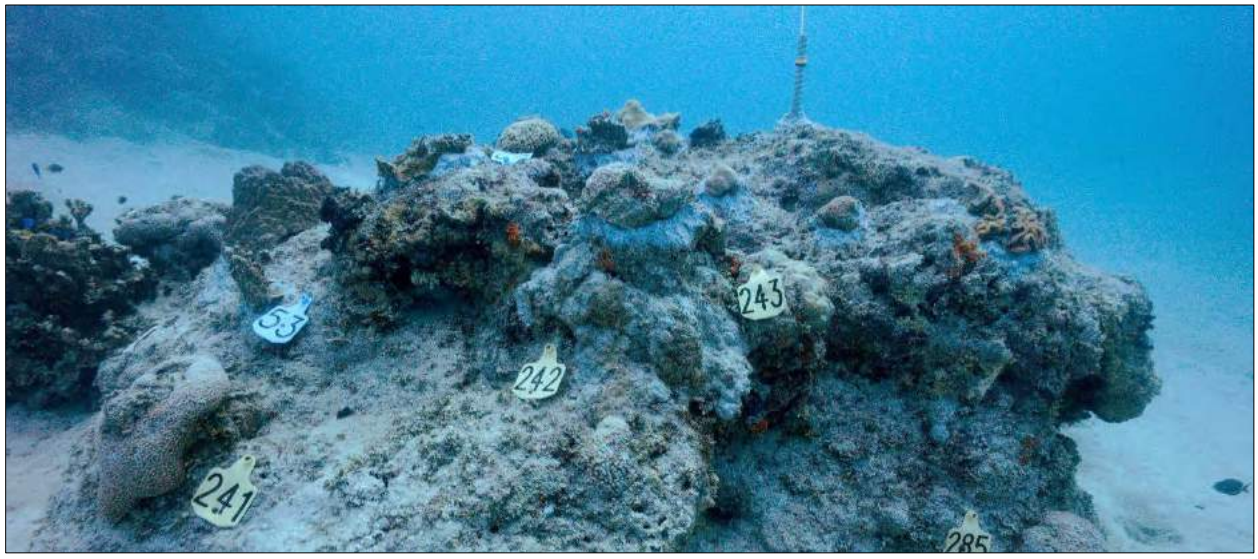
Coral Relocation Compensatory Mitigation for the Hotel Wharf and Access Road Maintenance and Repair Project, Apra Harbor, Guam

6-Month Monitoring Report



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1.0 Introduction

1.1 PROJECT BACKGROUND

Hotel Wharf is under the control of the Port Authority of Guam and is located on the northern side of Outer Apra Harbor, between Pier Dog (Dog Leg Pier) to the west and Pier A to the east (**Figure 1**). Maintenance and repair work were proposed for the structure and included removal of the cap, driving new sheet piles outside of the existing piles (wharf face), backfilling, and re-capping of the structure. As a result, all marine biota attached to the wharf face and on the seafloor within approximately 3 m of the wharf (Direct Impacts Zone) was to be lost unless removed.

Biological surveys of the wharf face and adjacent seafloor were conducted in January-February of 2019 (Burdick, 2019) and documented significant hard coral populations, as well as macroalgae and various sponge species growing within the Direct Impacts Zone. A Compensatory Mitigation Plan was prepared by Dueñas, Camacho & Associates, Inc. (2019) to present measures to minimize and offset adverse effects to resources within the project area. The primary objective of the plan was to mitigate for the loss of ecological functions and services due to direct impacts from the proposed construction activities on coral reef habitat.

Permits included:

- Guam Environmental Protection Agency 401 Water Quality Certification Order #2020-03;
- U.S. Army Corps of Engineers Permit No. POH-2017-253;
- Department of Agriculture Special Permit for Scientific Coral Relocation, License No. SC-20-003; and
- Federal Consistency Certification, Guam Coastal management Program FC No. 2018-0011.

The proposed measures included the movement of corals feasible for relocation from the Hotel Wharf face and immediately adjacent seafloor to an acceptable nearby recipient site, and a post-relocation monitoring program. Based upon the results of the 2019 survey, it was estimated there were potentially 636 corals on the wharf face and 194 colonies within the Direct Impacts Zone at the base of the wharf that were healthy enough and of a size suitable for relocation. Coral relocation criteria included:

1. Coral colonies located within the Direct Impacts Zone;
2. Coral size between 10 cm and 100 cm;
3. All coral species, excluding encrusting forms, small dendrophyllids, or any other corals that would not survive relocation; and
4. Healthy coral colonies with no bleaching or major paling.

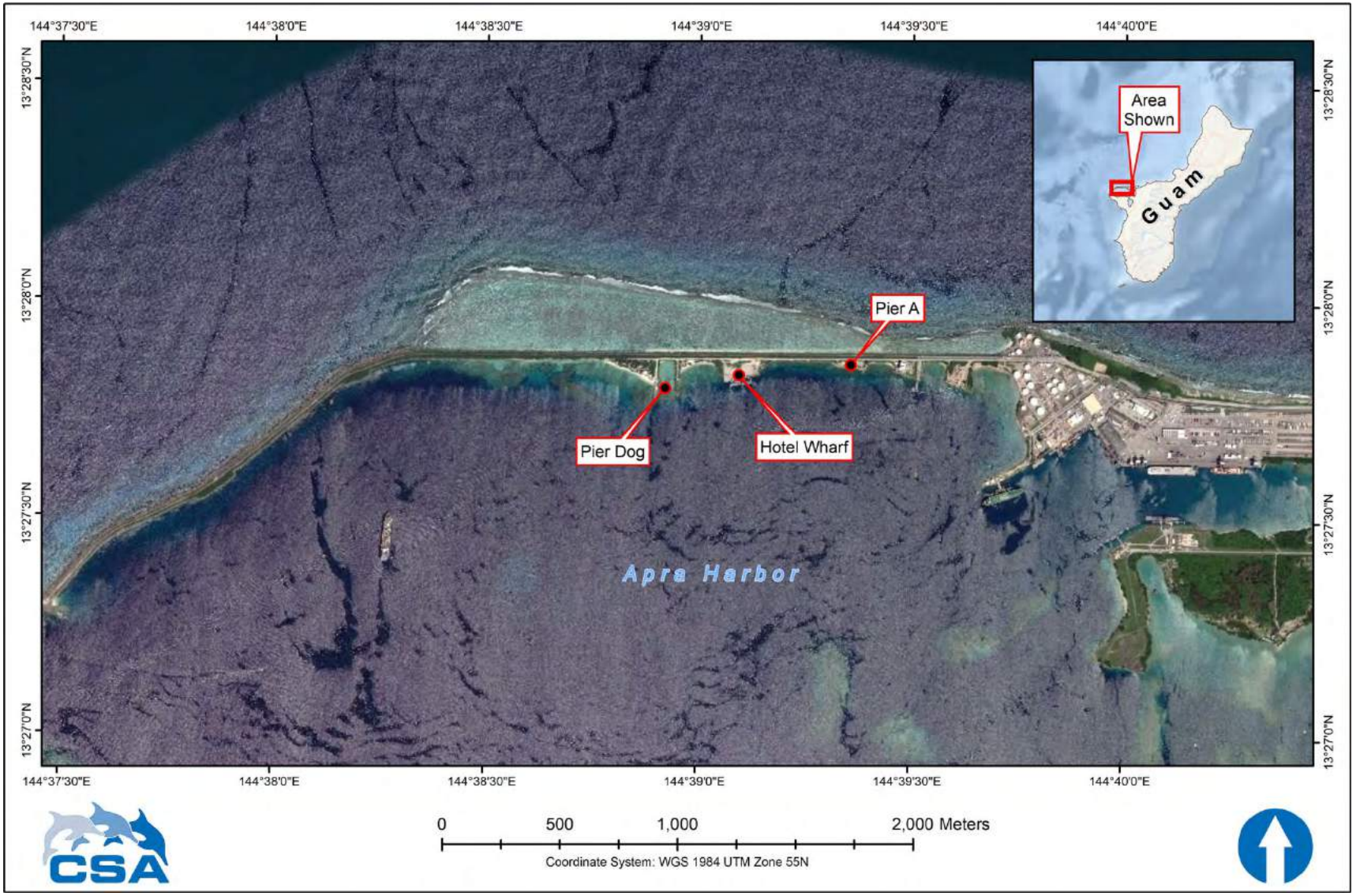

Figure 1. Location of Hotel Wharf along the northern edge of Apra Harbor, Guam.

1.2 CORAL RELOCATION

In March 2020, a team of divers from CSA Ocean Sciences Inc. (CSA) removed all corals meeting relocation criteria from the face of Hotel Wharf and from the surrounding seafloor at the base of the wharf and relocated them to reattachment areas to the southwest of Dog Leg Pier. This included a total of approximately 591 coral colonies, as well as more than 30 “corals of opportunity” found detached or broken loose at the shallow reattachment sites.

Suitable reattachment sites were selected based on site-specific conditions, including relative proximity to the wharf, similar water depth, available exposed substrate for coral attachment, and the presence of other healthy corals of the same species. A total of 11 distinct reattachment and reference sites were ultimately selected and marked with centrally positioned fiberglass rods cemented into the bottom (**Figure 2**). The three shallowest sites (1 to 3) were located along the reef flat and slope at water depths from 2.0 to 4.5 m. The other eight sites (4 to 11) were on individual reef rock outcrops and along the base of the reef slope at depths ranging from 9.5 to 12.8 m. **Table 1** lists coordinates of marker rods for each reattachment site.

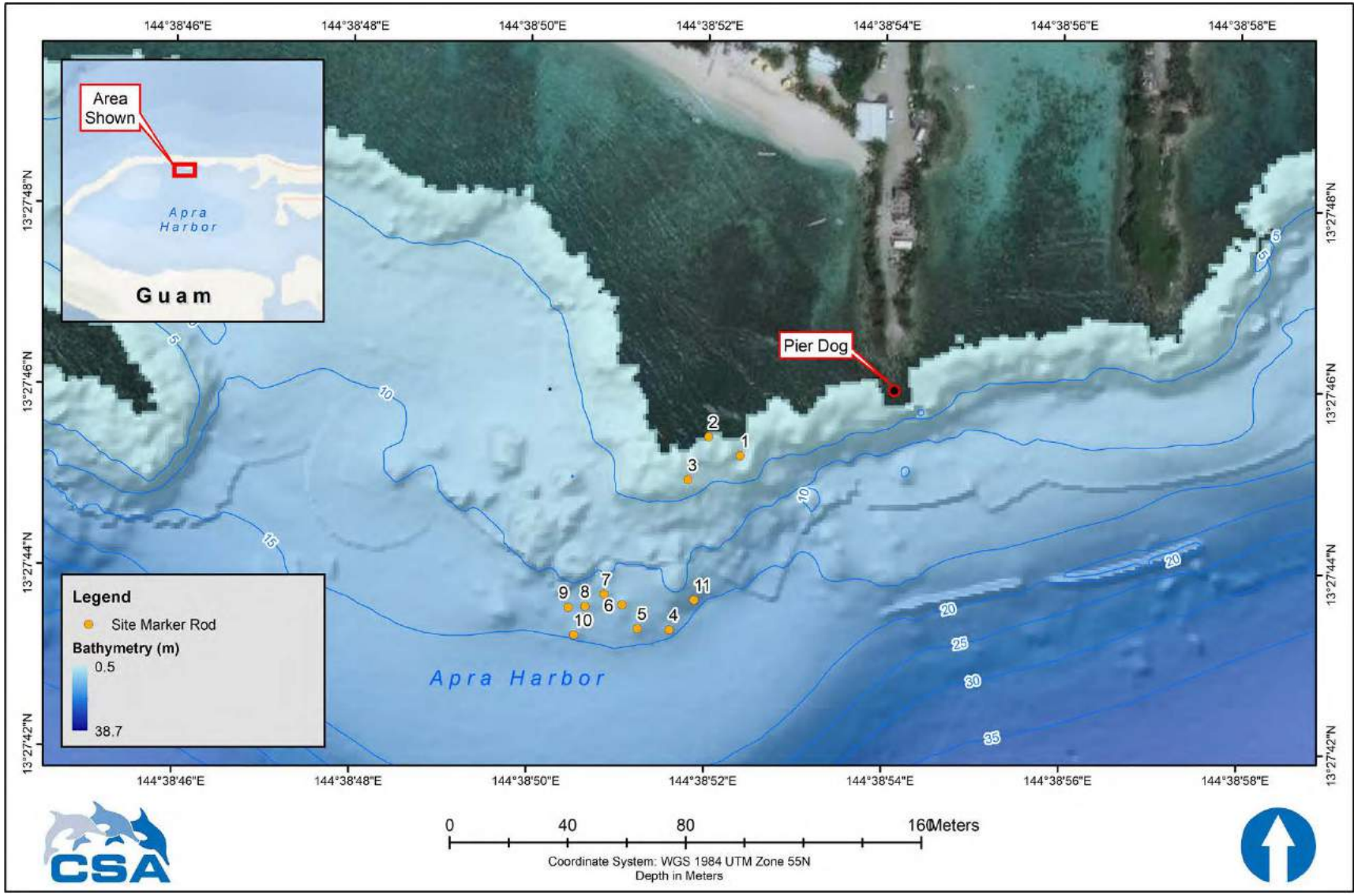

Figure 2. Locations of marker rods demarcating the approximate centers of selected coral reattachment and reference sites established during the coral relocation.

Table 1. Reattachment and reference site marker rod coordinates. WGS 1984 UTM Zone 55N Coordinate System.

Reattachment Site	Latitude (N)	Longitude (E)
1	13°27′45.47″	144°38′52.08″
2	13°27′45.26″	144°38′52.44″
3	13°27′44.79″	144°38′51.67″
4	13°27′43.11″	144°38′51.37″
5	13°27′43.25″	144°38′51.19″
6	13°27′43.53″	144°38′51.01″
7	13°27′43.63″	144°38′50.81″
8	13°27′43.57″	144°38′50.52″
9	13°27′43.66″	144°38′50.46″
10	13°27′43.32″	144°38′50.31″
11	13°27′43.52″	144°38′51.79″

Table 2 lists the number of colonies of each species relocated and reattached at shallow and deep sites. Coral colonies removed from the shallow upper section of the wharf and from the shallow ledges at the eastern and western ends of the wharf were placed at reattachment Sites 1, 2, and 3, located in shallower water depths. These included 228 colonies from the species *Favia favus*, *Pavona decussata*, *Pocillopora acuta*, *Pocillopora damicornis*, *Porites cylindrica*, *Porites* aff. *lichen*, *Porites lobata*, *Porites lutea*, *Porites monticulosa*, *Porites murrayensis*, *Porites rus*, *Porites solida*, and *Psammocora nierstraszi*.

Corals removed from deeper areas on the wharf, as well as from the adjacent seafloor, were distributed on rock features marked as Sites 4 through 11 in deeper water. These included 363 colonies dominated by *Astreopora cucullata*, *Porites lutea*, *Lobophyllia hemprichii*, *Porites lobata*, *Lobophyllia corymbosa*, *Astreopora gracilis*, *Favia matthaii*, *Porites rus*, *Lobophyllia hataii*, and *Porites solida*.

Table 2. Number of coral colonies by species relocated to shallow and deep reattachment sites, and numbers of relocated and reference corals tagged for monitoring.

Coral Species	Relocated Coral Colonies			Coral Colonies Tagged for Monitoring	
	Sites 1–3	Sites 4–11	Total	Relocated	Reference
Pocillopora damicornis	149	-	149	17	13
Astreopora cucullata	-	62	62	11	19
Porites ~lutea	9	46	55	4	12
Lobophyllia hemprichii	-	44	44	12	5
Pavona decussata	43	1	44	10	-
Porites ~lobata	8	36	44	12	9
Lobophyllia corymbosa	-	35	35	7	5
Astreopora gracilis	-	29	29	6	8
Favia matthaii	-	27	27	8	1
Porites rus	2	24	26	5	3
Lobophyllia hataii	-	21	21	6	-
Porites ~solida	2	14	16	3	3
Pocillopora acuta	4	1	5	2	-

Table 2. (Continued).

Coral Species	Relocated Coral Colonies			Coral Colonies Tagged for Monitoring	
	Sites 1–3	Sites 4–11	Total	Relocated	Reference
*Herpolitha limax**	-	4	4	3	1
Porites murrayensis	4	-	4	2	2
Leptoseris incrustans	-	3	3	3	1
Porites cylindrica	3	-	3	2	2
Porites horizontalata	-	2	2	2	2
Porites monticulosa (*convexa* sensu R&M, 1983)	1	1	2	2	2
Porites sp. (*P. lichen* sensu R&M 1983)	1	1	2	3	2
Astreopora elliptica	-	1	1	2	-
Astreopora listeri	-	1	1	1	1
Astreopora myriophthalma	-	1	1	1	1
Astreopora randalli	-	1	1	-	-
Cyphastrea chalcidicum	-	1	1	1	-
Favia favus	1	-	1	1	2
Leptastrea purpurea	-	3	3	3	2
Leptastrea transversa	-	1	1	-	1
Leptoseris mycetoseroides	-	1	1	-	-
Phymastrea valenciennesi (*Favites russelli* sensu R&M 1983)	-	1	1	1	1
Psammocora haimeana (*P. profundicella* sensu R&M 1983)	-	1	1	1	1
Psammocora nierstraszi	1	-	1	1	1
"Corals of opportunity" (*Porites cylindrica* and *Porites rus*)	30	-	30	-	-
Favia cf. *matthaii*	-	-	-	-	1
Total	**258**	**363**	**621**	**132**	**101**

"*" = colonies were not cemented to reef (free-living species); "-" = no colonies were selected; "~" = coral identification was not certain, but most similar to the stated species.

1.3 LONG-TERM MONITORING

Baseline and subsequent monitoring events will be used to determine the relative success of the coral relocation effort based on comparisons between relocated and reference corals. Recurring monitoring tasks include:

- General site assessment and maintenance;
- Assessment of relocated coral colony bonding status;
- Visual assessment of relocated and reference coral health conditions;
- Coral size measurements; and
- Collection of still photographs for all monitored corals.

Monitored coral colonies included an experimental group of 132 relocated corals and 101 reference corals (**Table 2**). Department of Agriculture Special Permit for Scientific Coral Relocation, License No. SC-20-003, specified the number of coral colonies of each relocated species to be monitored. For coral species with 50 or more individual colonies relocated, 20% were to be monitored; for species with 10 to 50 individual colonies relocated, 10% were to be monitored; and for species with less than 10 individuals, 100% were to be monitored. Reference corals were selected based on health condition, proximity to the reattachment site, and good representation of the relocated coral species. To aid divers during monitoring surveys, selected coral colonies were identified, marked with a unique numeric identification tag, and mapped by recording distances and compass bearings from the permanent site markers.

Per the approved Coral Relocation and Monitoring Plan (CSA, 2020a), post-relocation monitoring of the above tasks was required for selected relocated and reference corals during an immediate post-relocation baseline survey, and at 6-, 18-, and 36-months after relocation. The Baseline Monitoring Survey was conducted immediately following the coral relocation project in March 2020 (CSA, 2020b). This report presents the results of the 6-Month Monitoring Survey conducted in October 2020 to assess the condition of relocated and reference coral colonies.

As during the Coral Relocation and Baseline Monitoring Survey efforts, the 6-Month Monitoring Survey was undertaken while COVID-19 quarantine measures were in place for Guam. Following entry into Guam, CSA field staff immediately entered government-mandated quarantine for 14 days. During this time, field staff did not show symptoms associated with the virus. Following release from quarantine, field staff implemented CSA-mandated social distancing measures, including minimizing contact with other persons, mandatory face coverings, and frequent hand washing and use of hand sanitizers. Staff avoided all restaurants and, as possible, minimized visits to grocery stores and other retail outlets. Following the completion of the 6-Month Monitoring Survey, staff returned safely home, following requisite local isolation and quarantine guidelines, and no COVID-19 symptoms were developed.

2.0 Methods

2.1 VESSEL AND DIVING

CSA field operations were conducted from the *Sea Spinner*, a 40-ft long local dive vessel provided by Poseidon's Maidens Charters. In addition, Poseidon's Maidens Charters provided additional dive support including Nitrox scuba bottle fills and required dive safety equipment.

Coral monitoring tasks were performed by a three-person field team, including two scientific divers and one stand-by diver technician. All divers were certified by an internationally recognized dive association, in good standing with the CSA member organization (American Academy of Underwater Sciences), and current with all required safety certifications. Divers were covered by Maritime Employers Liability Insurance (coverage for divers and crew personnel while in navigable waters, including Jones Act).

2.2 CORAL MONITORING

2.2.1 General site assessment

Marine biologists assessed general habitat conditions at monitoring sites to detect significant changes that may affect relocated and reference corals. Qualitative observations of species composition, algal cover, sedimentation, and relative condition (coral tissue paling or bleaching; disease) of non-monitored corals were noted.

2.2.2 Bonding status of relocated colonies

Monitored coral colonies were visually assessed to determine reattachment status by inspecting the base for cracks or gaps between the coral colony and the natural rock substrate. If the attachment point (base of colony) appeared compromised in any way, it was manually tested (diver with gloved hand) for stability and attachment security.

2.2.3 Coral condition

Direct *in situ* observations of relative conditions were made for relocated and reference coral colonies. For each coral colony, a visual assessment was made recording any adverse health or stress conditions. Some of the monitored coral colonies were affected by, and assigned, more than one condition during the assessment. In addition to potential stress conditions, the observer estimated the percentage of the entire colony (0% to 100%) covered by living tissue. Physical damage to the monitored corals, including abrasions and broken branches, was also noted.

2.2.4 Coral size

Coral size was measured as the maximum length of living tissue on the colony. Size measurements were collected along the longest axis (vertical or horizontal) for each colony, depending on growth form. Most coral measurements were collected along a horizontal axis and notes were made for each monitored coral measured along a vertical axis to allow precise method replication during future monitoring events.

2.2.5 Photographs

Photographs were collected of all monitored coral colonies using a GoPro HERO7 digital camera within an underwater housing unit with dual lights. The camera was held perpendicular to the colony to collect a plan view image to qualitatively compare with imagery from future monitoring events. Additional photographs were collected at various oblique angles to document the condition of the colony or the proliferation of non-coral biota such as algae or sponges.

3.0 Results and Discussion

The 6-Month Monitoring Survey was conducted from 15 to 16 October 2020. Weather conditions during the survey were good with winds ranging from about 5 to 10 kn, partly cloudy skies, and passing showers. Sea state was relatively calm with small wind chop from the east. Subsurface visibility ranged from 10 to 15 m and was variable based on tidal exchange.

3.1 GENERAL SITE ASSESSMENT

General site conditions were similar to those observed during the Baseline Monitoring Survey. Relative cover of turf algae, sponges, cyanobacteria, and other epibiota were not noticeably different during the current survey. The most visual impact was observed at the shallow reattachment site where apparent fish predation had caused substantial damage to relocated coral colonies. Grazing impacts included partially or completely broken branches on *Pocillopora* spp. colonies, crushed and scattered *Pavona decussata* colonies, and large areas of tissue removed from mounding *Porites* colonies (hereafter called *Porites* massive). These grazing impacts appeared species-specific, with other relocated coral species (e.g., *Porites rus*, *Porites monticulosa*) not as affected following reattachment.

Grazing of coral tissue was also reported during the Baseline Monitoring Survey, with impacts to relocated *Pocillopora damicornis* colonies observed immediately following reattachment. In some cases, the tips of the majority of branches were nipped off prior to the completion of baseline monitoring. Grazing affects are discussed further in **Section 3.3**.

3.2 BONDING STATUS OF RELOCATED COLONIES

Divers visually assessed all relocated corals to determine reattachment status by inspecting the base for cracks or gaps between the coral colony and the cement/substratum. All monitored relocated corals and numbered monitoring tags were secure during the survey and no site maintenance was required.

3.3 CORAL CONDITION AND SIZE

Complete listings of monitored relocated and reference corals, along with health assessment data collected during the Baseline and 6-Month Monitoring Surveys, are presented in **Appendix A**. Photographs of each tagged monitored coral colony collected during both surveys are provided in **Appendices B** (relocated) and **C** (reference).

Survivorship

Coral survivorship for relocated and reference monitored corals was 85% and 96%, respectively, during the survey (**Table 3**). A total of 20 relocated corals and 4 reference corals died since the Baseline Monitoring Survey. *Pocillopora* spp. colonies relocated to the shallow reattachment site accounted for the majority of monitored relocated coral deaths (18) and three dead reference corals were *Pocillopora damicornis* colonies, also located in the shallow area. One monitored relocated *Pocillopora damicornis* colony remained alive during the current survey but has shown a large reduction in living tissue cover. Coral survivorship for relocated (98%) and reference (99%) monitored corals in the deep reattachment area were similar.

While the exact cause of this elevated mortality with *Pocillopora* spp. colonies was unclear, the decline may have been a combination of factors. Immediately after relocation, many *Pocillopora* spp. colonies were subjected to heavy fish grazing, likely resulting in additional colony stress following relocation activities (CSA, 2020b). While conducting the 6-Month health assessments, it was clear that additional grazing impacts had occurred following the Baseline Monitoring Survey, with many relocated colonies crushed and scattered on the reef and several colonies completely missing with the base still intact. As mentioned during the general site assessment, these grazing impacts appeared focused on *Pavona decussata, Pocillopora* spp., *Porites cylindrica*, and *Porites* massive taxa.

Pocillopora damicornis colonies have been successfully relocated in Apra Harbor during similar relocation projects in the past, with little mortality observed during subsequent monitoring assessments (CSA, 2017, 2018). While the observed mortality of *Pocillopora* spp. colonies during this project may have been due to natural events (e.g., fish grazing), it is clear, based on the comparison of calculated survivorship between monitored relocated (5%) and reference (77%) *Pocillopora* spp. colonies, relocation was not successful for these taxa. Due to the almost complete mortality observed with *Pocillopora* spp. colonies, these taxa were removed from remaining coral discussions and statistics, to provide clarity in discussions of remaining taxa. For comparison, coral survivorship excluding *Pocillopora* spp. colonies is also included in **Table 3**.

Table 3. Coral survivorship (%) for relocated and reference monitored coral colonies during the 6-Month Monitoring Survey. Coral survivorship excluding *Pocillopora* spp. taxa is also provided.

Treatment	Location	6-Month Coral Survivorship (%)	6-Month Coral Survivorship (%) excluding *Pocillopora* spp.
Relocated	Shallow	63%	100%
	Deep	98%	98%
	Overall	85%	98%
Reference	Shallow	90%	100%
	Deep	99%	99%
	Overall	96%	99%

Stress Conditions

In situ observations of coral health identified six conditions as potential sources of coral stress (**Table 4**). Algal overgrowth continued to be the most commonly reported condition on monitored coral colonies, observed on 75% of relocated and reference colonies during the survey. Algal overgrowth was generally observed as turf algae, *Halimeda* spp., and cyanobacteria growing on previously dead portions of the colonies during the assessment. Cyanobacteria, however, were observed actively growing over living coral tissue on monitored relocated corals #115 (*Lobophyllia corymbosa*) and #127 (*Leptoseris incrustans*), causing direct stress to the colonies. In the case of coral #127, cyanobacteria were growing over the entirety of the colony, resulting in substantial tissue paling (**Photo 1**). Cyanobacteria were removed from the colony for the coral assessment and photographs. Cyanobacteria were also observed growing on, and around, monitored reference corals (e.g., #232 [**Photo 2**], #290, #292) during the assessment and did not appear to target relocated corals or specific taxa as the cyanobacteria was also covering reef rock.

Table 4. Number (and percentage) of monitored coral colonies affected by the observed coral conditions recorded during the Baseline and 6-Month Monitoring Surveys.

Condition	Coral Type			
	Relocated		Reference	
	Baseline	6-Month	Baseline	6-Month
Algal overgrowth	82 (62%)	82 (75%)	69 (68%)	73 (75%)
Paling	52 (39%)	40 (36%)	22 (22%)	26 (27%)
Bioerosion (fish grazing or *Lithophaga* intrusion)	36 (27%)	27 (25%)	24 (24%)	31 (32%)
Sponge overgrowth	12 (9%)	4 (4%)	24 (24%)	16 (16%)
Tissue loss	6 (5%)	21 (19%)	4 (4%)	7 (7%)
Tunicate overgrowth	3 (2%)	1 (1%)	3 (3%)	2 (2%)

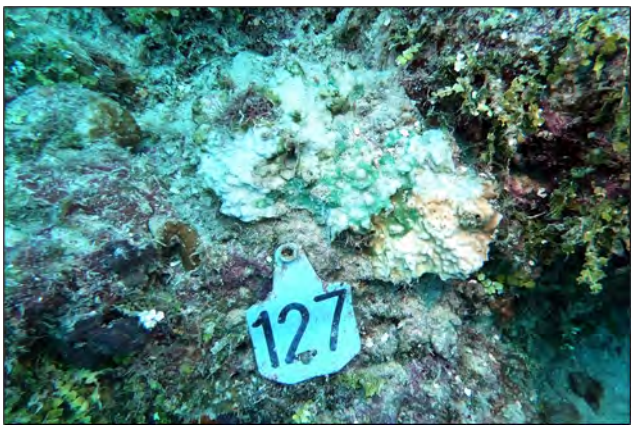

Photo 1. Monitored relocated *Leptoseris incrustans* colony #127 with tissue paling resulting from cyanobacterial cover observed during the 6-Month Monitoring Survey.

Photo 2. Cyanobacterial overgrowth (red circle) observed on monitored reference *Porites lutea* colony #232 during the 6-Month Monitoring Survey.

Frequency of the paling tissue condition has remained relatively unchanged since the Baseline Monitoring Survey and was recorded on 36% (40 colonies) of relocated corals and 27% (26 colonies) of

reference corals. Paling was most commonly observed as tissue discoloration and lightening of tissue pigments on isolated areas of monitored colonies, not complete paling of entire colonies.

Bioerosion was observed as grazing impacts (e.g., scars, breakage, crushing) and bivalve growth (primarily *Lithophaga* sp.) on 25% of relocated corals (27 colonies) and 32% of reference corals (31 colonies), similar to baseline conditions. Although *Lithophaga* sp. was the most commonly observed bioeroder, the greatest impact to monitored corals, particularly relocated colonies, was caused by fish grazing. As reported during the Baseline Monitoring Survey, relocated *Pocillopora* spp. colonies were noticeably impacted by parrotfish nipping the tips of branches immediately following reattachment. During the current survey, grazing impacts were also observed on *Pavona decussata*, *Porites cylindrica*, and *Porites* massive colonies in the shallow area. Several relocated coral colonies were found partially or completely crushed, with coral fragments surrounding the original attachment point (e.g., #45, *P. decussata*, **Photo 3**), while other colonies were missing completely with the attachment point still intact (e.g., #2, *Porites cylindrica*, **Photo 4**). Overall, these grazing impacts resulted in partial or total colony mortality for the affected corals and were generally limited to the shallow water area. To a lesser degree, grazing scars were also reported on three reference *Porites* massive corals in the shallow area (e.g., #224, *Porites lutea*, **Photo 5**), indicating these impacts were not limited to relocated coral colonies.

Photo 3. Monitored relocated *Pavona decussata* colony #45 crushed with fragments scattered (red circles) around the attachment point, indicating possible grazing impacts.

Photo 4. Missing monitored relocated *Porites cylindrica* colony #2 with the reattachment point (red circle) still intact, indicating possible grazing impacts.

a)

b)

Photo 5. Monitored reference *Porites lutea* colony #224 during the a) Baseline and b) 6-Month Monitoring Surveys showing fish grazing scars as pale spots throughout the colony during the 6-Month Monitoring Survey.

Sponge overgrowth decreased overall for both relocated and reference corals since the Baseline Monitoring Survey and continued to be more common on reference colonies. Most sponge overgrowth observations were limited to encrusting sponges growing around the edges of monitored colonies. Despite the overall decrease in sponge overgrowth observations, the sponge *Clathria eurypa*, reported during the previous survey, continued to expand in some areas at the deeper reattachment sites, and likely caused the death of reference *Porites lobata* coral #288. Coral #288 was partially covered by *C. eurypa* during the baseline assessment and was completely covered, and dead, during the current survey (**Photo 6**). *C. eurypa* was also reported on two reference *Astreopora* spp. colonies (#236 and

#238). *C. eurypa* competes aggressively for habitat space and will be monitored closely for the duration of the program.

Tissue loss observations among monitored relocated corals has increased from 6 (5%) to 21 (19%) colonies since the Baseline Monitoring Survey. The majority of tissue loss observations during the current survey (13) were recorded on relocated *Lobophyllia* spp. colonies, where recent areas of tissue loss had not yet been overgrown with algae or other fouling biota. Tissue loss among reference corals was relatively unchanged since the previous survey.

Tunicate overgrowth continued to be uncommon among monitored corals, affecting less than 2% of monitored corals during the current survey. Observed tunicate taxa included *Polycarpa* sp. and *Rhopalea* sp. growing within, and adjacent to, coral colonies.

a) b)

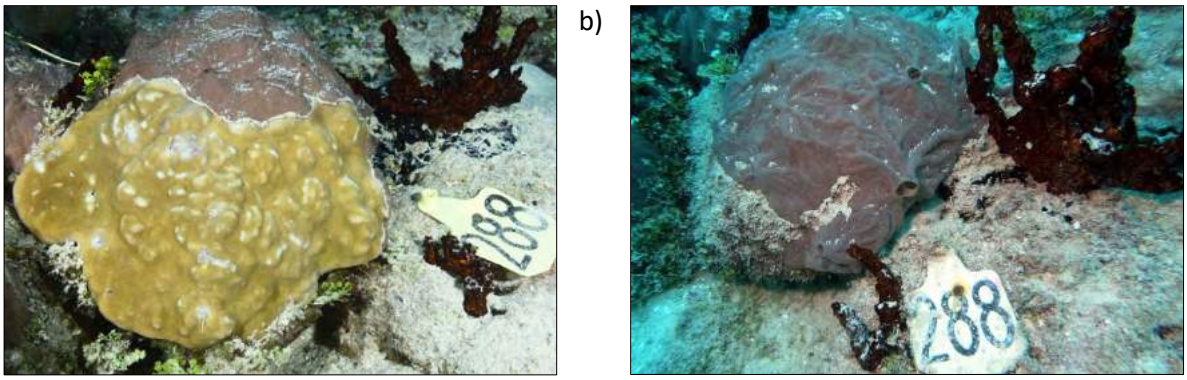

Photo 6. Monitored reference *Porites lobata* colony #288 during the a) Baseline and b) 6-Month Monitoring Surveys showing expanded *Clathria eurypa* sponge cover, resulting in coral mortality.

Living Tissue Cover

Mean percent living tissue cover has decreased for both relocated (-14.2%) and reference (-4.3%) corals since the Baseline Monitoring Survey (**Table 5**). This decline in living tissue cover among corals did not appear species- or depth-specific. Representative colonies of *Leptastrea purpurea*, *Lobophyllia* spp., *Leptoseris incrustans*, and *P. decussata* in the shallow and deep reattachment areas exhibited decreased living tissue cover in excess of 50% since the previous survey. Overall, however, the majority (68%) of monitored relocated corals exhibited less than 10% living tissue reduction, and 50% of the colonies remained unchanged, or had increases in living tissue cover.

Photos 7 and **8** show new tissue growth on monitored relocated *Porites* aff. *lichen* (#73) and *Porites lobata* (#92) colonies, respectively, located in the deep reattachment area. New tissue growth was observed on several other relocated coral colonies as well, indicating many of the corals have recovered from the often stressful relocation process and have continued tissue expansion and growth.

Table 5. Mean percent living tissue cover for relocated and reference coral colonies during the Baseline and 6-Month Monitoring Surveys. Note: data does not include monitored *Pocillopora* spp. colonies.

Treatment	Location	Mean Percent Living Tissue (%)		
		Baseline	6-Month	Change
Relocated	Shallow	86.3	72.2	-14.1
	Deep	89.4	75.2	-14.2
	Overall	88.6	74.4	**-14.2**
Reference	Shallow	91.6	86.8	-4.9
	Deep	75.9	71.7	-4.2
	Overall	78.7	74.4	**-4.3**

a) b)

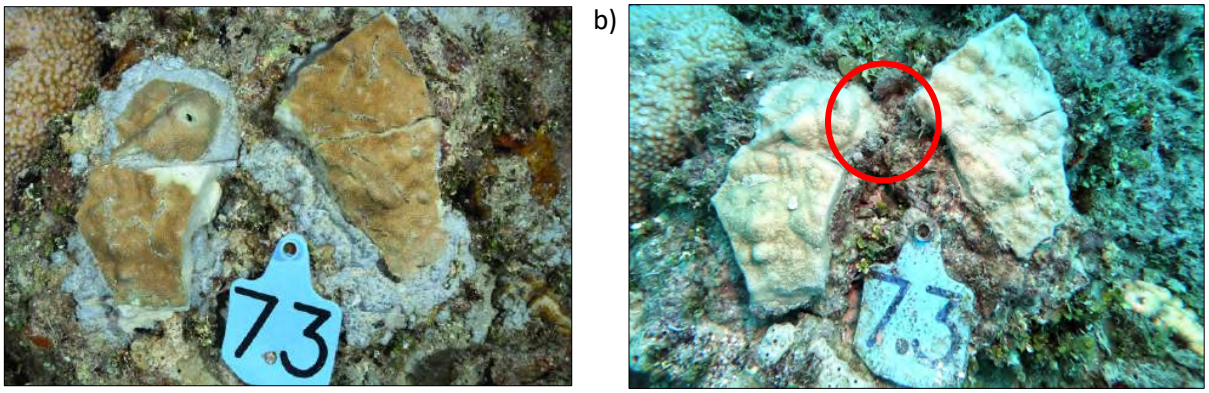

Photo 7. Monitored relocated *Porites* aff. *lichen* colony #73 during the a) Baseline and b) 6-Month Monitoring Surveys showing new tissue growth (red circle) around the edge of the colony since the Baseline Monitoring Survey.

a) b)

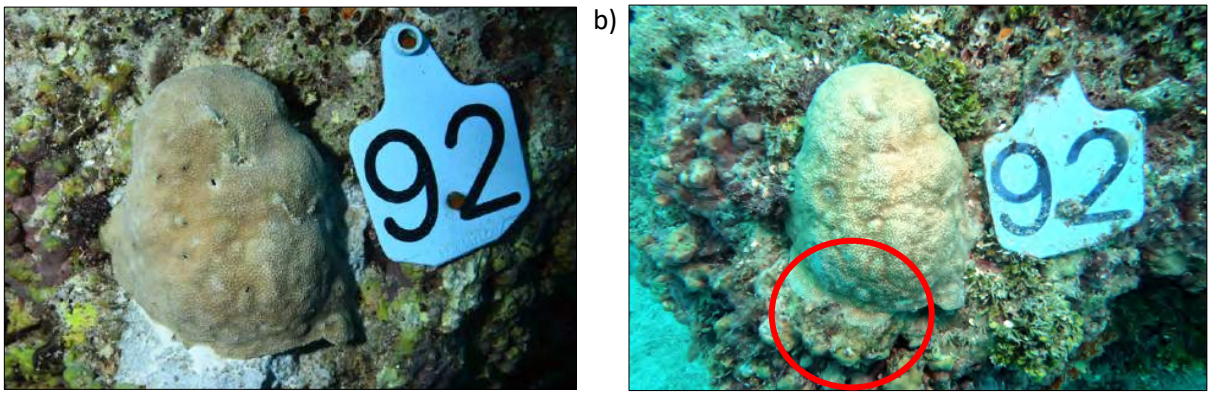

Photo 8. Monitored relocated *Porites lobata* colony #92 during the a) Baseline and b) 6-Month Monitoring Surveys showing new tissue growth (red circle) around the edge of the colony since the Baseline Monitoring Survey.

Coral Size

Overall, mean coral size has changed minimally since the Baseline Monitoring Survey, decreasing from 18.6 to 17.9 cm among relocated corals and increasing from 30.5 to 31.0 cm among reference corals (**Table 6**). This modest change in coral size was expected due to the relatively slow growth rates among corals and indicates that despite the decline in mean living tissue cover discussed above, a large reduction in overall coral size (maximum diameter) was not observed.

Table 6. Mean extent of living tissue (diameter) for relocated and reference coral colonies during the Baseline and 6-Month Monitoring Surveys. Note: data do not include dead colonies or *Pocillopora* spp. colonies.

Treatment	Location	Mean Coral Diameter (cm)		
		Baseline	6-Month	Change
Relocated	Shallow	19.5	18.3	-1.2
	Deep	18.3	17.8	-0.5
	Overall	**18.6**	**17.9**	**-0.7**
Reference	Shallow	26.7	29.2	2.5
	Deep	31.3	31.4	0.1
	Overall	**30.5**	**31.0**	**0.6**

4.0 Summary

Conditions at the monitoring sites were similar to those observed during the relocation project and subsequent Baseline Monitoring Survey. The most notable change was the evidence of substantial grazing in the shallow reattachment area. In this area, many relocated and reference colonies showed signs of fish grazing, with the most destructive observed with relocated colonies. In several cases, either a portion, or all of the relocated colonies were broken or crushed, while some colonies simply had small scrapes/nips taken from the tissue or branchlets.

It is believed the observed grazing pressure, along with the added stress normally associated with relocating a coral colony, likely contributed to the mortality observed with *Pocillopora* spp. colonies at the shallow reattachment site. Only one of eighteen monitored relocated *Pocillopora* spp. colonies was found alive during the 6-Month Monitoring Survey. In addition to the observed mortality, several *Pavona decussata*, *Porites cylindrica*, and *Porites* massive colonies also exhibited heavy grazing impacts, resulting in decreased living tissue cover among many monitored corals in the shallow reattachment area.

Other coral stress conditions observed included algae and sponge overgrowth, tissue paling and discoloration, and tissue loss. Overall, mean percent living tissue among monitored corals decreased for both relocated and reference colonies, indicating an overall decline in coral condition in the habitat. This decrease in living tissue cover was slightly higher for relocated colonies, possibly associated with the added stress of relocation activities. Although some decline in overall condition of relocated corals was observed, new tissue growth was also observed on several relocated corals, indicating recovery and coral growth at the sites. As the relocated corals continue to acclimate to the new habitat it is expected that monitored relocated and reference coral colonies will begin to react similarly to environmental conditions. Continued monitoring should provide the data necessary to determine the long-term success of the relocation project.

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Appendices

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Appendix A

Coral Baseline and 6-Month Health Assessment Data

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Table A-1. Coral health assessment data for monitored relocated colonies during Baseline and 6-Month Monitoring Surveys.

Tag	Taxa	Baseline Coral Assessment			6-Month Coral Assessment			Coral Location				Notes
		Percent Living Tissue	Condition	Maximum Diameter (cm)	Percent Living Tissue	Condition	Maximum Diameter (cm)	Depth Zone	Stake Number	Distance (m)	Bearing (°)	
1	*Porites cylindrica*	90	A	15.6	95	A,P	17.9	Shallow	3	2.5	18	
2	*Porites cylindrica*	95	A	12.5	2	TL,Bio	4.1	Shallow	3	2.7	10	most of colony destroyed and missing; do not assess *Pavona* sp. portion
3	*Porites* aff. *lichen*	95	P,Bio	16.4	95	P,A,Bio	15.2	Shallow	3	3.3	20	worm tubes, *Lithophaga*; not *P. lichen*; but in R&M 1983 as *P. lichen*
4	*Porites monticulosa*	95	A,TL,Bio	62.0	95	A	59.0	Shallow	3	3.1	32	assess large colony only
5	*Porites monticulosa*	85	A,TL	23.2	95	A	22.9	Shallow	3	3.4	60	--
6	*Porites* cf. *murrayensis*	98	P,Bio	13.7	99	Bio	14.2	Shallow	3	4.5	25	*Lithophaga*; do not assess dead area around edge of colony; could also be *P. lutea*
7	*Porites* cf. *murrayensis*	90	P,A,Bio	24.5	90	A,Bio	23.5	Shallow	1	4.5	245	*Lithophaga*; could also be *P. lutea*
8	*Porites rus*	95	A,P	25.4	100	P	27.8	Shallow	2	2.6	355	--
9	*Porites rus*	98	P,TL	12.4	98	P,A	16.1	Shallow	2	1.9	50	assess large colony only
10	*Porites rus*	85	A	17.0	90	A	22.6	Shallow	2	2.3	225	new growth at base of colony
11	*Porites lobata*	85	A,P,Bio	28.6	80	Bio,A	31.6	Shallow	1	3.8	213	grazing scars; *Lithophaga*
12	*Psammocora nierstraszi*	90	TL,A	7.5	90	A	7.7	Shallow	1	4	162	--
13	*Porites solida*	98	Bio,P	23.5	98	A,Bio	24.4	Shallow	1	1.6	165	*Lithophaga*
14	*Porites solida*	65	A,Bio,P	36.8	75	A	37.8	Shallow	1	5.9	210	scored entire rock structure
15	*Porites lobata*	98	TL,Bio,P	22.9	98	Bio,A	24.2	Shallow	1	6.1	205	*Lithophaga*
16	*Porites lobata*	99	P,A	16.5	100	P	17.0	Shallow	1	4.2	180	vertical measurement
17	*Porites lobata*	99	A,Bio	12.4	100	-	13.7	Shallow	1	4.1	225	--
18	*Porites lutea*	60	A,P,Bio	16.4	2	Bio,A	1.8	Shallow	1	4.1	212	only small area of tissue remaining; possible grazing
19	*Pocillopora damicornis*	97	P,Bio	26.4	Dead			Shallow	1	1.5	265	--
20	*Pocillopora damicornis*	100	P	20.5	Dead			Shallow	1	1.3	318	--
21	*Pocillopora damicornis*	98	P,Bio	17.9	Dead			Shallow	1	1.6	318	--
22	*Pocillopora damicornis*	100	P	15.9	Dead			Shallow	1	5.7	45	most of colony missing
23	*Pocillopora damicornis*	98	P,Bio	19.6	Dead			Shallow	1	5.9	42	--
24	*Pocillopora damicornis*	95	A,P	15.8	Dead			Shallow	1	5.5	38	--
25	*Pavona decussata*	60	A	17.6	5	Bio	5.7	Shallow	1	1.8	95	most of colony destroyed; small fragment remaining
26	*Pavona decussata*	95	A	10.2	70	Bio,A	9.5	Shallow	1	1.8	115	--
27	*Pavona decussata*	70	A	24.9	90	A	26.0	Shallow	1	1.9	125	--
28	*Pavona decussata*	95	A,P	15.5	25	A	15.9	Shallow	1	2.6	140	--
29	*Pocillopora damicornis*	90	A,Bio	12.3	Dead			Shallow	1	3.9	155	--
30	*Pocillopora damicornis*	95	A,P,Bio	17.0	Dead			Shallow	1	4.7	152	--
31	*Pocillopora damicornis*	95	Bio,P	15.8	Dead			Shallow	1	4.8	162	assess large colony only
32	*Pocillopora damicornis*	97	Bio	11.4	Dead			Shallow	1	4.7	175	--
33	*Porites lutea*	50	A,P,Bio	20.0	40	Bio	17.1	Shallow	3	3.4	75	top of colony grazed off
34	*Porites lutea*	99	P,Bio	11.1	90	Bio,A	10.5	Shallow	3	3.1	72	hole in center of colony, likely grazing; *Lithophaga*; could be *F. murrayensis*
35	*Favia favus*	70	A,Bio	18.0	50	A	22.4	Shallow	3	2.7	260	assess large colony only; could be *F. murrayensis*
36	*Pocillopora acuta*	99	P,Bio	24.2	Dead			Shallow	3	4.6	250	--
37	*Pocillopora acuta*	80	A,P,Bio	14.2	Dead			Shallow	3	5.1	238	--
38	*Pocillopora damicornis*	98	A,Bio,P	15.4	Dead			Shallow	3	4	248	--
39	*Pocillopora damicornis*	95	A,P,Bio	25.5	20	A,TL	16.3	Shallow	3	3.6	248	--
40	*Pocillopora damicornis*	98	Bio	24.7	Dead			Shallow	3	1.8	238	--

Table A-1. (Continued).

Tag	Taxa	Baseline Coral Assessment			6-Month Coral Assessment			Coral Location				Notes
		Percent Living Tissue	Condition	Maximum Diameter (cm)	Percent Living Tissue	Condition	Maximum Diameter (cm)	Depth Zone	Stake Number	Distance (m)	Bearing (°)	
41	*Pocillopora damicornis*	98	Bio,P	8.4	Dead			Shallow	3	1.3	242	--
42	*Pocillopora damicornis*	95	A,Bio	18.5	Dead			Shallow	3	0.5	210	--
43	*Pocillopora damicornis*	100	-	12.3	Dead			Shallow	3	2.7	350	--
44	*Pocillopora damicornis*	99	Bio	17.2	Dead			Shallow	3	3.7	335	--
45	*Pavona decussata*	98	P,A	17.6	80	A	11.9	Shallow	3	3.6	15	several broken branches
46	*Pavona decussata*	90	A,P	20.3	20	TL,Bio	6.9	Shallow	3	6.9	12	most of colony broken and scattered
47	*Pavona decussata*	85	A	15.8	10	TL,Bio	15.4	Shallow	2	6.4	218	colony broken and scattered
48	*Pavona decussata*	98	A	14.7	100	-	14.7	Shallow	2	0.6	230	--
49	*Pavona decussata*	60	A	12.6	85	A	11.7	Shallow	2	1.7	25	do not assess base of colony
50	*Porites lutea*	95	A,P,Bio	32.8	98	P,A,Bio	35.8	Deep	4	1.2	335	blue tissue coloration; *Lithophaga*
51	*Porites solida*	95	A	19.9	95	A	19.3	Deep	4	0.4	340	assess large colony only
52	*Leptoseris incrustans*	90	A,S	21.6	35	TL,A,P	21.4	Deep	4	0.9	315	--
53	*Porites rus*	98	A,P	14.8	99	Bio,P	15.2	Deep	4	1.3	315	*Lithophaga*; paled tissue at edges and tips of colony
54	*Favia matthaii*	95	A,P	14.2	95	A,P	14.7	Deep	5	1.7	140	--
55	*Lobophyllia hemprichii*	85	A	24.4	70	A	23.6	Deep	5	1.7	150	cyanobacteria
56	*Lobophyllia hemprichii*	85	A,S	17.6	35	TL,A	17.7	Deep	5	0.3	90	--
57	*Pavona decussata*	95	A	26.5	30	A,P	26.2	Deep	5	1.7	332	assessed entire rock structure
58	*Astreopora cucullata*	90	A	18.1	90	P,A	18.6	Deep	5	1.5	28	--
59	*Favia matthaii*	40	A	23.3	25	TL,A	13.5	Deep	5	5.7	125	two areas of living tissue remaining
60	*Favia matthaii*	100	-	4.6	100	A,P	4.5	Deep	5	5.7	135	assess large colony only; score changed based on photo review
61	*Astreopora cucullata*	90	A	24.3	90	A,S,Bio	24.5	Deep	4	7.2	332	*Lithophaga*
62	*Astreopora listeri*	100	P	12.2	98	P,A	11.1	Deep	4	7.3	340	assess large colony only
63	*Lobophyllia hemprichii*	55	A	36.2	65	TL,A	36.5	Deep	4	6.9	345	--
64	*Lobophyllia hemprichii*	95	A	15.8	85	TL,A	16.7	Deep	4	6.5	340	--
65	*Leptastrea* cf. *purpurea*	90	A,P	14.2	5	A	4.9	Deep	4	6.8	335	likely *L. purpurea*
66	*Lobophyllia hemprichii*	75	A	18.6	70	A	19.4	Deep	6	2.4	88	--
67	*Porites horizontalata*	99	A,P	8.7	2	A	2.0	Deep	6	1.9	118	--
68	*Lobophyllia hemprichii*	98	A	35.0	98	P,A	35.9	Deep	6	0.5	110	--
69	*Favia matthaii*	75	A	16.6	60	A	16.8	Deep	6	0.5	62	--
70	*Lobophyllia corymbosa*	95	A	15.2	5	TL,A	5.4	Deep	6	0.8	228	--
71	*Lobophyllia hemprichii*	100	-	17.7	99	P,A,T	19.1	Deep	6	1.3	348	*Rhopaelea* sp.; tissue paling
72	*Favia matthaii*	100	-	11.4	98	A	11.4	Deep	6	1.6	355	--
73	*Porites* aff. *lichen*	98	A,P	15.3	98	A,P	16.0	Deep	6	1.7	345	new growth at base of colony; assess colony above (southeast) tag; not *P. lichen* but in R&M 1983 as *P. lichen*
74	*Herpolitha limax**	100,100,100	-	10.5,14.4,30.2	100,100,100	-	11.7,15.4,30.6	Deep	6	2	328	three colonies, assess all
75	*Astreopora gracilis*	85	A	23.3	95	A,P	23.0	Deep	6	2.3	0	three colonies around tag; two small, one large
76	*Lobophyllia hemprichii*	65	A	24.5	50	TL,A	24.6	Deep	6	3	358	--
77	*Lobophyllia corymbosa*	90	A	31.0	80	TL,A	31.4	Deep	6	3.5	15	--
78	*Astreopora cucullata*	95	-	10.0	95	A,P	9.8	Deep	6	3.3	20	--
79	*Lobophyllia hataii*	95	A	16.2	95	A	15.9	Deep	6	2.9	28	--
80	*Lobophyllia corymbosa*	100	-	17.8	45	TL,A	17.2	Deep	6	3	45	--
81	*Porites lobata*	75	Bio	9.5	80	A,Bio	8.9	Deep	6	3.9	42	*Lithophaga*

Table A-1. (Continued).

Tag	Taxa	Baseline Coral Assessment			6-Month Coral Assessment			Coral Location				Notes
		Percent Living Tissue	Condition	Maximum Diameter (cm)	Percent Living Tissue	Condition	Maximum Diameter (cm)	Depth Zone	Stake Number	Distance (m)	Bearing (°)	
82	*Astreopora gracilis*	75	-	26.5	60	A,P	26.9	Deep	6	2	15	assessed entire rock structure
83	*Lobophyllia hemprichii*	65	A	28.0	40	TL,A	25.6	Deep	7	2.1	122	assessed entire colony
84	*Leptoseris incrustans*	97	-	15.5	Dead			Deep	7	1.8	138	--
85	*Lobophyllia hemprichii*	85	-	26.8	55	A	25.1	Deep	7	2.4	155	--
86	*Astreopora myriophthalma*	100	-	12.5	50	A,P	12.1	Deep	7	0.2	225	--
87	*Favia matthaii*	98	A	10.6	Dead			Deep	7	0.4	2	--
88	*Astreopora cucullata*	98	P	12.0	100	P	12.1	Deep	7	0.8	60	--
89	*Lobophyllia corymbosa*	80	S,T	22.5	40	TL,A	22.9	Deep	7	1	60	--
90	*Favia matthaii*	95	A,P	14.5	95	A	13.8	Deep	7	1	72	--
91	*Lobophyllia hemprichii*	90	S	21.2	40	TL,A,S	20.8	Deep	7	1.1	100	--
92	*Porites lobata*	100	Bio	13.8	100	-	13.4	Deep	7	1.3	90	new growth at edges of colony
93	*Cyphastrea chalcidicum*	65	-	8.2	70	A,P	8.2	Deep	7	1.4	8	--
94	*Favia matthaii*	95	S,A	24.5	85	A	23.9	Deep	7	3	5	--
95	*Astreopora gracilis*	90	-	10.0	100	-	10.2	Deep	7	2.8	10	--
96	*Astreopora cucullata*	90	A	19.0	85	A,P	1.0	Deep	7	4	342	--
97	*Astreopora cucullata*	75	S,A	24.6	60	A,P	22.1	Deep	7	3.8	330	--
98	*Lobophyllia hemprichii*	98	-	19.6	95	TL	20.2	Deep	7	7	342	--
99	*Astreopora cucullata*	90	S	13.5	90	S,P	14.2	Deep	7	6.4	346	scored sponge on side
100	*Astreopora cucullata*	100	P	11.9	100	P	11.8	Deep	7	0.6	317	--
101	*Phymastrea valenciennesi*	60	A,T	27.9	50	A	28.4	Deep	8	0.4	228	assess entire complex
102	*Lobophyllia hataii*	100	-	14.6	99	A	14.6	Deep	8	0.8	225	--
103	*Astreopora elliptica*	100	P	11.6	100	P	11.7	Deep	8	1.2	125	--
104	*Porites lobata*	90	A,P,Bio	17.9	99	Bio,P,A	19.4	Deep	8	0.9	175	*Lithophaga*; some tissue discoloration
105	*Astreopora cucullata*	90	A,S	14.9	99	P,Bio	15.5	Deep	8	1.7	240	*Lithophaga*
106	*Astreopora gracilis*	80	A,T	19.3	75	A,P	19.0	Deep	8	1.7	265	--
107	*Astreopora elliptica*	100	P	16.2	100	P	16.6	Deep	8	1.7	298	--
108	*Astreopora gracilis*	95	A	11.6	100	P	12.0	Deep	8	1.5	328	--
109	*Astreopora gracilis*	65	A	23.7	70	A,P	24.0	Deep	8	1.3	330	scored dead areas around edge of colony
110	*Astreopora cucullata*	80	A	16.2	97	P,A,Bio	16.6	Deep	8	2.5	22	*Lithophaga*
111	*Astreopora cucullata*	95	A,P	17.6	95	A,P	20.5	Deep	8	0.1	270	--
112	*Porites lobata*	100	P,Bio	21.1	99	Bio	23.4	Deep	8	1.1	32	*Lithophaga*
113	*Lobophyllia corymbosa*	85	S,A	22.4	80	A	22.7	Deep	10	2.4	260	assess entire complex
114	*Lobophyllia corymbosa*	70	S,A	23.7	85	TL,A	24.4	Deep	10	2	320	--
115	*Lobophyllia corymbosa*	65	A,S	30.1	60	A,TL	27.4	Deep	10	1	346	cyanobacteria; assess entire complex
116	*Porites horizontalata*	90	A,P	22.1	50	A	20.8	Deep	9	0.8	158	--
117	*Porites lobata*	95	A,P	12.4	98	Bio,A	13.3	Deep	9	0.6	85	*Lithophaga*
118	*Leptastrea purpurea*	100	-	10.1	5	TL,A	6.3	Deep	9	1.9	40	--
119	*Porites lobata*	90	A,P	9.0	70	A,P	8.9	Deep	9	1.5	115	--
120	*Porites lobata*	100	P	9.6	100	P	10.3	Deep	9	2	115	tissue paling and discoloration
121	*Lobophyllia hataii*	85	TL,P	13.9	60	A	13.7	Deep	8	1.2	135	--
122	*Lobophyllia hataii*	100	-	11.4	100	-	11.8	Deep	8	1.5	280	--
123	*Porites* aff. *lichen*	97	A,P,Bio	34.6	99	Bio	35.7	Deep	8	2.7	10	*Lithophaga*; not *P. lichen*, but in R&M 1983 as *P. lichen*
124	*Porites rus*	98	A	10.9	99	Bio,P	12.0	Deep	7	6.4	22	*Lithophaga*

Table A-1. (Continued).

Tag	Taxa	Baseline Coral Assessment			6-Month Coral Assessment			Coral Location				Notes
		Percent Living Tissue	Condition	Maximum Diameter (cm)	Percent Living Tissue	Condition	Maximum Diameter (cm)	Depth Zone	Stake Number	Distance (m)	Bearing (°)	
125	*Psammocora profundicella*	98	A	9.4	95	A	9.6	Deep	6	7.6	210	sensu R&M 1983- Veron still accepts this ID, but has recently been redone and this is not *P. haimeana*
126	*Leptastrea purpurea*	90	S,A,P	21.5	85	TL,A,Bio	22.9	Deep	6	5.3	200	*Lithophaga*
127	*Leptoseris incrustans*	90	A	22.9	80	P,A	23.0	Deep	6	6	200	colony covered by cyanobacteria
128	*Lobophyllia hataii*	90	A	16.1	70	A	16.0	Deep	6	7.6	205	--
129	*Lobophyllia hataii*	100	-	16.4	100	P	16.6	Deep	6	8.5	208	perhaps Burdick's *L.* cf. *hataii*
130	*Porites lobata*	95	A,Bio,P	19.8	75	A,S,Bio	20.8	Deep	6	1.6	298	*Lithophaga*

A = algal overgrowth; Bio = bioerosion; P = tissue paling; S = sponge overgrowth; T = tunicate intrusion; TL = tissue loss

Table A-2. Coral health assessment data for monitored reference colonies during Baseline and 6-Month Monitoring Surveys.

Tag	Taxa	Baseline Coral Assessment			6-Month Coral Assessment			Coral Location				Notes
		Percent Living Tissue	Condition	Maximum Diameter (cm)	Percent Living Tissue	Condition	Maximum Diameter (cm)	Depth Zone	Stake Number	Distance (m)	Bearing (°)	
200	*Pocillopora damicornis*	100	P, A	12.5	95	A	18.9	Shallow	2	3.8	292	--
201	*Pocillopora damicornis*	98	P,A	4.8	100	-	6.2	Shallow	2	2	310	--
202	*Pocillopora damicornis*	100	P	10.8	Dead			Shallow	2	4.9	345	--
203	*Pocillopora damicornis*	100	P	6.8	Dead			Shallow	2	5.7	12	--
204	*Pocillopora damicornis*	100	P	12.2	100	-	14.7	Shallow	2	5.3	10	--
205	*Pocillopora damicornis*	55	A,P	20.4	Dead			Shallow	2	4.8	330	--
206	*Pocillopora damicornis*	100	P,A	16.0	10	A	7.8	Shallow	2	7.7	315	--
207	*Pocillopora damicornis*	100	A	17.5	100	-	18.3	Shallow	2	2.3	152	located in a hole
208	*Pocillopora damicornis*	100	P	7.5	100	TL,P	7.9	Shallow	2	3.3	155	--
209	*Pocillopora damicornis*	100	-	18.0	100	-	20.5	Shallow	2	2.6	140	assess colony on left
210	*Pocillopora damicornis*	100	P	13.6	98	A	14.2	Shallow	2	8.4	195	--
211	*Pocillopora damicornis*	100	-	12.9	100	-	13.3	Shallow	2	7.5	198	on vertical wall
212	*Pocillopora damicornis*	100	P	9.6	100	-	11.5	Shallow	2	8.2	185	two broken branches
213	*Porites cylindrica*	100	-	19.4	100	-	21.9	Shallow	3	4.3	82	--
214	*Porites cylindrica*	100	-	15.5	95	A	18.2	Shallow	3	4.4	122	--
215	*Astreopora cucullata*	90	Bio,A	43.5	95	A,Bio	42.7	Deep	5	2.8	235	*Lithophaga*
216	*Porites monticulosa*	100	-	56.0	95	A	58.3	Shallow	3	3.7	105	--
217	*Porites monticulosa*	100	A	19.4	95	A	22.4	Shallow	3	2.8	272	vertical measurement
218	*Porites rus*	100	A	11.5	45	A	17.8	Shallow	3	4.2	240	--
219	*Porites rus*	100	-	11.3	98	A	14.7	Shallow	3	5.6	252	--
220	*Psammocora nierstraszi*	90	A	22.6	90	A	23.8	Shallow	3	2	118	--
221	*Porites lutea*	99	S	19.5	100	-	19.8	Shallow	3	1.8	45	--
222	*Porites lutea*	95	A	21.2	98	A	21.2	Shallow	3	3.2	18	--
223	*Porites lutea*	100	-	35.5	100	-	38.0	Shallow	3	3.7	2	--
224	*Porites lutea*	99	A	40.5	98	A,Bio	44.6	Shallow	3	5	15	grazing scars
225	*Porites lutea*	75	Bio,A,P	38.0	85	Bio,A	42.1	Shallow	3	5.8	10	grazing scars; *Lithophaga*; vertical measurement; colony on right
226	*Porites murrayensis*	80	A,Bio	25.5	80	Bio,A	30.0	Shallow	2	3.7	335	grazing scars; *Lithophaga*
227	*Porites murrayensis*	30	A	33.0	25	A	30.3	Shallow	2	4.5	8	*Lithophaga*
228	*Porites solida*	100	Bio	20.0	99	Bio	23.0	Shallow	2	2.9	152	*Lithophaga*; located under another colony; vertical measurement
229	*Porites solida*	98	A	37.5	85	A	40.3	Shallow	3	3.1	120	--
230	*Astreopora cucullata*	95	A,Bio	24.0	95	A,Bio	23.7	Deep	5	2	228	*Lithophaga*; vertical measurement
231	*Astreopora gracilis*	100	-	16.9	99	A,P	17.4	Deep	5	1.9	190	--
232	*Porites lutea*	95	A,Bio	22.2	50	A,P,Bio	22.1	Deep	5	2.1	172	cyanobacteria; Lithophaga
233	*Leptastrea purpurea*	60	TL,A	18.8	50	A,TL	18.6	Deep	5	1.8	105	score changed based on photo review; vertical measurement
234	*Astreopora gracilis*	95	A,Bio,P	23.8	95	T,P,Bio	24.9	Deep	5	1.5	10	*Lithophaga*
235	*Astreopora cucullata*	100	-	19.6	99	A	20.2	Deep	5	2.3	10	--
236	*Astreopora cucullata*	98	A	14.7	98	A,P	15.4	Deep	4	2.1	60	*Clathria* sponge around edge of colony; assess large colony only
237	*Astreopora gracilis*	100	-	15.4	100	P	16.0	Deep	4	2.4	50	--

Table A-2. (Continued).

Tag	Taxa	Baseline Coral Assessment			6-Month Coral Assessment			Coral Location				Notes
		Percent Living Tissue	Condition	Maximum Diameter (cm)	Percent Living Tissue	Condition	Maximum Diameter (cm)	Depth Zone	Stake Number	Distance (m)	Bearing (°)	
238	*Astreopora myriophthalma*	70	A,Bio,S	60.5	85	A,Bio,S	62.1	Deep	4	2.3	45	*Lithophaga*; bivalve; *Clathria* sponge
239	*Astreopora gracilis*	99	A,Bio,P	15.5	99	A,Bio,P	17.1	Deep	4	0.7	335	*Lithophaga*; tissue paling in spots
240	*Porites rus*	70	A,S,T	55.8	70	A	54.8	Deep	4	1.8	332	*Halimeda* sp.; score changed based on photo review
241	*Astreopora cucullata*	70	A,Bio	25.7	70	A,Bio	27.0	Deep	4	1.4	305	bivalve
242	*Porites horizontalata*	60	A,TL,P	25.0	65	A	29.0	Deep	4	0.9	288	--
243	*Porites lutea*	90	A,Bio	17.4	98	TL,Bio	17.3	Deep	4	0.6	262	*Lithophaga*
244	*Porites lobata*	60	A,Bio	71.0	70	A,Bio,P	72.1	Deep	4	2.5	210	*Lithophaga*; tissue paling in spots
245	*Leptoseris incrustans*	100	-	11.2	100	-	11.2	Deep	4	2.9	202	--
246	*Astreopora cucullata*	97	A	34.4	98	A	33.9	Deep	4	0.9	120	--
247	*Porites* aff. *lichen*	100	Bio	24.0	98	A	25.4	Deep	4	6.6	332	not *P. lichen*, but in R&M 1983 as *P. lichen*
248	*Porites* aff. *lichen*	99	Bio	22.3	98	A	21.0	Deep	4	6.7	342	not *P. lichen*, but in R&M 1983 as *P. lichen*
249	*Porites horizontalata*	90	S,Bio	23.8	90	S,P,A	24.8	Deep	5	1.1	190	--
250	*Psammocora profundicella*	30	A,S	14.7	20	A	15.1	Deep	5	0.9	282	assess lower colony only; sensu R&M 1983 - Veron still accepts this identification, but has recently been redone and this is not *P. haimeana*
251	*Phymastrea valenciennesi*	50	A	11.0	35	A,S	12.3	Deep	6	7	208	score changed based on photo review; assess area to right (southwest) of tag
252	*Astreopora cucullata*	98	A	29.5	98	P,Bio	30.9	Deep	6	7.5	200	*Lithophaga*
253	*Astreopora cucullata*	50	A,S	41.7	50	A,S	42.1	Deep	6	2	205	--
254	*Lobophyllia corymbosa*	20	A,S	49.0	15	A,S	42.2	Deep	6	2.9	226	measured lower living area; appears part of larger dead colony; assess as portion of original colony
255	*Astreopora cucullata*	95	A,Bio	24.2	95	A,Bio,P	24.7	Deep	6	3.4	40	*Lithophaga*; anemone
256	*Lobophyllia hemprichii*	99	A,P	16.0	95	A,T	12.7	Deep	9	1.8	45	*Polycarpa* sp. tunicate on edge
257	*Lobophyllia hemprichii*	90	A,S	19.6	75	A	12.5	Deep	9	2.6	20	score changed based on photo review; two areas of living tissue remaining
258	*Lobophyllia corymbosa*	40	A,S	40.5	55	A,S	45.7	Deep	10	7.4	302	--
259	*Leptastrea transversa*	60	A,S	26.4	75	A,Bio	24.1	Deep	10	4.6	105	*Lithophaga*; assess entire end of rock edge
260	*Lobophyllia corymbosa*	95	A,S,T	49.9	98	S,A	53.2	Deep	6	11.7	200	--
261	*Herpolitha limax*	100	P	12.5	5	TL,A	2.5	Deep	8	0.1	118	colony fell into sand; majority of colony dead; near site stake; "J" shaped
262	*Favia favus*	80	A	12.5	70	S,A	13.2	Deep	8	0.8	185	score changed based on photo review; assess large colony under tag only
263	*Porites lutea*	100	-	37.8	100	-	38.8	Deep	7	7.6	355	--
264	*Porites lobata*	65	A,TL	31.8	55	A,P,Bio	27.9	Deep	7	7.8	355	*Lithophaga*
265	*Porites lobata*	95	A	29.4	97	P,A,Bio	29.2	Deep	7	6.9	0	*Lithophaga*; reattached *Porites rus* colony on top
266	*Porites lutea*	65	A,P	31.2	65	P,A	30.4	Deep	7	5.4	10	--
267	*Porites lobata*	90	A	38.6	90	A,Bio	39.6	Deep	6	1.4	225	score changed based on photo review*; Lithophaga*; assess end of rock near tag
268	*Astreopora listeri*	85	A,S	59.4	80	A,S	60.0	Deep	6	1	90	--
269	*Astreopora cucullata*	98	A,Bio	34.5	95	P,A,Bio	33.6	Deep	6	2.4	58	*Lithophaga*
270	*Porites solida*	98	P	49.5	100	-	51.0	Deep	6	2.5	50	--
271	*Lobophyllia corymbosa*	100	-	36.0	100	-	40.2	Deep	11	7.5	185	--
272	*Leptastrea purpurea*	60	A,S	30.0	60	A,Bio	29.8	Deep	11	7.6	195	*Lithophaga*; bivalve

Table A-2. (Continued).

Tag	Taxa	Baseline Coral Assessment			6-Month Coral Assessment			Coral Location				Notes
		Percent Living Tissue	Condition	Maximum Diameter (cm)	Percent Living Tissue	Condition	Maximum Diameter (cm)	Depth Zone	Stake Number	Distance (m)	Bearing (°)	
273	*Lobophyllia hemprichii*	100	-	18.3	100	-	18.8	Deep	11	1.7	215	--
274	*Favia favus*	25	S	26.0	25	A	23.3	Deep	11	8	55	score changed based on photo review; assess entire rock under tag
275	*Favia matthaii*	10	S,A	5.0, 8.0, 9.5	10	A,S	4.5,7.8,9.0	Deep	11	6.6	42	three colonies
276	*Lobophyllia hemprichii*	50	A	24.5	55	A	24.0	Deep	11	10.4	25	--
277	*Lobophyllia corymbosa*	95	S,A	73.0	90	A	73.5	Deep	11	21.8	5	--
278	*Astreopora gracilis*	45	A	16.5	45	A	16.9	Deep	11	2.5	235	colony on left
279	*Lobophyllia hemprichii*	100	-	6.0	100	-	6.1	Deep	11	1.7	235	located under ledge
280	*Astreopora cucullata*	95	A	22.5	90	A,P,Bio	23.8	Deep	11	3.5	230	*Lithophaga*
281	*Astreopora gracilis*	90	A	20.0	80	A,P	20.1	Deep	11	4.1	250	*Porites monticulosa* overgrowth
282	*Favia* cf. *matthaii*	20	A	14.5	15	A,Bio	14.0	Deep	11	3	28	assessed coral below tag only; primary septa are more enlarged than normal for *F. matthaii* giving star-like appearance
283	*Porites lobata*	100	P	43.0	100	P	45.4	Deep	4	2.8	215	--
284	*Astreopora cucullata*	60	A,Bio	29.6	65	A,Bio	30.6	Deep	4	3.1	215	*Lithophaga*
285	*Astreopora gracilis*	100	-	23.2	100	P	22.9	Deep	4	1	225	--
286	*Astreopora cucullata*	60	A,S	36.7	65	A,S,P	37.4	Deep	5	3.5	75	assess area to left (north) of tag
287	*Astreopora cucullata*	70	A	51.0	85	A,S,P	60.4	Deep	5	4	355	--
288	*Porites lobata*	50	S,P	25.3	Dead			Deep	5	3.3	15	*Clathria* sponge
289	*Astreopora cucullata*	60	A,S	37.5	60	S,A	34.8	Deep	5	3	18	--
290	*Astreopora cucullata*	90	A,Bio	31.5	90	A,Bio	28.1	Deep	6	2.3	112	*Lithophaga*; cyanobacteria
291	*Porites lutea*	90	A,TL,P	51.8	40	TL,A,S	54.6	Deep	6	2.3	125	--
292	*Astreopora gracilis*	50	A	33.0	45	A	33.9	Deep	6	1.6	105	cyanobacteria; assess entire rock
293	*Astreopora cucullata*	70	A	35.2	70	A	35.5	Deep	6	2	60	cyanobacteria; assess area to north of tag
294	*Porites lutea*	60	A,S,T	77.5	60	A,TL,S	77.6	Deep	6	1.2	35	--
295	*Porites lobata*	99	A,Bio	26.5	50	A,P,Bio	35.6	Deep	7	2	155	*Lithophaga*; bivalve
296	*Astreopora cucullata*	90	S,A,Bio	26.6	95	A,Bio,P	25.7	Deep	7	0.7	238	*Lithophaga*; vertical measurement
297	*Porites lobata*	95	Bio,P,A	59.5	95	Bio,P,A	61.4	Deep	7	2.1	305	*Porites rus* colony on top
298	*Porites lobata*	85	A,S,Bio	49.4	70	A,Bio,P	51.0	Deep	7	6.2	5	*Lithophaga*; bivalve
299	*Porites lutea*	50	A,S	82.5	55	TL,S,Bio	75.7	Deep	10	1.3	218	*Lithophaga*; assess entire rock; *Astreopora* colony attached
300	*Astreopora cucullata*	85	A,Bio,S	35.5	80	A,P,Bio	34.9	Deep	10	1.9	200	*Lithophaga*; bivalve; vertical measurement

A = algal overgrowth; Bio = bioerosion; P = tissue paling; S = sponge overgrowth; T = tunicate intrusion; TL = tissue loss

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Appendix B

Photographs of Tagged Relocated Corals

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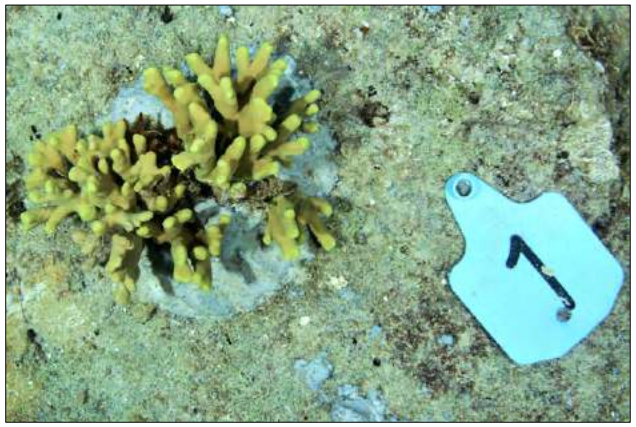
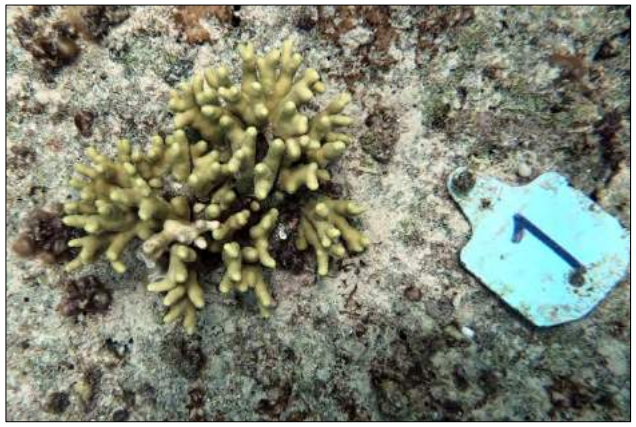


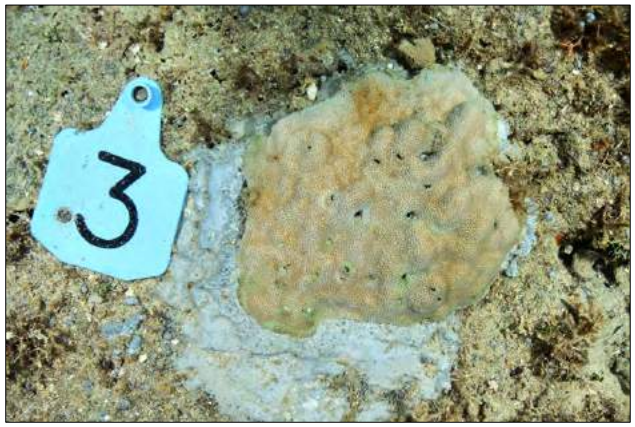
Relocated 1 *Porites cylindrica* – Baseline



Relocated 1 *Porites cylindrica* – 6-Month

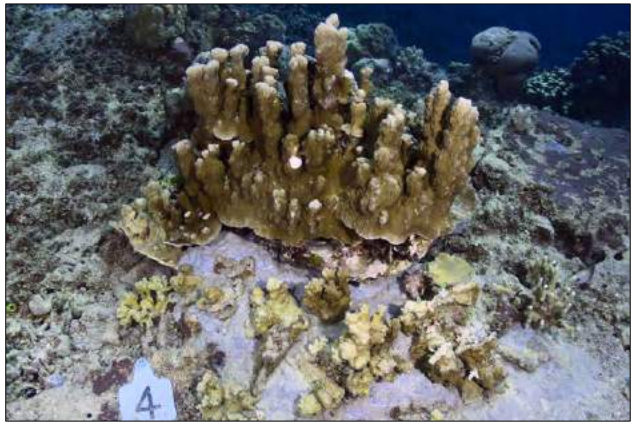
Relocated 2 *Porites cylindrica* – Baseline

Relocated 2 *Porites cylindrica* – 6-Month

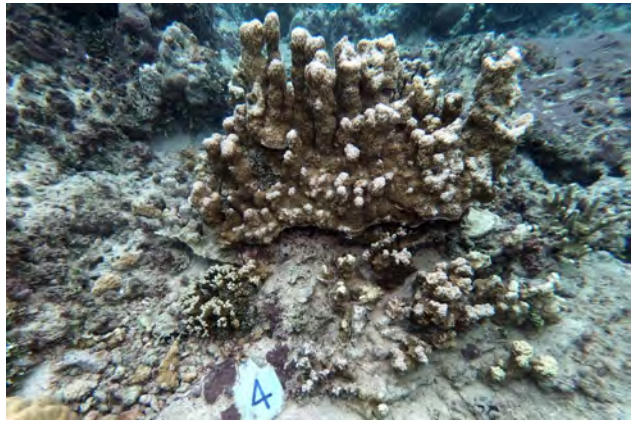


Relocated 3 *Porites* aff. *lichen* – Baseline

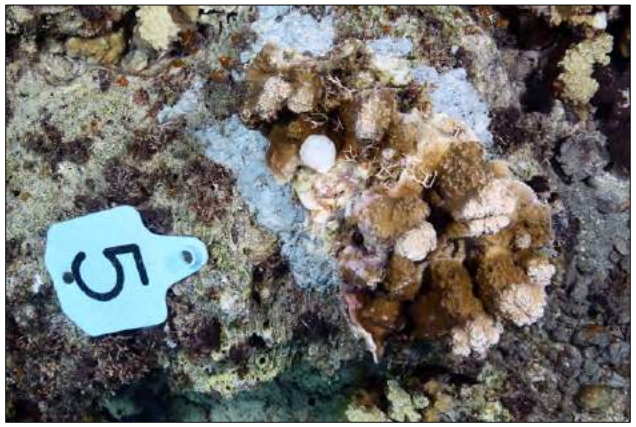
Relocated 3 *Porites* aff. *lichen* – 6-Month



Relocated 4 *Porites monticulosa* – Baseline

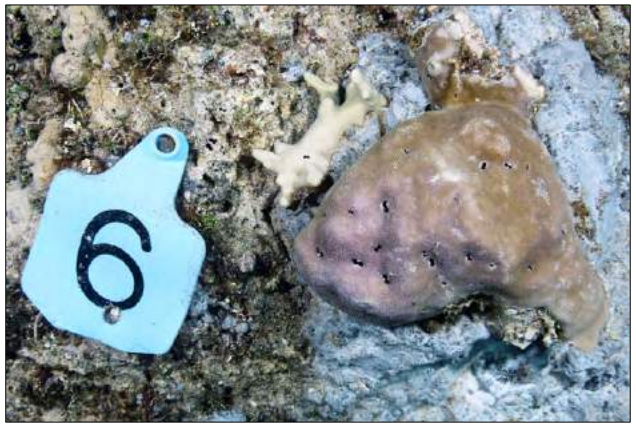


Relocated 4 *Porites monticulosa* – 6-Month



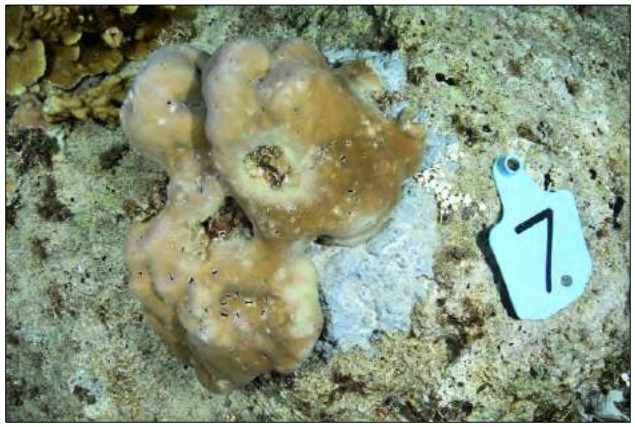
Relocated 5 *Porites monticulosa* – Baseline

Relocated 5 *Porites monticulosa* – 6-Month



Relocated 6 *Porites* cf. *murrayensis* – Baseline

Relocated 6 *Porites* cf. *murrayensis* – 6-Month

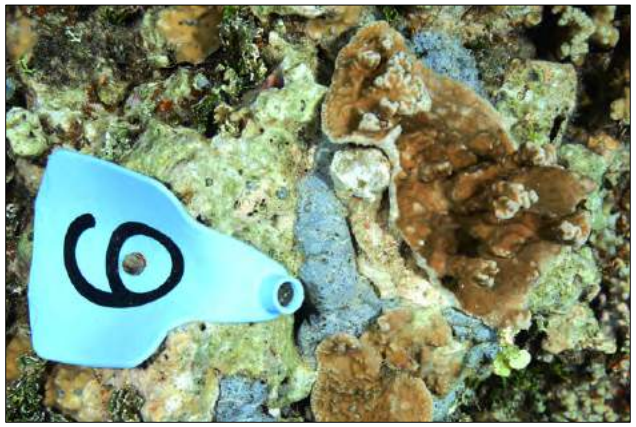


Relocated 7 *Porites* cf. *murrayensis* – Baseline

Relocated 7 *Porites* cf. *murrayensis* – 6-Month

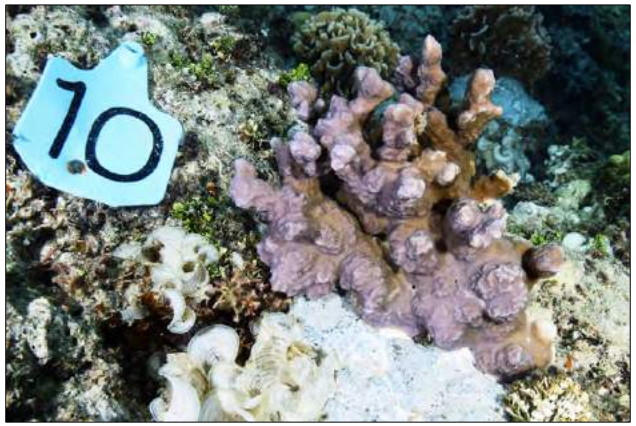
Relocated 8 *Porites rus* – Baseline

Relocated 8 *Porites rus* – 6-Month



Relocated 9 *Porites rus* – Baseline

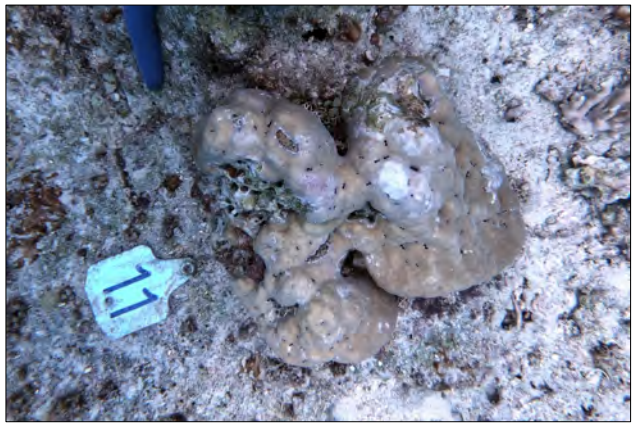
Relocated 9 *Porites rus* – 6-Month



Relocated 10 *Porites rus* – Baseline

Relocated 10 *Porites rus* – 6-Month

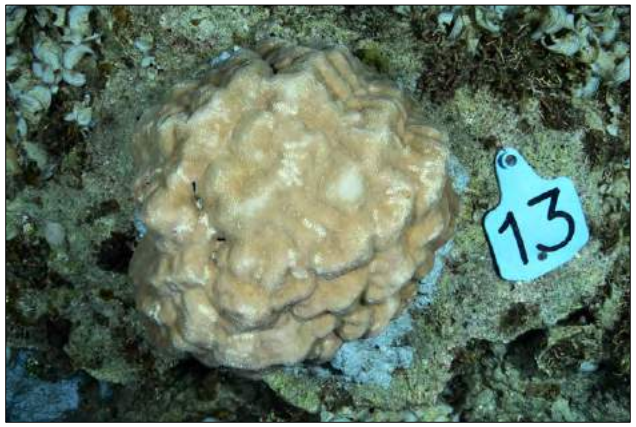
Relocated 11 *Porites lobata* – Baseline



Relocated 11 *Porites lobata* – 6-Month

Relocated 12 *Psammocora nierstraszi* – Baseline

Relocated 12 *Psammocora nierstraszi* – 6-Month



Relocated 13 *Porites solida* – Baseline

Relocated 13 *Porites solida* – 6-Month

Relocated 14 *Porites solida* – Baseline

Relocated 14 *Porites solida* – 6-Month

Relocated 15 *Porites lobata* – Baseline

Relocated 15 *Porites lobata* – 6-Month

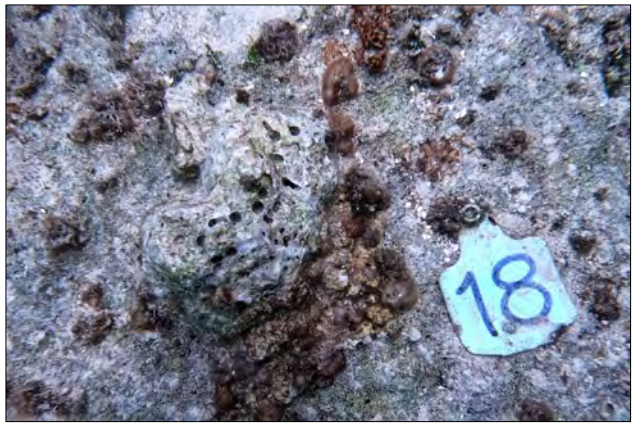
Relocated 16 *Porites lobata* – Baseline

Relocated 16 *Porites lobata* – 6-Month

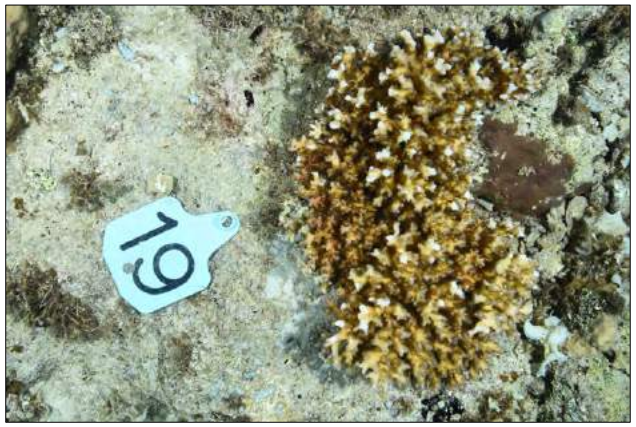
Relocated 17 *Porites lobata* – Baseline

Relocated 17 *Porites lobata* – 6-Month

Relocated 18 *Porites lutea* – Baseline

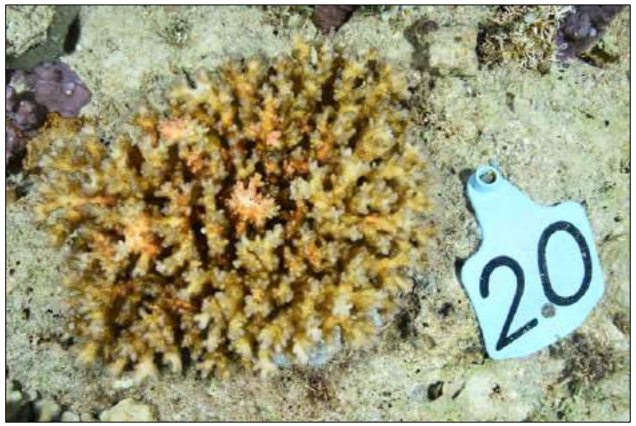


Relocated 18 *Porites lutea* – 6-Month



Relocated 19 *Pocillopora damicornis* – Baseline

Relocated 19 *Pocillopora damicornis* – 6-Month

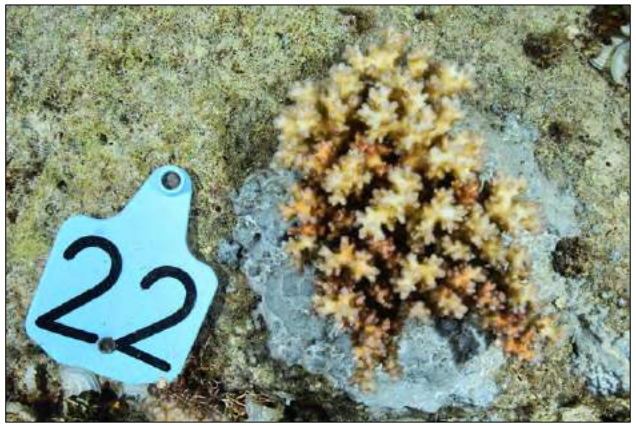


Relocated 20 *Pocillopora damicornis* – Baseline

Relocated 20 *Pocillopora damicornis* – 6-Month

Relocated 21 *Pocillopora damicornis* – Baseline

Relocated 21 *Pocillopora damicornis* – 6-Month



Relocated 22 *Pocillopora damicornis* – Baseline

Relocated 22 *Pocillopora damicornis* – 6-Month

Relocated 23 *Pocillopora damicornis* – Baseline

Relocated 23 *Pocillopora damicornis* – 6-Month

Relocated 24 *Pocillopora damicornis* – Baseline

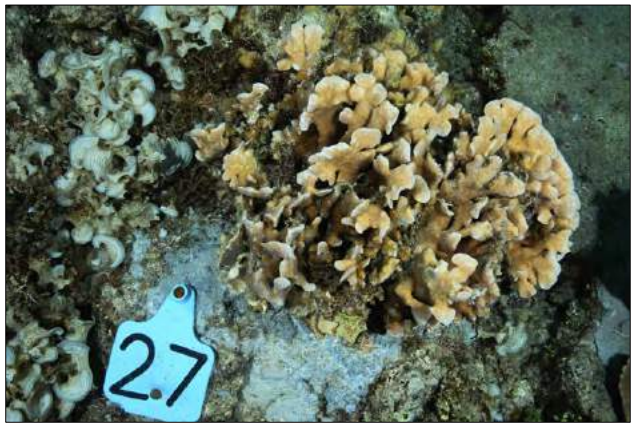
Relocated 24 *Pocillopora damicornis* – 6-Month

Relocated 25 *Pavona decussata* – Baseline

Relocated 25 *Pavona decussata* – 6-Month

Relocated 26 *Pavona decussata* – Baseline

Relocated 26 *Pavona decussata* – 6-Month



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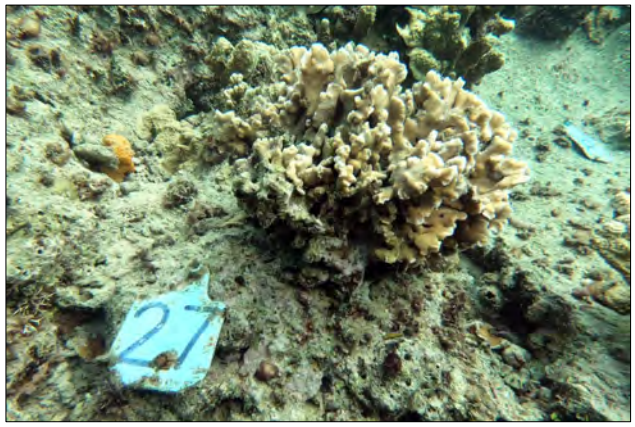


Relocated 27 *Pavona decussata* – 6-Month

Relocated 28 *Pavona decussata* – Baseline

Relocated 28 *Pavona decussata* – 6-Month

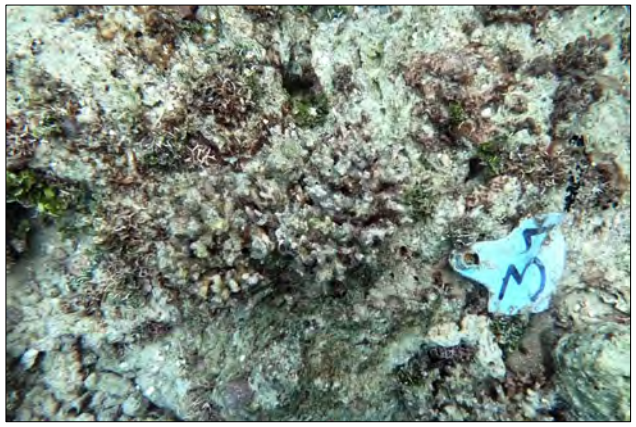
Relocated 29 *Pocillopora damicornis* – Baseline

Relocated 29 *Pocillopora damicornis* – 6-Month

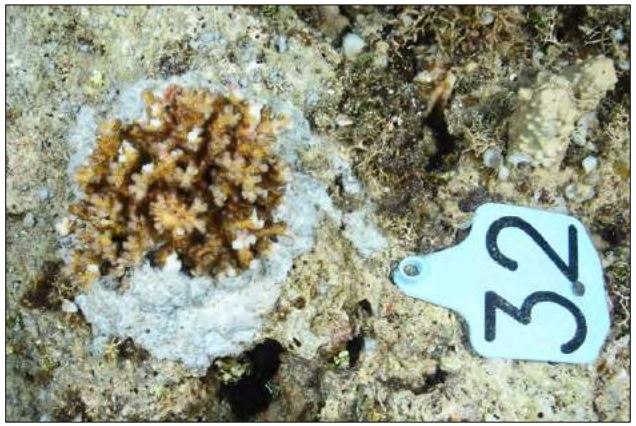
Relocated 30 *Pocillopora damicornis* – Baseline

Relocated 30 *Pocillopora damicornis* – 6-Month

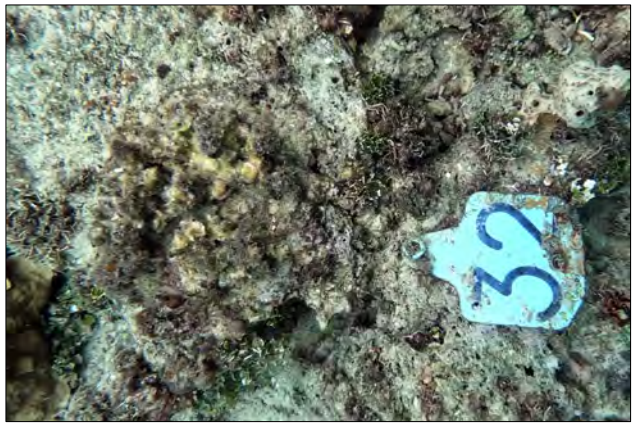
Relocated 31 *Pocillopora damicornis* – Baseline



Relocated 31 *Pocillopora damicornis* – 6-Month



Relocated 32 *Pocillopora damicornis* – Baseline

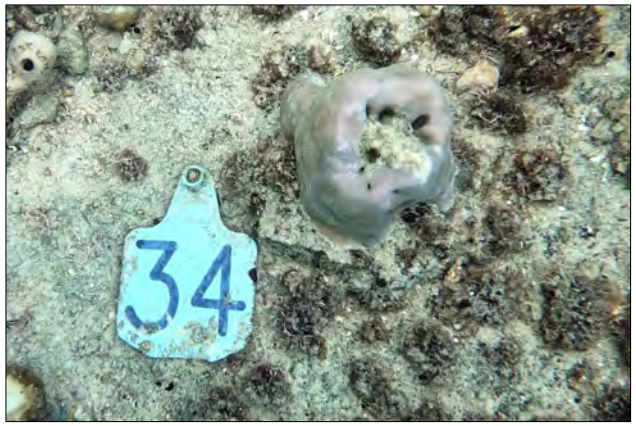


Relocated 32 *Pocillopora damicornis* – 6-Month

Relocated 33 *Porites lutea* – Baseline

Relocated 33 *Porites lutea* – 6-Month

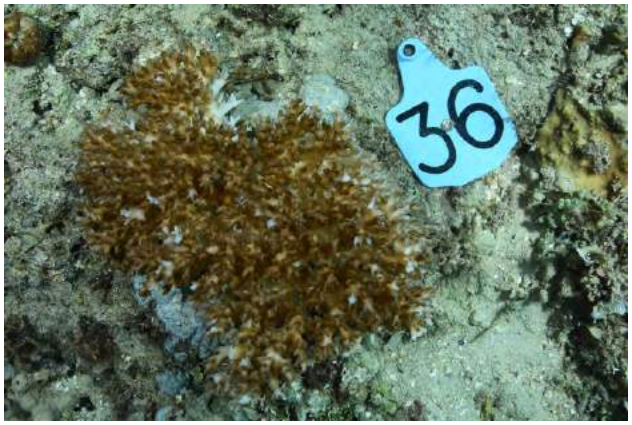
Relocated 34 *Porites lutea* – Baseline



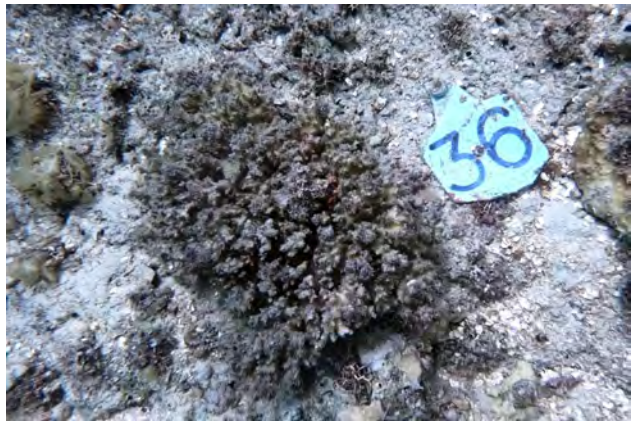
Relocated 34 *Porites lutea* – 6-Month

Relocated 35 *Favia favus* – Baseline

Relocated 35 *Favia favus* – 6-Month

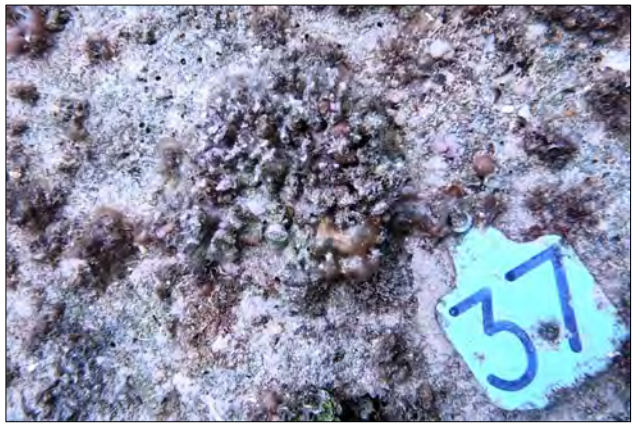


Relocated 36 *Pocillopora acuta* – Baseline



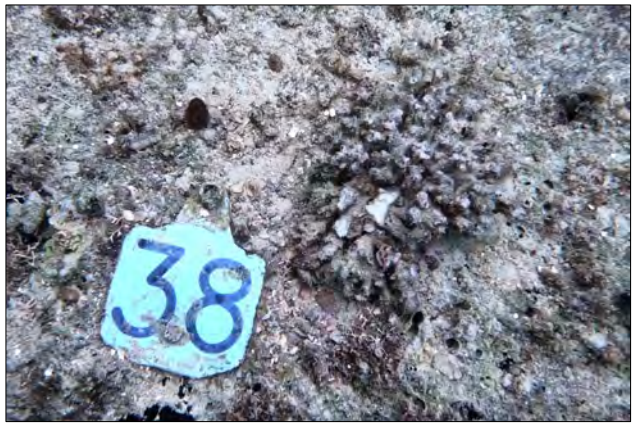
Relocated 36 *Pocillopora acuta* – 6-Month

Relocated 37 *Pocillopora acuta* – Baseline



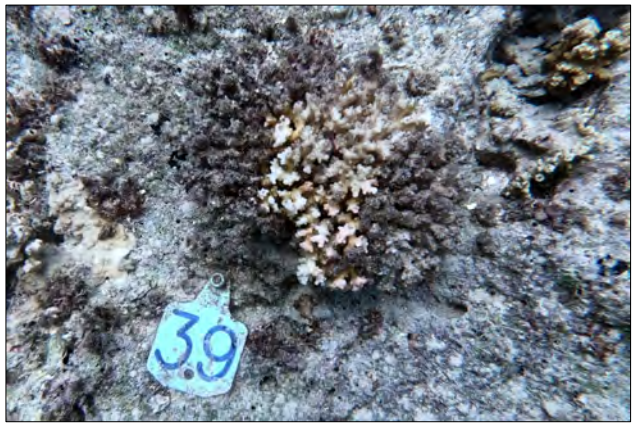
Relocated 37 *Pocillopora acuta* – 6-Month

Relocated 38 *Pocillopora damicornis* – Baseline

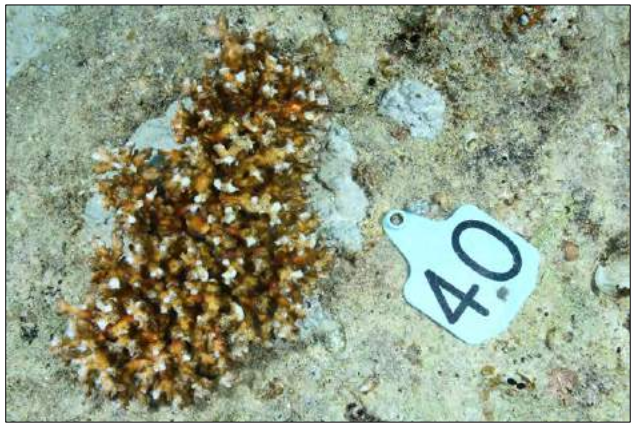


Relocated 38 *Pocillopora damicornis* – 6-Month

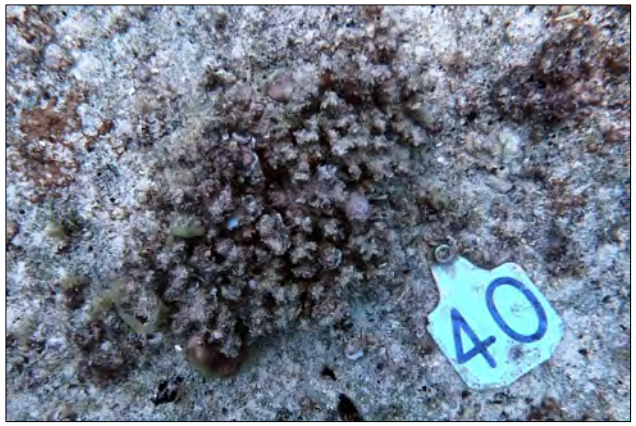
Relocated 39 *Pocillopora damicornis* – Baseline



Relocated 39 *Pocillopora damicornis* – 6-Month

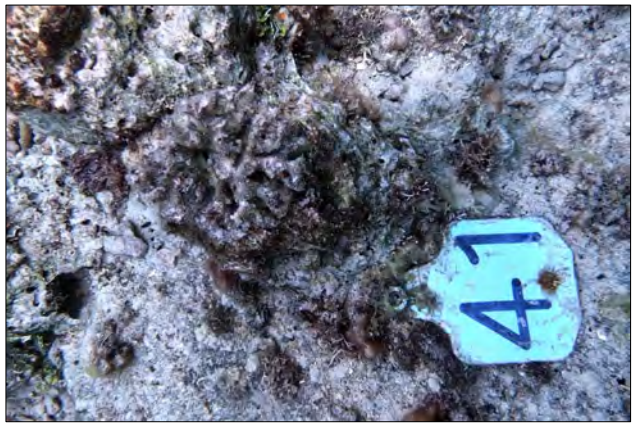


Relocated 40 *Pocillopora damicornis* – Baseline



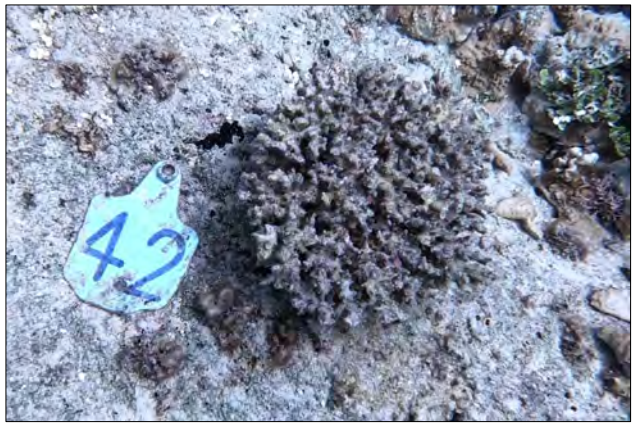
Relocated 40 *Pocillopora damicornis* – 6-Month

Relocated 41 *Pocillopora damicornis* – Baseline



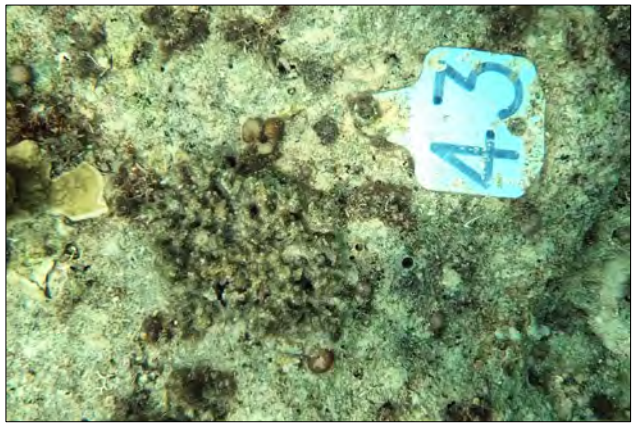
Relocated 41 *Pocillopora damicornis* – 6-Month

Relocated 42 *Pocillopora damicornis* – Baseline



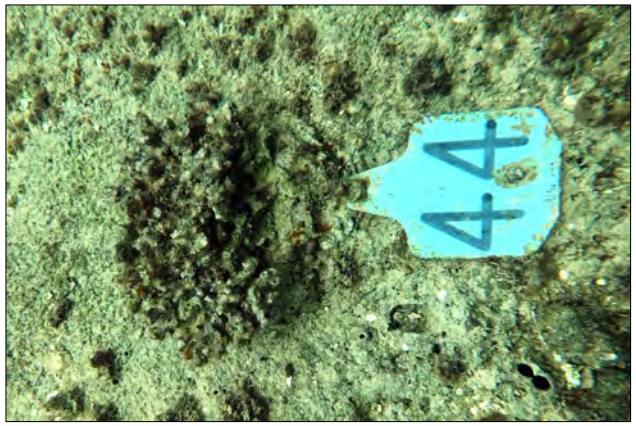
Relocated 42 *Pocillopora damicornis* – 6-Month

Relocated 43 *Pocillopora damicornis* – Baseline

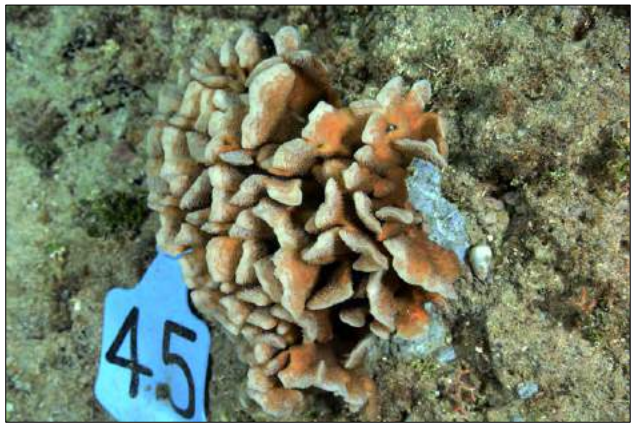


Relocated 43 *Pocillopora damicornis* – 6-Month

Relocated 44 *Pocillopora damicornis* – Baseline



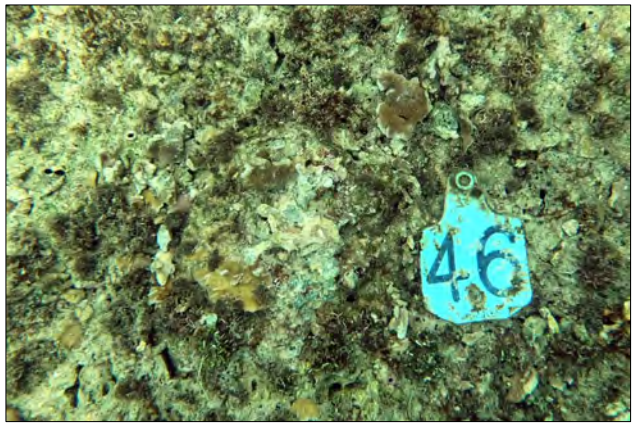
Relocated 44 *Pocillopora damicornis* – 6-Month



Relocated 45 *Pavona decussata* – Baseline

Relocated 45 *Pavona decussata* – 6-Month

Relocated 46 *Pavona decussata* – Baseline



Relocated 46 *Pavona decussata* – 6-Month

Relocated 47 *Pavona decussata* – Baseline

Relocated 47 *Pavona decussata* – 6-Month

Relocated 48 *Pavona decussata* – Baseline

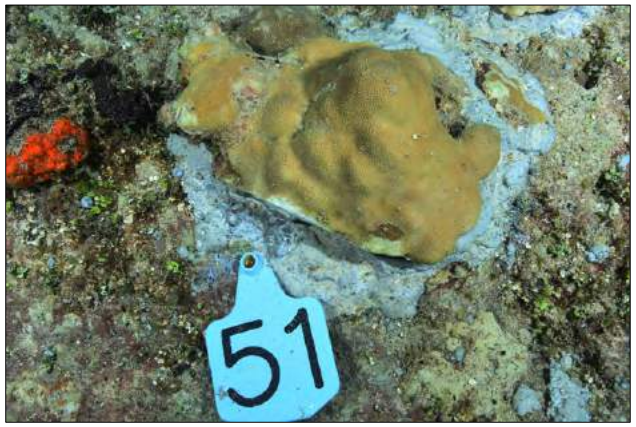
Relocated 48 *Pavona decussata* – 6-Month

Relocated 49 *Pavona decussata* – Baseline

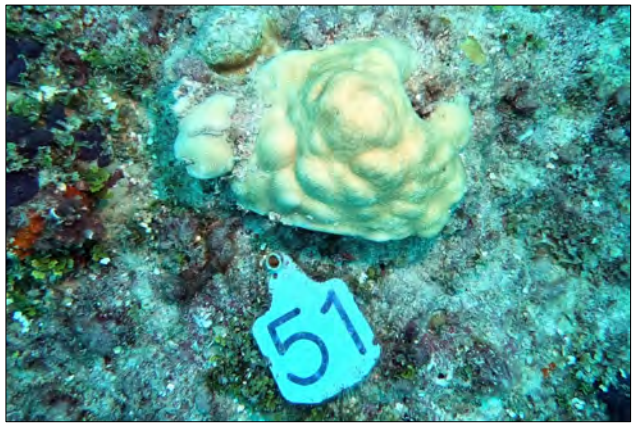
Relocated 49 *Pavona decussata* – 6-Month

Relocated 50 *Porites lutea* – Baseline

Relocated 50 *Porites lutea* – 6-Month



Relocated 51 *Porites solida* – Baseline



Relocated 51 *Porites solida* – 6-Month

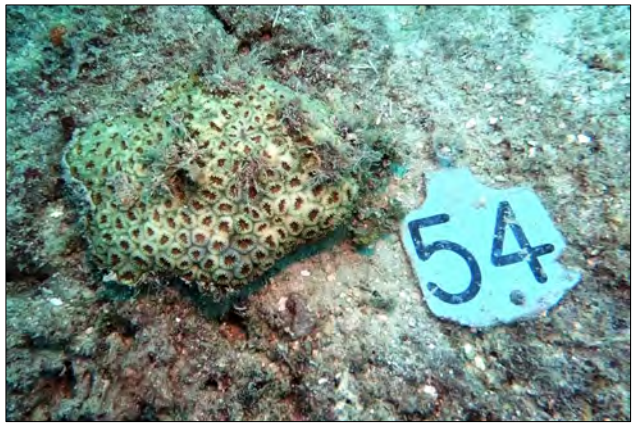
Relocated 52 *Leptoseris incrustans* – Baseline

Relocated 52 *Leptoseris incrustans* – 6-Month

Relocated 53 *Porites rus* – Baseline

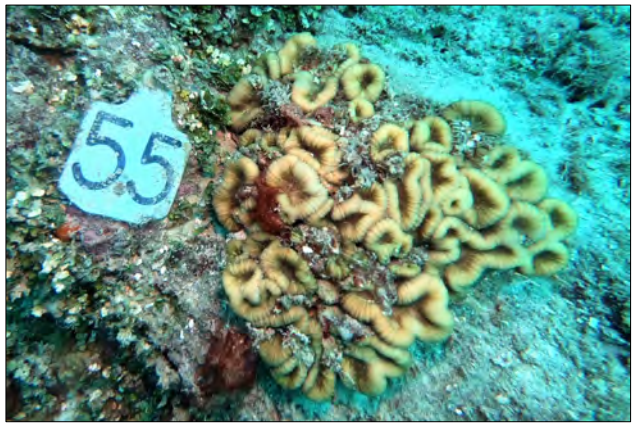
Relocated 53 *Porites rus* – 6-Month

Relocated 54 *Favia matthaii* – Baseline

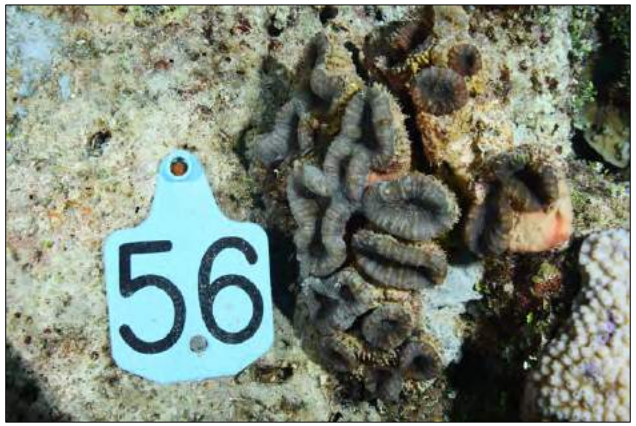


Relocated 54 *Favia matthaii* – 6-Month

Relocated 55 *Lobophyllia hemprichii* – Baseline

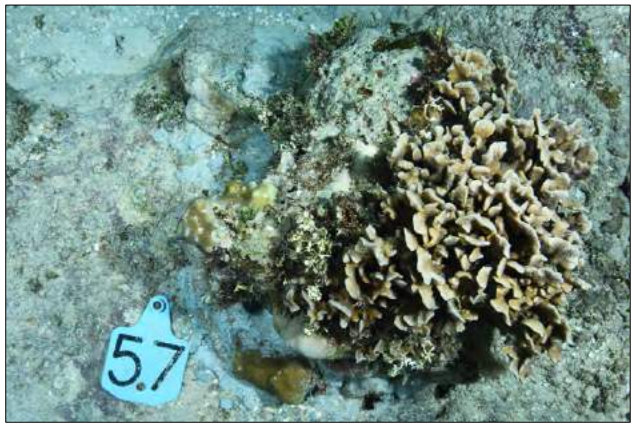


Relocated 55 *Lobophyllia hemprichii* – 6-Month

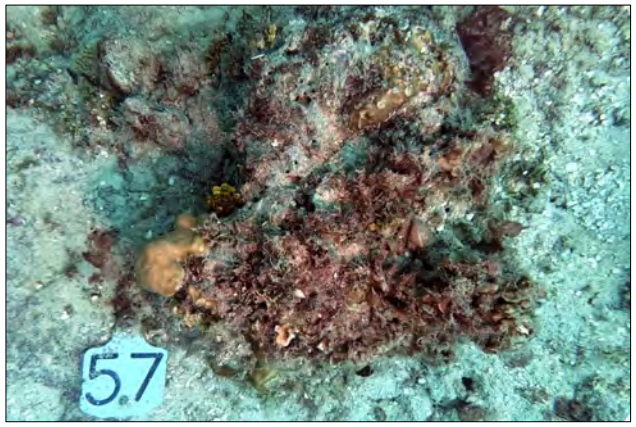


Relocated 56 *Lobophyllia hemprichii* – Baseline

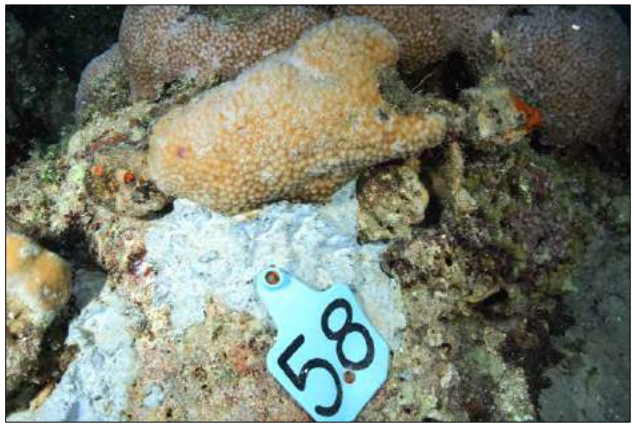
Relocated 56 *Lobophyllia hemprichii* – 6-Month



Relocated 57 *Pavona decussata* – Baseline

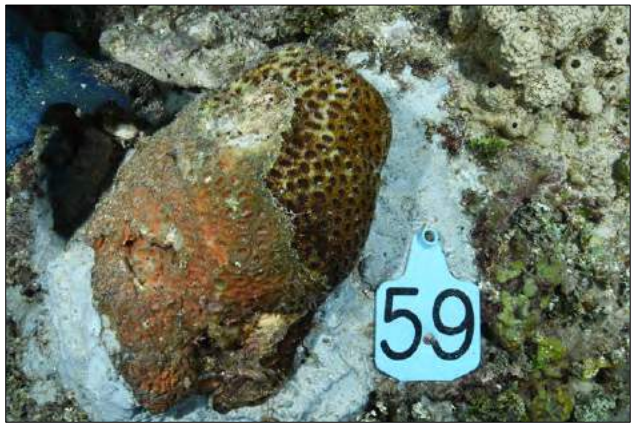


Relocated 57 *Pavona decussata* – 6-Month



Relocated 58 *Astreopora cucullata* – Baseline

Relocated 58 *Astreopora cucullata* – 6-Month

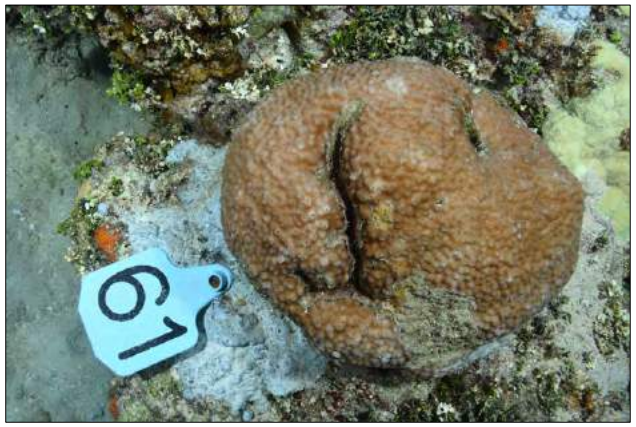


Relocated 59 *Favia matthaii* – Baseline

Relocated 59 *Favia matthaii* – 6-Month

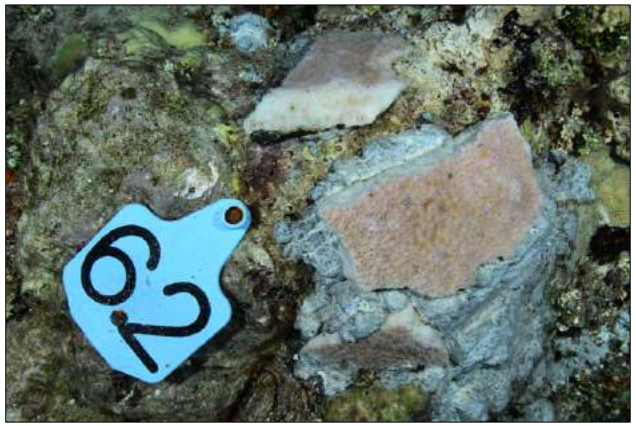
Relocated 60 *Favia matthaii* – Baseline

Relocated 60 *Favia matthaii* – 6-Month



Relocated 61 *Astreopora cucullata* – Baseline

Relocated 61 *Astreopora cucullata* – 6-Month



Relocated 62 *Astreopora listeri* – Baseline

Relocated 62 *Astreopora listeri* – 6-Month

Relocated 63 *Lobophyllia hemprichii* – Baseline

Relocated 63 *Lobophyllia hemprichii* – 6-Month

Relocated 64 *Lobophyllia hemprichii* – Baseline

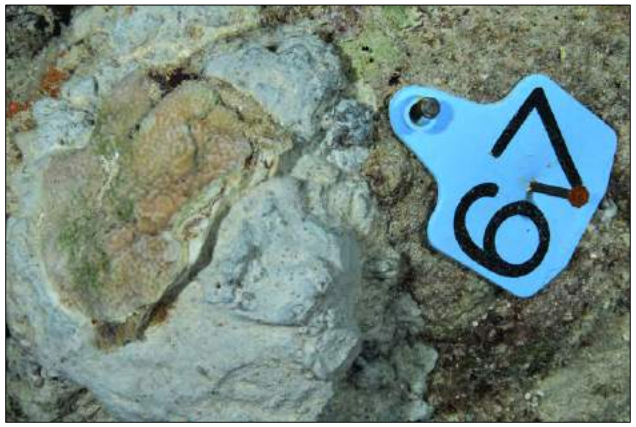
Relocated 64 *Lobophyllia hemprichii* – 6-Month

Relocated 65 *Leptastrea* cf. *purpurea* – Baseline

Relocated 65 *Leptastrea* cf. *purpurea* – 6-Month

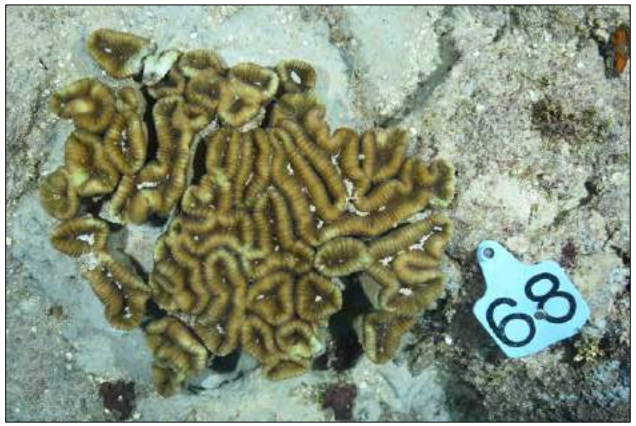
Relocated 66 *Lobophyllia hemprichii* – Baseline

Relocated 66 *Lobophyllia hemprichii* – 6-Month

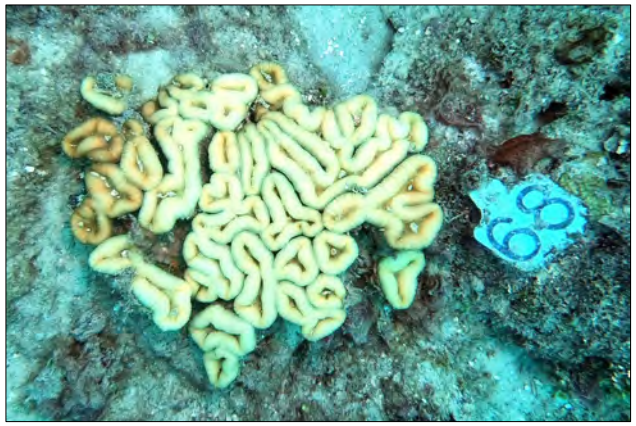


Relocated 67 *Porites horizontalata* – Baseline

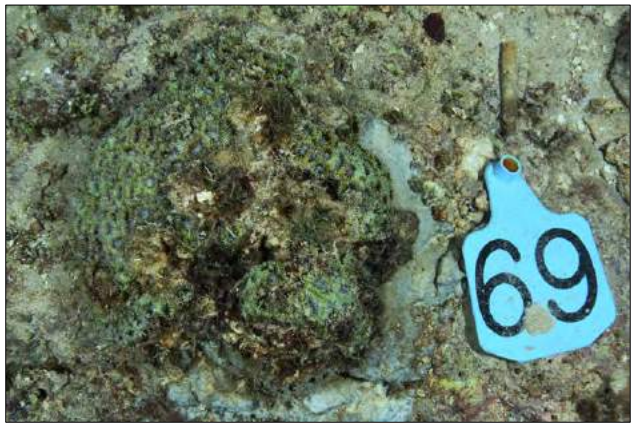
Relocated 67 *Porites horizontalata* – 6-Month



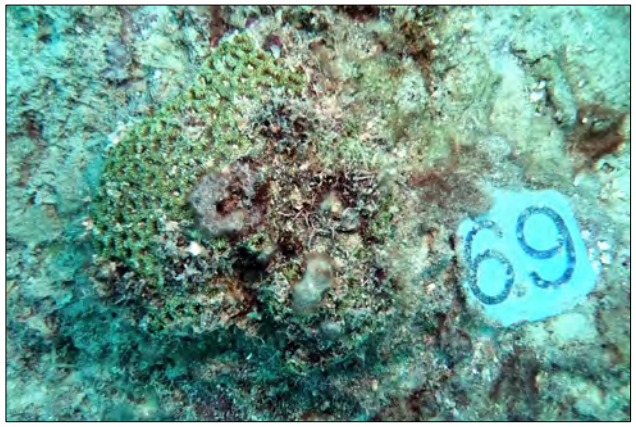
Relocated 68 *Lobophyllia hemprichii* – Baseline



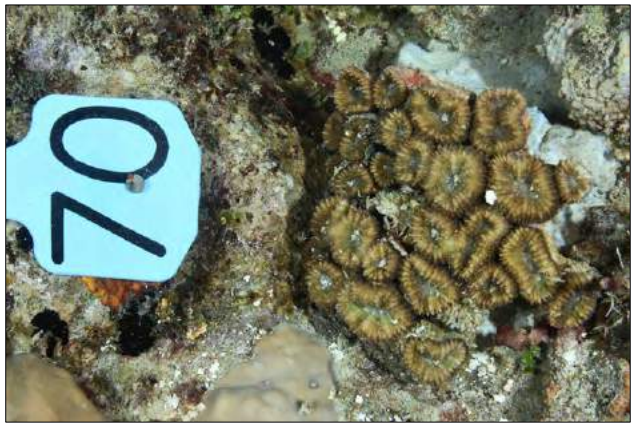
Relocated 68 *Lobophyllia hemprichii* – 6-Month



Relocated 69 *Favia matthaii* – Baseline



Relocated 69 *Favia matthaii* – 6-Month

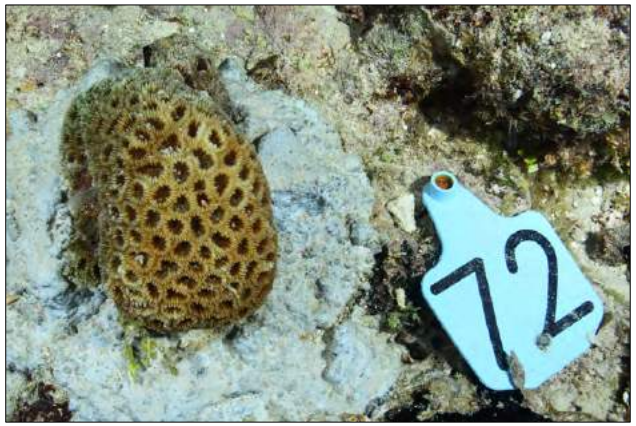


Relocated 70 *Lobophyllia corymbosa* – Baseline

Relocated 70 *Lobophyllia corymbosa* – 6-Month

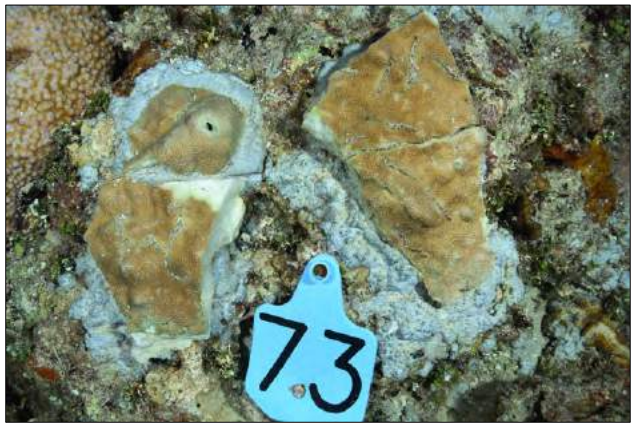
Relocated 71 *Lobophyllia hemprichii* – Baseline

Relocated 71 *Lobophyllia hemprichii* – 6-Month



Relocated 72 *Favia matthaii* – Baseline

Relocated 72 *Favia matthaii* – 6-Month



Relocated 73 *Porites* aff. *lichen* – Baseline

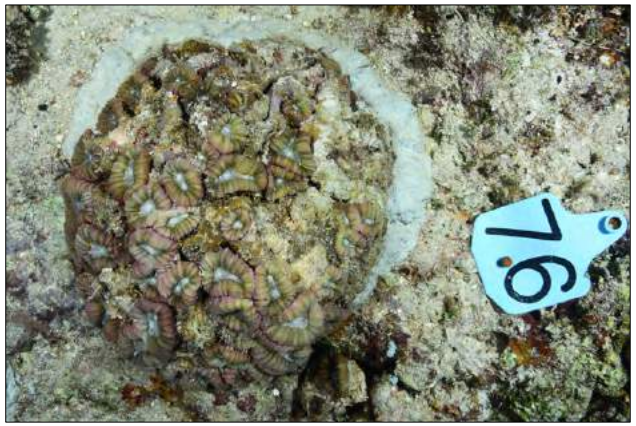
Relocated 73 *Porites* aff. *lichen* – 6-Month

Relocated 74 *Herpolitha limax* – Baseline

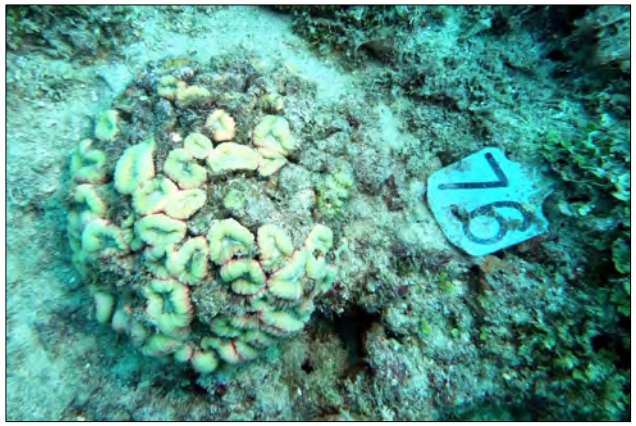
Relocated 74 *Herpolitha limax* – 6-Month

Relocated 75 *Astreopora gracilis* – Baseline

Relocated 75 *Astreopora gracilis* – 6-Month



Relocated 76 *Lobophyllia hemprichii* – Baseline



Relocated 76 *Lobophyllia hemprichii* – 6-Month

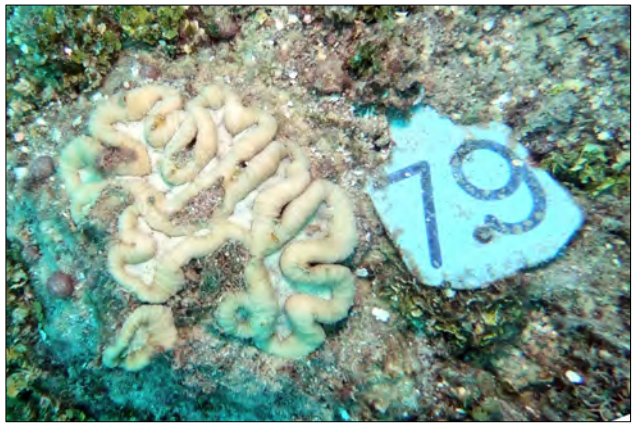
Relocated 77 *Lobophyllia corymbosa* – Baseline

Relocated 77 *Lobophyllia corymbosa* – 6-Month

Relocated 78 *Astreopora cucullata* – Baseline

Relocated 78 *Astreopora cucullata* – 6-Month

Relocated 79 *Lobophyllia hataii* – Baseline



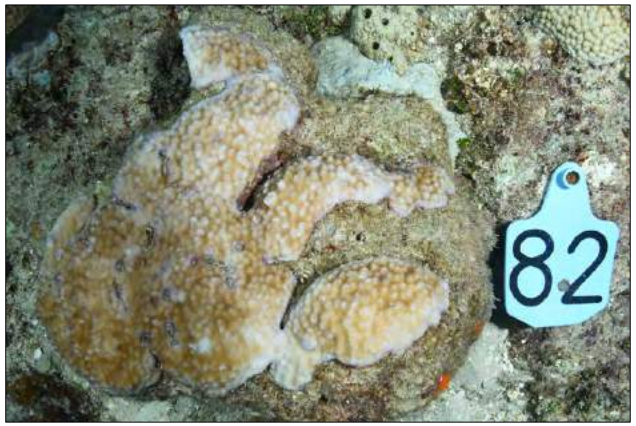
Relocated 79 *Lobophyllia hataii* – 6-Month

Relocated 80 *Lobophyllia corymbosa* – Baseline

Relocated 80 *Lobophyllia corymbosa* – 6-Month

Relocated 81 *Porites lobata* – Baseline

Relocated 81 *Porites lobata* – 6-Month

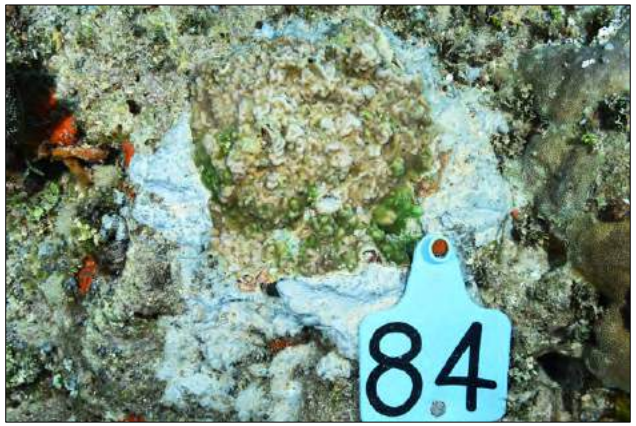


Relocated 82 *Astreopora gracilis* – Baseline

Relocated 82 *Astreopora gracilis* – 6-Month

Relocated 83 *Lobophyllia hemprichii* – Baseline

Relocated 83 *Lobophyllia hemprichii* – 6-Month



Relocated 84 *Leptoseris incrustans* – Baseline

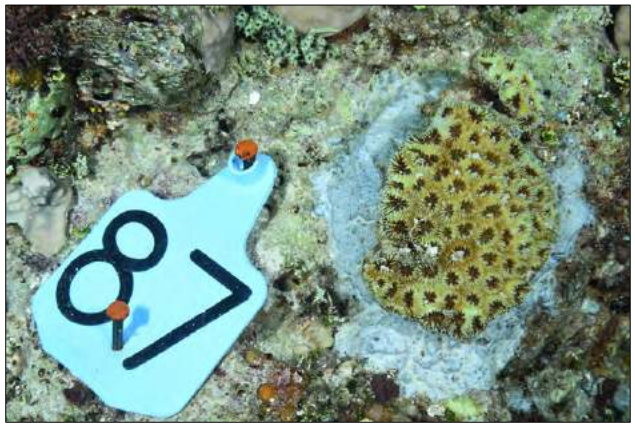
Relocated 84 *Leptoseris incrustans* – 6-Month

Relocated 85 *Lobophyllia hemprichii* – Baseline

Relocated 85 *Lobophyllia hemprichii* – 6-Month

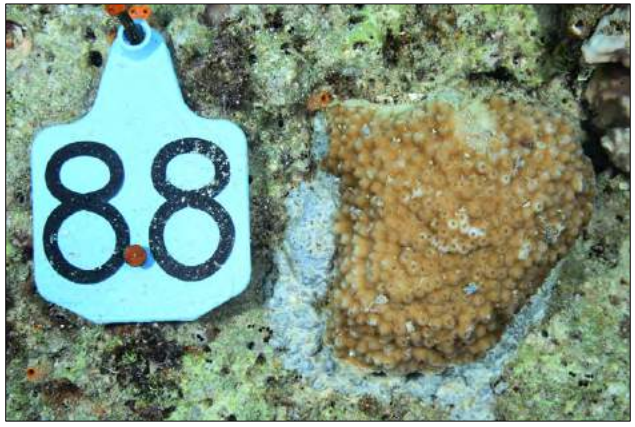
Relocated 86 *Astreopora myriophthalma* – Baseline

Relocated 86 *Astreopora myriophthalma* – 6-Month



Relocated 87 *Favia matthaii* – Baseline

Relocated 87 *Favia matthaii* – 6-Month



Relocated 88 *Astreopora cucullata* – Baseline

Relocated 88 *Astreopora cucullata* – 6-Month

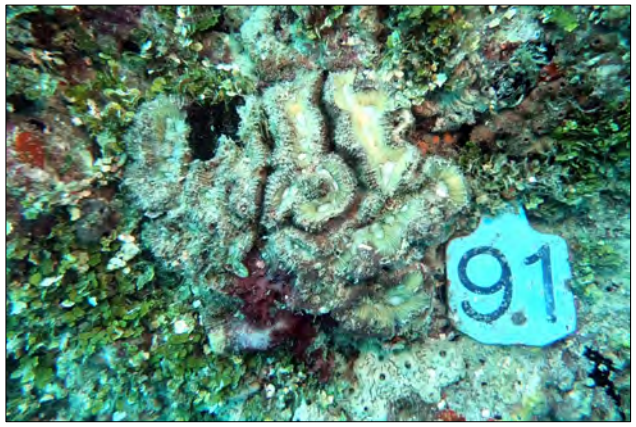
Relocated 89 *Lobophyllia corymbosa* – Baseline

Relocated 89 *Lobophyllia corymbosa* – 6-Month

Relocated 90 *Favia matthaii* – Baseline

Relocated 90 *Favia matthaii* – 6-Month

Relocated 91 *Lobophyllia hemprichii* – Baseline

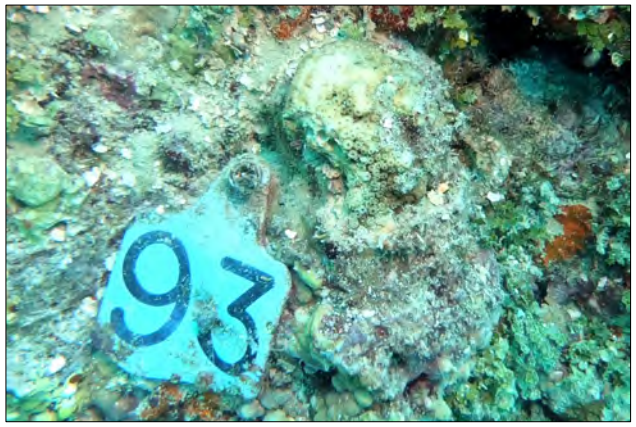


Relocated 91 *Lobophyllia hemprichii* – 6-Month

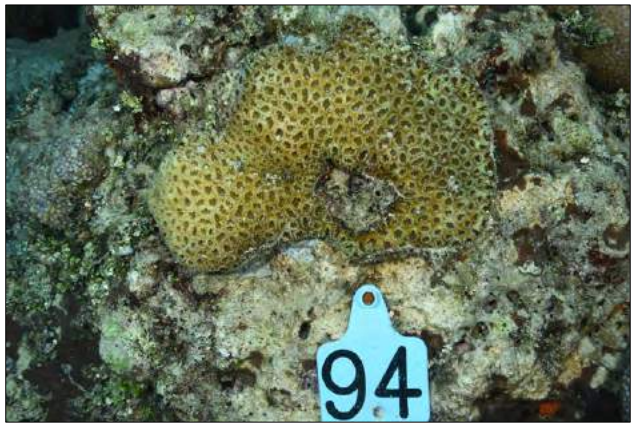
Relocated 92 *Porites lobata* – Baseline

Relocated 92 *Porites lobata* – 6-Month

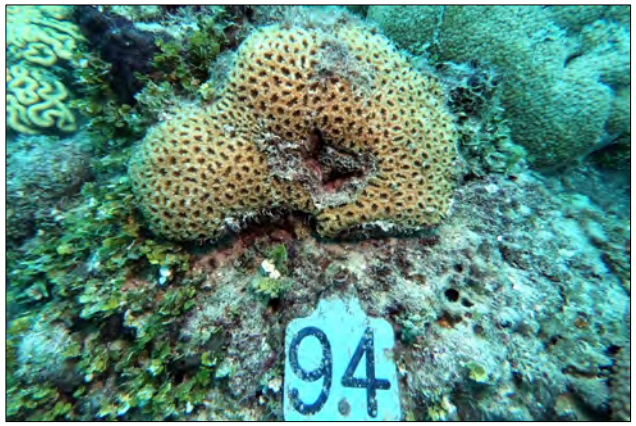
Relocated 93 *Cyphastrea chalcidicum* – Baseline



Relocated 93 *Cyphastrea chalcidicum* – 6-Month



Relocated 94 *Favia matthaii* – Baseline

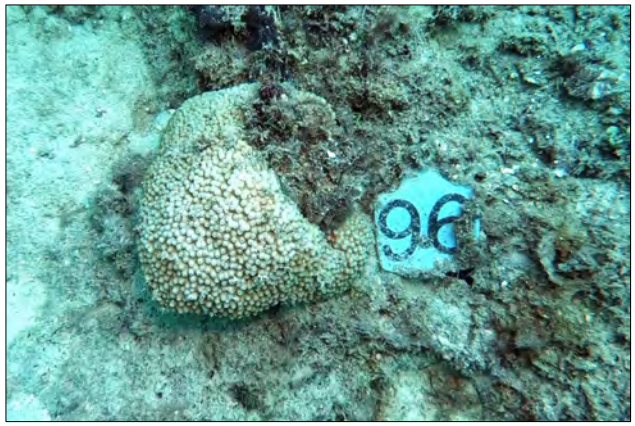


Relocated 94 *Favia matthaii* – 6-Month

Relocated 95 *Astreopora gracilis* – Baseline

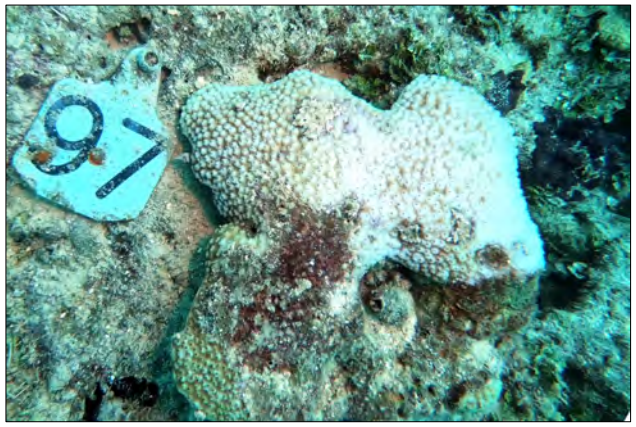
Relocated 95 *Astreopora gracilis* – 6-Month

Relocated 96 *Astreopora cucullata* – Baseline



Relocated 96 *Astreopora cucullata* – 6-Month

Relocated 97 *Astreopora cucullata* – Baseline

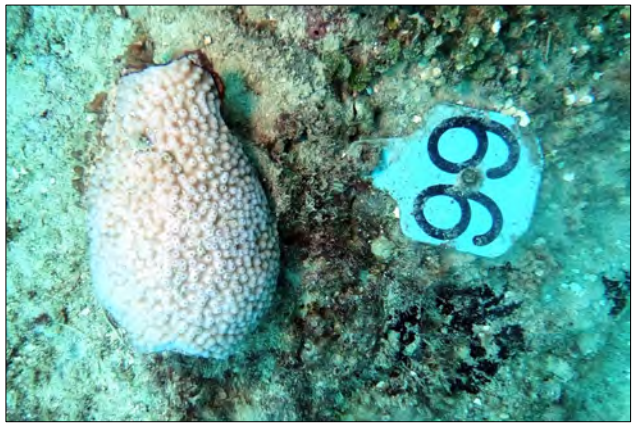


Relocated 97 *Astreopora cucullata* – 6-Month

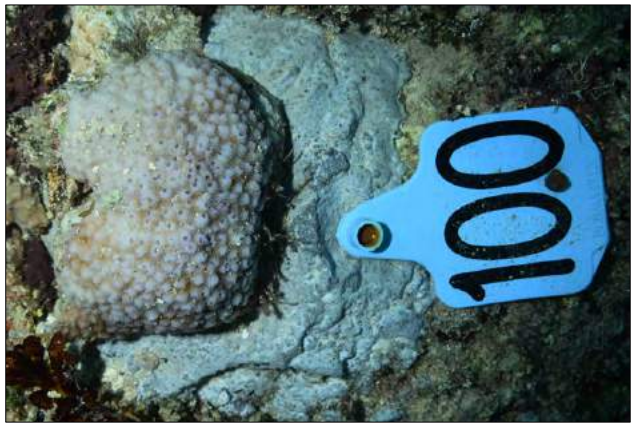
Relocated 98 *Lobophyllia hemprichii* – Baseline

Relocated 98 *Lobophyllia hemprichii* – 6-Month

Relocated 99 *Astreopora cucullata* – Baseline

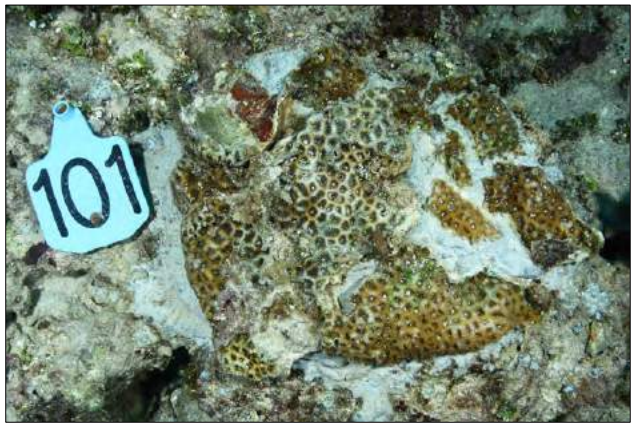


Relocated 99 *Astreopora cucullata* – 6-Month

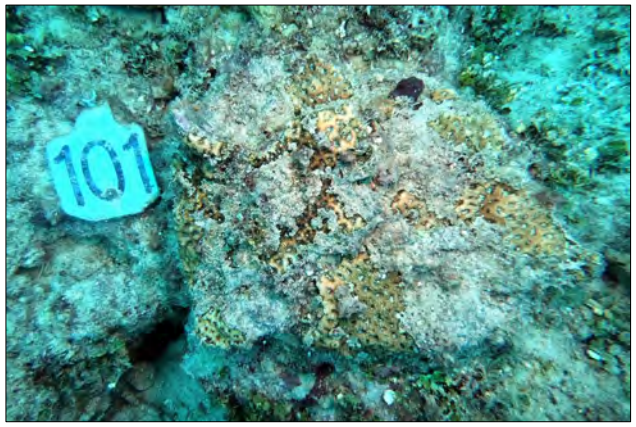


Relocated 100 *Astreopora cucullata* – Baseline

Relocated 100 *Astreopora cucullata* – 6-Month



Relocated 101 *Phymastrea valenciennesi* – Baseline



Relocated 101 *Phymastrea valenciennesi* – 6-Month

Relocated 102 *Lobophyllia hataii* – Baseline

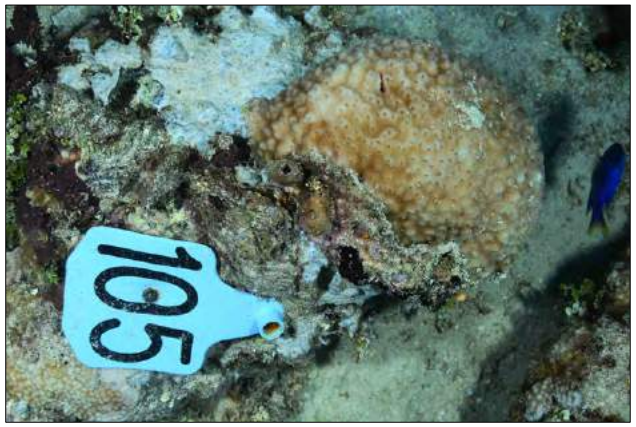
Relocated 102 *Lobophyllia hataii* – 6-Month

Relocated 103 *Astreopora elliptica* – Baseline

Relocated 103 *Astreopora elliptica* – 6-Month

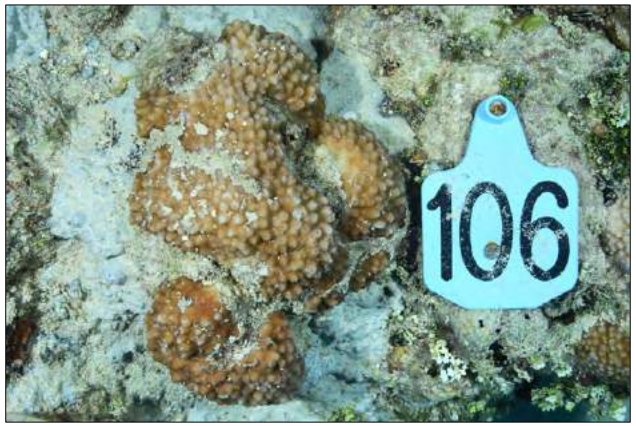
Relocated 104 *Porites lobata* – Baseline

Relocated 104 *Porites lobata* – 6-Month

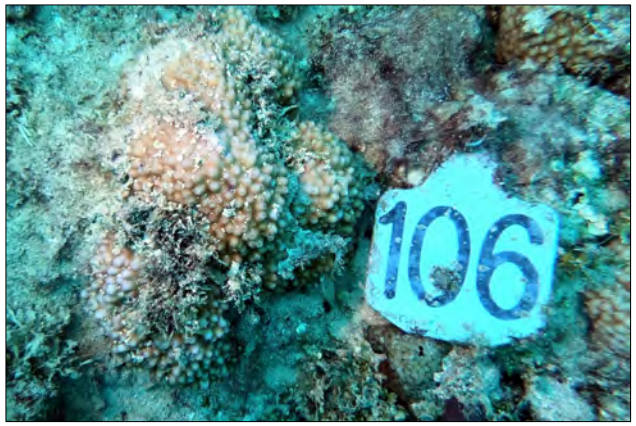


Relocated 105 *Astreopora cucullata* – Baseline

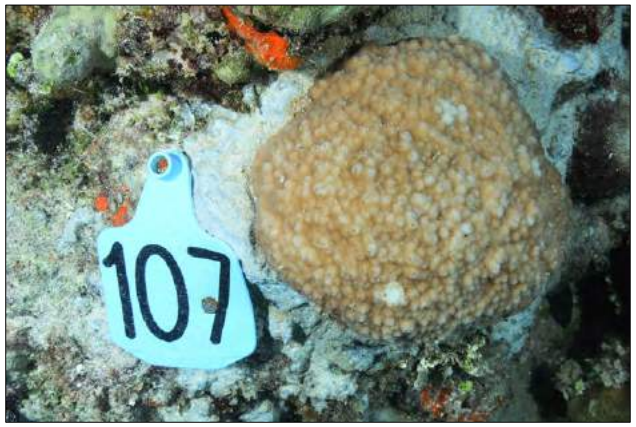
Relocated 105 *Astreopora cucullata* – 6-Month



Relocated 106 *Astreopora gracilis* – Baseline



Relocated 106 *Astreopora gracilis* – 6-Month

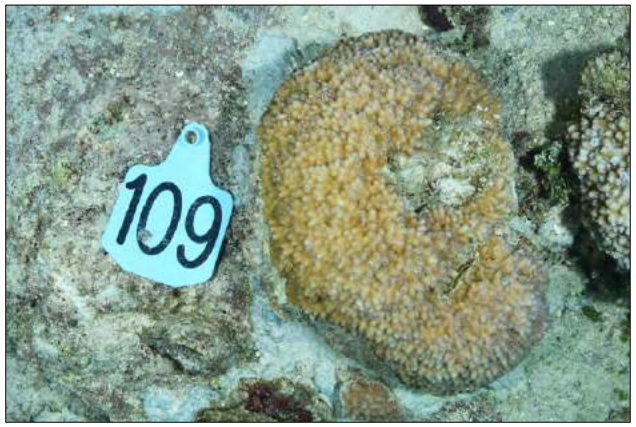


Relocated 107 *Astreopora elliptica* – Baseline

Relocated 107 *Astreopora elliptica* – 6-Month

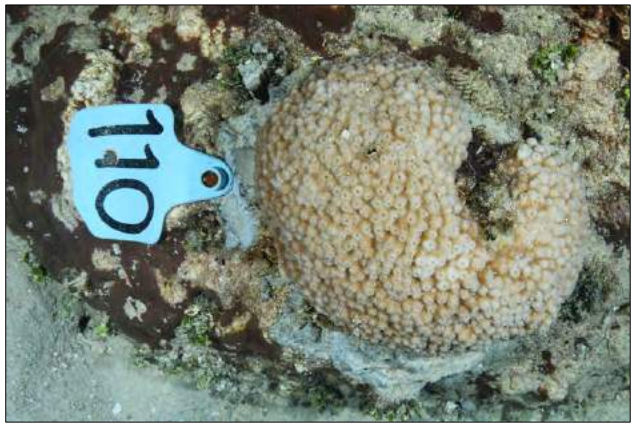
Relocated 108 *Astreopora gracilis* – Baseline

Relocated 108 *Astreopora gracilis* – 6-Month

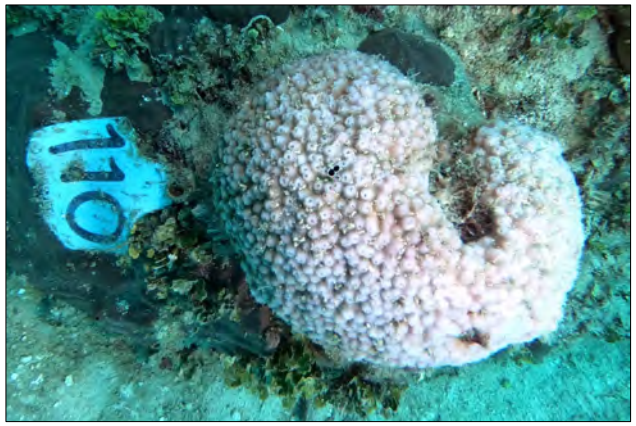


Relocated 109 *Astreopora gracilis* – Baseline

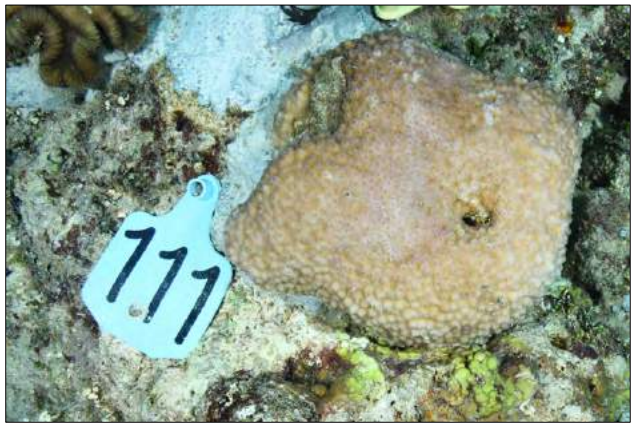
Relocated 109 *Astreopora gracilis* – 6-Month



Relocated 110 *Astreopora cucullata* – Baseline

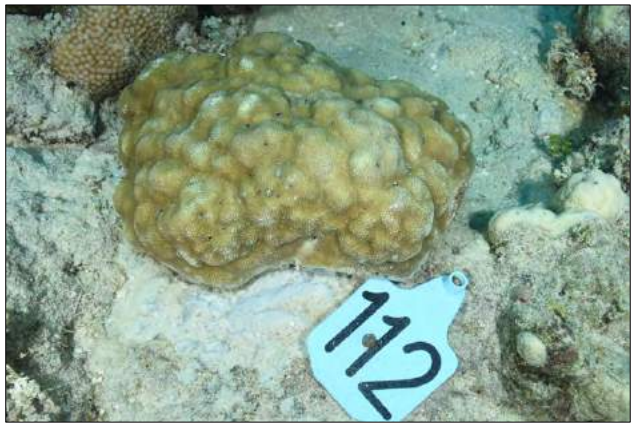


Relocated 110 *Astreopora cucullata* – 6-Month



Relocated 111 *Astreopora cucullata* – Baseline

Relocated 111 *Astreopora cucullata* – 6-Month



Relocated 112 *Porites lobata* – Baseline

Relocated 112 *Porites lobata* – 6-Month

Relocated 113 *Lobophyllia corymbosa* – Baseline

Relocated 113 *Lobophyllia corymbosa* – 6-Month

Relocated 114 *Lobophyllia corymbosa* – Baseline

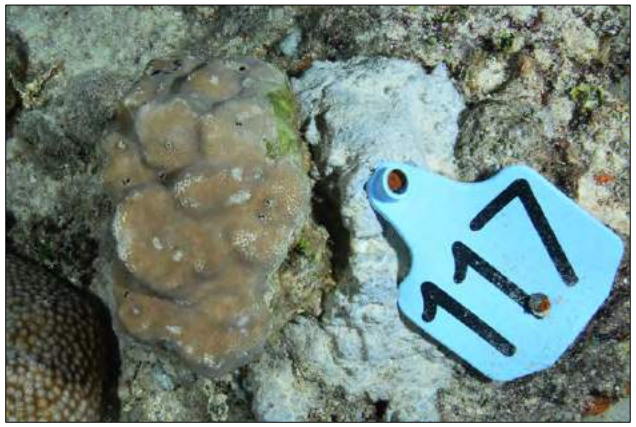
Relocated 114 *Lobophyllia corymbosa* – 6-Month

Relocated 115 *Lobophyllia corymbosa* – Baseline

Relocated 115 *Lobophyllia corymbosa* – 6-Month

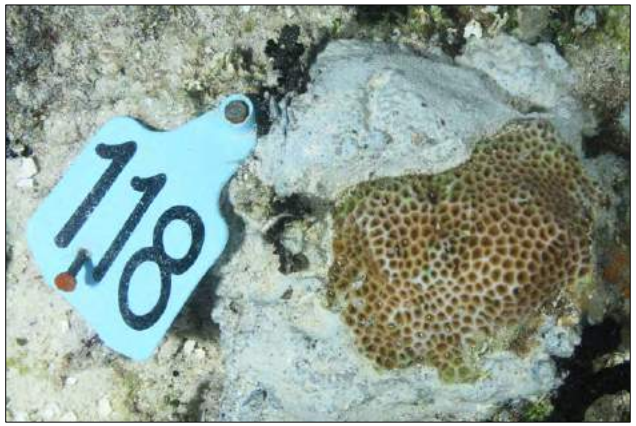
Relocated 116 *Porites horizontalata* – Baseline

Relocated 116 *Porites horizontalata* – 6-Month



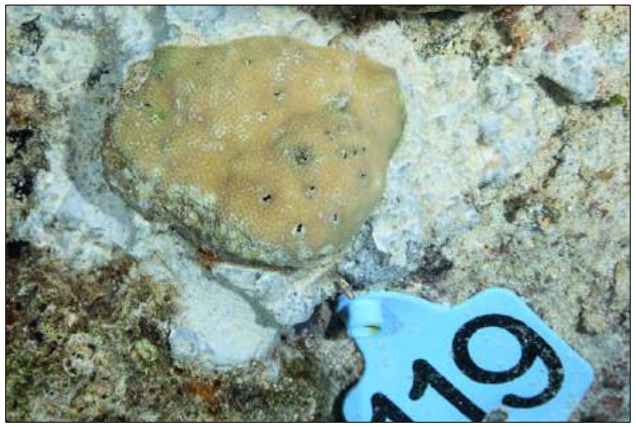
Relocated 117 *Porites lobata* – Baseline

Relocated 117 *Porites lobata* – 6-Month

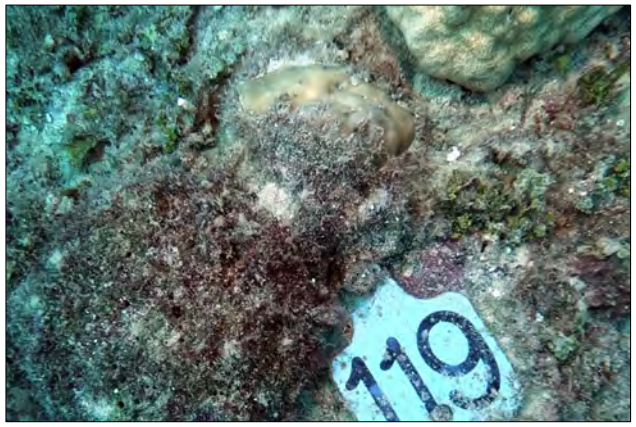


Relocated 118 *Leptastrea purpurea* – Baseline

Relocated 118 *Leptastrea purpurea* – 6-Month



Relocated 119 *Porites lobata* – Baseline



Relocated 119 *Porites lobata* – 6-Month

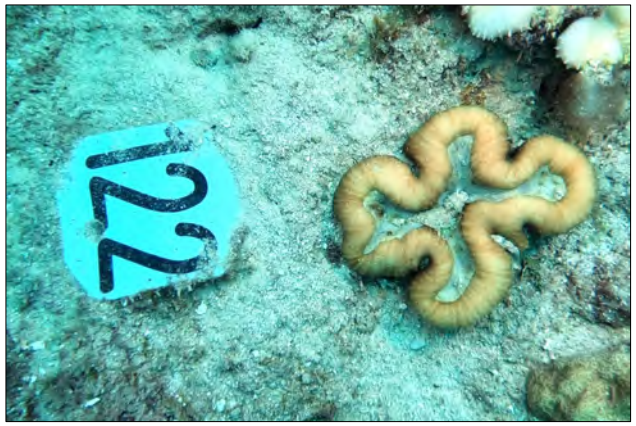
Relocated 120 *Porites lobata* – Baseline

Relocated 120 *Porites lobata* – 6-Month

Relocated 121 *Lobophyllia hataii* – Baseline

Relocated 121 *Lobophyllia hataii* – 6-Month

Relocated 122 *Lobophyllia hataii* – Baseline



Relocated 122 *Lobophyllia hataii* – 6-Month

Relocated 123 *Porites* aff. *lichen* – Baseline

Relocated 123 *Porites* aff. *lichen* – 6-Month

Relocated 124 *Porites rus* – Baseline

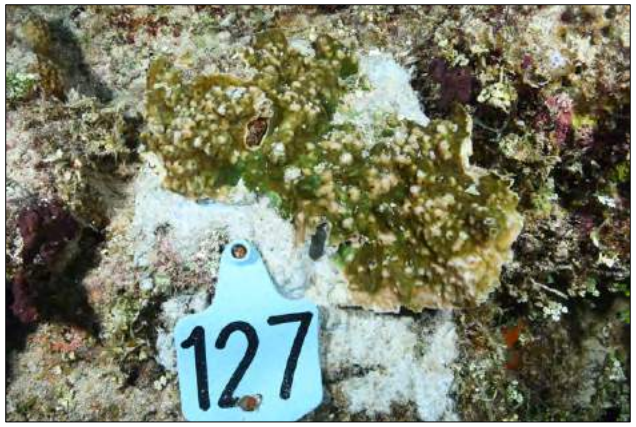
Relocated 124 *Porites rus* – 6-Month

Relocated 125 *Psammocora profundicella* – Baseline

Relocated 125 *Psammocora profundicella* – 6-Month

Relocated 126 *Leptastrea purpurea* – Baseline

Relocated 126 *Leptastrea purpurea* – 6-Month



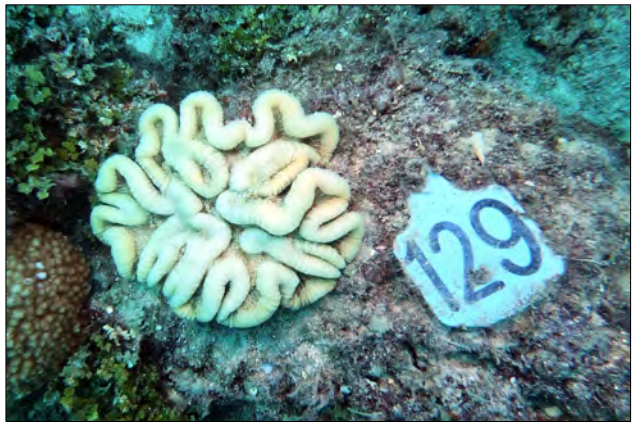
Relocated 127 *Leptoseris incrustans* – Baseline

Relocated 127 *Leptoseris incrustans* – 6-Month

Relocated 128 *Lobophyllia hataii* – Baseline

Relocated 128 *Lobophyllia hataii* – 6-Month

Relocated 129 *Lobophyllia hataii* – Baseline



Relocated 129 *Lobophyllia hataii* – 6-Month

Relocated 130 *Porites lobata* – Baseline

Relocated 130 *Porites lobata* – 6-Month

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Appendix C

Photographs of Tagged Reference Corals

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Reference 200 *Pocillopora damicornis* – Baseline

Reference 200 *Pocillopora damicornis* – 6-Month

Reference 201 *Pocillopora damicornis* – Baseline

Reference 201 *Pocillopora damicornis* – 6-Month

Reference 202 *Pocillopora damicornis* – Baseline

Reference 202 *Pocillopora damicornis* – 6-Month

Reference 203 *Pocillopora damicornis* – Baseline

Reference 203 *Pocillopora damicornis* – 6-Month

Reference 204 *Pocillopora damicornis* – Baseline

Reference 204 *Pocillopora damicornis* – 6-Month

Reference 205 *Pocillopora damicornis* – Baseline

Reference 205 *Pocillopora damicornis* – 6-Month

Reference 206 *Pocillopora damicornis* – Baseline

Reference 206 *Pocillopora damicornis* – 6-Month

Reference 207 *Pocillopora damicornis* – Baseline

Reference 207 *Pocillopora damicornis* – 6-Month

Reference 208 *Pocillopora damicornis* – Baseline

Reference 208 *Pocillopora damicornis* – 6-Month

Reference 209 *Pocillopora damicornis* – Baseline

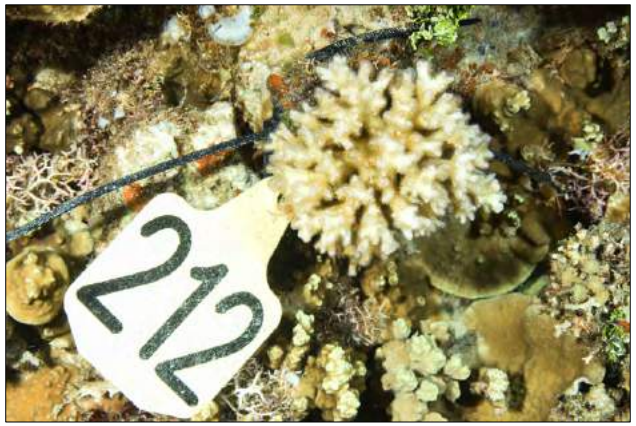
Reference 209 *Pocillopora damicornis* – 6-Month

Reference 210 *Pocillopora damicornis* – Baseline

Reference 210 *Pocillopora damicornis* – 6-Month

Reference 211 *Pocillopora damicornis* – Baseline

Reference 211 *Pocillopora damicornis* – 6-Month



Reference 212 *Pocillopora damicornis* – Baseline

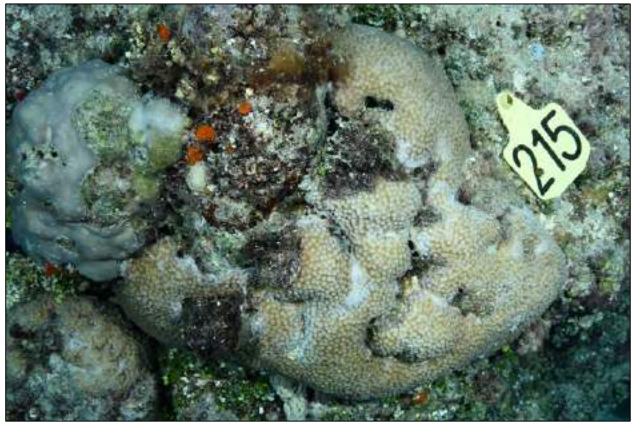
Reference 212 *Pocillopora damicornis* – 6-Month

Reference 213 *Porites cylindrica* – Baseline

Reference 213 *Porites cylindrica* – 6-Month

Reference 214 *Porites cylindrica* – Baseline

Reference 214 *Porites cylindrica* – 6-Month



Reference 215 *Astreopora cucullata* – Baseline

Reference 215 *Astreopora cucullata* – 6-Month

Reference 216 *Porites monticulosa* – Baseline

Reference 216 *Porites monticulosa* – 6-Month

Reference 217 *Porites monticulosa* – Baseline

Reference 217 *Porites monticulosa* – 6-Month

Reference 218 *Porites rus* – Baseline

Reference 218 *Porites rus* – 6-Month

Reference 219 *Porites rus* – Baseline

Reference 219 *Porites rus* – 6-Month

Reference 220 *Psammocora nierstraszi* – Baseline

Reference 220 *Psammocora nierstraszi* – 6-Month

Reference 221 *Porites lutea* – Baseline

Reference 221 *Porites lutea* – 6-Month

Reference 222 *Porites lutea* – Baseline

Reference 222 *Porites lutea* – 6-Month

Reference 223 *Porites lutea* – Baseline

Reference 223 *Porites lutea* – 6-Month

Reference 224 *Porites lutea* – Baseline

Reference 224 *Porites lutea* – 6-Month

Reference 225 *Porites lutea* – Baseline

Reference 225 *Porites lutea* – 6-Month

Reference 226 *Porites murrayensis* – Baseline

Reference 226 *Porites murrayensis* – 6-Month

Reference 227 *Porites murrayensis* – Baseline

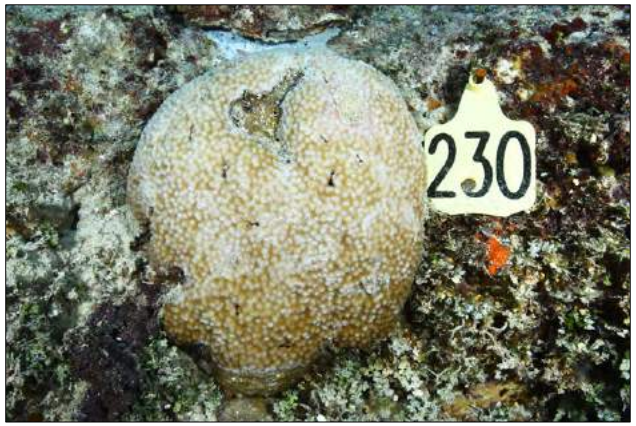
Reference 227 *Porites murrayensis* – 6-Month

Reference 228 *Porites solida* – Baseline

Reference 228 *Porites solida* – 6-Month

Reference 229 *Porites solida* – Baseline

Reference 229 *Porites solida* – 6-Month



Reference 230 *Astreopora cucullata* – Baseline

Reference 230 *Astreopora cucullata* – 6-Month

Reference 231 *Astreopora gracilis* – Baseline

Reference 231 *Astreopora gracilis* – 6-Month

Reference 232 *Porites lutea* – Baseline

Reference 232 *Porites lutea* – 6-Month

Reference 233 *Leptastrea purpurea* – Baseline

Reference 233 *Leptastrea purpurea* – 6-Month

Reference 234 *Astreopora gracilis* – Baseline

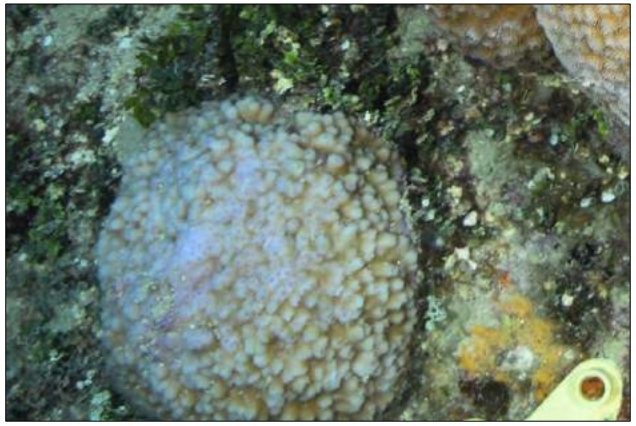
Reference 234 *Astreopora gracilis* – 6-Month

Reference 235 *Astreopora cucullata* – Baseline

Reference 235 *Astreopora cucullata* – 6-Month

Reference 236 *Astreopora cucullata* – Baseline

Reference 236 *Astreopora cucullata* – 6-Month



Reference 237 *Astreopora gracilis* – Baseline

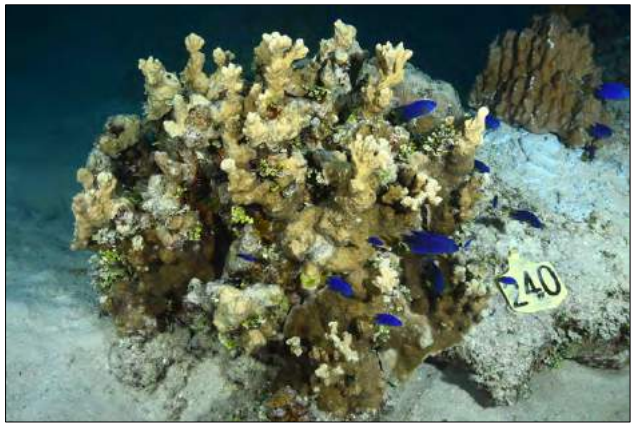
Reference 237 *Astreopora gracilis* – 6-Month

Reference 238 *Astreopora myriophthalma* – Baseline

Reference 238 *Astreopora myriophthalma* – 6-Month

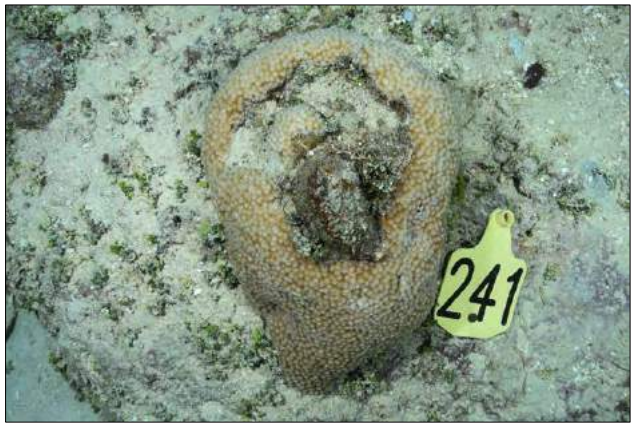
Reference 239 *Astreopora gracilis* – Baseline

Reference 239 *Astreopora gracilis* – 6-Month



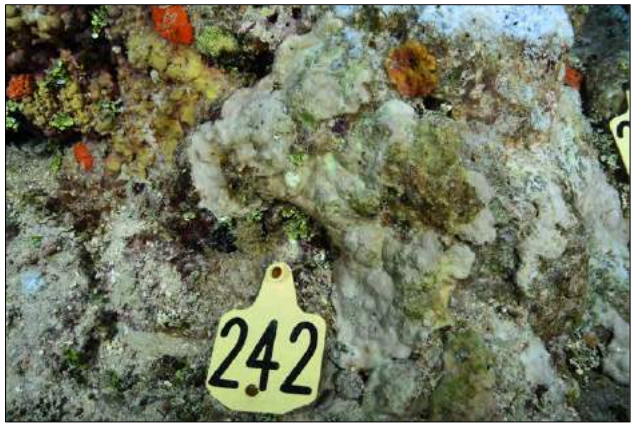
Reference 240 *Porites rus* – Baseline

Reference 240 *Porites rus* – 6-Month



Reference 241 *Astreopora cucullata* – Baseline

Reference 241 *Astreopora cucullata* – 6-Month



Reference 242 *Porites horizontalata* – Baseline

Reference 242 *Porites horizontalata* – 6-Month

Reference 243 *Porites lutea* – Baseline

Reference 243 *Porites lutea* – 6-Month

Reference 244 *Porites lobata* – Baseline

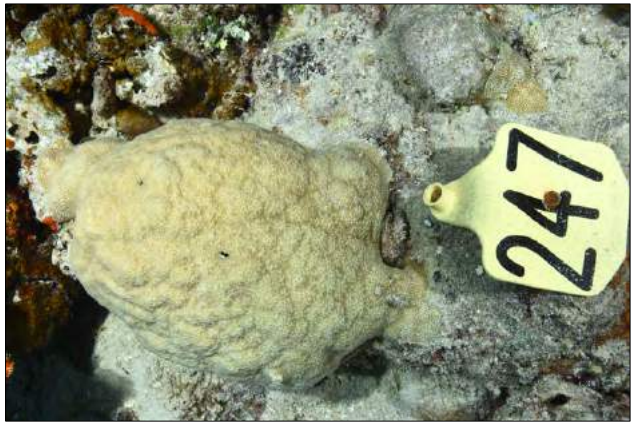
Reference 244 *Porites lobata* – 6-Month

Reference 245 *Leptoseris incrustans* – Baseline

Reference 245 *Leptoseris incrustans* – 6-Month

Reference 246 *Astreopora cucullata* – Baseline

Reference 246 *Astreopora cucullata* – 6-Month



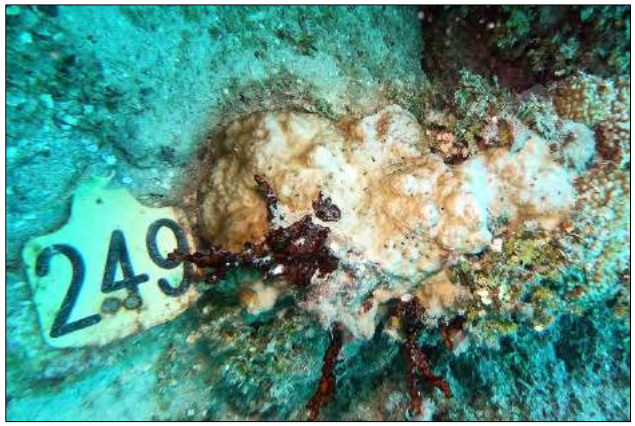
Reference 247 *Porites* aff. *lichen* – Baseline

Reference 247 *Porites* aff. *lichen* – 6-Month

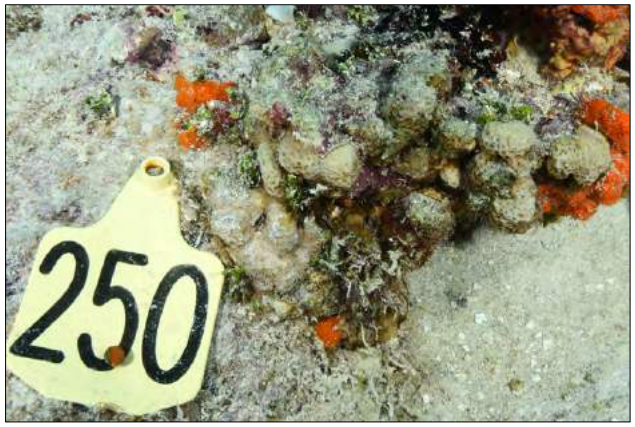
Reference 248 *Porites* aff. *lichen* – Baseline

Reference 248 *Porites* aff. *lichen* – 6-Month

Reference 249 *Porites horizontalata* – Baseline



Reference 249 *Porites horizontalata* – 6-Month



Reference 250 *Psammocora profundicella* – Baseline

Reference 250 *Psammocora profundicella* – 6-Month

Reference 251 *Phymastrea valenciennesi* – Baseline

Reference 251 *Phymastrea valenciennesi* – 6-Month

Reference 252 *Astreopora cucullata* – Baseline

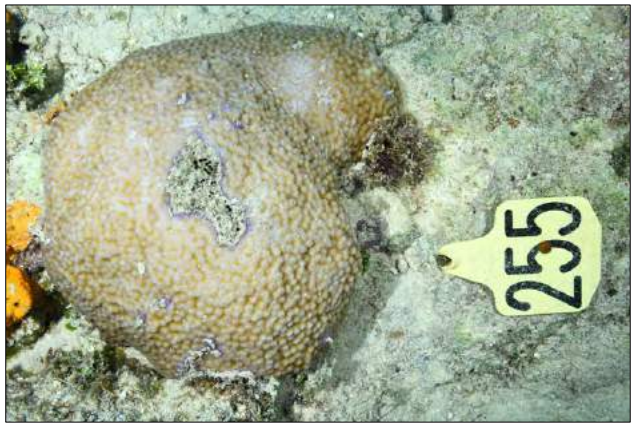
Reference 252 *Astreopora cucullata* – 6-Month

Reference 253 *Astreopora cucullata* – Baseline

Reference 253 *Astreopora cucullata* – 6-Month

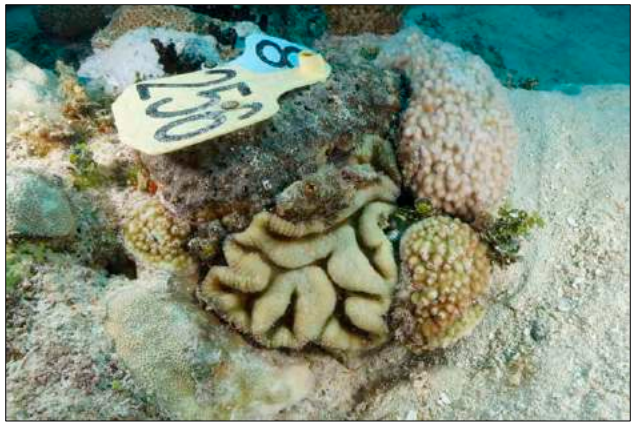
Reference 254 *Lobophyllia corymbosa* – Baseline

Reference 254 *Lobophyllia corymbosa* – 6-Month



Reference 255 *Astreopora cucullata* – Baseline

Reference 255 *Astreopora cucullata* – 6-Month



Reference 256 *Lobophyllia hemprichii* – Baseline

Reference 256 *Lobophyllia hemprichii* – 6-Month

Reference 257 *Lobophyllia hemprichii* – Baseline

Reference 257 *Lobophyllia hemprichii* – 6-Month

Reference 258 *Lobophyllia corymbosa* – Baseline

Reference 258 *Lobophyllia corymbosa* – 6-Month

Reference 259 *Leptastrea transversa* – Baseline

Reference 259 *Leptastrea transversa* – 6-Month

Reference 260 *Lobophyllia corymbosa* – Baseline

Reference 260 *Lobophyllia corymbosa* – 6-Month

Reference 261 *Herpolitha limax* – Baseline

Reference 261 *Herpolitha limax* – 6-Month

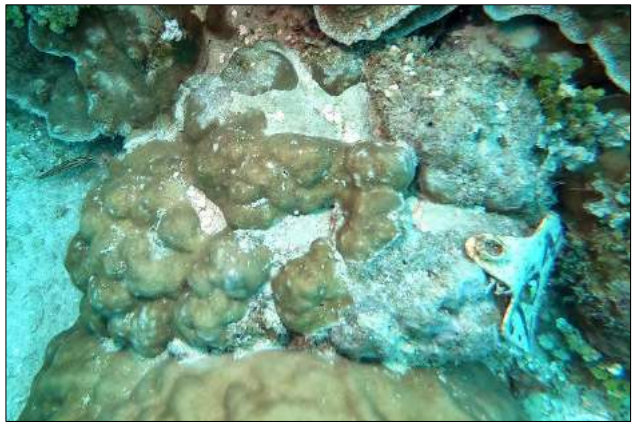
Reference 262 *Favia favus* – Baseline

Reference 262 *Favia favus* – 6-Month

Reference 263 *Porites lutea* – Baseline

Reference 263 *Porites lutea* – 6-Month

Reference 264 *Porites lobata* – Baseline



Reference 264 *Porites lobata* – 6-Month

Reference 265 *Porites lobata* – Baseline

Reference 265 *Porites lobata* – 6-Month

Reference 266 *Porites lutea* – Baseline

Reference 266 *Porites lutea* – 6-Month

Reference 267 *Porites lobata* – Baseline

Reference 267 *Porites lobata* – 6-Month

Reference 268 *Astreopora listeri* – Baseline

Reference 268 *Astreopora listeri* – 6-Month

Reference 269 *Astreopora cucullata* – Baseline

Reference 269 *Astreopora cucullata* – 6-Month

Reference 270 *Porites solida* – Baseline

Reference 270 *Porites solida* – 6-Month

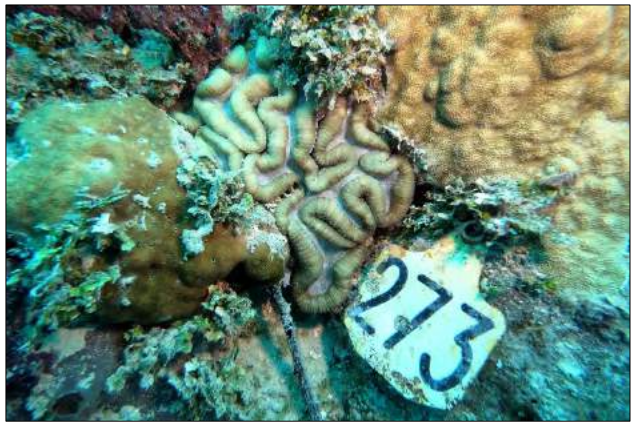
Reference 271 *Lobophyllia corymbosa* – Baseline

Reference 271 *Lobophyllia corymbosa* – 6-Month

Reference 272 *Leptastrea purpurea* – Baseline

Reference 272 *Leptastrea purpurea* – 6-Month

Reference 273 *Lobophyllia hemprichii* – Baseline



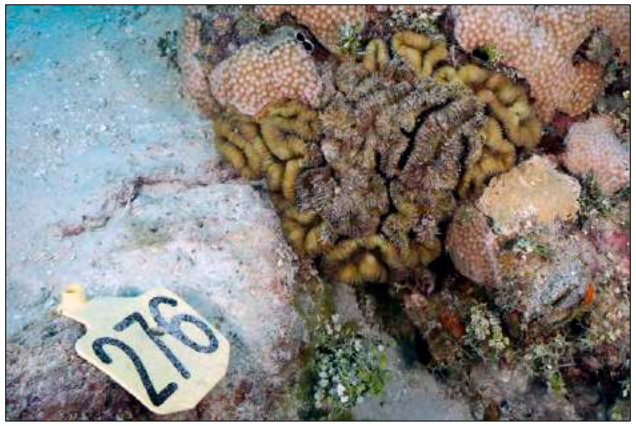
Reference 273 *Lobophyllia hemprichii* – 6-Month

Reference 274 *Favia favus* – Baseline

Reference 274 *Favia favus* – 6-Month

Reference 275 *Favia matthaii* – Baseline

Reference 275 *Favia matthaii* – 6-Month



Reference 276 *Lobophyllia hemprichii* – Baseline

Reference 276 *Lobophyllia hemprichii* – 6-Month

Reference 277 *Lobophyllia corymbosa* – Baseline

Reference 277 *Lobophyllia corymbosa* – 6-Month

Reference 278 *Astreopora gracilis* – Baseline

Reference 278 *Astreopora gracilis* – 6-Month

Reference 279 *Lobophyllia hemprichii* – Baseline

Reference 279 *Lobophyllia hemprichii* – 6-Month

Reference 280 *Astreopora cucullata* – Baseline

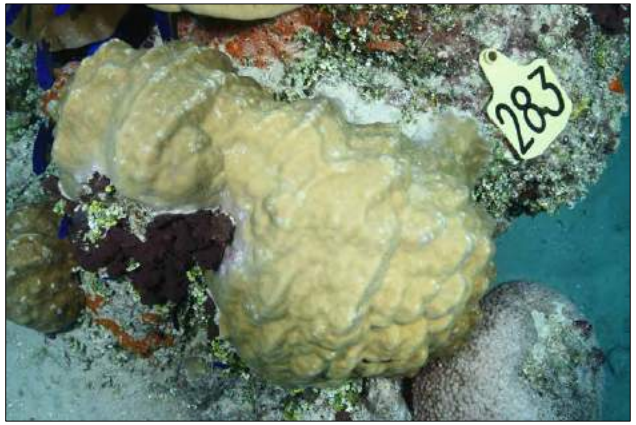
Reference 280 *Astreopora cucullata* – 6-Month

Reference 281 *Astreopora gracilis* – Baseline

Reference 281 *Astreopora gracilis* – 6-Month

Reference 282 *Favia* cf. *matthaii* – Baseline

Reference 282 *Favia* cf. *matthaii* – 6-Month



Reference 283 *Porites lobata* – Baseline

Reference 283 *Porites lobata* – 6-Month

Reference 284 *Astreopora cucullata* – Baseline

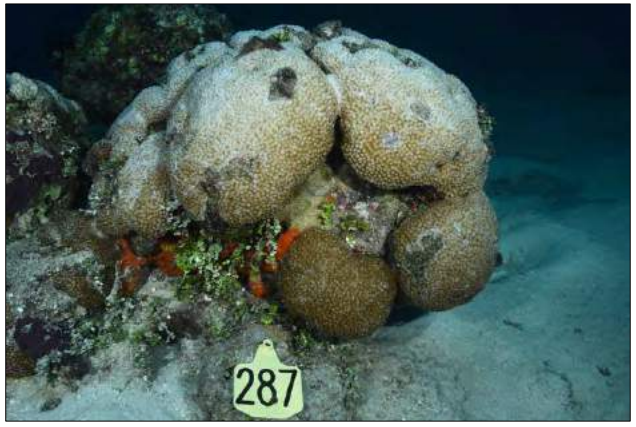
Reference 284 *Astreopora cucullata* – 6-Month

Reference 285 *Astreopora gracilis* – Baseline

Reference 285 *Astreopora gracilis* – 6-Month

Reference 286 *Astreopora cucullata* – Baseline

Reference 286 *Astreopora cucullata* – 6-Month



Reference 287 *Astreopora cucullata* – Baseline

Reference 287 *Astreopora cucullata* – 6-Month

Reference 288 *Porites lobata* – Baseline

Reference 288 *Porites lobata* – 6-Month

Reference 289 *Astreopora cucullata* – Baseline

Reference 289 *Astreopora cucullata* – 6-Month

Reference 290 *Astreopora cucullata* – Baseline

Reference 290 *Astreopora cucullata* – 6-Month

Reference 291 *Porites lutea* – Baseline

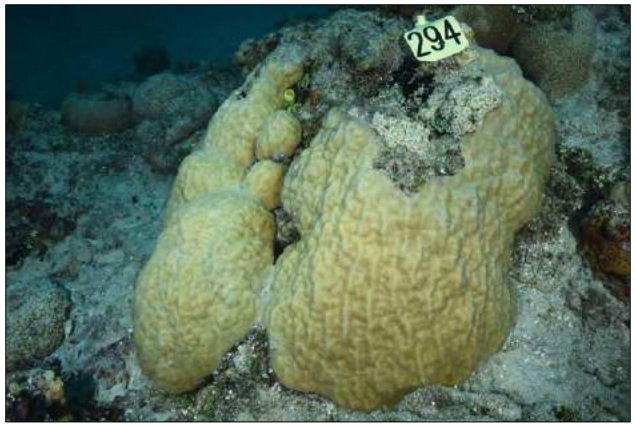
Reference 291 *Porites lutea* – 6-Month

Reference 292 *Astreopora gracilis* – Baseline

Reference 292 *Astreopora gracilis* – 6-Month

Reference 293 *Astreopora cucullata* – Baseline

Reference 293 *Astreopora cucullata* – 6-Month



Reference 294 *Porites lutea* – Baseline

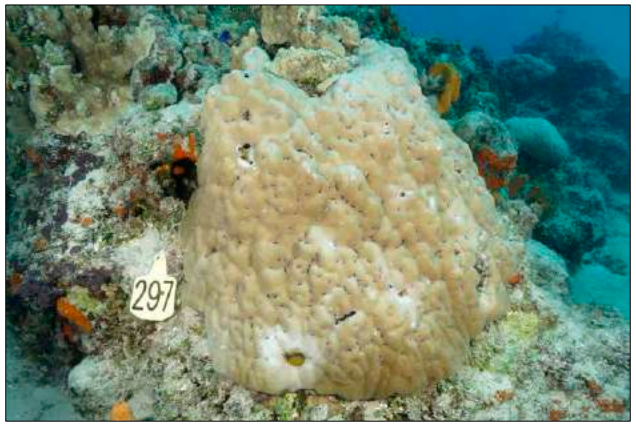
Reference 294 *Porites lutea* – 6-Month

Reference 295 *Porites lobata* – Baseline

Reference 295 *Porites lobata* – 6-Month

Reference 296 *Astreopora cucullata* – Baseline

Reference 296 *Astreopora cucullata* – 6-Month



Reference 297*Porites lobata* – Baseline

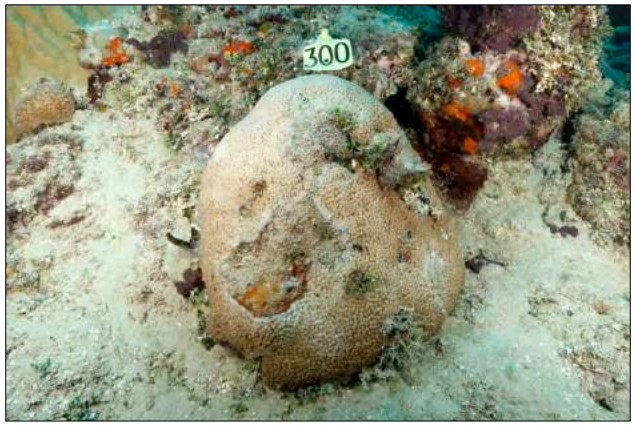
Reference 297 *Porites lobata* – 6-Month

Reference 298 *Porites lobata* – Baseline

Reference 298 *Porites lobata* – 6-Month

Reference 299 *Porites lutea* – Baseline

Reference 299 *Porites lutea* – 6-Month



Reference 300 *Astreopora cucullata* – Baseline

Reference 300 *Astreopora cucullata* – 6-Month