

## **JOB PROGRESS REPORT RESEARCH PROJECT SEGMENT**

**STATE:** Territory of Guam

**PROJECT NO.:** F-1R-6  
**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, 1997 to September 30, 1998

### **SUMMARY**

During FY98, initial planning for the Marine Preserve Fish Assessment Surveys had begun.

Of Guam's five marine preserves (Figure 1), fish assessment surveys will be conducted at the Piti Bomb Holes Preserve and the Achang Reef Flat Preserve. The surveys will be divided into two habitat types: the reef flat and the fore reef slope. The reef flat habitat will be divided into microhabitats such as sandy bottom, seagrass beds, and coral/rubble habitats. The control site chosen for the reef flat at the Piti Bomb Holes Preserve is Cocos Lagoon, the control site chosen for the Piti Bomb Holes Preserve fore reef slope is the Asan fore reef slope (area closer to Adelup), the control site chosen for the Achang Reef Flat Preserve reef flat was the Pago Bay reef flat, and the control site chosen for the Achang Reef Flat Preserve fore reef slope was the Atao Beach fore reef slope. Field surveys were conducted at a variety of sites until suitable control sites could be selected. Fish assessment surveys will also be conducted near the Piti Observatory since feeding practices appear to be aggregating fish.

A visual fish survey was chosen: reef flat surveys and fore reef slope surveys will consist of 50 m X 5 m strip transects. To augment the results of these surveys, interval counts, filming with an underwater video camera, and photo-sampling of substrate will be conducted. The fish species to be surveyed are the important food fishes and the butterflyfishes since they usually serve as indicators of coral cover.

### **BACKGROUND**

In order to restore fish stocks in the coastal areas around Guam, Bill No. 49 (COR) was signed into law on May 12, 1998 as Public Law 24-21 establishing five marine preserves and making changes to Guam's fishing regulations. The names of the preserves are the Pati Point Preserve, the Tumon Bay Preserve, the Piti Bomb Holes Preserve, the Sasa Bay Preserve, and the Achang Reef Flat Preserve. 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. To monitor the effectiveness of marine preserves in restoring a dwindling fishery and heighten public awareness, stock assessment surveys of the marine preserves and control sites need to be conducted. The justification for the marine preserves came from data obtained from the Inshore Fisheries Survey Project (F-1R, Subproject F-1, Study 1, Job 2).

### **OBJECTIVE**

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

## **PROCEDURES**

Initial planning for the stock assessment surveys of the marine preserves involved choosing control and experimental sites, habitat types to sample, and sampling methods. The professors from the University of Guam marine lab were consulted to provide insight into the plans. Literature on marine preserves, papers on marine biological surveys on Guam, and maps of Guam's reefs and beaches were also obtained and reviewed.

Fieldwork was conducted on the reef flat to determine if the control and experimental sites chosen were similar. The use of different sampling markers were also explored and discussed.

## **RESULTS**

From meetings held with the professors from the University of Guam marine lab, the Piti Bomb Holes Preserve and the Achang Reef Flat Preserve were chosen as the experimental sites for the fish assessment surveys. The two preserves were chosen as experimental sites because no fishing is allowed at all within these preserve as compared to the Tumon Bay Preserve and the Pati Point Preserve in which limited fishing is still allowed. The Sasa Bay Preserve was not considered due to poor visibility in the water. The reef flat and the fore reef slope are the two habitats chosen for the survey. Within the reef flat, the sandy bottom, the seagrass beds, and the coral/rubble habitats are to be surveyed.

From discussions between Agriculture staff and from obtained literature, control sites were chosen for the two experimental sites. Reef flat for Piti Bomb Holes Preserve = Cocos Lagoon; fore reef slope for Piti Bomb Holes Preserve = Asan fore reef slope (area closer to Adelup); reef flat for Achang Reef Flat Preserve reef flat = Pago Bay reef flat; fore reef slope for Achang Reef Flat Preserve = Atao Beach fore reef slope. Fish assessment surveys will also be conducted near the Piti Observatory since feeding practices appear to aggregate reef fish. Figure 1 depicts the general areas of the experimental and control sites.

Visual sampling methods were suggested as potential methods for the fish assessment surveys: strip transects, stationary point counts, interval counts, and underwater video cameras. Strip transects 50 m X 5 m were chosen as the primary method to estimate fish abundance over time because of all sampling methods for reef fishes, the use of strip transects has received the most intensive analysis of precision, accuracy, efficiency and data attributes (Cappo, Michael and Brown, Ian W. 1996). Interval counts, the use of an underwater video camera, and a photogrammetric method to sample substrate will be conducted to augment the presentation of survey results. The interval counts will be conducted for species diversity, sites will be filmed with a video camera to provide a before and after visual representation over the study time period, and substrate sampling will be conducted to depict the status of the biota within defined habitats at a given time. The important food fishes and the butterflyfishes, since they usually serve as indicators of coral cover, were chosen as the fish species to survey for the assessment.

Similarities were exhibited between the control and experimental sites when field surveys were conducted on the reef flats of the Piti Bomb Holes Preserve, Pago Bay, Achang Reef Flat Preserve and Cocos Lagoon. The different habitat types and potential areas to sample within the control and experimental sites were noted.

## **RECOMMENDATIONS**

- 1) Practice survey methods to ensure comfortability with the methods and to incorporate any modifications, if needed.
- 2) It is recommended that a new boat be purchased as soon as possible for the Department of Agriculture so surveys on the fore reef slope and Cocos Lagoon can be conducted. It is also recommended that the new boat 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. Agriculture's old boat, the 20 ft. Corwin, does not meet all these requirements and is inoperable at this time.
- 3) Since the deadline for submitting requisitions for FY98 has ended, it is recommended that as soon as requisitions can be accepted for FY99 that they be submitted to obtain materials needed for the fish assessment survey.
- 4) It is recommended that different sampling markers be considered due to the fact that some of habitats to be sampled for the survey are on sandy bottoms and seagrass beds.
- 5) It is recommended that memorandums be sent to the University of Guam marine lab and to the Department of Parks and Recreation to request the use of their boats for the surveys.

#### **PROJECT COST**

The estimated cost of the project is \$15,000.

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#### **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

