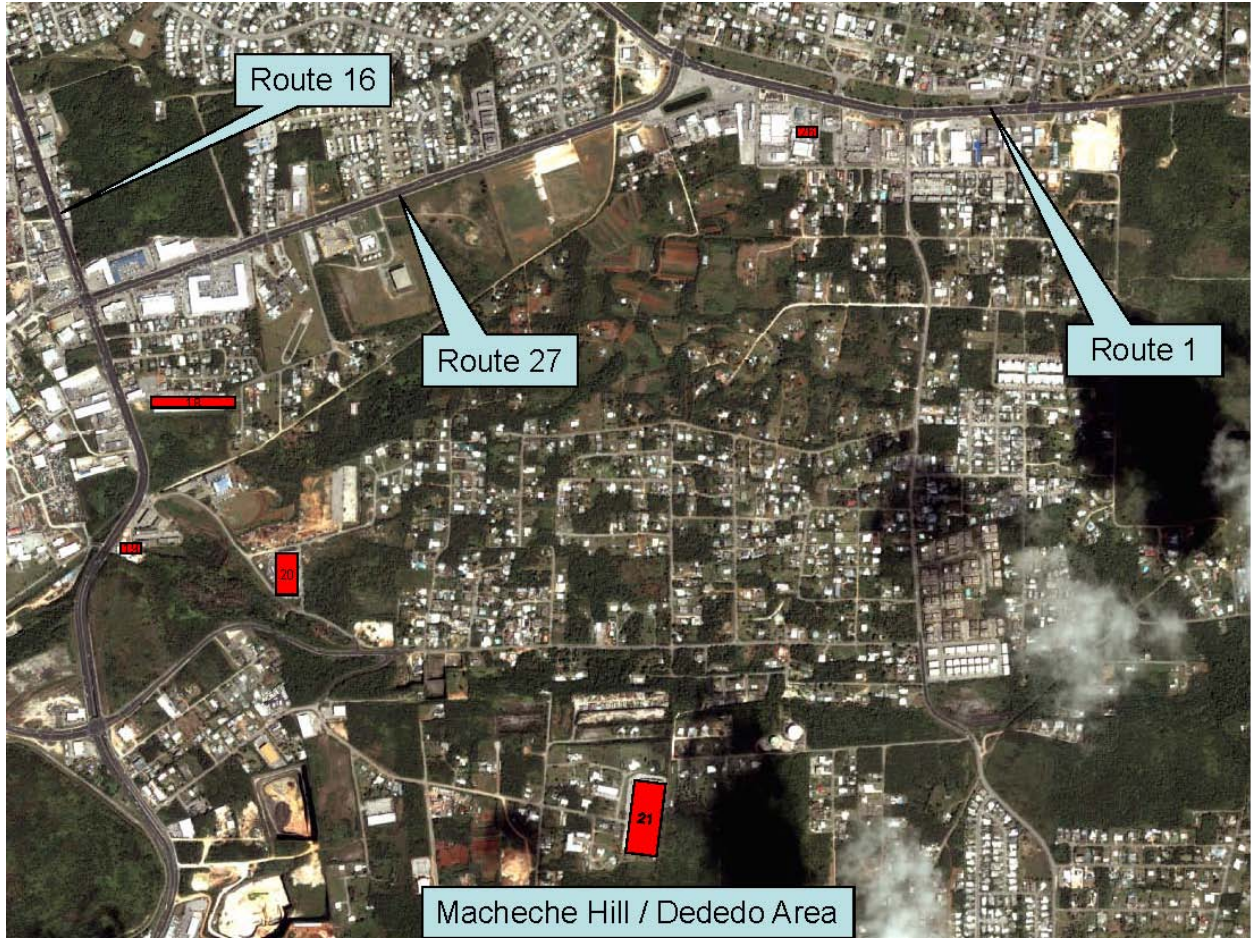


Figure 5. Map of central Guam, showing location of several commercial freight forwarding companies. Figure 6 provides a legend for the different location names.

OIA Harmon Trapline Legend

- | | |
|---------------------------|-----------------------------|
| 1. American Moving | 16. Cargo Net |
| 2. Foremost | 17. Pacific Island Movers |
| 3. Jae Hoon | 18. NAPA |
| 4. Marianas Steamship | 19. J.C. Marketing |
| 5. Ambyth | 20. MID PAC |
| 6. Pepsi | 21. Duty Free |
| 7. Ambros | 22. CTSI |
| 8. Dewitt | 23. Hawaii Intercontinental |
| 9. GTW | 24. Lueng Fung |
| 10. J.L. Baker | 25. M.B.I. |
| 11. Black Construction | 26. Triple J Shipping |
| 12. Kweks / Guam Couriers | 27. Conwood |
| 13. Triple B. Forwarders | 28. FEMA |
| 14. Dick | 29. U.S. Post Office |
| 15. Pacific | 30. Home Depot |

Figure 6. Names of freight forwarding companies identified in Figures 3 - 5, shown above.



Figure 7. Map of the Port Authority of Guam. Red lines indicate placement of BTS traps and toxicant devices.



Figure 8. Map of Naval Base Guam. Red lines indicate placement of BTS traps and toxicant devices.

APPENDIX 1

UNITED STATES DEPARTMENT OF AGRICULTURE ANIMAL and PLANT HEALTH INSPECTION SERVICE WILDLIFE SERVICES GUAM

WILDLIFE TECHNICIAN (TRAPPER) STANDARD OPERATING PROCEDURES

This Standard Operating Procedure (SOP) is an internal document reviewed annually that covers responsibilities and duties for USDA, APHIS, Wildlife Services (WS) Trappers working on Guam. These standard operating procedures (SOP) are designed to give employees guidance in their daily duties as well as provide a foundation for evaluation and development. Due to regulations and policies established by cooperators, each area of operation will have other requirements in addition to this SOP. It is the responsibility of each employee to know, understand, and follow these regulations.

DUTIES

The primary duty for Trappers is the operation and maintenance of brown tree snake traps. All other regular duties are considered as support for this primary duty. Additional or special projects are not a part of regular duties. In addition to this SOP, all other federal, department, and agency regulations will be complied with.

FIELD DUTIES

Operation of Brown Tree Snake Control Devices

Field Operations and Maintenance

Duties in the field revolve around removal of brown tree snakes (BTS) and cleaning of the trap.

- Remove BTS or non-target species
- BTS: Remove end-cone and put snake(s) into a snake bag.
 - Record take data for records or project, location, number etc.
 - Use one snake bag for multiple snakes unless a project stipulates otherwise.
 - Snakes will be euthanized according to policy
- Non-targets: Rats will be euthanized according to area policy and immediately removed from the trap. At no time should dead rats be left inside or around the trap. Any other non-target animals captured e.g., birds, crabs, monitor lizards will be removed immediately from the trap and released unharmed.
- Remove mouse, feed and potato. Using a wire brush, clean the trap of debris

- Focus on the mouse chamber, bottom of the trap, and the cones when cleaning
- Inspect the trap for potential damage to: mouse chamber, cones, overall trap body, and sign.
- Conduct field repairs as necessary or able
 - Replace damaged cones, this includes if the doors are malfunctioning
 - Replace loose, lost or damaged clips
 - Replace tie cords if frayed, cut or missing

Traps needing more substantial repairs e.g., holes in wire mesh, will be removed from the field and replaced immediately i.e., within the same day with an operational trap.

- Assess mouse health. Mice with visible health problems will be:
 - Left in trap if the trap is not accessible to the public
 - Removed from the trap and replaced with a healthy mouse if [trap] accessible by the public.
- Mice in the field found with pups will be removed and replaced. Mouse and pups will be taken back to shop and placed in a separate cage.
- Put in new feed and potato. Attempt to re-use good feed and potato, trim old potatoes (if more than half remains), and remove moldy, wet, or heavily used feed blocks ($\leq 1/4$)
- Do not trap mouse behind feed or potato
- Mouse must be visible to BTS from both ends of the trap
- If reusing feed blocks and potatoes, there must last at least one week's worth (equivalent to: one medium sized potato and one standard sized feed block.
- Ensure trap door is securely clipped when finished
- Repeat steps at next trap

PVC Bait Station Field Maintenance

- Baits are changed twice weekly: Tuesdays and Fridays
- Presence or absence of bait will be recorded
- Old, unused bait will be:
 - Placed in a plastic bag
 - Removed from the field
 - Disposed of in an appropriate manner i.e., dumpster/trash can.

Snake Control Device Placement

Traps and PVC bait stations are placed in jungle and urban areas and may be secured to vegetation, fence-lines, or other appropriated structures. Snake control devices will always be placed 20m apart unless informed otherwise.

- Key points for functioning traps:
 - Trap door flaps swing freely with no gaps around edges
 - Trap is level
 - All securing clips are secure (one on each cone, one on mouse chamber door).
 - Traps are secured using nylon cord; average length 1m.

- Traps in jungles:
 - Will be hung 1.5m above ground. Traps should be hung higher if
 - problems with pigs and feral dogs are encountered
 - Places traps a minimum of 3m from the jungle's edge
 - Secure trap with a minimum of 2 points of contact; 3 is preferable

- Traps on fence-lines or walls:
 - Hung 1.5m above ground
 - Placed *inside* secured fence-line in areas with *security* concerns*
 - Placed *outside* fence-line in areas with *low security* concerns
 - Secure trap with a minimum of 3 points of contact

* Security concerns relate to the security of the trap. Brown treesnake traps can be stolen for a variety of reasons and it is our responsibility to ensure efforts are made to protect them. Typically traps outside a secured or unmonitored area e.g., DOD property are subject to theft.

Spotlighting

Spotlighting is a scheduled activity that is conducted according to schedules developed by each area of operation. Spotlighting usually is conducted between 1900-2200. Employees will adjust their timesheet to reflect spotlighting duties (to report night differential).

Animal Care

Live animals must be cared for according to established policy and regulations. All live animals will, at a minimum, be sheltered from the weather, direct sunlight, and receive food and water. Any cage containing an animal will be kept from public view and will be kept locked unless being accessed during removal of an animal or during cage maintenance e.g., feeding, cleaning, etc.

Brown Tree Snakes

Brown tree snakes are retained for two purposes: 1) demonstrations and 2) canine training.

- 1) Demonstrations – snakes used in demonstrations are typically larger (>1200 mm SVL) but are housed with other snakes. Use snake tongs to remove snakes from the cage. During the demonstration do not roughly handle the snakes beyond the necessary amount needed to retain control.
- 2) Snakes used for canine training purposes will be retained for two weeks. Freshly caught snakes will be placed in cage labeled “Week One”, after one week has passed the snakes will be moved to the cage labeled “Week Two”. At the start of the third week all snakes in “Week Two” will be euthanized according to the regulations.

Water and feed: All caged snakes will have an ample supply of water at all times (check daily). Snakes will be fed at a minimum of once per week (with one mouse per snake). Dead or sickly mice will be used to feed the caged snakes

Note: periodically snakes will be collected to assist with research e.g., NWRC. These snakes will be housed separately until the requesting researcher arrives to take possession of the snakes.

Mice

Mice are delivered weekly to the main office by a private breeder. Mice transported from the office to the individual areas of operation will be protected from direct sunlight during transit.

Mice that are not in a trap are housed in wire mesh cages. These cages will have an adequate of feed blocks and potatoes and be protected from direct sunlight:

- Feed and potatoes are changed 2-3 times per week depending on number of mice.
- No more than 15 mice per holding cage (to prevent fighting due to overcrowding)
- The area around and underneath cages will be cleaned DAILY.

Because mice are vital resource any live births must be protected. Any female mouse found with pups will be removed from the main population or trap and housed separately until the pups are independent of their mother.

Monitor Lizards

Each area of operation is allowed to keep on **ONE** monitor lizard on hand for demonstration purposes only. An ample water supply will be provided at all times. The monitor will be fed a minimum of once per week with a dead or sickly mouse.

Trap and Equipment Maintenance

Trap Refurbishment

Trap refurbishment will occur when a trap is damaged to the point where it can no longer function as an operational trap i.e., unserviceable. An operational trap is one that catches a snake and also protects the mouse.

Damage can occur from a variety sources: non-targets, local climate, accidents, and unforeseen events. In many cases preventative maintenance can prevent more serious damage from occurring and thus prolong the life of the trap.

Listed below are four main areas that, if damaged, require the trap be removed from the field. The trap is deemed unserviceable and **MUST** be replaced immediately i.e., the same day.

Damaged door flaps

Missing flaps/pins

No glue

Twisted/torn/bent door components

Damaged trap body

Holes in the main body

Crushed body
Excessive rust that leads to easily damaged trap
Signs – cracked or illegible

Damaged cones

Missing doors
Twisted/crushed cone rim
Holes in cone
Cracked fusion weld

Mouse chamber

Holes in chamber (approximately dime size or larger)
Twisted/bent chamber door
Chamber wall

Field capable repairs

Frayed or broken tie cords (550 cord)
Excessively rusted/twisted or broken clips
Cones; unserviceable cones can be replaced in the field with new cones, however, the old cones must be taken in for repairs.

Equipment maintenance

Equipment used to support or conduct WS activities will be maintained according to manufacturer guidelines or established policies.

Vehicle maintenance

Vehicles include trucks, ATVs and Mules.

- Vehicles will be washed weekly
- Fluids checked once per week
- Oil changes as scheduled
- Repairs will be carried out as soon as possible. Coordinate logistics with your immediate supervisors and L. Rivera.
- Use sun shield when parking the vehicle at the end of the day.

General Shop Standards

Food Preparation and Storage

Feed blocks prepared for mice consist of bird feed (grain mix) and wax. Feed (loose and prepared) will be stored in large yellow bins to prevent spoilage and rodent access.

Unopened feed and potatoes will be stored in a designated room with air conditioning to prevent spoilage.

Any moldy or spoiled feed/potatoes will be discarded.

General Safety

Employee safety procedures will adhere to WS policy, OSHA (U.S. Department of Labor: Occupational Safety & Health Administration), and regulations established by cooperators. Protective Personal Equipment (PPE) will be dependent on duties conducted, but for general duty the minimum PPE worn will be safety boots.

ATV PPE

Helmet
Gloves
Long Sleeves/Pants
Safety Boots

Bush Cutting PPE

Protective Eyewear
Long Sleeves/Pants
Gloves
Safety Boots

Feed Preparation PPE

Apron
Gloves
Long Sleeves or Safety Sleeves
Protective Eyewear when replenishing or melting wax. **Note:** Do not melt the wax using a temperature greater than 500⁰F

Other General Safety Considerations

Use Kevlar gloves when cutting trail with machete
When operating machinery in the shop e.g., drill press, grinder, etc wear the appropriate PPE
Power tools, (padlock, lockout) industrial machinery lockout (base regs)

ADMINISTRATIVE DUTIES

MIS2000 Records

MIS records are maintained for reporting to cooperators and agency planning, accurate and timely reporting is very important. MIS data must be input on a minimum weekly basis.

Key Reporting on MIS

- BTS Take
- Non-Targets
- Mouse Loss

Do Not:

- Alter Settings or templates
- Do not alter inventory

Any necessary changes to agreements will be done by the MIS technician. For further details concerning MIS SOP consult your MIS Field Handbook.

Personal Property Issue

Upon hiring employees are issued:

Office Keys

Uniforms

New or replacement uniforms will be subject to availability and needs.

Full uniform issues will be made upon hiring

Replacement uniforms issued as need

Route uniform requests through your immediate supervisor

Issued uniforms will be signed for on an internal document maintained at the main office.

Communication Equipment (iConnect)

Handheld devices are issued to employees upon hiring

Badges

All employees will receive an official USDA badge; all other badges issued/carried by employees will depend on the areas they are assigned to work.

AAFB

Department of Defense Affiliate Badge

Line Badge (Issued after clearance approval)

COMNAVMAR

Department of Defense Affiliate Badge

“C” Badge

Port Authority Badge

Barrigada

Department of Defense Affiliate Badge

Airport Operations Area (AOA) – only supervisory personnel and K9 handlers will receive escort authority (EA).

Employees are accountable for property received from the government and its’ cooperators. Property valued at \$50 or greater will be signed for on a Form 13 (Receipt for Property). The form(s) will be maintained in the employee’s file at the main office until the return the property or is no longer accountable for it.

All assigned field equipment will be maintained in good working order, i.e., clean, functional, etc.

Employees are responsible for reporting equipment that is no longer functional or needs replacing to their immediate supervisor.

All damaged, lost or unserviceable equipment must be reported and accompanied by an ***AD Form 112*** (Report of Unserviceable, Lost, Stolen, Damaged or Destroyed Property).