

SITE VISIT – PILLOW TALK

The "PILLOW TALK" grounded and sank on 24 October 1997 after contacting a shallow patch reef in Biscayne National Park (BISC). Following initial contact with one portion of the reef (Site 1), the vessel lost a shaft and took on water resulting in the sinking of the vessel onto another adjacent patch reef (Site 2). The vessel was temporarily refloated by a local salvager but during the salvage attempt the salvager lost control of the refloated vessel and it sank again onto another reef location (Site 3). The "PILLOW TALK" was successfully removed from BISC on the following day, 25 October 1997. BISC personnel responded to the grounding event and conducted site injury assessments at each of three impact locations (Sites 1, 2, and 3).

On 23 October 2001, a site visit was conducted at the two of the three "PILLOW TALK" impact locations. Site visit participants included Karen Battle of BISC and Robert Mulcahy of MRI. The purpose of the site visit was to assess the feasibility of primary restoration at the impact locations. Site 1 was the initial contact point on the inbound path of the grounding vessel and observed impacts were comprised primarily of fractured and scarred hard coral colonies. Site 2, where the vessel first sank, was not located and subsequently not observed during this site visit. Site 3, the final resting location of the "PILLOW TALK", is a low-relief patch reef with hard coral colonies ranging in diameter from 0.1 to 1 m. Site 3 impact is characterized by damaged reef substrate with an area (25 m²) which is relatively devoid of benthic biota. Primary restoration is highly recommended for the Site 3 impact area.

PRIMARY RESTORATION RECOMMENDATIONS

Primary restoration is not recommended at Site 1. Site 1 injuries included broken and scarred hard corals that have stabilized and have begun recovery since the grounding event. Coral reattachment as primary restoration is not feasible at Site 1 since any loose or broken coral fragments displaced during the grounding are no longer available for reattachment. Substrate augmentation at Site 1 would be minimally beneficial as primary restoration since natural recovery of the damaged hard coral substrate is ongoing and there is a lack of adequate space on the seafloor for placement of artificial reef structures.

Primary restoration is recommended at Sites 2 and 3. Primary restoration at Sites 2 and 3 will be comprised of substrate augmentation and stabilization for impacted low-relief reef structure. This will be accomplished by installing specially designed reef modules at Sites 2 and 3. Although the team did not inspect Site 2 during the site visit, the same restoration technique is recommended for Sites 2 and 3 since impacts were reported to be similar at both sites.

The damaged substrate at Sites 2 and 3 should be reconstructed and stabilized to replace lost three-dimensional relief and facilitate natural biotal recolonization. Recommended reef modules are specifically modified structures to meet the biological and aesthetic needs of BISC for these sites. Functionally similar reef modules have been field-tested and installed by MRI at the Bache Shoal orphan grounding site (**Figure 1**) and Western Sambo Reef (**Figure 2**). The recommended reef module design is different in that it incorporates a relatively high volume of natural coral rock and has a more natural appearance due to its irregular shape and contoured edges (**Figure 3**). The recommended modules are composed of approximately 60% coral rock and 40% Portland Type 2 concrete by volume. The coral rock will consist of boulders no larger than 0.25 m in diameter and will be purchased from a local quarry and transported out to the site, and the concrete will be ordered directly from the manufacturer to ensure high quality.

The recommended reef modules are constructed in-place, underwater, using removable pre-fabricated fiberglass forms. The layout of reef modules for Sites 2 and 3 are shown in **Figures 4** and **5**, respectively. Each module is secured using fiberglass rebar placed into the reef substrate which provides sheer strength and matrix reinforcement. The rebar is grouted into the reef module during on-site construction. The fiberglass rebar and initial concrete pour will secure the module in place during storm events, which will facilitate additional concretion of the module to the seafloor by natural cementing agents.

The artificial structures created during restoration provide substrate for epibiotal recruitment and potential transplanting. If made available, it is suggested that living coral tissue be transplanted on the reef modules from BISC's coral reef nursery next to Boca Chica Key. These small pieces of coral were collected following other vessel groundings and were transported and attached to artificial reef structures in place just offshore of the north side of Boca Chica Key. The primary objective for epibiotal transplantation is to accelerate habitat restoration by improving epibiotal cover, biodiversity, and structural complexity.



Figure 1. Artificial Reef Module on Bache Shoal, Biscayne National Park

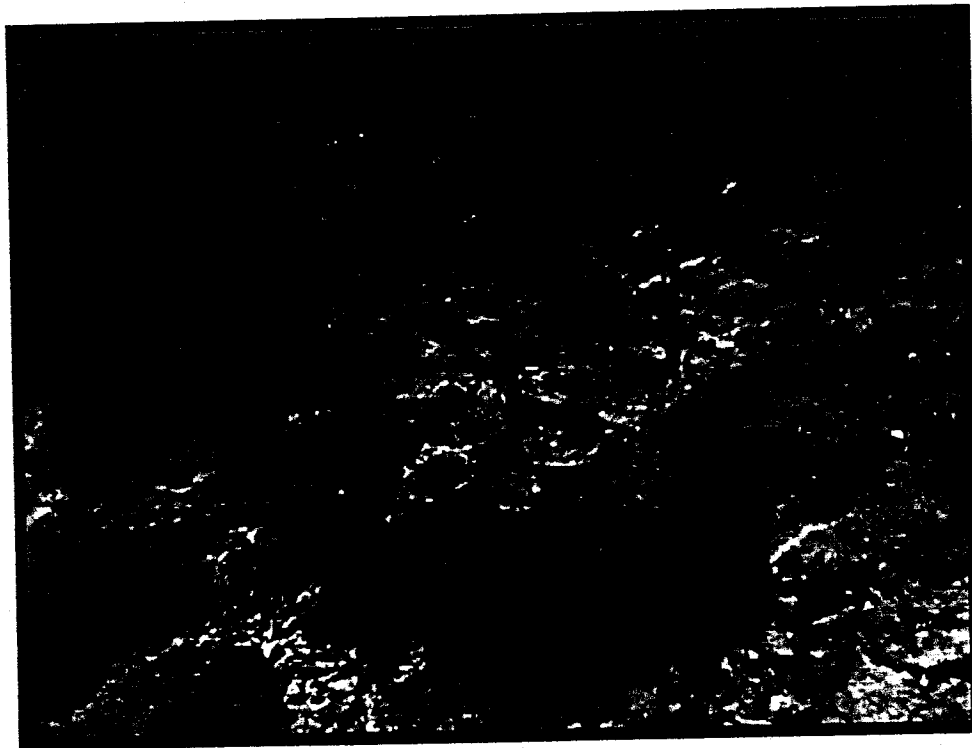


Figure 2. Artificial Reef Module on Western Sambo Reef, Florida Keys National Marine Sanctuary

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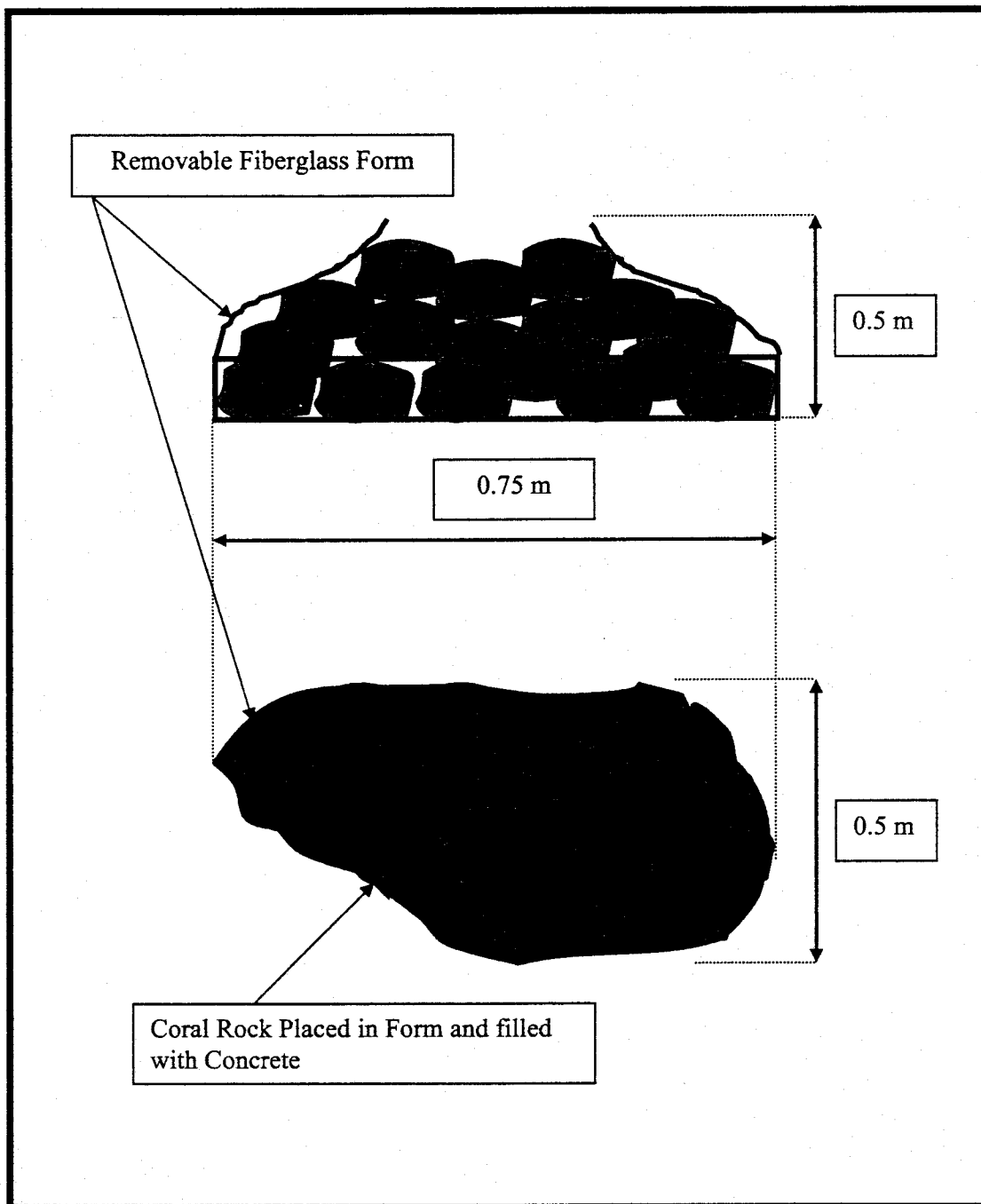


Figure 3. Artificial Reef Module Design

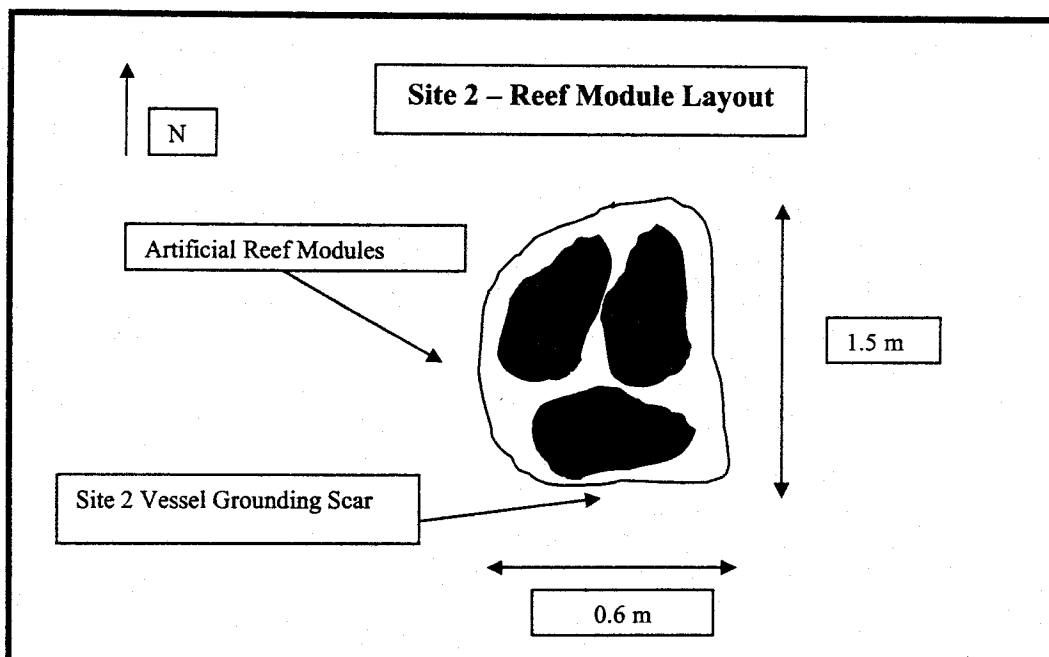


Figure 4. Proposed layout of reef modules at Site 2. Site dimensions taken from Injury Assessment field notes provided by the BISC.

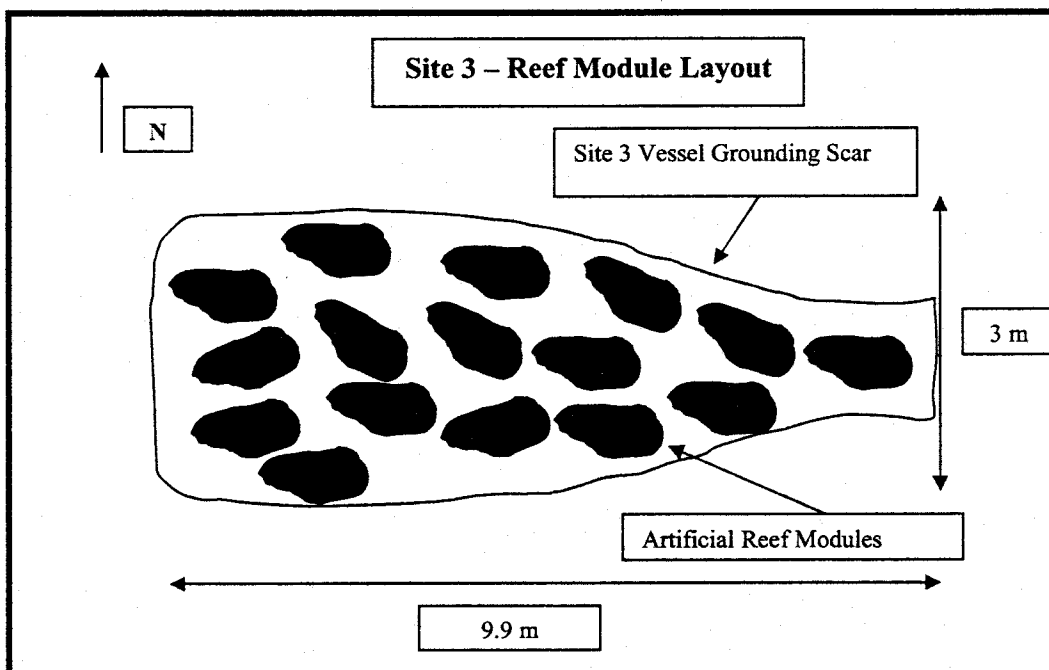


Figure 5. Proposed layout of reef modules at Site 3. Site dimensions taken from Injury Assessment field notes provided by the BISC.

Project Costs

The following summary costs are included for the primary restoration for the Pillow Talk grounding site. The costs include mobilization of all the necessary equipment and personnel to complete the project and field time for a restoration crew of four personnel.

The mobilization efforts include the purchase of approximately 2 tons of coral rock at the specified size and trucking of the material to BISC. Personnel will organize the mobilization efforts in Stuart Florida and then transit to the site. The field effort is estimated at approximately 5 days on site. An additional 2 days are included for weather contingency. Detailed costs are shown in Tables 1 and 2 and Optional Costs are shown in Table 3.

Mobilization / Demobilization Fixed Price	\$13,699
PILLOW TALK Site Restoration (estimated 5 days @ \$4,299/dy)	\$21,495
<u>Weather Contingency (estimated 2 days @ \$4,299/dy)</u>	<u>\$ 8,598</u>
Total Estimated Cost	\$43,792
 * Optional Cost to transplant corals from the coral nursery Estimated at 3 days @ \$4,454	 \$13,362
Total Estimated Cost with Option to Transplant Coral	\$57,154

Table 1 – Mobilization / Demobilization

Pillow Talk Reef Restoration Mobilization / Demobilization		TOTAL
LABOR		\$5,052.00
EQUIPMENT		\$1,800.00
OTHER DIRECT COSTS		\$6,847.10
Total:		\$13,699.10

	Cat.	Hours	Rate	Total
R. Mulcahy	Prin	2	\$98.00	\$196.00
B. Graham	SS	16	\$89.00	\$1,424.00
T. Lamoure	OM	16	\$67.00	\$1,072.00
D. Doherty	Tech	16	\$59.00	\$944.00
T. Talbot	Tech	24	\$59.00	\$1,416.00
Total:				\$5,052.00

	UNITS	QTY	RATE		PRICE
Work Vessel	dy	2	\$450.00		\$900.00
Scuba Gear (4 men @ 2 days)	dy	8	\$25.00		\$200.00
U/W Compressor	dy	2	\$125.00		\$250.00
Truck	dy	2	\$75.00		\$150.00
U/W Drill	dy	2	\$150.00		\$300.00
Total					\$1,800.00

	UNITS	QTY	RATE	COST&15%	PRICE
Fiber Forms	ea	10	\$400.00	\$460.00	\$4,600.00
Coral Rock	ton	2	\$100.00	\$115.00	\$230.00
Rock Delivery	ea	1	\$500.00	\$575.00	\$575.00
Misc.	lot	1	\$250.00	\$287.50	\$287.50
Fiberglass Rebar	ea	20	\$5.00	\$5.75	\$115.00
Per Diem (4 men/dy @ \$113/dy)	dy	8	\$113.00	\$129.95	\$1,039.60
Total :					\$6,847.10

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Table 2 – Day Rate

Pillow Talk Reef Restoration Day Rate					TOTAL
LABOR					\$2,740.00
EQUIPMENT					\$900.00
OTHER DIRECT COSTS					\$659.00
Total:					\$4,299.00
	Cat.		Hours	Rate	Total
R. Mulcahy	Prin			\$98.00	
B. Graham	SS		10	\$89.00	\$890.00
T. Lamoure	OM		10	\$67.00	\$670.00
D. Doherty	Tech		10	\$59.00	\$590.00
T. Talbot	Tech		10	\$59.00	\$590.00
Total:					\$2,740.00
	UNITS	QTY	RATE	PRICE	
Work Vessel	dy	1	\$450.00	\$450.00	
Scuba Gear (4 men @ 1 days)	dy	4	\$25.00	\$100.00	
U/W Compressor	dy	1	\$125.00	\$125.00	
Truck	dy	1	\$75.00	\$75.00	
U/W Drill	dy	1	\$150.00	\$150.00	
Total :				\$900.00	

	UNITS	QTY	RATE	COST&15%	PRICE
Misc.	Lot	1	\$100.00	\$115.00	\$115.00
Vessel Fuel	gals	40	\$2.00	\$2.30	\$92.00
Per Diem (4 men/dy @ \$113/dy)	dy	4	\$113.00	\$113.00	\$452.00
Total :				\$659.00	

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Table 3 – Optional Day Rate for Coral Transplantation

Pillow Talk Reef Restoration Day Rate for Transplantation of Coral		TOTAL
LABOR		\$2,740.00
EQUIPMENT		\$900.00
OTHER DIRECT COSTS		\$814.25
Total:		\$4,454.25

	Cat.	Hours	Rate	Total
R. Mulcahy	Prin		\$98.00	\$0.00
B. Graham	SS	10	\$89.00	\$890.00
T. Lamoure	OM	10	\$67.00	\$670.00
D. Doherty	Tech	10	\$59.00	\$590.00
T. Talbot	Tech	10	\$59.00	\$590.00
Total:				\$2,740.00

	UNITS	QTY	RATE	PRICE
Work Vessel	dy	1	\$450.00	\$450.00
Scuba Gear (4 men @ 1 days)	dy	4	\$25.00	\$100.00
U/W Compressor	dy	1	\$125.00	\$125.00
Truck	dy	1	\$75.00	\$75.00
U/W Drill	dy	1	\$150.00	\$150.00
Total :				\$900.00

	UNITS	QTY	RATE	COST&15%	PRICE
Misc.	Lot	1	\$100.00	\$115.00	\$115.00
Vessel Fuel	gals	40	\$2.00	\$2.30	\$92.00
Per Diem (4 men/dy @ \$113/dy)	dy	4	\$113.00	\$113.00	\$452.00
Epoxy	ea	5	\$27.00	\$31.05	\$155.25
Total :					\$814.25