

# Carrying Capacity Study Report

The Gladden Spit & Silk Cayes Marine Reserve and Laughing  
Bird Caye National Park



# Carrying Capacity Study Report: The Silk Cayes and Laughing Bird Caye

Prepared by Osmany Salas and Glenn Haas  
February 10, 2012

Osmany Salas, the Lead Consultant for this project, is a freelance consultant in natural resources policy and management. He has extensive experience in strategic planning, natural resources policy development, management planning for protected areas, among other areas. He holds a Masters of Science in Natural Resources Policy and Management from the University of Michigan. (Email: [osmany.salas@gmail.com](mailto:osmany.salas@gmail.com))

Glenn Ernest Haas (Ph.D.) served as Associate Consultant and Technical Adviser for the project. Dr. Haas is one of the foremost experts on visitor capacity (recreational carrying capacity). From 2002 to the present, he has served as a private consultant and expert witness on visitor capacity on public lands and waters. He holds a Ph.D. in Natural Resources Planning/Recreation and Nature-based Tourism Management from Colorado State University. (Email: [glennehaas@comcast.net](mailto:glennehaas@comcast.net))

## Contents

1. Background and Introduction .....	4
2. Consultancy Objectives .....	4
3. Methodology .....	5
a. Field Visits, Document Compilation and Literature Review .....	5
b. Develop Capacity Decision Criteria .....	5
c. Inventory and Analyze Current Situation .....	5
i. Ecological Assessment.....	5
ii. Visitor/Commercial Use Assessment .....	5
iii. Management Assessment.....	5
d. Formulate three Management Alternatives and Capacities .....	5
e. Evaluate Management Alternatives and Capacities.....	6
f. Select a preferred alternative and capacity .....	6
g. Community Feedback and Reporting .....	6
h. Final Report .....	6
4. Findings.....	6
5. Overview – Alternatives for Managing Visitor Use .....	10
a. Analysis – Silk Cayes management alternatives .....	12
i. Physical Resource Considerations – Silk Cayes .....	12
ii. Social Considerations – Silk Cayes .....	13
iii. Management Considerations – Silk Cayes .....	14
b. Analysis – Laughing Bird Caye management alternatives .....	15
i. Physical Resource Considerations – Laughing Bird Caye .....	15
ii. Social Considerations – Laughing Bird Caye .....	16
iii. Management Considerations – Laughing Bird Caye .....	17
6. Decision Criteria for Visitor Capacity Decision-making.....	18
7. Evaluation of Alternatives – the Silk Cayes .....	19
8. Evaluation of Alternatives – Laughing Bird Caye.....	22
9. Other Concerns .....	23
10. Proposed Visitor Use Guidelines .....	25
a. Guidelines for Bareboat Charters.....	25
b. Visitor Use Guidelines for “Kaya-Camping” .....	27
c. Visitor Use Guidelines for Camping.....	28
11. Management Recommendations.....	29
Appendix 1 – Agreement for the Operation of a Liveaboard Passenger Vessel in Belizean Waters .....	32
Appendix 2– Environmental Compliance Plan for Live-aboard Passenger Vessels .....	37
Appendix 3– Recommended Best Practices for Piers.....	41
Figure 1: GSSCMR Visitation 2009-2011.....	8
Figure 2: LBCNP Visitation 2009-2011 .....	10
Table 1: Key observations at the Silk Cayes & Little Water Caye.....	7
Table 2: Key Observations at Laughing Bird Caye.....	9

## **1. Background and Introduction**

The Southern Environmental Association (SEA) is one of southern Belize's leading environmental NGOs, particularly in the area of marine protected areas management. SEA is a non-governmental organization whose mission is to "continuously work towards improving stewardship and the environmental integrity of key marine areas in southern Belize through effective, collaborative protected areas management, community involvement, and strategic partnerships for the benefit of all stakeholders."

SEA manages the Laughing Bird Caye National Park under a co-management agreement with the Forest Department, Ministry of Natural Resources and the Environment. SEA has also partnered with the Fisheries Department, Ministry of Agriculture and Fisheries, and co-manages the Gladden Spit/Silk Cayes Marine Reserve. Additionally, SEA supports the Fisheries Department in the management of the Sapodilla Cayes Marine Reserve.

SEA represents a new approach to co-management of marine protected areas (MPAs) and works to address some of the major constraints currently faced by co-managers, specifically the involvement of community stakeholders, integrating science and monitoring into management practice, and building stronger links between NGO's, stakeholders and government. One of SEA's major goals is to manage its three MPAs as "as effective models of conservation management for the region."

SEA has called for consultant bids to "prepare a carrying capacity study, including a carrying capacity report for the Gladden Spit and Silk Cayes Marine Reserve, and the Laughing Bird Caye National Park" (hereinafter referred to as "the project"). This project is financially supported by the Protected Areas Conservation Trust (PACT).

## **2. Consultancy Objectives**

The consultancy will aim to achieve the following specific objectives:

- Conduct an assessment of commercial activities that occur in critical areas of two MPAs that SEA manages to determine level of use by these entities;
- Conduct a carrying capacity survey of the two areas with a view to determining projections for unsustainable activity levels;
- Make recommendations for carrying capacity indicators to be considered by natural resource managers;
- Plan and execute community meetings per stakeholder community/focus group sessions with relevant stakeholders to provide input in the process;
- Plan and execute at least one validation workshop per stakeholder community to communicate the findings of these activities to stakeholders; and
- Present the findings of the carrying capacity study and carrying capacity survey in a report and power point presentation to SEA.

### **3. Methodology**

#### ***a. Field Visits, Document Compilation and Literature Review***

A detailed review and analysis of existing information was conducted. The following information was compiled: reports, visitation data, management plans, maps, and other relevant documents and reports. The Consultants also visited Laughing Bird Caye National Park and Gladden Spit/Silk Cayes Marine Reserve, and held discussions with SEA's protected areas manager and the reserve staff. The Consultants' observations are noted in Table 1 and Table 2 below (Section 4).

#### ***b. Develop Capacity Decision Criteria***

The key issues, concerns, threats and opportunities to consider in developing a reasonable and fair capacity to the sites were identified. A draft report (in the form of a matrix entitled "Alternatives for Managing Visitor Use on Gladden Spit/Silk Cayes and Laughing Bird Caye") was submitted to SEA for review and comments. The information in this matrix has been incorporated into this report.

#### ***c. Inventory and Analyze Current Situation***

##### **i. Ecological Assessment**

Via discussions with SEA staff and tour guides/operators, as well as through a review of the reserve management plans, the quantity and quality of the marine and island ecosystem was assessed. The factors most sensitive to human intervention were identified.

##### **ii. Visitor/Commercial Use Assessment**

Through the stakeholder consultations, discussions with SEA staff, and personal observation the following were determined: current type and amount of visitation; pattern of visitation; estimates of peak use days; number of tour guides and operators; type of use; nature of visitation in terms of boat mooring; tour guides/operator complaints, conflicts and satisfaction; perceived crowding; spatial and temporal preferences of operators; ideas from operators for how to manage sites; identification of issues and concerns from tour guides/operators; and a rough estimate of future visitor/commercial use (demand). These findings have been incorporated into this report.

##### **iii. Management Assessment**

Via discussions with SEA's management team and key tour guides/operators, as well as through personal observation of management efforts at the sites, the following were assessed: the type and level of management/enforcement in the study area; permits and fee operation; interpretation; number of tour guides/operator conflicts and violations; and management issues and concerns for the study area.

#### ***d. Formulate three Management Alternatives and Capacities***

Since the capacity of a site will be influenced by how the area is managed, the team considered several management options (e.g., mooring buoys, time-entry, spatial and temporal distribution of operators, regulations, etc.) and what the capacity might be for each alternative.

#### ***e. Evaluate Management Alternatives and Capacities***

Based upon the capacity decision criteria established in **Step d**, the pros and cons, and strengths and weaknesses, of the proposed alternatives and capacities were rigorously evaluated via analysis of the matrix “*Alternatives for Managing Visitor Use on Gladden Spit/Silk Cayes and Laughing Bird Caye*” and using professional judgment and feedback from SEA’s management team.

#### ***f. Select a preferred alternative and capacity***

Based up the evaluation results and stakeholder feedback in **Step e**, the preferred alternative for each protected area was selected to address concerns and recommended for adoption along with the capacities for each site. Using professional judgment, the management alternatives were analyzed using a matrix entitled “*Capacity Decision Criteria to Evaluate Alternatives*”.

#### ***g. Community Feedback and Reporting***

Two community meetings were conducted to present alternatives and recommendation, and to solicit feedback. Management alternatives and visitor use guidelines were refined to address stakeholder concerns as much as possible.

#### ***h. Final Report***

A final report was presented to SEA including management strategy, visitor use guidelines and management recommendations.

### **4. Findings**

The Consultants focused primarily on visitor use in and around the Silk Cayes (Gladden Spit/Silk Cayes Marine Reserve) and Laughing Bird Caye (Laughing Bird Caye National Park). Initially, the client had wanted the Consultants to also focus on the Sapodilla Cayes Range within the Sapodilla Cayes Marine Reserve. However, due to funding limitations, the Sapodilla Cayes were not included in this consultancy.

A site visit to the project sites, led by SEA’s Protected Areas Manager, was conducted. The visit included stop-overs at the two sets of cayes – Silk Cayes and Laughing Bird Caye – as well as at Little Water Caye, which serves as a base of operations for SEA rangers. Table 1 summarizes the Consultants’ key observations at the Silk Cayes and Little Water Caye, bolstered by statistics and reports provided by the client:

**Table 1: Key observations at the Silk Cayes & Little Water Caye**

	<b>North Silk Caye</b>	<b>Middle Silk Caye</b>	<b>South Silk Caye</b>	<b>Little Water Caye</b>
<b>Legislation</b>	Marine Reserve – Fisheries Act	Marine Reserve – Fisheries Act	Marine Reserve – Fisheries Act	-----
<b>Size</b>	< 1 acre	< 1 acre	< 1 acre	4 acres
<b>Location</b>	The three Silk Cayes are situated within a 378-acre conservation zone within GSSCMR, located 36 km off the coast from Placencia Village			Strategically located between the GSSCMR and the LBCNP
<b>Visitation Policy</b>	Closed	Seasonally open	Year-round	Administrative
<b>Visitation</b>	0	6,021 (GSSCMR, 2010)		-----
<b>Allowed <i>in situ</i> activities</b>	Closed	Camping – see comment above (Visitation Policy)	Camping, Picnicking, Boat docking	Camping
<b>Allowed <i>ex situ</i> activities</b>	None	Snorkeling, diving, kayaking – see comment above (Visitation Policy)	Snorkeling, diving, kayaking	Snorkeling, kayaking
<b>Facilities</b>	None	None	Toilet, picnic tables, BBQ grill	Staff toilets, Ranger’s quarters, pier
<b>Staffing</b>	None	None	Periodic presence, no permanent base	Permanent base
<b>Tenure</b>	Marine Reserve – conservation zone	Marine Reserve – conservation zone	Marine Reserve – conservation zone	Privately owned (SEA)
<b>Physical condition</b>	The Tropical Littoral Forest seems to be in good condition	The Tropical Littoral Forest seems to be in good condition	The sandy beaches are constantly shifting, with natural erosion and deposition occurring in response to tide, wind and storm actions; only patches (remnants) of Tropical Littoral Forest noted	The Tropical Littoral Forest seems to be in good condition, with the exception of the administration area which has been mostly cleared of native vegetation
<b>Wildlife</b>	The cayes support important nesting colonies of gulls and terns, with laughing gulls relocating here when disturbed at Laughing Bird Caye; A resident osprey has also nested on Middle Silk Caye; Cayes historically important for turtle nesting, although only false crawls were reported for 2010, and no successful nests (SEA, 2010).			Five turtle nests were recently reported, though only one of these hatched successfully (SEA, 2010).

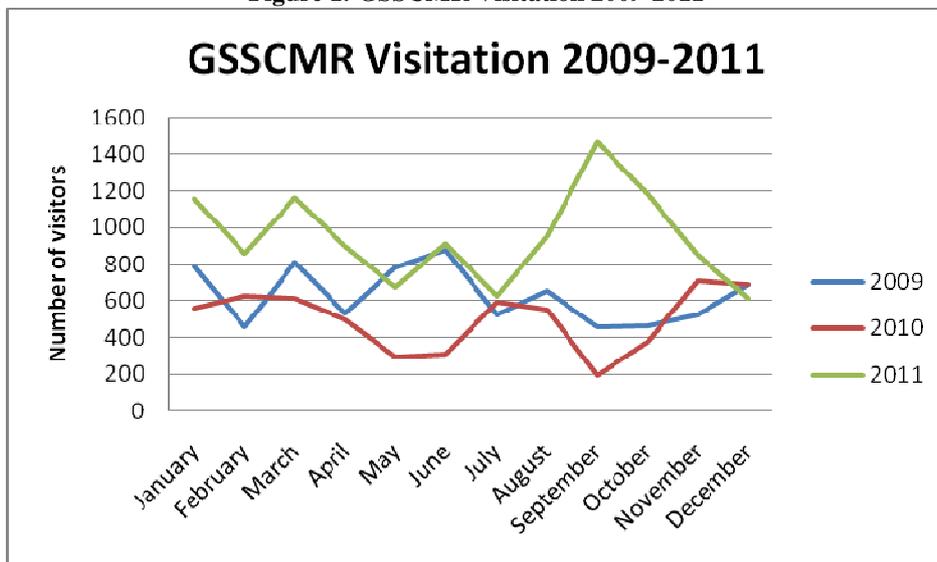
Although Middle Silk Caye has in the past been seasonally open to visitation, it is currently considered by SEA to be closed. In the past, when turtle nesting was in progress, visitation to Middle Silk Caye was not permitted, ensuring the nesting season was successful. Interestingly, local tour guides do not share SEA’s position regarding the closure of Middle Silk Caye, and

have always understood it to be open for seasonal use. Consultations with tour guides have confirmed that they expect (and actually depend on) Middle Silk Caye to be open to visitation, albeit seasonally and under certain conditions. In fact, tour guides are generally of the opinion that South Silk Caye should remain open for day visits but closed to camping, with the proviso that Middle Silk Caye be open for camping.

Of the three cayes, only South Silk Caye contains visitor facilities, namely, a toilet, picnic tables and a barbecue grill. If Middle Silk Caye would be open for any type of visitation, there would be a need for at least basic visitor facilities on the island like are currently in place at South Silk Caye. If camping would be the primary recreation activity allowed at Middle Silk Caye, rudimentary camping platforms would also be needed.

Regardless of the type of visitor activity, the level of visitation (over 11,000 according to 2011 figures) is a major concern, given the tiny size of the cayes.

**Figure 1: GSSCMR Visitation 2009-2011**



As Figure 1 above shows, the peak visitation in 2011 was over 1,100 per month in January, March and October. (September 2011 experienced a surge of visitation, which appears to be an outlier and will not be discussed here.) Over 615 visitors per month visited the marine reserve in all other months of 2011. Excluding the statistics for September 2011, this could conceivably translate to an average of 154-275 tourists visiting South Silk Caye on a weekly basis, or 22-40 visitors per day.

While the marine reserve is 26,000 acres in size, the three Silk Cayes comprise approximately 3 acres, less than 0.00012% of the entire reserve. This tiny fraction may appear insignificant to the layperson. However, tour guides and operators compete for this extremely limited space to conduct their kayaking, camping, snorkeling and diving operations. At the same time, it is widely recognized that these tiny islands contain increasingly patchy littoral forests and nesting grounds for sea turtles, gulls and terns. Without proper controls and guidelines, the sensitive island ecosystem would be irreversibly degraded.

Table 2 below summarizes the Consultants' key observations at Laughing Bird Caye. Again, these recorded observations were bolstered by statistics and reports provided by the client:

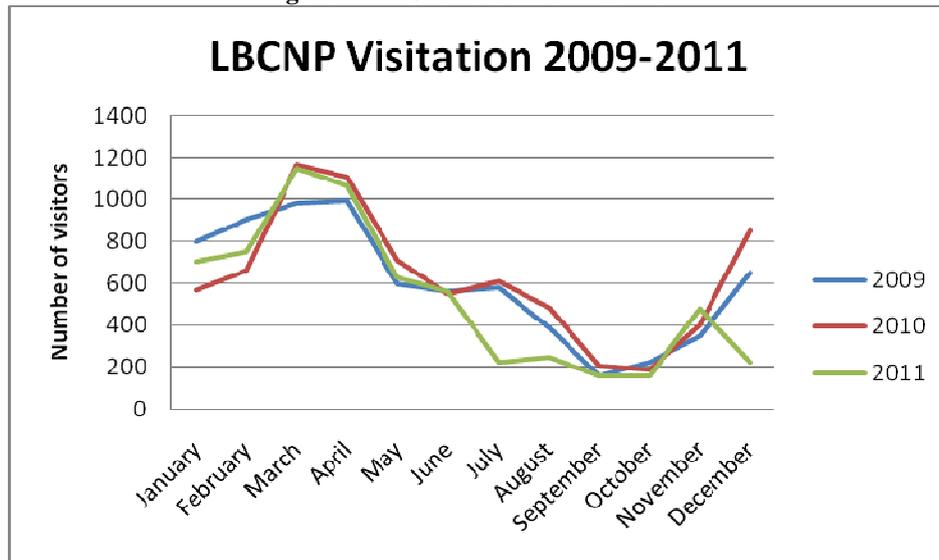
**Table 2: Key Observations at Laughing Bird Caye**

	<b>Laughing Bird Caye</b>	<b>Little Water Caye</b>
<b>Legislation</b>	National Park – National Parks System Act	-----
<b>Size</b>	1.4 acres	4 acres
<b>Location</b>	Within LBCNP, located approximately 18 km off the coast from Placencia Village	Strategically located between the GSSCMR and the LBCNP
<b>Visitation Policy</b>	Year-round	Administrative
<b>Visitation</b>	7,508 (LBCNP, 2010)	-----
<b>Allowed <i>in situ</i> activities</b>	Picnicking	Camping
<b>Allowed <i>ex situ</i> activities</b>	Snorkeling, diving, kayaking	Snorkeling, kayaking
<b>Facilities</b>	Public and staff toilets, picnic shed and tables, BBQ grills, Ranger's quarters	Staff toilets, Ranger's quarters, pier
<b>Staffing</b>	Permanent base	Permanent base
<b>Tenure</b>	National Park – no-take	Privately owned (SEA)
<b>Physical condition</b>	Mixed mangrove scrub and Herbaceous Beach Vegetation/ Littoral forest seems to be in good condition on the northern part of the caye	The Tropical Littoral Forest seems to be in good condition, with the exception of the administration area which has been mostly cleared of native vegetation
<b>Wildlife</b>	Hawksbill turtles and ground nesting birds use the sandy beaches of the caye as crucial nesting grounds (Wildtracks, 2010).	Five turtle nests were recently reported, though only one of these hatched successfully (SEA, 2010).

Laughing Bird Caye is located within the Laughing Bird Caye National Park, which is essentially a no-take area, given its designation under the National Parks System Act. The area has been open to visitation, one of two key purposes of the national park. The other key purpose is conservation.

While the national park is 10,119 acres in size, most visitors conberge at different times of the day on Laughing Bird Caye, which is only 1.4 acres – only 0.00014% of the overall area. Visitation amounted to over 7,508 in 2010, according to park visitor statistics. Figure 2 below shows the monthly visitor statistics over a three-year period:

Figure 2: LBCNP Visitation 2009-2011



Just as at the Silk Cayes, tour guides and operators compete for the extremely limited space on Laughing Bird Caye to conduct their kayaking, camping, snorkeling and diving operations. Peak visitation in 2011 occurred during the months of January to April – roughly 916 visitors per month on average. This could conceivably translate to an average of 229 visitors per week or 33 visitors per day stopping over at Laughing Bird Caye during those four peak months. Hawksbill turtles and ground nesting birds use the sandy beaches of the cayes as crucial nesting grounds (Wildtracks, 2010). While the mixed mangrove scrub and Herbaceous Beach Vegetation/ Littoral forest seems to be in good condition on the northern part of the cayes, this high level of visitor use would eventually place a strain on the island ecosystem without proper controls and guidelines.

The discussion that follows seeks to present alternatives for visitor use, with the aim of determining projections for unsustainable activity levels and making carrying capacity recommendations to be considered by natural resource managers. More specifically, recommendations will focus on the amount and type of use that is compatible with the management prescriptions for an Laughing Bird Caye National Park and Gladden Spit & Silk Cayes Marine Reserve.

Such recommendations are compatible with the view of the Fisheries Department regarding carrying capacity, as eloquently described by Isaias Majil, Senior Fisheries Officer:

“Our Department recognizes that 20 ill informed and uncontrolled tourists can cause much more damage than 200 well informed, responsible tourists who follow the rules and regulations of an area.”

## 5. Overview – Alternatives for Managing Visitor Use

Most stakeholders recognize that unlimited and unregulated visitor use would undermine the ecological integrity of the Silk Cayes and Laughing Bird Caye, which are much too small and sensitive. At the same time, however, tour guides and operators seem unwilling to accept strict limitations and regulations governing their use of these islands. These stakeholders are adamant

that the challenge does not lay with their level and type of use but, rather, the insufficient and inconsistent management presence – and consequent inadequate law enforcement – provided by SEA within the protected areas. While SEA accepts that their management of these reserves needs to be strengthened, the organization also notes that financial support remains a constant challenge to their efforts. SEA also recognizes that visitor use of the islands needs to be managed in order that the ecosystem integrity of the area is not undermined. However, the tour guides/operators and SEA share the following view: The tourism product, and consequently community tourism business ventures, would be severely affected if the islands’ sensitive ecosystem is irreversibly damaged.

Given these perspectives, three different management scenarios or alternatives are presented: 1) The Current Situation, 2) Soft Adventure Tourism alternative, and 3) Hard Adventure Tourism alternative.

The **Current Situation** is characterized by the following attributes:

- ☞ Moderate level of resource conservation and restoration;
- ☞ Regular/intermittent management presence and monitoring;
- ☞ High level of visitor interaction and socialization;
- ☞ Low level of visitor tranquility and solitude.

The **Soft Adventure Tourism alternative** seeks to institute a moderate level of user limitations and management regulations, and is defined by the following attributes:

- ☞ Moderate/high level of resource conservation and restoration;
- ☞ Frequent management presence and monitoring;
- ☞ High level of visitor interaction and socialization;
- ☞ Low level of visitor tranquility and solitude;
- ☞ High level of community owned/managed tourism business ventures.

Conversely, the **Hard Adventure Tourism alternative** is characterized by a strict level of user limitations and management regulations, and is defined by the following attributes:

- ☞ High level of resource conservation and restoration;
- ☞ Extensive management presence and monitoring;
- ☞ Low level of visitor interaction and socialization;
- ☞ High level of visitor tranquility and solitude;
- ☞ Low level of community owned/managed tourism business ventures.

Whichever management alternative is selected – either “Soft” or “Hard” – will be a significant improvement on the current management prescriptions for the Silk Cayes and Laughing Bird Caye. Clearly, the current situation cannot be maintained, since this will inexorably and gradually lead to the irreversible damage of the sensitive ecosystem of the cayes.

The tables that follow list the key considerations for each of the management alternatives, including the current situation. The key considerations are as follows:

1. Physical resource considerations:
  - ☞ Desired resource conditions being managed for;
  - ☞ Condition of key resources;

- 🌀 Trends or patterns
- 2. Social considerations:
  - 🌀 Desired recreational experience being managed for;
  - 🌀 Key recreational activities being managed for;
  - 🌀 Occurrences of crowding or congestion;
  - 🌀 Average size of visiting groups and length of visitation time
- 3. Management considerations:
  - 🌀 Level of patrol and Ranger presence;
  - 🌀 Facilities provided;
  - 🌀 Boat capacity;
  - 🌀 Length of stay, etc.

***a. Analysis – Silk Cayes management alternatives***

The tables below provide detailed information for each scenario as they pertain to the Silk Cayes.

**i. Physical Resource Considerations – Silk Cayes**

Current Situation	Soft Adventure Tourism	Hard Adventure Tourism
<b>Desired resource conditions being managed for</b>		
Maintain current type and level of marine and terrestrial resources	Restore resources with protective enclosure around 25% of South Silk Caye area for herbaceous beach vegetation	Restore resources by <u>prohibiting access</u> to 50% of South Silk Caye area for herbaceous beach vegetation (5 year moratorium)
Maintain year-round prohibition on access to North Silk Caye	Maintain year-round prohibition on access to North Silk Caye and portions of Middle Silk Caye	Maintain year-round prohibition on access to North Silk Caye and portions of Middle Silk Caye
None	Install warning signs regarding boat access to areas of seagrass beds in shallow areas that have been scarred due to high boat activity	Prohibit boat access year-round to areas of seagrass beds in shallow areas that have been scarred due to high boat activity
<b>Condition of key resources</b>		
North Silk Caye off limits to human use, and Middle Silk Caye seasonally accessible	North Silk Caye off limits to human use, and portion of Middle Silk Caye accessible – fully protect nesting sites	North Silk Caye and portions of Middle Silk Caye off limits to human use – protected as turtle nesting beaches
South Silk Caye beaches are fully accessible to visitors	Human activity on South Silk Caye carefully regulated during turtle nesting activity	Human activity on South Silk Caye carefully regulated during turtle nesting activity
<b>Trends or patterns</b>		
Guides are required (although not abided by everyone, e.g., the bareboat charters)	Better guide regulations implemented to reduce impact to the coral reef adjacent to the Silk Cayes – groups no larger than five snorkelers and guide mandatory; North Silk Cayes off limits to snorkeling	Stringent guide regulations implemented to reduce impact to the coral reef adjacent to South Silk Caye – groups no larger than three snorkelers and guide mandatory; North and Middle Silk Cayes off limits to snorkeling
N/A	25% of South Silk Caye off	50% of South Silk Caye off

	limits to visitors – for herbeaceous beach vegetation restoration and bird nesting	limits to visitors – for herbeaceous beach vegetation restoration and bird nesting
North Silk Caye off limits to human use – fully protected as turtle nesting beaches; South Silk Caye beaches are fully accessible to visitors	Turtle nests on South Silk Caye are protected with enclosures and monitored	North Silk Caye and Middle Silk Caye – fully protected as turtle nesting beaches; South Silk Caye beaches are fully accessible to visitors , except for turtle nesting sites
Access to the whale shark congregation area is strictly regulated by SEA	Better management of how divers interact with the whale sharks – working group	Better management of how divers interact with the whale sharks – working group

## ii. Social Considerations – Silk Cayes

Current Situation	Soft Adventure Tourism	Hard Adventure Tourism
<b>Desired recreational experience being managed for</b>		
Provide people the opportunity to view a world class reef	Provide people the opportunity to view a world class reef	Provide people the opportunity to enjoy the tranquility of an undeveloped Caribbean island and view a world-class reef
Meet and enjoy Belizeans and foreign nationals	Meet and enjoy Belizeans and foreign nationals	Privacy and solitude afforded
Comforted by rustic facilities and conveniences in a safe & secure environment with PA rangers present	Comforted by rustic facilities and conveniences in a safe & secure environment with PA rangers present	Few facilities and conveniences
<b>Key recreational activities being managed for</b>		
Coral reef snorkeling and diving tours (which originate from the mainland, with many of the larger coastal resorts, such as Hamanasi (Hopkins) and Pelican Beach Resort (Dangriga) providing day tour packages) – the best dive sites are off the Silk Cayes	Coral reef snorkeling and diving tours (which originate from the mainland, with many of the larger coastal resorts, such as Hamanasi (Hopkins) and Pelican Beach Resort (Dangriga) providing day tour packages)	Coral reef snorkeling and diving tours – based on a quota/lottery system
Whale shark viewing (March to June is whale shark season) -- access to the whale shark congregation area is strictly regulated by SEA	Whale shark viewing – based on the quota/lottery system, and the rules and regulations	Whale shark viewing – based on the quota/lottery system and rules and regulations
Kayaking/camping tours – South Silk Caye used only for lunch and snorkeling purposes – Little Water Caye serves as the base	Camping on a Middle and South Silk Caye – based on a quota/lottery system	Camping on a Middle Silk Caye – based on a quota/lottery system
Bareboat charters (catamarans) – are unregulated and not encouraged but taking	Bareboat charters need to be under permit, assigned to mooring spots/balls, charged for	Bareboat charters need to be under permit, assigned to mooring spots/balls, charged for

place – anchor anywhere, no guides, illegal fishing/diving, anchor damage, groundings – include dinghies that head to the cayes when last tour boats leave – fall under the Hotel Act and therefore not required to have captain, tour guide and fishing licences	daily visits, and capped to four per night	daily visits, and capped to four per night
<b>Occurrences of crowding or congestion</b>		
Increasing reports of crowding and congestion	Less than 20% of <u>high season</u>	Less than 10% of <u>high season</u> (March – June)
Visitation is usually highest in March to May (based on 2005-2010 data, SEA), tying in with the whale shark season, with many tour operators offering an inclusive tour, stopping at both the Silk Cayes and the whale shark zone	Visitation is highest in March and April, tying in with the whale shark season, with many tour operators offering an inclusive tour, stopping at both the Silk Cayes and the whale shark zone	Recreation activities (snorkeling, diving, camping, shark viewing, swimming) based on a quota/lottery system only
Over-crowding on South Silk Caye during the high tourist season	Crowding on South Silk Caye during the high tourist season kept in check	Little Water Caye becomes the base of operations (camping, facilities, etc.)
The size of the beaches available for turtle and bird nesting has been impacted by un-monitored camping on Middle and South Silk Cayes	Turtle nesting beaches and bird nesting areas monitored and cordoned off on Middle and South Silk Cayes	
<b>Average size of groups/length of visitation time</b>		
Guided boats transport 4 tourists; some groups of 1-person kayaks travel together		
No restrictions; typical visits are 1-6 hours	No restrictions; typical visits are 1-6 hours	Typical visits are 1-3 hours – by reservation block
N/A	Conduct visitor survey to ensure visitor satisfaction (crowding, conflict). Sample size could be a minimum of 50 respondents per season. If 30%+ dissatisfaction recorded, sampling could be intensified to a minimum of 250 respondents per season. A visitor survey by an independent party should be routine and annual.	Conduct visitor survey to ensure visitor satisfaction (crowding, conflict). Sample size could be a minimum of 50 respondents per season. If 30%+ dissatisfaction recorded, sampling could be intensified to a minimum of 250 respondents per season. A visitor survey by an independent party should be routine and annual.

### iii. Management Considerations – Silk Cayes

Current Situation	Soft Adventure Tourism	Hard Adventure Tourism
<b>Level of patrol and ranger presence</b>		
Ranger presence (Within the reserve boundaries. Rangers on patrol during these hours. Start the day with a stop at Silk Cayes and then one pass in the afternoon) from 10am-3 pm and one evening pass-by high season;		

Rangers stationed on Little Water Caye, adjacent to marine reserve		
Patrol boat sent to Gladden between 6-7 every night of the high season; maybe a tour of duty from 11-2 and 5-7 for patrol and maintenance		
<b>Level of on-site interpretation</b>		
No on-site activities; Guides will inform	No on-site activities; Guides will inform	No on-site activities; Guides will inform
Facilities provided		
2 tables, bathroom; fire pit	2 tables; Bathroom; Remove fire pit; Designated boat landing zone	Bathroom; Remove fire pit and tables; Designated boat landing zone
<b>Regulations for overnight camping</b>		
Overnight camping discouraged; Bareboat charters conducting unregulated camping	Camping on Middle and South Silk Cayes accessible to visitors who have been selected through the quota/lottery program – limited to one tent (max 4 campers) per caye on a daily basis ? Two tents?	Camping on Middle Silk Caye accessible to visitors who have been selected through the quota/lottery program – limited to one tent (max 4 campers) on a daily basis? Two tents?
<b>Length of stay restriction</b>		
None at this time	Enable two reservation blocks (4 boats per block) – morning and afternoon groups -- Work with operators to configure a morning and afternoon time block----SEA could handle the reservations, maybe start with just weekends to control use	Enable one morning reservation block (4 boats per block) – Work with operators to configure a morning OR afternoon time block----SEA could handle the reservations, maybe start with just weekends to control use...
<b>Prescribed shoreline boat capacity</b>		
None at this time	6 boats at one time	3 boats at one time
<b>Prescribed people at one time capacity</b>		
None at this time	24	12
<b>Prescribed overnight boat mooring capacity</b>		
None at this time – daily moorings off Silk Cayes cannot be monitored from Little Water Caye (3-4 miles away)	8 (4 X 2)	4 (determined by mooring buoy type)

***b. Analysis – Laughing Bird Caye management alternatives***

The tables below provide detailed information for each scenario as they pertain to Laughing Bird Caye.

**i. Physical Resource Considerations – Laughing Bird Caye**

Current Situation	Soft Adventure Tourism	Hard Adventure Tourism
<b>Desired resource conditions being managed for</b>		
Maintain current type and level of marine and terrestrial resources	Restore resources by <u>prohibiting access</u> to the northern quadrant of Laughing Bird Caye for herbaceous beach vegetation (5	Restore resources by <u>prohibiting access</u> to the northern quadrant of Laughing Bird Caye for herbaceous beach vegetation

	year moratorium)	(indefinite)
Free access	Install warning signs regarding boat access to areas of seagrass beds in shallow areas that have been scarred due to high boat activity	Prohibit boat access year-round to areas of seagrass beds in shallow areas that have been scarred due to high boat activity
Maintain protective enclosures around sea turtle nests	Maintain protective enclosures around sea turtle nests	Maintain protective enclosures around sea turtle nests
<b>Condition of key resources</b>		
N/A	50% of the coral areas are off limits to human activity and boat traffic	75% of the coral areas are off limits to human activity (snorkeling, diving) and boat traffic
	Park beaches open year-round	Park beaches off limits to visitors during the months of June to October;
<b>Trends or patterns</b>		
Snorkeling anywhere	Snorkeling activity limited to demarcated areas which total about 75% of coral/seagrass areas	Snorkeling activity limited to demarcated areas which total less than 25% of coral/seagrass areas
No zoning	The caye has been zoned to allow regeneration of the northern end only to natural vegetation, promoting a natural herbaceous beach vegetation, with some littoral forest components, whilst the middle and southern portion is maintained for visitor use	The caye has been zoned to allow regeneration of the northern and southern ends to natural vegetation, promoting a natural herbaceous beach vegetation, with some littoral forest components, whilst the middle portion is maintained for visitor use;
N/A	The majority of the middle and southern portions of the caye is maintained as sand, with shading provided by coconuts, for visitation, hosting up to 50 visitors at a time, on occasion;	The majority of the middle portion of the caye is maintained as sand, with shading provided by coconuts, for visitation, hosting over up to 30 visitors at a time, on occasion
Selective pruning/clearing allowed	The removal of natural vegetation is prohibited on the caye.	Selective pruning allowed

## ii. Social Considerations – Laughing Bird Caye

Current Situation	Soft Adventure Tourism	Hard Adventure Tourism
<b>Desired recreational experience being managed for</b>		
Provide people the opportunity to view a world class faro	Low level of tranquility and solitude	High level of visitor tranquility and solitude
Meet and enjoy Belizeans and foreign nationals	High level of visitor interaction and socialization	Low level of visitor interaction and socialization
Comforted by rustic facilities and conveniences in a safe &	Comforted by “fairly elaborate” - facilities and conveniences in a	Comforted by rustic facilities and conveniences in a safe & secure

secure environment with Protected Areas rangers present	safe & secure environment with PA rangers present	environment with PA Rangers present
<b>Key recreational activities being managed for</b>		
Snorkeling; Diving ( <i>Note: Marine and coral life seem healthier off the northern end of the caye</i> ); Kayaking; Picnicking; Camping; Other social activities; Meeting other people	Snorkeling; Diving; Kayaking; Picnicking; Camping; Other social activities; Meeting other people	Snorkeling; Diving; Kayaking; Picnicking; Other social activities; Meeting other people – No camping
Camping not allowed	Overnight camping only permitted on Little Water Caye – camping platforms constructed	Camping and/or campfires on the beach not permitted, especially during the nesting-hatching season
<b>Occurrences of crowding or congestion</b>		
Increasing reports of crowding and congestion	Less than 20% of high season days	Less than 10% of high season days
Conflicts between boats and snorkelers	Designate boating landing and trafficking areas	Designate boating landing and trafficking areas – also mention designated snorkel entry and exit points (more than those that exist already or better signage at least)
<b>Average size of groups/length of visitation time</b>		
Guided boats transport 4 tourists; some groups of 1-person kayaks travel together – again, is the average only 4 people?		
No restrictions; typical visits are 1-6 hours	No restrictions; typical visits are 1-6 hours	No restrictions; typical visits are 1-4 hours

### iii. Management Considerations – Laughing Bird Caye

Current Situation	Soft Adventure Tourism	Hard Adventure Tourism
<b>Level of patrol and ranger presence</b>		
24/7 ranger presence; ranger station located on Laughing Bird Caye within park boundaries, and patrols conducted once daily		
<b>Level of on-site interpretation</b>		
Personal ranger message on arrival at caye and interpretive signs (minimal at present)	Personal ranger message and interpretive signs; Guided underwater interpretive trail (one-way) separated from boat landing area	Personal ranger message and interpretive signs
<b>Facilities provided</b>		
15 tables, Shelter, Bathroom, Signage, Designated snorkel ingress/egress	20 tables, Shelter, Bathroom, Signage, Designated snorkel ingress/egress	15 tables, Shelter, Bathroom, Signage, Designated snorkel ingress/egress
<b>Regulations for overnight camping</b>		
No overnight camping	Overnight camping only permitted on Little Water Caye – camping platforms constructed	Overnight camping only permitted on Little Water Caye – in designated areas only
		Camping and/or campfires on the beach not permitted, especially

		during the nesting-hatching season;
<b>Length of stay restriction</b>		
None at this time	1 to 4 hours (2 block times)	1 to 4 hours (1 block time)
<b>Prescribed shoreline boat capacity</b>		
None at this time	8 boats at one time	5 boats at one time
<b>Prescribed people at one time capacity</b>		
None at this time	50	30
<b>Prescribed overnight boat mooring capacity</b>		
None at this time – daily moorings easily monitored from LBC	0	0

## 6. Decision Criteria for Visitor Capacity Decision-making

A report entitled “*Visitor Capacity on Public Lands and Waters: Making Better Decisions*” (Haas, G. E. 2002) states that arbitrary decisions are those made without principle and reason. The report lists a number of reasons for decisions, which it refers to as “decision criteria”. An explicit list of decision criteria can serve several important functions in rational planning. These functions are as follows:

1. A list of decision criteria helps to make a decision process transparent and trackable to stakeholders;
2. Decision criteria can help in creatively developing a full set of reasonable alternatives;
3. A list of decision criteria helps assure a full, fair, adequate and deliberate evaluation and assessment of the consequences of each alternative;
4. Decision criteria can improve communications and increase meaningful public participation, understanding and support;
5. An explicit list of criteria is important when more advanced decision analysis is desired such as weighting or ranking;
6. A list of decision criteria is demonstrable evidence for the administrative record; and
7. Criteria are important for adaptive management because they help us understand and learn from past decision and experiences.<sup>1</sup>

The following list illustrates the decision criteria that were used to evaluate the management alternatives for the Silk Cayes and Laughing Bird Caye.

---

### Decision Making Criteria

---

**Affects Ecological Integrity.** The degree to which each alternative:

- ☞ Affects the ecological integrity of the site, local vicinity or bio-region
- ☞ Affects the important or priority resources or values the area is being managed to protect
- ☞ Has irreversible effects on resources, or effects that cannot be restored or recovered

**Supported by Science.** The degree to which each alternative:

- ☞ Is based upon reasonable assumptions and trends
- 

<sup>1</sup> Source: Haas, G. E. 2002. *Visitor Capacity on Public Lands and Waters: Making Better Decisions*. A Report of the Federal Interagency Task Force on Visitor Capacity on Public Lands. Submitted to the Assistant Secretary for Fish and Wildlife and Parks, U.S. Department of the Interior, Washington, DC, May 1, 2002. Published by the National Recreation and Park Association, Ashburn, Virginia.

- 
- 🔗 May involve high uncertain risks or consequences
  - 🔗 Is based on insufficient scientific information
  - 🔗 Will secure needed scientific information in the future
  - 🔗 Has an adequate monitoring program involving resource, social, and managerial attributes

**Level of Public Support.** The degree to which each alternative:

- 🔗 Contributes to the desired welfare of stakeholders
- 🔗 Build meaningful and appropriate partnerships with collaborators
- 🔗 Allows for options and opportunities for future generations

**Affects Integrity of Recreation Experience.** The degree to which each alternative:

- 🔗 Is appropriate and consistent with the management objectives
- 🔗 Provides for unique or rare recreation opportunities locally, regionally or nationally
- 🔗 Attracts visitors who otherwise would not visit
- 🔗 Provides an appropriate recreation experience by the least intrusive means

**Management Suitability and Capability.** The degree to which each alternative:

- 🔗 Complements other important resource uses, users or values
  - 🔗 Requires reallocated or increased resources in services, personnel, facilities, programs, or equipment
  - 🔗 Is administratively feasible (e.g., budget, personnel, equipment, facilities, O&M standards)
  - 🔗 Has consequences that can be mitigated (i.e., avoid, minimize or limit extent, compensate, restore, rehabilitate, reduce, or eliminate)
- 

## 7. Evaluation of Alternatives – the Silk Cayes

The table below shows the results of the evaluation of the management alternatives for the Silk Cayes, using the decision making criteria listed above. A rating system of #1 to #3 is used to compare the current situation with the “Soft” and “Hard” alternatives, with #1 being “least preferred/desirable” and #3 being “most preferred/desirable”.

<b>Rating system to compare options:</b> <b>1=least preferred/desirable;</b> <b>2=moderately preferred/desirable;</b> <b>3=most preferred/desirable</b>	<b>Alternatives</b>		
	<b>Current Situation</b>	<b>Soft</b>	<b>Hard</b>
<b>Criteria:</b>			
<b>Affects Ecological Integrity. The degree to which each alternative:</b>			
Affects the ecological integrity of the site, local vicinity or bio-region	1	2	3
Affects the important or priority resources or values the area is being managed to protect	1	2	3
Has irreversible effects on resources, or effects that cannot be restored or recovered	1	2	3
<b>Supported by Science. The degree to which each alternative:</b>			
Is based upon reasonable assumptions and trends	1	2	3
May involve high uncertain risks or consequences	1	2	3
Is based on insufficient scientific information	0	2	3
Will secure needed scientific information in the future	1	3	3
Has an adequate monitoring program involving resource, social, and managerial attributes	1	2	2
<b>Level of Public Support. The degree to which each alternative:</b>			
Contributes to the desired welfare of stakeholders	2	3	2
Build meaningful and appropriate partnerships with collaborators	1	3	2
Allows for options and opportunities for future generations	1	2	3
<b>Affects Integrity of Recreation Experience. The degree to which each alternative:</b>			
Is appropriate and consistent with the management objectives	1	2	3
Provides for unique or rare recreation opportunities locally, regionally or nationally	1	2	3
Attracts visitors who otherwise would not visit	1	2	3
Provides an appropriate recreation experience by the least intrusive means	1	2	3
<b>Management Suitability and Capability. The degree to which each alternative:</b>			
Complements other important resource uses, users or values	1	2	3
Requires reallocated or increased resources in services, personnel, facilities, programs, or equipment	1	2	3
Is administratively feasible (e.g., budget, personnel, equipment, facilities, O&M standards)	1	2	3
Has consequences that can be mitigated (i.e., avoid, minimize or limit extent, compensate, restore, rehabilitate, reduce, or eliminate)	1	2	3
<b>TOTAL RANKING SCORE – SILK CAYES</b>	<b>19</b>	<b>41</b>	<b>54</b>

The Total Ranking Score indicates that the “Hard” alternative is the most preferred/desirable option, since it received the highest score among the three options. This result indicates that the

“Hard Adventure Tourism” alternative should be embraced for the Silk Cayes. This suggests that the management prescription for the Silk Cayes should focus on achieving a high level of resource conservation and restoration through extensive management presence and monitoring. Such a focus would in turn result in a low level of visitor interaction and socialization, and a high level of visitor tranquility and solitude due to carefully managed and low visitation permitted for the islands. This management prescription is consistent with the purpose of the Conservation Zone, within which the Silk Cayes are located.

At the stakeholder consultations, it became clear that local tour guides and operators recognize the fragility of the ecosystem of the Silk Cayes area, particularly at South Silk Caye. It also became clear that the tourism business ventures of these tour guides and operators would suffer if access to the Silk Cayes would be strictly limited. To put it another way, the Silk Cayes represent an essential component of the tourism product on which these tour guides and operators depend for their livelihood.

The management agency, SEA, wished to change the visitor use status of Middle Silk Caye from seasonally open to permanently closed, due to justified ecological reasons, as previously discussed. The status for North Silk Caye is to remain unchanged – that is, any type of tourism visitation and recreation activities is prohibited on North Silk Caye.

The tour guides and operators that were consulted were of the general opinion that Middle Silk Caye should be open to camping, which is currently permitted only on South Silk Caye. At the same time, they suggested that camping could be restricted at South Silk Caye, given the fragility of the cayes’ ecosystem and its central feature as a key stop-over for visitors on kayaking, snorkeling, and diving tours.

An interesting opportunity for compromise has been presented – one that will allow SEA to institute user guidelines to ensure the reduction of visitor impacts on the cayes and surroundings, as well as allow local tour guides and operators to maintain and even expand their tourism operations, while instituting better management practices and collaboration with SEA.

An amalgam of the “Hard” and “Soft” management alternatives is therefore recommended for the Silk Cayes area. The visitor use guidelines that are presented elsewhere in this report are based on such a combination. Essentially, the key characteristics of this combined management alternative are as follows:

- ☞ High level of resource conservation and restoration;
- ☞ Extensive management presence and monitoring;
- ☞ Moderate level of visitor interaction and socialization;
- ☞ Moderate level of visitor tranquility and solitude;
- ☞ Moderate level of community owned/managed tourism business ventures.

For this combined management alternative to function, and to ensure a high level of resource conservation and restoration, SEA would need to put into effect extensive management presence and monitoring in the marine reserve. At this time, SEA’s current staffing limitations do not allow the organization to effectively carry this out on a regular and sustained basis. SEA is hard pressed to increase the size of its cadre of Rangers due to chronic financial challenges.

Obviously, alternatives to this scenario need to be considered, if the features of the combined Hard/Soft Tourism Alternative are to be achieved. Ideas include the deputization by the Minister of Fisheries of reputable and trustworthy tour guides and operators as fishery officers, and the re-establishment of SEA’s Community Rangers Program.

## 8. Evaluation of Alternatives – Laughing Bird Caye

The table below shows the results of the evaluation of the management alternatives for Laughing Bird Caye, using the decision making criteria listed in Section 6 above.

Rating system to compare options: 1=least preferred/desirable; 2=moderately preferred/desirable; 3=most preferred/desirable	Alternatives		
	Current Situation	Soft	Hard
<b>Criteria:</b>			
<b>Affects Ecological Integrity. The degree to which each alternative:</b>			
Affects the ecological integrity of the site, local vicinity or bio-region	1	2	3
Affects the important or priority resources or values the area is being managed to protect	1	2	3
Has irreversible effects on resources, or effects that cannot be restored or recovered	1	2	3
<b>Supported by Science. The degree to which each alternative:</b>			
Is based upon reasonable assumptions and trends	1	3	3
May involve high uncertain risks or consequences	1	2	3
Is based on insufficient scientific information	1	2	3
Will secure needed scientific information in the future	2	3	3
Has an adequate monitoring program involving resource, social, and managerial attributes	1	3	3
<b>Level of Public Support. The degree to which each alternative:</b>			
Contributes to the desired welfare of stakeholders	1	3	2
Build meaningful and appropriate partnerships with collaborators	1	3	2
Allows for options and opportunities for future generations	1	3	3
<b>Affects Integrity of Recreation Experience. The degree to which each alternative:</b>			
Is appropriate and consistent with the management objectives	2	3	2
Provides for unique or rare recreation opportunities locally, regionally or nationally	2	3	3
Attracts visitors who otherwise would not visit	1	3	3
Provides an appropriate recreation experience by the least intrusive means	1	2	3
<b>Management Suitability and Capability. The degree to which each alternative:</b>			
Complements other important resource uses, users or values	1	3	2
Requires reallocated or increased resources in services, personnel, facilities, programs, or equipment	1	3	2

Is administratively feasible (e.g., budget, personnel, equipment, facilities, O&M standards)	1	3	2
Has consequences that can be mitigated (i.e., avoid, minimize or limit extent, compensate, restore, rehabilitate, reduce, or eliminate)	1	2	3
<b>TOTAL RANKING SCORE - LAUGHING BIRD CAYE</b>	<b>22</b>	<b>51</b>	<b>50</b>

While the Total Ranking Score clearly indicates that the Current Situation at Laughing Bird Caye is least preferred/desirable, the scores for the “Soft” and “Hard” management alternative are virtually identical. Given that the major management focus of Laughing Bird Caye National Park is conservation and tourism, the “Soft” tourism management alternative would be the most preferred/desirable option for the caye. The key characteristics of this “Soft” alternative, which seeks to institute a moderate level of user limitations and management regulations, are as follows:

- ☞ Moderate/high level of resource conservation and restoration;
- ☞ Frequent management presence and monitoring;
- ☞ High level of visitor interaction and socialization;
- ☞ Low level of visitor tranquility and solitude;
- ☞ High level of community owned/managed tourism business ventures.

Along with the Silk Cayes, Laughing Bird Caye represents an essential component of the tourism product on which local tour guides and operators depend for their livelihood. Laughing Bird Caye has been a key stop-over for kayaking, snorkeling, and diving tours. Because of the caye’s proximity to the mainland, the island is a popular destination for day visitors who engage in snorkeling, swimming and picnicking activities. Camping has not been permitted on the island.

The stakeholder consultations revealed that allowing camping on Laughing Bird Caye would be a welcome improvement, and would present a viable alternative to camping on the Silk Cayes. Laughing Bird Caye is at least four times the size of any of the Silk Cayes, and already contains elaborate visitor facilities that could easily accommodate fairly large groups.

While camping on Laughing Bird Caye may well present a viable income generating option for SEA, visitor use guidelines would need to be adhered to, given the fragility of the caye’s ecosystem and its function as a key nesting ground for sea turtles, gulls and terns.

SEA would need to maintain its management presence and monitoring in the national park, and strengthen it through partnerships with reputable and trustworthy local tour guides and operators serving as Community Rangers and who have been deputized by the Minister of Fisheries as fishery officers.

## 9. Other Concerns

Increasingly, live-aboards or bareboat charters are becoming a popular way of experiencing the beauty and solitude of the Laughing Bird Caye National Park and the Gladden Spit & Silk Cayes Marine Reserve. These vessels fall under the Hotels and Tourist Accommodation Act. As mandated under this Act, bareboat charters are legally required to apply for a live-aboard license from the Belize Tourism Board to be able to operate in Belizean waters. The live-aboards

received a signed agreement (*Agreement for the Operation of a Liveaboard Passenger Vessel in Belizean Waters*) as well as an *Environmental Compliance Plan* as proof that they are registered. (See Appendices 1 and 2 for copies of the agreements.)

The stakeholder consultation revealed that local tour guides/operators regularly observe the passengers of bareboat charters engaging in the most flagrant violations of the rules and regulations of the reserves. Specifically, the local tour guides/operators stated the following concerns related to bareboat or live-aboard charters, based on first-hand observations:

- ☞ The live-aboard charters are not required to obtain Captain’s License, Tour Guide License, fishing licenses and such other licenses that local tour guides and operators are required to obtain.
- ☞ Live-aboard charters pay hotel tax but not tour guide tax.
- ☞ Live-aboard charters do not hire local guides or tour operators.
- ☞ Live-aboard charters crew and passengers engage in fishing and diving activities without the proper permits and licenses.
- ☞ After the last tour boats have left the marine reserves, the live-aboard charters reportedly anchor anywhere, and the crew and passengers oftentimes engage in unlicensed fishing.
- ☞ There have been several incidents of anchor damage and groundings on the reef caused by live-aboard charters which have gone unreported or which have had no follow-up from the authorities.
- ☞ The live-aboard charters tend to “mop up” all the prime dive spots.

Besides very passionately sharing these concerns at the stakeholder consultations, the tour guides and operators collectively expressed their frustration that SEA has not been able to take charge of the situation and put the bareboat charters in check. Due to a lack of clarity in relation to the laws and regulations governing the bareboat charters, SEA was unsure if their Rangers had any jurisdiction over these charters.

The conditions provided under the Agreement for the Operation of a Liveaboard Passenger vessel in Belizean Waters, as well as under the Environmental Compliance Plan, address many of the concerns expressed by the tour guides and operators. The *Agreement for the Operation of a Liveaboard Passenger Vessel in Belizean Waters* contains the following provisions, among others:

- Govern the operations of the Licensee and the live aboard vessel while in Belizean waters;
- Governs the tourist accommodation operations of the vessel while in Belizean waters;
- Requires the Licensee to become familiar with laws relating to the marine areas, and to strictly comply with such laws **which include but are not restricted to** the Environmental Protection Act, the Port Authority Act, **the Fisheries Act**, the Public Health Act and the Maritime Areas Act and any regulations made under these Acts;
- **Requires the Licensee to hire suitable local tour guides or tour operators** (duly licensed under established legislation) for all marine and land-based tour itineraries;
- Requires the Licensee to ensure that no damage is caused by the live-aboard passenger vessel to any part of the Belizean Barrier Reef and its supporting ecosystems;
- Requires the Licensee to report to the Belize Tourism Board, The Department of the Environment and The Fisheries Department any grounding of the vessel on the coral reef

and/or any pollution caused by the vessel in Belizean waters. These agencies shall make a determination as to appropriate compensation for any damages or pollution caused; and

- Requires the Licensee to clean up all pollution that may have been caused anywhere in Belize and its territorial waters as a result of its operations.

These provisions indicate that SEA does indeed have jurisdiction over the bareboat charters, particularly when these charters venture into the marine reserves (namely, GSSCMR and LBCNP) under SEA's remit.

## 10. Proposed Visitor Use Guidelines

The previous analysis indicates that the activities that could have the greatest impact on the fragile ecosystem of the cayes are camping (including unregulated day visits) and free-for-all visits by bareboat charters. Conversely, these same activities present viable revenue generation options for SEA as long as they are regulated.

Before presenting proposed visitor use guidelines for these recreation activities, it would be instructive to lay out the following set of proposed management decisions for SEA's consideration:

1. Camping should be permitted on Middle Silk Caye and should be the only recreation activity permitted on that island;
2. Camping should no longer be permitted on South Silk Caye. Only short stopovers for activities such as picnicking, swimming and snorkeling should be allowed.
3. South Silk Caye should remain off-limits for any type of tourism/recreation activities.
4. Camping should be considered as a permissible activity at Laughing Bird Caye, but only on the sandy beaches near the picnic area. No clearing of vegetation or any disturbance whatsoever to turtle and shorebird nests should take place.
5. Bareboat charters should be required to abide by the same rules and regulations that are applicable to local tour guides and operators.

In consideration of this set of proposed management decisions, visitor use guidelines are hereby presented for kayaking, camping, and bareboat charters.

### *a. Guidelines for Bareboat Charters*

Section 2 of the Hotels and Tourist Accommodation Act defines "tourist accommodation" as follows: "...includes, without derogating from paragraph (a) above, apartments, condominiums, guest-houses, beach-houses, time-share units, cruise ships, **liveaboard vessels**, camp-sites, religious, education and research facilities, community-based tourist establishments, and any other type or category of accommodation used by guests."

Live-aboards or bareboat vessels fall under the Hotels and Tourist Accommodation Act. As mandated under this Act, bareboat charters are legally required to apply for a live-aboard license from the Belize Tourism Board to be able to operate in Belizean waters. The live-aboards received a signed agreement (Agreement for the Operation of a Liveaboard Passenger vessel in Belizean Waters) as well as an Environmental Compliance Plan as proof that they are registered.

Based on the conditions provided under the *Agreement for the Operation of a Liveaboard Passenger Vessel in Belizean Waters* (see Appendix 1), as well as under the *Environmental Compliance Plan* (see Appendix 2), the guidelines listed below are hereby proposed. These guidelines aim to ensure that the unique environment of the cayes and reserves is protected. These guidelines should be adopted as soon as possible and observed by live-aboard charters as fully as possible.

1. Live-aboard captains must have a working knowledge of the reserves. Boats must be properly licensed and equipped with sufficient life vests and other safety devices as per Port Authority's regulations.
2. All live-aboards wishing to enter the reserves should first check-in with SEA Rangers stationed at Little Water Caye or Laughing Bird Caye.
3. Live-aboard charters must hire licensed local tour guides or tour operators, who will provide briefing on regulations to passengers before entering the reserves. These guides must at all times accompany the live-aboard charter.
4. If snorkeling will be included in the tour, a maximum ratio of eight (8) snorkelers to each licensed guide is permitted.
5. All passengers must pay the mandated entrance fee of \$10US per person for the first three days, and an additional US\$25 per person thereafter.
6. Entry of live-aboard charters into the Silk Cayes or Laughing Bird Caye areas should be no earlier than 8:00 AM. All charters should be out of the reserve by 5:00 PM on the same day, unless special permission is granted by SEA to stay longer according to established guidelines.
7. Live-aboards must become familiar with laws relating to the marine areas, and are required to strictly comply with such laws which include but are not restricted to the Environmental Protection Act, the Port Authority Act, the Fisheries Act, the National Parks System Act, the Public Health Act and the Maritime Areas Act, as well as the GSSCMR and LBCNP Regulations and tourism guidelines, and any other regulations made under these Acts.
8. Live-aboards are required to hire suitable local tour guides or tour operators (duly licensed under established legislation) for all marine and land-based tour itineraries.
9. Live-aboard charters must ensure that no damage is caused by the live-aboard passenger vessel to any part of the Belizean Barrier Reef and its supporting ecosystems.
10. Live-aboards must report to the Belize Tourism Board, The Department of the Environment, the Fisheries Department, and SEA any grounding of the vessel on the coral reef and/or any pollution caused by the vessel in Belizean waters. These agencies shall make a determination as to appropriate compensation for any damages or pollution caused.
11. Live-aboards are required to clean up all pollution that may have been caused anywhere in the marine reserves as a result of its operations.

Camping rules:

12. Live-aboard crew and passengers are not allowed to camp on the Silk Cayes or at Laughing Bird Caye without the required camping permit from SEA (see camping guidelines).
13. The Camping Guidelines shall apply without exception.

Licensing:

14. Snorkeling tours must be led by a licensed local tour guide.

Sanctions:

15. Any person who contravenes any of the provisions of these regulations is guilty of an offense and liable on summary conviction to a fine or to imprisonment, or to both such fine and period of imprisonment, as provided under the relevant Acts and regulations, and/or revocation of permit(s) to enter the Silk Cayes area/GSSCMR and LBCNP.
16. Notwithstanding the above, any person who damages corals shall pay a fine, or some higher penalty based on the assessed damage, as prescribed under the relevant Acts and regulations.

***b. Visitor Use Guidelines for “Kaya-Camping”***

“Kaya-Camping” is one of the most intimate ways to enjoy the spectacular beauty of the Silk Cayes’ area and Laughing Bird Caye. However, to protect the cayes’ unique environment, the following rules and regulations apply. Visitors are required to observe these guidelines as fully as possible.

1. Tour guides wishing to conduct kayaking/camping tours within the Gladden Spit & Silk Cayes Marine Reserve and Laughing Bird Caye National Park must be licensed tour guides and carry at all times their valid Tour Guide identification cards, as well as a kayaking/camping permit obtained from SEA.
2. The Silk Cayes: Camping is permitted on Middle Silk Caye only. Camping is not permitted on North Silk Caye or South Silk Caye.
3. Camping is permitted on Laughing Bird Caye.
4. Boat captains must have working knowledge of the reserves as well as carry their Captains License. Boats must be properly licensed and equipped with sufficient life vests and other safety devices as per Port Authority’s regulations.
5. One reservation block per day will be available for kayaking/camping tours.
6. Entry of kayakers/campers into the Silk Cayes area should be no later than 3:00 PM. All kayakers/campers should be out of the reserve by 2:00 PM on the last day of the tour.
7. The Silk Cayes: Maximum length of stay is three days and two overnights.
8. Laughing Bird Caye: Maximum length of stay is two days and one overnights.
9. Kayaking/camping groups must comprise not more than 9 persons (including the guides) per tour group.
10. A maximum of five two-person tents (including one tent for the guides) is allowed.
11. Kayaking/camping tours will be allocated by lottery, for the peak tourist season (December to May). The lottery will be held in a similar way as that conducted for whale shark viewing. During the rest of the year, tours will secure reservations from SEA on a first-come-first-served basis.
12. Each kayaking/camping tour must be led by a licensed guide per eight (8) clients.
13. Each tour group must be comprised of not more than nine (9) kayaks (one-person or two-person) including the guide’s.
14. If snorkeling will be included in the tour, a maximum ratio of eight (8) snorkelers to each licensed guide is permitted.
15. Any boat used for kayaking tours must be at least 23 feet and no longer than 48 feet.
16. The Silk Cayes: All boats transporting kayaks and tourists should check-in with SEA Rangers stationed at Little Water Caye prior to proceeding to the Silk Cayes.

17. Laughing Bird Caye: All boats transporting kayaks and tourists should check-in with SEA Rangers stationed at Laughing Bird Caye upon arrival.
18. Guides are required to provide briefing on regulations to tourists before entering the Silk Cayes area or Laughing Bird Caye.
17. All tourists must pay a fee: a mandated fee of \$10US per person for the first three days, and an additional US\$25 per person thereafter.
18. The camping rules apply – see **Visitor Use Guidelines for Camping**.
19. Any person who contravenes any of the provisions of these regulations is guilty of an offense and liable on summary conviction to a fine or to imprisonment, or to both such fine and period of imprisonment, as provided under the relevant Acts and regulations, and/or revocation of permit(s) to enter the Silk Cayes area/GSSCMR.
20. Notwithstanding the above, any person who damages corals shall be liable to pay a fine or some higher penalty as provided under relevant laws and regulations.

### *c. Visitor Use Guidelines for Camping*

Within the Silk Cayes Conservation Zone of the GSSCMR, camping is permitted on Middle Silk Caye only. Camping is not permitted on North Silk Caye or South Silk Caye. Camping is permitted on Laughing Bird Caye.

The following camping rules apply:

1. Camp only in designated sites. Do not camp in the vegetated areas.
2. Swim at your own risk. No lifeguards are on duty.
3. Fires are permitted in the BBQ area only.
4. Gathering wood or plants, or in any way removing or defacing any natural or manmade feature is prohibited.
5. Firearms, traps or other hunting/fishing equipment are strictly prohibited.
6. All plants and animals on the island are protected. Please keep your distance. Report any turtle activity to the Rangers.
7. Campground and beach quiet hours are between 7:00 PM and 7:00 AM. Radios and loud or amplified sound or music are not allowed at any time.
8. Pets are not allowed on the cayes.
9. Each camp area must be left clean, and all personal property must be removed. All trash must be taken out by the tour group.
10. Keep your site clean of all litter and waste. Keep garbage, litter and foreign substances out of the sea.
11. Use toilets properly. Do not throw garbage, litter, or other foreign substances in toilets.
12. Do not put cans, bottles, plastic, food or rocks in BBQ pit.
13. Be sure your fire is completely extinguished before going to sleep at night.
14. SEA is not responsible for any loss or damage to personal property.
15. Any person who contravenes any of the provisions of these regulations is guilty of an offense and liable on summary conviction to a fine or to imprisonment, or to both such fine and period of imprisonment, as provided under the relevant Acts and regulations, and/or revocation of permit(s) to enter the Silk Cayes area/GSSCMR.

16. Notwithstanding the above, any person who damages the vegetation or corals or molests the wildlife shall be liable to pay a fine or some higher penalty as provided under relevant laws and regulations.

## 11. Management Recommendations

The guidelines described above are geared at minimizing visitor use impacts on the Silk Cayes and Laughing Bird Caye. These guidelines, however, will not be worth the paper on which they are written unless the management presence and visitor facilities at the reserves are improved and expanded.

A number of standard visitor facilities (at least at basic and well maintained levels) will need to be installed at Middle Silk Caye and Laughing Bird Caye. The current visitor facilities at South Silk Caye will need to be improved.

The table below lists key recommendations for consideration. A column indicating suggested prioritization of the recommendation is included for reference.

NO.	RECOMMENDATION	PRIORITY		
		TOP	MEDIUM	LOW
1	At the earliest possible time, the staffing complement for the GSSCMR should be increased by 100% – an additional two Rangers – in order to bolster the management presence in the marine reserve and Silk Cayes area.	X		
2	If financial constraints do not allow the previous recommendation to be instituted, SEA should consider seeking the support of the Fisheries Department to deputize reputable and reliable tour guides and operators as fishery officers, in order to augment SEA’s monitoring and enforcement functions.		X	
3	SEA should immediately revive and reinvigorate its Community Rangers Program, as a means of augmenting its monitoring and enforcement functions.	X		
4	Camping should be permitted at Middle Silk Caye. To accommodate for this, sturdy visitor facilities need to be built and installed. Such facilities should include: composting toilet (Clivus multrum) in an appropriate location; removable camping platforms, three picnic tables, and one BBQ grill.		X	
5	As soon as camping activities start taking place at Middle Silk Caye, camping should not be		X	

	permitted on South Silk Caye. Only day activities – such as picnicking and swimming – should be permitted.			
6	The prohibition of any type of visitor use at North Silk Caye shall be maintained indefinitely.	X		
7	SEA should consider permitting camping at Laughing Bird Caye, given the availability of camping space and good visitor facilities.		X	
8	Given the level and type of visitor use at Laughing Bird Caye, SEA should consider building a pier at an appropriate location on the caye. The following principles should be considered when planning, designing and constructing the pier: 1) Plan and design to minimize risk from storms, hurricanes and erosion.2) In evaluating alternative designs, long-term impacts and associated cost (economic and ecological) must be considered prior to construction. <sup>2</sup>			X
9	The entrance fees for GSSCMR and LBCNP should be clarified. According to the Fisheries Department, the mandated fee per person for the first three days is \$10US. For longer stays, the fee is US\$25 per person.	X		
10	A camping fee of US\$20 per person should be instituted at the Silk cayes and Laughing Bird Caye. This amount is consistent with the camping fee at Half Moon Caye Natural Monument. <sup>3</sup> The revenue generated from camping would go towards maintaining the visitor facilities and paying for additional monitoring activities.		X	
11	The visitor use guidelines should be reviewed and endorsed by a local committee comprised of SEA staff and local tour guides and operators. The guidelines should then be submitted to the Fisheries Department for review and approval. Subsequently, these guidelines should be appended to the reserve management plans and included in the reserve regulations.	X		

<sup>2</sup> See Appendix 3 for Recommended Best Practices – Piers (Source: Gillett, V. and O. Salas. 2008. *Recommended Best Practices for the Cayes of Belize—Based on lessons Learned at Glover’s Reef Atoll* (Final Draft). Fisheries Department and WCS.)

<sup>3</sup> The camping fee at Half Moon Caye is US\$20 for foreigners and US\$10 for Belizeans.

12

In order for bareboat charters (live-aboards) to operate within the GSSCMR and LBCNP, the vessels/Captains must first check in at the nearest Ranger Station (SEA HQ, Little Water Caye, or Laughing Bird Caye) and sign the ***Guidelines for Bareboat Charters***. At the earliest possible time, SEA staff should inform the owners/Captains about these regulations.

X



- 4) The Licensee shall observe and comply with the terms, conditions, and requirements of the Environmental Compliance Plan, attached hereto as Appendix 1, which shall form part of this Agreement.
- 5) The Board will require the Licensee to furnish the Board with proof of suitable third party liability insurance for each vessel.
- 6) The Licensee will comply with all requirements of Belizean Law relating to income tax, social security and labor laws with respect to its employees.
- 7) The Hotels and Tourist Accommodation Act, Chapter 285 of the Substantive Laws of Belize, Revised Edition 2003, (or any Act repealing and replacing same) will govern the tourist accommodation operations of the vessel while in Belizean waters.
- 8) The Licensee will comply with all foreign exchange controls and regulations imposed under the Laws of Belize.
- 9) The Licensee undertakes to become familiar with laws relating to the marine areas, and will strictly comply with such laws which include but are not restricted to the Environmental Protection Act, the Port Authority Act, the Fisheries Act, the Public Health Act and the Maritime Areas Act and any regulations made under these Acts
- 10) The Licensee shall fully comply with the provisions of the Hotel and Tourist Accommodation Act and tax payable under this Act (or any Act repealing or replacing same), is accepted as amounting to the sum of US\$10.00 per passenger per cruise in Belizean waters not exceeding seven days. Each additional seven-day period or portion thereof, the passenger will be charged an additional U.S. \$10.00 and Licensee agrees to promptly pay such tax within fourteen days of the end of the month in which the voyage was made. Individual Guest Registrations shall accompany tax payments for each cruise and such tax

shall be paid to the Belize Tourist Board's office in accordance with the requirements of the Hotels and Tourist Accommodation Act.

- 11) The Licensee will hire suitable local tour guides or tour operators (duly licensed under established legislation) for all marine and land-based tour itineraries.
- (12) The Licensee shall ensure that no damage is caused by the live-aboard passenger vessel to any part of the Belizean Barrier Reef and its supporting ecosystems.
- 13) The licensee will report to the Belize Tourism Board, The Department of the Environment and The Fisheries Department any grounding of the vessel on the coral reef and/or any pollution caused by the vessel in Belizean waters.
- 14) Based on an investigation and review of the report as per section 12 above The Department of the Environment, The Fisheries Department and Belize Tourism Board shall make a determination as to appropriate compensation for any damages or pollution caused.
- 15) The Licensee shall to the satisfaction of the Department of the Environment clean up all pollution that may have been caused anywhere in Belize and its territorial waters as a result of its operations, and if the Licensee fails to do so, the Department of the Environment may proceed to clean up such pollution, and any expenses so incurred by the Department, shall, notwithstanding anything to the contrary elsewhere in this Agreement immediately become a debt payable by the Licensee to the Department of the Environment and may be recovered by civil proceedings under the Laws of Belize.
- 16) The Licensee duly performing and conforming to the terms and conditions of this Agreement and the applicable laws, rules and regulations of all Governmental Bodies shall peaceably enjoy the license hereby granted.

- 17) The Registrar of Hotels and Tourist Accommodation, on behalf of the Board may terminate this License, if:
- a. There is a breach of the Environmental Compliance Plan, or
  - b. there is a breach of the Environmental Protection Act or the Port Authority Act, the Fisheries Act, the Public Health Act or the Maritime Areas Act or any Regulations made there under;
  - c. There is a violation or violations committed under the Hotels and Tourist Accommodation Act;
  - d. There has been a breach of any of the terms or conditions of this Agreement.
- 18) This Agreement and the License granted hereunder may be terminated by the Registrar due to a breach or non-compliance with the terms and conditions of this Agreement by the Licensee
- 19) Any notice required or permitted to be given under this Agreement shall be in writing and deemed given and effective upon delivery if sent by personal delivery or by facsimile transmission or five (5) days after posting if sent by registered mail, return receipt requested, with postage pre-paid and addressed as follows:

If to the Licensee: ***c/o Radisson Fort George Marina***  
***Marine Parade, Belize City, Belize C.A.***

If to the Registrar: ***Registrar of Hotels and Tourist Accommodation***  
***#64 Regent Street, P. O. Box 325, Belize City,***  
***Belize, C.A.***





1. Live-aboard passenger vessels will only be allowed to anchor at sites or in harbor specified by Port Authority and inside the reef and along the coast in areas where there is no coral. In the vicinity of the reef and inside all marine protected areas, vessels must moor at sites designated by the Fisheries Department, or where adequate mooring facilities have been installed. Other motor vessels associated with the live-aboard vessel will not be allowed to drop anchor, where harm to the Belize Barrier Reef or any part thereof could be caused by the anchor chain, vessel, or anchor itself. The licensee may be liable to pay compensation for any damage caused.
2. In the event that the live-aboard vessel or other small craft is to be anchored in the vicinity of the atolls or reef, permanent-mooring sites will be established for this purpose in consultation with the Fisheries Department.
3. In the future, based on mutual agreement, a user fee will be charged on all government-installed moorings for the upkeep and maintenance of existing moorings, and the installation and establishment of new mooring sites.

#### **RECREATIONAL ACTIVITIES**

1. An orientation program is to be prepared by the operator of the live-aboard passenger vessel or its agent to inform their visitors to Belize about the natural resources and environment of Belize and of the legislation that exists to protect them. Before any activity is undertaken, vessel operators will remind their passengers of the rules and guidelines associated with each type of activity.
2. A listing of sites intended to be visited and a list of intended activities will be submitted to the Belize Tourist Board, the Fisheries Department and the Department of the Environment.

#### **DIVING AND SNORKELING ACTIVITIES**

1. No divers or person will be allowed to touch, stand on, or damage any coral or reef formation. To assist in this endeavour, divers will not be equipped or allowed to wear gloves, unless for very special reasons.
2. No person shall disturb, or remove or collect from the sea any species of flora or fauna, including rocks, dead coral, shells or sand.
3. No snorkeling or any other recreational activity will be allowed in sandy, shallow areas near the reef where harm could be caused to corals due to the water column being loaded with sediment.
4. No more than twenty (20) divers or persons snorkeling will be allowed to be present at the same time in an area of one hundred (100) square yards.

5. A maximum of eight (8) divers or persons snorkeling will accompany a guide. This is in order to guarantee proper supervision of the visitors, should they need special assistance.

#### **ACTIVITIES ON BOARD LIVE-ABOARD PASSENGER VESSELS**

1. No out-of-season marine product will be served on board the vessel in respect of Belize's closed season for marine products.
2. No hazardous chemicals will be used for cleaning decks. Phosphate free detergents will be used for this purpose.

#### **WASTE DISPOSAL**

In an effort to reduce and prevent the environmental impacts associated with waste generation and its disposal the operator of the live-aboard passenger vessel to take the following measures:

1. No solid waste or used oil will be released or dumped into the sea or on cayes during the vessel's tour in Belizean waters. Sewage wastes may only be released in open waters, away from the reef, atolls and cayes.
2. Any boat or smaller vessel taking tourists to an island or caye destination in Belize will ensure that no litter or waste is thrown over-board or left littering the island or caye. All waste originating from the mother vessel will be placed into a container and returned to the mother vessel.
3. Where day excursions to mainland destinations are offered to live-aboard vessel passengers, only licensed Belizean operators will be hired to provide all associated services, including tours, food, beverages, and transportation.
4. No oily or contaminated bilge water will be released in Belizean territorial waters without the prior written permission of the Department of the Environment. Exceptions can be made in emergency situations where the vessel is taking on water to the extent that the safety of the vessel or those aboard would be threatened.
5. The live-aboard vessel operator, the Licensee and any authorized agent or port agent will comply with all requirements of MARPOL and its annexes.

#### **IMPLEMENTATION AND MONITORING OF ENVIRONMENTAL ACTION PLAN**

The implementation of this environmental compliance plan shall be the direct responsibility of the Licensee and any authorized agent or port agent. Monitoring will be carried out by the Department of the Environment, the Fisheries Department, The Belize Tourist Board, and other relevant agencies, to ensure this plan is being adhered to.

**IN WITNESS WHEREOF** the Parties have by their duly authorized agent hereunto set their hands and seals the day and year first above written,

The Registrar of Hotels & )  
Tourist Accommodation )  
(For the Government of Belize) ) [NAME]  
Before me: ) *Registrar of Hotels and Tourist Accommodations*

\_\_\_\_\_  
**Witness:**

[COMPANY] )  
[NAME] )  
Before me: ) [NAME]  
[COMPANY]

\_\_\_\_\_  
**Witness:**

### *Appendix 3– Recommended Best Practices for Piers<sup>4</sup>*

The following principles should be considered when planning, designing and constructing piers:

- ☞ Plan and design to minimize risk from storms, hurricanes and erosion.
  - ☞ In evaluating alternative designs, long-term impacts and associated cost (economic and ecological) must be considered prior to construction.
1. ***Piers should be constructed in areas with sufficient water depth.*** Boats normally need to operate in water of a particular depth in order to function properly without harming engines, boat hulls or the subsurface vegetation within the area. In determining the location or siting of piers consideration should be given to boat(s) draught, and the available depths of water within the site. Where water is very shallow, it may be necessary to construct longer piers to reach the required depth, as long as navigation will not be impacted. ***Pier length*** should not exceed 350 feet. Proper siting will minimize dredging requirements which will benefit fisheries, habitat, and submerged and emergent vegetation.
  2. ***Design boat piers to withstand waves, or undermining from erosion or rough waters.*** Pier decking should be anchored to pilings (posts) and horizontal beams to avoid having them float off their foundations when waters rise. Vertical pilings and cross-bracing ***could*** be incorporated in pier structures to withstand the force of larger waves and hydrostatic pressures from higher tides that occur during storms and hurricanes.
  3. ***Design and siting of a pier should carefully consider the impacts of hurricanes, waves and wind forces.*** Piers must be adequately designed for hurricanes and storms. Ideally, these facilities should be located in the lee of the island where it receives natural protection from larger waves. This is particularly important in view of the worsening trend in unpredictable weather phenomenon which now plagues the region. However, even locating facilities properly does not ensure they are hurricane-proof. In any case, the developer must balance storm-proof construction costs (i.e. higher decking elevation or deeper pilings to accommodate storm tides and waves) with the potential cost of repairs to damage that might occur to normal construction. Building structures that can withstand hurricane forces are more expensive in the short term, but may actually be less expensive over the long term.
  4. ***Pile structures are recommended for pier construction.*** Use pile structures to reduce the probability that water circulation will be impeded. Piers should be ***well anchored***; ideally pile-driven would be most suitable for Glovers Reef particularly where the **bottom** is mud and/or sand and small rocks. Piles should be driven down to a minimum of 6-8 feet.
  5. ***Minimum Pier Height.*** Shading from docks/pier construction reduces the density of submerged aquatic vegetation growth directly under the structure. ***Height*** is therefore an important variable with docks and docks of **2 feet or higher** will significantly reduce impact.
  6. Use materials that enhance natural aesthetics. Material to be used for pier construction should be durable and long lasting. Pressurized treated lumber not less than 2 inches in thickness is preferred. Lumber is often treated to slow deterioration. An “environmentally friendly” treatment process, using non-leaching chemical materials may be used to minimize the likelihood of introducing toxic or hazardous chemicals into the marine environment. The primary material used today for docks and piers is chromate copper arsenate (CCA) but new

---

<sup>4</sup> Source: Gillett, V. and O. Salas. 2008. *Recommended Best Practices for the Cayes of Belize—Based on lessons Learned at Glover’s Reef Atoll* (Final Draft). Fisheries Department and WCS.

innovations include steel- reinforced plastics and recycled plastic. Creosote-treated wood is strongly discouraged as creosote is toxic to both humans and fish.

7. In places where many small piers are planned for a local area, instead consider building a **community pier**; owned and operated by several individuals. It could be less expensive. Having one community pier also reduces the cumulative impacts (impediments to navigation and public access, and damage to turtle grass habitat) that typically result from clusters of small piers. Additionally, the design of small piers makes them less resistant to hurricane damage than larger piers. For individual owners, the cost to fully replace or make major storm damage repairs to their piers may create an unnecessary economic hardship.
8. Proper illumination is required on every pier or dock to reduce impact as a navigational hazard. However, effects on turtle nesting need to be considered as well. It is therefore preferable to have hidden, walkway-only lighting on piers.
9. The construction of other “structures” on piers should be discouraged.
10. Construction of piers is required to follow **the permitting process** under the relevant authorities including the **Physical Planning Unit** of the Ministry of Natural Resources. The process will ensure compliance with: Regulatory requirements, Zoning, Development Scale, Building (structure and material), Site plan, Layout, Lighting, Electrical, Storm resistance, Integrity, Recreational value, and Aesthetics.
11. Dock and pier permit conditions need to be reasonably flexible to take into account cost, safety and site practicality.
12. **Utilize techniques to reduce impacts during construction.** Mechanisms such as floating silt fences should be temporarily employed around the construction site to reduce sediment and contaminant impacts to reefs and wetland habitats when driving piles or dredging.