

**JOB PROGRESS REPORT
RESEARCH PROJECT SEGMENT**

STATE: Territory of Guam

PROJECT NO.: F-1R-7
SUBPROJECT NO.: F-4
STUDY NO.: 1
JOB NO.: 1

JOB TITLE: Stock Assessment Surveys of Marine Preserves and Control Sites

PERIOD COVERED: October 1, 1998 to September 30, 1999

SUMMARY

During FY99, baseline data was collected at the Piti Bomb Holes Preserve, Achang Reef Flat Preserve and their control sites. Strip transects, 50m x 50m, were laid out on the reef flats and the fore reef slopes at each site. Transects on the reef flats were divided into the following categories: sandy bottom; seagrass beds; and coral/rubble habitats. Transects on the fore reef slopes were divided into 20, 30, 40, and 50 ft. depth habitats. Two divers, one on each side of the tape, moved along transects to record the number and sizes of important food fishes, butterflyfishes, and visually obvious fishes.

Thirty-minute interval counts were conducted on the reef flats and fore reef slopes at each site. Interval counts on the reef flats and fore reef slopes were divided into the above-mentioned habitat types.

Video transects for substrate cover were conducted on the fore reef slopes of Piti Bomb Holes Preserve and Asan control sites. Video transects on the fore reef slopes were divided into the above-mentioned habitat types.

BACKGROUND

In order to restore fish stocks in the coastal areas around Guam, Public Law 24-21 was established five marine preserves and made changes to Guam's fishing regulations. The names of the preserves are listed as follows: Pati Point; Tumon Bay; the Piti Bomb Holes; Sasa Bay; and Achang Reef Flat (Figure 1). Under P. L. 24-21, the Department of Agriculture is required to monitor the areas for two years to determine the effects of the marine preserves on food fish populations and report the findings to the legislature. Stock assessment surveys of the marine preserves and control sites need to be conducted to monitor their effectiveness in the restoration of a dwindling fishery resource. Harvest and participation data obtained through the Inshore Fisheries Survey Project (F-1R, Subproject F-1, Study 1, Job 2) was used to justify the establishment of the marine preserves.

OBJECTIVE

To evaluate the effect on sport fish populations caused by the creation of marine preserves.

PROCEDURES

Logistics

The survey team on the reef flat consisted of 4 to 5 snorkelers/divers while the team on the fore reef slope consisted of 4 to 5 divers and a boat person. Two persons were designated to count fish (reduce bias) and one person recorded the video transects. Different counters were used at different times due to work scheduling conflicts.

Surveys required the following equipment: snorkel and SCUBA gear; a boat with safety gear; one Nikon Action 8 video camera with stingray video housing (47 in. rebar mounted on the left side); GPS; pencils with clipboards and underwater data sheets; two 50 meter measuring tapes; PVC pipes (1 in. dia. And 3 to 6 in. lengths); and PVC caps (glued to their ends and tied with nylon cords).

Site Selection

The Piti Bomb Holes and Achang Reef Flat Preserves are the experimental sites for stock assessment surveys. Cocos Lagoon is the control site for the Piti Bomb Holes reef flat and the Asan fore reef slope, which is closer to Adelupe (Figure 1), is the control site for the fore reef slope of the Piti Bomb Holes Preserve. Pago Bay reef flat is the control site for the Achang Reef Flat Preserve. During FY99, the control site for the Achang Reef Flat fore reef slope was changed to Cocos fore reef slope.

Transect Selection

Strip transects, 50 m X 5 m, were laid out on the reef flats and the fore reef slopes of each site. Eight strip transects (2 at the 20, 2 at the 30, 2 at the 40, and 2 at the 50 ft. depths) were laid out on the fore reef slopes of the Piti Bomb Holes Preserve, Asan, and Cocos. Because of poor weather conditions and lack of a boat, only four strip transects (1 at the 20, 1 at the 30, 1 at the 40, and 1 at the 50 ft. depths) were laid on the fore reef slope of the Achang Reef Flat Preserve. Eight strip transects (3 on the seagrass, 3 on the coral/algal/rubble, and 2 on the sandy bottom) were laid out on the reef flats of the Piti Bomb Holes Preserve and Cocos Lagoon. Eight strip transects (4 on the seagrass, and 4 on the coral/algal/rubble) were laid out on the reef flats of the Achang Reef Flat Preserve and Pago Bay. Also, eight strip transects were laid out near the Piti Observatory because business-feeding practices appear to be aggregating fish.

Strip Transect Technique

Two to three snorkelers/divers laid out a measuring tape to mark the length of a transect. They tied a PVC pipe to a rock at both ends of the transect to semi-permanently mark the transect. When they completed laying the transect, the fish counters, one on each side of the tape, moved along the transect recording the number and size of important food fishes, butterflyfishes, and visually obvious fishes. The transect width was estimated visually. A new transect was laid with another tape measure while the fish counters were recording fishes. The counters moved along the new transect when they completed recording fish from the previous transect. The measuring tape from the previous transect was retrieved while the counters were recording fish in the new transect, and the process continued until all transects were laid and all fish counts completed.

The transects were separated by at least 5 to 10 meters. In addition to the placement of the markers (PVC pipes), GPS coordinates were taken and maps were drawn in order to relocate the transects.

Interval (Timed-Swim) Count Technique

Interval counts, which involved counting fish for thirty minutes near the transect areas, were conducted on the reef flats and the fore reef slopes of each site. Four interval counts (2 between the 20 - 30 ft, and 2 between the 40 - 50 ft. depths) were conducted near the transects on the fore reef slopes of the Piti Bomb Holes Preserve, Asan , and Cocos. Because of poor weather conditions and lack of a boat, interval counts weren't conducted on the fore reef slope of the Achang Reef Flat Preserve. Six interval counts (2 on the seagrass, 2 on the coral/algal/rubble, and 2 on the sandy bottom) were conducted on the reef flats of the Piti Bomb Holes Preserve and Cocos Lagoon. Four interval counts (2 on the seagrass and 2 on the coral/algal/rubble) were conducted on the reef flat of the Achang Reef Flat Preserve and Cocos Lagoon.

Video Transect Technique

The method to assess the percentage of substrate cover was changed to video transects during FY99. Video transects on the fore reef slopes of the Piti Bomb Holes Preserve and Asan were conducted. Because of poor weather and lack of a boat, video transects of the fore reef slopes of the Achang Reef Flat Preserve and Cocos weren't conducted. The strip transects for the fish surveys were also used for the video transects. The procedure for recording substrate was similar to the strip transect method. Substrate was recorded from one end of the transect to the other. The rebar was used to guide the camera along the tape measure and to maintain camera and substrate distance.

RECOMMENDATIONS

- 1) If weather permits and a boat is available, obtain more baseline data on the fore reef slopes of the Achang Reef Flat Preserve and Cocos; otherwise, sufficient data has been collected.
- 2) Purchase a new boat as soon as possible for the Department of Agriculture so surveys on the forereef slope and Cocos Lagoon can be conducted. The new boat should be longer than 20 ft., able to carry six to eight passengers/divers, and capable of handling seas on the east side of the island.
- 3) Continue the temporary use of the University of Guam Marine Lab boat for the surveys, and initiate procurement of boat rental.
- 4) Investigate alternative methods besides GPS and maps to relocate transects.

PROJECT COST

The estimated cost of the "Stock Assessment Survey of Marine Preserves and Control Sites" was approximately \$70,000.

This report was prepared by: Jay T. Gutierrez.

LITERATURE CITED

Cappo, Michael and Brown, Ian W. 1996. Evaluation of sampling methods for reef fish populations of commercial and recreational interest. CRC Reef Research Tech. Rep. No. 6. 72 pp.

GOVERNMENT OF GUAM DEPARTMENT OF AGRICULTURE
DIVISION OF AQUATIC AND WILDLIFE RESOURCES

FIGURE 1. GENERAL AREAS OF EXPERIMENTAL AND CONTROL SITES

