

JOB PROGRESS REPORT DEVELOPMENT PROJECT SEGMENT

STATE: Territory of Guam

PROJECT NO: F-2-D
SEGMENT: 11

PROJECT TITLE: Fabrication and Deployment of Shallow Water Moorings (2331)

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

OBJECTIVE

To develop a shallow water mooring program at popular fishing and recreational diving locations to minimize anchor damage to reef habitats.

SUMMARY

Installation of thirty-four shallow water moorings (SWMs) began on March 4, 1999 and was completed on April 9, 1999. Figure 1 provides a list of the thirty-four SWM sites and also maps their approximate locations; Table 1 lists the coordinates and depths of each site; Figures 2 - 10 provide a more detailed illustration of the location of each site. Figure 11 illustrates the design of the SWM system currently in use.

Of the three anchor types available - cemented eye-bolt, epoxied eye-bolt and Manta Ray anchor - only the cemented and epoxied eye-bolt anchors were utilized. It was anticipated that Manta Ray anchors would be necessary for the Apra Harbor, Sella Bay, Cetti Bay SWM sites, as well as other predominantly sand and mud bottom sites. However, hard limestone substrate was found at each of these sites and the decision was thus made to continue use of the eye-bolt anchors. Of the two types of eye-bolt anchors, the epoxied eye-bolt anchor was the most convenient to install given the ease in handling the epoxy and the relatively short curing time. The holding strength of all eye-bolt anchors installed were load-tested to withstand at least 2,000 pounds of vertical pull.

The DAWR SWMs are intended to accommodate a mixed usership and a wide variety of vessel lengths, ranging from subsistence fishing in a small skiff, to scuba diving from the larger 40-foot tour-boats carrying 30-50 recreational divers. However, the majority of the vessels utilizing the SWMs are expected to be in the 14 to 25-foot range. To ensure their availability and to prevent the mooring systems from being overloaded, decals have been affixed to the SWM buoys that indicate a 3-hour time limit, a maximum boat length of 50 feet, and a maximum weight of 35 gross tons.

Expansion of SWM Program

Expansion of the DAWR SWM program is likely as additional locations have already been identified and requested. Conversely, some sites may eventually be deleted from the program if they are determined to be rarely used, unnecessary, impractical or in conflict with other local, federal, military or existing commercial operations.

If the decision is made to further expand the SWM program, DAWR will be required to go through the same authorization and permitting processes for any new sites added to the program, including installation of additional systems at existing sites. However, it will likely

take much less time to complete the necessary steps for a “Phase II” expansion of the DAWR SWM program.

Table 1. Shallow Water Mooring Site Coordinates and Depths.

No.	Site Name	Coordinates	Depth (ft.)
1.	Double Reef #1	13°36.219'N / 144°50.105'E	33
2.	Double Reef #2	13°35.713'N / 144°49.988'E	39
3.	Hilaan Pt.	13°33.763'N / 144°48.985'E	45
4.	Gun Beach	13°31.470'N / 144°48.068'E	20
5.	Tumon #1	13°31.032'N / 144°47.162'E	30
6.	Tumon #2	13°30.641'N / 144°47.162'E	45
7.	Alupat Island	13°21.608'N / 144°46.026'E	47
8.	East Agana	13°29.337'N / 144°45.873'E	35
9.	West Agana	13°29.046'N / 144°44.008'E	48
10.	Asan	13°28.646'N / 144°42.780'E	49
11.	Piti	13°28.602'N / 144°41.833'E	49
12.	Amphitheater	13°27.914'N / 144°40.549'E	57
13.	Luminao Reef	13°28.070'N / 144°39.366'E	45
14.	Blue Hole	13°26.177'N / 144°37.589'E	50
15.	Shark Pits	13°25.260'N / 144°38.372'E	56
16.	Rizal	13°24.666'N / 144°38.953'E	46
17.	Haps Reef	13°23.678'N / 144°39.196'E	50
18.	Alutom Island	13°23.072'N / 144°38.763'E	53
19.	Bangi Point	13°22.373'N / 144°38.528'E	50
20.	Anae Island	13°21.380'N / 144°38.240'E	20
21.	Pete's Reef	13°20.652'N / 144°38.265'E	55
22.	Sella Bay	13°19.361'N / 144°39.100'E	16
23.	Cetti Bay	13°18.932'N / 144°39.188'E	35
24.	Toguan Bay	13°17.003'N / 144°39.665'E	37
25.	Bile Bay	13°16.600'N / 144°39.700'E	48
26.	Cocos #1	13°15.900'N / 144°39.258'E	46
27.	Cocos #2	13°15.061'N / 144°38.715'E	36
28.	Navy Channel	13°14.485'N / 144°38.375'E	37
29.	Cocos Wall	13°14.250'N / 144°39.552'E	45
30.	Cocos #3	13°14.249'N / 144°40.019'E	55
31.	Jade Shoals	13°27.189'N / 144°39.720'E	45
32.	Western Shoals	13°27.020'N / 144°29.230'E	20
33.	Gab Gab #1	13°26.694'N / 144°38.729'E	20
34.	Gab Gab #2	13°26.706'N / 144°38.655'E	60

RECOMMENDATIONS

The project to develop and enhance the Guam SWM program should be continued with the following recommendation for FY00:

1. A maintenance routine for the mooring buoy program should be implemented under F-3-D-4 now that the initial installation phase has been completed. Procedures should include changing the safety shackle at the anchor pin before the nut seizes on the bolt, and replacement of any missing information decals that may have come off.
2. An evaluation of the SWM program should be conducted to determine if the location of existing sites remain satisfactory and if additional sites are

necessary. Input from the SWM usership should also be solicited and compiled to aid in planning the future course of the project.

3. Most of the hydraulic equipment purchased by DAWR for the installation of the SWM anchors was stolen in July, 1999. Rather than replacing the equipment, DAWR should consider having the contractor selected for any future installation contract furnish the necessary hydraulic equipment if the charge is reasonable.

PROGRAM COST

The estimated cost for the SWM project is \$116,436.

This Report was Prepared by: Andrew A. Torres.

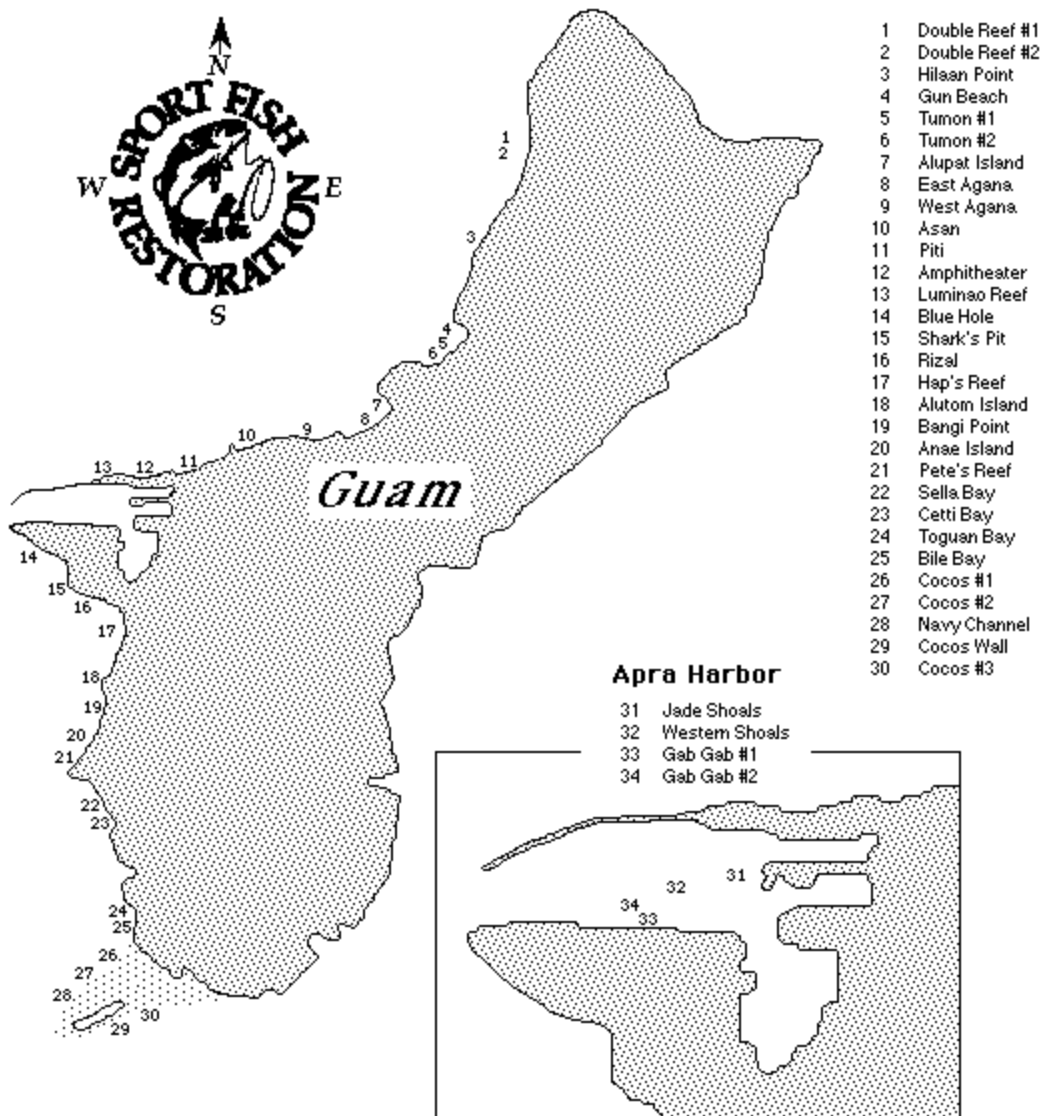


Figure 1. Shallow Water Mooring Sites

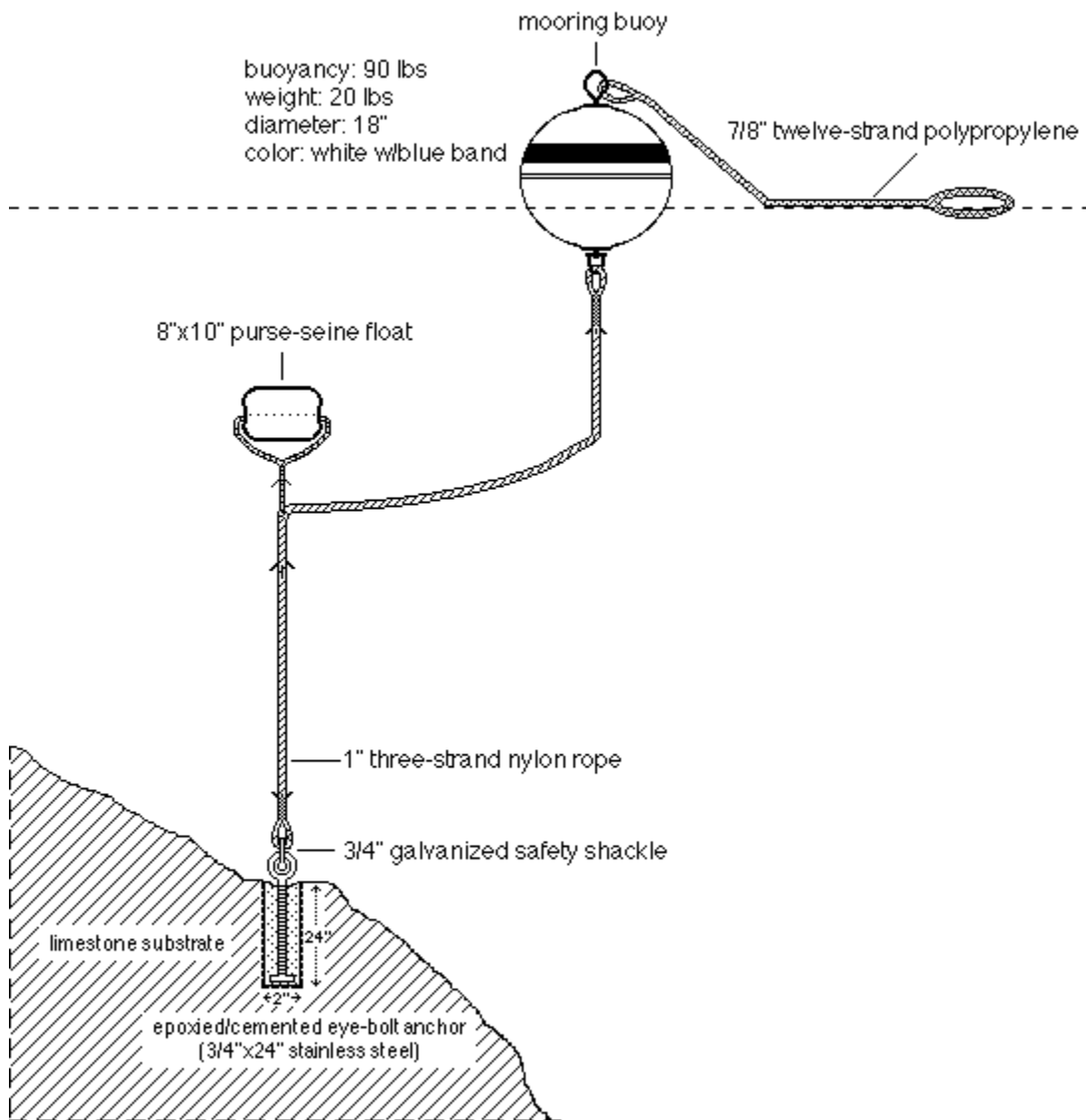


Figure 11. Shallow Water Mooring Design