

# The First Species Conservation Introduction In the Northern Mariana Islands: Translocation of Bridled White-eyes (*Zosterops conspicillatus*) to Sarigan from Saipan

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## Introduction

The Commonwealth of the Northern Mariana Islands (CNMI) has determined that Saipan supports an incipient population of the Brown Treesnake (*Boiga irregularis*; Colvin et al. 2005). This introduced species extirpated or drove to extinction nine of 12 species of native forest birds on Guam within the last half-century, and is likely the single greatest threat to terrestrial ecosystems in the CNMI (Colvin et al. 2005).

As a response to this threat, the CNMI Division of Fish and Wildlife (DFW) in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the Association of Zoos and Aquariums (AZA) investigated possible conservation measures to safeguard CNMI's unique avian species. It was decided that the long-term survival of these species required the establishment of satellite, "insurance" populations on islands in the Mariana archipelago that afford safety from the Brown Treesnake. This interagency meeting also initiated the Marianas Avifauna Conservation (MAC) Project, developed to identify and implement conservation actions necessary to ensure the persistence of CNMI's avifauna.

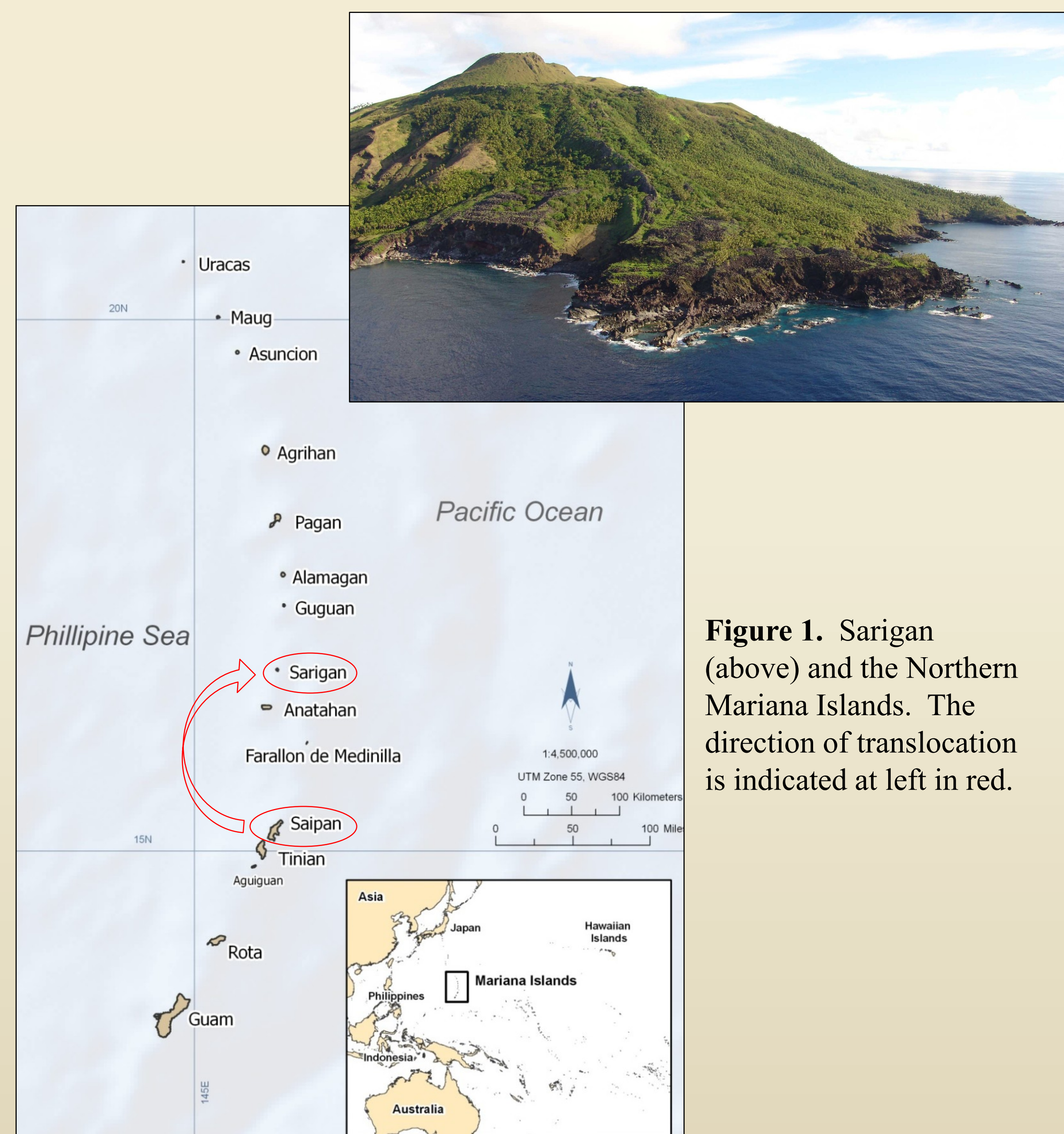
## Objectives and Goals

This pilot Conservation Introduction effort was undertaken by the CNMI to:

- Establish a self-sustaining, satellite population of an endemic species on the northern Mariana island of Sarigan.
- Develop and refine techniques and protocol to be used in future conservation of sensitive and endangered species of CNMI avifauna.
- Assess introduction efforts through periodic monitoring of survival and reproduction of the introduced population on Sarigan.

To accomplish these goals, the MAC Project employed two conservation tools endorsed by the World Conservation Union (IUCN):

- Conservation Introduction** – an attempt to establish a species, for the purpose of conservation, outside its recorded distribution but within an appropriate habitat and eco-geographical area (IUCN 1998).
- Translocation** – a deliberate and mediated movement of wild individuals or populations from one area with free release in another (IUCN 1987, 1998).



**Figure 1.** Sarigan (above) and the Northern Mariana Islands. The direction of translocation is indicated at left in red.

## The Location

The CNMI is a chain of 14 volcanic islands spanning a north-south distance of 604 km and comprising a land area of 469 km<sup>2</sup> (Fig. 1). The CNMI's climate is marine tropical, hot and humid, and characterized by relatively high and uniform yearly temperatures.

Sarigan is an "extinct" stratovolcano that lies 176 km north of Saipan, the CNMI's most populous island (Fig. 1). The island is approximately 500 ha in area and 549 meters at its highest elevation, with irregular shoreline and steep, rugged, eroded cliffs created by old lava flows and landslides. Nearly 45% (223 ha) of the island is forested, the remainder grass or barren rock. Forest cover is approximately 34-40% native (75-90 ha) and 60% old coconut plantation/agro forest (133 ha).

## The Bridled White-eye

The Bridled White-eye (*Zosterops conspicillatus*) was selected to develop a model for future conservation introduction and translocation efforts because:



- The species is endemic to the Mariana Islands
- Large, extant populations exist on three islands of the archipelago
- It is a habitat generalist, increasing the likelihood of establishing a viable population
- It either coexists (or coexisted) with, or is socially submissive to (Craig 1996), all but one of the avian species of conservation concern in the CNMI (i.e., Rota White-eye [*Zosterops rotensis*]).

## Materials and Methods

### Capture and Radio-tagging

From 22-24 April 2008, 77 Bridled White-eyes were mist-netted on Saipan. All were marked with numbered aluminum leg bands, screened for health issues, and blood sampled for sexing; two died of inanition. The remaining 75 were assessed (mean mass = 6.6 grams; range = 5.3-7.6 grams) and the 50 most robust selected for translocation to Sarigan and color banded red.

A subset of white-eyes was radio-tagged to (1) determine the cause of any mortalities, and (2) to gain a feel for movements and cover types used on Sarigan. Originally, 20 birds were to be tagged with 0.35 gram backpack transmitters (model LB-2N, *Holohil Systems Ltd*). However, only 15 of the 50 birds met the MAC Project body mass limit ( $\geq 7$  grams) and were radio-tagged. Transmitters were glued to the inter-scapular region following Johnson et al. (1991).

## Results

### Translocation

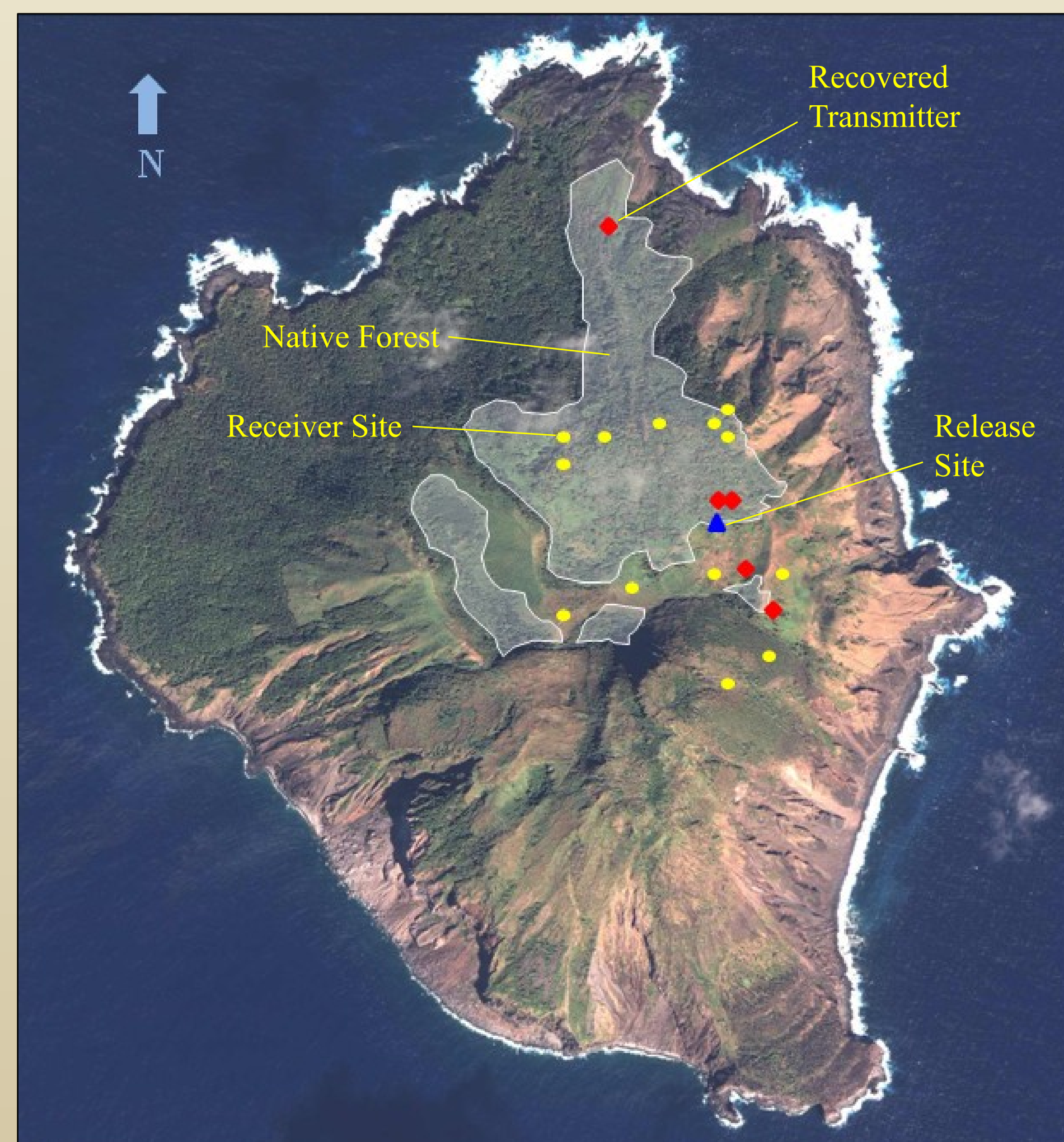
On 3 May 2008, 50 Bridled White-eyes were divided into six AZA designed transport boxes (35.6 cm x 45.7 cm x 20.3 cm). At 07:00 the birds departed Saipan on a Bell 206 *JetRanger* helicopter and arrived at Sarigan ~1 hr later. Upon arrival, the birds were transferred into four AZA designed "field release cages" (45.7 cm x 91.4 cm x 30.5 cm) delivered to the island several days earlier. Several transmitters had fallen off the white-eyes in transit to the island, one of which was determined faulty. Working transmitters were reattached and 14 radio-tagged white-eyes released. The remaining birds were allowed to calm and acclimate for ~45 min and were released at 09:15.

### Post-release Monitoring – Radio Telemetry

Bridled White-eyes were monitored via ground based radio-telemetry by two DFW biologists from 14 receiver sites (Fig. 2) over 10 days (3-12 May). Rugged terrain prohibited triangulation on active transmitters and actual locations could not be accurately determined. Transmitters determined stationary for more than three days were recovered (Fig. 2) for inspection.

### Results:

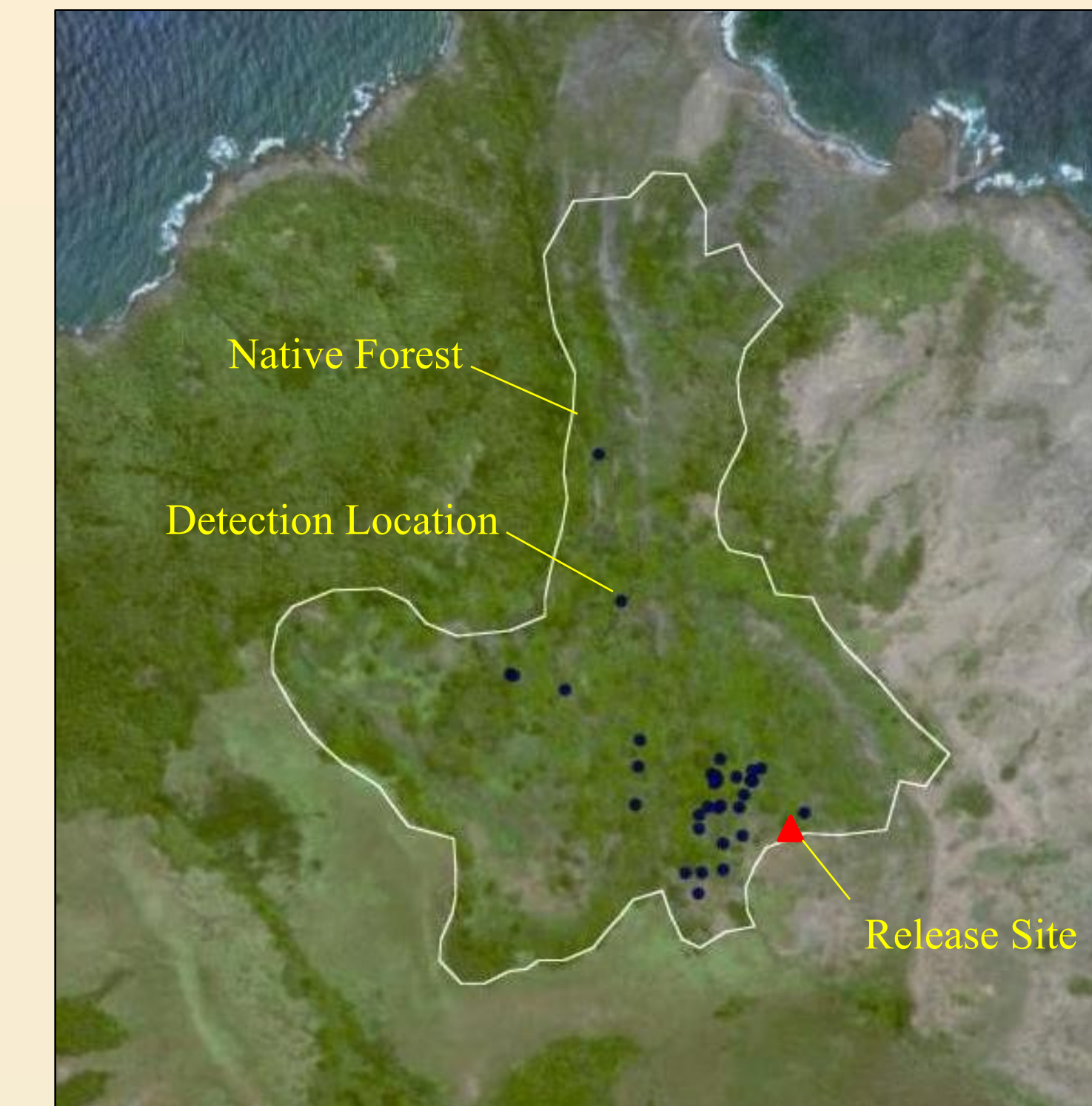
- Five transmitters were recovered between four and eight days post-release – there was no evidence of mortality
- Although detected in native forest at least once between one and three days post-release, the fate of five birds was unknown
- The remaining four birds were never detected



**Figure 2.** Locations of receiver sites and recovered transmitters.

## 2009 Assessment and Translocation

On 23 March 2009, DFW and USFWS biologists arrived on Sarigan to assess the status of the 2008 founder population of Bridled White-eyes. Two color banded and six to 10 unbanded white-eyes were observed in native forest northwest of the release site. Additionally, a few active, vocal flocks of four to 10 birds were heard in dense canopy and a recently used white-eye nest was found. Breeding had successfully occurred.



**Figure 3.** Locations of detected white-eyes.

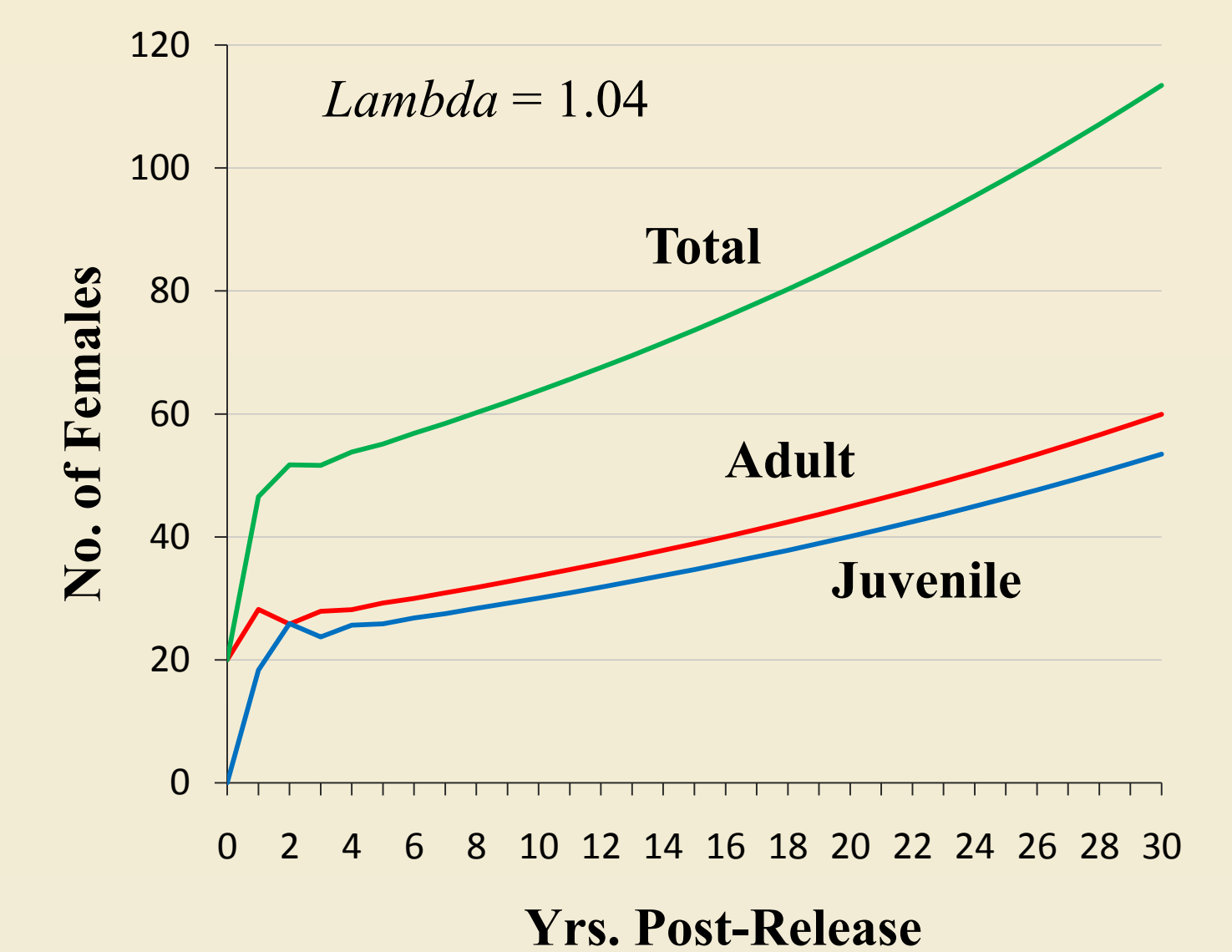
To augment the founder population another cohort of white-eyes were translocated to Sarigan from Saipan's neighboring island of Tinian (fig. 1), following the methods tested in 2008. Poor weather delayed translocation by more than two days, forcing the hard release of 50 white-eyes on 6 May; no radio-tags were successfully deployed. During the ensuing week of monitoring, two birds released in 2008 were observed feeding fledged young and as many as 86 white-eyes were detected at 32 locations (Fig. 3). However, an accurate population estimate was impossible with the data collected.

## Population Modeling

The sex ratio of Bridled White-eyes introduced on Sarigan in 2008 was 1:1.45 female ( $n = 20$ ) to male ( $n = 29$ ), and in 2009 was 1:2.1 female ( $n = 16$ ) to male ( $n = 34$ ). As vital rates data necessary to develop a population model specific to Bridled White-eyes were lacking, those of the closely related Silveryeye (*Zosterops lateralis*) were used to support model development: adult survival = 61%; juvenile survival = 47%; breeding success = 3.1 fledglings/pair (Kikkawa and Wilson 1983, Brook and Kikkawa 1998). After the 2009 translocation, the projected female population at 10, 20, and 30 years was 70, 101, and 147 respectively (see graph).

### Assumptions

- Vital rates for the two white-eye species were similar
- Breeding by all birds  $\geq 1$  yr old
- Birds  $< 1$  yr old did not breed
- Breeding success was estimated over 1 yr
- Equal sex ratios in offspring
- Juvenile survival differed from yearly adult survival
- No stochastic or catastrophic events



## Discussion

In the short term, the conservation introduction of Bridled White-eyes to Sarigan was successful. No known mortalities occurred during either the 2008 or 2009 translocation and a breeding population had been established. Yearly monitoring focusing on survival, recruitment, and reproduction will shed light on the long term viability of the current population and serve to direct any necessary management actions. However, executing the necessary frequency of monitoring will be a challenge given the logistics and funds needed to maintain personnel on a remote island in the CNMI, even for a short time. The techniques developed for avian species translocation in the Marianas will be used for future conservation introductions of more sensitive species including the Tinian Monarch (*Monarcha takatsukasae*) and Golden White-eye (*Cleptornis marchei*).

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