

**JOB PROGRESS REPORT
PROGRAM PROJECT SEGMENT**

STATE: Territory of Guam

PROJECT NO.: BTS 2000

SEGMENT: 1

PROJECT TITLE: Brown Treesnake Control Program

GRANTOR: Office of Insular Affairs, U.S. Department of Interior

PERIOD COVERED: October 1, 1999 to September 30, 2000

SUMMARY

This report provides background information on Guam Department of Agriculture's Division of Aquatic & Wildlife Resources (DAWR) Brown Treesnake (BTS) Control Program and reports the activities for FY00 from October 1, 1999 to September 30, 2000.

During FY00 55 traps were issued to customers and 8 BTS were reported from customer trapping. BTS trapping at A. B. Won Pat Airport ended in October 1999. Airport trapping removed 1 BTS in FY00; 788 BTS were removed since trapping began in February 1997.

The 12 traps at Mahlac swiftlet cave on Naval Ordnance Annex (NOA) were removed in January 2000. Seven BTS were removed in FY00; 54 BTS were removed since trapping began in March 1999.

Snake control efforts resulted in the removal of 109 BTS from inside Northwest Field Area 50 (NWF-A50) (including 2 caught by hand) in FY00. The 2 main trapping strategies used within NWF-A50 were:

- i) Grid trapping consisting of 14 transects of 10 traps with 2 gate traps, for a total of 142 traps; and,
- ii) Perimeter trapping with 2 or 3 activated transects for a total of either 66 or 74 activated traps.

Outside NWF-A50 the number of mark-and-release traps set was increased from 25 to 53. There were 256 mark and release records; including 138 newly tagged BTS, 94 recaptures, and 24 unknowns. Five marked BTS, which apparently breached the barrier, were caught inside NWF-A50. The BTS barrier surrounding NWF-A50 was maintained (247 h) by retying

the hardware cloth to the cyclone fence; removing vegetation from the footing of the fence, and removing vegetation/insect cases on the fence.

Trapping in Munitions Storage Area (MSA), Andersen Air Force Base (AAFB) expanded from 137 to 478 active traps, including 428 perimeter traps and two 25-trap interior grids. There were 1,790 BTS removed. No new crow nest snake barriers were installed in FY00. However, 4 BTS were removed from 5 traps set around an active nest tree with a barrier installed in FY99. Trapping around the DAWR captive breeding facility removed 30 BTS. DAWR BTS construction of snake traps was reduced in June 2000 with the arrival of 200 manufactured snake traps from USDA's Wildlife Services shop in Yakima, WA.

BACKGROUND

On Guam, predation by the introduced Brown treesnake (*Boiga irregularis*) has extirpated most of the native forest birds, and is responsible for the decline of several other types of native wildlife. To reduce the threat of BTS spreading to other Pacific islands and to minimize further effects on native Guam wildlife, the Office of Insular Affairs, U.S. Department of the Interior, began funding Guam BTS research and control in 1990.

The Guam BTS programs focus on reducing BTS populations in specific areas, such as outbound cargo storage, electrical substations, and designated habitats for the reestablishment of endangered species. DAWR BTS research and control projects have included the creation, testing, and installation of barriers for use on nesting trees of native forest bird species and the use of wide-area trapping and barriers to create snake-reduced environments for the reintroduction of endangered species into the wild. In addition, DAWR removed BTS at A. B. Won Pat Airport in support of U.S. Department of Agriculture, Wildlife Service's (USDA/WS) efforts to prevent BTS from entering the outbound cargo flow and colonizing other Pacific islands.

OBJECTIVE

To support endangered species recovery tasks by controlling BTS predation.

PROCEDURES AND RESULTS

Public Outreach & Education

Snake traps are distributed free to the public upon request. A brochure outlining proper trapping procedures, including tips on placement and use of an attractant, is provided to each customer. Customers are asked to identify where the snake trap will be placed, describe the surrounding habitat, and asked to either bring in any BTS caught or, phone in snake measurements.

Free trap distribution to the public began in August 1996. In FY00, 55 traps were issued to customers and 8 BTS were reported from the public. As of September 30, 2000, 2,043 snake traps have been issued and 646 captures were reported.

Other DAWR BTS outreach and education activities included: distributing BTS brochures; responding to public questions regarding BTS and its control; aiding the public with snake removal (based upon the availability of resources); presentations to university classes; and, participating in public events such as Charter Day at the University of Guam (UOG).

In FY00, 2 BTS presentations were given to UOG classes; and, DAWR BTS staff participated in UOG Charter Day activities. A display, which included a snake trap, caged snakes, posters and brochures, was set up from 8:00 a.m. to 2:00 p.m. with wildlife technicians available to answer questions. The display was in conjunction with other agriculture displays from both UOG and Government of Guam.

Trap Construction, Repair, & Areas

Since the inception of the DAWR BTS Control Program in 1996, all snake traps in the program have been designed and constructed by DAWR BTS personnel. As of October 1, 1999, there were 466 traps available for use; these 466 traps do not include the many traps built to replace those damaged in the field. In June 2000 the first shipment of 200 manufactured traps arrived from USDA/WS Yakima, WA shop for use in the DAWR BTS program. The purchase of manufactured traps allowed the DAWR BTS technicians to focus on removing BTS rather than construction of traps.

The following paragraphs describe DAWR snake trapping efforts in each of the various locations.

A.B. Won Pat Airport

DAWR trapping efforts at A.B. Won Pat Airport began in February 1997. One hundred and fourteen traps were located on fences and in forest areas. Trapping was initiated to augment USDA/WS trapping efforts to reduce the chance of BTS spreading via aircraft and cargo to other pacific islands. In FY00, 1 BTS was removed from A.B. Won Pat Airport. Seven hundred and seventy-eight snakes were removed since February 1997. In addition to trapping, 1,855 BTS were removed between November 1996 through August 1998 by Micheal Kuhlmann spotlighting the fence surrounding A.B. Won Pat Airport and Naval Hospital. Records do not indicate exact numbers from each location; however, the majority were from A.B. Won Pat Airport.

In October 1999, in consultation with USDA/WS, the 114 traps from A.B. Won Pat Airport were removed. This decision allowed DAWR BTS Control Program to focus efforts on creating snake-reduced habitat for endangered species recovery

Naval Ordnance Annex (Mahlac Cave)

Mahlac cave is the largest active nesting cave used by the Guam swiftlet (*Aerodramus vanikorensis*). Twelve snake traps were placed around the mouth of Mahlac cave in March 1999 and checked weekly until December 1999. Seven BTS were removed in FY00; 54 BTS were removed since trapping began. Capture rates varied from 0 to 5.28 BTS per 100 trap nights. Snake removals varied between 1 and 6 BTS per week. DAWR traps were removed and plans were made for USDA/WS to resume efforts with Navy funding. FY00 swiftlet count data indicate the population is at its highest peak since counts were initiated in 1980.

Northwest Field (Inside Area 50)

NWF-A50 is a 24-hectare area of limestone forest located in NWF (an abandoned airfield) on AAFB. In 1991, AAFB placed a 6-foot chain-link fence around the area and began removal of feral ungulates in an effort to test natural ecosystem-restoration. In early 1997, NWF-A50 was selected as a release site for captive-bred Guam rails (*Gallirallus owstoni*). Snake trapping and barrier technology were used to control the BTS population in preparation for the release of the rails. Since May 1997, various trapping strategies have been employed to reduce BTS populations. Currently 142 traps (14 transects of 10 traps, plus 2 traps on the fence near the entrance to NWF-A50) remain within NWF-A50.

The chain-link fence surrounding NWF-A50 was fitted with a BTS barrier in August 1998. The barrier is based upon a design developed by the U.S. Geological Survey's Biological Resources Division (USGS/BRD). It is constructed of 1/4 inch galvanized hardware cloth (wire mesh), which is fastened to the tarmac and extends to the top of the 6-foot chain-link fence. At the top of the barrier is a semi-circular bulge designed to repel any BTS that attempts to scale the wire mesh barrier.

FY00 BTS control efforts within NWF-A50 continued with trapping and barrier maintenance; 109 BTS were removed from inside NWF-A50, including 2 hand-caught. Traps were checked 3 times per week and all snakes removed saved for analysis. Maintenance of the NWF-A50 barrier involved 247 hours of wiring the mesh barrier to the cyclone fence and removing vegetation from the barrier.

Northwest Field (Outside Area 50)

The NWF traps outside the fence of NWF-A50 are located across the tarmac and along the forest edge bordering Area 50. Since January 1998 these traps have been used to monitor immigration into or emigration from NWF-A50. When BTS are initially caught, they are injected with an electro-magnetic Passive Integrated Transponder (PIT) tag, sexed, measured, and released at the trap site. On subsequent captures, the snakes are scanned, sexed,

measured, data recorded, and released. All BTS removed from within NWF-A50, MSA and surrounding areas are scanned for the presence of PIT tags.

In FY00, the traps were increased from 25 to 53. In FY00 there were 256 mark and release records, 138 new BTS marked, 94 recaptures and 24 unknowns. Five marked BTS were recaptured and killed within NWF-A50.

Munitions Storage Area Perimeter-trapping of Forest Blocks

The MSA, AAFB was chosen for area-wide BTS control because it contains several potential release sites for Mariana crows (*Corvus kubaryi*), to be translocated from Rota. The forested habitat is divided by a system of tarmac roads, which provide easy access to perimeter-trap blocks of forest within MSA. DAWR's perimeter-trapping efforts in MSA began in 1996 and are concentrated north of D Avenue (see map). Trap placement complements USDA/WS current MSA area-wide BTS control project.

In FY00 perimeter-trapping efforts within MSA were expanded from 112 to 428 traps. Seventeen hundred and twenty-four BTS were removed in FY00; 3,263 BTS have been removed since trapping began in 1996.

Munitions Storage Area Mariana Crow Hack Sites

In addition to perimeter-trapping efforts in MSA, 25-trap interior grids are set in specific sites chosen for Mariana crow releases. These interior grids are arranged in 5 transects of 5 traps and cover one hectare in area. The first 25-trap interior grid was established in November 1998 within Block A (see map). In the first year, the number of BTS removed per week varied between 10 and 0; and, 97 BTS were removed.

In FY00, the Block A grid captures varied from 0 to 4 BTS per week; 33 BTS were removed. A second interior 25-trap grid was initiated in April 2000 within Block DD. The weekly number of BTS removed per week in the Block DD grid varied from 0 to 2 BTS per week; 33 BTS were removed from Block DD Grid.

Munitions Storage Area Mariana Crow Nest Sites

Mariana crow nests are protected from BTS by placing an electric snake barrier around the trunk of active nest trees. During dark hours, barriers are installed, the canopy of the nest tree is visually searched for BTS and surrounding trees are trimmed to reduce access to the nest tree from other tree canopies. In addition to the barrier, traps are set in the immediate area; 4 traps are set around the base of the nest tree and 1 trap is placed in the canopy of the nest tree. Traps are then checked during dark hours. The first Mariana crow successfully fledged from an electric-barrier protected nest in 1991. Although no new barriers were placed in FY00, a nest

tree with an existing barrier became active in January 1999 and 4 BTS were removed from the surrounding area.

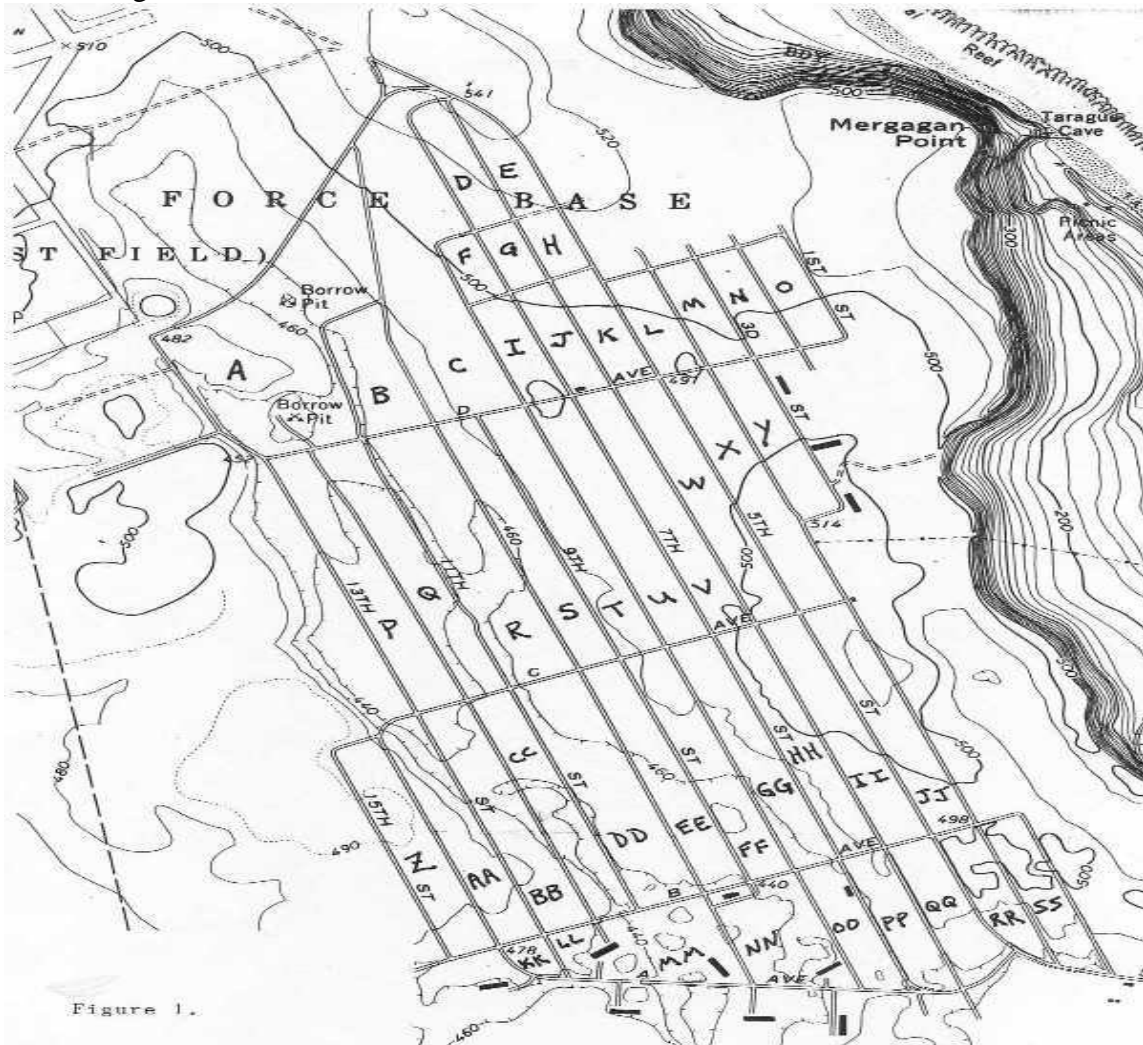


Figure 1. Map of the Munitions Storage Area, AAFB with Block Designations.

Mangilao Captive Breeding Facility

BTS removal began in October 1996 with between 9 and 12 snake traps on the fence surrounding the DAWR endangered species captive-breeding facility in Mangilao, Guam. As of December 1999, 12 snake traps were installed. Trap captures varied between 0 and 3 BTS per week; and, 30 BTS were removed in FY00.

FY00 DAWR BTS capture totals caught in all areas is shown in Table 1.

Table 1: FY00 BTS control totals. The # of snake traps set in MSA blocks varied within FY00 due to changes in trap strategy or shortage of mice and/or snake traps.

Trap Area	Forest Block	Trap Array	# Traps Set	FY00 Total	Grand Total	First Record	Last Record
MSA							
	Block A	Perimeter	99-112	444	1983	6/5/98	open
	Block B	Perimeter	49	169	169	11/1/99	open
	Block C	Perimeter	43-81	562	562	11/5/99	open
	Block D	Perimeter	40-61	56	56	6/22/00	open
	Block E	Perimeter	55	181	181	2/15/00	open
	Block A	Grid	25	33	130	11/30/98	open
	Block DD	Grid	25	33	33	4/27/00	open
	Nest Sites		5	4	4	3/1/00	3/9/00
	Unlabelled	Perimeter	44	142	142	7/18/00	open
	Unlabelled	Perimeter	25	170	170	2/10/00	6/6/00
	Subtotal			1794	3430		
NWF-A50	Inside	Variable	48 - 142	107	769	5/29/97	open
A.B. Won Pat Airport		Perimeter	114	1	788	2/10/97	10/6/99
NOA	Mahlac cave	Perimeter	12	7	54	3/19/99	12/21/99
Mangilao Rail Yard		Perimeter	12	30	30	1/13/00	open
	Subtotal			38	872		
Miscellaneous:							
NWF-A50	Outside	Perimeter	25-53	* 255	n/a	1/20/98	open
Hand-caught	Variable	n/a	n/a	10	^2222	8/29/96	open
	Total			1949	~7293		

* These 255 snakes were trapped and released; 138 of the 255 were newly marked. Released BTS were not included in the total.

^ Includes all hand-caught BTS by DAWR personnel, the public, and spotlighting.

~ Only includes those areas listed.

n/a Not applicable.

MISCELLANEOUS

Don Nichols and Elaine Lamirande, pathology researchers from the Smithsonian National Zoological Park, were on Guam October 25 to November 9, 1999. DAWR BTS Control Program staff assisted by capturing BTS for their research, lending equipment and supplying space for storage of live snakes.

Robert Beck, Wildlife Supervisor, and Diane Vice, BTS Project Leader, attended the 2000 BTS Workplan Meeting in Honolulu, HI, January 5-6, 2000. The meeting provided a forum to discuss BTS programs and achievements from the past year.

Unfortunately, the combination effects of October rains on a dilapidated building caused an electrical failure in the BTS office forcing the movement of furniture and equipment into another room. In addition, the captive mouse population was moved outdoors to provide office space and to acclimatize the mice to Guam's heat and humidity before field use.

Mouse mortality at the DAWR facility was unusually high in the February mouse shipment. The mice appeared stressed upon arrival and deaths were continually reported despite the reduction in density. Other BTS control facilities experienced similar mouse problems. Improvements to the captive mouse facilities were made to reduce mouse mortality at the BTS lab. New mouse compartments were constructed which provided more space per mouse and mice were moved to an area where air conditioning and an exhaust fan were installed. The facility improvements seem to have increased the survival of the captive mouse population at the BTS lab.

BTS removed (except from NWF-A50) which were gravid or measured less than 700 mm SVL were given to USGS/BRD for use in reproductive biology or trap development research.

RECOMMENDATIONS

- 1) Continue to support endangered species recovery efforts by controlling BTS predation in the MSA, AAFB.
- 2) Use electrical barriers placed on bird nest trees to prevent BTS from taking eggs and/or chicks.
- 3) Control BTS at bird hack sites.
- 4) Continue public information/assistance efforts with presentations, issuing snake traps to the public, and assisting with BTS removals.
- 5) Seek additional funding sources to expand area BTS control to support endangered species recovery.

PROGRAM COST

The estimated cost of the project is \$300,000.

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