

CORAL REEF REHABILITATION PROJECT



**Coastal and Marine Management Division
Protected Area, Wildlife and Coastal Zone Management Service
Department of Environment and Natural Resources
Region XI, Davao City**



PROJECT DESCRIPTION

- **One of the five components of the Sustainable Coral Reef Ecosystems Management Program (SCREMP) which is the establishment of protection and rehabilitation measures**
- **A form of active coral reef restoration which allows colonies to grow in a planned structure**
- **It covers a total area of 1.10 hectares located in the vicinity of Brgy. Adecor, Kaputian Dist., Island Garden City of Samal**

PROJECT DESCRIPTION

- **It employs a combination of corrugated steel bar and nylon lines as modular frames and plastic tie wraps to hold coral fragments in place**
- **A total of 175 modular frames were deployed covering an area of 1.10 hectares**
- **Establishment cost is equivalent to P 478,145.00 under the regular supplemental budget (CO-based) of the Management of Coastal and Marine Resources implemented and managed by the Coastal and Marine Management Division of DENR-PAWCZMS**

OBJECTIVES OF THE PROJECT

- **Implement sustainable management of coastal and marine resources through resource and habitat conservation, protection and rehabilitation**
- **Contribute to food security and improve human well-being of the coastal communities through improved health and integrity of the coral reef ecosystem**
- **Strengthen Marine Protected Area (MPA) management through active involvement of concerned stakeholders in the project**
- **Establish database on the various phases of coral rehabilitation activities in the Region**

SIGNIFICANCE OF THE PROJECT

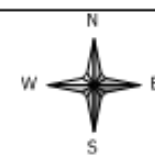
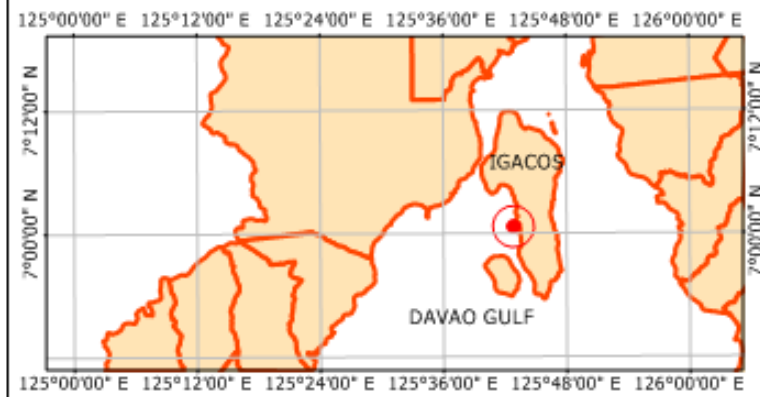
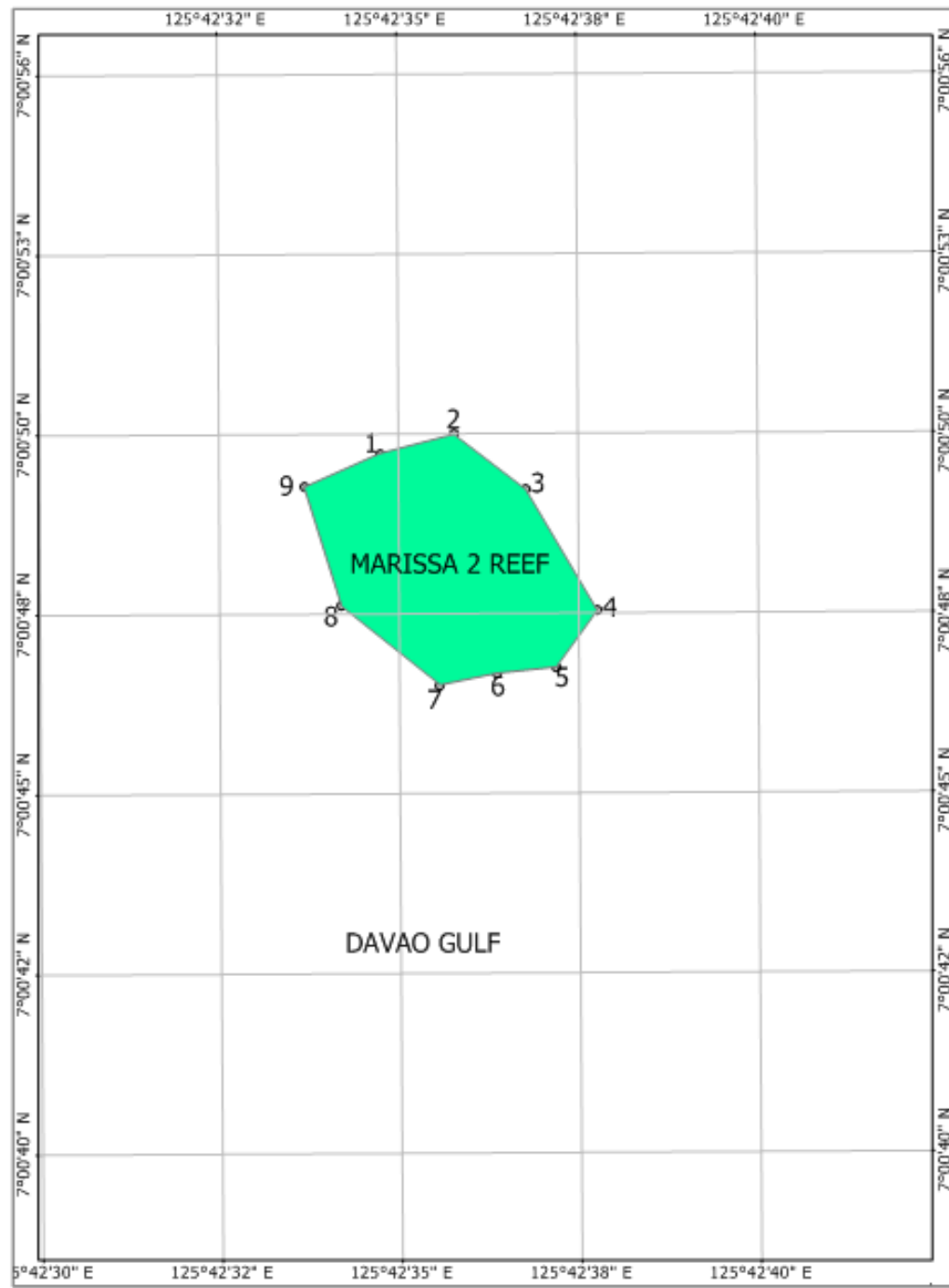
- **Restore closest to their natural form coral colonies damaged by human-induced activities or natural threats (storm damage, etc.)**
- **Increase or improve density of coral colonies and biodiversity in the site which consequently result to increase in productivity**
- **Enhance economic benefits for the fisherfolks in terms of fishery and for the LGU in terms of ecotourism and education tourism**
- **Provide baseline information on coral rehabilitation activities in the Region**

LOCATION OF THE PROJECT



SITE DESCRIPTION

- The reef area is located near the vanishing island of Jagnaya, Brgy. Adecor, Kaputian District, Island Garden City of Samal**
- Is a fishing ground for the local fisherfolks**
- Has patches of coral structures with wide spacing**
- Coral rubble and sand dominate the spaced area.**
- Depth range is about 8 - 43 ft.**
- Also observed to be prone to sandslide owing to its sloping topography.**



MAP SHOWING THE AREA OF MARISSA 2 REEF,
BRGY. ADECOR, KAPUTIAN DIST., IGACOS

SCALE: 1:2800



LEGENDS:



TECHNICAL DESCRIPTION

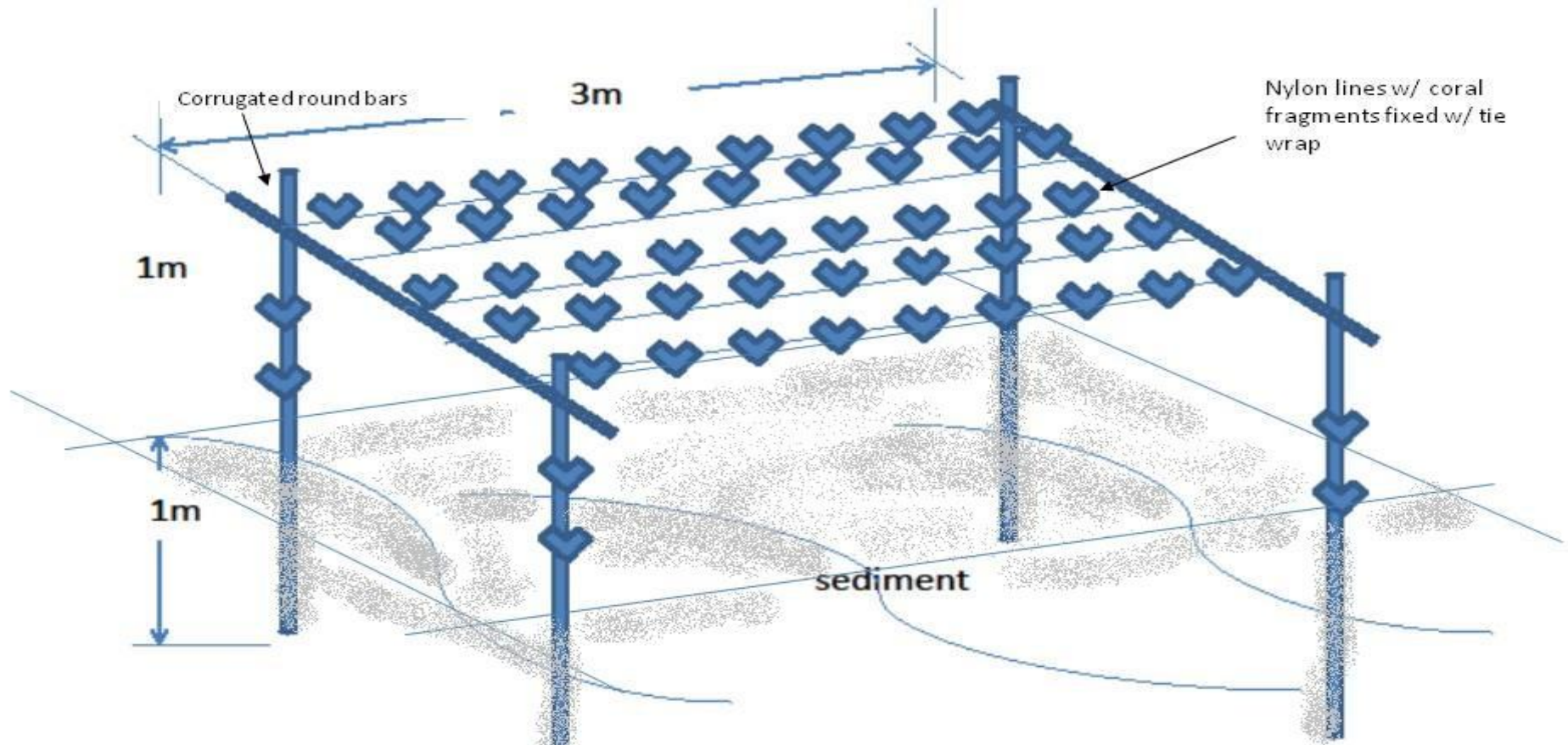
POINTS	LAT	LONG
1	7°00'45.8" N	125.7111
2	7°00'46.0" N	125.7114
3	7°00'45.3" N	125.7117
4	7°00'43.4" N	125.7119
5	7°00'42.6" N	125.7118
6	7°00'42.6" N	125.7116
7	7°00'42.4" N	125.7113
8	7°00'43.6" N	125.7109
9	7°00'45.4" N	125.7108

DEPLOYMENT OF MODULES

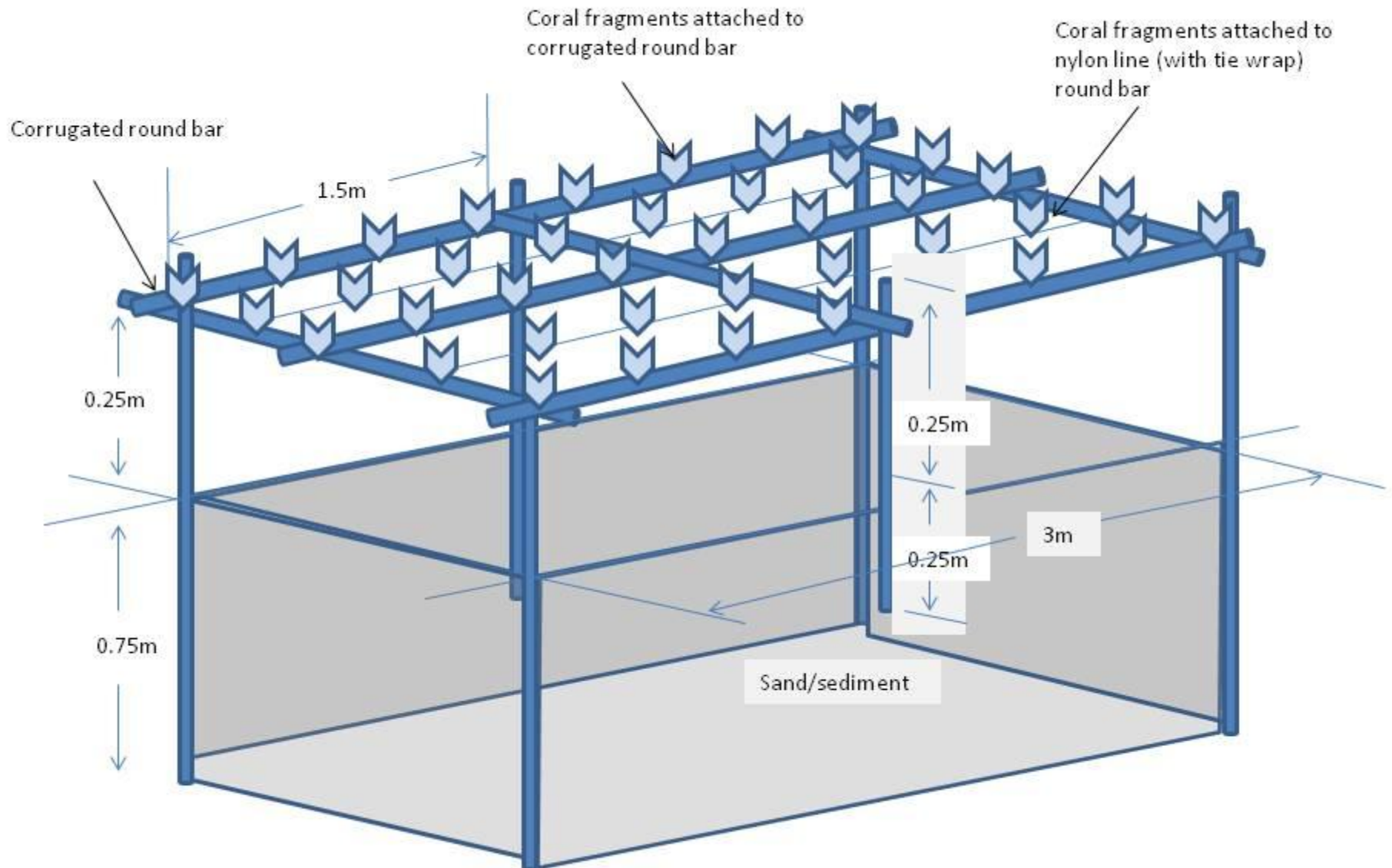
Date Conducted	QTY	Temperature	Depth
July 26-28, 2012	6	86f - 30°C	30-36ft
August 03	3	86f - 30°C	25-30ft
Sept. 19-23	40	86f - 30°C	16-28 ft
October 29-31	40	84f-85 (28-29°C)	9-23ft
Nov. 28-30, 2012	40	83f	10-25ft
Dec. 1, 2012	11	83f	10-36ft
April 16-19,2013	35	84f-86f	8-43ft
Total	175		

TARGET AREA =1HA

THE CORAL MODULE



Module Design 1 : “Sampayan Sytle” - made up of two steel frames at both ends of the line; 5 nylon lines (3m long) to where the coral fragments were attached



Module Design 2 : Modified steel frame with only 2 nylon lines and 3 steel bars to hold corals fragments

METHODOLOGY

(The Davao SCREMP technology)



**Coastal and Marine Management Division
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Department of Environment and Natural Resources
Region Xi, Davao City**



Coordination with the Brgy. Council of Adecor



An hour with Brgy. Adecor, Samal Island – Presentation of the Coral Rehabilitation Project to Brgy. Adecor during a special session presided by Brgy. Captain Vincent Floirendo, to elicit support to the project in terms of protection and surveillance by the Bantay Dagat

CONSTRUCTION



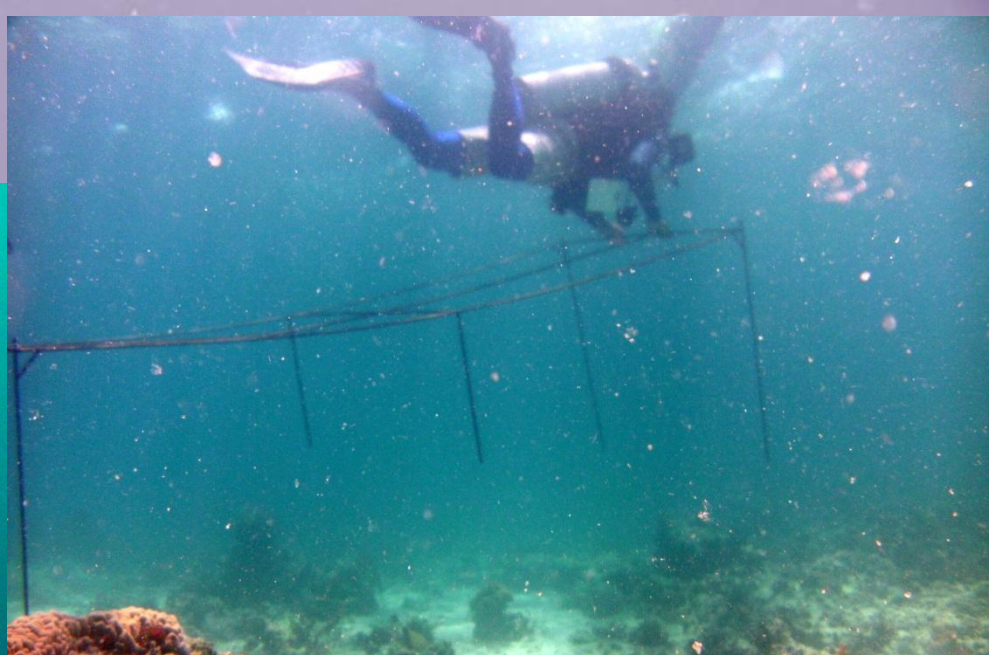
ON-BOARD ACTIVITIES



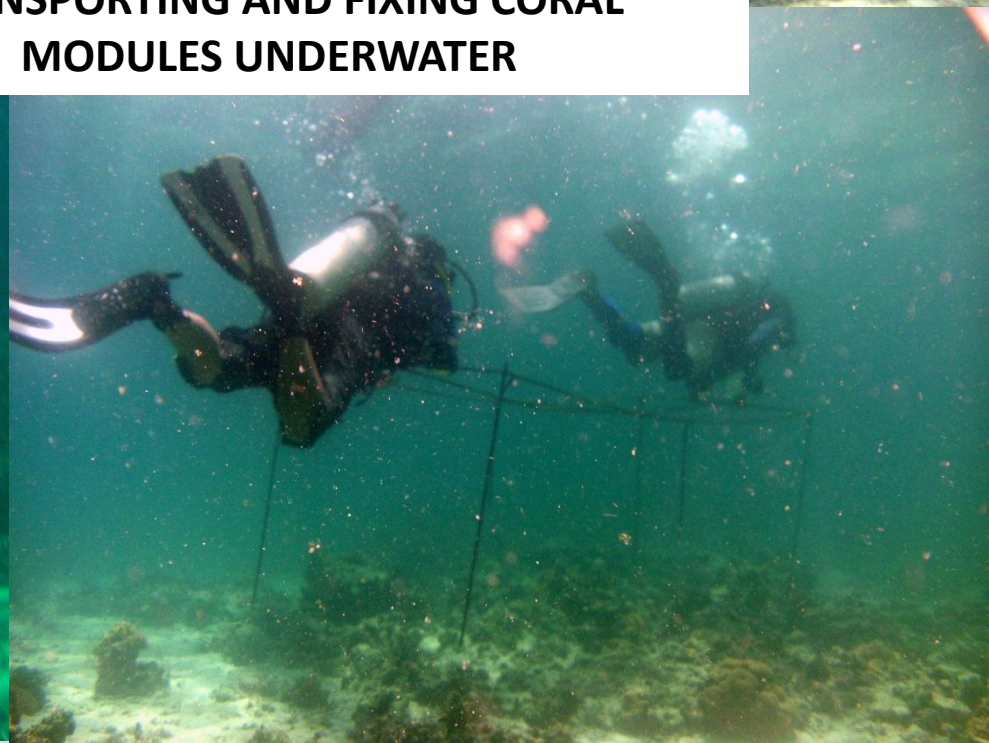
Attaching tie-wraps to the coral frames

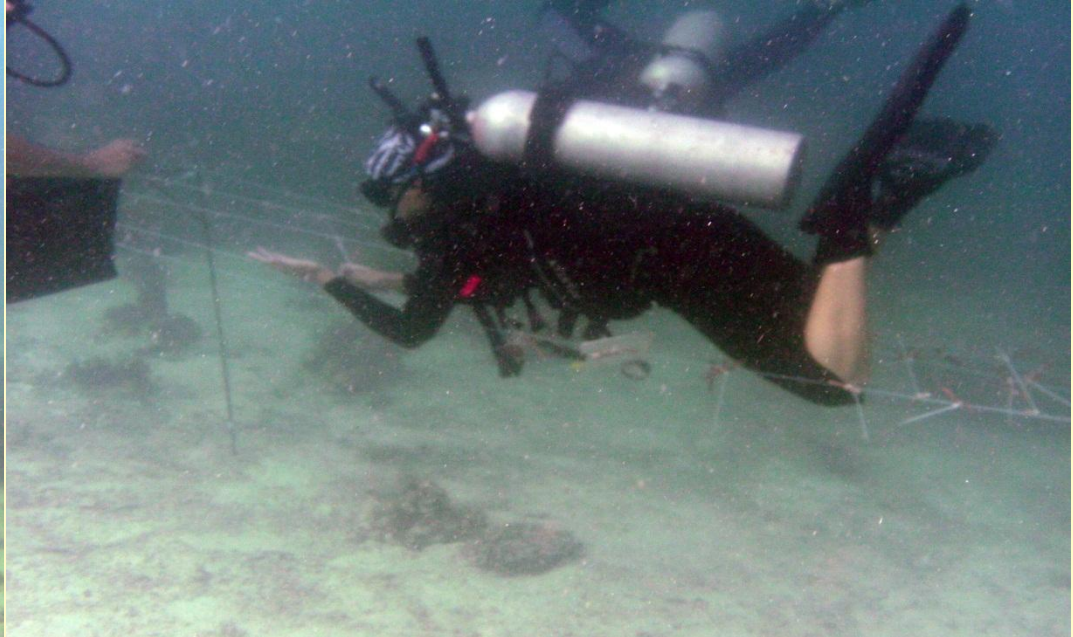


INSTALLATION

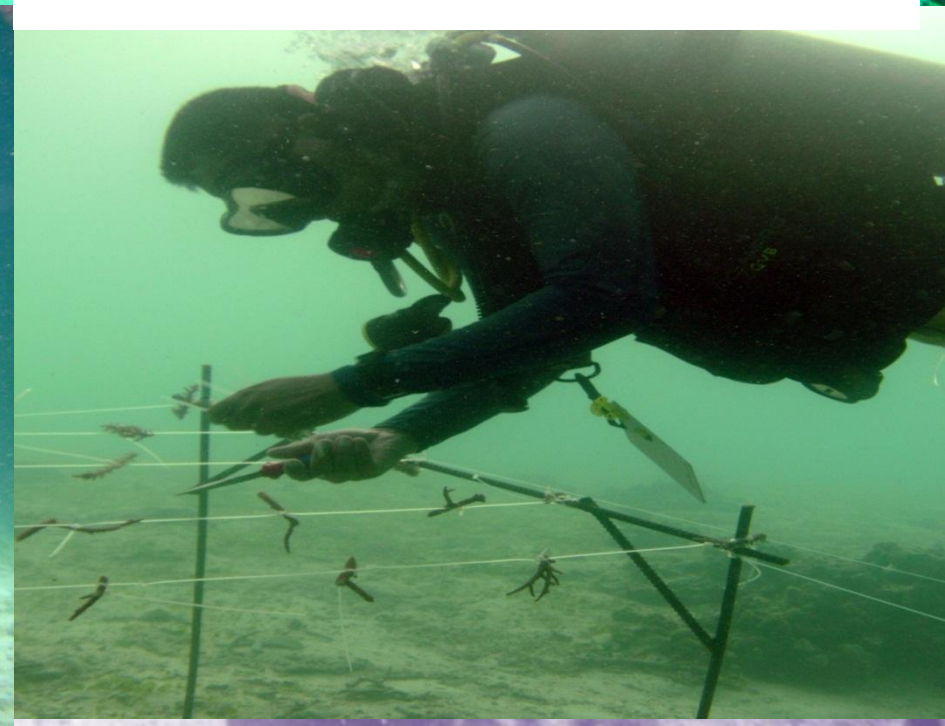
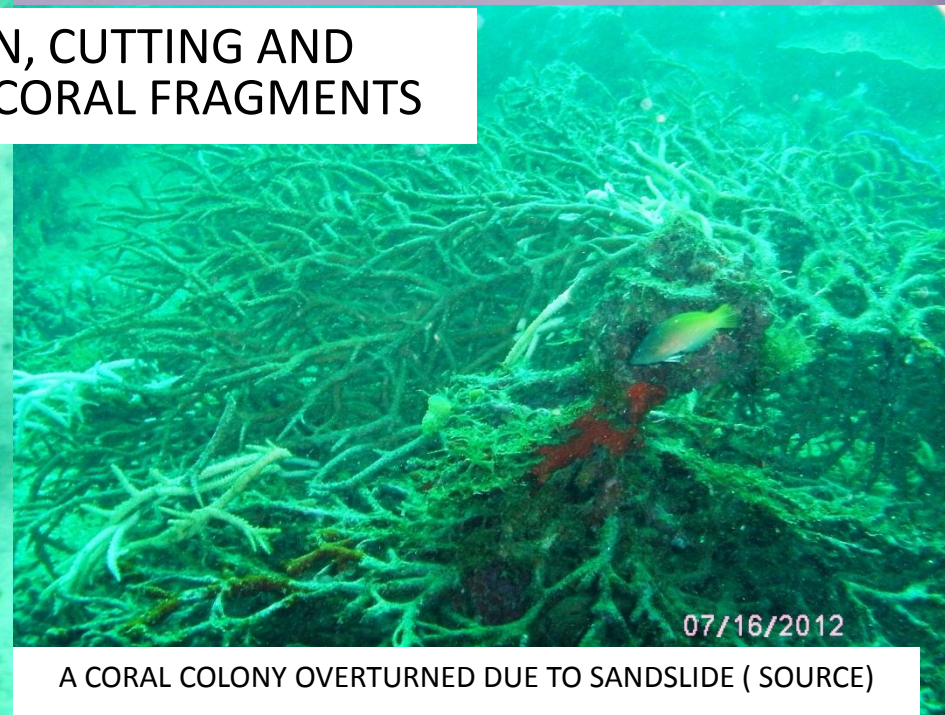


**TRANSPORTING AND FIXING CORAL
MODULES UNDERWATER**

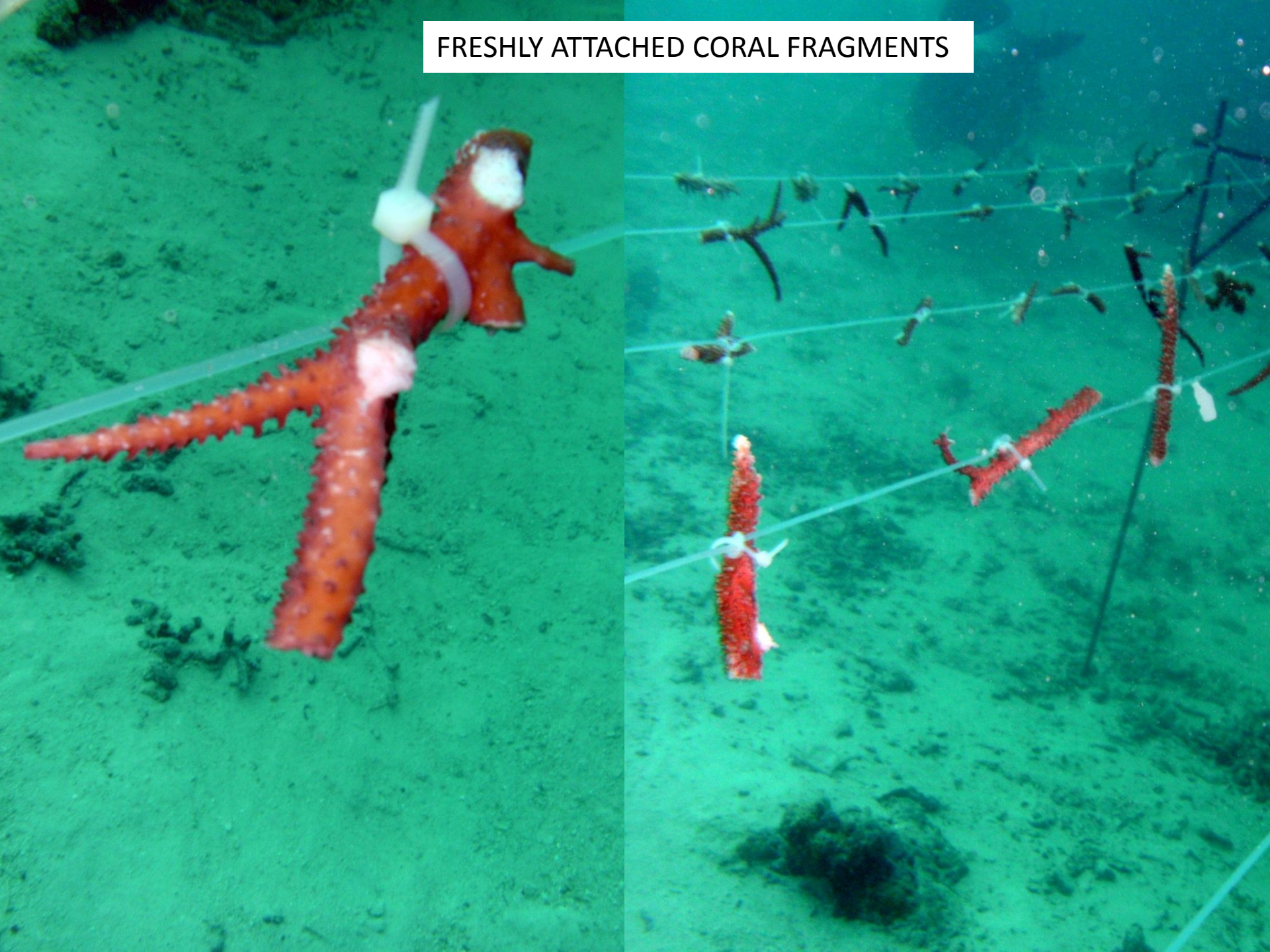




COLLECTION, CUTTING AND PLANTING OF CORAL FRAGMENTS



FRESHLY ATTACHED CORAL FRAGMENTS

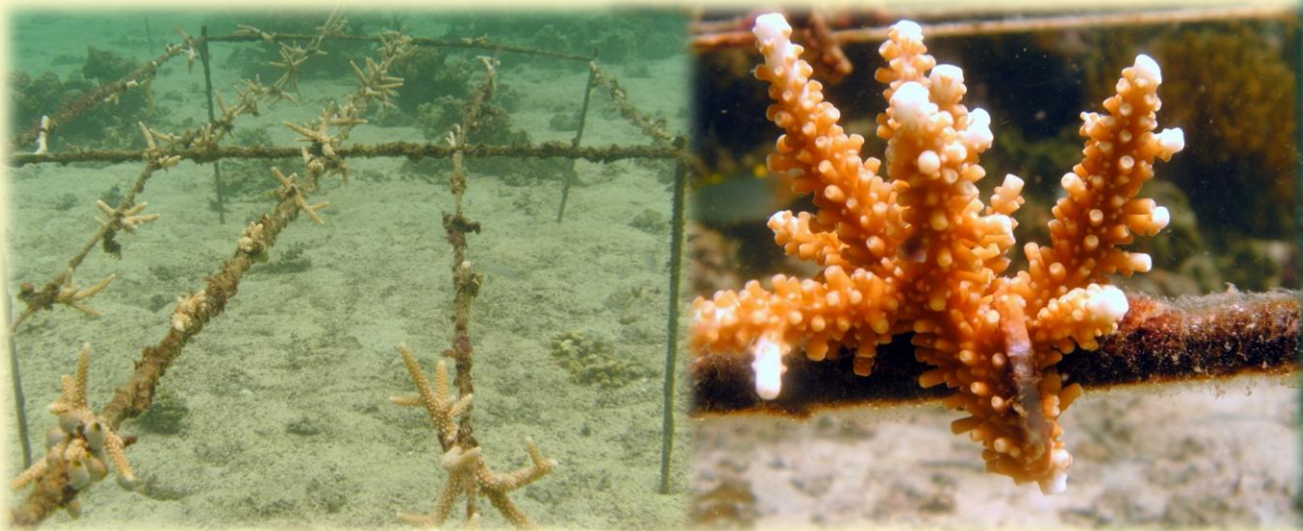




WHAT WE DID

1. Modular frames

- fixed to the substrate to maximize strength against underwater current and served as a strong foundation for the planted CORALS



2. Collection of coral fragments

- fragments came from colonies that were
 - ❖ overturned and already in fragments (natural and man-made)
 - ❖ dying
 - ❖ fallen into deeper area and smothered by sand

Note: excess coral fragments were fixed in coral rubbles in patches of barren areas adjacent to the reef frames

3. Markers and labels

- Installed marker bouys around the Marissa 2 reef and laminated labels in every modular frames (e.g. M1L1 = Module 1 Line 1) for ease in monitoring

4. Divers

- with technical knowledge about the activity
- volunteers were oriented regarding the activity and they were assigned in installation of frames and other activities that require no technical skills

WHAT WE DIDN'T DO

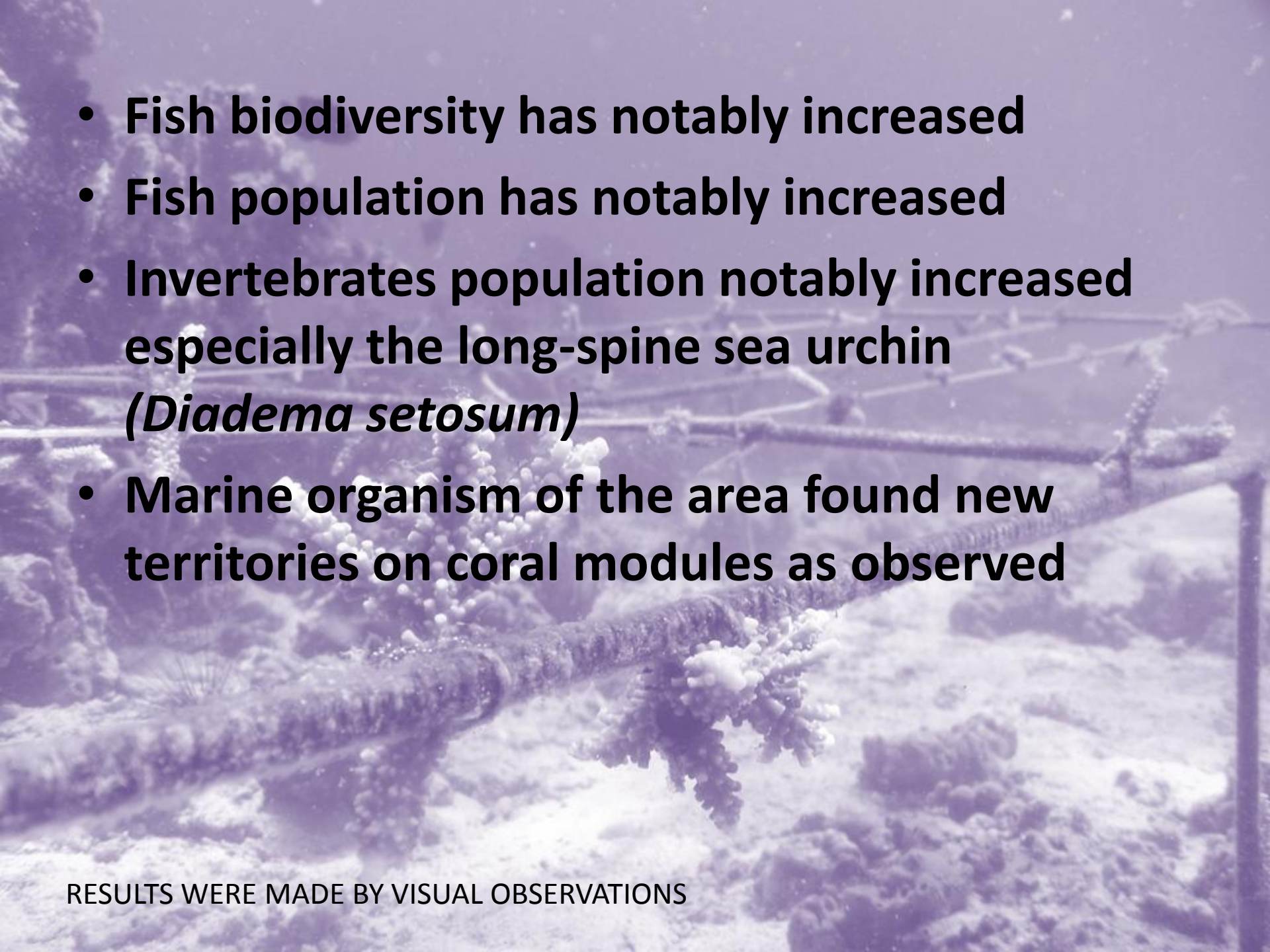
- **ON COLLECTION OF CORAL FRAGMENTS**
 - ❖ cut from healthy coral colonies
 - ❖ uproot healthy coral colonies
 - ❖ intentionally fragment or break coral colonies to acquire healthy coral fragments

A satellite image of the Amazon basin, showing the Amazon River and surrounding land. The text "MONITORING RESULTS" is overlaid in the center.

MONITORING RESULTS

MONITORING ACTIVITY	
DATE	LENGTH (mm)
September 19-23, 2012	85.3
November 10, 2012	48.3
April 15,21,2013	59.3

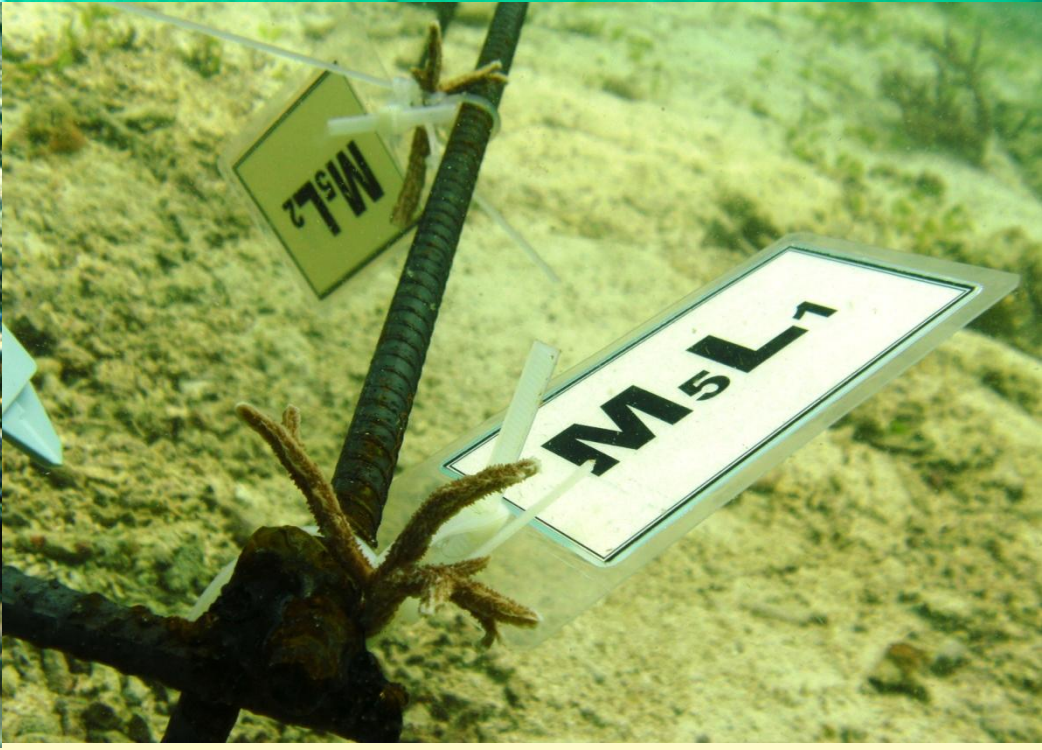
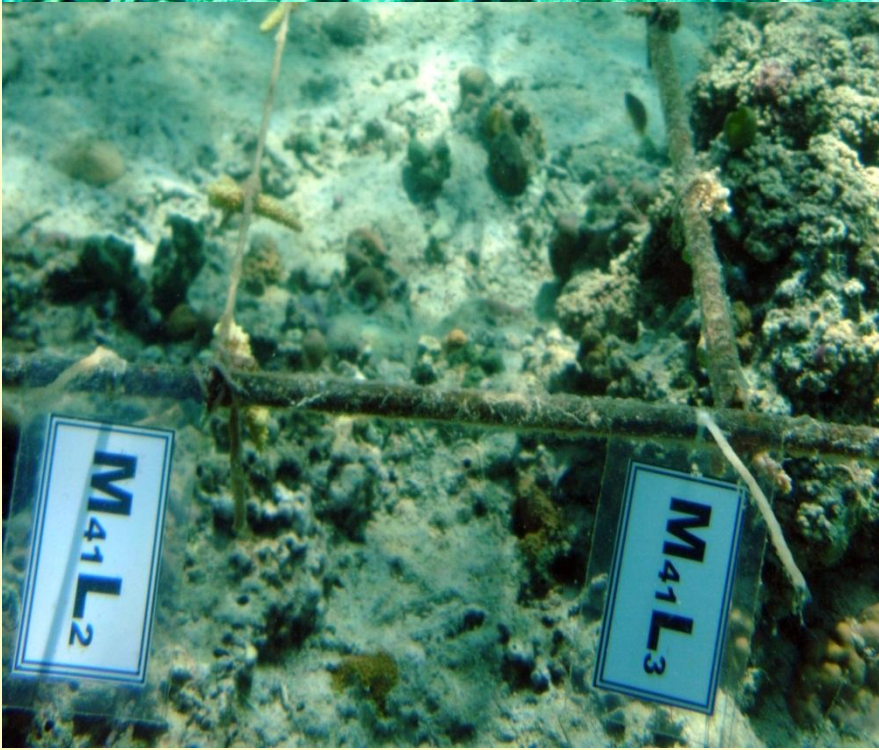
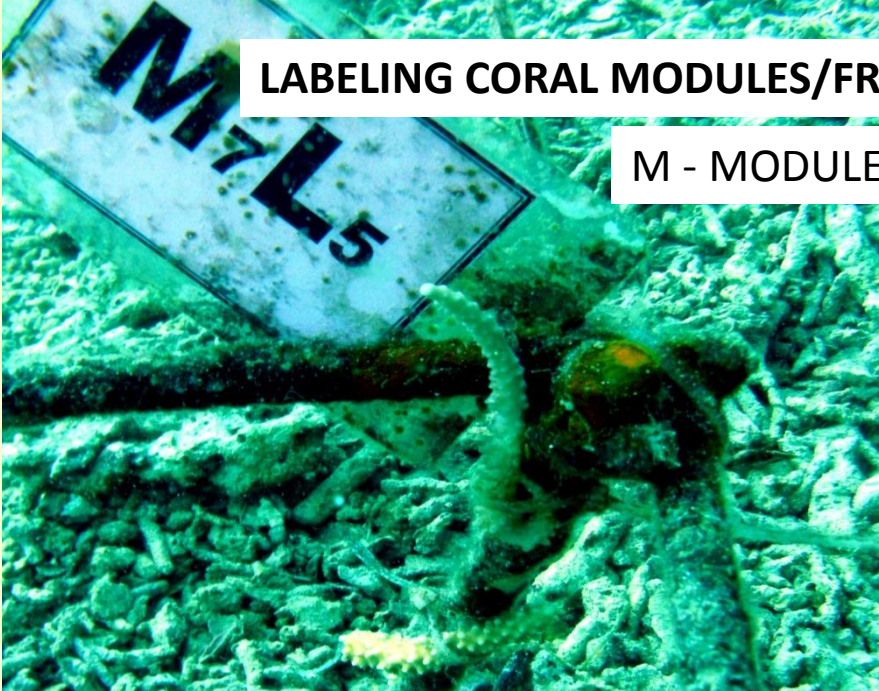
MONITORING ACTIVITY		
DATE	SURVIVAL RATE	NUMBER OF FRAMES SAMPLED
OCTOBER 19-31, 2012	94%	11
APRIL 15-21, 2013	67%	11

- 
- An underwater photograph of a coral reef, heavily tinted with a purple hue. The image shows various coral structures, including branching and table corals, and a sandy seabed. The text is overlaid on the upper left portion of the image.
- Fish biodiversity has notably increased
 - Fish population has notably increased
 - Invertebrates population notably increased especially the long-spine sea urchin (*Diadema setosum*)
 - Marine organism of the area found new territories on coral modules as observed

RESULTS WERE MADE BY VISUAL OBSERVATIONS

LABELING CORAL MODULES/FRAMES FOR EASY MONITORING

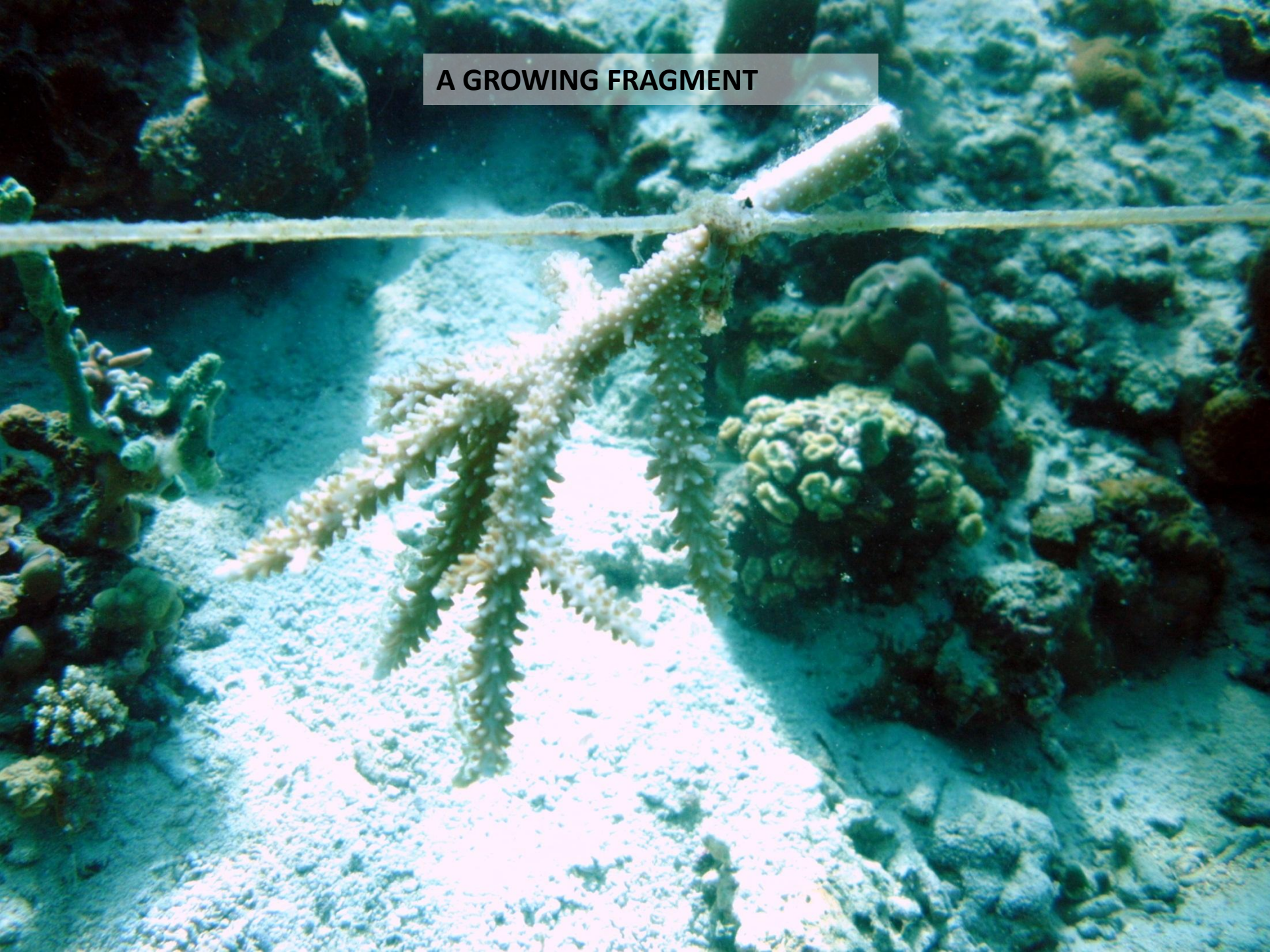
M - MODULES, L - LINES



**CORAL MODULE/FRAME WITH FRESHLY
ATTACHED CORAL FRAGMENTS**



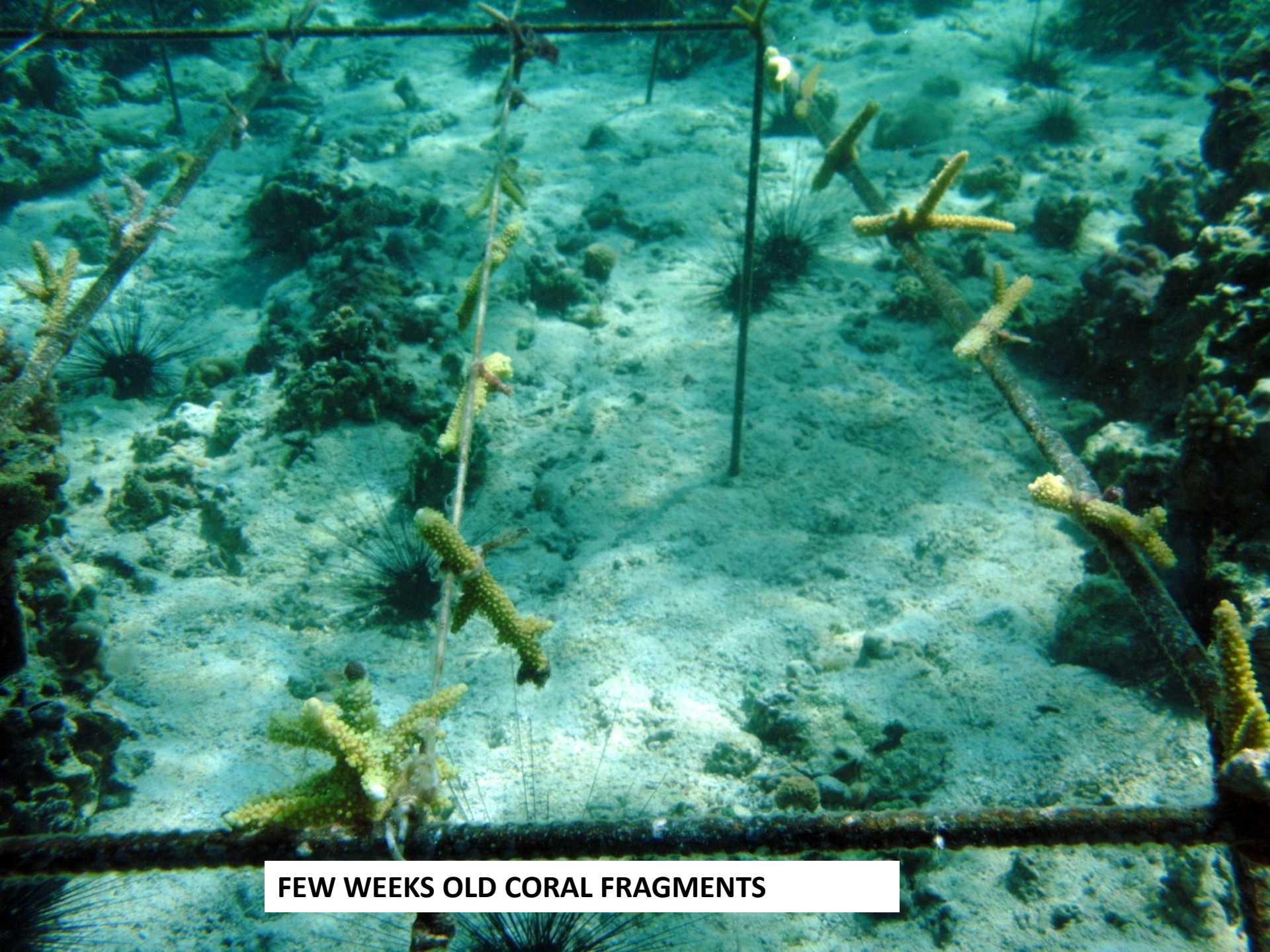
A GROWING FRAGMENT



An underwater photograph showing coral fragments on a reef. The coral is yellowish-white and appears to be growing. A horizontal metal rod is visible in the background. The water is clear and blue. The coral fragments are in the foreground, and the background shows more coral and the reef structure.

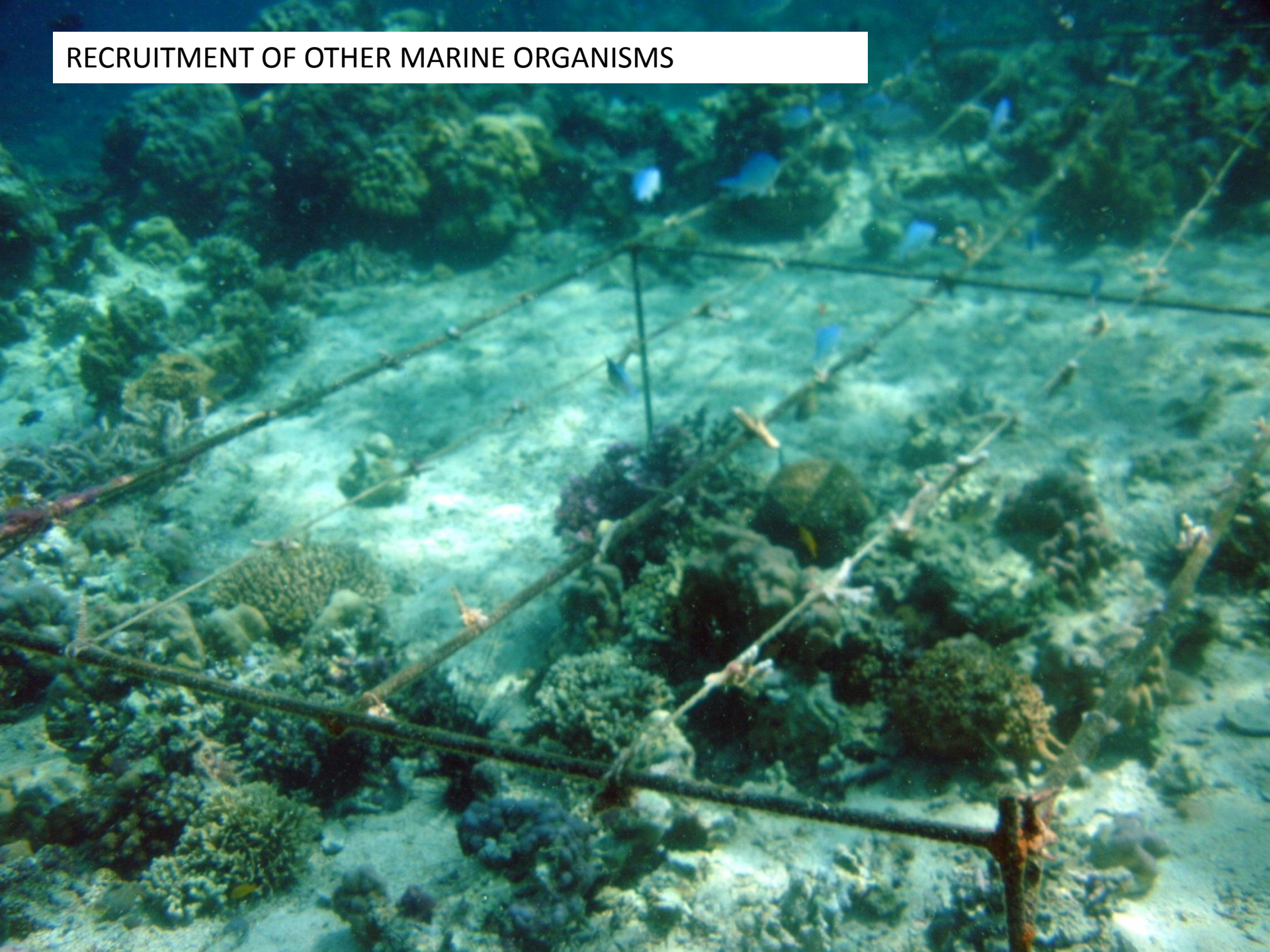
ALIVE AND GROWING FRAGMENTS

NOTE: TIE WRAPS WERE ENGULFED BY THE TISSUE OF THE GROWING CORAL



FEW WEEKS OLD CORAL FRAGMENTS

RECRUITMENT OF OTHER MARINE ORGANISMS



An underwater photograph showing a coral reef structure. In the foreground, a large, dark, cylindrical structure, possibly a pipe or a large piece of coral, runs diagonally across the frame. Several smaller, branching coral structures are attached to it. The background shows a sandy seabed with scattered coral fragments and a few small fish swimming in the water. The text "AFTER 8 MONTHS" is overlaid in the center of the image.

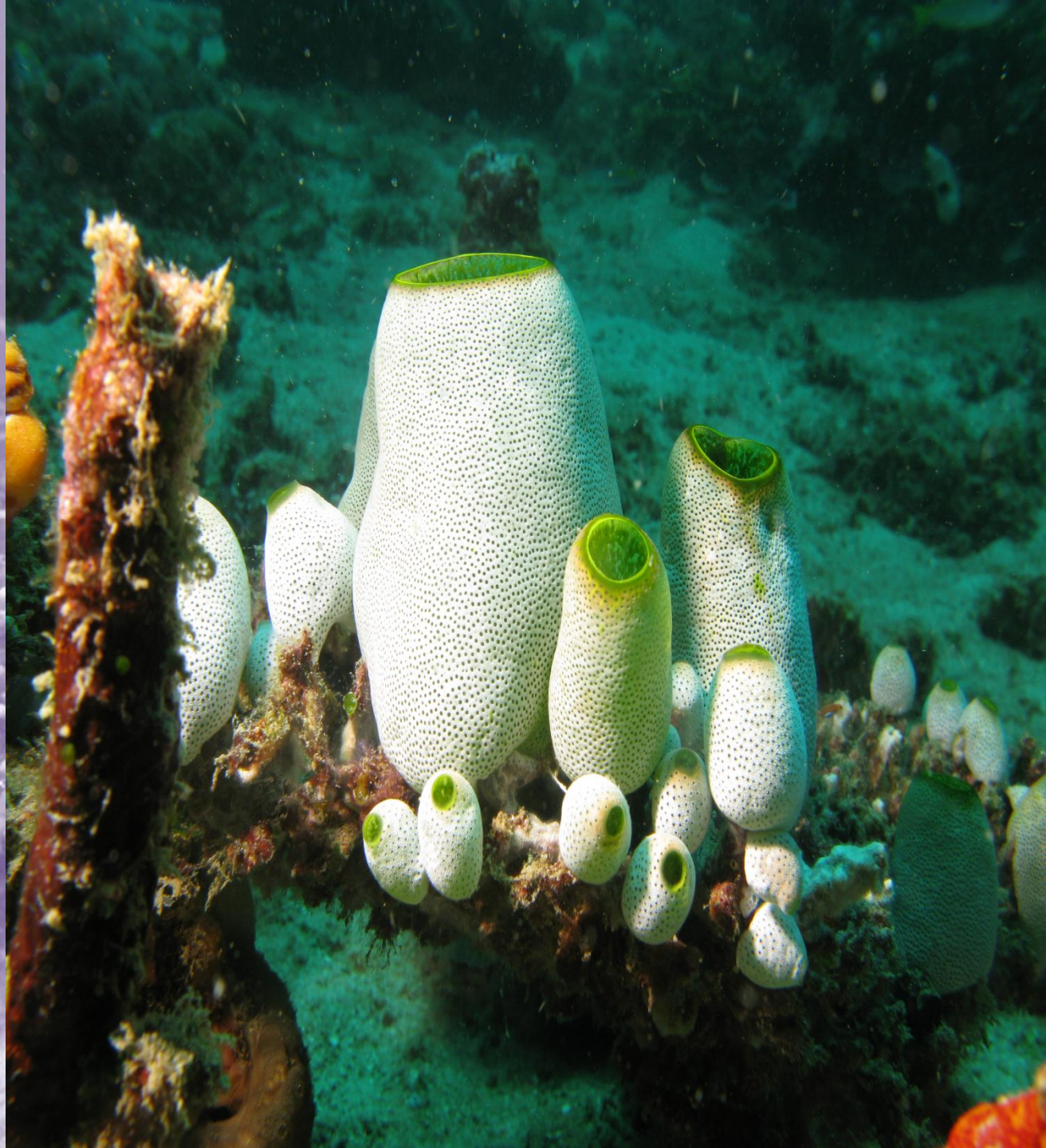
AFTER 8 MONTHS



SOME OF THE FRAMES WERE DESTROYED

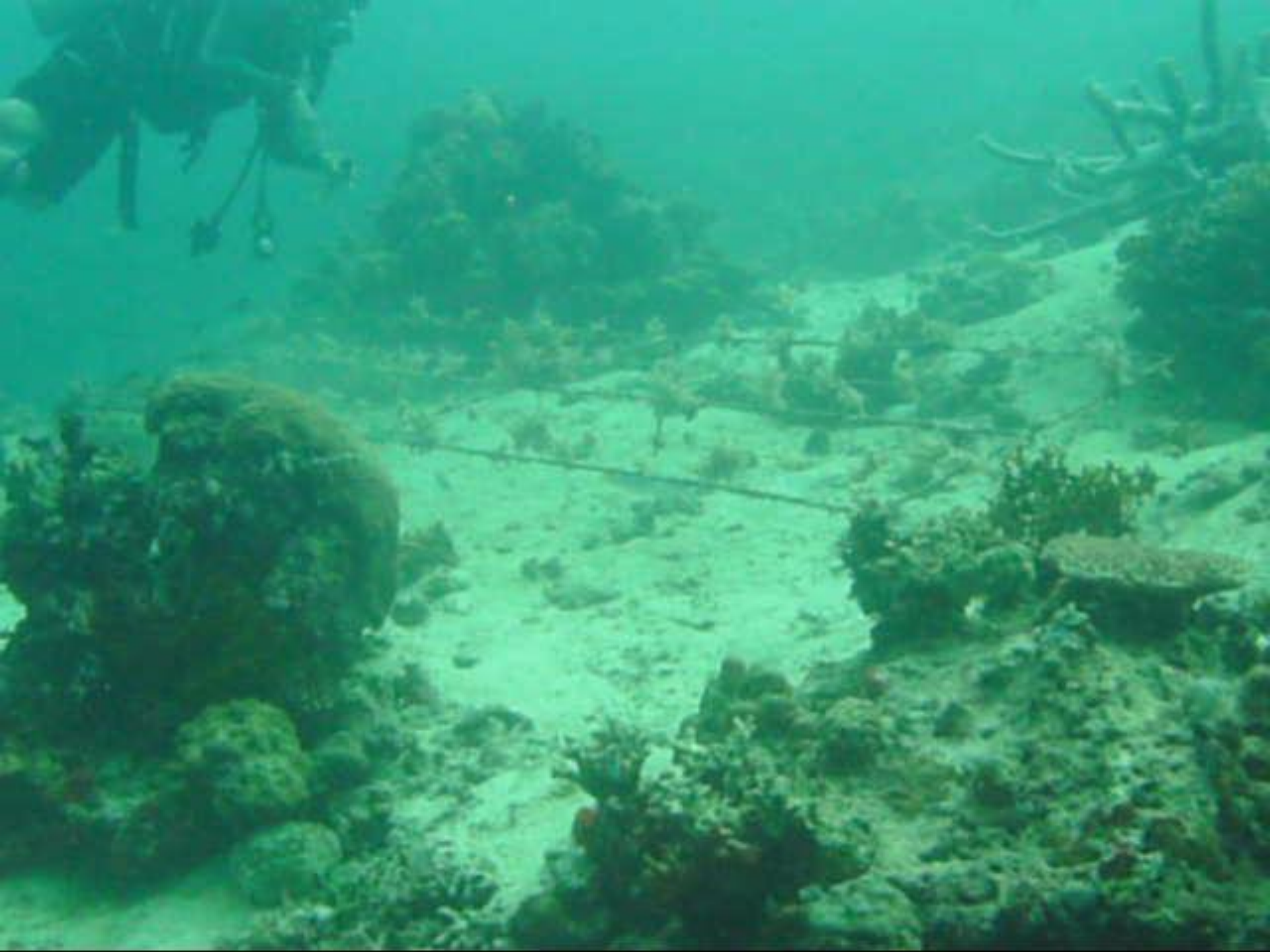
INVADING SEA
SQUIRTS
DOMINATED
MOST OF THE
FRAMES
WHICH LEADS
TO CORAL
DEATH

INFESTATION
OF PREDATORY
SNAIL

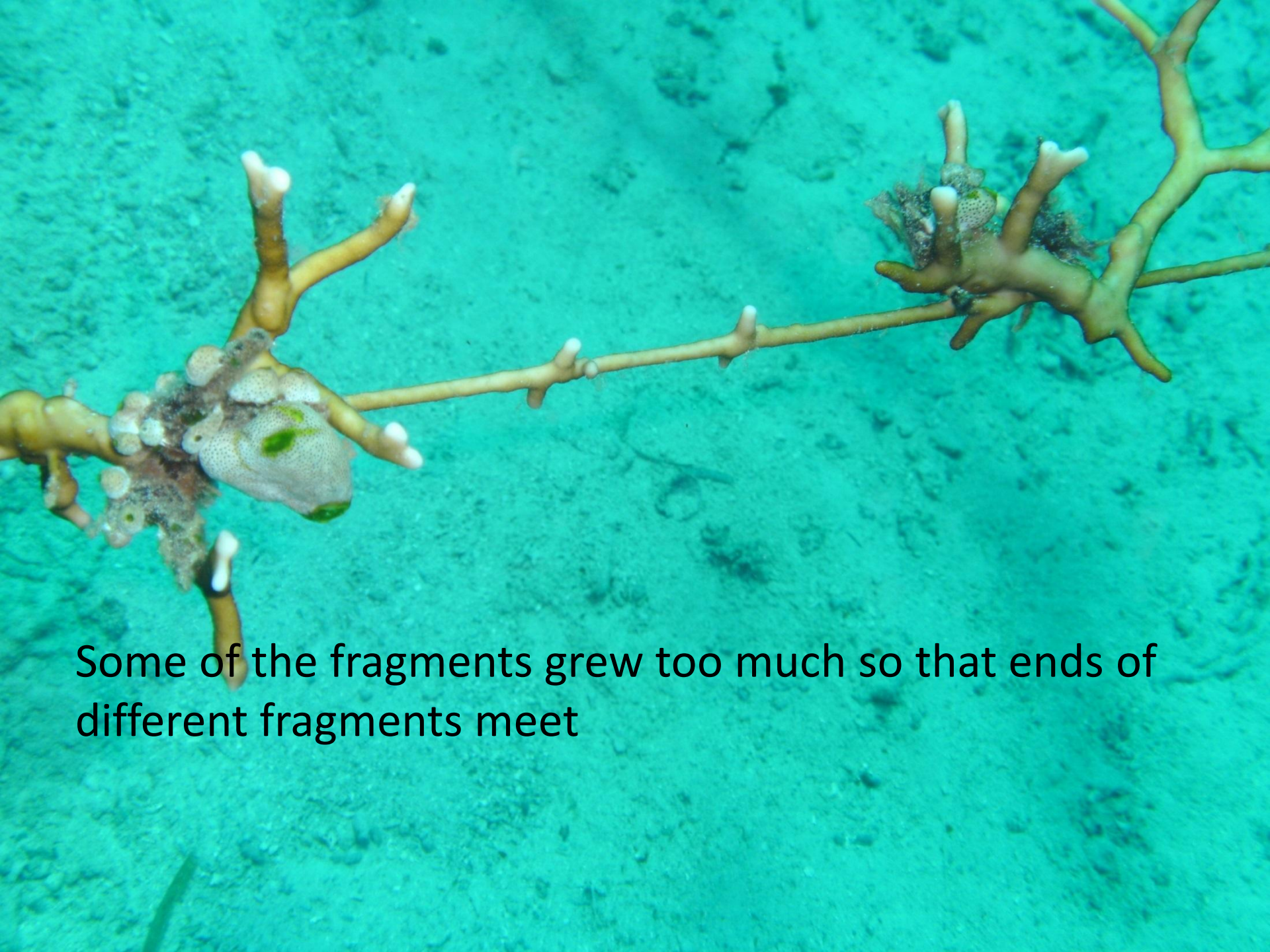




CLEANING ACTIVITIES WERE DONE TO REMOVE UNWANTED ORGANISMS ON THE FRAMES







Some of the fragments grew too much so that ends of different fragments meet



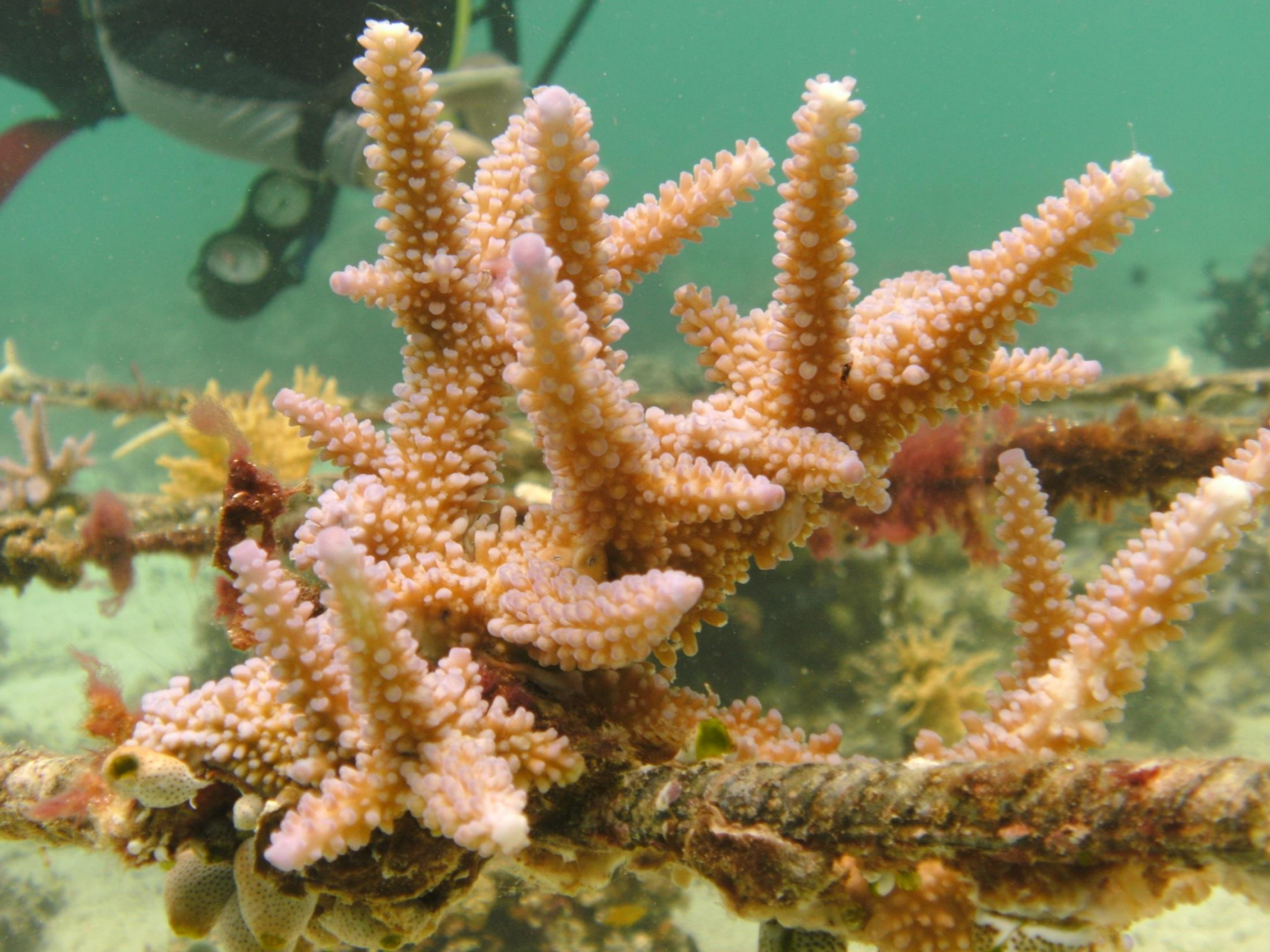
Attachment
complete

Started from a single fragment and grew
so much branches





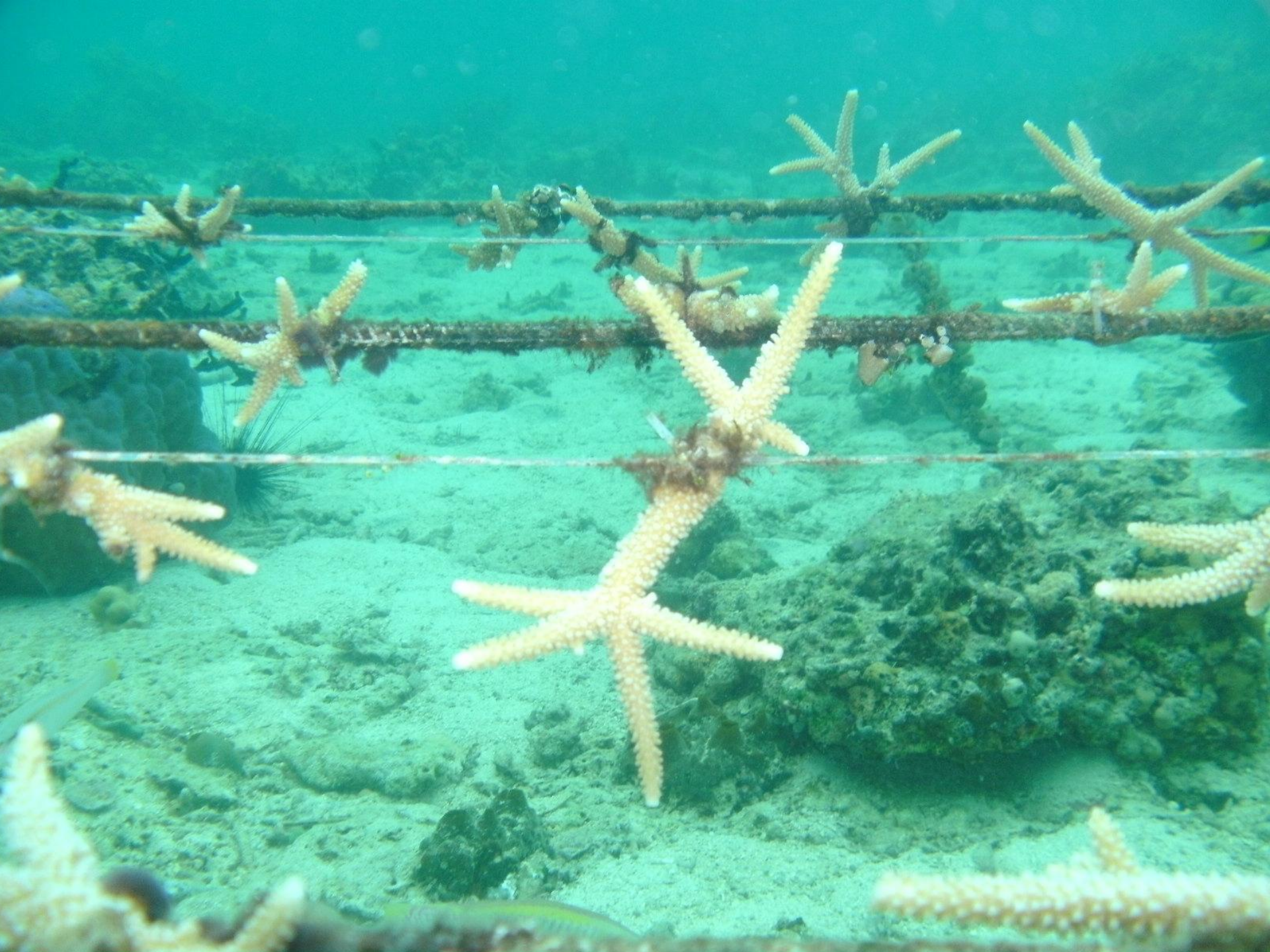




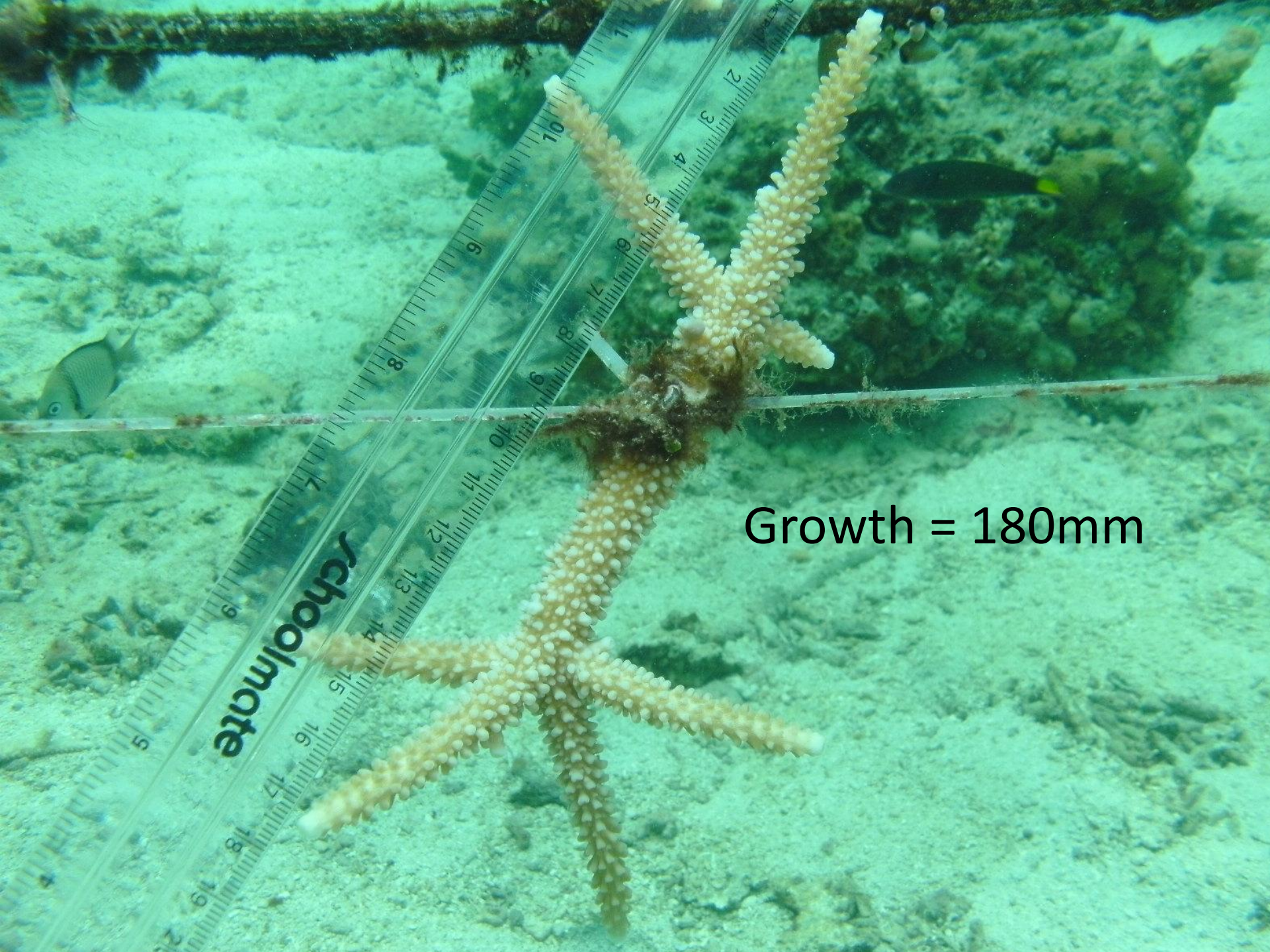
Eventually, these two coral colonies will bind to each other forming one big colony





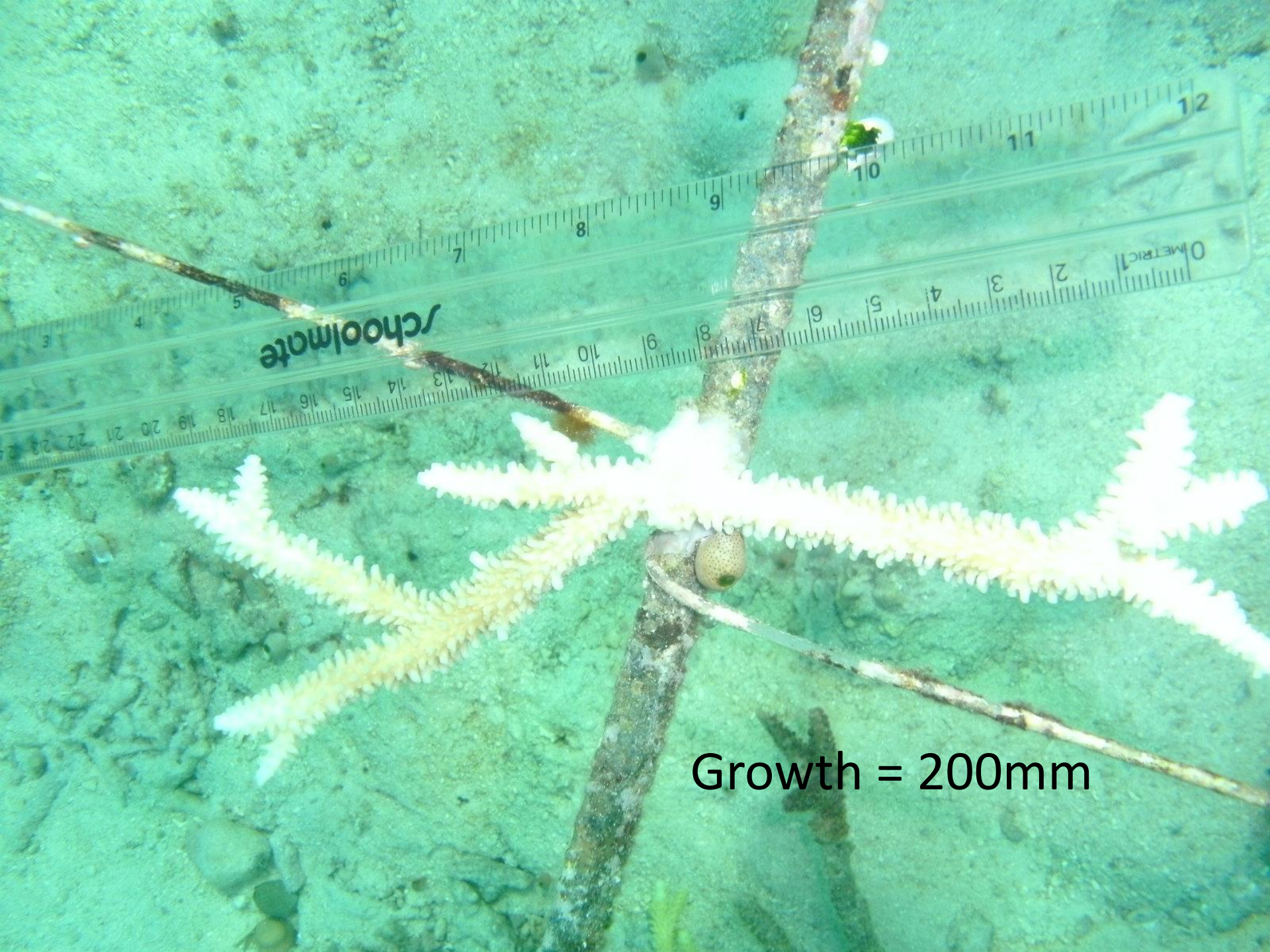




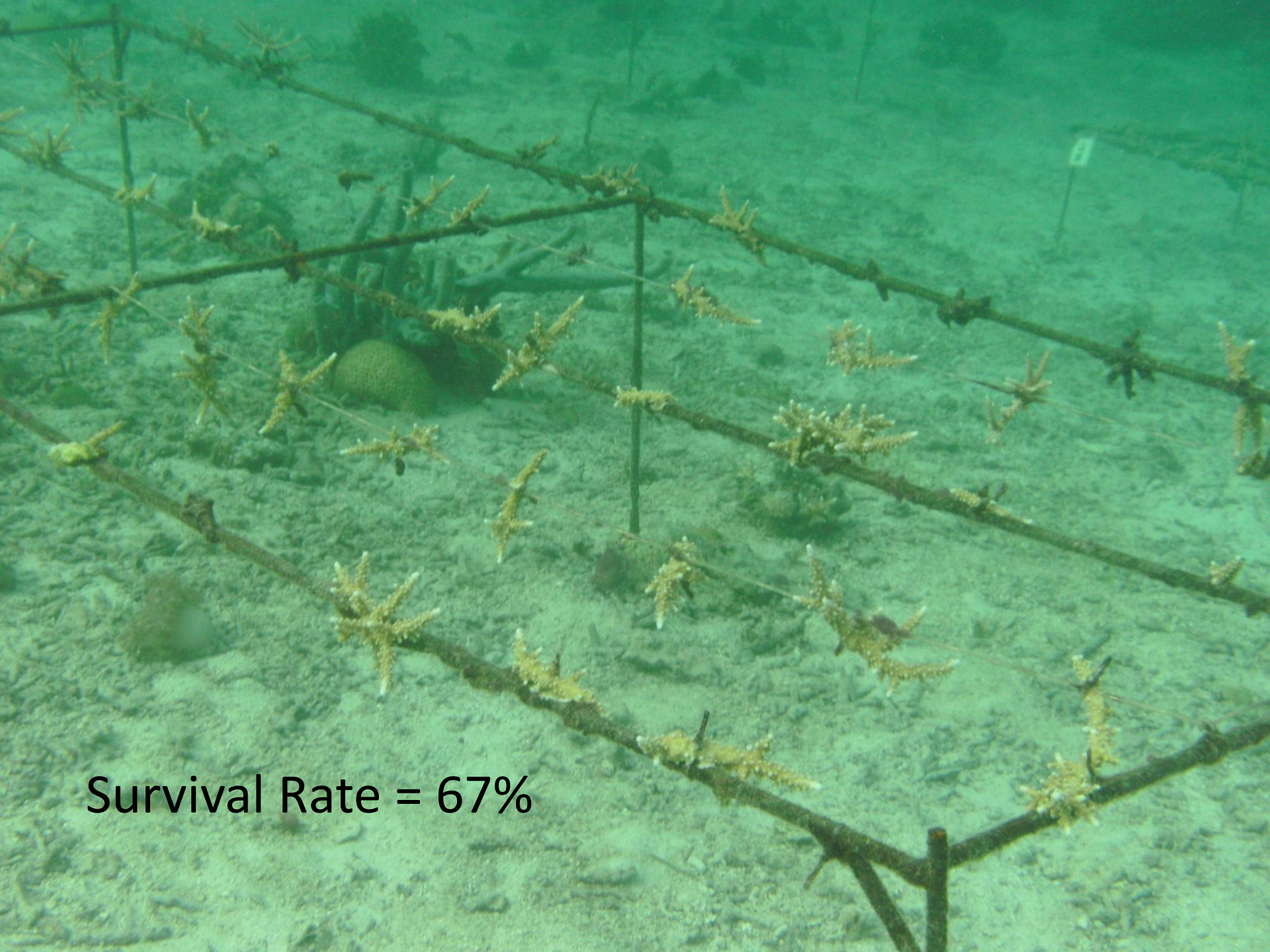


Growth = 180mm



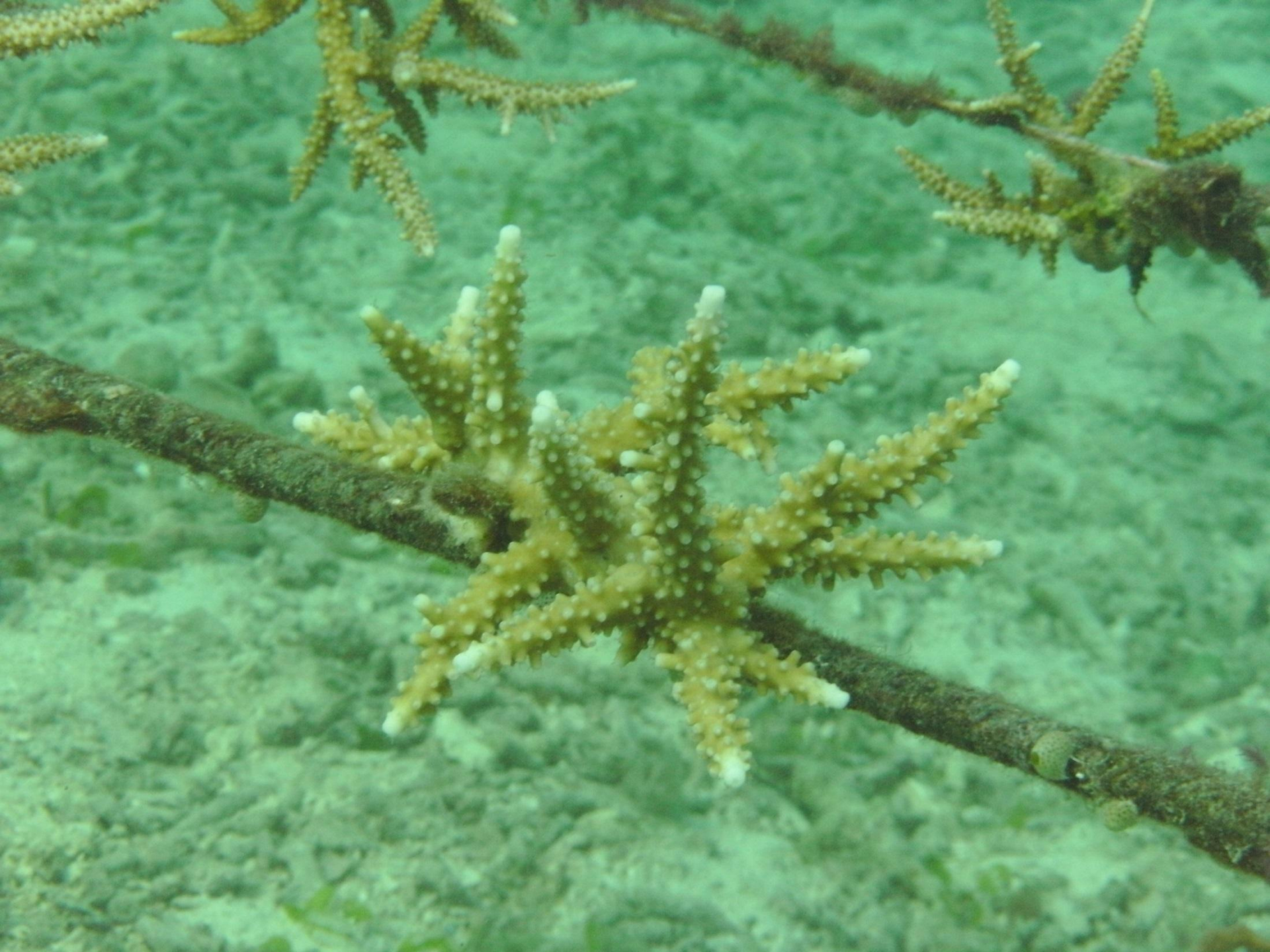


Growth = 200mm



Survival Rate = 67%





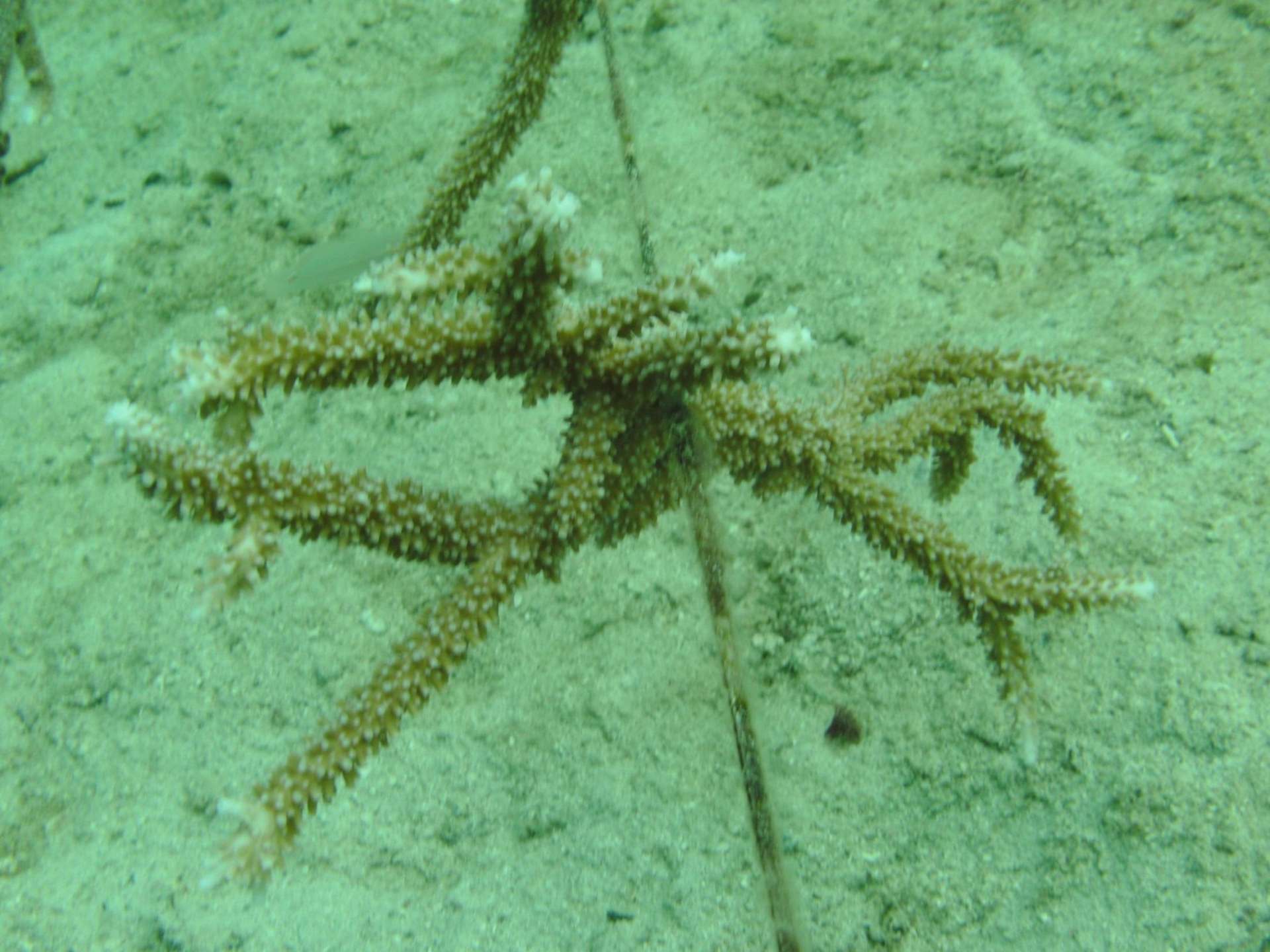


Attachment complete! Notice the disappearance of the tie wrap that was engulfed by the coral tissue





A branching coral making the nylon line its foundation and spread its tissue through it to extend colony









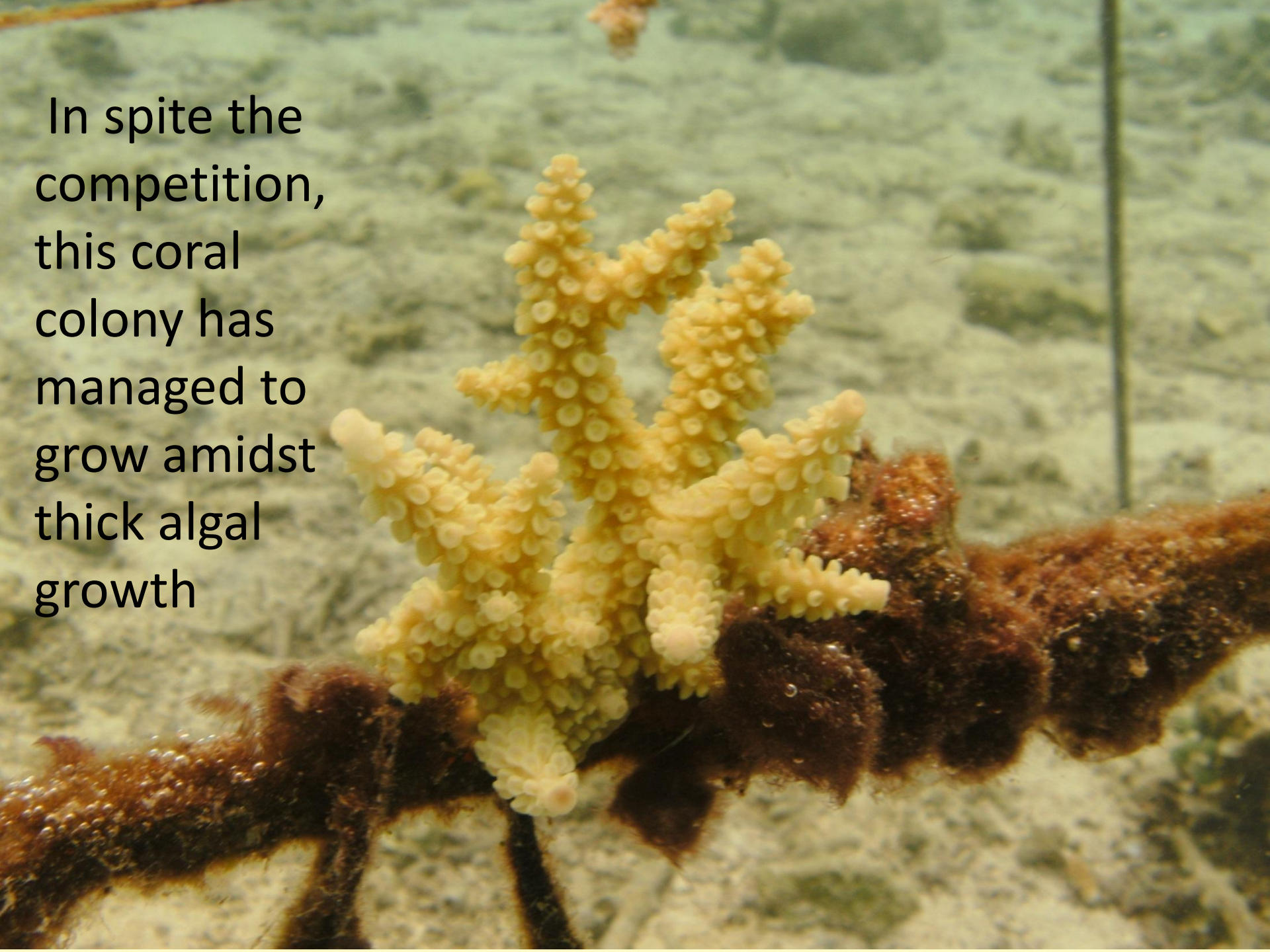








In spite the
competition,
this coral
colony has
managed to
grow amidst
thick algal
growth









This slow growing
coral colony has
managed to
compete algae





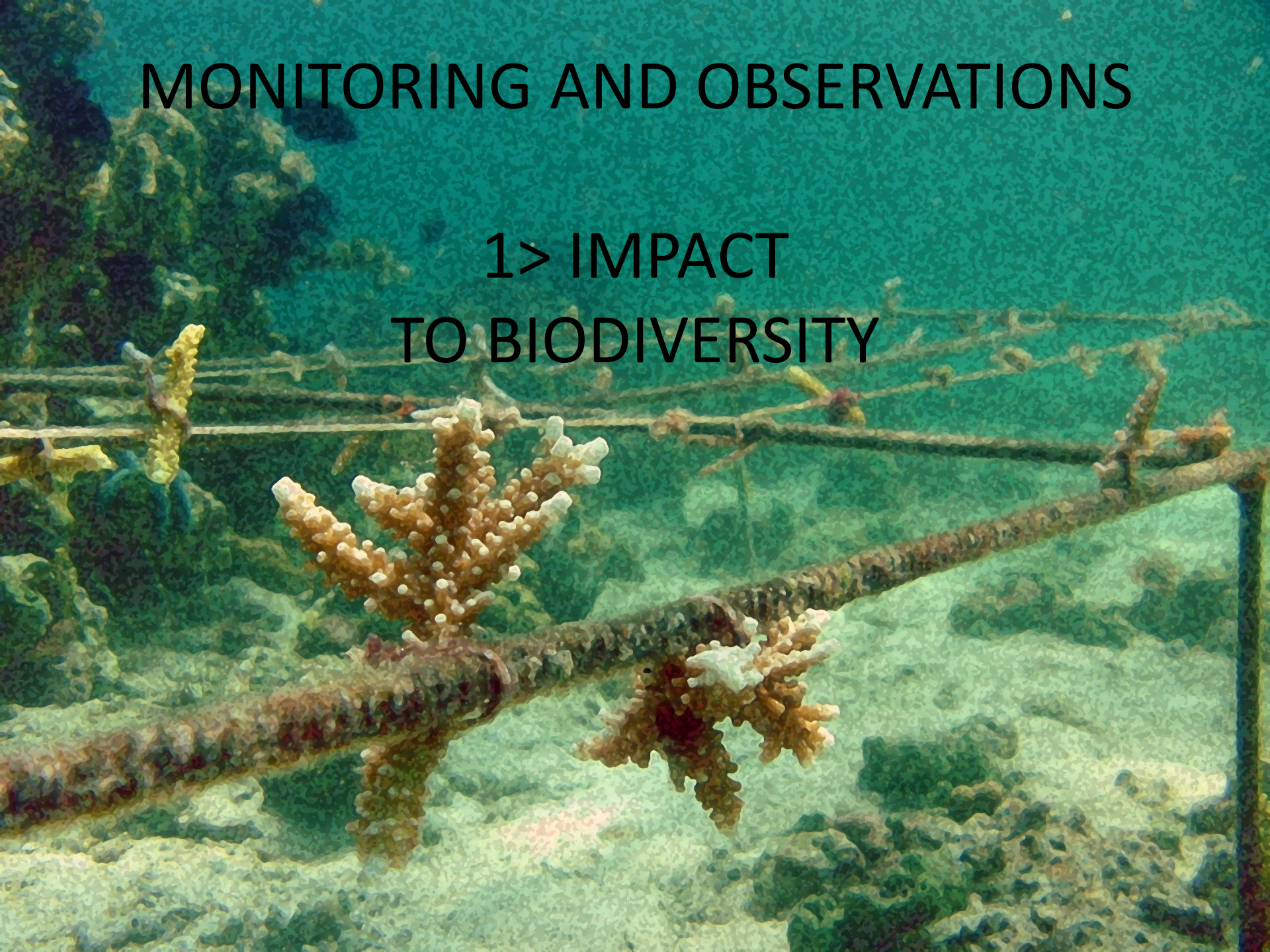




An example of a coral
frame with massive
coral colony growth

MONITORING AND OBSERVATIONS

1> IMPACT TO BIODIVERSITY

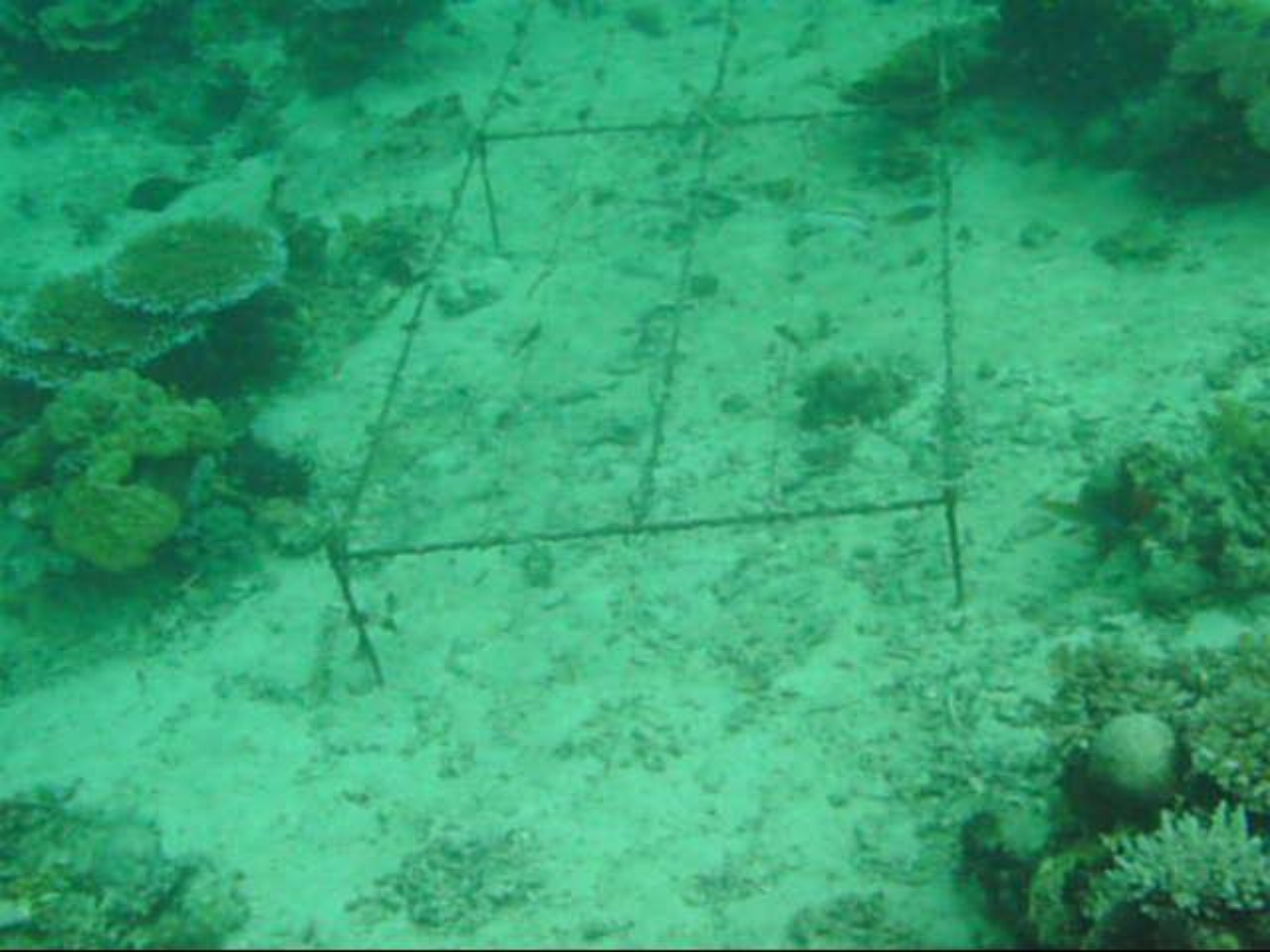


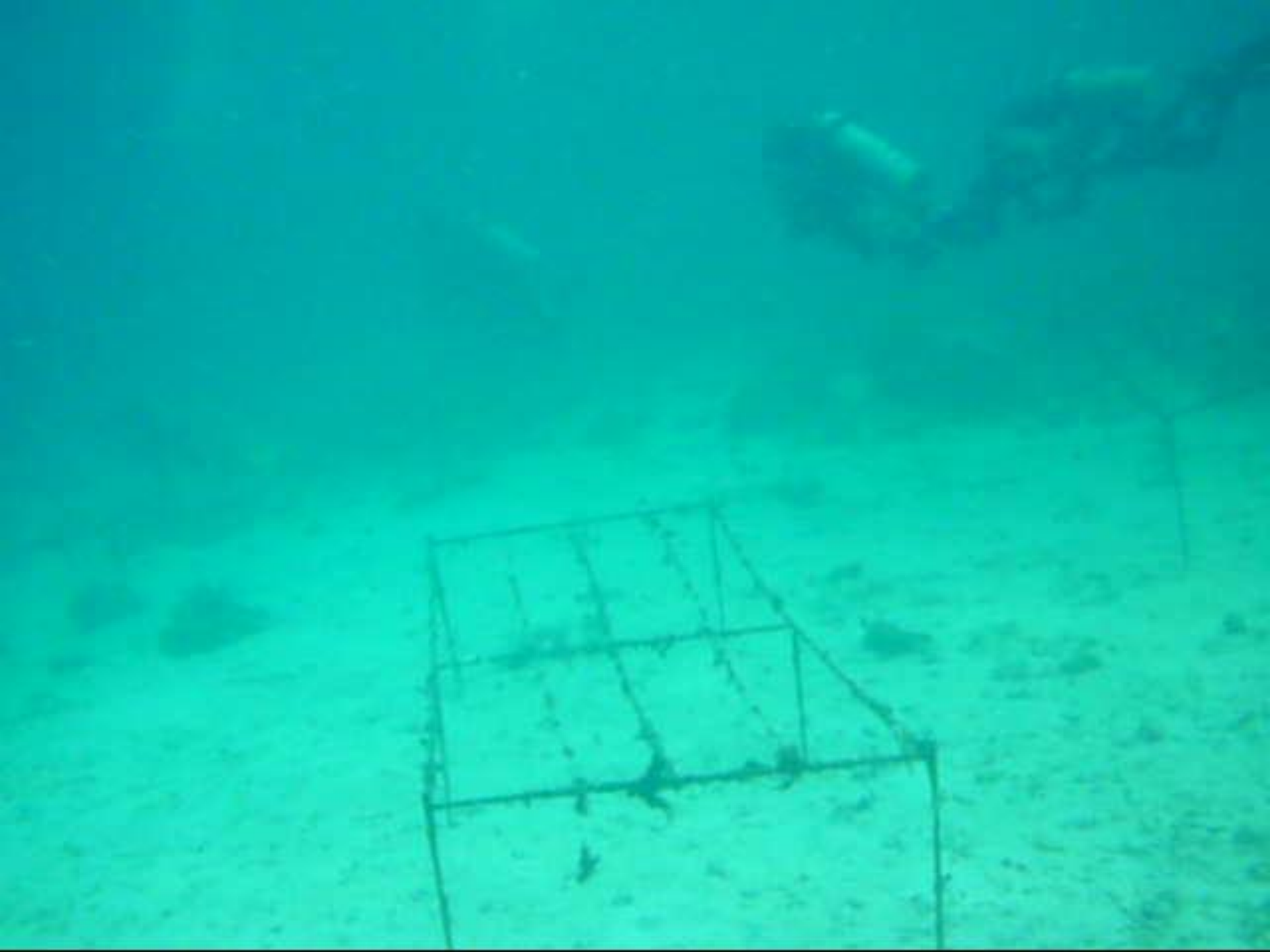


INCREASE IN FISH POPULATION

HAVEN FOR VISITING PREY







FORAGING AREA FOR LARGER PREDATOR

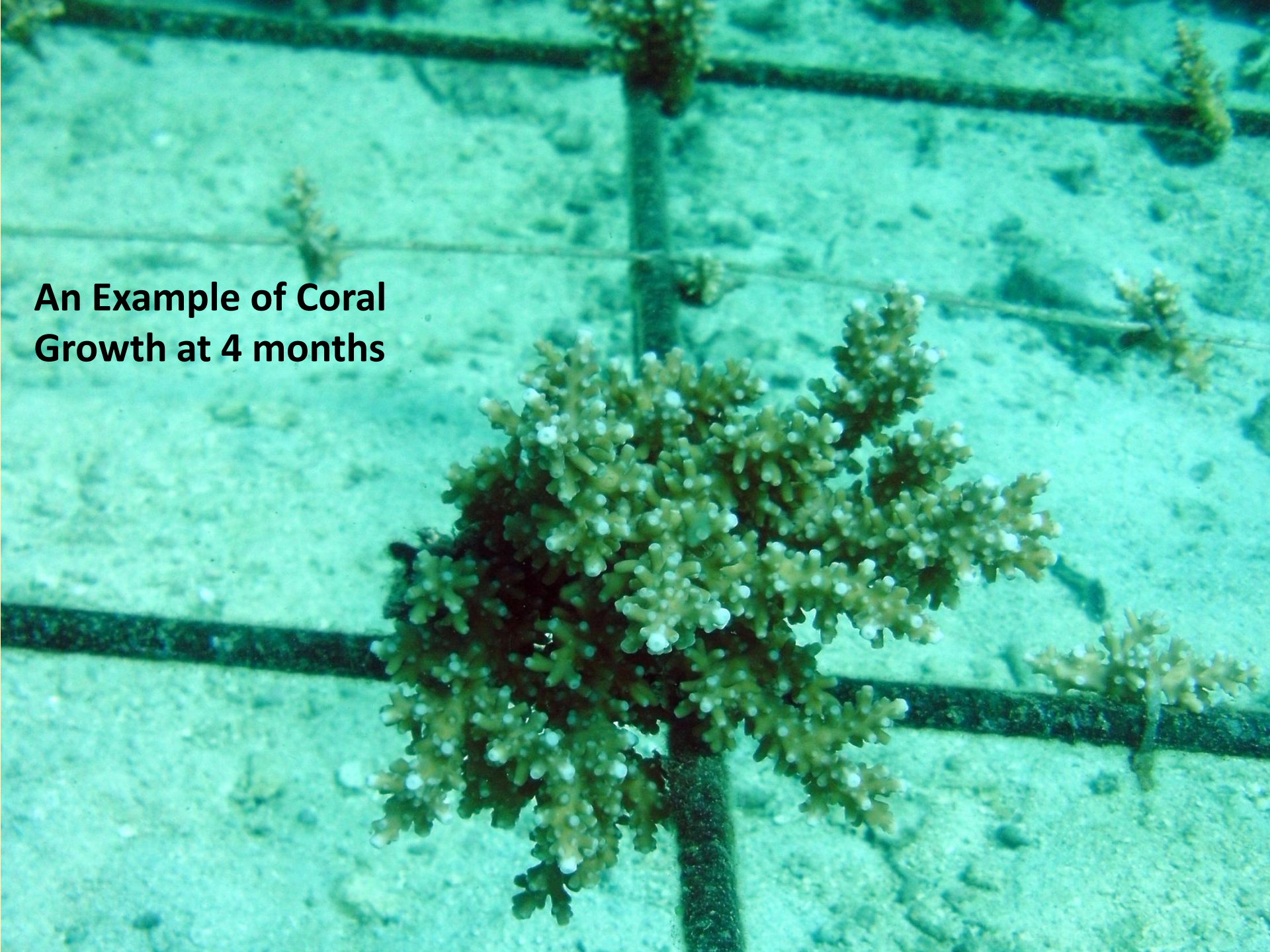






HUNTING GROUND FOR EVEN LARGER PREDATORS

**An Example of Coral
Growth at 4 months**



An underwater photograph showing a large, branching coral colony with a dense, rounded, and somewhat flattened structure. The coral is a light tan or yellowish-brown color, with many small, rounded polyps visible on its surface. It is growing from a dark, woody branch that runs diagonally across the frame. The background is a sandy seabed with some scattered coral rubble and small fish. The water is clear, and the lighting is bright, suggesting a shallow depth. The text "Coral Growth on the 8th month" is overlaid in the bottom left corner.

**Coral Growth on the
8th month**

RECOMMENDATIONS

- THE AREA MUST BE PROTECTED THROUGH AN ORDINANCE AND/OR BE ESTABLISHED AS A MARINE PROTECTED AREA
- MARKER BOUYS AND MOORING BOUYS MUST BE ESTABLISHED
- TECHNOLOGY TRANSFER TO COMMUNITY
- AWARENESS CAMPAIGN TO COMMUNITY
- RESPONSIBLE DIVING



CORAL REHABILITATION PROJECT TEAM:

DENR-PAWCZMS-CMMD 11

PENRO-Davao del Norte

CENRO-Panabo City

LGU Samal

**VOLUNTEERS FROM THE CARABAO DIVE CENTER
AND FRIENDS**

Maraming Salamat Po...



Happy Month of the Ocean!!!