Technical and Financial Proposal

Marine Survey of Montego Bay Marine Park

Assessment of Reef Health for Management Recommendations

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April 24, 2014.

1.0 SCOPE OF WORK

This study will be an assessment of the benthic marine environment of selected sites within the Montego Bay Marine Park. It will cover the major environments of coral reefs, seagrass beds and mangrove-associated aquatic flora and fauna. The main purpose of the study is to attain an objective assessment of the current status of these environments and to make recommendations to the Montego Bay Marine Park Trust to guide their management of the Park. Capacity-building will also be done for the environmental officers and rangers of the Trust in marine assessments.

2.0 TERMS OF REFERENCE

The survey will be guided by the following Terms of Reference developed in conjunction with Montego Bay Marine Park Trust.

1. Review previous relevant studies done.
2. Conduct training for MBMPT field staff in survey techniques, data analysis and reporting
3. Conduct fieldwork at selected sites employing standard methodology for sampling coral reefs, seagrass beds and mangrove-associated aquatic flora and fauna.
4. Collect and analyze reef data for coral cover, macroalgal cover and fish community. A combination of the AGRRA (fish), photo and video transects will be used along 30m transects
5. Collect and analyse seagrass data for seagrass cover and macroalgal cover. Herbivores and other macrofauna will also be identified. 100m transects and 0.5x0.5m quadrats will be used perpendicular to the coastline.
6. Produce a report that will include current status, comparison with previous surveys, identification of threats, and recommendations to management. This report will also guide the stakeholder workshop under this project.
7. Deliverables:
    i. one electronic copy of the report (in MSWord and .pdf formats)
    ii. video (.mpeg format) and still (.jpeg format) footage of survey sites.

3.0 SITE LOCATION

The site location is shown in Figures 1 and 2 below:

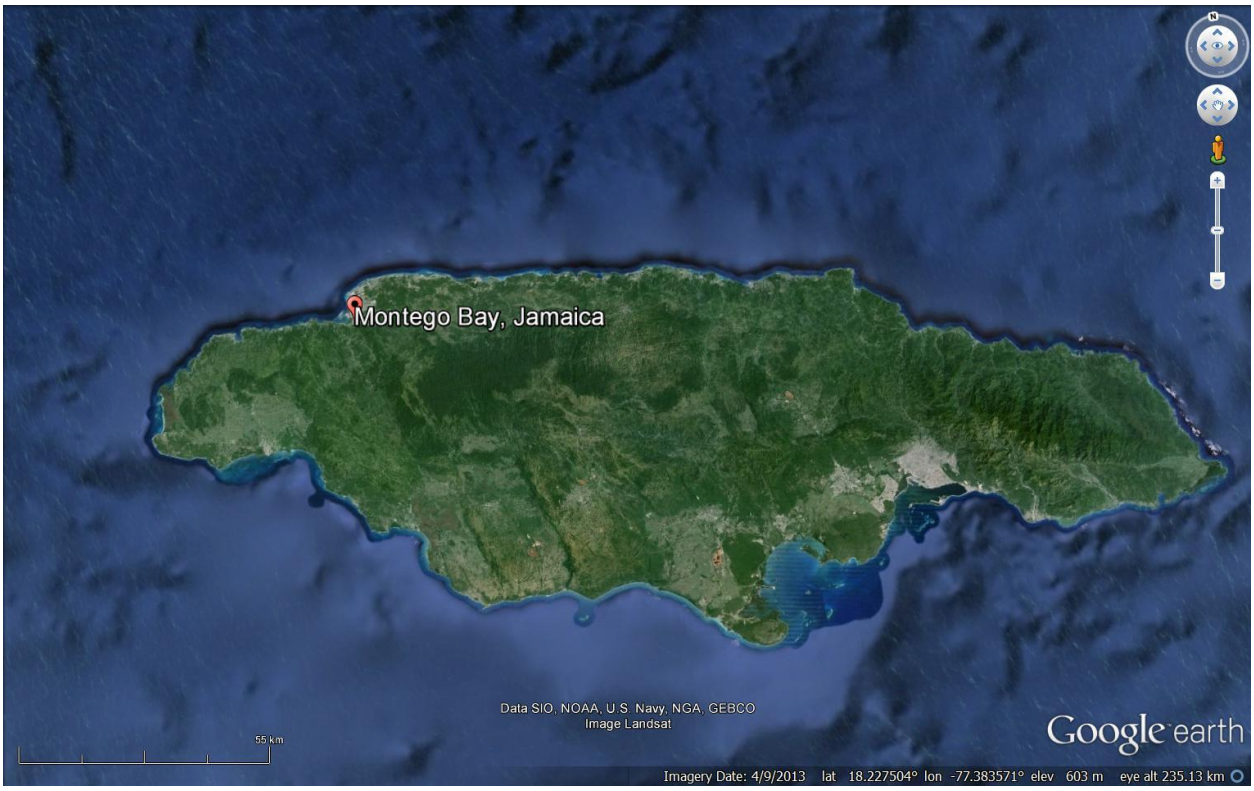

Figure 1: Montego Bay, Jamaica

Figure 2: Survey Site showing area for study

4.0 PROPOSED SURVEY METHODOLOGY

2.1 The Benthic Reef Community

Six (6) stations, Reef 1-6 will be chosen using satellite imagery, previous substrate maps/assessments and the boundaries of the marine park. They will be ground-truthed by SCUBA. The approximate locations are tabulated below:

These reefs will have a maximum depth of approximately 20m to allow adequate dive time for assessments. All six (6) stations will be assessed using SCUBA to evaluate the coral and macroalgal composition of the benthic environment, as well as the Reef Fish Community (**Error! Reference source not found.** below).

The reef coral and macroalgal cover will be evaluated along three (3) 30m transects at each station. Digital Images will be captured using a Canon Rebel T2i Digital SLR Camera at 3m intervals 80cm above the substrate. A 50x50cm PVC quadrat was used as a guide for the camera and this was placed adjacent to the transect line at the 3m interval. This is shown in Figure 3 below.

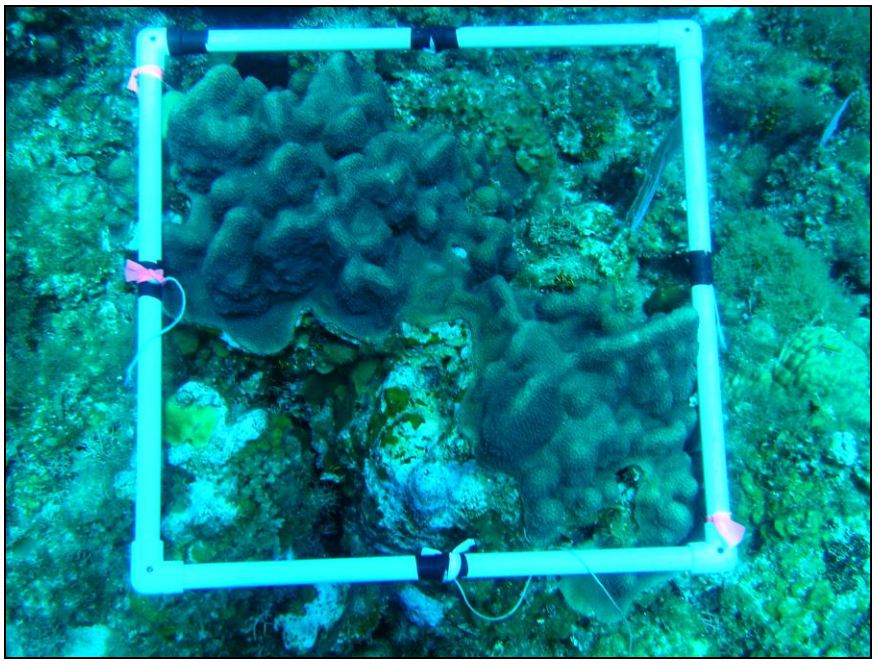

Figure 3: Raw digital image captured in the field

The images will then be uploaded to a computer programme called Coral Point Count with Excel Extensions (CPCe v3.4) developed by the National Coral Reef Institute of the United States. The field of view of each image for analysis will be limited by the quadrat. Twenty (20) random points will then be superimposed over the image and the coral and algal species covered by each point identified (Figure 4). Evidence of disease will also be noted.

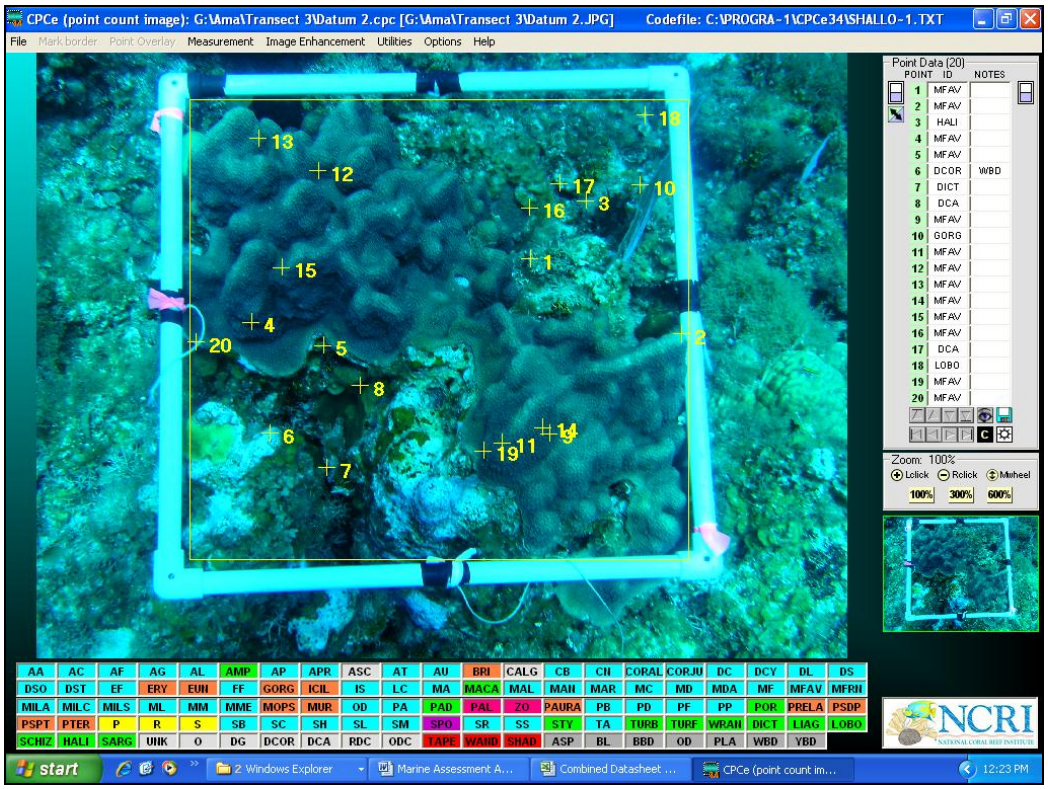

Figure 4: Analysis of Image using CPCe v3.4

2.2 The Reef Fish Community

The identical stations (Reef 1-6) will be used to evaluate the fish communities. Fish populations will be evaluated using the method developed for the Atlantic and Gulf Rapid Reef Assessment (AGRRA). Six (6) 30m transects will be laid at each station and assessed using this method. This is depicted in Figure 5 below:

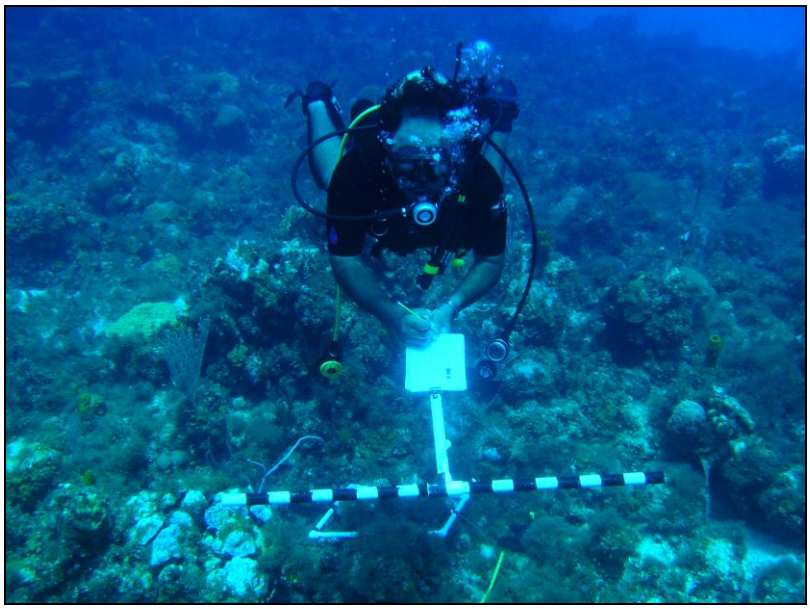

Figure 5: Fish survey along 30m transect using AGRRA method

In addition, a 20-minute roving dive will be conducted at each station during which fish species were identified and given a frequency rating of Single (S=single occurrence), Few (F=2-10 occurrences), Many (M=11-100 occurrences) or Abundant (A=>100 occurrences). This was done using underwater videography to ensure a timely and accurate representation of the fish species composition.

Important invertebrate species, eg. *Diadema antillarum* will also be noted. Six (6) 1mx1m quadrats will be laid to ascertain densities of *Diadema* in the sampling areas.

2.3 Seagrass Beds

Six (6) survey sites will be chosen to assess the seagrass beds within the MBMP. At each of these sites, three (3) 100m transects will be laid. While laying each 100m transect line, video footage will be captured.

At 10m intervals along each transect, a 0.5mx0.5m quadrat will be laid beside the tape (Figure 6). Digital images will be taken for each quadrat after which visual estimation of percentage benthic cover will be carried out.

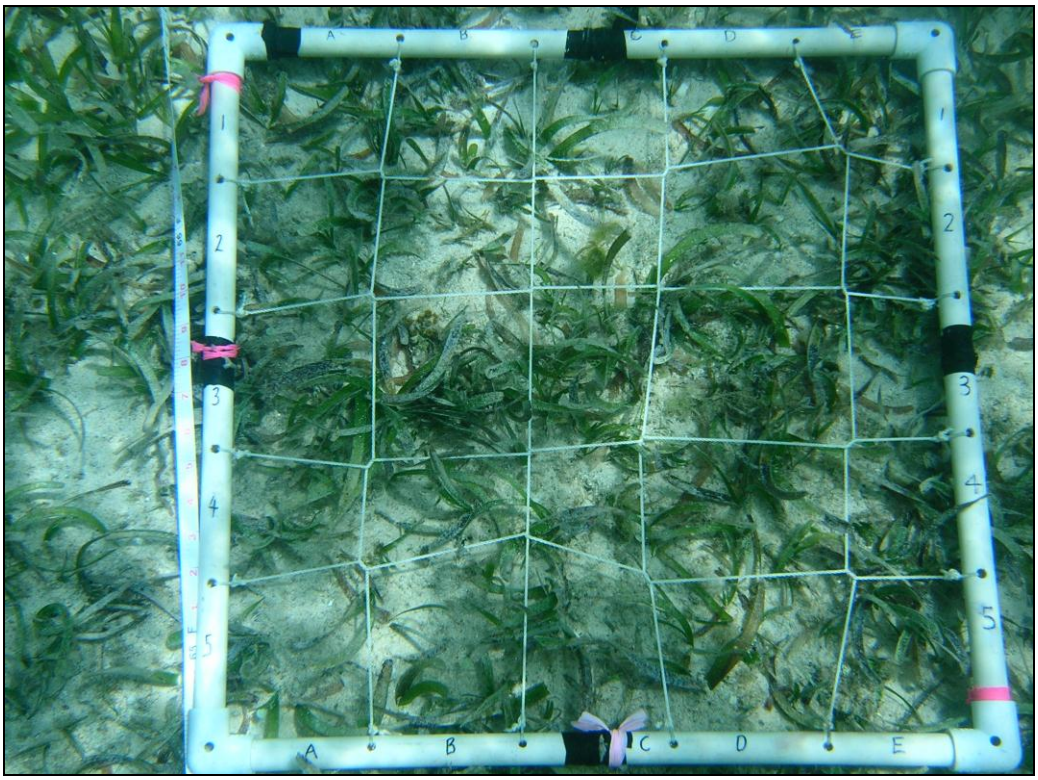

Figure 6: 0.5m x 0.5m Quadrat

Visual estimates will be done for *Thallassia testudinum, Syringodium filiforme, Halimeda spp., Caulerpa sp., Penicillus sp,* and any other algae as well as sand/bare substrate.

At each site, a 20 minute roving dive will be done within a radius of 25m from the transect lines with the use of an underwater video camera. A species list of observed macrofauna will then compiled from the video footage and field notes.

5.0 TIMELINE

The project will be completed using an estimated effort of 10 days. It is expected that at least three (3) staff members of the MBMPT will be involved in both the training and the assessment.

This assessment can be accomplished within 3 months of start of the project.

	Man Days of Effort									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Literature Review										
Training of MBMPT Staff										
Field Work										
Data Analyses										
Report Preparation and Submission										

5.0 BUDGET

Item	Description	Unit Cost	Quantity	Total
Consultancy Fee	Consultancy Fee (man days) for training of MBMPT Officers, conducting reef and seagrass assessments, report preparation, participating in stakeholder workshops	400	10	4,000
Equipment	SCUBA Gear and sampling equipment for MBMPT Officers	800	2	1,600
Local Travel and Subsistence	Ground and water transportation costs to field sites, accommodation for assessment team (daily cost)	230	7	1,610
Workshop	Stakeholder workshop to present findings of surveys	790	1	790
			Total (US$)	**8,000**