ORACABESSA BAY FISH SANCTUARY MANAGEMENT PLAN

-A gazetted fish sanctuary since May 19, 2010-

The Oracabessa Bay Fish Sanctuary (OBFS) is gazetted by the Ministry of Agriculture & Fisheries (MOA&F) as a Fish Sanctuary in Oracabessa, St. Mary, Jamaica.

Prepared for:

The Oracabessa Bay Fish Sanctuary

A Collaborative Project by:

ORACABESSA FOUNDATION

ST. MARY FISHERMAN'S CO-OP
James Bond Fishin Beach, Oracabessa, St. Mary

PEACE CORPS

GOLDEN EYE

Environmental Foundation of Jamaica

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1. EXECUTIVE SUMMARY

The Oracabessa Bay Fish Sanctuary (OBFS) is gazetted by the Ministry of Agriculture & Fisheries (MOA&F) as a Marine Protected Area (MPA) in Oracabessa, St. Mary, Jamaica. It has been created to address the national problem of unsustainable fishing practices. Oracabessa Bay is of biological significance to Jamaica as it is home to several species found on the IUCN Red List of Threatened Species and is a breeding ground to a variety of indigenous fish, coral, turtles, and other marine life. The sanctuary is a no fishing zone and its managing body aims to enforce the no fishing legislation, curb poor fishing practices in Oracabessa, and educate the public on the importance of marine protected areas for future generations.

The Oracabessa Bay Fish Sanctuary NGO is a collaborative organization created by the Oracabessa Foundation, St. Mary Fisherman Cooperative (Oracabessa Branch), and GoldenEye to govern the sanctuary gazetted by the Government of Jamaica. This NGO will manage goals and operations of OBFS inside and outside of Oracabessa Bay. Our mission is to increase biodiversity in Oracabessa Bay to improve livelihoods of the local community.

The Oracabessa Bay Fish Sanctuary Management Plan (OBFSMP) is designed to use local and scientific knowledge (see sections entitled Biological Significance, Baseline, Physical Features, Boundaries and Coordinates, and Climate) of Oracabessa Bay to implement OBFS management objectives and activities to ensure the success of the sanctuary. Management objectives and activities include habitat and species management, environmental education, enforcement, training, and more. Oracabessa Bay Fish Sanctuary is a joint project between Fisheries and the OBFS NGO. Its power to enforce is designated by the Ministry of Agriculture and Fisheries under the Memorandum of Agreement (MOA), Natural Resources Conservation Authority Establishment of Authority (NRCA), and the Fishing Industry Act (FIA).

The OBFSMP has been developed by Oracabessa fisherman and stakeholders for Oracabessa fisherman and stakeholders. Oracabessa Bay Fish Sanctuary's success will be accredited to the people of Oracabessa, the Government of Jamaica, and all persons committed to making fishing a sustainable livelihood once again. The management plan was funded by a grant from the Environmental Foundation of Jamaica (EFJ).

2. INTRODUCTION

Oracabessa has always been a fishing village. Even in its heyday as a major banana shipping port from the 1920s to 1960's, fishers were the backbone of providing a sustainable livelihood to families in the area. Even now as tourism is poised to pick up where bananas left off decades ago, fisher-folk continue to play an important, vibrant role in the well-being of the Oracabessa community. Unfortunately, their job is getting harder every day.

Jamaica has some of the most depleted fish stocks of any country in the world. Oracabessa Bay is no different. As little as 25 years ago you could make your way down to Fisherman's Beach and have no problem getting your hands on an 8, 10 or even 15 pound snapper. Walking into a restaurant you would have had your choice of fish - and it would have been sliced. Why? Because the fish were too big to put on your plate!

Today, 10 pound snappers are about as plentiful as mermaids and unicorns. Because these big predatory fish are gone, two things happen: First, fishers are forced to catch smaller and smaller fish - which lowers the overall breeding stock of the population. Given enough time, the fish population will simply collapse. Second, fishers start to take the reef-grazing fish. As this happens, the quality of the reef declines. This in turns causes a loss of habitat... and the vicious cycle is reinforced. Add to these issues the problems with spear-shooters, pollution, and the myriad problems associated with poverty in general and the picture is not good. Things have clearly changed. Not for the better. Not for anyone.

But, the situation is not hopeless! In April 2009 the St. Mary Fisherman's Cooperative and the Oracabessa Foundation officially began a partnership to reverse this decline. Out of this partnership has come the Oracabessa Bay Fish Sanctuary which was officially gazetted in May 2010. The near-term goal of the sanctuary is to create a no-fishing zone protecting the Bay's critical breeding areas and fish habitat. The longer term goal of the Sanctuary is to increase the biodiversity in Oracabessa Bay in order to improve the livelihoods of local community members.

The following Management Plan outlines how the Fisherman's Cooperative and the Oracabessa Foundation hope to implement and sustain the Sanctuary. We are under no illusions that we have created 'the perfect plan' that will exist unchanged in perpetuity. In fact, we fully expect it to change. These pages may be more accurately read as the output of a relationship building process between the main stakeholders in Oracabessa Bay. A process which still ongoing and ever-evolving, but which represents the best chance for a healthy Oracabessa Bay.

3. BIOLOGICAL SIGNIFICANCE

A. OBFS Shoreline

Oracabessa Bay's reef network, diversified shoreline, and estuarine area make for one of the best breeding grounds in Jamaica for a variety of fish, turtles, coral, and marine mammals.

1. Reef Network

   Coral reefs support more species per unit area than any other marine environment. In section *5. Physical Features G. Bathymetry* you can see that coral reefs can be found along 75% of Oracabessa Bay shoreline. The shoreline that is not surrounded by reef consists of natural beaches and estuarine areas.

2. Diversified Shoreline

   Oracabessa Bay's shoreline consists of cliffs abutting the ocean with only two naturally occurring beaches (Gibraltar Beach and Oracabessa Fishing Beach). Since a major land reclamation project in the early 1970's, explained in section *5. Physical Features A. Coastal Landforms,* approximately half of the bay's shoreline is now reclaimed land that the ocean once occupied. These manmade landforms have created shallow water areas and lagoons within the bay that serve as a nursery for small fish seeking food and refuge.

   Gibraltar Beach is recognized by NEPA as being a beach of significance because its sand is used by three different species of sea-turtles as a nest for their eggs. On the south side of the beach lies Jacks River which empties into Oracabessa Bay and separates Gibraltar Beach from Fishermans Beach.

3. Estuarine Area

   Jacks River empties into Oracabessa Bay creating an estuary. An estuary is best described as an area with both seawater and freshwater which provides high levels of nutrients in both the water column and sediment, making estuaries among the most productive natural habitats in the world. Oracabessa Bay is no exception to this rule of thumb and is the reason the West Indian Manatee is spotted around the bay.

B. IUCN Red List of Threatened Species

1. **Endangered Species** The bay is home to an array of indigenous wild-life. The West Indian Manatee (*Trichechus manatus)*, Green Sea Turtle (*Chelonia mydas)*, and Loggerhead Sea Turtle (*Caretta caretta)* are only a few patrons of Oracabessa.
2. **Critically Endangered Species** include Elkhorn Coral (*Acropora palmate)*, Staghorn Coral (*Acropora cervicornis)*, and Hawksbill Sea Turtle (*Eretmochelys imbricate)*. Gibraltar Beach is a nesting area for more than 60 female Hawksbill Sea Turtle's and produces over 8,000 eggs annually.

4. BASELINE

See Appendix A: NEPA's Baseline Survey Assessment: *A Rapid Assessment of the Reefs of OBFS*

5. PHYSICAL FEATURES

A. Coastal Landforms

Oracabessa Bay's shoreline was once primarily comprised of sea cliffs. Due to a major government initiative in the mid 1970's OBFS's shoreline is now primarily reclaimed land with stone walls that are constructed from a firm surface underwater with mortar and cut stone. There are 5 beaches 2 of which are natural (Fishermen's beach and Gibraltar beach). Between these two naturally occurring beaches is the mouth of Jacks River that empties into Oracabessa Bay. On the Westside of the mouth (Fishermen's beach) lies a man-made groin of cut stone that is 10m wide and sticks out into the water 100m. The 3 manmade beaches are James Bond Beach, Oracabessa Fishing Beach, and Low Cay beach. Low Cay beach is protected by two smaller cut stone groins that extend 15m into the water on either side of the beach. The rest of the shoreline, east of GoldenEye, consists of the naturally occurring sea cliff coastline.

There is one island (Santa Maria Island) in OBFS which is on GoldenEye's property. Elevations of Santa Maria Island range from 2.5 feet to 11 feet above mean sea level. Surrounding this island is 'The Lagoon' that has an average depth of 4' and a maximum depth

of over 5'. The Lagoon has two outlet points; on the Eastside of the island is a culvert that runs between the lagoon and Oracabessa fishing bay, and the Westside of the lagoon empties into the ocean.

There are two peninsulas within OBFS. Both are manmade and part of Blackwell's estate. The larger peninsula is part of GoldenEye's property and the smaller of the two is part of James Bond Beach's grounds.

The OBFS is rectangular in shape. It has two land borders and two borders that occur in the ocean which will be marked with buoys. The land border starts on the Northern most part of Gibraltar beach, below the house Lada Bay, and runs westward to stick rock located at Lovely Spot property.

The manmade area's mentioned above were part of a government project in the 1970's that was originally designed to create a deep water pier to ship bananas. The harbour was dredged and the foreshore dumped. Along the unnaturally placed land are masses of large stones from the top of the land to the shallow sea-bed to help the land keep from erosion.

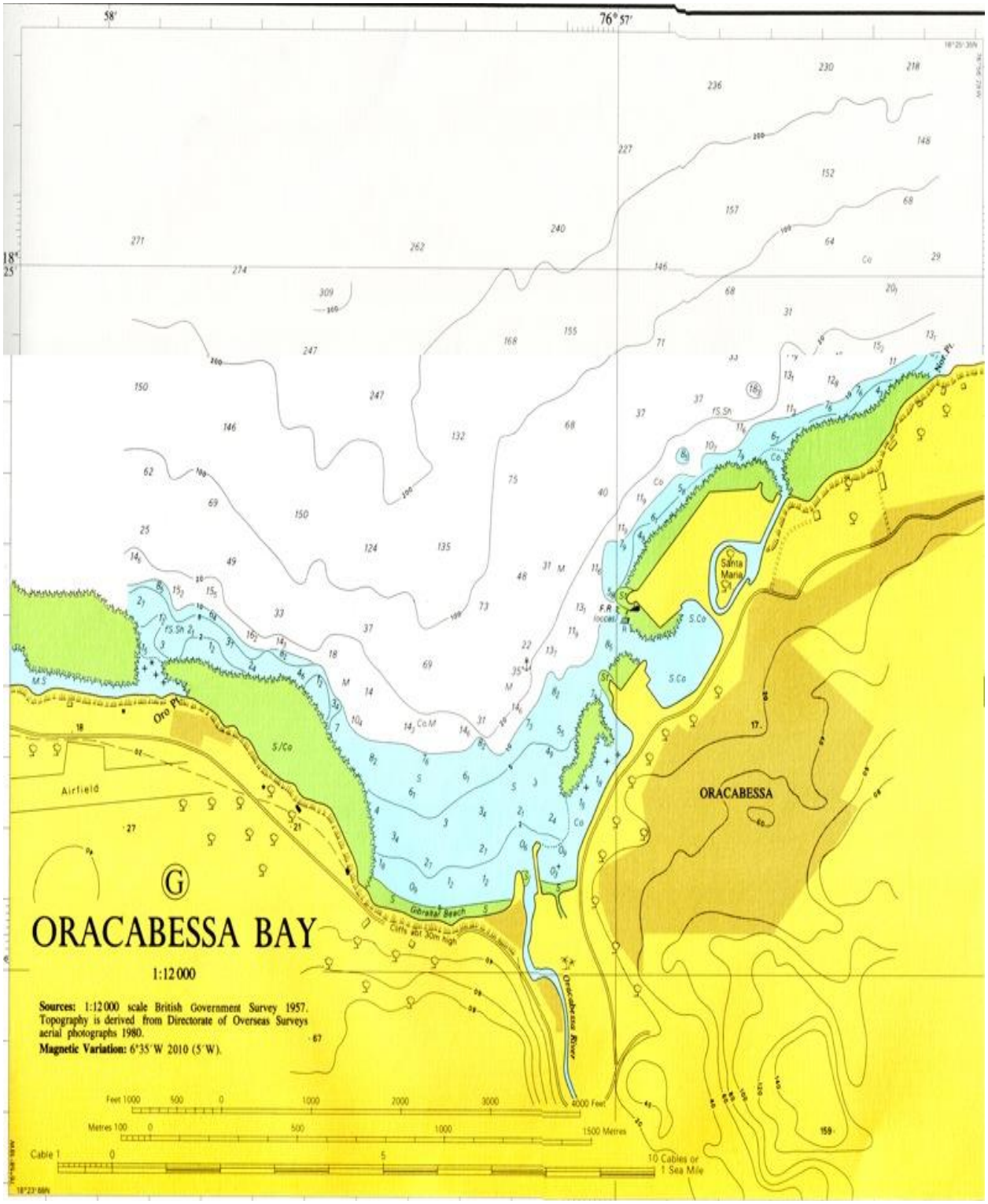
B. Salinity & Turbidity

Oracabessa Bay for the most part consists of saline water with an average salinity level of 35 (grams of salt per litre of water). Oracabessa Bay has an estuarine area caused by the outflow of Jacks River into the bay. This results in an area of brackish water located around Fishermen's Beach and Gibraltar Beach. The turbidity of the water is good but influenced by the river. After a heavy rain the entire bay can turn brown due to soil and other land deposits from the river.

C. Fresh Water Inputs

There is one main river that flows into Oracabessa Bay (Jacks River) which provides OBFS with a unique estuarine area. When it rains in Oracabessa Jacks River empties sediment into the bay. After a heavy rain a large portion of the bay (Gibraltar Beach to the edge eastern edge of GoldenEye's peninsula) can be brown for days before the tides carry the sediment out to sea. The limestone cliffs around Oracabessa do not allow much saturation of the land from rain which leads to surface run-off.

D. Bathymetry



E. Geology

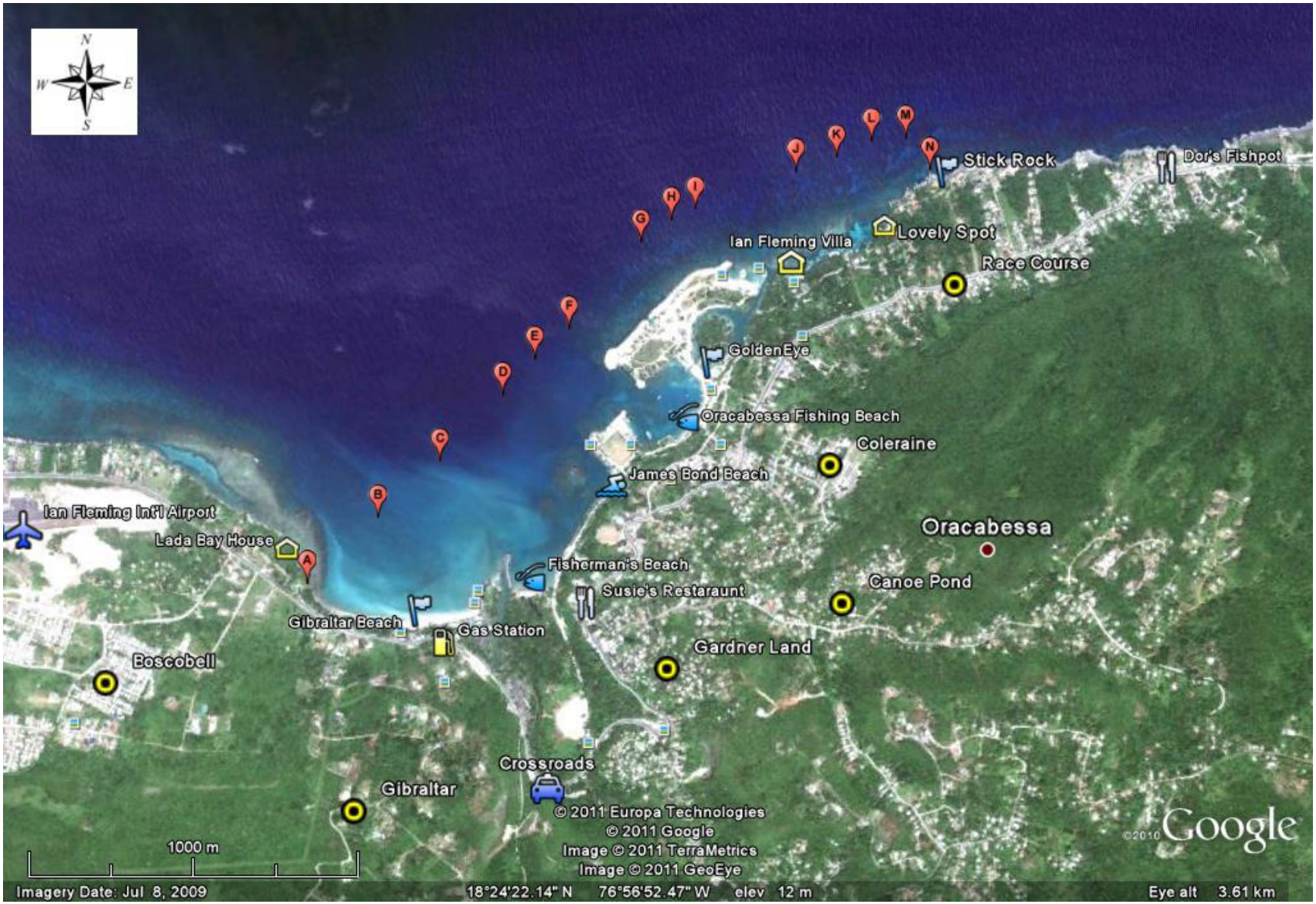
On Jamaica, Cretaceous basement rocks are capped by tertiary limestone and, on the north coast, by the Coastal Formation of Pleistocene reef deposits. Quaternary sea-level changes have created terraces above and below the present sea level, bounded by raised or drowned sea cliffs. On land, sub aerial solution has created a karst lithology, with terraces covered by Dry Limestone Woodland. Karst topography is an assemblage of topographic forms resulting from dissolution of carbonate bedrock and consisting primarily of closely spaced sinks. Along the north coast, a narrow submarine shelf (<1 km wide) supports well defined Holocene fringing and sill reefs.

Oracabessa Bay geologic reef structure has little naturally occurring difference compared to the North Coast of Jamaica. However, the for-mentioned project to build a deep water pier substantially changed the portion of the reef and shoreline. A major reef system in OBFS still runs from snorkeler's cove (GoldenEye property) to stick rock on the eastern most end of the sanctuary. Reefs can also be found surrounding the James Bond Beach grounds.

6. BOUNDARIES & COORDINATES

Point	Longitude (N)	Latitude (W)
A	18 24 51.2	76 56 23.3
B	18 24 54.5	76 56 25.9
C	18 24 54.2	76 56 29.6
D	18 24 52.5	76 56 33.4
E	18 24 47.2	76 56 37.8
F	18 24 51.1	76 56 48.7
G	18 24 46.1	76 56 51.3
H	18 24 43.8	76 56 54.6
I	18 24 34.9	76 57 02.4
J	18 24 28.1	76 57 06.1
K	18 24 31.8	76 57 09.6
L	18 24 21.3	76 57 16.4
M	18 24 15.5	76 57 23.1
N	18 24 08.8	76 57 30.6

Oracabessa Bay is located in Oracabessa, St. Mary, Jamaica which is 20km east of Ocho Rios on the North Coast of Jamaica, West Indies. Oracabessa Bay has a shoreline that stretches 4.2km (2.84m). The sanctuary shoreline stretches 3.1 km (2.08m) which puts 73% of Oracabessa Bay's shoreline in OBFS. Chris Blackwell owns property that makes up 71% (2.2 km) of the OBFS shoreline.


N
W
E
S
Stick Rock
Dor's Fishpot
Lovely Spot
Ian Fleming Villa
Race Course
GoldenEye
Oracabessa Fishing Beach
Coleraine
James Bond Beach
Ian Fleming Int'l Airport
Lada Bay House
Oracabessa
Fisherman's Beach
Susie's Restaraunt
Canoe Pond
Gibraltar Beach
Gas Station
Gardner Land
Boscobell
Crossroads
Gibraltar
© 2011 Europa Technologies
© 2011 Google
Image © 2011 TerraMetrics
Image © 2011 GeoEye
©2010 Google
1000 m
Imagery Date: Jul 8, 2009
18°24'22.14" N 76°56'52.47" W elev 12 m
Eye alt 3.61 km

7. CLIMATE

A. Climate Overview

Jamaica's climate is subtropical, traditionally marked by two wet and two dry seasons, and irregularly modified by cold fronts from North America in winter and by tropical disturbances from the Atlantic in summer and autumn. Persistent rains, sometimes continuing for a week or more without interruption, occur between October and December; a second period of heavy rainfall often occurs during April and May. However this general pattern can vary significantly from year to year. June and July are normally the driest months of the year.

B. Temperature, Precipitation, and Humidity

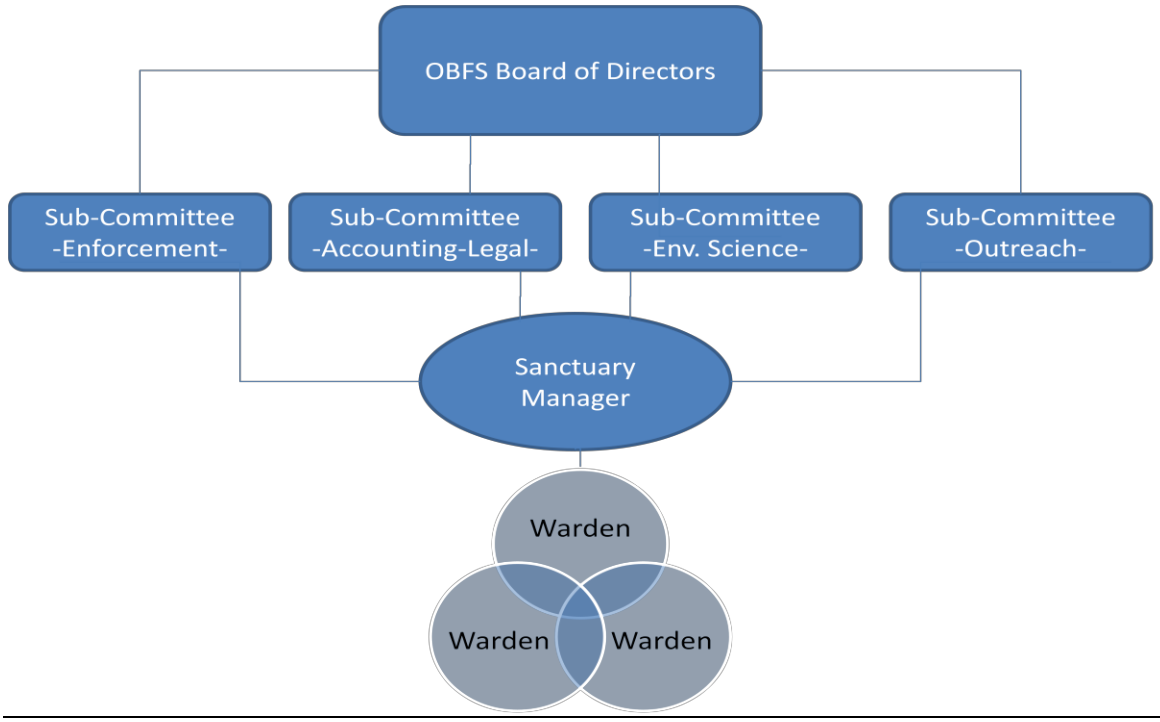
	Minimum Avg. Temperature	Maximum Avg. Temperature	Avg. Water Temperature	Sunshine Hours	Probability of Rain	Humidity
January	23°C 73°F	**29°C 84°F**	27°C 81°F	8	28%	81%
February	**22°C 72°F**	30°C 86°F	27°C 81°F	**9**	20%	79%
March	23°C 73°F	30°C 86°F	**26°C 79°F**	8	**16%**	77%
April	23°C 73°F	31°C 88°F	27°C 81°F	**9**	21%	78%
May	24°C 75°F	32°C 90°F	28°C 82°F	8	35%	79%
June	**25°C 77°F**	**33°C 91°F**	28°C 82°F	8	29%	78%
July	**25°C 77°F**	**33°C 91°F**	29°C 84°F	**9**	27%	**76%**
August	**25°C 77°F**	**33°C 91°F**	29°C 84°F	8	35%	77%
September	**25°C 77°F**	**33°C 91°F**	**30°C 86°F**	8	40%	79%
October	24°C 75°F	32°C 90°F	29°C 84°F	**7**	**41%**	**82%**
November	24°C 75°F	31°C 88°F	28°C 82°F	**7**	36%	81%
December	23°C 73°F	30°C 86°F	28°C 82°F	**7**	30%	80%

C. Winds

The weather of the north coast of Jamaica is dominated by north-easterly tradewinds, modified by local sea and land breeze systems. The trades combined with sea breezes usually give rise, by mid-morning (10am), to a wind from the northeast that increases from an initial speed of 1-2m/s to 4-9m/s in mid-afternoon (2pm) and returns to 1-2m/s in early evening (6pm). There is usually no wind late between 9pm-5am because the differences in heat capacities of the land and sea masses generate land breezes that counteract the constant tradewinds).

Major changes in wind parameters are not in direction but in speed, with average wind speeds lowest in October and as high as 13m/s in May. During the months December to March, the regular tradewind and land-sea breeze patterns may be interrupted by the passage of cold fronts from North America. These "northers" occur with irregular frequency from year to year; they typically last for three to four days and are accompanied by rain and strong north-westerly winds of 2-15m/s (18-40 k/h). During summer and early fall, the tradewinds are weaker and less predictable, and there may be extended periods of unusually calm weather with little or no wind during early morning hours.

8. GOVERNANCE & MANAGEMENT STRUCTURE



Goal: Create and maintain an effective and open governance and management structure.

OBFS Board will have 11 members; 4 Co-opted and 7 Institutional Board members.

1. The 7 institutional members are part of the 3 main organizations that are joining to create the OBFS and will always have part in the decision making process. These three organizations are the St. Mary Fisherman Cooperative (Oracabessa Branch), Oracabessa Foundation, and GoldenEye. The two other board members will be a Gibraltar Beach stakeholder and another community member that demonstrates an interest in the activities of the bay.

2. The 4 Co-opted members will be voted on to the board by the previous board members, and the first board will be voted in by the current members of the current 'unofficial' OBFS Board. Co-opted board members will serve for a term no longer than 12 months at which point they may be re-elected into that position (or a different one if they qualify) with no term limit. Co-opted members will strictly be a reference of expertise and will not have voting rights.

3. Co-opted board members will rotate being voted in by institutional board members (2 one year, and 2 the following) so all 4 members will not be replaced at one time to ensure operational competency of OBFS and its activities.

Institutional Board Members

The St. Mary Fisherman Cooperative, Oracabessa Foundation, and GoldenEye will have specific positions that will automatically step into their position on the OBFS Board of Directors. Community stakeholders will also be reserved 2 seats on the Board.

- St. Mary Fisherman Cooperative- will consist of the President, Vice President, and a member of the SMFC elected by members of the SMFC.
- Oracabessa Foundation- will be the organizations current Executive Director.
- GoldenEye- will be GoldenEye's current Head of Water Sports.
- Community Members- should be stakeholder's who invest time and money into the bay. Ideally a representative from Gibraltar Beach area and another Oracabessa Bay resident.

Co-opted Members

- Community Members- (2) will be citizens of the Oracabessa area that are not fisherman but have a stake in Oracabessa Bay.
- Scientist - will ideally be of a marine background. Other earth and bio sciences will be taken into consideration.
- Lawyer- will ideally be of an environmental background, but any type of lawyer may be considered for the job.
- Accountant- will ideally have been familiar with government procurement and accounting practices.
- Enforcement Officer- will ideally be, but not limited to, an acting/retired marine police officer.

Sub-Committees

- Will consist of at least 2 board members (1 of which is the chair), and non-board members interested in participating with OBFS.
- Create goals, assist ongoing and new activities implemented by OBFS, and identify any problems that may occur in their areas of expertise (i.e. education, enforcement, accounting, legal, etc.).

Sanctuary Manager

- Responsible for transforming ideas and goals of OBFS into a working reality.
- Partake and assist in the training and ongoing improvement of fishery inspectors.
- Ensure that all documents of OBFS (i.e. financial, registration and licensing, legal, etc.) are kept safe and ready to be viewed by OBFS stakeholders and MOA&F staff.
- Demonstrate ability to manage objectives well, and display aptitude for more responsibility.

Fishery Inspectors

- Enforce MOA&F and OBFS laws and policies.
- Attend and fully participate in all training activities, and must obtain all licenses and certificates necessary to registered FI.
- Interact with fisherman respectfully, develop good relations with all community members, and work with local enforcement officers to maintain an effective OBFS.
- Demonstrate ability to handle difficult situations with professionalism**.**

9. MANAGEMENT OBJECTIVES & ACTIVITIES

A. Vision & Mission Statement of Oracabessa Bay Fish Sanctuary

Vision: A healthy bay that provides for all community members.

Mission Statement: To increase biodiversity in Oracabessa Bay to improve livelihoods of the local community.

B. Funding & Financial Management

Goals

I. Annually raise funding and in-kind contributions equal to or greater than the financial support given by MOA&F

II. Spend all funds provided by the Government of Jamaica on ensuring the success of OBFS.

III. Spend at least half of outside funding on experimental programs in the areas of research/enforcement/education/etc. to ensure the continued growth and dexterity of Oracabessa Bay Fish Sanctuary.

Requirements

I. Maintain monthly and quarterly reports monitoring cash flow to ensure optimal funding from MOA&F, which is dependent on OBFS spending.

II. Develop an annual budget and submit financial reports for the operation of the sanctuary to all financial supporters (MOA&F, SMFC, OF, GE, private investors, etc) within the time agreed, and in the format specified by the Fisheries Division of the MOA&F.

III. Ensure that there is safe custody of the accounting records, which will be readily available for the scrutiny of OBFS Board of Directors and MOA&F personnel.

C. Habitats & Species Management

The Oracabessa Bay Fish Sanctuary will implement the following habitat & species management focal points through strategies outlined in sections *D. Enforcement* and *E. Environmental Education*.

OBFS shall use internal, government, and private expertise to monitor and evaluate the following goals;

I. Rebuild overfished stocks and maintain them at sustainably productive levels.
II. Protect and enhance fish habitats.
III. Eliminate fishing and foster compliance with no take regulations within the sanctuary.
IV. Increase community understanding of the sanctuary and foster community stewardship/ownership of conservation measures in the area.
V. Creating initiatives for rehabilitation of nurseries, mangroves, estuarial areas, and native species (remove invasive species).

D. Enforcement

Within the Oracabessa Bay Fish Sanctuary

Goals

I. To eliminate fishing and the taking of other marine life in OBFS.
II. Anyone caught fishing or taking from the OBFS will be subject to the OBFS Three Strike Policy.
III. Three Strike Policy- 1st offense: Warning, 2nd offense: Ticket, 3rd offense: Arrest

Outside the Oracabessa Bay Fish Sanctuary

Goals

I. Make sure that all fishermen have a registered boat and fishing license by a Registered Licensing Authority.
II. Enforce MOA&F and Fishing Industry Act polices on fishing equipment.
III. Reduce property theft (stealing of fishing equipment, and fish caught legally outside of OBFS).

Under the Memorandum of Agreement (MOA) and the Fishing Industry Act (FIA)

- Wardens will obtain district constable status and become licensed fishery inspectors by requesting the support of the Jamaica Constabulary Force, ISCF, Jamaica Defence Force, National Environment and Planning Agency, and other enforcement agencies.
- The fishery warden will not only be responsible to enforce within the Fish Sanctuaries, but also Buffer Zones and surrounding areas as necessary or possible.

- Wardens will be paid by OBFS through funding that will be provided by MOA&F, private investors, and domestic/international fundraising. Training and fishery inspector supervision will also be funded in a similar fashion.
- Wardens will be expected to work closely with OBFS and MOA&F in adherence to those organization's policies and procedures (operating legally/ethically). Wardens will be held accountable to enforce all laws governing fish sanctuaries (FIA, super ceding legislation from MOA&F and/or OBFS.
- Wardens will be available for the police questioning and sentencing hearings, as witnesses, when legal prosecutions are needed.
- OBFS and partners will be expected to provide wardens with appropriate, safety approved equipment.

Roles as Identified Under the OBFS Fisheries Warden Contract

The persons appointed to be fishery inspectors will be appointed for a one year period in the first instants with an initial three month probationary period. During the first year all fishery inspectors will be monitored to ensure that have a working knowledge of all laws that apply to the effective and efficient running of the sanctuary. The role of the Fishery warden is;

- To undertake the enforcement of the no fishing zone on land and at sea.
- To be fully aware of all laws and conditions that needs to be observed within OBFS.
- To enforce all laws and conditions that apply to the sanctuary and its buffer zones.
    1. NRCA 2. Fishing Industry Act 3. MOA
- To follow the directions of the management board in regards to enforcement of laws and conditions within the sanctuary and buffer zones.
- To be able to carry out the duties of a fishery inspector in regard to being able to use all equipment such as boats and equipment needed to efficiently carry out their duties.
- To be physically fit and able to swim
- To have no criminal record
- To be responsible for the maintenance and safety of all equipment used within the execution of their work the equipment
- To be involved in the education programmes organised and delivered by the sanctuary.
- To be able to support the monitoring and evaluation of the sanctuary and the production of reports for the ministry of agriculture and fisheries.

- To support the development of the marine environment within the sanctuary
- To be willing to train and then function as a District Constable.
- Fisheries wardens will be required to work flexible shifts and working hours as directed by the Sanctuary manager.
- To undertake all activities directed by the sanctuary manager or management board.

Employment is conditional on the continuation of the contract for managing the sanctuary from the MOA&F. Termination of contracts will require one months notice.

All fisheries inspectors will be expected to work only on sanctuary business during the times they are on duty. Other activities such as fishing or using sanctuary equipment while on duty will result in immediate suspension pending investigation by the management board.

E. Environmental Education

Goals

Increase awareness of all community members about:

1. The problem in Oracabessa Bay.
2. What is being done to treat the problem?
3. How community problems can contribute to addressing the problem.

Prevention & Treatment Initiatives

The Oracabessa Bay Fish Sanctuary will establish an Education sub-committee who will;

I. Work with other fish sanctuaries, the MOA&F, and NEPA to promote awareness of fish sanctuaries on a local, national and international level.

II. Work with the local community, stake holders, schools and other local groups to raise awareness and understanding of the Oracabessa Bay Fish Sanctuary, the reasons for the fish sanctuary, problems with environmental issues, wider impacts of over fishing and the progress being made by the OBFS in reversing the environmental impacts and the declining fish stocks.

III. Work directly with key stakeholders to improve compliance in fishing methods and locations for fishing, improve environmental practices that impact the health of Oracabessa Bay and build an effective working relationship with stakeholders.

IV. Disseminate the results of our monitoring and evaluation within the OBFS. We will seek to establish methods to undertake this dissemination including community notice boards, regular meetings and other electronic methods.

Environmental Education Implementation Plan

	Target	Milestones	Outcome	Timeline
Main Fish Sanctuary Signs	To have made and erected two signs to show the Boundaries of the Oracabessa Bay Fish Sanctuary	1. Design the signs 2. Select suitable locations 3. Produce the signs 4. Erect the signs	Two signs erected at the boundaries of the Fish sanctuary.	4 months Nov. 2011 – Feb. 2012
Production of educational materials	To design and produce a poster and brochure about fish sanctuaries in Jamaica and the Oracabessa Bay Fish Sanctuary.	1. Establish a group to write the text for both documents 2. Produce a design for both the brochure and the poster 3. Estimate the number of posters and brochures needed 4. Get quotation for printing 5. Select the best value for money quotation 6. Place order for production. 7. Distribute finished posters and brochures to our target audience	All local schools, post offices, libraries, community groups and fisherman beaches have copies of the posters displayed and have brochures to distribute.	4 months Dec. 2011 – Mar. 2012
Develop a website for the Oracabessa Bay Fish Sanctuary	To develop a website to show the work of the Oracabessa Bay Fish Sanctuary	1. To design a website that will show the work of the OBFS 2. A description of the sanctuary and how it is managed 3. The information gathered through the monitoring and evaluation undertaken by the OBFS 4. Photographs and video collected as part of the operation of the OBFS 5. Information on the network of fish sanctuaries throughout Jamaica 6. Information on the Law as it applies to the Fish Sanctuary	A working website with our own URL that is updated on a regular basis.	4 Months Jan. 2012 – Apr. 2012

F. Training

Training of OBFS staff, local fishers and local community members is critical to the success of the fish sanctuary. Training goals include;

I. Prospective wardens will be trained by NEPA and Fisheries to become fully licensed game wardens/fishery inspectors.
II. Working closely with the St Mary Fishermans Co-operative the needs of the local fishers will be assessed and workshops looking at relevant issues will be organised e.g. new fishing regulations, new fishing methods and techniques etc.
III. The training programmes and workshops will be closely monitored and evaluated to ensure value for money and effectiveness.
IV. Annually conduct audit of the skills needed for all staff employed by the OBFS, and have a personal training program that will be monitored twice each year to ensure success.

G. Sharing

OBFS will encourage the free flow and exchange of information and experience's about management and protection of coral reef resources between marine protected areas, governments, and other interested persons.

Oracabessa Bay Fish Sanctuary's open information management system will strive to ensure not only its MPA's success, but also, the success of all fish sanctuaries in Jamaica, the Caribbean, and furthermore, the world. It is our goal to create an organization that will be a catalyst for sharing best practices in maintaining a sustainable sanctuary. We at OBFS recognize our need for outside assistance in achieving our goal and will actively pursue supporting supplementary marine protected areas, and other environmental conservation organizations.

10. LEGAL CONTEXT

A. Oracabessa Bay Fish Sanctuary NGO

The Oracabessa Bay Fish Sanctuary is recognized by the Government of Jamaica as a marine protected area as of May 2010 when it became officially gazetted. Management authority has been delegated by the Ministry of Agriculture and Fisheries (MOA&F) to the Oracabessa Foundation through the Memorandum of Agreement, which was signed December 09, 2010. The Oracabessa Foundation will manage the sanctuary on an interim basis until the Oracabessa Bay Fish Sanctuary NGO acquires the necessary legal status to operate as the partner organization. OBFS will be a cooperative venture by the St. Mary's Fisherman Cooperative (Oracabessa Branch), Oracabessa Foundation, and GoldenEye.

B. Governing Legislation of OBFS

1. *Memorandum of Agreement (MOA)*

   The agreement between the Government of Jamaica and partner organizations to establish and operate a marine protected area which defines responsibilities of both parties in areas of administration, funding & financial management, legal framework, enforcement, environmental education, training, and more.

2. *Natural Resources Conservation Authority Establishment of Authority (NRCA)*

   Authority was established July 5, 1991. The function of this Authority will be to take such steps as are necessary for the effective management of the physical environment of Jamaica so as to ensure the conservation, protection and proper use of its natural resources; to promote public awareness of the ecological systems of Jamaica and their importance to the social and economic life of the Island; to manage such national parks, marine parks, protected areas and public recreational facilities as may be prescribed, to advise the Minister on matters of general policy relating to the management, development, conservation and care of the environment; and to perform such other functions pertaining to the natural

resources of Jamaica as may be assigned to it by the Minister or by or under this Act or any other enactment.

3. *Fishing Industry Act (FIA)*

Established October 1, 1976 the FIA says that no person shall engage in fishing in Jamaica as may be prescribed, unless he is the holder of a valid license issued by the Licensing Authority. Any person in breach of this act shall be guilty of an offence which is punishable by fine not exceeding J$1,000. Default of payment can mean imprisonment not to exceed 12 months. The Minister may designate by general notice a public officer as the Licensing Authority and such other public officers as he may think fit to assist the Licensing Authority (OBFS warden).

11. FORMAL REVIEW OF OBFS MANAGEMENT PLAN

The Oracabessa Bay Fish Sanctuary Management Plan will operate for 15 months; a review process will commence 3 months before it expires. This review process will be informed by the ongoing monitoring of the implementation of its operational plans.

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13. ACKNOWLEDGEMENTS

The following persons and organizations played a vital role in the establishment of the Oracabessa Bay Fish Sanctuary and need to be acknowledged for their efforts. They have given their time, energy, and resources ensure the success of OBFS as a marine protected area.

Jonathan Gosse (Oracabessa Foundation) for leading weekly sanctuary meetings, and his diligent and unyielding commitment to the community of Oracabessa.

David Murray (President: St. Mary Fisherman Cooperative) for giving his time and backing the OBFS with the much needed support of the St Mary Fisherman's Cooperative.

Melvyn Tennant (Community Member) for bringing experience and hard work in transforming an idea into a working reality.

The Environmental Foundation of Jamaica for funding our project *A Future For Fishermen* which allowed us to create this management plan for our fish sanctuary.

The Ministry of Agriculture & Fisheries, especially Fisheries Department, for its effort to establish fish sanctuaries in Jamaica.

Nicole Brown (Independent Consultant) for creating a 'road-map' on how to develop a marine protected area management plan.

The Environmental Fund of Jamaica for providing the Oracabessa Foundation with a grant; 'A Future for Fisherman: Management Plan Development for the Oracabessa Bay Fish Sanctuary.'

Winston Notise (VP: St. Mary Fisherman Cooperative) for being an active liaison between the fisherman's cooperative and the community.

Pauline Richards (Secretary: St. Mary Fisherman Cooperative) for her commitment to ensuring the success of the OBFS and being a voice for women in Oracabessa.

John Fannell (Fisherman) for his dedication to the St. Mary Fisherman Cooperative and for being a concerned and conscious fisherman in Oracabessa.

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Martin Fannell (Fisherman) for his passion for fishing and enthusiasm in being part of the Oracabessa Bay Fish Sanctuary.

Kenric Simms (Glass Bottom Boat Owner) for participating in OBFS activities, and for his commitment to marine conservation.

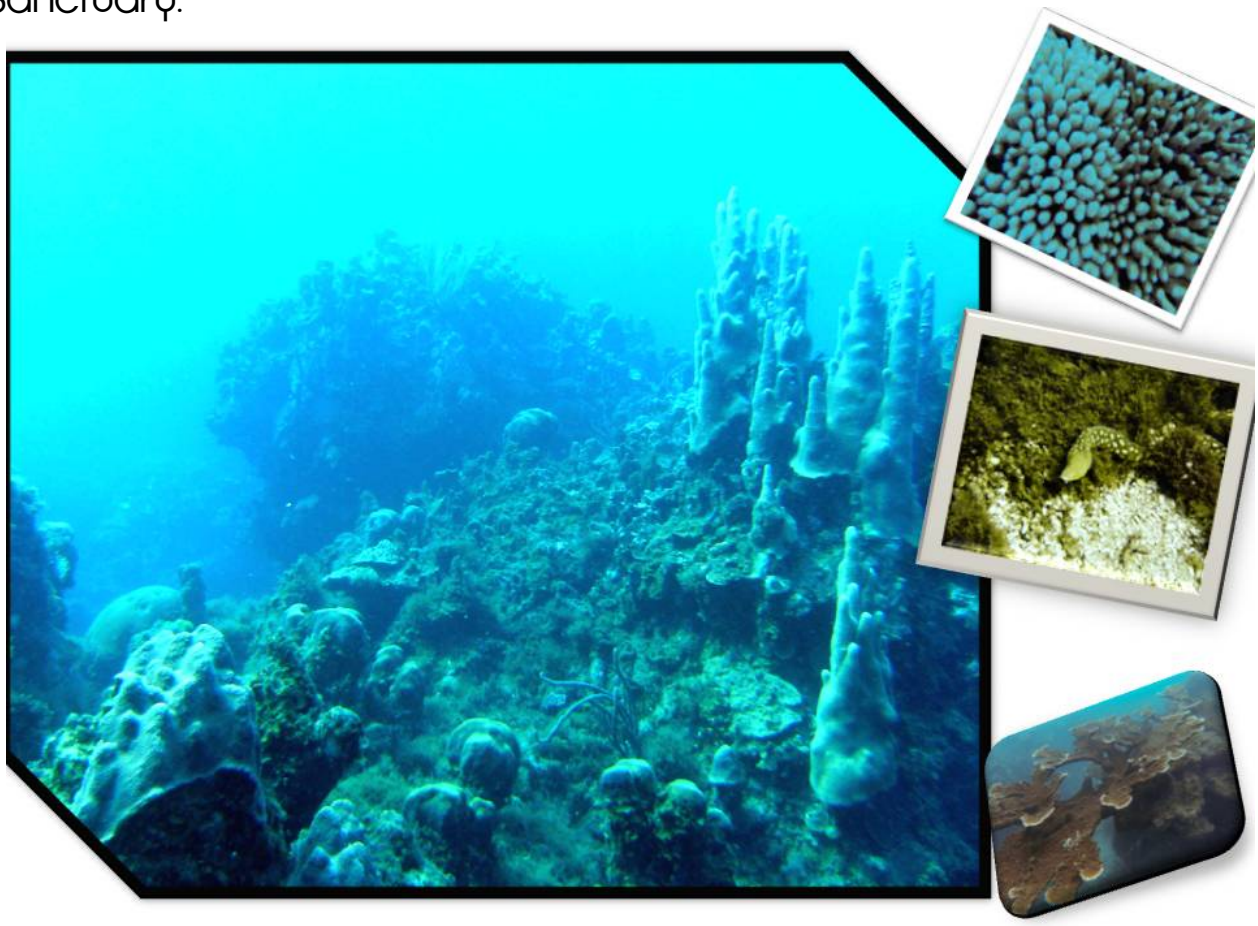
Carlton Brown (Fisherman) for bringing a local perspective on issues concerning the Oracabessa Bay Fish Sanctuary.

14. APPENDIX A

ORACEBESSA FISH SANCTUARY

BASELINE SURVEY ASSESSMENT

A Rapid Assessment of the Reefs of the Oracabessa Bay Fish Sanctuary.



October 2011

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Executive Summary

The Oracabessa Fish Sanctuary is one of nine newly established Fish Sanctuaries in Jamaica. This approximately 96.1 hectare sanctuary is managed by the Oracabessa Foundation in partnership with the St. Mary Fisherman's Cooperative. There is a paucity of baseline information readily available on the reef biota and fish populations in this marine space and in order to measure the efficacy of the goals, objectives and management systems that are to be implemented in the sanctuary then it necessary that sound baseline data is collected to inform the evaluation process

In September 2010 and May 2011 rapid ecological assessments of the reefs within and immediately adjacent to Oracabessa Bay Fish sanctuary was conducted to determine current reefs health and the status fish populations. The goal of the assessments was to collect data on the following indicators of reef health: (a) coral cover, (b) algal cover, (c) reef relief (rugosity), and (d) fish families. The assessment conducted at seven (7) reef areas using a modified Atlantic & Gulf Rapid Reef Assessment (AGRRA) methodology- this utilized a combination of photo-transects and AGRRA fish assessment methods.

In general, all the reef systems assessed were algal dominated and the fish population although diverse is comprised of mainly juvenile individuals. The topography of the reefs assessed were medium to low relief and the mean hard coral cover of the entire survey site was determined to be 7.09% ± 2.3SE and

macro algae a mean cover was 75.58% ± 3.8SE. With the exception of Morantie Reef, (20.1% ± 3.8SE), there was no noticeable difference in hard coral cover between those reefs located with the boundary of the sanctuary and those found just outside the boundary. Fleshy algal cover was always in excess of 50% cover at all sites which is indicative of an algal dominated reef system.

Sixty-nine (69) different fish species were recorded in the Oracabessa Fish Sanctuary during assessments conducted in 2010 and 2011. Forty percent (40 %) of fish species recorded during the assessments were often observed in low densities. These species include blue tangs, bar jacks, graysby and coney. Commercially important species such as snappers and grunts were rarely observed and were usually observed in low densities.

Parrotfish were recorded in high densities at all sites investigated. However based on the assessment of the biomass and size class of the fish populations observed it was determined that populations observed was predominantly comprised of the juvenile to sub-adult fishes. Also of importance and concern is the fact that 2-10 lionfish individuals were recorded at each site.

Background

The Oracabessa Fish Sanctuary is one of nine newly established Fish Sanctuaries declared by the Minister of Agriculture in May 2010. This approximately 96.1 hectare sanctuary is managed by the Oracabessa Foundation in partnership with the St. Mary Fisherman's Cooperative. The primary objective of the sanctuary is to create a no-fishing zone that will ultimately protect the breeding grounds and fish habitats in the bay and gradually increase the fish population in the adjacent fishing areas.

The partnership between the Oracabessa Foundation and the local fishers is still in its infancy however, there is a high level of enthusiasm by all involved in the management of this marine protected area. In order to measure the efficacy of the goals, objectives and management systems implemented in the sanctuary then it necessary that sound baseline data is collected to inform the evaluation process.

In September 2010 and May 2011 rapid ecological assessments of the reef at seven (7) sites within and immediately adjacent to Oracabessa Bay Fish sanctuary was conducted to determine current reefs health and the status fish populations. The goal of the assessments was to collect data on the following indicators of reef health: (a) coral cover, (b) algal cover, (c) reef relief (rugosity), and (d) fish families. This report presents the findings of the ecological surveys conducted.

Methodology

The assessment conducted at seven (7) reef areas using a modified Atlantic & Gulf Rapid Reef Assessment (AGRRA) methodology- this utilized a combination of photo-transects and AGRRA fish assessment methods. The assessment was conducted on September 22 and 23, 2010 (3 sites) and May 11 - 13, 2011 (4 sites) with the assistance of the local fishermen who were instrumentally in the site selections for assessments (Figure1 & Table 1). Rock was the only site that was assessed on both occasions.

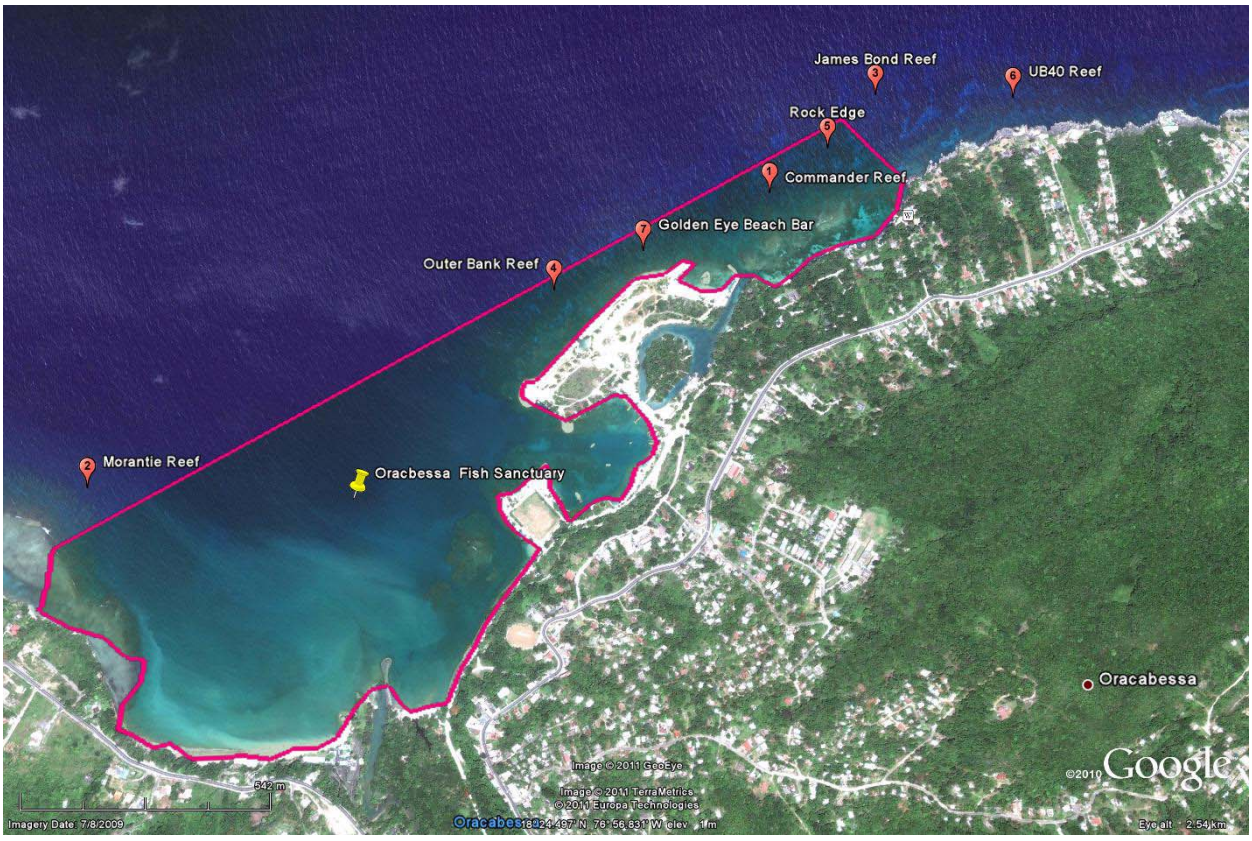


Figure 1: Oracabessa Bay Fish Sanctuary Assessment Sites

Table 1: Location of Assessment Sites

Site	Latitude	Longitude	Depth
Commander Reef	18° 24.784'N	76° 56.641'W	14m
Morantie Reef	18° 24.411'N	76° 57.551'W	8m
James Bond Reef	18° 24.908'N	76° 56.500'W	12.8m
Outer Bank Reef	18° 24.661'N	76° 56.929'W	8m
Rock Edge*	18° 24.841'N	76° 56.564'W	14m
UB 40 Reef	18° 24.904'N	76° 56.317'W	10.6m
Golden Eye Beach Bar	18° 24.711'N	76°56.8098'W	10m

** Repeat Site*

Benthic Assessments

At each site five 20m transects were deployed. The lines were photographed at 0.5m intervals with the camera placed at a fixed distance of 0.5m above the substrate to determine the composition present. The data collected using the photographic survey was then analyzed using a visual basic programme "Coral Point Count with Excel extensions" (CPCe) version 3.6. This programme is used to provide an estimate of the substrate composition from still images or frame-grabbed video (Kohler and Gill, 2006). The programme utilizes the random point count method in which random points are generated and distributed on a still image and the species or substrates underlying these points are then identified.

Reef Complexity

Reef rugosity, a measure of the structural architecture or three-dimensional nature of the site was determined using the chain length method. At each site five 10m chains were draped over the substrate directly beside the transect line. The reef rugosity is expressed as an index of the ratio of the chain length to the actual length of the transect line by the following formula: Rugosity = 1 – (CL/TL); where CL = chain length and TL = transect length. The closer the resulting value is to zero the flatter the reef.

Fish

Along the same lines used for the substrate assessment, 2m wide by 20m long belts were assessed using a modification of the AGRRA methodology for assessing fish. In this modification, five 20m transects were assessed instead of a minimum of six 2m wide by 30m long belt transects. During this assessment fish density and size classes of key fish species that play an important role in reef ecology and commercially important fishes were measured. The estimation of total biomass of individual fish groups was also determined from this assessment.

Roving diver surveys, a feature of AGRRA fish assessments, were also conducted. Two parameters were used to assess the fish population, species density and percentage sighting frequency (%SF). These parameters provide a measure of the relative density of species and the frequency with which these

species were observed. These surveys recorded the species seen and an abundance category for each species thus allowing for density calculations for each site. The fish observed where categorized based on the estimates of the number of individuals sighted during each survey: **S**ingle = 1, **F**ew = 2-10, **M**any = 11-100, and **A**bundant = over 100. This data was further translated to an abundance scale of 1- 4 with 4 representing the highest abundance (Abundant) and 1 representing the lowest abundance (Single). The information gleaned from the species density and the sighting frequency data was then used to determine the overall abundance of the recorded fish species found in the sanctuary.

Table 2: Interpretation of Findings for Roving Diver Census (REEF, 2010)

Category	Den	%SF	Explanation
A	HIGH Den >3.0	HIGH %SF >50	Species is often observed and observed at high densities. Species is seen > 50% of the time and when it is seen the abundance category most often recorded is M or A.
B	HIGH Den >3.0	LOW %SF <50	Species is not often seen, but when it is seen, it is observed at high densities. Species is seen < 50% of the time and when it is seen the abundance category most often recorded is M or A.
C	LOW Den <3.0	HIGH %SF >50	Species is often observed, but always at low densities. Species is seen > 50% of the time and when it is seen the abundance category most often recorded is F or S.
D	LOW Den <3.0	LOW %SF <50	Species is not often observed and when it is observed, it is at very low densities. Species is seen < 50% of the time and when it is seen the abundance category most often recorded is F or S.

Findings

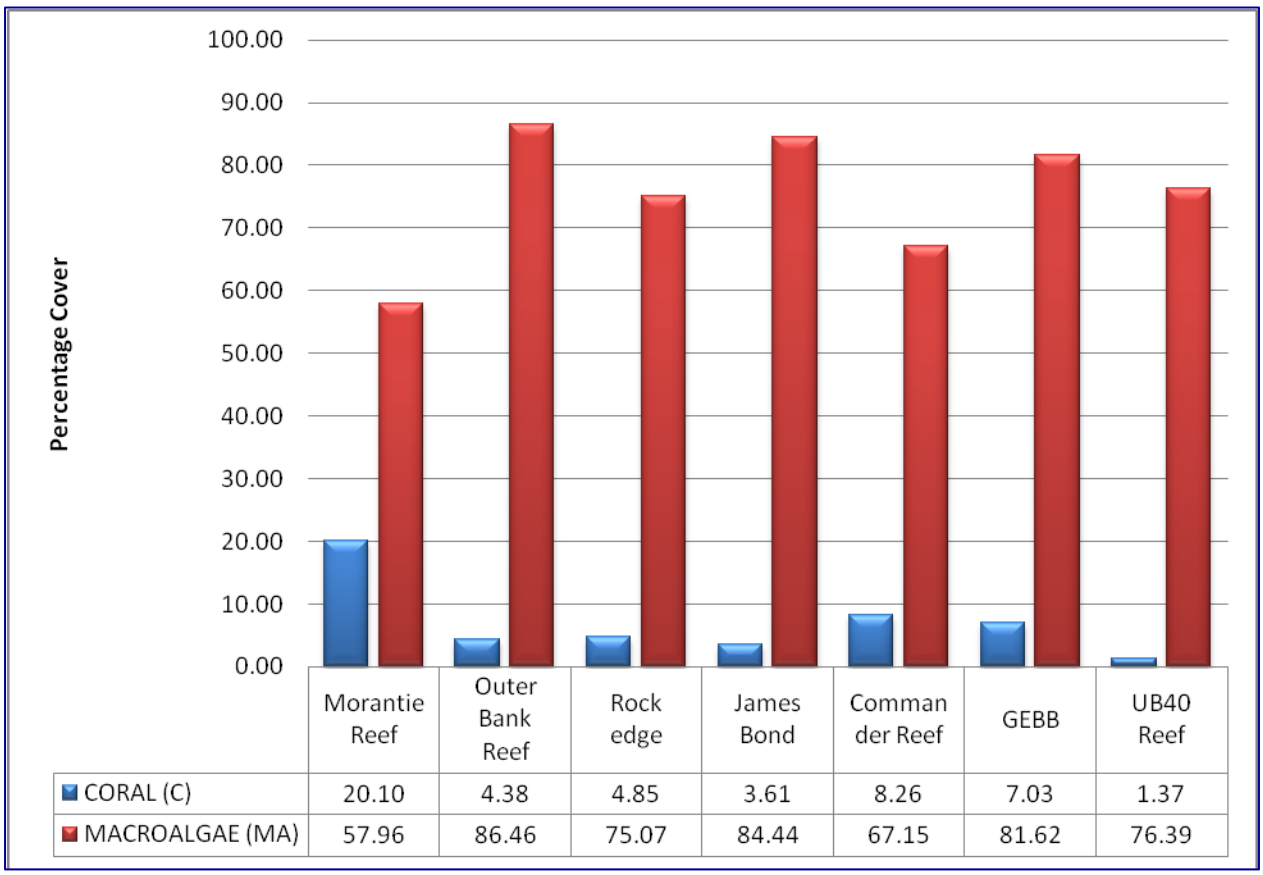
The general observations of the rapid ecological assessment of the reefs of the sanctuary indicate that there is some room for improvement of existing health status of this ecosystem. Reef systems are algal dominated and the fish population although diverse is comprised of mainly juvenile individuals. The analysis of the baseline data collected for each reef health indicator is presented in the following paragraphs.

Benthic Cover

The benthic cover of the reef provides a comparison of the functional groups that comprise a reef such as coral, algae, sponges and other sessile invertebrates. Benthic cover provides a good indicator of the process of reef competition among reef organism. The availability of space is a reef is essential to reef organism for growth and development and as a result there is often competition between reef biota. The competition between live coral cover and fleshy algal cover is of concern to because the loss of live coral cover will result in shift from coral dominated reefs to algal dominated reefs. The loss of live coral cover will ultimately lead to a loss of reef framework. Coral cover is an excellent indicator of reef health and is normally a proxy for net coral growth.

The results from the baseline assessment indicate that the reefs within the area assessed had a mean hard coral cover of 7.09% ± 2.3SE and macro algae a mean cover of 75.58% ± 3.8SE. With the exception of Morantie Reef, with a

coral cover of 20.1% ± 3.8SE, there was no noticeable difference in benthic cover between those reefs located with the boundary of the sanctuary and those found just outside the boundary. Fleshy algal cover was always in excess of 50% cover at all sites which is indicative of an algal dominated reef system (Figure 2).



	Morantie Reef	Outer Bank Reef	Rock edge	James Bond	Commander Reef	GEBB	UB40 Reef
CORAL (C)	20.10	4.38	4.85	3.61	8.26	7.03	1.37
MACROALGAE (MA)	57.96	86.46	75.07	84.44	67.15	81.62	76.39

Figure 2: Benthic Cover at Survey Sites

Reef Complexity (Rugosity)

A reef's architecture and structural complexity will determine the availability of habitats for reef organism to shelter. The relief of a reef also aids in the protection of shorelines. The higher the reef rugosity then more habitat is available to provide shelter to reef fish and other organism. At the sites assessed the reefs were relatively low to medium relief and of similar species richness. In Figure 3 which shows a plot of species richness compared with the reef rugosity, there is a noticeable (approximately two-fold) increase in the species richness at the Golden Eye Beach Bar and the UB 40 site in comparison to the other sites. This discrepancy is attributable to differences in observer expertise.

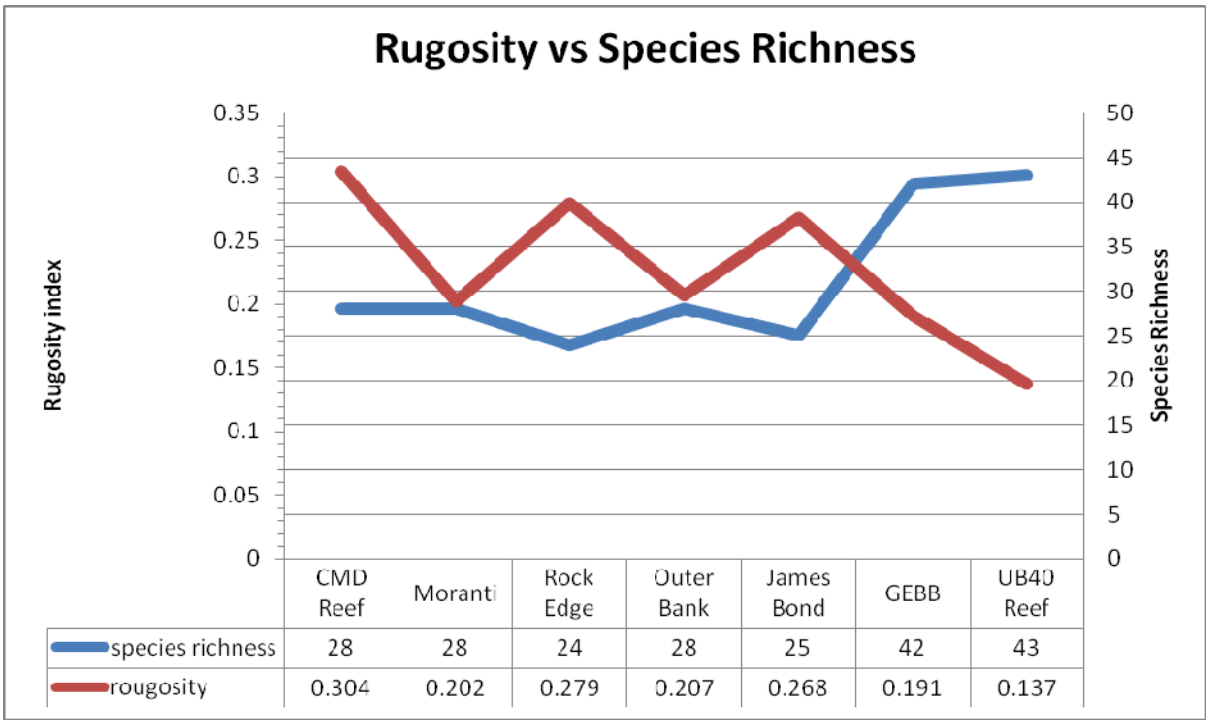


Figure 3: Reef Rugosity and Species Richness

Fish Community

The assessment of fish populations provides an indication of fish community dynamics and an indication of anthropogenic influences such as over-fishing. The examination of commercially fish density, size and biomass will provide an indication of the status of the fish stocks and by extension fishing pressure in the area.

In addition the overall assemblage of fish species on the reef gives a general indication of the community dynamics on the reef. The relative abundance of one trophic group to another will dictate species interactions; the types of predators on the reef are determined by the relative availability of prey food items. Similarly, the amount of fleshy algae on a reef is determined to a significant extent on the abundance of herbivorous fish on the reef.

Four indicators of fish health were assessed using data collected on key reef fish species and commercially important groups; (a) the total biomass of key fish groups (b) the observed size classes of the fish groups (c) the relative abundance key fish species and (d) a sighting frequency of all fish species observed during the surveys.

Fish Biomass

Fish biomass gives and overall indication of the reef fish community health status. The biomass of reef fish is calculated based on estimates of length to weight relationships of the individual groups. Fish biomass estimation is also a good indicator of the reproductive health of the fish population. Larger fish will in general produce greater numbers of offspring.

The data collected indicates that parrot fish biomass (159g/100m^2) was the highest on the reef however this total biomass was still low in comparison to other Caribbean reefs. All other families were well below 100g/100m^2 (Figure 4).

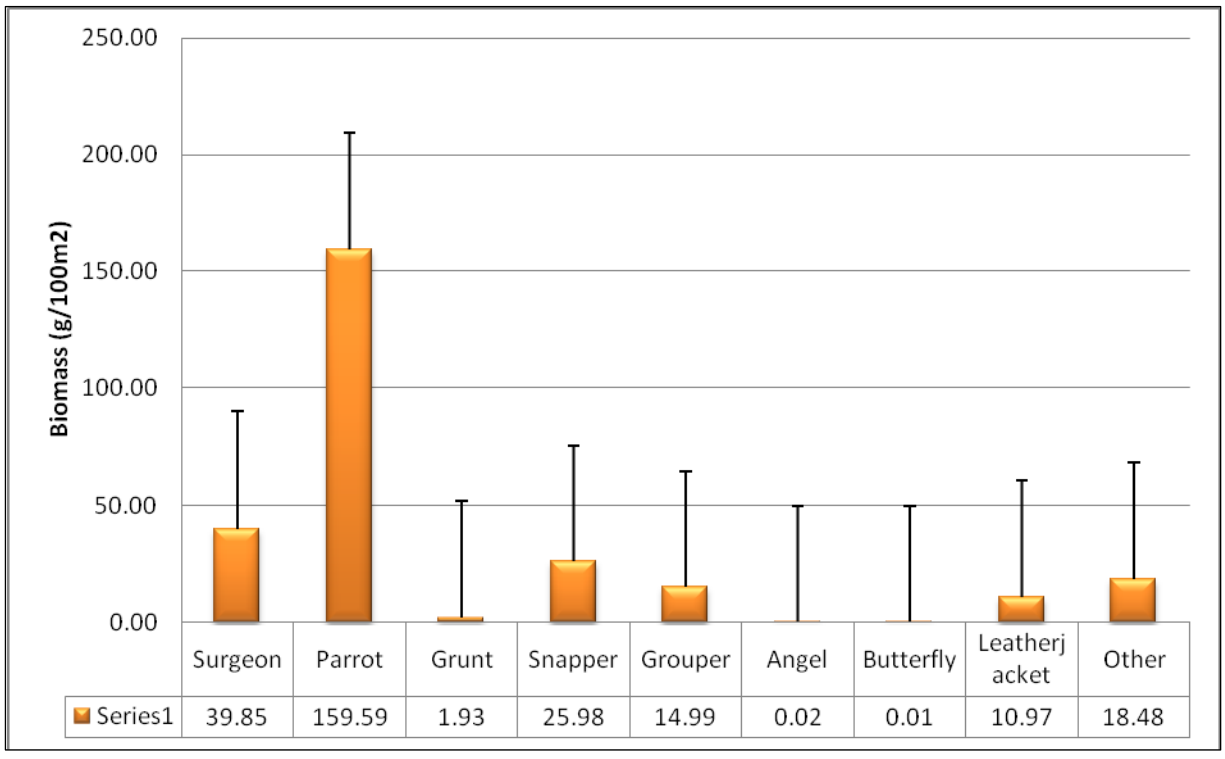


Figure 4: Mean Biomass of Fish Families

Fish Size

An examination of the size classes of the fish population is generally a good indication of the resilience of the fish population. The mean of the size class observed within each fish family gives an indication of relative age of the cohort of the population. The average size of fish species recorded was below the expected size class range of adults (Table 3).

Table 3: Expected Size Adult Size Class for Commercially Important Fish Families

Group	Surgeonfish	Parrotfish	Grunt	Snapper	Grouper
Adult size range (cm)	15 -30	15 - 25	15 - 25	17 - 45	15 - 25

For all species recorded the highest distribution of individuals were recorded in the 6-10 cm size class. In the case of the commercially important species such as the parrotfish, grunts and groupers high number of individuals were also recorded in the 11-20 cm size class. No species had individuals >21 cm in size (Figure 5). This indicates that the fish population within the study area is mostly comprised of the juvenile to sub-adult class ranges.

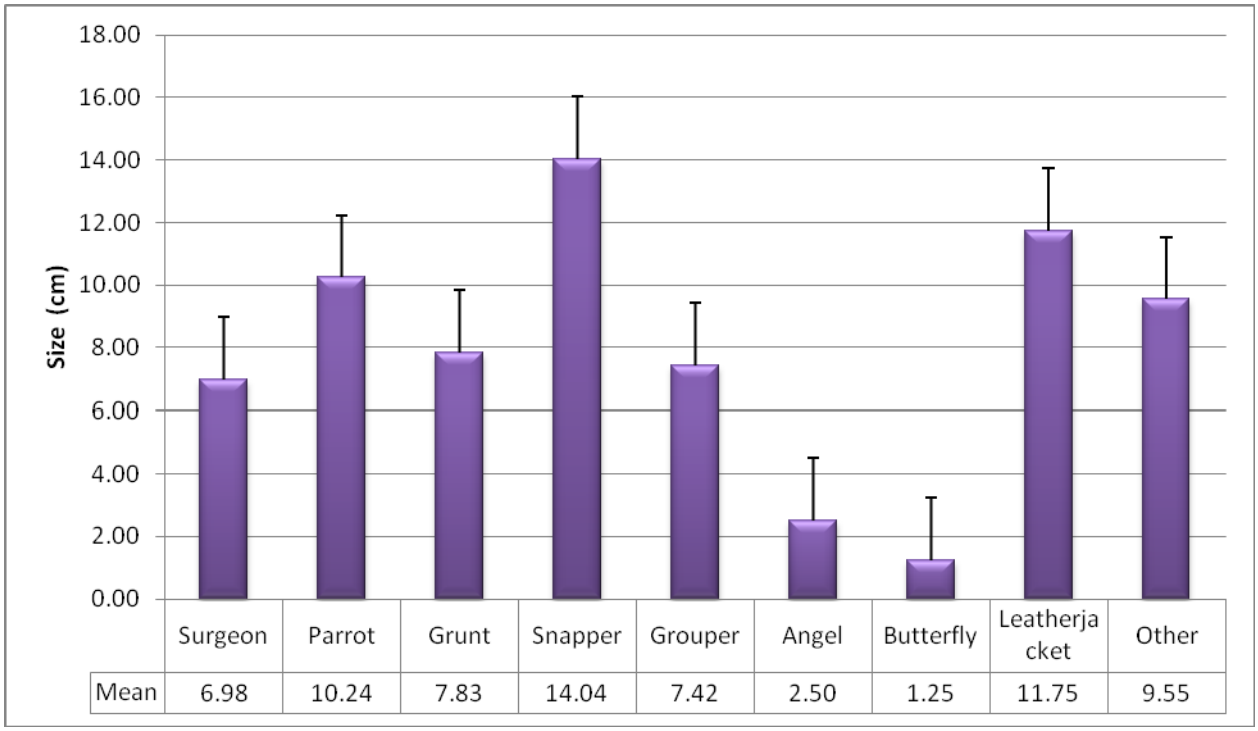


Figure 5: Mean Size Class of Fish Families

Fish Density

Healthy reef fish communities will have high numbers of fish on a reef. Fish density was relatively low when compared to other reef with the Caribbean. Of the main families parrotfishes and surgeon were the most abundant on the reef surveyed all other species were observed in relatively low densities. (Figure 6).

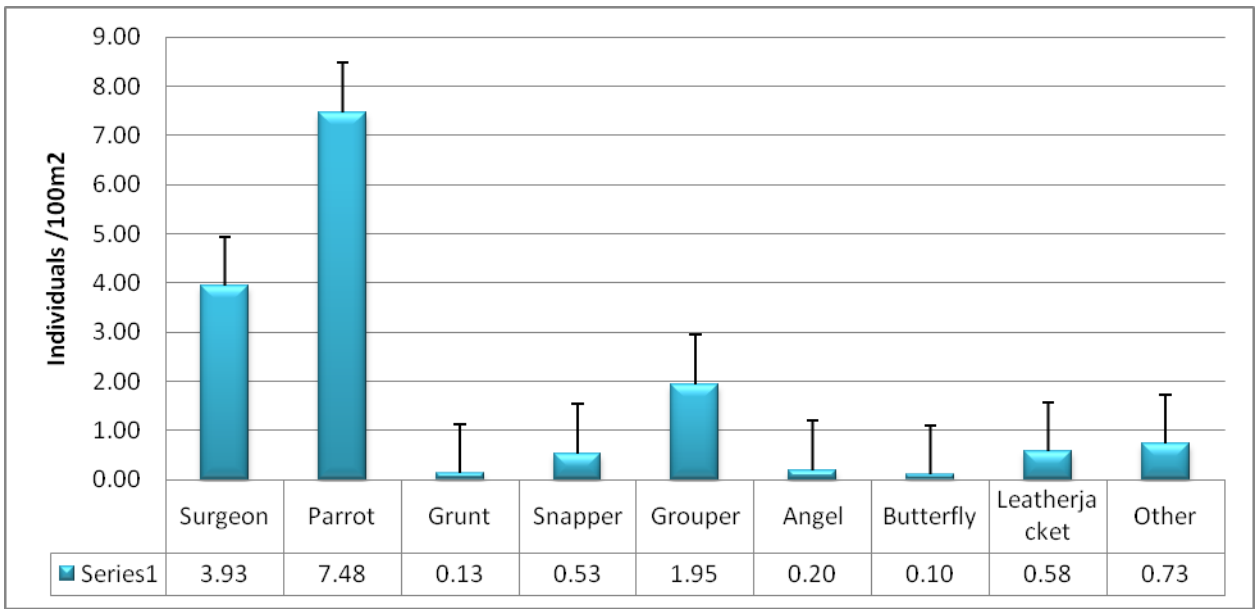


Figure 6: Mean Density of Fish Families

Fish Sighting Frequency & Distribution

An analysis of the density and the sighting frequency data can be used to determine the overall abundance of the recorded fish species from the study area. Using the roving Diver methodology, sixty-nine (69) different fish species were recorded in the Oracabessa Fish Sanctuary during assessments conducted in 2010 and 2011. The species list is provided in Appendix I

Data collected in 2010 and 2011 indicate that over 40 % of fish species recorded during the assessments are often observed but usually in low densities (Category C) {Figure 7}. These species include blue tangs, bar jacks, graysby and coney. Species that were often observed in high densities (Category A) for both years include the commercially important ocean surgeonfish as well as the blue chromis and yellowhead wrasse. Commercially important species

such as snappers and grunts were rarely observed and were usually observed in low densities. The indicator species banded butterfly and foureye butterfly were spotted however they occurred in low densities. The striped and spotted parrotfish were recorded in high densities at all sites investigated (Category A). They were however recorded in the AGRRA fish assessment as predominantly within the juvenile to sub-adult size class range. Also of importance and concern is the fact that 2-10 lionfish individuals were recorded at each site investigated.

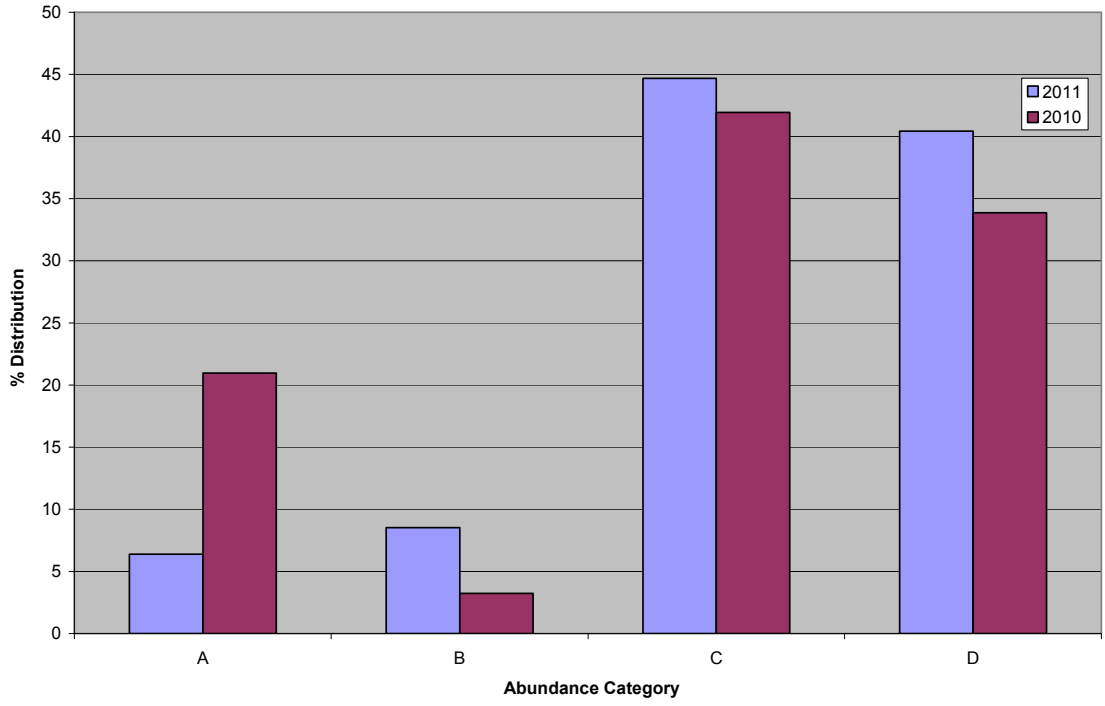


Figure 7: Fish Abundance determined by Sighting Frequency and Density

Author's Statement

This baseline assessment was conducted to provide a snapshot of the current conditions of the reefs within the sanctuary and also of the fish stocks. The data collected represents a starting point for further investigations and may be used a benchmark to measure management interventions to enhance fish populations and overall reef health.

Appendix 1 : Fish Sighting Data

		2011					2010		
Fish Species	**Common Name**	**Commander Reef**	**Outer Bank Reef**	**James Bond Reef**	**Morantie Reef**	**Rock Edge**	**Rock Edge**	**UB40 Reef**	**Goldeneye Beach Bar**
Abudefduf saxatilis	Sergeant Major				m		f	f	s
Acanthurus bahianus	Ocean Surgeonfish	m	m	m	m	m	a	a	a
Acanthurus coeruleus	Blue Tang	m	m	f	f		f	m	m
Aluterus scriptus	Scrawled Filefish						s		
Amblycirhitus pinos	Redspotted hawkfish							s	f
Aulostomus maculatus	Trumpetfish	f					f		f
Bodianus rufus	Spanish Hogfish			f				f	f
Canthidermis sufflamen	Ocean Triggerfish			m					
Canthigaster rostrata	Sharpnose Puffer	f					f		f
Caranx latus	Horse-eye Jack		f						
Caranx ruber	Bar Jack	s	s	f	f	f	f	f	f
Chaetodon capistratus	Foureye Butterflyfish	f	f			f	s	S	s
Chaetodon striatus	Banded Butterflyfish	f	f	f	f		s	f	
Chromis cyanea	Blue Chromis		m		a	m	m	a	a
Chromis multilineata	Brown Chromis	m				m		m	m
Clepticus parrai	Creole Wrasse	m	m	f	f		m		a
Epinephelus cruentatus	Graysby	f	f	f	f	f	f	m	s
Epinephelus fulvus	Coney			f	s	f	s	m	f
Epinephelus guttatus	Red Hind							f	
Equetus punctatus	Tobaccofish							s	f
Equetus punctatus	Spotted Drum							f	
Gobiosoma evelynae	Sharknose Goby						f		
Gramma loreto	Fairy Basslet		f		f		f	f	m
Haemulon flavolineatum	French Grunt	f	f				f	s	f
Haemulon parrai	Sailors Choice						s		
Halichoeres garnoti	Yellowhead Wrasse	a	m	m	f	m	a		a
Halichoeres maculipinna	Clown Wrasse		f				m		
Holocanthus tricolor	Rock Beauty								s
Holocentrus marianus	Longjaw Squirrelfish	m	m	f	f	m	f	m	f
Holocentrus rufus	Longspine	f	f	m	m	f	f	m	f

		2011					2010		
Fish Species	**Common Name**	**Commander Reef**	**Outer Bank Reef**	**James Bond Reef**	**Morantie Reef**	**Rock Edge**	**Rock Edge**	**UB40 Reef**	**Goldeneye Beach Bar**
Hypoplectrus gummigutta	Squirrelfish Blue Hamlet							f	
Hypoplectrus guttavarius	Shy Hamlet							f	f
Hypoplectrus indigo	Indigo Hamlet			f			s	f	f
Hypoplectrus puella	Barred Hamlet			m			f	f	s
Hypoplectrus unicolor	Butter Hamlet	s						f	f
Inermia vittata	Boga							f	
Lactophrys triqueter	Smooth Trunkfish								s
Lutjanus analis	Mutton Snapper					f	m	s	
Lutjanus mahogoni	Mahogany Snapper		s		f				f
Malacanthus plumieri	Sand Tilefish	s					f		s
Melichthys niger	Black Durgon				f			m	s
Microspathodon chrysurus	Yellowtail Damselfish	f		f	f	f	m	m	m
Mulloidichthys martinicus	Yellow Goatfish		m		f		f	f	m
Myrichthys breviceps	Sharptail Eel		s						
Myrichthys ocellatus	Goldspoted Eel							s	
Myripristis jacobus	Blackbar Soldierfish	f					m	m	m
Ocyurus chrysurus	Yellowtail Snapper	f	m	f	f	m			
Pempheris schomburgki	Glassy Sweeper								m
Priacanthus cruentatus	Glasseye Snapper						f		
Pseudopeneus maculatus	Spotted Goatfish	f	m	f	m	f	f	s	s
Pterois sp.	Lionfish	f	f	f	f		f	f	f
Rypticus saponaceus	Greater Soapfish						f		
Scarus croicensis	Striped Parrotfish	f	f	f		m	m	a	a
Scarus taeniopterus	Princess Parrotfish		m	f	f	f			
Scarus vetula	Queen Parrotfish						f		
Scomberomorus regalis	Cero Mackerel					f			
Serranus tigrinus	Harlequin Bass	f	f	f	f	f		f	f
Sparisoma atomarium	Greenblotch							m	m

		2011					2010		
Fish Species	**Common Name**	**Commander Reef**	**Outer Bank Reef**	**James Bond Reef**	**Morantie Reef**	**Rock Edge**	**Rock Edge**	**UB40 Reef**	**Goldeneye Beach Bar**
	Parrotfish								
Sparisoma aurofrenatum	Redband Parrotfish	f		f	f	m	f	f	f
Sparisoma rubripinne	Redfin Parrotfish				f		f		
Sparisoma viride	Stoplight Parrotfish	f	m	m	f	m	m	a	m
Sphyraena barracuda	Great Barracuda							s	
Stegastes dorsopunicans (formerly fuscus)	Dusky Damselfish						f		
Stegastes partitus	Bicolor Damselfish	f	f		f	m	m	a	a
Stegastes planifrons	Threespot Damselfish	f	f	m	m	m		f	
Stegastes variabilis	Cocoa Damselfish							f	
Thalassoma bifasciatum	Bluehead Wrasse		f	m	f	f	m		m
Urolophus jamaicensis	Yellow Stingray	s				f			
	Yellowbelly hamlet							s	
	TOTAL	**28**	**28**	**25**	**28**	**24**	**40**	**43**	**42**

KEY	
s	Single
f	Few
m	Many
a	Abundant

Fish Species	Common Name	Category	
		2011	2010
Abudefduf saxatilis	Sergeant Major	B	D
Acanthurus bahianus	Ocean Surgeonfish	A	A
Acanthurus coeruleus	Blue Tang	C	C
Aluterus scriptus	Scrawled Filefish	-	D
Amblycirhitus pinos	Redspotted hawkfish	-	C
Aulostomus maculatus	Trumpetfish	D	C
Bodianus rufus	Spanish Hogfish	D	C
Canthidermis sufflamen	Ocean Triggerfish	B	-
Canthigaster rostrata	Sharpnose Puffer	D	C
Caranx latus	Horse-eye Jack	D	-
Caranx ruber	Bar Jack	C	C
Chaetodon capistratus	Foureye Butterflyfish	C	C
Chaetodon striatus	Banded Butterflyfish	C	A
Chromis cyanea	Blue Chromis	A	A
Chromis multilineata	Brown Chromis	B	A
Clepticus parrai	Creole Wrasse	C	A
Epinephelus cruentatus	Graysby	C	C
Epinephelus fulvus	Coney	C	C
Epinephelus guttatus	Red Hind	-	D
Equetus punctatus	Spotted Drum	-	D
Gobiosoma evelynae	Sharknose Goby	-	D
Gramma loreto	Fairy Basslet	D	C
Haemulon flavolineatum	French Grunt	D	C
Haemulon parrai	Sailors Choice	-	D
Halichoeres garnoti	Yellowhead Wrasse	A	A
Halichoeres maculipinna	Clown Wrasse	D	B
Holocanthus tricolor	Rock Beauty	-	D
Holocentrus marianus	Longjaw Squirrelfish	C	C
Holocentrus rufus	Longspine Squirrelfish	C	C
Hypoplectrus gummigutta	Blue Hamlet	-	D
Hypoplectrus guttavarius	Shy Hamlet	-	C
Hypoplectrus indigo	Indigo Hamlet	D	C
Hypoplectrus puella	Barred Hamlet	B	C
Hypoplectrus unicolor	Butter Hamlet	D	C

Inermia vittata	Boga	-	D
Lactophrys triqueter	Smooth Trunkfish	-	D
Lutjanus analis	Mutton Snapper	D	C
Lutjanus mahogoni	Mahogany Snapper	D	D
Malacanthus plumieri	Sand Tilefish	D	C
Melichthys niger	Black Durgon	D	C
Microspathodon chrysurus	Yellowtail Damselfish	C	A
Mulloidichthys martinicus	Yellow Goatfish	D	C
Myrichthys breviceps	Sharptail Eel	D	-
Myrichthys ocellatus	Goldspoted Eel	-	D
Myripristis jacobus	Blackbar Soldierfish	D	A
Ocyurus chrysurus	Yellowtail Snapper	C	-
Pempheris schomburgki	Glassy Sweeper	-	B
Priacanthus cruentatus	Glasseye Snapper	-	D
Pseudopeneus maculatus	Spotted Goatfish	C	C
Pterois sp.	Lionfish	C	C
Rypticus saponaceus	Greater Soapfish	-	D
Scarus croicensis	Striped Parrotfish	C	A
Scarus taeniopterus	Princess Parrotfish	C	-
Scarus vetula	Queen Parrotfish	-	D
Scomberomorus regalis	Cero Mackerel	D	-
Serranus tabacarius	Tobaccofish	-	C
Serranus tigrinus	Harlequin Bass	C	C
Sparisoma atomarium	Greenblotch Parrotfish	-	A
Sparisoma aurofrenatum	Redband Parrotfish	C	C
Sparisoma rubripinne	Redfin Parrotfish	D	D
Sparisoma viride	Stoplight Parrotfish	C	A
Sphyraena barracuda	Great Barracuda	-	D
Stegastes dorsopunicans (formerly fuscus)	Dusky Damselfish	-	D
Stegastes partitus	Bicolor Damselfish	C	A
Stegastes planifrons	Threespot Damselfish	C	D
Stegastes variabilis	Cocoa Damselfish	-	D
Thalassoma bifasciatum	Bluehead Wrasse	C	A
Urolophus jamaicensis	Yellow Stingray	D	-
	Yellowbelly hamlet	-	D