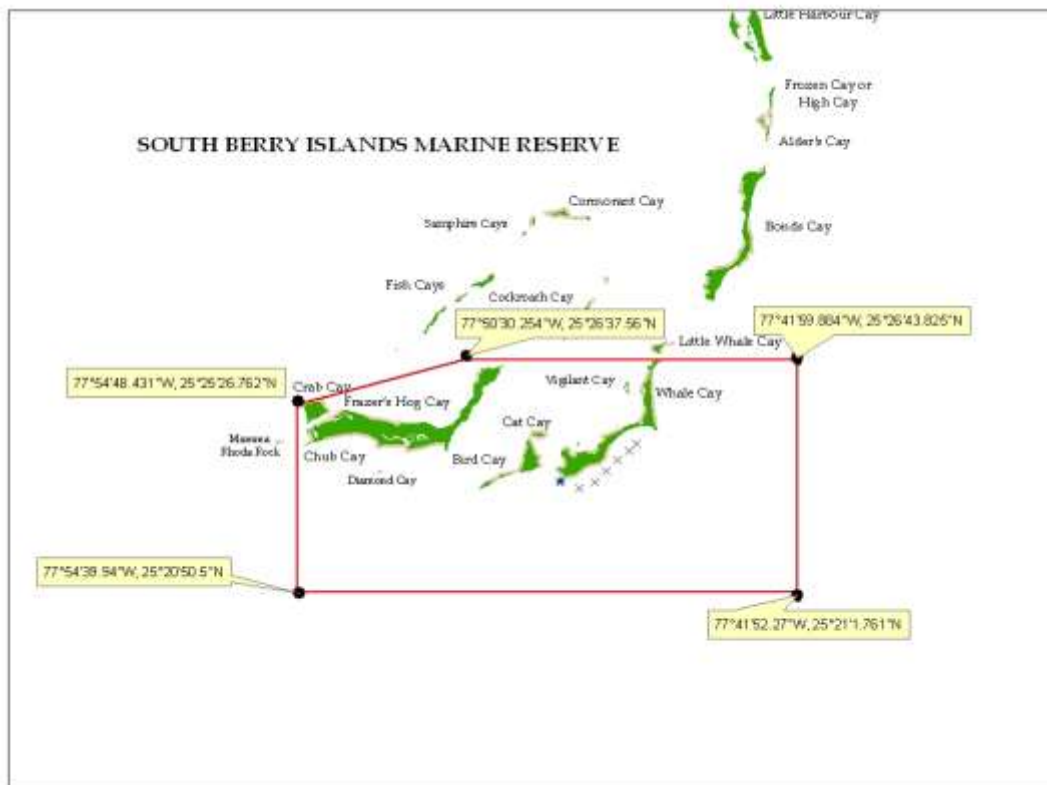


# MANAGEMENT PLAN FOR THE SOUTH BERRY ISLANDS MARINE RESERVE 2009-2013



**FLOYD HOMER**  
**21<sup>ST</sup> AUGUST, 2009**

## **ACKNOWLEDEGMENT**

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# **MANAGEMENT PLAN FOR THE SOUTH BERRY ISLANDS MARINE RESERVE 2009-2013**

Floyd Homer  
21<sup>st</sup> August, 2009

## **INTRODUCTION**

The Government of The Bahamas is committed to fulfilling its international obligations under the Convention on Biological Diversity, through the implementation of local action consistent with the Articles of the Convention. Article 8 of this Convention prescribes general activities for the conservation and sustainable use of biodiversity, including the establishment and management of protected areas. Further, the Programme of Work on Protected Areas (PoWPA) which was agreed upon at the Seventh Conference of the Parties of the Convention for Biological Diversity in 2004, provided detailed guidance on protected areas and clearly defined time frames for implementation.

The National Implementation Support Programme (NISP) was developed as a partnership between The Bahamas Environment, Science, and Technology (BEST) Commission, The Bahamas National Trust (BNT), Department of Marine Resources (DMR) and The Nature Conservancy Northern Caribbean Program (TNC NCP) to ensure collaboration in the implementation of the PoWPA in The Bahamas. Over the past year, the NISP Partner agencies have worked together to complete the following tasks related to the national system of protected areas – Ecological Gap Analysis, Rapid Assessment and Prioritization of Protected Area Management (RAPPAM), Capacity Action Plan (CAXP) and Sustainable Finance Plan (SFP). These agencies have also collaborated to finalize the Master Plan for The Bahamas' national protected area system which incorporates the various tasks outlined above as well as an Action Plan for implementation of the PoWPA over the next ten years.

The preparation of a management plan for the South Berry Islands Marine Reserve (SBIMR) has been targeted as a priority for the NISP partnership. This management plan is based on a review of existing literature, consultations with key stakeholder groups/agencies, and guidance from the NISP partnership.

## **RESOURCE DESCRIPTION**

### **Name of Area and Location**

The South Berry Islands are located northeast of Andros Island at about 25°N and 21 miles from Nicholls Town on Andros. The South Berry Islands Marine Reserve is about 72 square miles in area (Figure 1) and includes Crab Cay, Chub Cay, Frazer's Hog Cay, Bird Cay, Cat Cay, Whale Cay and several other small cays and rocks.

### **Physical Features**

The Berry Islands are a group of cays representing one of the 22 bank systems of the Bahamas archipelago. The South Berry Islands are surrounded on three sides by very deep (about 12,000 feet) water, called the Tongue of the Ocean. On the north and northwest is a large shallow bank ranging in depth of up to about 75 feet. The largest cays in the South Berry Islands are Chub Cay, Frazer's Hog Cay (Figure 2), and Whale Cay (Figure 3). Chub Cay and Frazer's Hog Cay are relatively flat and are separated by small channels of water that drain the wetlands south of the airstrip on Chub Cay. There are a series of low ridges parallel with the coastline that reaches a height of about 15 feet. The combined length of these two cays is about 5 miles. Whale Cay is also flat and about 4.5 miles long. Low sand dunes are found along the south shore, some of which have been degraded by road construction over the years. A few salt ponds and water channels are evident on several of the cays.

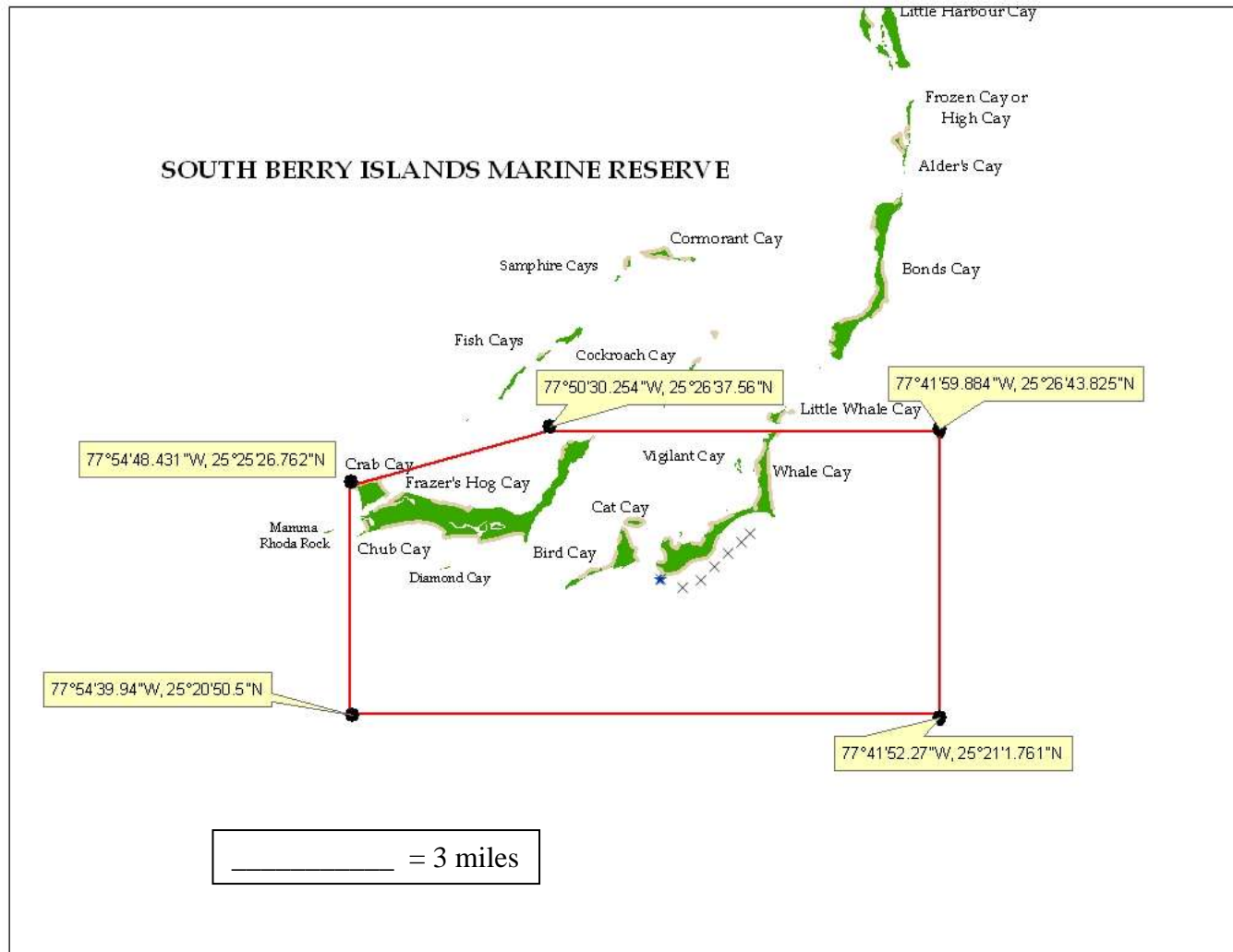


Figure 1. Location of the South Berry Islands Marine Reserve, showing reserve boundary in red.



Figure 2. Satellite image of Chub Cay and Frazer's Hog Cay





Figure 3. Satellite image of Whale Cay

## Climate

The Bahamas has a tropical maritime wet and dry type climate with winter incursions of modified cold air. In New Providence, winter temperatures seldom fall much below 60°F and usually reach about 75°F during the afternoon. In the summer, temperatures usually fall to 78°F or less at night and seldom rise above 90°F during the day. In the more northerly islands, winter temperatures are somewhat lower than in New Providence, and some 5 degrees higher in the southern islands. In summer months, temperatures tend to be similar throughout The Bahamas. Sea surface temperatures normally vary between 74°F in February and 83°F in August. (The Bahamas Meteorology Department <http://www.bahamasweather.org.bs/index.php?page=climate> ).

Humidity is fairly high, especially in the summer months. Winds are predominantly easterly throughout the year, but with a tendency to become north-easterly from October to April and south-easterly from May to September. Wind speeds are, on average below 10 knots; in winter months, periods of a day to two of north and northeast winds of about 25 knots may occur.

There are more than seven hours of bright sunshine per day in Nassau on average, though periods of a day or two of cloudy weather can occur at any time of year. The length of day (the interval between sunrise and sunset) varies from 10 hours and 35 minutes in late December to 13 hours and 41 minutes in late June.

Rain showers occur any time of the year, but the rainy months are May to October; for example, in Nassau, rainfall averages 2 inches a month from November to April and 6 inches a month from May to October. In the northern islands, it is up to 20% more. The southern islands normally receive only half the Nassau total. Rainfall is mainly in the form of heavy showers or thundershowers, which clear quickly.

#### Hurricanes

The Bahamas is in the Caribbean hurricane belt and the Berry Islands have been impacted by 11 Category 3 hurricanes between 1887 and 1965 (Figure 4) and two Category 1 hurricanes between 1995 and 2001 (NOAA Coastal Services Centre <http://csc-s-maps-q.csc.noaa.gov/hurricanes/viewer.html> ). Category 3 hurricanes have sustained winds of 111-130 mph and storm surges of 9-12 ft. Category 1 hurricanes have sustained winds of 74-95 mph and storm surges of 4-5 ft.

#### **Plant Life (Terrestrial & Aquatic)**

Surveys of terrestrial plant life primarily from Environmental Impact Assessments on Chub Cay indicated that several hundred acres of black and red mangrove shrub wetlands are found on the eastern and northern portions of the Cay. In the absence of more recent field survey data, the species listing from the Whale Cay Development Environmental Impact Assessment Report (2005) provides an indicative list of species likely to be found in the South Berry Islands. Thirteen species of marine algae, two species of sea grass, and 112 species of terrestrial plants were recorded.



Figure 4. Category 3 Hurricanes passing through or near the Berry Islands. (NOAA Coastal Services Centre <http://csc-s-maps-q.csc.noaa.gov/hurricanes/viewer.html> )

## **Animal Life (Terrestrial & Aquatic)**

The low shrub vegetation supports a range of birds and insects. Feral cats and introduced raccoons have been recorded for Chub Cay. In the absence of more recent field survey data, the species listing from the Whale Cay Development Environmental Impact Assessment Report (2005 by Applied Technology & Management, Inc.) provides an indicative list of species likely to be found in the South Berry Islands. Five species of land crabs, three species of seashore snails, thirty-five species of birds, two species of amphibians, four species of reptiles and eight species of insects were recorded in September 2005.

In terms of marine species, the following were recorded: one species of Annelids, fourteen species of Cnidarians, three species of Crustaceans, one species of Echinoderms, forty-five species of Fish, three species of Mollusks, and one species of Tunicates.

## **HISTORY AND DEVELOPMENT**

### **Historical Importance**

Cultural reconnaissance surveys conducted by Brockington and Associates in 2005 for the Chub Cay Club Ltd and Islands by Design Ltd., found no cultural or historic artifacts on Chub Cay property or in the near shore environment. There were no substantial records of Lucayan (Amerindian) occupation here or in the Berry Islands in general.

### **Written and Oral History**

The text in this sub-section was extracted from the Cultural Resources Reconnaissance Survey, Chub Cay Club Development Tract, Berry Islands (2005) by Brockington and Associates.

The earliest recorded evidence of settlement by Europeans in the Berry Islands was in 1835. A subsequent influx of “Liberated Africans” to the Berry islands resulted from the abolition of slavery and the development of Williams Town. Allotments were demarcated and offered for sale at 2 shillings to encourage settlement and a light house was erected on the eastern end of the Cay in 1863. However it seems that Williams Town was gradually abandoned by the latter half of the 19<sup>th</sup> century from the fragmentary records that are available.

By 1907, there were extensive sisal plantations on Crab Cay and Whale Cay with sisal processing factories. In 1915, the Berry Island Company on Whale Cay established a coconut plantation with 4,000 plants and a nursery of 15,000 plants. Sponge harvesting was said to have been carried out off Whale Cay and other cays in the Berry islands, but

no records exist. Other products mentioned for the Berry Islands were livestock farming (sheep and cattle), which seem to have died out after 1919.

During World War I, migration of labour from the Berry Islands to Florida and South Carolina for work on construction projects, or to join the armed forces was common. However, after 1921 there was an increase in the illegal sale of intoxicating liquors across the Florida Channel to the USA from The Bahamas and including the Berry Islands, which provided a lucrative income for those involved.

Around 1926, three severe hurricanes devastated the Berry Islands and brought sisal production on Whale Cay to an end. It appeared that the Great Depression of the USA also impacted negatively on life in the Berry Islands. In 1948, a crawfish station was established on Hog Cay for the capture and export of the Caribbean Spiny Lobster. Another station soon followed on Crab Cay.

In the early 1950's, a new trend of resort development was initiated in Whale Cay, Little Whale Cay and Bird Cay. In the early 1960's, the Chub Cay Club was built to develop the Tongue of the Ocean as a sport fisherman's paradise. By 1988, the Chub Cay Club was the Berry Islands largest employer with a resident population of 90 persons. In 1989, visitor arrivals were recorded as 3,310 persons.

### **Recent Developments**

The SBIMR has been the route used by game fishers during the fishing tournaments held at least twice a year by Chub Cay Club. Some recreational SCUBA diving and fishing by residents and guests of Chub Cay and Whale Cay are reported in the SBIMR. However, the recent closure of the SCUBA diving operation on Chub Cay is likely to significantly reduce such activity in the marine reserve.

The Berry Island Club, situated on Frazer's Hog Cay, is a small private hotel with four lodging facilities in addition to a restaurant, fuel dock and small marina. They provide boat rentals to guests, and mooring buoys to private yachters.

The SBIMR is also used for safe passage by many boats including commercial fishing vessels, and as a safe haven on the west end of Chub Cay, during rough seas and storms.

### **Conservation Status**

The Government of The Bahamas granted approval to the declaration of this area as a No-take Marine Area on December 29th, 2008. The Attorney General's Office is in the process of finalizing the boundary descriptions and will soon complete the gazetting of an Order under the Fisheries Act. Section 13 of this Act will declare the area a protected area. Specifically, Section 13 states among other things:

- (1) The Minister may by order declare any area of the waters within the exclusive fishery zone whether alone or together with any area of land adjacent to such waters to be a protected area for the purposes of this Act.
- (2) Any order made under this section may prohibit fishing for any fishery resource whatever or for any fishery resource specified in the order, by any person otherwise than under the authority of and in accordance with the terms and conditions of a permit in that behalf granted to that person for that purpose.

There is no specific regulation that provides details on how the SBIMR should be managed, however, Section 19 (1) (z) of the Act provides for the Minister to make regulations, which among other things, can prescribe anything to be prescribed under the provisions of this Act, which may include regulations for the development and implementation of a management plan.

### **Access**

Access to the South Berry Islands is usually by air and boats. Bahamas Fast Ferries offers a charter service from Nassau to Chub Cay; the trip takes about one hour. Private yachts are accommodated at the port facility and marina on Chub Cay and on Frazer's Hog Cay. Airstrips are located on Chub Cay and Whale Cay and accommodate small private and commercial aircrafts.

## **CURRENT HUMAN USE**

### **Land Use**

The 2000 Census of Population and Housing Report indicated that there were 709 in the Berry Islands who were accommodated in 269 private dwellings. Much of the limited development in the South Berry Islands is found on Chub Cay and Whale Cay. About 68% of the population was between the ages of 15 to 64 years, the range, which will include much of the available labour. The Chub Cay Development owns about 964 acres including, the Chub Cay Club and Marina which occupy about 212 acres in the west of the Cay. An airstrip is located along the northeast shore of Chub Cay and about 75 acres of 2-5 acre parcels of private lands are found along the south shore. A network of roads connects most parts of the island, with a main road running parallel to the shoreline. There is also an airstrip on Whale Cay and a network of roads. A major road runs along the length of the island.

### **Resource Type, Uses and Users**

During a workshop in Nassau (6-8 Jul, 2009) on planning for management of the SBIMR, stakeholders identified the following resources, uses and users in the SBIMR:

### *Resources*

- Conch
- Bonefish
- Crawfish
- Scalefish
- Gamefish
- Sea Turtle
- Crab
- Bird
- Sponge

### *Resource uses*

- Swimming and snorkelling
- Scuba diving
- Sailing tours/site seeing
- Scientific research
- Safe haven in rough weather
- Innocent passage
- Temporary storage of illegal goods
- Transshipment of illegal immigrants

### *Key resources users/stakeholders:*

- Bahamians, including children and future generations
- Tourists
- Scientists
- Fishermen (sport fishing and commercial fishing)
- Tour Guides
- Hotel Operators
- Private property owners

Chub Cay and Frazer's Hog Cay each has a marina; some boat repairs and maintenance are done on Chub Cay.

## **DESCRIPTION OF MANAGEMENT ISSUES**

### **Institutional Capacity**

The Department of Marine Resources (DMR) has legal responsibility for the SBIMR, but currently lack staffing and resources for effective management of the SBIMR. The DMR does not have an officer stationed in The Berry Islands, nor is there a vessel to patrol the area. However, cooperation with the Police or Defence Force has been employed in the past as a means of getting some help in patrolling Marine Reserves. Weak enforcement of

the Fisheries Regulations by Customs and Police Officers due to lack of resources and limited knowledge of the regulations was also identified as a constraint.

### **Resource Degradation**

Illegal fishing, harvesting undersized/juvenile species (groupers, conch), harvesting lobsters during the closed season and the illegal use of air compressors were identified as activities that lead to resource degradation. Invasive alien species, such as the lionfish and possibly jelly fish, as well as anchor damage, anchor drag, and marine debris dumped from land and from boats were other negative impacts on the SBIMR. The extent to which these activities and invasive alien species were affecting the resources of the SBIMR is not known.

### **Community Participation**

Land owners, residents and guests of the Cays use the area for fishing, swimming, boating activities and boat maintenance. Fishing tournaments (at least two per year), are organised by the Chub Cay Club and a major part of the route is through the SBIMR. An area to the west of Chub Cay is also used as a safe haven for vessels in rough seas and as a passage for fishing boats. The restrictions to be enforced in the SBIMR as a no-take area will require further engagement of these stakeholders to define alternatives and to support the management plan.

### **Legislative Support**

The jurisdiction of DMR with respect to wetlands along the cays is unclear. The Archipelagic Waters and Maritime Jurisdiction Act, 1993 indicated that the baselines from which the breadth of the territorial sea of The Bahamas is measured shall be the low-water line along the coast of each island unless otherwise specified by physical features marked on official charts or to geographical co-ordinates of points declared by Order of the Governor-General. The low-water line needs to be defined as well as any physical features which may have been defined by Order, so that the jurisdiction of the DMR will be clear.

Further the Regulations under the Fisheries Resources (Jurisdiction & Conservation) Act need to clearly prescribe the requirements for the SBIMR management plan including zoning, as well as permissible and prohibited activities. This would create the legislative basis for implementation of the management plan.

## **RELEVANT POLICIES**

There are several policy instruments that are relevant to the management of the South Berry Islands Marine Reserve, which were intended to guide any development or land use in The Bahamas. These key policies are below.



## **National Environmental Policy**

The goal of this policy is the sustainable use of the environment of The Bahamas to meet the needs of the present and future generations through the following specific objectives:

- to prevent, reduce, or eliminate various forms of pollution to ensure adequate protection of the environment and the health of its citizens;
- to conserve the biological diversity of the country and the stability, integrity, resilience and productivity of ecosystems; and
- to provide for the environment to be fully integrated into policy, plans, programmes and development project decisions that might be detrimental to the continued health safety and productivity of the country's environment.

## **National Wetlands Policy**

The goal of this policy is to conserve, restore and manage wetlands wisely in conjunction with sustainable development practices. The specific objectives are to:

- Manage human activity on or near wetlands in a manner which will achieve no loss of significant wetland habitat and no net loss of wetland functions;
- Promote the recognition and integration of wetland functions in resource management and economic development decision-making with regard to sector policies and programmes;
- Promote and facilitate the development of wetland stewardship, awareness and education through government initiatives, and cooperative relationships with local citizens, private sector stakeholders, and municipal, provincial and local governments;
- Develop a shared vision between all spheres of government and promote the application of wise practices in relation to wetland management and conservation;
- Meet The Bahamas' commitments as signatory to relevant international treaties, in relation to the management of wetlands.

## **The Bahamas 2020 Declaration**

The Government of the Commonwealth of The Bahamas, as representatives of the people, is committed to the following:

- Ensuring that critical ecosystem services provided by our forests and oceans are kept intact;
- Acting responsibly as stewards of unique biodiversity;

- Ensuring that we act to sustain our livelihoods and the livelihoods of Bahamians in generations to come;
- Ensuring that our children and our children's children may enjoy the quality of life and beauty that our islands have provided us;
- Contributing to global targets set out in the Millennium Development Goals, the Johannesburg Plan of Implementation for the World Summit on Sustainable Development, the Mauritius Strategy for Small Island Developing States and the relevant Programmes of Work of the Convention on Biological Diversity and related regional and sub-regional initiatives and obligations.

The Bahamas also agrees, among other things, to undertake a commitment to preserve the marine and terrestrial environments by meeting the targets established by the Convention for 2010 and 2012, and further commits to effectively conserve at least 20% of the near-shore marine resources across The Bahamas by 2020 and ensure a minimum of 50% of existing marine and 50% of existing terrestrial national parks and protected areas are effectively managed by 2020 through provision and facilitation of necessary core staff, infrastructure, policies, regulations, byelaws and management plans to make them functioning protected areas where sustainable activities occur inclusive of research, education, habitat rehabilitation and conservation, as deemed appropriate.

## **RELEVANT LEGISLATION**

There are several pieces of legislation that offer opportunities for controlling negative impacts on ecosystems including protected areas. The major laws that can be used to regulate activities in the South Berry Islands Marine Reserve are outlined below.

### **The Bahamas National Trust Act (1959)**

This Act establishes The Bahamas National Trust and provide for its operation, including the acquisition of properties, terrestrial or marine, and the development of regulations (bye-laws) for their management. Lands or buildings vested in the Trust are to be held for the benefit of The Bahamas and are inalienable.

### **Conservation and Protection of the Physical Landscape of The Bahamas Act (1997)**

Excavation, mining (including beach sand), quarrying and landfill operations are regulated under this Act. The Minister may also declare any tree a protected species requiring a permit for harvest. Currently, 11 species of trees are listed as protected.

### **Fisheries Resources (Jurisdiction and Conservation) Act (1977)**

This Act provides for the establishment and management of exclusive fishery zones, the regulation of Bahamian fishing vessels and the declaration of protected areas. The Minister may by order declare any area of the waters within the exclusive fishery zone, whether alone or together with any area of land adjacent to such waters, to be a protected area for the purposes of this Act.

### **Wild Animals (Protection) Act (1968)**

This Act was intended to control the taking and export of wild animals. Any animal in the wild or feral cannot be captured or removed without a license issued by the Minister. Only three animals are listed in the Schedule for licenses for capture and export.

### **Wild Birds Protection Act (1952)**

The killing or capture of wild birds in the closed season is prohibited and punishable. It shall be lawful for the Minister to establish reserves for the protection of any wild bird and from time to time to vary, enlarge or reduce the extent of such reserves. Such reserves may comprise any land belonging to the Crown or to any private owner. Several species of birds are listed with a closed season in the Schedule.

### **Archipelagic Waters and Maritime Jurisdiction Act (1993)**

This Act defines the territorial sea, archipelagic waters, internal waters and the exclusive economic zone of The Bahamas and the uses thereof. The inner limits of the territorial sea is defined and hence the jurisdiction of the DMR.

## **MULTILATERAL ENVIRONMENTAL AGREEMENTS**

The major multilateral environmental agreement related to protected areas which should govern local actions of State Parties is the Convention on Biological Diversity and its Programme of Work on Protected Areas. Under Article 8 of the Convention, State Parties are required to:

- Use guidelines, tools and processes necessary for identifying, monitoring, regulating and conserving biological diversity; including the establishment and management of a system of protected areas.
- Put into practice principles of conservation and sustainability both within and outside of protected areas.
- Rehabilitate endangered species, prevent the introduction of alien species and

- control or eliminate those that threaten ecosystems or species.
- Maintain local knowledge and practices relevant to sustainable use of biodiversity.
- Maintain the legal/regulatory framework to protect endangered species and develop programmes for their recovery.

The overall purpose of the Programme of Work on Protected Areas (PoWPA) is to support the establishment and maintenance by 2010 for terrestrial and by 2012 for marine areas, of comprehensive, effectively managed, and ecologically representative national and regional systems of protected areas. PoWPA encourages State Parties to take action on 89 activities related to the:

1. Establishment and strengthening of national and regional systems of protected areas.
2. Integration of protected areas into broader land- and seascapes and sectors.
3. Establishment and strengthening of regional networks, transboundary protected areas (TBPAs).
4. Improvement of site-based protected area planning and management.
5. Prevention and mitigation of the negative impacts of key threats to protected areas.
6. Promotion of equity and benefit-sharing.
7. Enhancement and secure involvement of indigenous and local communities and relevant stakeholders.
8. Provision of an enabling policy, institutional and socio-economic environment for protected areas.
9. Building of capacity for the planning, establishment and management of protected areas.
10. Development, application and transfer appropriate technologies for protected areas.
11. Ensuring of financial sustainability of protected areas and national and regional systems of protected areas.
12. Strengthening of communication, education and public awareness.
13. Development and adoption of minimum standards and best practices for national and regional protected area systems.
14. Evaluation and improvement of the effectiveness of protected areas management.
15. Assessment and monitoring of protected area status and trends.
16. Ensuring that scientific knowledge contributes to the establishment and effectiveness of protected areas and protected area systems.

## **MANAGEMENT ACTIVITIES**

### **Goals**

The goal of the SBIMR is the conservation and management of the fishery resource, including key habitats of The Bahamas.

### **Objectives**

The objectives proposed for the SBIMR were to:

1. Enhance fisheries production and fisheries management efforts through habitat protection and enhancement.
2. Protect healthy examples of natural marine ecosystem structure and functions.
3. Manage visitor and resident use at a level which will maintain the area in a natural or near natural state.
4. Enhance opportunities for scientific research that may directly benefit The Bahamas.
5. Facilitate effective management of marine resources through capacity building of the Department of Marine Resources and partners.

### **Activities**

Several key activities were proposed to achieve the objectives and are outlined below.

Objective 1: Enhancing fisheries production and fisheries management efforts through habitat protection and enhancement.

Key activities:

1. Preparation of a zoning plan to include a safe haven area and anchorage areas, using properly installed mooring buoys, and installation of demarcation buoys.
2. Develop and undertake a programme for fishery stock and recruitment assessment.
3. Develop and undertake a programme for coastal water quality assessment.
4. Conduct surveillance and enforcement.

Objective 2: Protecting healthy examples of natural marine ecosystem structure and functions.

Key activities:

1. Participatory monitoring of reef health and structure developed and implemented.

2. Control of alien invasive species jointly with key stakeholders.
3. Marine debris and waste removal programme developed including awareness and education of stakeholders.
4. Procedures for runoff control developed and employed by landowners or developers.
5. Oil and chemical response plan developed to minimise contamination in the area.
6. Information sharing protocol developed and adopted among stakeholders.
7. Clarification and awareness building on the key regulations related to the SBIMR to assist in protecting the area.
8. Explore use of schools to “adopt-a-marine reserve” in awareness building and education.

Objective 3: Managing visitor and resident use at a level which will maintain the area in a natural or near natural state.

Key activities:

1. Determine the carrying capacity for different components of the SBIMR and regulate visitor use.
2. Develop an awareness and education programme on appropriate use of the marine reserve consistent with its designation.
3. Provide guidance on the training and certification of wardens and guides who may utilise the marine reserve.
4. Determine and demarcate the limits of jurisdiction of the DMR on the landward boundaries of the marine reserve.
5. Determine alternative routes for Sports fishers, and require all tournaments to be supervised.
6. Explore the feasibility of introducing user fees for mooring buoys deployed by the DMR and partners.
7. Review and adopt a Standard Operating Procedure for Enforcement.

Objective 4: Enhance opportunities for scientific research that may directly benefit The Bahamas.

Key activities:

1. Develop and implement a structured participatory monitoring programme that will involve capable stakeholders.
2. Identify research priorities and research partners for the SBIMR.
3. Explore the use of research tourism as a management tool.

Objective 5: Facilitate effective management of marine resources through capacity building of the DMR and partners.

Key activities:

1. Identify training needs of DMR staff and partners related to management of the marine reserve, prioritise and arrange for training.
2. Identify human resource needs and arrange for recruitment.
3. Identify infrastructure and equipment needs and arrange for procurement.
4. Develop a management and administration system for the marine reserve.

### Functional Areas

For operational purposes, the activities outlined for achievement of the SBIMR objectives can be grouped into four functional areas:

1. Resource Management and Protection
2. Community Outreach
3. Tourism and Recreation
4. Management and Administration
5. Facilities Operations and Management

Each functional area can have several programmes which can be in the following table.

Functional Area	Programme	Description
Resource Management and Protection	Surveillance and Enforcement	Primarily through patrols to ensure compliance with the law and zoning restrictions.
	Scientific Monitoring and Research	Priorities for initial attention will include coral reef health, fishery assessments, uses and user impacts.
	Species and Habitat Management	Plans for management of targeted species and habitats developed, based on monitoring, research, or identified adverse impacts.
	Zoning and Boundaries	The limits of the marine reserve and specific use zones will be clearly demarcated.
Community Outreach	Awareness and Education	Designed to improve local and visitor attitudes and use of the marine resources leading to reduced negative impacts.
	Public Outreach and Information	Building support among the local communities and users for the SBIMR.
Tourism and Recreation	User Fee Collection	Feasibility to be explored through use of government installed mooring buoys.
	Visitor Awareness and Interpretation	Design and installation of interpretive signage, preparation of brochures and other documentation,

<b>Functional Area</b>	<b>Programme</b>	<b>Description</b>
		as well as scheduled activities for visitors when appropriate.
Management and Administration	General Management and Administration	Administrative activities related to operation of field office including procurement of goods and services, recruitment of staff and staff accommodation.
	Training	Mainly in-house training to build the capacity of staff to effectively carry out management activities at the SBIMR.
	Financial Management	Developing systems for managing disbursements, income and donations for upkeep of the SBIMR.
	Partnership Relations	Developing and maintaining relationships with individuals and institutions that can assist in achieving the objectives of the marine reserve.
	Information Technology	Acquisition, technical support and maintenance of communication systems and equipment.
Facilities Operations and Management	Docking Facilities	Deployment and maintenance of mooring buoys.
	Buildings, Ground and Utilities	Acquisition or construction of a field office for the SBIMR, and provision of utilities and services.
	Boat & Vehicle Operations and Maintenance	Acquisition and maintenance of fully equipped patrol boat.



## **IMPLEMENTATION OF THE MANAGEMENT PLAN**

This management plan is expected to be implemented over a period of five years. At the end of that period an independent evaluation of the implementation of the plan should be conducted as an aid to the preparation of a new plan for another five-year period.

There is currently no infrastructure in place specifically for the management of the SBIMR. Much of the first year will likely be spent on preparations for management of the SBIMR. The major activities in the first year of implementation will include:

1. Building support among stakeholders in the South Berry Islands for the marine reserve.
2. Identification of specific zones and developing the zoning plan.
3. Demarcation of the boundaries and zones.
4. Recruitment of staff for the SBIMR.
5. Identification of staff training needs and arranging for training.
6. Surveillance and enforcement.

### **Building Support among Stakeholders**

Building a positive relationship with the land owners and developers to accept and help enforce the rules and regulations for the SBIMR will minimise negative impacts on and hostility to the marine reserve. Direct interpersonal communications with key stakeholder groups or community outreach, has to be employed to help solve problems that may arise and reduce potential conflicts. Building community support among the targeted groups, for management activities in the marine reserve requires an understanding of the socio-economic conditions and needs of these target groups. The process for building this support requires the following steps:

1. Identification of the target groups.
2. Preparation of a profile on each of these groups (i.e. occupations, living conditions, needs, knowledge about the marine reserve, etc).
3. Identification of the opinion leader(s) in each of these groups.
4. Determination of what information needs to be communicated.
5. Determination of how this information can be effectively communicated.
6. Identification of local activities in which staff could participate or assist.
7. Design an evaluation process for the effectiveness of communication efforts.
8. Identification of the resources and cost required for implementation of outreach.
9. Identification of logistics (including collaborating agencies) required.
10. Agreement on the timeframe for execution of these activities.
11. Agreement on the responsibility of each person in carrying out these activities.
12. Preparation of the community outreach plan.
13. Implementation of outreach activities and provision of quarterly analytic progress reports.
14. Evaluation of effectiveness of outreach activities and redesign of future efforts.

## Demarcation of Zones

During the first workshop with stakeholders on the preparation of this management plan (6-8 July, 2009), participants identified the following uses of the SBIMR which should be allowed:

- swimming (but with restrictions in selected areas);
- boat access and innocent passage;
- anchoring;
- safe haven;
- scientific investigation;
- kayaking;
- snorkelling (but with restrictions in selected areas);
- parasailing; and
- water skiing.

Participants were strongly supportive of no recreational or commercial scuba diving in the marine reserve and recommended that the appropriateness of jet-ski use in the marine reserve should be investigated to determine if it should be allowed. Participants noted that boat maintenance and disposal of waste at the Chub Cay Club marina need to be investigated to determine measures to reduce negative impacts in the marine reserve and may also require some form of zoning. The following steps are proposed for identification and agreement of appropriate zones:

1. Arrange for a workshop to determine the need and best location for the zones identified above. Community meetings may be preferable for reaching particular target groups for consensus on the need for the proposed zones.
2. Participants should include the Chub Cay Club, land owners and developers in the SBIMR, Bahamas National Trust, Department of Marine Resources, Royal Bahamas Police Force, Royal Bahamas Defense Force, tour/watersports operators, fishermen and local government representatives.
3. Let all parties represent their case and through consensus develop a proposal for the activities and zoning.
4. Visit the area proposed for the zone with selected stakeholders to determine its appropriateness.
5. Test the appropriateness of the proposed zone by monitoring its use over a few months.
6. Present findings at a meeting of the key stakeholders and make adjustments if needed, to redefine the zone in agreement with the stakeholders.
7. Finalise zoning plan and declare the redefined zones in accordance with the Fisheries Resources (Jurisdiction and Conservation) Regulations.

## **Demarcation of Boundaries**

Conflicts of use within the marine reserve can occur where there are varied uses and users and where there is no clear demarcation of boundaries and zones. The landward boundary of the marine reserve in particular, will need special attention because future coastal development of the cays within the marine reserve may cause some infringement. The process of preparation for demarcation could include the following steps:

1. Review existing regulations and other documents to verify the description of the boundaries of the SBIMR.
2. Locate the boundary references described in the legislation on a maritime chart.
3. Using the Lat/Long or UTM coordinates, find the boundaries in the field using the GPS.
4. During a field reconnaissance, determine the best physical location along the boundaries for the demarcation buoys or other appropriate markers, using the GPS and line of site estimation. Also estimate the quantity of buoys and other hardware which will be needed.
5. Obtain specifications of anchors, pins and other hardware for installation of demarcation buoys and markers.
6. Select appropriate types and quantity of hardware and place an order for purchase.
7. Arrange for installation equipment and expertise to operate the equipment.
8. Invite selected stakeholders to collaborate in installation of the buoys and markers.
9. Prepare a schedule for installation of demarcation buoys and markers.

## **Staff Recruitment and Training**

Effective management will require several staff with dedicated responsibilities for the SBIMR. At a minimum, two Fisheries Inspectors, one Education/Community Relations Officer and one Administrative Officer will be required. Arrangements of recruitment of new staff or redeployment of staff elsewhere in the civil service should be given some priority. In the meantime, a training needs assessment of existing staff who will be assigned to the marine reserve should be undertaken. Relevant in-house or external training for these staff should also be given priority. The following areas for training should also be considered:

- Communication skills
- Participatory planning process
- Developing effective workplans
- Report writing
- Computer skills
- Interpretation of applicable legislation

## **Surveillance and Enforcement**

The movement of people and vessels in the marine reserve will be assessed through routine patrols by Fisheries Inspectors, Police or Defense Force. Irregular schedules should also be planned to detect infringement of the marine reserve regulations and to monitor user activities.

Interpretative enforcement of the regulations will be the preferred method of dealing with infringement of the regulations. First-time offenders may be given a warning and will be provided with information on the SBIMR, including the boundaries, zones, regulations and why it is important to respect and support conservation in the marine reserve. If a first-time offender is a boat captain/owner, he/she may be asked to report to the SBIMR Office or the Police Station on Chub Cay within 24 hours for an orientation on the SBIMR. Failure to comply will be recorded in a log to guide further action if there is another infringement by that individual. Since the SBIMR is a no-take area, no warnings will be given to offenders under the following conditions:

1. Use of illegal fishing implements
2. Possession of undersized catch
3. Possession of catch out of season
4. Possession of commercial quantities of catch without the appropriate license
5. Use of hazardous substances within the park
6. Lack of cooperation

Fisheries Inspectors will have the ability to enforce the regulations to the fullest extent of the law. In such cases, the gathering of evidence and filing of a report on the incident will follow procedures developed in consultation with the Police and the DMR.

## **INSTITUTIONAL ARRANGEMENTS**

The Department of Marine Resources currently has the sole responsibility for management of the South Berry Islands Marine Reserve. At this time, no arrangements with any other agency are in place for collaborative management of the marine reserve. However, assistance with enforcement and patrols in the area are facilitated by the Police and Defense Force, since the DMR has no vessel or staff dedicated to the SBIMR.

It would be useful to establish a SBIMR Local Management Committee (SLMC) to advise on and facilitate management of the marine reserve. This committee could also assist in managing any conflict that may arise among the stakeholders using the marine reserve. The composition of the SLMC should include representatives from the: Department of Marine Resources, Chub Cay Club, Berry Island Club, land owners and developers in the SBIMR, Bahamas National Trust, Royal Bahamas Police Force, tour/watersports operators, and local government.

## **ADMINISTRATION AND MAINTENANCE**

### **Staffing**

At a minimum, two Fisheries Inspectors, one Education/Community Relations Officer and one Administrative Officer will be required for the SBIMR. Research and support staff will be deployed as needed from the DMR in Nassau. Consultants for specific training or management activities may also be hired as needed.

### **Equipment**

The major equipment required for effective management of the SBIMR will be a 25ft fully outfitted patrol/work boat that could travel in very shallow water. A trailer and light truck for moving the boat on the Cay will also be required. Mobile communication equipment for the patrol officers and a base station for the SBIMR office will be needed. Additionally, computers and other office equipment will support the full operation of SBIMR.

### **Maintenance**

Maintenance of the marine reserve infrastructure (signs, buoys, etc) and equipment (boat, truck, radios, etc) will be the responsibility of the Fisheries Inspectors, and maintenance of office equipment will be the responsibility of the Administrative Officer. Equipment should generally be inspected at least monthly to determine the need for servicing. All mooring buoys should be physically numbered and marked with the DMR logo for ease of identification. The following schedule for maintenance is proposed (van Breda and Gjerde, 1992):

1. Monthly
  - i. Inspect condition of all buoys and pick-up lines; note GPS location.
  - ii. Clean algal growth from pick-up lines or replace if necessary.
  - iii. Clean buoy and check for cracks, replace if necessary.
  - iv. Inspect and clean exposed portions of buoy through-line and replace as appropriate.
  
2. Every three months
  - i. Inspect down line for wear and damage, replace if necessary.
  - ii. Inspect shackle for wear and damage, replace if necessary.
  - iii. Inspect anchor and examine area between anchor and shackle for signs of wear.
  - iv. Inspect anchor mount site and surrounding area, look for signs of movement or looseness between the anchor and cement core or between the cement core and the substrate.

3. Every six months  
Replace buoy through line and pick up line after six months of use if the system is used regularly.
4. Annually  
Replace pin in down line shackle.
5. Every two years  
Replace down line if necessary.

## BUDGET

Key Activities	Projected budget by year					Total
	2009	2010	2011	2012	2013	
<b><u>Resource Management and Protection</u></b>						
<b><i>Surveillance &amp; Enforcement</i></b>						
1 Boat & trailer acquisition	\$0.00	\$50,000.00	\$0.00	\$0.00	\$0.00	\$50,000.00
2 Fuel	\$0.00	\$20,000.00	\$25,000.00	\$30,000.00	\$35,000.00	\$110,000.00
<b><i>Scientific Monitoring &amp; Research</i></b>						
3 Fishery assessments	\$0.00	\$20,000.00	\$0.00	\$25,000.00	\$0.00	\$45,000.00
4 Habitat monitoring	\$0.00	\$10,000.00	\$10,000.00	\$12,000.00	\$12,000.00	\$44,000.00
5 User monitoring	\$5,000.00	\$10,000.00	\$10,000.00	\$12,000.00	\$12,000.00	\$49,000.00
<b><i>Species &amp; Habitat Management</i></b>						
6 Control of alien species	\$0.00	\$10,000.00	\$20,000.00	\$10,000.00	\$20,000.00	\$60,000.00
7 Marine debris and waste removal	\$0.00	\$10,000.00	\$5,000.00	\$5,000.00	\$5,000.00	\$25,000.00
8 Oil & Chemical Response plan	\$0.00	\$0.00	\$10,000.00	\$0.00	\$0.00	\$10,000.00
<b><i>Zoning &amp; Boundaries</i></b>						
9 Demarcation markers & buoys	\$0.00	\$50,000.00	\$0.00	\$0.00	\$10,000.00	\$60,000.00
10 Preparation of zoning plan	\$10,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$10,000.00
Resource Management & Protection Sub-total						<b><u>\$463,000.00</u></b>
<b><u>Community Outreach</u></b>						
<b><i>Awareness &amp; Education</i></b>						
11 Preparation of awareness materials	\$0.00	\$10,000.00	\$0.00	\$10,000.00	\$0.00	\$20,000.00
12 Workshops	\$0.00	\$20,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$50,000.00

<b>Key Activities</b>		<b>Projected budget by year</b>					<b>Total</b>
<b><i>Outreach &amp; Information</i></b>							
13	Community meetings Community	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$50,000.00
14	projects	\$0.00	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$40,000.00
Community Outreach Sub-total							<b><u>\$160,000.00</u></b>
<b><u>Tourism &amp; Recreation</u></b>							
<b><i>User Fee Collection</i></b>							
15	Feasibility study on user fees	\$0.00	\$15,000.00	\$0.00	\$0.00	\$0.00	\$15,000.00
16	Fee collection system	\$0.00	\$0.00	\$0.00	\$20,000.00	\$0.00	\$20,000.00
<b><i>Visitor Awareness &amp; Interpretation</i></b>							
17	Design and installation of signage	\$0.00	\$20,000.00	\$0.00	\$0.00	\$10,000.00	\$30,000.00
18	Interpretation materials	\$0.00	\$10,000.00	\$10,000.00	\$0.00	\$10,000.00	\$30,000.00
Tourism & Recreation Sub-total							<b><u>\$95,000.00</u></b>
<b><u>Management &amp; Administration</u></b>							
<b><i>General Mgt &amp; Admin</i></b>							
19	Personnel (4 staff)	\$0.00	\$100,000.00	\$105,000.00	\$110,000.00	\$122,000.00	\$437,000.00
20	Office equipment	\$0.00	\$12,000.00	\$0.00	\$0.00	\$5,000.00	\$17,000.00
21	Office supplies	\$0.00	\$5,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$35,000.00
22	Utilities, etc.	\$0.00	\$6,000.00	\$6,000.00	\$7,000.00	\$7,000.00	\$26,000.00
23	Light truck	\$0.00	\$0.00	\$25,000.00	\$0.00	\$0.00	\$25,000.00



<b>Key Activities</b>		<b>Projected budget by year</b>					<b>Total</b>
<b><i>Training</i></b>							
24	In-house training	\$5,000.00	\$5,000.00	\$0.00	\$5,000.00	\$0.00	\$15,000.00
25	External training	\$0.00	\$0.00	\$15,000.00	\$0.00	\$15,000.00	\$30,000.00
<b><i>Financial Management</i></b>							
26	Accounting	\$0.00	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00	\$20,000.00
<b><i>Partnership Relations</i></b>							
27	Meetings	\$1,000.00	\$5,000.00	\$5,000.00	\$6,000.00	\$6,000.00	\$23,000.00
28	Joint activities	\$0.00	\$2,000.00	\$2,000.00	\$3,000.00	\$3,000.00	\$10,000.00
<b><i>Information Technology</i></b>							
29	Communication systems	\$0.00	\$10,000.00	\$0.00	\$0.00	\$5,000.00	\$15,000.00
30	Computer systems	\$0.00	\$6,000.00	\$0.00	\$0.00	\$2,000.00	\$8,000.00
Management & Administration Sub-total							<b><u>\$661,000.00</u></b>
<b><u>Facilities Operations &amp; Mgt</u></b>							
<b><i>Docking facilities</i></b>							
31	Mooring buoys	\$0.00	\$20,000.00	\$10,000.00	\$5,000.00	\$2,000.00	\$37,000.00
<b><i>Buildings, Grounds &amp; Utilities</i></b>							
32	Construction of Office	\$0.00	\$120,000.00	\$0.00	\$0.00	\$0.00	\$120,000.00
33	Office furnishing	\$0.00	\$10,000.00	\$0.00	\$0.00	\$3,000.00	\$13,000.00

<b>Key Activities</b>		<b>Projected budget by year</b>					<b>Total</b>
<b><i>Boat &amp; Vehicle Maintenance</i></b>							
34	Insurance	\$0.00	\$8,000.00	\$7,000.00	\$6,000.00	\$5,000.00	\$26,000.00
35	Maintenance	\$0.00	\$5,000.00	\$5,000.00	\$7,000.00	\$7,000.00	\$24,000.00
Facilities Operations & Mgt. Sub-total							<b><u>\$220,000.00</u></b>
		<b>Year 1</b>	<b>Year 2</b>	<b>year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>TOTAL</b>
	<b>Yearly Totals</b>	\$31,000.00	\$594,000.00	\$315,000.00	\$318,000.00	\$341,000.00	<b><u>\$1,599,000.00</u></b>

## MONITORING AND EVALUATION

Quarterly work plans should be developed by the staff with responsibility for the SBIMR. These workplans will contain elements of the management plan that staff think are feasible for implementation, based on the human resource capacity, financial allocations and administrative challenges of the DMR.

Progress on implementation of the management plan should be reviewed quarterly or at least twice per year so that difficulties in execution of activities could be identified and resolved and slippage in timely outputs could be controlled. Progress can be measured by achievement of tangible outputs within a given timeline. The use of indicators of progress can provide an easy means of verifying achievement, linking programme activity to outputs. Several indicators are proposed below for each programme activity:

Functional Area	Programme	Indicators of Progress
Resource Management and Protection	Surveillance and Enforcement	<ol style="list-style-type: none"> <li>1. Boat procured</li> <li>2. Number of marine patrols per month</li> <li>3. Number of beach patrols per month</li> <li>4. Number and type of infringement of SBIMR regulations per month</li> <li>5. Number and type of follow-up action with offenders</li> </ol>
	Scientific Monitoring and Research	<ol style="list-style-type: none"> <li>1. Number and location of monitoring stations identified</li> <li>2. Monitoring stations established and mapped</li> <li>3. Number and type of measurements taken per quarter</li> <li>4. Data analysis reports</li> <li>5. Number of monthly park user surveys conducted</li> <li>6. Research priorities identified</li> <li>7. Number of research activities initiated</li> <li>8. Recommendations for management interventions prepared</li> </ol>
	Species and Habitat Management	<ol style="list-style-type: none"> <li>1. Number of activities executed for control of alien species</li> <li>2. Number of activities executed for debris and pollution abatement</li> <li>3. Oil &amp; chemical response plan developed</li> </ol>
	Zoning and Boundaries	<ol style="list-style-type: none"> <li>1. Number of meetings held with stakeholders</li> <li>2. Identification of number and types of zones</li> <li>3. Stakeholders agreement on size, shape and location of zones</li> <li>4. Zoning plan completed</li> <li>5. Designation and trial of use of zones</li> </ol>

<b>Functional Area</b>	<b>Programme</b>	<b>Indicators of Progress</b>
Community Outreach	Awareness and Education	<ol style="list-style-type: none"> <li>1. Programme of activities for priority groups developed</li> <li>2. Number of different types of awareness materials prepared</li> <li>3. Number of awareness events planned</li> <li>4. Number of awareness events executed</li> <li>5. Evaluation of effectiveness completed</li> <li>6. Redesign of future activities (if needed)</li> </ol>
	Public Outreach and Information	<ol style="list-style-type: none"> <li>1. Programme of activities for target groups developed</li> <li>2. Profile of each group prepared</li> <li>3. Number of outreach events planned</li> <li>4. Number of outreach events executed</li> <li>5. Evaluation of effectiveness completed</li> <li>6. Redesign of future activities (if needed)</li> </ol>
Tourism and Recreation	User Fee Collection	<ol style="list-style-type: none"> <li>1. Feasibility study completed</li> <li>2. Fee collection system implemented</li> </ol>
	Visitor Awareness and Interpretation	<ol style="list-style-type: none"> <li>1. Number of signs prepared</li> <li>2. Number of different types of awareness materials prepared</li> <li>3. Number of awareness events planned</li> <li>4. Number of awareness events executed</li> <li>5. Evaluation of effectiveness completed</li> </ol>
Management and Administration	General Management and Administration	<ol style="list-style-type: none"> <li>1. Personnel recruited for SBIMR</li> <li>2. Types of equipment procured</li> <li>3. Office supplies procured</li> </ol>
	Training	<ol style="list-style-type: none"> <li>1. Mechanism to facilitate in-house learning developed</li> <li>2. Number and type of training activities per quarter</li> </ol>
	Financial Management	<ol style="list-style-type: none"> <li>1. Accounting system in place</li> <li>2. Quarterly financial reports prepared</li> </ol>
	Partnership Relations	<ol style="list-style-type: none"> <li>1. Number of partners engaged per year</li> <li>2. Number of meetings to develop relationships</li> <li>3. Number of partners actively collaborating in the management of the SBIMR</li> </ol>
	Information Technology	<ol style="list-style-type: none"> <li>1. Number and types of equipment procured</li> <li>2. Number of staff trained to use equipment</li> </ol>
Facilities Operations and Management	Docking Facilities	<ol style="list-style-type: none"> <li>1. Number of mooring buoys acquired</li> <li>2. Buoy accessories acquired</li> <li>3. Agreement by stakeholders on location for deployment</li> <li>4. Number of mooring buoys deployed</li> </ol>
	Buildings, Ground and Utilities	<ol style="list-style-type: none"> <li>1. Land for office obtained</li> <li>2. Plan for construction approved</li> </ol>

Functional Area	Programme	Indicators of Progress
		3. Building constructed and utilities connected 4. Building utilized by staff
	Boat & Vehicle Operations and Maintenance	1. Insurance paid for boat & vehicle 2. Maintenance schedule developed & utilized

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