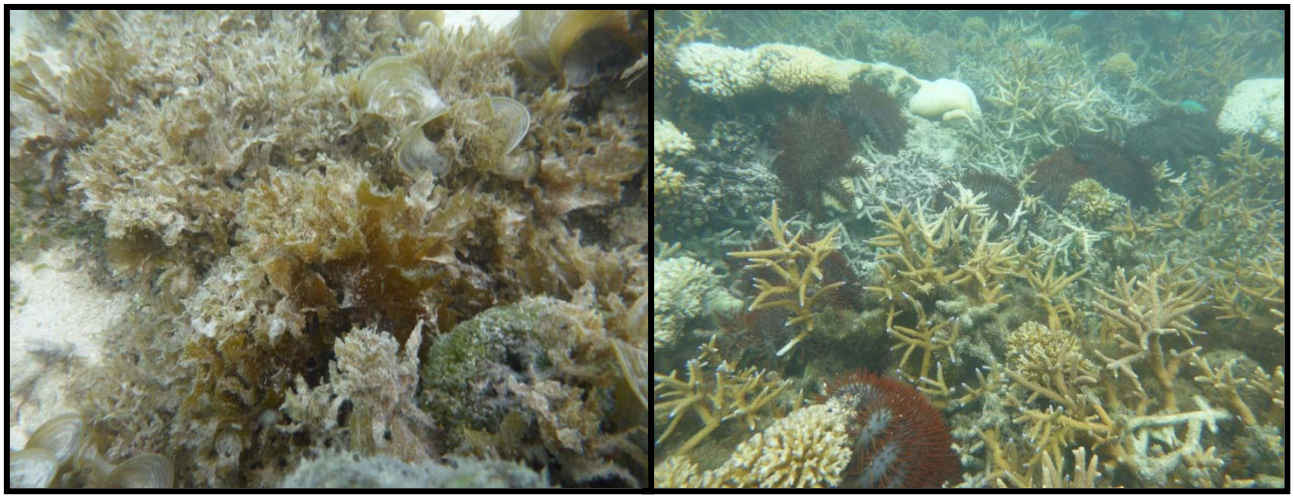
Report on the distribution of the introduced seaweeds (*Codium arenicola* and *Spatoglossum macrodontum*) and the distribution and density of the crown of thorn starfish (*Acanthaster planci*)



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1. INTRODUCTION

A survey conducted in 2008 identified two introduced seaweed species that do not occur naturally in the marine environment of Samoa. These were the *Codium arenicola* which is found in Thailand and Southeast Asia and the *Spatoglossum macrodontum,*a brown algae recorded from French Polynesia, Hawaii and Australia. The two seaweeds were observed distributed and well established around the Apia harbour, Mulinuu and Palolo deep marine reserve.

The crown of thorn starfish (COTS) are coral-eating starfish that occur throughout the Indo-Pacific region (Wilmes, 2014). They are naturally found on coral reefs where they can be observed in low numbers. An outbreak of the COTS was observed in a number of villages after the 2009 tsunami.The Fisheries Division of the Ministry of Agriculture and Fisheries and the MNRE worked with the communities to collect the starfish mainly from the areas along the southern and south-eastern coast of Upolu Island. This activity was an effort to help with the recovery of coral reefs from the impacts of the tsunami. However, there were a number of reports from various villages on both Upolu, Savaii and Manono Islands reporting large numbers of crown of thorn starfish (COT) in their marine environment and concerns that the increase in the number of COTs were impacting the health of the corals.

A two day survey (18 – 19 September) was carried out for the reefs of Manono-tai and Mulifanua to determine the presence of the two introduced seaweeds and the density of the COTS. This report provides findings of the survey conducted for the areas identified as part of the Activity 4 program in the GEF – PAS project.

2. OBJECTIVES

The main objectives of this survey are to:

(a) Identify the distribution and impacts of the two introduced seaweeds
(b) Determine the distribution and density of COTS
(c) Map the distribution of the two seaweeds

3. METHODOLOGY

There will be two teams carrying out the activities proposed in the plan. Team 1 will undertake the seaweed monitoring. Team 2 will focus on the COTs.

3.1 General Benthic Community Observations

Team 1 will randomly snorkel to observe the presence or absence of the two seaweeds as well as record any other potential introduced species. Once the seaweeds have been identified from the site, photos and samples will be collected for species confirmation. The location of the initial sighting of any of the two seaweeds will be recorded using the GPS. Team 1 will continue to snorkel within the area of the initial sighting to note the distribution and spread of the seaweed. This will then be mapped to present the total area covered by any of the two seaweeds.

3.2 Manta Tow Assessments

Manta tow survey will be carried out for large reef areas such as Manono tai, Saanapu, Sataoa and Mulivai to name a few. During a manta tow, two divers will be towed behind a small boat around the reef area. The boat will stop every ten minutes so the divers can record evidence of the crown of thorn starfish (sightings of the COT or feeding scars on the corals) (Figure 1). A GPS will automatically log the boat tracks. The number of starfish seen during the ten minute tows will be used to estimate the status and density of the COT population.

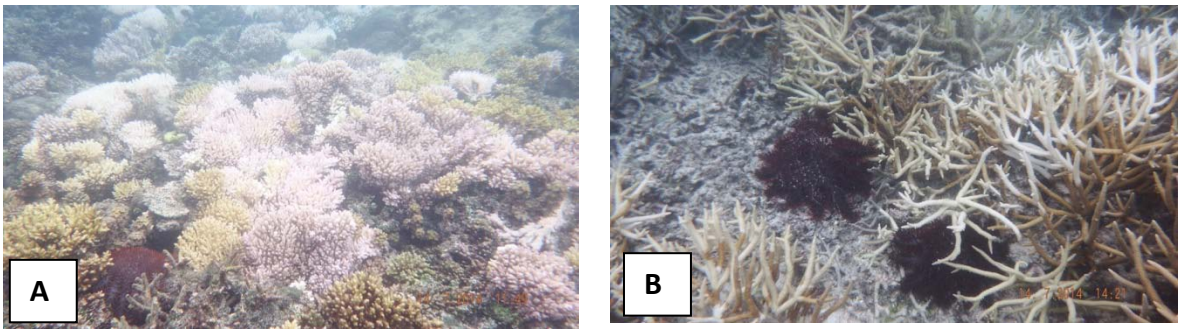

Figure 1: A: Scars left by COTS; **B:** COTs observed feeding on *Acropora* corals.

4. RESULTS

4.1 Presence of the introduced seaweeds

Only the *Spatoglossum macrodontum* introduced seaweed was observed in certain areas of Manono-tai. The *S. macrodontum* was observed around healthy seagrass bed areas **(Figure 1)** and around the Faleu reserve. For the seagrass bed sites, the seaweed did not appear to be over-growing and competing with the seagrass. The *S. macrodontum* observed in Faleu reserve was attached on corals and growing with other seaweed species, compared to the *S. macrodontum* seen in the seagrass beds where they were found loosely attached on the sandy substrate **(Figure 2)**. No *S. macrodontum* was observed around the Mulifanua area.

There were no *Codium arenicola* observed in any of the survey sites.

Figure 2:*Spatoglossum macrodontum* seen around the seagrass beds.

Manono-tai:

A total of 3 stations were positioned along the reef crest and lagoon area which were laid out covering the entire island. Each station had 4 transects covering a total distance of 300m (4 transects = 1,200m or 1.2km). The overall health of the coral reefs was also recorded.

Station 1: An estimate of 70 COTS were made for this station. The corals were mainly dead and covered with algae hence the small numbers of COTS observed.

Station 2: An estimate of 138 COTS were counted. This station had areas with live corals and these were also the areas which had the highest number of COTS in the area.

Station 3: Only an estimate of 23 COTS were counted. The corals observed in this station were mainly dead with rubble.

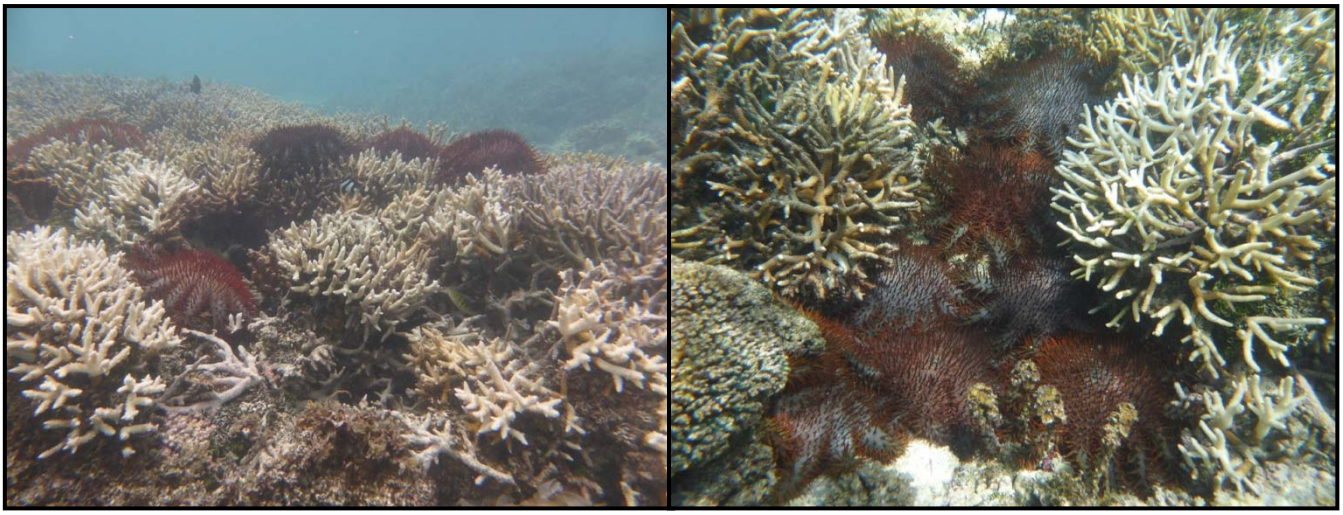

Figure 3: Adult COTS feeding on live corals.

Mulifanua:

A total of 9 sites were selected along the reefs along Mulifanua.

Site 1: This area was mainly dominated with seaweeds such as the *Sargassum sp.* and *Padina sp.* The area also had dead corals and rubble. Only 1 COT was observed for this area.

Site 2: This area was mainly dominated with seaweeds such as the *Sargassum sp.* and *Padina sp*. Three COTS were observed.

Site 3: Live corals mainly dominated this site and were also the area with a high number of COTS observed. An estimated of more than 200 COTS was observed. **Figure 3** shows COTS feeding on live corals.

Site 4: Live corals mainly dominated this site. More than 500 COTS were counted. An average of 100 COTS were counted per person.

Site 5: This area also had live corals and more than 300 COTS were counted.

Site 6: This site was similar to site 5 where live corals were dominant. An estimate of more than 300 COTS were counted.

Site 7: This area was mainly sandy and dominated with *Halimeda*. No corals were found and no COTS were present.

Site 8: This site had patches of live corals and an estimate of more than 100 COTS was observed for this particular area.

Site 9: No COTS or corals were found in this area. Area is mainly sandy and dominated by the *Halimeda sp*.

5. CONCLUSION

This survey confirmed the presence of one of the introduced seaweed around Manono-tai and also provided an estimated density of COTS for the area. Although the *Spatoglossum macrodontum* was recorded for certain sites around Manono island, they were observed not to be over-growing and outcompeting with the seagrass beds. This seaweed was also not observed around Mulifanua area suggesting that is confined to just Manono island.

The COTS were observed in high numbers for certain sites around Manono island and this was dependent on the live corals. For most of the reefs around Manono island, there were considerable damage and dead corals which are either from the impacts of the COTS or from the impacts of the previous natural disasters (tsunami and cyclone Evan).

The coral reefs around Mulifanua are heavily impacted by the outbreak of the COTS **(Figure 3)**. Large adults can be observed feeding on the live corals which have caused mass bleaching for these reefs.

6. RECOMMENDATIONS

- To continue to assess other selected sites for the presence of the two seaweeds
- To determine the density of the COTS in other areas around the islands
- To carry out intensive COT collection both manually and with the use of the ox bile solution for areas that are high in COT numbers.