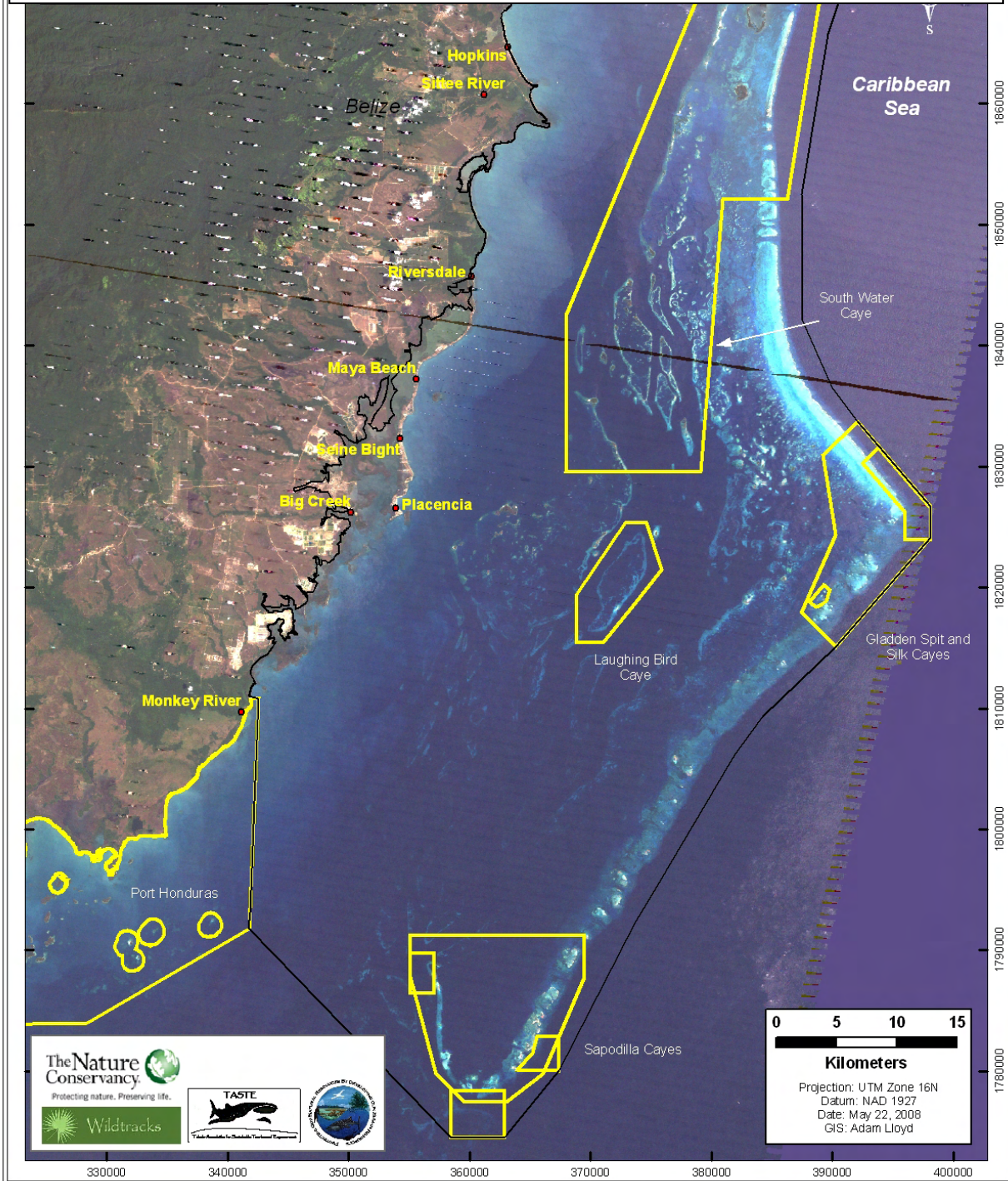


Conservation Action Planning

Southern Belize Reef Complex



Final Report
2008

Acknowledgments

We would like to thank the over 60 participants who took part in this seascape-scale Conservation Action Planning process - those who participated in the CAP workshop and associated technical meetings, those who provided additional scientific information for development of the plan, and those who represented the community, fishing, tourism and agricultural sectors - for ensuring that this output is as accurate as possible based on the data available.

In particular, we would like to thank the members of the Core Planning Team for their continued support and input:

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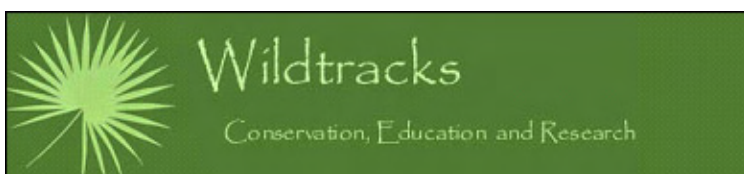
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We would also like to thank Nestor Windevoxel for his assistance during the workshops, Adam Lloyd for GIS support and producing the maps and Nigel Martinez and Shannon Romero for their invaluable logistical and administrative support.

A full list of participants is included in Annex 8



Prepared by:
Paul and Zoe Walker, 2008

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Introduction

The Southern Belize Reef Complex (SBRC) encompasses some of the most important components of the Mesoamerican Reef system. It stretches from the littoral forest and mangroves of the coastline, across the shallow coastal lagoon with its scattering of idyllic cayes and near-pristine reefs, to the Belize Barrier reef and the reef drop-off, where grouper and snapper gather in huge spawning aggregations.

Belize, with its low population and relatively sparse coastal development, is recognized for having some of the least impacted reef areas and the highest diversity of fish species in the region. From the immense, impressive whale sharks to the smallest coral polyp, the reef and associated seagrass and mangroves are a complex, integrated series of ecosystems that support viable populations of threatened species, sustain the coastal fishing communities and draw tourists to Belize.

The Mesoamerican Reef (MAR) is the largest coral reef system in the Western Hemisphere, stretching for more than 1000 kilometres (625 miles) along the coast of Belize, Guatemala, Honduras and Mexico. One of the most diverse ecosystems on earth, the MAR is considered outstanding on a global scale, and a priority for conservation action (Kramer and Kramer, 2002; Arrivillaga and Windevoxhel, 2008).

As part of the Belize Barrier Reef World Heritage Site, this area has international recognition for its natural and cultural resources. Coastal communities associated with the SBRC are continuing a traditional way of life that is closely tied to these marine resources, with fishermen free-diving for lobster and conch from locally built sailboats, or catching snapper and grouper for the local fish markets. These communities are seeking to maintain their cultural values and their links with the marine environment as they move into other livelihoods such as tourism.

Challenges lie ahead for the reef and the people who depend upon it. Numbers of critically endangered species such as hawksbill turtles and goliath groupers are declining, as are those of important commercial fish stocks, lobster and conch, as increasing human pressure is placed on the system. Coastal developments, overfishing, aquaculture and agriculture runoff, and oil exploration and transport are ever increasing threats to the integrity of the Southern Belize Reef Complex.

A Plan for Conservation Action

This Conservation Action Plan (CAP) has been developed through a series of participatory workshops, with input from over sixty participants from all key stakeholder sectors. Fishermen, tour guides, protected area managers, researchers and Government departments have all contributed towards the process, providing important information for integration into the Plan. Outputs from this process provide recommendations for improving management effectiveness of the SBRC, including the strengthening of collaborations between project partners.

The Core Planning Team, facilitated by The Nature Conservancy, was identified at the start of the process, and includes representatives from the Fisheries and Forest departments, as well as Friends of Nature (FoN) and the Toledo Association for Sustainable Tourism and Empowerment (TASTE).

FoN and TASTE are currently collaborating to form the Southern Environmental Association (SEA), which will be responsible for the management of the three co-managed parks - Gladden Spit and Silk Cayes Marine Reserve, Laughing Bird Caye National Park and Sapodilla Cayes Marine Reserve. SEA is working towards taking full management authority for the three parks, with better integration of system-level monitoring, enforcement and community involvement. Both FoN and TASTE view this as a positive step towards improving the effectiveness of marine protected areas management across the SBRC.

The Southern Belize Reef Complex fits within a wider scope of landscape/seascape scale planning initiatives within Belize, filling an important gap in marine coverage. Conservation Action Plans have been developed for the Maya Mountains Massif and the Maya Mountain Marine Corridor, covering the ridge to reef of southern Belize (Figure 1; TNC, 2008). The Southern Belize Reef Complex CAP provides connectivity between current landscape and seascape planning initiatives, and guidance for informed and adaptive management across the broader seascape, encompassing four marine protected areas, four known spawning aggregation sites, and marine resources that support numerous coastal communities.

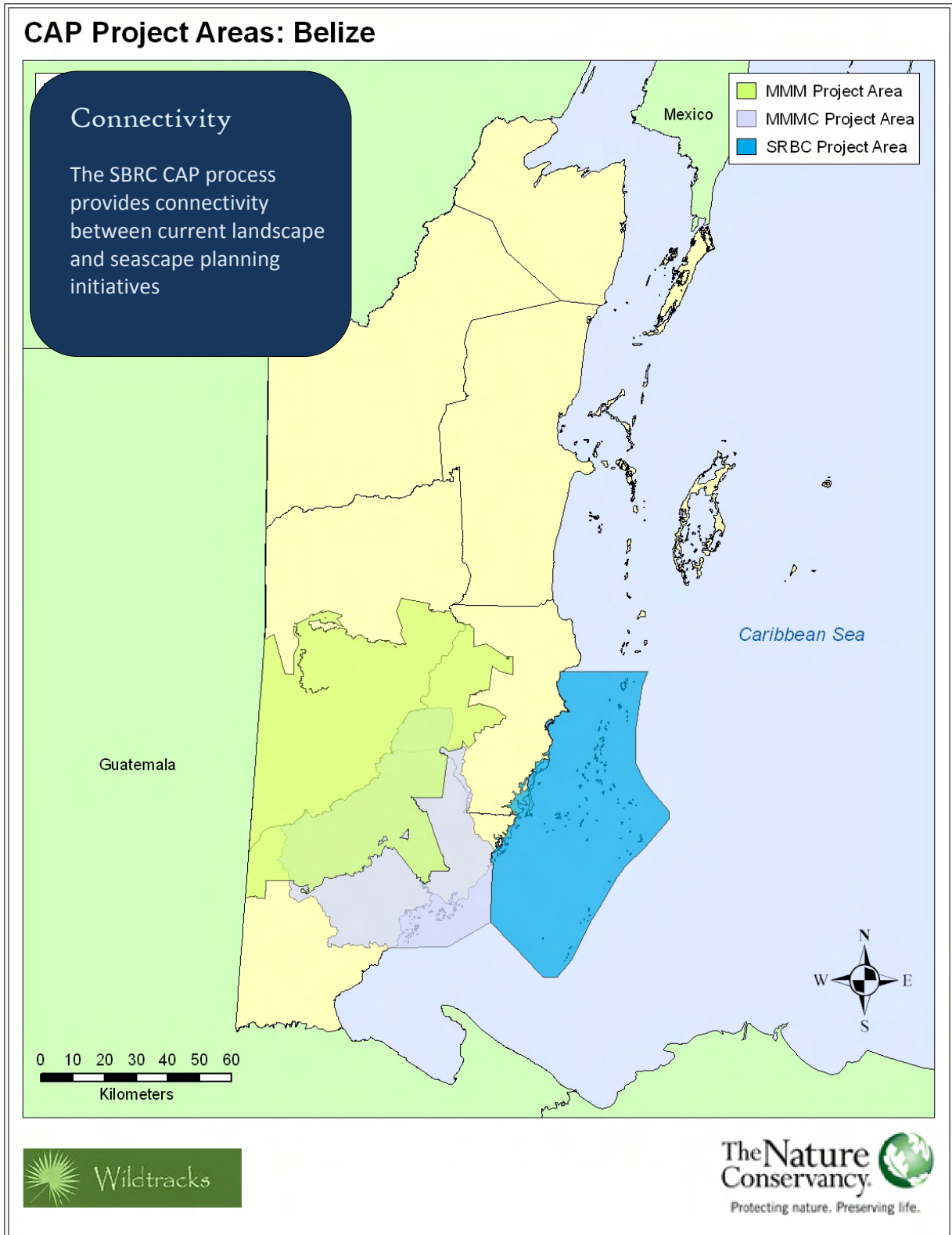


Figure 1: Belize CAP project areas

Project Scope

The SBRC stretches southwards from the northern boundary of South Water Caye Marine Reserve to the northern boundary of Port Honduras Marine Reserve, and south-eastwards from the coastline of Belize to the Sapodilla Cayes and the outer reef (Figure 2). This area is characterized by the variety of reef structures, important cross-shelf habitat linkages and an assemblage of ecosystems considered possibly the most biodiverse in the region. The SBRC is of great scientific value and importance for many species of conservation concern, including the critically endangered hawksbill turtle (*Eretmochelys imbricata*) and goliath grouper (*Epinephelus itajara*), and the endangered green and loggerhead turtles (*Chelonia mydas* and *Caretta caretta*) (IUCN, 2008).

The SBRC encompasses four marine protected areas - Laughing Bird Caye National Park, Sapodilla Cayes Marine Reserve, Gladden Spit and Silk Cayes Marine Reserve, and South Water Caye Marine Reserve. Three of these are part of a serial nomination of seven sites that are recognized as components of the Belize Barrier Reef System - World Heritage Site, representing classic examples of fringing, faroe and barrier reefs. Also covered within the scope are four legally protected critical spawning aggregation sites, including Gladden Spit, the largest aggregation known in the Mesoamerican Reef ecoregion.

Within the SBRC, the estuarine and coastal areas are considered important for the West Indian manatee, whilst the sandy beaches have a history of use as nesting sites for all three marine turtle species. The nearshore mangrove nursery areas and seagrass are regionally important for recruitment for a significant number of the commercial marine species. These resources are an integral part in the support of the cultural traditions of the coastal fishing communities.

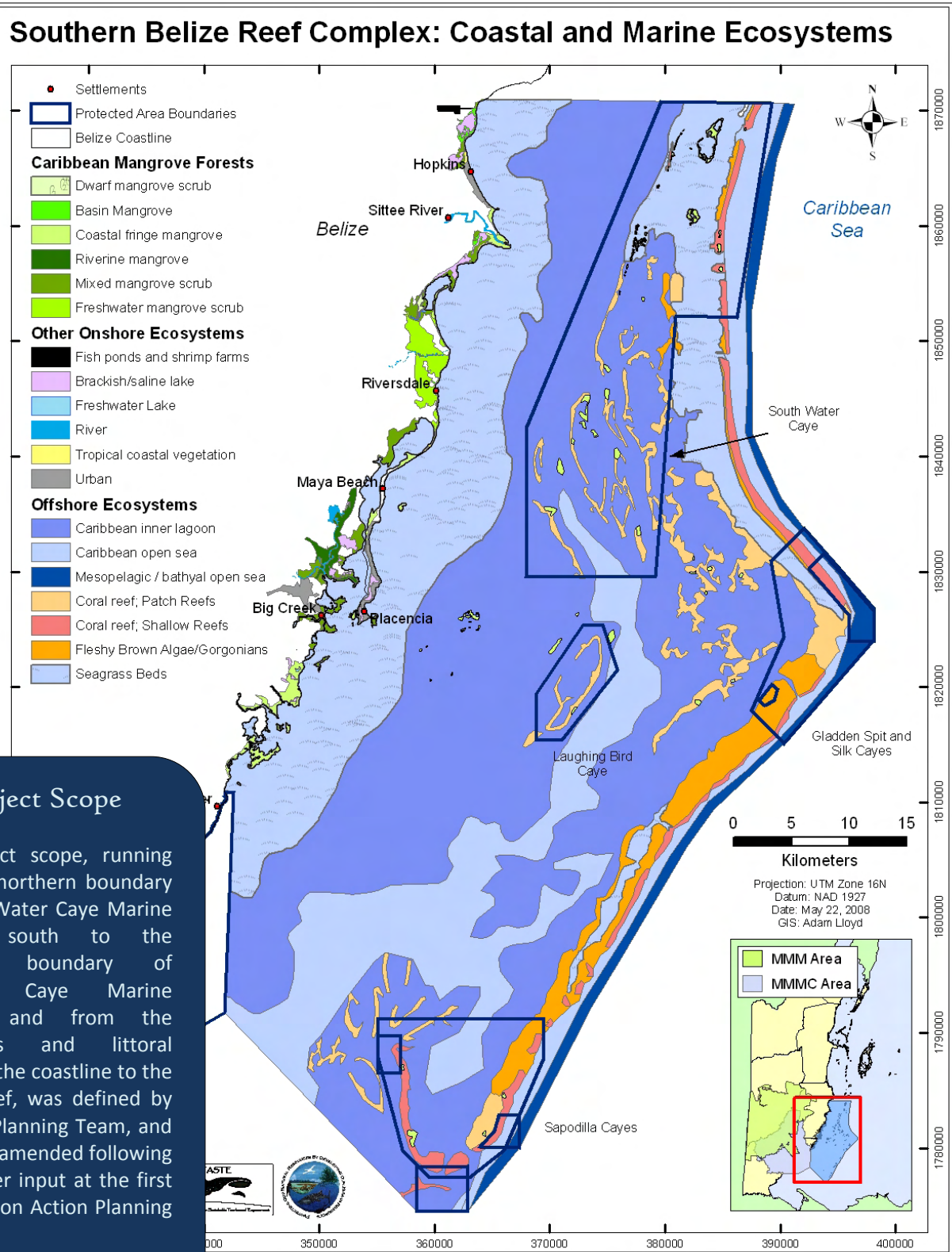


Figure 2: Project Scope - Southern Belize Reef Complex

Protected Areas of the Southern Belize Reef Complex

Acres

Marine Reserve (IUCN Cat. IV)

South Water Caye Marine Reserve	117,875
Sapodilla Cayes	38,594
Gladden Spit and Silk Cayes	25,978

National Parks (IUCN Cat. II)

Laughingbird Caye National Park	10,120
---------------------------------	--------

Spawning Aggregation Sites (IUCN Cat. IV)

Gladden Spit	3,997
Rise and Fall Bank	4,252
Nicholas Caye	1,663
Seal Caye	1,600

Total SBRC Area (approx. acres) 779,682

Species of International Concern

Critically Endangered

Goliath Grouper	<i>Epinephelus itajara</i>
Black Grouper	<i>Epinephelus nigritus</i>
Hawksbill Turtle	<i>Eretmochelys imbricata</i>

Endangered

Loggerhead Turtle	<i>Caretta caretta</i>
Green Turtle	<i>Chelonia mydas</i>
Nassau Grouper	<i>Epinephelus striatus</i>
Red Porgy	<i>Pagrus pagrus</i>
Great Hammerhead	<i>Sphyrna mokarran</i>

Vulnerable

Queen Triggerfish	<i>Balistes vetula</i>
West Indian Manatee	<i>Trichechus manatus</i>
Hogfish	<i>Lachnolaimus maximus</i>
Mutton Snapper	<i>Lutjanus analis</i>
Cubera Snapper	<i>Lutjanus cyanopterus</i>
Yellowmouth Grouper	<i>Mycteroperca interstitialis</i>
Whale Shark	<i>Rhincodon typus</i>
Whiteline Toadfish	<i>Sanopus greenfieldorum</i>
Rainbow Parrotfish	<i>Scarus guacamaia</i>

IUCN, Redlist, 2008

Table 1: Species of International Concern

What is at Risk?

Stretching along the coast of Belize, Guatemala, Honduras and Mexico for more than 600 miles, the Mesoamerican Reef is the largest coral reef system in the Western Hemisphere.¹ The SBRC is considered a priority within the Mesoamerican Reef ecoregion. It is important nationally and regionally in its role of maintaining viable populations of at least 17 species of international concern (Table 1).² Three of these are considered Critically Endangered – Goliath and Black Groupers (*Epinephelus itajara* and *Epinephelus nigritus*), the Hawksbill Turtle (*Eretmochelys imbricata*). A further two, the Smalltooth and Largetooth Sawfish (*Pristis pectinata* and *P. perotteti*), are now thought to be ecologically extinct within the SBRC, and possibly within Belize.³

The Complex also protects four spawning aggregation sites, where the black grouper (*Mycteroperca bonaci*), the endangered Nassau grouper (*Epinephelus striatus*) and the vulnerable mutton and cubera snappers (*Lutjanus analis* and *L. cyanoptera*) – gather in vast numbers to spawn around the full moon. The fisheries resources support the artisanal and commercial fishermen and coastal communities throughout Belize, from Sarteneja in the north, to the more southerly communities adjacent and within the SBRC – Dangriga, Riversdale, Hopkins, Sittee River, Seine Bight, Placencia, Independence, and Monkey River.

The environmental services of the SBRC are critical, not only for the marine biodiversity, but also for the coastal communities, and for Belize as a country. The mangroves and littoral forests provide protection for both life and property, preventing coastal erosion. They also provide an important nursery area for many commercially important marine species.

The reef also has immense economic value to Belize as a tourism resource, with its diverse, colourful fish, clear waters and the coral-sand cayes. Tourism is one of the primary foreign exchange earners for Belize, bringing with it employment opportunities and the possibility of income diversification in the coastal fishing communities.

¹ World Resource Institute, 2001

² Rated as Critically Endangered, Endangered or Vulnerable under IUCN, 2007

³ Rachel Graham, Wildlife Conservation Society, pers. com. 2008

Developing a Vision

The first step of the consultative process was to establish a vision for the Southern Belize Reef Complex as a collaborative initiative with the participation of the key stakeholders – this was achieved during the first CAP workshop for the Conservation Action Planning process (CAP1), held on the 6th/7th May, 2008. It focused on the participation of a broad range of stakeholders for the development of the long term **Vision** for the effective conservation of the natural resource values of the Southern Belize Reef Complex in perpetuity. Objective and strategy development has been conducted with this Vision in mind.

**Developing a Vision
for the Southern
Belize Reef Complex**



A Vision for the Southern Belize Reef Complex BELIZE

A collaborative stewardship of the internationally recognized Southern Belize Reef Complex, through strategic partnerships to conserve and improve the integrity of these socio-economically and biologically important ecosystems for the benefit of future generations

*A collective Vision for the
Southern Belize Reef Complex,
Belize CAP Workshop,
May, 2008*

1. Conservation Targets

1.1 Introduction

For the purposes of the Conservation Action Planning Process, a number of conservation targets were selected during the first workshop, to meet the following criteria (adapted from TNC, 2007):

- **Targets should represent the biodiversity of the site.** The focal targets should represent or capture the array of ecological systems, communities, and species of importance at the project area and the multiple spatial scales at which they occur.
- **Targets reflect ecoregion or other existing conservation goals.** Focal targets should reflect efforts at the regional and national level where they exist, such as TNC and Conservation International (CI) Ecoregional Assessments, the National Protected Areas System Plan, and the National Biodiversity Action Plan. Focal targets that are grounded in the reasons for the project area's current status of protection, and the identification of the Belize Barrier Reef as one of the regions key marine areas of ecological, biological and social importance (Kramer and Kramer, 2002).
- **Targets are viable or at least feasibly restorable.** Viability (or integrity) indicates the ability of a conservation target to persist for many generations. If a target is on the threshold of collapse, or conserving a proposed target requires extraordinary human intervention, it may not represent the best use of limited conservation resources.
- **Targets are highly threatened.** All else being equal, focusing on highly threatened targets will help ensure that critical threats are identified and addressed through conservation actions.

1.2 Selected Conservation Targets

Eight **Conservation Targets** were chosen to represent and encompass the biodiversity values of the Southern Belize Reef Complex (Figure 3), and to provide a basis for setting goals, developing strategies and actions, and monitoring success.

Ecosystem Level Targets: Assemblages of ecological communities that occur together, share common ecological processes, and have similar characteristics. Two coastal and three marine ecosystems have been selected

- *Littoral Forest / Sandy Beaches*
- *Mangroves*
- *Coastal Lagoons and Estuaries*
- *Seagrass*
- *Coral Reef Communities*

Focal Conservation Targets for the Southern Belize Reef Complex

- Littoral Forest / Sandy Beach
- Mangroves
- Coastal Lagoons and Estuaries
- Seagrass
- Coral Reef Communities
- Commercial and Recreational Species
- Spawning Aggregations
- Wide Ranging Large Marine Vertebrates

Species Assemblages: Groups of species that share common natural process or have similar conservation requirements:

- *Commercial / Recreational Species*
- *Spawning Aggregations*
- *Wide Ranging Large Marine Vertebrates*

Each of these targets has a series of associated **nested targets** – species or species assemblages considered of particular conservation importance that are represented by the target (**Annex One: Conservation Targets and Nested Targets**).

Conservation Targets

Selection of Conservation Targets

A series of conservation targets were selected to represent and encompass the biodiversity values of the area, and to provide a basis for setting goals, developing strategies and actions, and monitoring success.

Southern Belize Reef Complex:




Mangroves
Mangrove forest species, providing structure for nesting coastal/marine bird species, and juvenile lobster and commercial fish species. Protect the coastline from erosion



Coastal Lagoons and Estuaries
Seagrass, critical ecosystems for juvenile lobster and commercial fish species, sawfish, rays, West Indian (Antillean) manatee



Littoral Forest and Sandy Beaches
Tropical coastal vegetation, nesting beaches of hawksbill, green and loggerhead turtles, American crocodiles, and migratory bird species.



Commercial / Recreational Species
Queen conch, spiny lobster, crabs, shrimp, commercial finfish - grouper, snapper etc., sports fish (permit, snook, bonefish, tarpon), and baitfish



Wide Ranging Large Marine Vertebrates
Shark species, including whale sharks, hawksbill, green and loggerhead turtles, dolphins – require connectivity to seas and oceans beyond the SBRC



Spawning Aggregations
Congregations of spawning finfish – particularly grouper and snapper. Critical for maintenance of many commercial species



Coral Reef Communities
Coral species, reef fish, key herbivores (*Diadema*, parrotfish), reef invertebrates. Maintain the high productivity of the reef ecosystem.

Figure 3: Conservation Targets

2. Biodiversity Assessment

2.1 Introduction

The Viability Assessment and associated development of indicators conducted under the Conservation Action Planning process has assisted the project team in building an informed structure to guide monitoring and research in the Southern Belize Reef Complex area. It has been developed using the best available information on the target's biology and ecology, with extensive input from technical and field experts.

The Assessment provides:

- An objective, consistent means for determining changes in the status of each focal conservation target over time, allowing the management partners to measure success of conservation action planning strategies
- An objective and consistent way to compare the status of a specific focal target with future conditions, and with other projects that focus on that target
- A basis for the identification of current and potential threats to a target and identifies past impacts that require mitigation actions
- A basis for strategy design and the foundation for monitoring
- Guidance in summarizing and documenting knowledge and assumptions about the biology and ecology of each target, with identification of crucial information gaps and research questions.

2.2 Assessing Biodiversity Viability

The first stage of the viability assessment is the identification of **key ecological attributes** (KEAs) for each of the conservation targets. The key ecological attribute is defined as “an aspect of a target's biology or ecology that if present, defines a healthy target and if missing or altered, would lead to the outright loss or extreme degradation of that target over time” (*TNC, 2007*).

For the purposes of this project, and in line with the TNC Conservation Action Planning approach, the Key Ecological Attributes have been grouped into three classes:

- **Size** - a measure of the area or abundance of the conservation target's occurrence.
- **Condition** - a measure of the biological composition, structure and biotic interactions that characterize the occurrence.
- **Landscape context** - an assessment of the target's environment including ecological processes and regimes that maintain the target occurrence - such as water temperature and natural disturbances and connectivity, allowing access to habitats and resources or the ability to respond to environmental change through dispersal or migration.

Whilst the **Key Ecological Attribute** defines the critical requirements for each conservation target, **indicators** have been used to provide a means of measuring the status of the Key Ecological Attributes. An effort has been made throughout the viability assessment to use indicators that are measureable, precise, consistent, sensitive and technically and financially feasible, and where

possible, use the outputs of current ongoing monitoring programmes within the project area.⁴ The indicators suggested by the Healthy Reefs initiative have also been taken into consideration. A viability rating is developed for each indicator, based on the following scale:

- **Very Good** – The Indicator is considered to have an ecologically desirable status, requiring little or no intervention for maintenance.
- **Good** – The indicator lies within the acceptable range of variation, though some intervention is required for maintenance.
- **Fair** – The indicator lies outside the acceptable range of variation, and human intervention is required if the viability of the target is to be maintained
- **Poor** – Restoration of the conservation target is increasingly difficult, and impacts may result in extirpation from the conservation area

The current status and project goals for each indicator were developed during the workshop, and have been used as the basis for this first report, with recommendations for strengthening these preliminary indicators (**Annex Two: Assessment of Target Viability**).

⁴ AGGRA, MBRS Synoptic Monitoring Programme, WWF, WCS etc

2.3 Biodiversity Viability – Summary Results

The Viability Assessment provides an objective, consistent means for determining changes in the status of each focal conservation target over time, allowing the measurement of success of strategic conservation actions, and a summary of overall viability for each target, and for the project area as a whole (Table 2).

Conservation Targets	Landscape Context	Condition	Size	Overall Viability Rating
Littoral Forest / Sandy Beach	Good	Fair	Fair	Fair
Mangroves	Fair	Fair	Good	Fair
Coastal Lagoons and Estuaries	Good	Fair	Poor	Fair
Seagrass	Good	Very Good	Very Good	Very Good
Coral Reef Communities	Good	Poor	Fair	Fair
Commercial / Recreational Species	Fair	Fair	Fair	Fair
Spawning Aggregations	Fair	Fair	Fair	Fair
Wide Ranging Large Marine Vertebrates	Good	Good	Fair	Good
Overall Viability Rating for the Southern Belize Reef Complex				Fair

Table 2: Summary of Conservation Target Viability for the Southern Belize Reef Complex

The resultant viability analysis demonstrates that one conservation target is rated as ‘Very Good’ (**Seagrass**). One target - **Wide Ranging Large Marine Vertebrates** - is rated as ‘Good’, and six targets are rated as ‘Fair’ - the **Littoral Forest / Sandy Beaches**, **Mangroves**, **Coastal Lagoons and Estuaries**, **Coral reef Communities**, **Commercial and Recreational Species**, and **Spawning Aggregations**.

Overall, the Southern Belize Reef Complex is considered to have a viability rating of ‘**Fair**’.

3. Threats and Opportunities

3.1 Assessment of Critical Threats

The CAP2 workshop focused on the Southern Belize Reef Complex as a whole, and assessed stresses and threats at both the technical and site levels, with representation from researchers, Fisheries Dept, and both protected area management and field staff. The summary results from the planning process provide each conservation target with a threat status rating.

Outputs from the CAP2 workshop identified and assessed stresses and sources of stress, allowing prioritization of conservation actions and resources towards the most critical threats. This was achieved through analyzing the stresses in terms of scope and severity, and the sources of stress through assessment of contribution and irreversibility.

Three conservation targets are rated as having **Very High** threat levels, reflecting the particularly heavy pressure on the natural resources from coastal development and fishing:

- **Littoral Forests / Sandy Beaches**
- **Coastal Lagoons and Estuaries**
- **Commercial and Recreational Species**

Four conservation targets are rated as having **High** threat levels:

- **Mangroves**
- **Coral Reef Communities**
- **Spawning Aggregations**
- **Wide Ranging Large Marine Vertebrates**

Of all the conservation targets, only **Seagrass** (excluding the seagrass beds in the lagoon and estuarine areas) is rated as having a threat status of **Medium**, and none have a threat status of **Low**.

The CAP process assesses the stress and the source of stress for each conservation target, using standardized definitions (Figure 4)

Conservation Action Planning Assessment of Critical Threats for the Southern Belize Reef Complex (CAP2)

Conservation Target Threat Status:

Very High

- Coastal / Caye Development
- Fishing Pressure
- Climate Change

High

- Aquaculture
- Agricultural Runoff
- Oil Spill
- Poor Fishing Practices

Medium

- Visitor Impacts

Low

- Oil Exploration and Drilling

Rating Criteria for Stresses

Stress – The impaired aspects of conservation targets that result directly or indirectly from human activities (e.g., low population size, reduced extent of forest system; reduced river flows; increased sedimentation; lowered groundwater table level). Generally equivalent to degraded key ecological attributes (e.g., habitat loss).

Severity - The level of damage to the conservation target that can reasonably be expected within 10 years under current circumstances (i.e., given the continuation of the existing situation).

- **Very High:** The threat is likely to destroy or eliminate the conservation target over some portion of the target's occurrence at the site.
- **High:** The threat is likely to seriously degrade the conservation target over some portion of the target's occurrence at the site.
- **Medium:** The threat is likely to moderately degrade the conservation target over some portion of the target's occurrence at the site.
- **Low:** The threat is likely to only slightly impair the conservation target over some portion of the target's occurrence at the site.

Scope - The geographic scope of impact on the conservation target at the site that can reasonably be expected within 10 years under current circumstances (i.e., given the continuation of the existing situation).

- **Very High:** The threat is likely to be widespread or pervasive in its scope and affect the conservation target throughout the target's occurrences at the site.
- **High:** The threat is likely to be widespread in its scope and affect the conservation target at many of its locations at the site.
- **Medium:** The threat is likely to be localized in its scope and affect the conservation target at some of the target's locations at the site.
- **Low:** The threat is likely to be very localized in its scope and affect the conservation target at a limited portion of the target's location at the site.

Rating Criteria for Sources of Stress

Source of Stress (Direct Threat) – The proximate activities or processes that directly have caused, are causing or may cause stresses and thus the destruction, degradation and/or impairment of focal conservation targets (e.g., coastal development).

Contribution - The expected contribution of the source, acting alone, to the full expression of a stress (as determined in the stress assessment) under current circumstances (i.e., given the continuation of the existing management/conservation situation).

- **Very High:** The source is a very large contributor of the particular stress.
- **High:** The source is a large contributor of the particular stress.
- **Medium:** The source is a moderate contributor of the particular stress.
- **Low:** The source is a low contributor of the particular stress.

Irreversibility - The degree to which the effects of a source of stress can be restored.

- **Very High:** The source produces a stress that is not reversible (e.g., hotel development on a caye).
- **High:** The source produces a stress that is reversible, but not practically affordable (e.g., wetland converted to agriculture).
- **Medium:** The source produces a stress that is reversible with a reasonable commitment of resources (e.g., ditching and draining of wetland).
- **Low:** The source produces a stress that is easily reversible at relatively low cost (e.g., off-road vehicles trespassing in wetland).

Figure 4: Rating Criteria for Stress and Source of Stress. TNC. 2007

3.2 Threat Assessment - Summary of Results

Southern Belize Reef Complex									
Threats Across Targets	Littoral Forest / Sandy Beach	Mangroves	Coastal Lagoons and Estuaries	Seagrass	Coral Reef Communities	Commercial / Recreational Species	Spawning Aggregations	Wide Ranging Large Marine Vertebrates	Overall Threat Rank
Project-specific threats									
Coastal / Caye Development	Very High	High	Very High	Medium	Very High	High	High	High	Very High
Fishing Pressure	-	-	Medium	-	High	Very High	Very High	High	Very High
Climate Change	Very High	Medium	High	-	High	High	Medium	Medium	Very High
Aquaculture	High	High	Very High	Low	Medium	Medium	Medium	Medium	High
Agricultural runoff	-	High	Very High	Medium	Medium	Medium	Medium	Medium	High
Oil spill	Medium	-	Very High	Low	Low	-	-	Medium	High
Poor fishing practices	-	Low	Medium	-	Low	High	High	High	High
Visitor Impacts (tourists, researchers etc.)	-	-	Medium	-	Low	-	Medium	Low	Medium
Oil Exploration and Drilling	-	-	-	Low	Low	-	-	-	Low
Threat Status for Targets and Project	Very High	High	Very High	Medium	High	Very High	High	High	Very High

Figure 5: Threat Ratings for the Southern Belize Reef Complex

3.3 Situation Analysis

The information derived from the first two CAP workshops (on the viability of conservation targets and the direct impacts) assisted in the development of a situation analysis. A wide range of stakeholders, each with a different perspective on the Southern Belize Reef Complex, also provided inputs into the process.

The Situation Analysis workshop generated a description of the participants understanding of impacts on the conservation targets and the stresses on the Southern Belize Reef Complex as a whole, both in terms of the biological issues and the human context. This assists in identifying opportunities within the project scope, and the participatory process also assists in building a picture of the contributing factors - the indirect threats, key actors, and opportunities for successful action - that are integral in the development of objectives and strategies as an output of the conservation planning process.

Using the Conservation Target **Coastal Lagoons and Estuaries** as an example of the outputs of the Situation Analysis assessment, the information can be summarised in a flow diagram (Figures 6 and 7; Annex Three: Situation Analysis Outputs).

Key to Situation Analysis Diagrams:

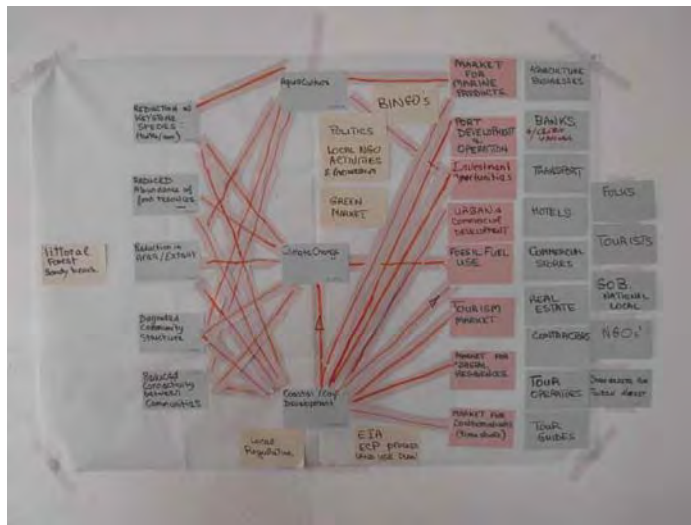


Figure 6: Situation Analysis Output - Southern Belize Reef Complex

Conservation Target: Coastal Lagoons and Estuaries

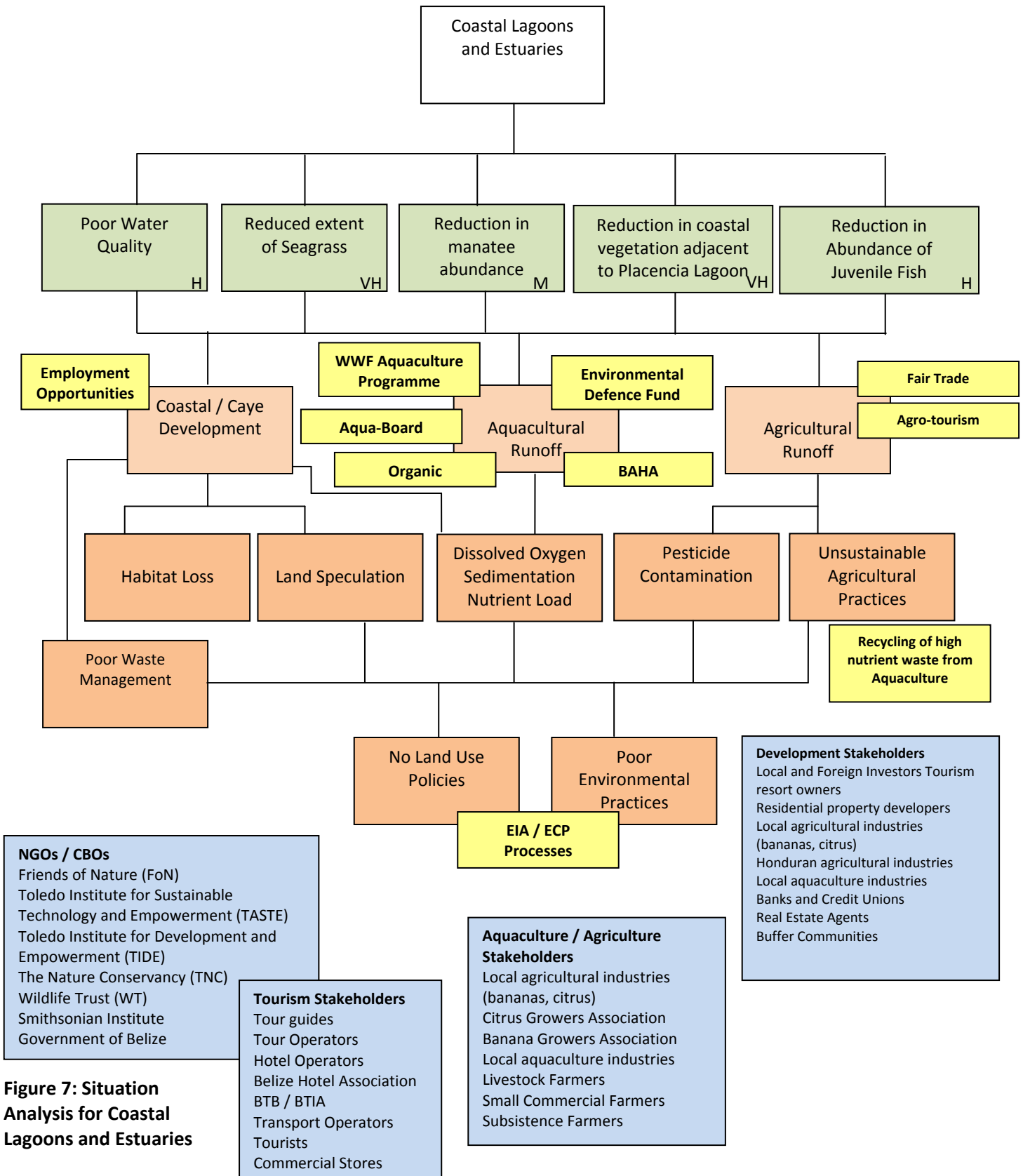


Figure 7: Situation Analysis for Coastal Lagoons and Estuaries

4.0 Management Strategies for the Southern Belize Reef Complex

4.1 Strategy Development: Objectives and Strategic Actions

Introduction

With information available from the CAP workshops on the target viability and critical threats, and the development of situation analyses for the different biodiversity conservation targets, a general stakeholder meeting was held to develop objectives and strategies for successful implementation of effective conservation management of the Southern Belize Reef Complex.

Objectives, defined as “Specific statements detailing the desired accomplishments or outcomes of a particular set of activities within a project” (TNC, 2007), have been developed towards fulfilment of the Vision for the Southern Belize Reef Complex, and focus primarily on the abatement of critical threats and identified specific conservation requirements. These objectives were developed using the following criteria:

That they be:

- **Specific** – to ensure that all stakeholders involved in the project have the same understanding of what the terms mean.
- **Measurable** - to allow progress to be measured.
- **Achievable** - realistic given the current conditions, 10-year time period, resources allocated, etc.
- **Relevant** – impact oriented and represent the necessary changes in key ecological attributes, critical threat factors, or project resources to achieve the project goal.
- **Time-Limited** - clear about when the objective will be achieved.

Using this as a framework, twelve objectives were developed during Workshop Three (29th / 30th July, 2008), grouped under four categories – **Resource Use Management, Resilience and Restoration, Management Effectiveness and Financial Sustainability,** and **Land Use and Water Quality Management.** Strategic Actions were also developed to provide a framework for achieving each objective, and a first assessment of prioritisation was conducted (Table 3; Annex Four: Objectives and Strategic Actions for the Southern Belize Reef Complex).

Objectives for the Southern Belize Reef Complex

Objective 1: By 2013, illegal fishing activities within the SBRC will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level.

Objective 2: By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet Environmental Impact Assessment, Environmental Compliance Plan and best practices standards, with independent monitoring in place

Objective 3: By 2013, all marine protected areas within SBRC will be able to obtain 50% of their annual budget through a secured diversified funding base - user fees, government, endowment, concessions, and environmental tax

Objective 4: By 2013, the level of agricultural contamination impacting the SBRC will be reduced from 2008 levels, through collaboration with other organizations and agencies that influence agro-chemical use and application

Objective 5: By 2013, the management agencies of the SBRC will have the legal framework and institutional capacity to undertake effective management of marine resources

Objective 6: By 2015, at least 50% of coral reefs and mangroves resilient to climate change located within the SBRC will be effectively protected.

Objective 7: By 2019, 20% of the current area of degraded littoral forest & sandy beaches within the SBRC will be restored

Objective 8: By 2019, populations of commercial / recreational species are increased by 20% from current stock assessments as a result of effective management

Objective 9: By 2019, populations of fish at Spawning Aggregation Sites will be stabilized & sustained within the SBRC through good resource-use practices

Objective 10: By 2019, the condition and extent of coral reef communities will be improved by 10%, through development and implementation of a coral reef restoration programme and associated public awareness activities

Objective 11: By 2014, all marine protected areas within the Southern Belize Reef Complex will have at least 20% of their area designated as no-take

Objective 12: By 2010, all petroleum-associated activities -transportation, exploration and extraction - within SBRC will comply with international and national environmental regulations and safety standards

Resource Use Management	
Objectives	Strategic Actions
Objective 1: By 2013, illegal fishing activities within the SBRC will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level.	<ul style="list-style-type: none"> ▪ Implement / enforce policies & regulations ▪ Conduct an assessment of the fish stock within the SBRC ▪ Identify and protect nursery grounds (for all marine species) from extraction / damage ▪ Implement an effective, standardized monitoring and data management program for the SBRC area ▪ Develop and implement coral reef and mangrove restoration programs ▪ Create an alternative livelihood program for fisher folk within the SBRC ▪ Develop and implement public awareness program ▪ Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area ▪ Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
Objective 8: By 2019, populations of commercial / recreational species are increased by 20% from current stock assessments as a result of effective management	
Objective 9: By 2019, populations of fish at Spawning Aggregation Sites will be stabilized & sustained within the SBRC through good resource-use practices	
Objective 11: By 2014, all marine protected areas within the Southern Belize Reef Complex will have at least 20% of their area designated as no-take	
Resilience and Restoration	
Objectives	Strategic Actions
Objective 6: By 2015, at least 50% of coral reefs and mangroves resilient to climate change located within the SBRC will be effectively protected.	<ul style="list-style-type: none"> ▪ Develop and implement coral reef and mangrove restoration programs ▪ Implement a restoration process for littoral forest and beach communities Identify and protect nursery grounds (for all marine species) from extraction / damage ▪ Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area ▪ Develop or adopt best practices guidelines and certification programs relating to coastal developments, and engage relevant stakeholders for implementation Implement / enforce policies & regulations ▪ Implement an effective, standardized monitoring and data management program for the SBRC area ▪ Develop and implement public awareness program ▪ Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
Objective 7: By 2019, 20% of the current area of degraded littoral forest & sandy beaches within the SBRC will be restored	
Objective 10: By 2019, the condition and extent of coral reef communities will be improved by 10%, through development and implementation of a coral reef restoration programme and associated public awareness activities	

Table 3: Objectives and Strategies

Management Effectiveness and Financial Sustainability	
Objectives	Strategic Actions
<p>Objective 3: By 2013, all marine protected areas within SBRC will be able to obtain 50% of their annual budget through a secured diversified funding base - user fees, government, endowment, concessions, and environmental tax</p>	<ul style="list-style-type: none"> ▪ Review and enhance administrative structure of co-management institution ▪ Engaging APAMO/NPAC in completing the development of the legal co-management framework and standard co-management agreement. ▪ Development of mechanisms for integrating local participation and capacity building of local expertise ▪ Implement / enforce policies & regulations ▪ Develop and implement financial sustainability mechanisms ▪ Implement an effective, standardized monitoring and data management program for the SBRC area ▪ Develop and implement public awareness program ▪ Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area ▪ Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
<p>Objective 5: By 2013, the management agencies of the SBRC will have the legal framework and institutional capacity to undertake effective management of marine resources</p>	
Land Use and Water Quality Management	
Objectives	Strategic Actions
<p>Objective 2: By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet Environmental Impact Assessment, Environmental Compliance Plan and best practices standards, with independent monitoring in place</p>	<ul style="list-style-type: none"> ▪ Implement / enforce policies & regulations ▪ Develop or adopt best practices guidelines and certification programmes relating to coastal developments, and engage relevant stakeholders for implementation ▪ Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area ▪ Develop or adopt best practices guidelines and certification programs relating to coastal developments, and engage relevant stakeholders for implementation ▪ Implement / enforce policies & regulations ▪ Lobby for creation / adoption of navigation and oil exploration / extraction standards as needed, and enforce all such regulations ▪ Ensure support of initiatives towards reducing agrochemical contamination of runoff into SBRC ▪ Implement an effective, standardized monitoring and data management program for the SBRC area ▪ Create and adopt Contingency Plan for oil spills within the SBRC ▪ Develop and implement public awareness program ▪ Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
<p>Objective 4: By 2013, the level of agricultural contamination impacting the SBRC will be reduced from 2008 levels, through collaboration with other organizations and agencies that influence agro-chemical use and application</p>	
<p>Objective 12: By 2010, all petroleum-associated activities -transportation, exploration and extraction - within SBRC will comply with international and national environmental regulations and safety standards</p>	

Table 3: Objectives and Strategies

4.2 Priority Conservation Objectives

As human and financial resources for conservation are limited, the Conservation Action Planning process identifies those targets and threats that are most critical, facilitating prioritization of conservation objectives and strategic actions. The highest priority areas are outlined below.

Objective 1: By 2013 illegal fishing activities within the SBRC will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level.

The SBRC is an important resource for many coastal communities engaged in artisanal and commercial fishing activities, from Sarteneja in the north to Monkey River in the south. Whilst the presence of commercial species such as grouper and snapper indicate that marine resources are relatively healthy by regional standards, the pressure on marine stocks is increasing, with an increasing number of fishermen, and incursions from neighbouring countries. Overfishing of commercial marine species has resulted in reduced catch per unit effort and a shift in the community and population structures of fish lobster and conch harvested within the area.



- **Strategic action:** Implement / enforce policies and regulations
- **Strategic action:** Implement an effective, standardized monitoring and data management program for the SBRC area
- **Strategic action:** Create alternative livelihoods for fisher folk within the SBRC

Objective 2: By 2013, 15% of current and 75% of future coastal developments impacting the SBRC meet Environmental Impact Assessment / Environmental Compliance Plan and best practices standards, with independent monitoring in place

Land development in the coastal zone and cayes of the SBRC, whether for tourism or residential development, has resulted in the removal of a significant portion of littoral forest and herbaceous beach vegetation, which play a critical role in stabilizing island structure, reducing coastal erosion, beach loss and sedimentation. Their loss is accelerating as the developmental value and demand for beach frontage escalates. In addition, shoreline structures such as piers, marinas, and seawalls have led to loss and/or alteration of habitats.



Clearance on the cayes greatly undermines the stability of the islands themselves, making them, and any infrastructure thereon, a great deal more susceptible to the impacts of hurricanes. The long-term sustainability of cay-based tourism and residential developments can be made significantly more financially viable through the maintenance of this ecosystem.

- **Strategic action:** Develop or adopt best practices guidelines and certification programs relating to coastal developments, and engage relevant stakeholders for implementation
- **Strategic action:** Implement an effective, standardized monitoring and data management program for the SBRC area
- **Strategic action:** Develop and implement public awareness program
- **Strategic action:** Implement / enforce policies & regulations
- **Strategic action:** Lobby Coastal Zone Management Authority and Institute, local and national Government Representatives and agencies for policy and zoning for the SBRC area
- **Strategic action:** Lobby for creation / adoption of navigation and oil exploration / extraction standards as needed, and enforce all such regulations

Objective 3: By 2013, all marine protected areas within SBRC will be able to obtain 50% of their annual budget through a secured diversified funding base (user fees, government, endowment, concessions, and environmental tax)

All marine protected areas within the Southern Belize Reef Complex will need to focus on mechanisms for financial sustainability – both at the system level, for implementation of system-level strategies, and at the site-level, for ongoing site management activities.

Financial planning will assist in the identification of priority financial sustainability mechanisms at both system- and site-level, while also identifying areas where cost-sharing can reduce individual protected area operational costs, maintaining or even increasing management effectiveness.

- **Strategic action:** Develop and implement financial sustainability mechanisms
- **Strategic action:** Lobby CZMAI, local and national Government Representatives and agencies for policy and zoning for the SBRC area



Objective 4: By 2013, the level of agricultural contamination impacting the SBRC will be reduced from the current 2008 levels (to be determined through collaboration with other organizations that influence agro-chemical use and application).

Agricultural runoff has been identified by several regional assessments as a major impacting factor on the state of the Mesoamerican Reef (Kramer and Kramer, 2002; WRI, 2005; Arrivillaga and Windevoxhel, 2008). Whilst the majority (80%) of sediment and agrochemical contamination is believed to originate in Honduras (WRI, 2005), the banana and citrus farms of the Belize coastal plain are also contributing to the impacts. WWF, a member of the ICRAN-MAR Alliance, is working to diminish these impacts by promoting best management practices in the agricultural sector of the coastal plain, to reduce pesticide use and soil erosion.

- **Strategic action:** Ensure support of initiatives towards reducing agrochemical contamination of runoff into SBRC
- **Strategic action:** Lobby CZMAI, local and national Government Representatives and agencies for policy and zoning for the SBRC area
- **Strategic action:** Develop or adopt best practices guidelines and certification programmes relating to coastal developments, and engage relevant stakeholders for implementation



4.3 Cross Cutting Strategic Actions

A number of the strategic actions are cross cutting over four or more of the twelve objectives, and have therefore been identified as potential priorities for effective management (Table 4).

Cross Cutting Strategies for the Southern Belize Reef Complex												
	Objective											
Strategic Action	1	2	3	4	5	6	7	8	9	10	11	12
Implement / enforce policies & regulations												
Develop and implement public awareness program												
Implement an effective, standardized monitoring and data management program for the SBRC area												
Lobby CZMAI, local and national Government Representatives and agencies for policy and zoning for the SBRC area												
Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area												
Identify and protect nursery grounds from extraction / damage												
Create an alternative livelihood program for fisher folk within the SBRC												
Develop or adopt best practices guidelines and certification programs relating to coastal developments, and engage relevant stakeholders for implementation												

Table 4: Cross cutting strategies for the effective management of the Southern Belize Reef Complex

5.0 Measuring Success

Indicators of success have been developed for measuring the impacts and effects of implementation of strategic actions within the SBRC, focused on monitoring of biodiversity viability, threat levels and achievement of objectives.

Monitoring Viability

The viability of each conservation target has been rated on its Key Ecological Attributes, based on Landscape Context, Condition and Size. A series of indicators has been developed to measure the status of these attributes, and provide conservation managers with a means to measure the effectiveness of their strategies on the viability of the conservation targets.

Category	Key Ecological Attribute	Indicator
Landscape Context	Nutrient concentrations & dynamics	Water quality
Condition	Presence / abundance of key functional guilds	Density of Parrotfish
Size	Size / extent of characteristic ecosystems	% seagrass cover

Examples of Viability Indicators

Monitoring Objective and Strategy Success for Adaptive Management

Indicators are also tied to each objective, to provide a mechanism to measure success of the outcomes of strategy implementation.

Indicators of Objective and Strategy Success	
Objective	Indicators of Success of Conservation Actions
Objective 2. By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place	<ul style="list-style-type: none"> ▪ Total area of littoral forest / sandy beaches ▪ % coastal / caye developments that meet best practices standards (including aquaculture industry)
Objective 8. By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management	<ul style="list-style-type: none"> ▪ Conch density ▪ Average Catch per man-hour (Catch per unit effort) ▪ Biomass of adult fish

Measuring success of conservation actions facilitates adaptive management, enabling conservation managers to keep abreast of the changing human landscape and develop new strategies to ensure continued management effectiveness into the future.

6.0 Recommendations and Next Steps

The following recommendations are based on the outputs of the four Conservation Action Planning workshops, and on discussions during Core Planning Meetings during the CAP process.

- **Recommendation One**

A Management Steering Committee should be formed to collaborate and coordinate implementation of the system-level Objectives and Strategic Actions developed during the CAP process

The Conservation Action Planning process for the Southern Belize Reef Complex demonstrated the strengths of the four protected area managers / co-managers (Department of Fisheries, Forest Department, Friends of Nature and the Toledo Association for Sustainable Tourism and Empowerment), working as a team towards strategic actions to achieve the effective system-level management of the Southern Belize Reef Complex. Each team member brought their individual perspective and skills to the planning, with a willingness to use these to develop system-level management concepts, beyond the boundaries of the individual protected area.

A critical first step is the creation of two permanent oversight committees – the Management Steering Committee (to coordinate implementation of system-level management programs and activities), and the Directorate (to provide executive oversight, and liaison with National Protected Areas Commission (NPAC); Figure 8)).

The Management Steering Committee, comprised of those active at site-management level, will coordinate and implement the conservation strategies. The Steering Committee should meet every two months to discuss progress and collaborative activities for the following quarter, with an annual meeting focus on central coordination of system-level programmatic areas for the Southern Belize Reef Complex as a whole, and to review measures of success.

The Steering Committee will report to a Directorate comprised of executive management personnel, representing the management and co-management organizations, which should meet twice a year to discuss and oversee the system-level management of the Southern Belize Reef Complex. The Directorate is responsible for liaising with the protected area institution being established under NPAC to oversee management of Belize's protected areas.

These two committees should be formalized through an agreement between the four management / co-management organizations, and fit within the national structure of system-level management.

There should also be a biannual meeting of the key stakeholder representatives (Coastal Zone Management Authority and Institute, Department of Geology and Petroleum, fishermen, tour guides, tour operators, caye and coastal property owners etc.) and broader stakeholder sectors, in order to establish and maintain participation in the implementation process, and an integrated resource management approach for the SBRC - fostering a land- and sea-scape level of sustainable resource use, with effective cross-sectoral collaboration to maintain the biodiversity and ecosystem functionality upon which the various sectors depend.

This fulfils the stated aim of the National Protected Areas System Plan to consolidate individual protected areas into system-level management units, and ensure broad stakeholder participation throughout the implementation process.

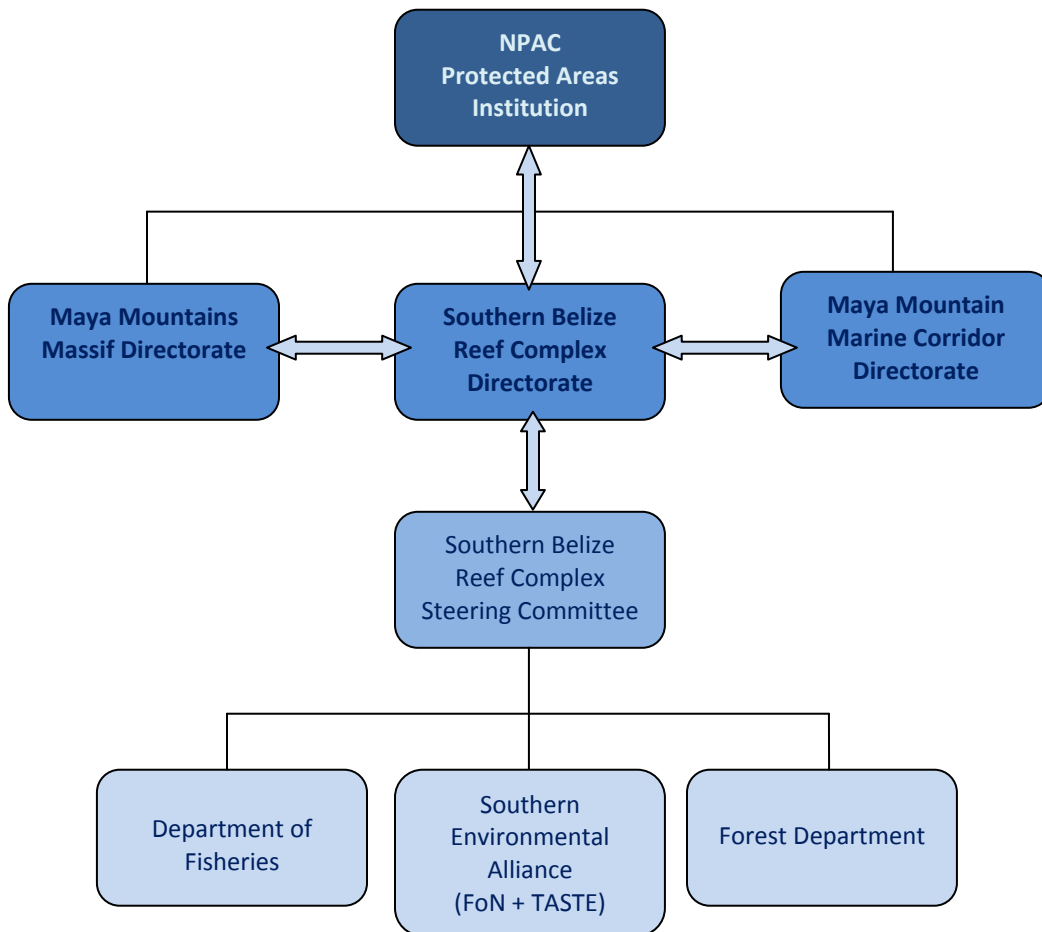


Figure 8: Recommended Collaborative Management Structure for the Southern Belize Reef Complex

▪ **Recommendation Two**

Development of a structured workplan for collaborative and coordinated implementation of the Conservation Action Plan and associated monitoring activities

Continued close collaboration of the management / co-management organizations at both the Steering Committee and Directorate levels is essential for the successful implementation of the Conservation Action Plan if effective system-level management is to be achieved. This relies on clear, open lines of communication, and the development and implementation of a structured workplan that clearly defines the roles and responsibilities of each team member.

System-level Programs

- Natural and Cultural Resource Management Program
- Resource Use Program
- Scientific Research and Monitoring Program
- Community Development Program
- Outreach Program
- Public Use Program
- Administration Program
- Infrastructure and Maintenance Program

The workplan should be based on system-level programmatic areas (Table 5), providing a framework for coordination of implementation, with those activities to be implemented at system-level by the collaborating partners, and those activities at site-level to be integrated within the annual

operational plans for each of the protected areas, for implementation by the respective management / co-management agencies.

It is recommended that for each program area, a lead agency should be identified to take on the role and responsibility of active coordination of implementation, in collaboration with site-level managers and other stakeholders. Logically, for example, Fisheries Department would lead the Resource Use Program, whilst SEA would be stronger leading the Outreach Program.

System-Level Management Programmes							
Strategy: Establish System-level programs to ensure coordinated implementation of the Conservation Action Plan at system-level							
Enhance management capacity and management effectiveness through provision of support to protected area managers across the SBRC system, and through collaborative implementation of activities coordinated through programmatic areas	Natural and Cultural Resource Management Program	Sustainable Fisheries Program	Research and Monitoring Program	Community Development Program	Outreach and Education Program	Public Use (Tourism and Recreation)	Administration and Infrastructure Programs
	Coordination of system-level surveillance and enforcement	Coordination of licenses / monitoring for sustainable fisheries	Coordination of system-level scientific research	Coordination of system-level alternative livelihood initiatives	Coordination of system-level environmental education	Coordination of system-level visitor activities	General coordination and administration at system-level, including accounting
	Coordination of system-level zoning and boundaries	Coordination of licenses / monitoring of other resource use (eg. sport fishing)	Coordination of activities to fill identified system-level knowledge gaps	Coordination of system-level community capacity building initiatives	Coordination of system-level public outreach and information	Coordination of system-level visitor education and interpretation	Coordination of system-level planning
	Coordination of habitat restoration		Coordination of system-level monitoring for conservation action planning indicators			Coordination of system-level best practices policies	System-level financial sustainability mechanisms
	Coordination of system-level cultural resource management		Coordination of system-level scientific data management			Coordination of system-level visitor safety and protection policies	Coordination of system-level collaborative initiatives
	Coordination of licenses / monitoring for extraction of non-sustainable resources (eg. minerals)						Capacity building of partner organizations
							Infrastructure and maintenance

Table 5: System-Level Management Programmes

- **Recommendation Three**

Prioritize implementation of activities in line with priorities identified under the Conservation Action Planning process

A number of priorities and broad cross-cutting strategies were identified under the Conservation Action Planning that should be borne in mind during the development of the workplan.

Priority Objectives: Four objectives were highlighted by workshop participants as priorities

Objective 1: By 2013, illegal fishing activities within the SBRC will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level.

Objective 2: By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet Environmental Impact Assessment, Environmental Compliance Plan and best practices standards, with independent monitoring in place

Objective 3: By 2013, all marine protected areas within SBRC will be able to obtain 50% of their annual budget through a secured diversified funding base - user fees, government, endowment, concessions, and environmental tax

Objective 4: By 2013, the level of agricultural contamination impacting the SBRC will be reduced from 2008 levels, through collaboration with other organizations and agencies that influence agro-chemical use and application

Priority Threats: Three threats were identified as the Very High, and should therefore be considered for priority status:

Threat 1: Coastal / Caye Development

Threat 2: Fishing Pressure

Threat 3: Climate Change

Annexes

Annex One:	Conservation Targets and Nested Targets
Annex Two:	Assessment of Target Viability
Annex Three:	Situation Analysis per Conservation Target
Annex Four:	Objectives and Strategic Actions - Southern Belize Reef Complex
Annex Five:	Monitoring Framework for the Southern Belize Reef Complex
Annex Six:	Core Planning Team
Annex Seven:	SBRC Charter for the Conservation Action Planning Process
Annex Eight:	Participants List
Annex Nine:	Maps

Annex One: Conservation Targets and Nested Targets

Southern Belize Reef Complex – Conservation Targets	
Target #1	Littoral Forest / Sandy Beach
Nested Target # 1	Marine Turtles - nests
Nested Target # 2	American Crocodiles (<i>Crocodylus acutus</i>)
Nested Target # 3	Migratory and Nesting Bird Species
Nested Target # 4	Island leaf-toed gecko (<i>Phyllodactylus insularis</i>)
Target #2	Mangroves
Nested Target # 1	Nesting birds
Nested Target # 2	Crustaceans
Nested Target # 3	Crocodiles
Nested Target # 4	Juvenile fish populations
Target #3	Coastal Lagoons and Estuaries
Nested Target # 1	Algae
Nested Target # 2	Sawfish (<i>Pectinus pectinata</i>)
Nested Target # 3	Rays
Nested Target # 4	Juvenile fish
Nested Target # 5	Crustaceans
Nested Target # 6	Seagrass
Target #4	Seagrass
Nested Target # 1	West Indian (Antillean) Manatee (<i>Trichechus manatus</i>)
Nested Target # 2	Queen Conch (<i>Strombus gigas</i>)
Nested Target # 3	Green Turtle (<i>Chelonia mydas</i>)
Nested Target # 4	Juvenile fish species
Nested Target # 5	Crustaceans
Nested Target # 6	Algae
Target #5	Coral Reef Communities
Nested Target # 1	Coral species
Nested Target # 2	Reef fish
Nested Target # 3	Herbivores

Southern Belize Reef Complex – Conservation Targets (continued)	
Target #6	Commercial / Recreational Species
Nested Target # 1	Queen Conch (<i>Strombus gigas</i>)
Nested Target # 2	Caribbean Spiny Lobster (<i>Panulirus argus</i>)
Nested Target # 3	Crabs
Nested Target # 4	Shrimp
Nested Target # 5	Finfish
Nested Target # 6	Snook
Nested Target # 7	Permit
Nested Target # 8	Bonefish
Nested Target # 9	Tarpon
Nested Target # 10	Baitfish
Target #7	Spawning Aggregations
Nested Target # 1	31 species of finfish
Target #8	Wide Ranging Large Marine Vertebrates
Nested Target # 1	Whaleshark
Nested Target # 2	Sharks
Nested Target # 3	Dolphin
Nested Target # 4	Marine Turtles

Conservation Target: Littoral Forest / Sandy Beach		
Conservation Target	Justification for Target Selection	Species, Communities or Ecological Systems represented by Target
<p>Littoral Forest / Sandy Beach Viability Indicators:</p> <ul style="list-style-type: none"> ▪ Level of fragmentation within littoral forest system ▪ Abundance and diversity of resident and migratory birds ▪ % of area in natural condition ▪ Abundance of turtle nests ▪ Total area of littoral forest / sandy beaches 	<p>Tropical littoral forests and herbaceous beach communities are classified within the Belize Ecosystem Map as <i>Tropical Coastal Vegetation on recent sediments</i> (Meerman and Sabido, 2001). This vegetation type, found in isolated patches on the coast, and on the cayes, is very resilient to hurricane damage, and can become established on small, isolated cayes, with long distances between patches.</p> <p>This ecosystem is highlighted under Belize's National Protected Areas System Plan as being significantly under-represented within the current protected area system, with only 8.6% of the national coverage being under protection, as compared with the national target of 60% for this ecosystem. Only 4.1% of the littoral forest on Belize's cayes lie within protected areas – a significant shortfall considering the importance of this ecosystem for migratory birds and island specialists such as Belize's endemic Island Leaf-toed Gecko.</p> <p>On the mainland, Littoral forests tend to be found on the higher coastal areas, with past pressure for conversion to coconut stands, and with the present pressure as the highest valued land for real estate and property development, leading to concerns for long term viability, especially in the Placencia area.</p> <p>The herbaceous beach community also included within this target is considered very important for the stabilization of the turtle and crocodile nesting beaches. Again, this ecosystem is found in areas targeted for residential and tourism development, whether on the coast on the Placencia spit, or on the cayes, where it is often subjected to extensive clearance to expose the sandy beaches</p>	<p>Nested within the Littoral Forest target are a series of associated species. Seasonally, migratory bird species use the coastal forests and cayes as they pass through.</p> <p>The island leaf-toed gecko (<i>Phyllodactylus insularis</i>) is Belize's only endemic reptile, the justification for its inclusion on Belize's National List of Critical Species (Meerman, 2005). This species has been recorded recently from several cayes off the coast of southern Belize (Crawl Caye, False Caye, Lagoon Caye, Peter Douglas Caye and West Snake Caye; Boback, S.M., 2005).</p> <p>The sandy beaches of the area provide nesting sites for endangered sea turtles (green, loggerhead and hawksbill turtles) and the American Crocodile. Also nesting on some of the sandy cayes are a range of bird species – least, roseate and bridled terns, laughing gulls, pelicans and frigatebirds among them.</p>

Conservation Target: Mangroves		
Conservation Target	Justification for Target Selection	Species, Communities or Ecological Systems represented by Target
<p>Mangroves</p> <p>Viability Indicators:</p> <ul style="list-style-type: none"> ▪ Water quality – nutrient load ▪ Ratio of live:dead mangrove ▪ Abundance of juvenile fish ▪ Total area of mangrove ecosystems 	<p>Mangroves play a key role in the maintenance of cayes and coastal integrity through erosion control, and also a critical fisheries nursery area for commercially valuable species (e.g. permit, snook, lobster, snappers, goliath grouper, etc). The trees themselves serve as nesting habitat and the leaves provide nutrients for plankton, which serves as the basis of the detrital food chain.</p> <p>Whilst these important roles are widely recognised, there is extensive clearance of mangroves in both coastal areas and the cayes, with the associated reduction in the essential ecosystem services they provide.</p> <p>Whilst formally widespread within the Placencia Lagoon area, coastal development is rapidly removing this ecosystem, especially in water’s edge locations. Some of the cayes, such as Twin Cayes, Pelican Cayes and Tobacco and Blue Ground Ranges in the South Water Caye Marine Reserve, have important oceanic mangroves, though again, clearance for development is removing some of these important nursery areas. In the Sapodilla Cayes Marine Reserve, mangrove is not highly prevalent although both Franks Caye East and Seal Caye I do have stands of red mangrove (<i>Rhizophora mangle</i>).</p>	<p>The mangroves are important in their role as a nursery area for juvenile fish and crustaceans, and are considered important in the maintenance of commercial fish and lobster stocks. The roots provide a substrate for the mangrove oyster, shrimp, sponges and many other invertebrates.</p> <p>Species associated with the mangrove ecosystem include those marine birds that use the mangrove structure for nesting – for example, Boobys and Noddys, Magnificent Frigatebirds, Brown Pelicans, Neotropical Cormorants.</p> <p>The mangrove-lined lagoons, estuarine areas and cayes also provide protection for both Morelet’s and the American crocodiles</p>

Conservation Target: Coastal Lagoons and Estuaries		
Conservation Target	Justification for Target Selection	Species, Communities or Ecological Systems represented by Target
<p>Coastal Lagoons and Estuaries</p> <p>Viability Indicators:</p> <ul style="list-style-type: none"> ▪ Water Quality - Average dissolved oxygen ▪ Abundance of juvenile fish in Placencia Lagoon ▪ Number of manatees in Placencia Lagoon ▪ Extent of coastal vegetation adjacent to Placencia Lagoon ▪ % Seagrass cover 	<p>Coastal lagoons and estuaries within the project area include (from the north southwards):</p> <ul style="list-style-type: none"> ▪ Commerce Bight Lagoon, ▪ Freshwater Creek lagoon, ▪ Indian Hill Lagoon, ▪ Placencia Lagoon ▪ Sapodilla Lagoon <p>Each of these has a varying level of human impact, from the relatively intact Indian Hill Lagoon, with its intact seagrass beds to the heavily impacted Placencia and Sapodilla Lagoons, where seagrass beds are responding by declining or almost disappearing altogether.</p> <p>These systems rely on seagrass as the base of the food chain, and on intact mangrove lining the banks, both these ecosystem providing important nursery habitat. Decreasing water quality in Placencia Lagoon, primarily from aquaculture and increasing coastal development (particularly dredging activities) is thought to have reduced the distribution of lagoonal seagrass to less than 30% of its original extent.</p> <p>Seagrass used to be present throughout the lagoon system - Upper Lagoon (Halodule / Halophila....40%), Middle lagoon (Halophila b., Thassalia t, Halodule...>60%), Southern Middle lagoon (80 - 100%), Lower lagoon / Roberts Grove (10%), Southern Lower Lagoon (75 - 80%)</p> <p>Now reduced to: Upper Lagoon (Halodule / Halophila....20%), Middle lagoon (Halophila b., Thassalia t, Halodule 0%), Southern Middle lagoon (2%), Lower lagoon / Roberts Grove (5%), Southern Lower Lagoon (60 - 75%)</p>	<p>Coastal lagoons are considered particularly important for their role in the lifecycles of many commercial fish species (including bonefish and several grunt, jack, mullet, and snapper species), and for the spiny lobster, providing a nursery area in the shelter in seagrass beds and mangrove roots. Other crustaceans and molluscs are also important components of these ecosystems.</p> <p>At one time, the sawfish (<i>Pectinus pectinata</i>) was abundant within these lagoon systems, but is now considered ecologically extinct following heavy fishing pressure.</p> <p>Several ray species, including the cow-nosed ray (<i>Rhinoptera bonasus</i>) use the systems to congregate for mating in the shallow waters between the months of February and April. Spotted eagle ray and southern stingray may also be present within the lagoon systems year round.</p> <p>The decreasing salinity of these systems also attracts the West Indian, or Antillean, Manatee (<i>Trichechus manatus</i>), as do the formerly extensive sea grass beds. The decrease in the extent of seagrass, and the increasing human presence on the water are thought to be shifting the general distribution of this species to the coastal areas further south of Placencia.</p> <p>The sea grass is also thought to provide a substrate for several endemic species of algae.</p>

Conservation Target: Seagrass		
Conservation Target	Justification for Target Selection	Species, Communities or Ecological Systems represented by Target
<p>Seagrass</p> <p>Viability Indicators:</p> <ul style="list-style-type: none"> ▪ Water quality - Average total suspended solids ▪ Water quality - Changes in site level micro-climate patterns outside the range of natural variation ▪ Seagrass density ▪ % sea grass cover 	<p>Seagrass meadows are essential for maintaining the ecological health of the shallow marine ecosystems, with an important role in nutrient cycling and sediment stabilization. They are also a critical ecosystem for many fish and invertebrate species, with an acre of sea grass being shown to support up to 40,000 fish and 50 million small invertebrates (Seagrass Ecosystems Research Laboratory, 2005).</p> <p>This target focuses on the coastal and marine seagrass beds, excluding those beds found within estuaries and coastal lagoons, which are dealt with separately. 90 – 100% of the sea grass beds are considered to be intact, with only marginal impacts from coastal development in the shallow coastal waters, and around cayes.</p> <p>Primary concerns are water quality – agrochemical pollution and increased sediment loads from both Belize and Guatemala.</p>	<p>Nested targets include the West Indian Manatee (<i>Trichechus manatus</i>), the largest of Belize’s herbivorous marine mammals, as well as marine turtles. Both these species play a role in the maintenance of the seagrass and increase the productivity of this ecosystem through grazing.</p> <p>Seagrass beds are also essential for the Queen Conch (<i>Strombus gigas</i>), one of the most important commercial species extracted from the sea, and for the juveniles of many commercial fish species. Parrotfish, herbivores that play a critical role in maintaining the reef, also rely on the seagrass beds as juveniles.</p>

Conservation Target: Coral Reef Communities		
Conservation Target	Justification for Target Selection	Species, Communities or Ecological Systems represented by Target
<p>Coral Reef Communities</p> <p>Viability Indicators:</p> <ul style="list-style-type: none"> ▪ Water quality - Water temperature ▪ % survey sites showing coral bleaching ▪ % of survey sites that show an increased Integrated Healthy Reef Index ▪ Number of coral recruits ▪ <i>Diadema</i> density ▪ Parrotfish density ▪ % recent coral mortality ▪ Biomass of adult fish ▪ Abundance of juvenile fish (nursery functionality) 	<p>The reef building corals of the Southern Belize Reef Complex are critical to the maintenance of local biodiversity, and considered a conservation priority in ecoregional planning initiatives. Coral reefs are one of most diverse ecosystems on this planet, essential to the viability of the majority of fish and marine invertebrates living on the reef, providing basic structure for shelter, foraging, and reproduction.</p> <p>The coral reef is essential to the maintenance of the artisanal fishing industry, particularly for spiny lobster and finfish populations. It is also one of the more important tourism resources Belize has to offer, and supports a significant percentage of employment in Placencia, as well as contributing to incomes in Punta Gorda, Dangriga, Hopkins and other coastal communities in the area.</p> <p>Healthy Reef Initiative: A healthy reef can be characterized by relatively high live coral cover, moderate cover of crustose corraline calcareous and short turf algae, and low covering of fleshy macroalgae. Regional live coral cover average is 14% (15% on fore reefs and 11% on the reef crest.</p> <p>Coral reef in the SBRC is being impacted by warming seas – optimal water temperatures lie within 25 - 29°C. Monthly averages that exceed 0.5°C above the historical average for that month are likely to cause bleaching.</p>	<p>The reef ecosystems of the SBRC, including fore-reef, back-reef, reef slope, patch reef, are composed of many scleractinian coral species, This provides a diverse range of habitats for a multitude of fish species and invertebrates, including commercially important species such as the spiny lobster and a variety of fish.</p> <p>Many species of fish have been recorded within the SBRC, of which thirteen are IUCN redlist species:</p> <p>Goliath Grouper (<i>Epinephelus itajara</i>) CR Black Grouper (<i>Epinephelus nigritus</i>) CR Nassau Grouper (<i>Epinephelus striatus</i>) EN Red Porgy (<i>Pagrus pagrus</i>) EN Great Hammerhead (<i>Sphyrna mokarran</i>) EN Queen Triggerfish (<i>Balistes vetula</i>) VU Hogfish (<i>Lachnolaimus maximus</i>) VU Mutton Snapper (<i>Lutjanus analis</i>) VU Cubera Snapper (<i>Lutjanus cyanopterus</i>) VU Yellowmouth Grouper (<i>Mycteroperca interstitialis</i>) VU Whaleshark (<i>Rhincodon typus</i>) VU Whitelined Toadfish (<i>Sanopus greenfieldorum</i>) VU Rainbow Parrotfish (<i>Scarus guacamaia</i>) VU</p>

Conservation Target: Commercial / Recreational Species		
Conservation Target	Justification for Target Selection	Species, Communities or Ecological Systems represented by Target
<p>Commercial / Recreational Species</p> <p>Viability Indicators:</p> <ul style="list-style-type: none"> ▪ Abundance of juvenile fish (nursery functionality) ▪ Biomass of commercial fish ▪ Conch density ▪ Average catch per year per boat (recreational) 	<p>This target, commercial marine species, covers fin fish, lobster and conch – fished primarily by artisanal fishermen of the northern fishing communities (Sarteneja, Chunox and Copper Bank) and of the more adjacent coastal communities such as Placencia, Punta Gorda, Hopkins, and Monkey River, who are reliant on lobster, conch and finfish resources for their livelihoods.</p> <p>The role of many of the target fin-fish species as top predators is essential in reef community structure. Most commercially important marine species have complicated life cycles that rely on the health of the entire marine ecosystem – utilizing not just the reef, but also the sea grass beds and the coastal mangroves at some point during their life cycles.</p> <p>The two invertebrate species of commercial importance to the SBRC are the Caribbean Spiny Lobster (<i>Panulirus argus</i>) and Queen conch (<i>Strombus gigas</i>), both of which are fished extensively throughout the area. The Caribbean Spiny Lobster fishery is the largest capture fishery in Belize, with production representing over 40% of total capture fisheries production in 2006, and an export value of US\$7.37 million (Fisheries Department, 2007). Lobster landings peaked in 1981 at 2,204,622 lbs, but have fallen to 457,680 lbs in 2006 (Fisheries Department, 2007). It is significant to note that the total national lobster production over this period has declined by almost 25%, and there are concerns for the continued sustainability of the lobster fishing industry.</p> <p>Sport fishing is an increasing activity within the SBRC, focusing on permit, barracuda, bonefish, tarpon, mullet, crevalle and horse-eye jacks, and snook.</p>	<p>Caribbean Spiny Lobster (<i>Panulirus argus</i>) and Queen conch (<i>Strombus gigas</i>), are fished extensively throughout the area. Figures show that conch density averages 44/ha in open fishing areas, and 255/ha in no take zones. The Healthy Reef target is 300 – 400 adults per hectare.</p> <p>The high diversity of fish species recorded within the SBRC includes Snapper (Lutjanidae) (<i>Lutjanus cyanopterus</i>, <i>L. jocu</i>, <i>L. apodus</i>, and <i>L. mahogany</i>), Grouper (Serranidae – <i>Myctoperca bonaci</i>, <i>M. venenosa</i> and <i>M. tigris</i>), the Great Barracuda (<i>Sphyraena barracuda</i>), Grunt (Haemulidae); Goatfish (Mullidae), and Parrotfish (Scaridae – <i>Scarus coelestinus</i>, <i>Sparisoma chrysopteron</i> and <i>S. Virida</i>)</p>

Viability of Conservation Targets: Spawning Aggregation																											
Conservation Target	Justification for Target Selection				Species, Communities or Ecological Systems represented by Target																						
<p>Spawning Aggregation Viability Indicators:</p> <ul style="list-style-type: none"> ▪ Abundance of juveniles ▪ Number of large, adult fish species ▪ Diversity of spawning species at SPAG sites ▪ % increase in fish abundance from baseline 	<p>At least four critical spawning aggregation sites (three sites on the Sapodilla Caye Marine Reserve – Rise and Fall Bank, Nicholas Caye, Seal Caye, and a fourth, Gladden Spit, the largest aggregation known in the Mesoamerican Reef ecoregion). Protected spawning aggregation sites (both through SI and through surveillance and enforcement presence) provide an important benefit to the fishing sector, protecting commercially important fin-fish species such as grouper, snapper and jack, during the reproductive stage of their life cycle.</p>				<p>Gladden Spit Spawning Aggregation species:</p> <p>Mutton Snapper (<i>Lutjanus analis</i>) Cubera Snapper (<i>Lutjanus cyanopterus</i>); Dog Snapper (<i>Lutjanus jocu</i>); Yellowtail Snapper (<i>Ocyurus chrsurus</i>); Nassau Grouper (<i>Epinephelus striatus</i>) – Endangered (IUCN); Red Hind (<i>Epinephelus guttatus</i>); Black Grouper (<i>Mycteroperca bonaci</i>); Yellowfin Grouper (<i>Mycteroperca venenosa</i>); Tiger Grouper (<i>Mycteroperca tigris</i>); Amber Jack (<i>Seriola dumerilii</i>); Bar Jack (<i>Caranx ruber</i>); Blue Runner (<i>Caranx crisis</i>); Yellow Jack (<i>Caranx bartholomaei</i>); Crevalle Jack (<i>Caranx hippos</i>); Horse-eye Jack (<i>Caranx latus</i>); White Margate (<i>Haemulon album</i>) Hogfish (<i>Lachmolaemus maximus</i>) Ocean Triggerfish (<i>Canthidermis sufflamen</i>); Jolthead Porgy (<i>Calamus bajonado</i>); Permit (<i>Trachionatus fulcatus</i>); Smooth Trunkfish (<i>Lactophrys triqueter</i>)</p>																						
	SPAG Site	Vulnerability	Ecological Importance	Monitoring Importance			<p><i>MBRS SPAG Monitoring Recommendations, Heyman et. al. 2003</i></p> <table border="1"> <thead> <tr> <th>Nassau Grouper Site</th> <th>2003</th> <th>2004</th> <th>2005</th> <th>2006</th> <th>2007</th> <th>2008</th> </tr> </thead> <tbody> <tr> <td>Gladden Spit</td> <td>250</td> <td>450</td> <td>360</td> <td>239</td> <td>255</td> <td>350</td> </tr> <tr> <td>Nicholas Caye</td> <td>52</td> <td>50</td> <td>80</td> <td>48</td> <td>80</td> <td>100</td> </tr> </tbody> </table> <p><i>Information circular No. 6 / The Belize Spawning Aggregation Working Group</i></p>		Nassau Grouper Site	2003	2004	2005	2006	2007	2008	Gladden Spit	250	450	360	239	255	350	Nicholas Caye	52	50	80	48
	Nassau Grouper Site	2003	2004	2005	2006	2007			2008																		
	Gladden Spit	250	450	360	239	255			350																		
	Nicholas Caye	52	50	80	48	80			100																		
Gladden Spit	3	3	1																								
Rise and Fall Bank	3	1	2																								
Nicholas Caye	2	3	2																								
Seal Caye	2	2	2																								
<p>(1) Vulnerability: (Existing and future fishing pressure) 1: Low vulnerability 2: Medium vulnerability 3: High vulnerability (2) Ecological Importance: (based on the number of species and individuals spawning at the site) 1. Low importance 2. Medium importance 3. High importance (4) Monitoring Category 1: Intensive, year-round monitoring – as many dives as possible, hopefully > 300/year 2: Intensive monitoring in January and April – 10 days consecutive, 2 days before - 10 days after full moon 3: Exploratory monitoring – as many dives as possible during any months of the year but most importantly during January – May and from 2 days to 8 days after full moon.</p>				<p><i>MBRS SPAG Monitoring Recommendations, Heyman et. al. 2003</i></p>																							
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Viability of Conservation Targets: Wide Ranging Large Marine Vertebrates		
Conservation Target	Justification for Target Selection	Species, Communities or Ecological Systems represented by Target
<p>Wide Ranging Large Marine Vertebrates Viability Indicators:</p> <ul style="list-style-type: none"> ▪ Average travel distance recorded per wide ranging sharks (including whale sharks) and turtles ▪ Number of feeding areas / sources for whale sharks ▪ Number of shark species (diversity) ▪ Number of whale sharks showing site fidelity at Gladden Spit across the years ▪ Population size by species 	<p>This target includes those species that require larger areas than the Southern Belize Reef Complex, with connectivity to the open oceans.</p> <p>The world's largest fish, the whale shark (<i>Rincodon typus</i>), whilst thought to be primarily pelagic feeders, congregate at Gladden Spit each year to feed on spawn at the aggregation site during the ten days of the full moon in May, June and July. This vulnerable (IUCN, 2008) species is considered highly migratory, travelling 1000's of kilometres, and occurs throughout tropical and warm temperate waters around the globe.</p> <p>Other sharks are also included within this target, particularly those of the <i>Carcharinus</i> and <i>Sphyrna</i> genus.</p> <p>Three species of marine turtles, all highlighted as endangered or critically endangered species by IUCN, frequent the waters of the SBRC, and use the cayes as a traditional nesting sites.</p> <p>The wide ranging green, hawksbill and loggerhead turtles are known to migrate between temperate and tropical zones, and are therefore also within this target.</p>	<p>Sharks: Bull Shark <i>Carcharhinus leucas</i> Blacktip Shark <i>Carcharhinus limbatus</i> Whitetip Shark <i>Carcharhinus longimanus</i> Caribbean Reef Shark <i>Carcharhinus perezi</i> Sandbar Shark <i>Carcharhinus plumbeus</i> Smalltail Shark <i>Carcharhinus porosus</i> Tiger Shark <i>Galeocerdo cuvier</i> Lemon Shark <i>Negaprion brevirostris</i> Blue Shark <i>Prionace glauca</i> Scalloped Hammerhead <i>Sphyrna lewini</i> Great Hammerhead <i>Sphyrna mokarran</i> Smooth Hammerhead <i>Sphyrna zygaena</i></p> <p>Dolphins Fraser's Dolphin <i>Lagenodelphis hosei</i> Bottle-nosed Dolphin Atlantic Spotted Dolphin</p> <p>Green Turtle <i>Caretta caretta</i> Hawksbill Turtle <i>Eretmochelys imbricata</i> Loggerhead Turtle <i>Chelonia mydas</i></p>

Annex Two: Assessment of Target Viability

Southern Belize Reef Complex

Assessment of Target Viability					Indicator Ratings				Current Indicator Status
					Bold = Current <i>Italics = Desired</i>				
Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good		
1	Littoral Forest / Sandy Beach	Landscape Context	Connectivity among communities & ecosystems	Level of fragmentation within littoral forest system			<i>Current / Desired status</i>		Needs improved mapping
1	Littoral Forest / Sandy Beach	Condition	Abundance of food resources	Abundance and diversity of resident and migratory birds			<i>Current / Desired status</i>		
1	Littoral Forest / Sandy Beach	Condition	Community architecture	% of area in natural condition		Current status	<i>Desired Status</i>		
1	Littoral Forest / Sandy Beach	Condition	Presence / abundance of keystone species	Abundance of turtle nests		Current status	<i>Desired Status</i>		
1	Littoral Forest / Sandy Beach	Size	Size / extent of characteristic communities / ecosystems	Total area of littoral forest / sandy beaches		Current extent - but see notes	<i>Desired Status</i>		Needs improved mapping
2	Mangroves	Landscape Context	Nutrient concentrations & dynamics	Water quality		Current status?	<i>Desired Status</i>		Patchy, varied across the system, different sources
2	Mangroves	Condition	Population structure & recruitment	Abundance of juvenile fish		Current Status	<i>Desired Status</i>		Patchy, varied across the system,
2	Mangroves	Condition	Community architecture	Ratio of live:dead mangrove			<i>Current / Desired Status</i>		Default

Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status
2	Mangroves	Size	Size / extent of characteristic communities / ecosystems	Total area of mangrove ecosystems			Current /Desired Status		Overall clearance thought to be around 10%, The system is still thought to be sufficiently extensive to retain functionality & viability.
3	Coastal Lagoons and Estuaries	Landscape Context	Water quality	Water quality	DO < 4	DO 4-5	DO 5-7	DO 8	6mg/l
3	Coastal Lagoons and Estuaries	Condition	Population structure & recruitment	Abundance of juvenile fish		Current Status	<i>Desired Status</i>		
3	Coastal Lagoons and Estuaries	Condition	Presence / abundance of keystone species	# of manatee in Placencia Lagoon	<10	10-20	20-29	30+	10
3	Coastal Lagoons and Estuaries	Condition	Size / extent of characteristic ecosystems	extent of coastal vegetation on Placencia Lagoon	<45%	45 - 59%	60 - 74%	>75%	0.6
3	Coastal Lagoons and Estuaries	Size	Size / extent of characteristic ecosystems	% seagrass cover	<30%	30 - 69%	70 - 90%	90 - 100%	<30%
4	Seagrass	Landscape Context	Water quality	Water quality			Current / Desired Status		MBRS protocols
4	Seagrass	Condition	Primary productivity	Seagrass density	0 - 29%	30-49%	50-79%	80 - 100%	80-90%
4	Seagrass	Size	Size / extent of characteristic communities / ecosystems	% seagrass cover	< 50%	50% - 75%	75% - 90%	90%- 100%	> 95% - Minimal dredging
5	Coral Reef Communities	Landscape Context	Water temperature	Water quality	<24 or >30C	24-25 or 29-30C	25-26 or 28-29C	26-28C	

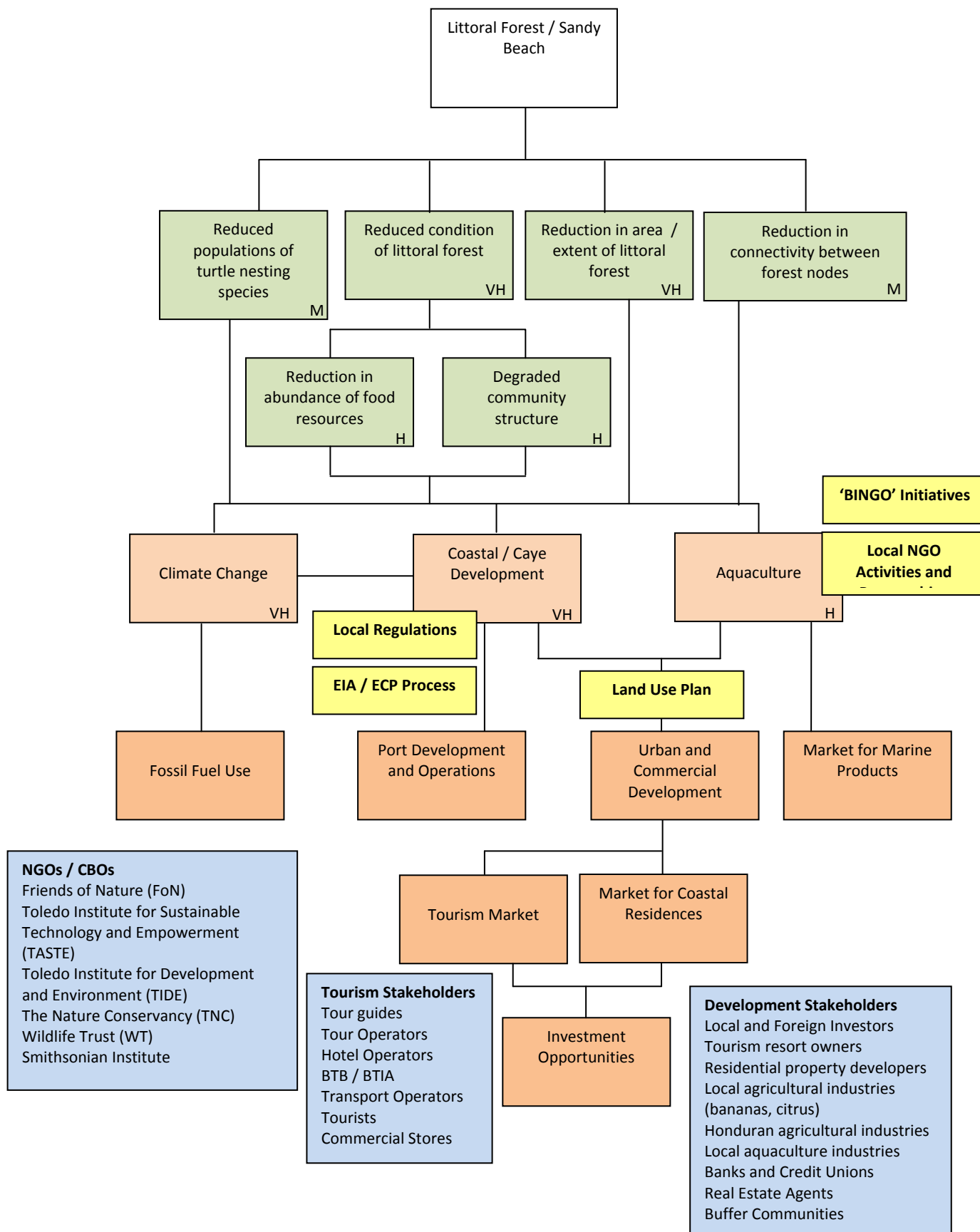
Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status
5	Coral Reef Communities	Condition	Coral Bleaching Indicator	% of survey sites showing coral bleaching	>10%		<i>Current /Desired Status</i>		SCMR Average 3.3%
5	Coral Reef Communities	Condition	Population structure & recruitment	% of survey sites that show an increased Integrated Healthy Reef Index			<i>Current /Desired Status</i>		Default
5	Coral Reef Communities	Condition	Population structure & recruitment	Number of coral recruits	0.00 recruits/m² - 10/m²	10 recruits/m ² - 15/m ²	15 recruits/m ² - 20/m ²	>20recruits/m ²	5.9 recruits / m ²
5	Coral Reef Communities	Condition	Presence / abundance of key functional guilds	Diadema density	<0.2/m ²	0.3-0.6/m ²	0.6-1.2/m²	>1.2/m ²	Data needs to be revisited to determine current status
5	Coral Reef Communities	Condition	Presence / abundance of key functional guilds	Parrotfish Density	1-1250 g/100m²	1250.01-4650 g/100m ²	>4650.01 g/100m ²		Data needs to be revised
5	Coral Reef Communities	Condition	Successional dynamics	% recent coral mortality	>8%	4-8%	2-4%	<2%	Gladden Spit / LBC Rapid Assessment 2006
5	Coral Reef Communities	Condition	Trophic structure	Biomass of adult fish	1.0-2110g/100 m²	2110.01-7150g/100 m ²	>7150.01g/100m ²		Averaged based on MBRS data (Needs to be revisited)
5	Coral Reef Communities	Size	Population size & dynamics	Abundance of juvenile fish (nursery functionality)		Current Status	<i>Desired Status</i>		Baseline data needed
6	Commercial / Recreational Species	Landscape Context	Connectivity among communities & ecosystems	Abundance of juvenile fish (nursery functionality)		Current Status			Baseline data needed
6	Commercial / Recreational Species	Condition	Population structure & recruitment	Biomass of commercial fish	0 – 2000g/100 m²	2000 – 3000g/ m ²	3000 – 4000g/ m ²	>4000g/ m ²	1400g/100 m ² Gladden Spit / LBC Rapid Assessment 2006
6	Commercial / Recreational Species	Condition	Population structure & recruitment	Conch density	<50/ha	Current Status	<i>Desired Status</i>		

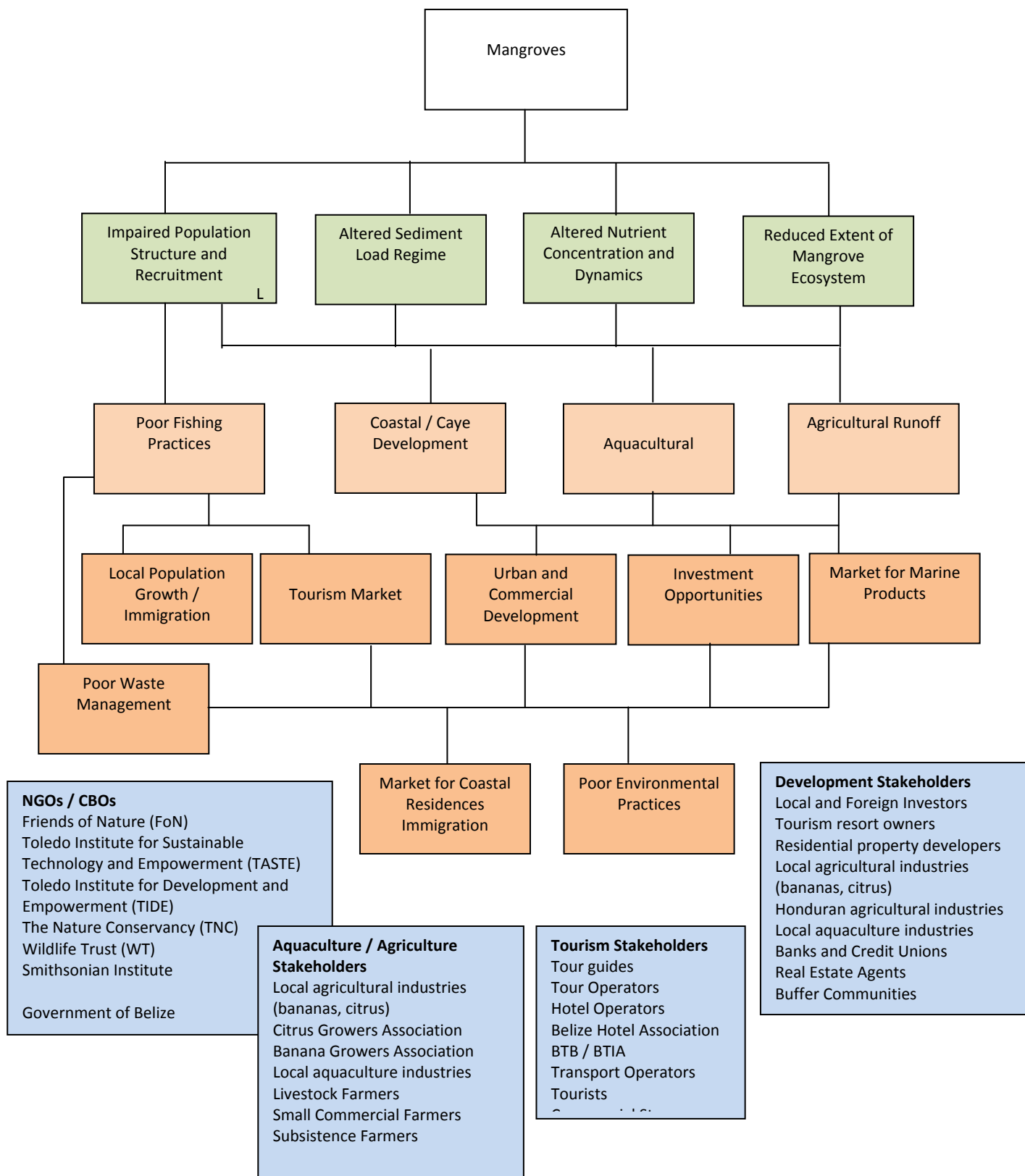
Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status
6	Commercial / Recreational Species	Size	Population size & dynamics	Average Catch per Year per boat - Recreational (Bonefish, permit)	<100	100-199	200-299	>300 lbs	
7	Spawning Aggregations	Landscape Context	Connectivity among communities & ecosystems	Abundance of juvenile fish		Current status	<i>Desired status</i>		
7	Spawning Aggregations	Condition	Population structure & recruitment	# of large, adult fish species	< 25% of the spawning population are LARGE adults	25% - 35% of the spawning population are LARGE adults	<i>36% - 50% of the spawning population are LARGE adults</i>	>50% but <75% of the spawning population are LARGE adults	Currently, most of the spawning populations seem to fall within a normal distribution with few very large fish, mostly average sized fish and very few small fish.
7	Spawning Aggregations	Condition	Species composition / dominance	Diversity of species at SPAG sites	< 5 species	5 - 10 species	10 - 15 species	>15 species	Based on current counts (2008)
7	Spawning Aggregations	Size	Population size & dynamics	% increase in fish abundance from designated baseline	Nassau & Mutton (< 1000 fish)	Nassau & Mutton (1000 - 2999 fish)	<i>Nassau & Mutton (3000 - 5000 fish)</i>	Nassau & Mutton (> 5000 fish)	2008 monitoring data
8	Wide Ranging Large Marine Vertebrates	Landscape Context	Connectivity among communities & ecosystems	Average travel distance recorded per wide ranging sharks (incl WS) and turtles	TBD	TBD	Current Status	TBD	Default No information currently available. Check with R. Graham
8	Wide Ranging Large Marine Vertebrates	Condition	Abundance of food resources for whalesharks	# of feeding areas/source for whale sharks	1 site/source	2 site/source	3-4 site/source	> 4 site/source	Currently seen on a seasonal basis at Gladden, Victoria Channel, off the reef and near Seal Cayes
8	Wide Ranging Large Marine Vertebrates	Condition	Species composition / dominance	# of shark species (diversity)	< 5 species	5 - 7 species	8 - 10 species	>10 species	5 of the species listed are common. Others are seen at different locations throughout the year

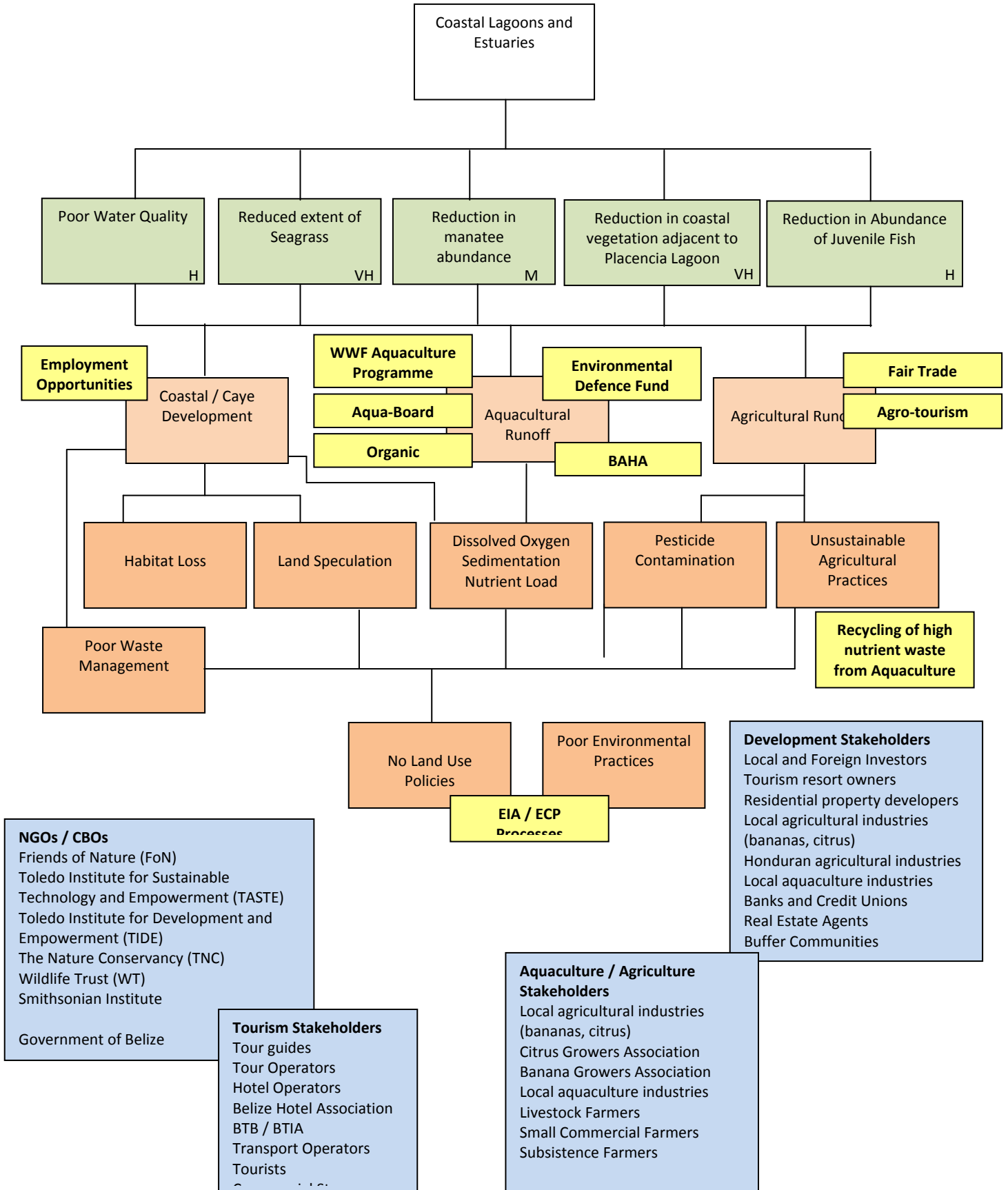
Conservation Target		Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Status
8	Wide Ranging Large Marine Vertebrates	Size	Population size & dynamics	% of whale sharks showing site fidelity at Gladden Spit across the years	0-1	2	3-5	>5	Based on past monitoring data
8	Wide Ranging Large Marine Vertebrates	Size	Population size & dynamics	Population size by species	TBD	Current Status	<i>Desired Status</i>	TBD	Default Check with Rachel Graham

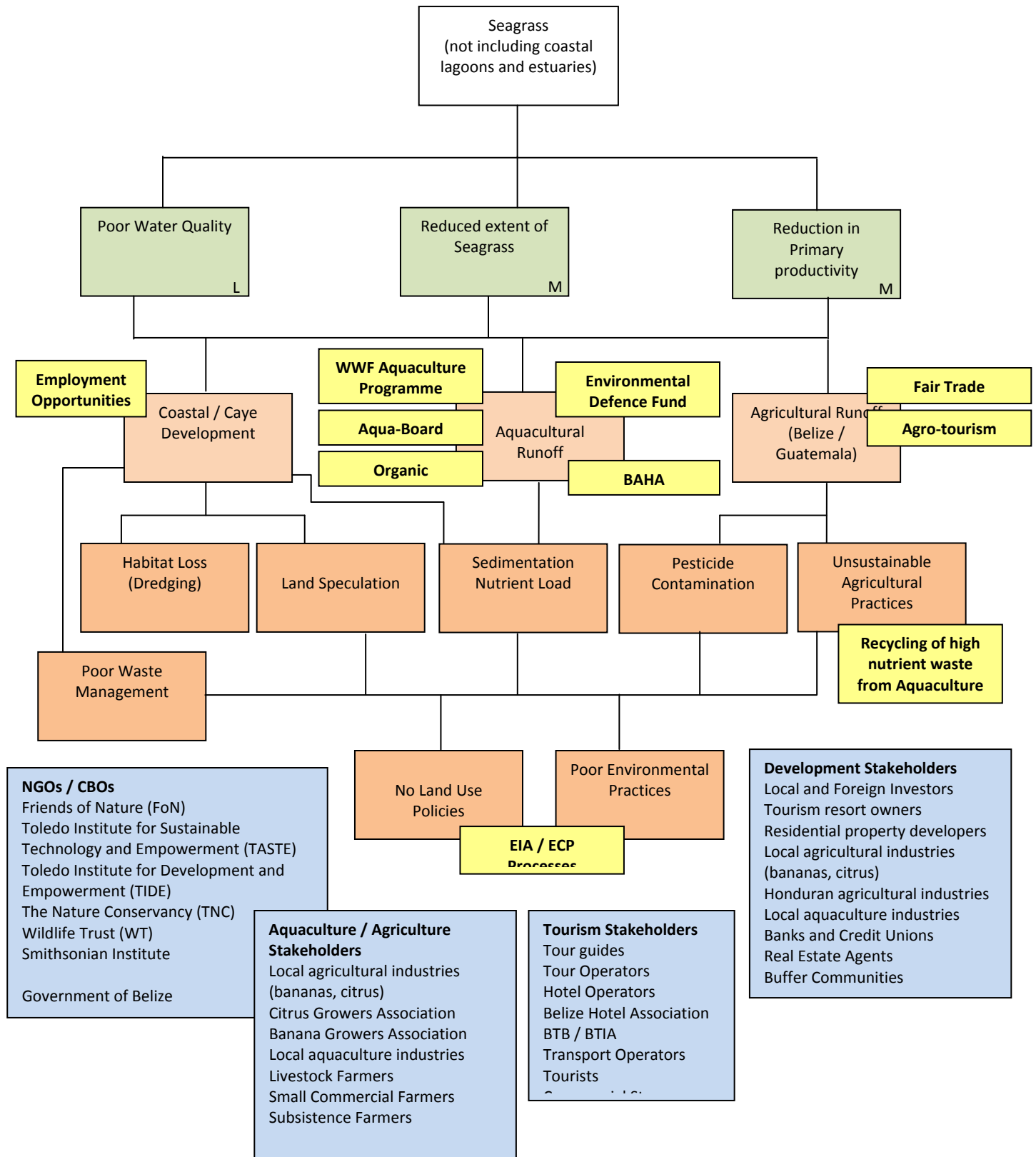
Annex Three

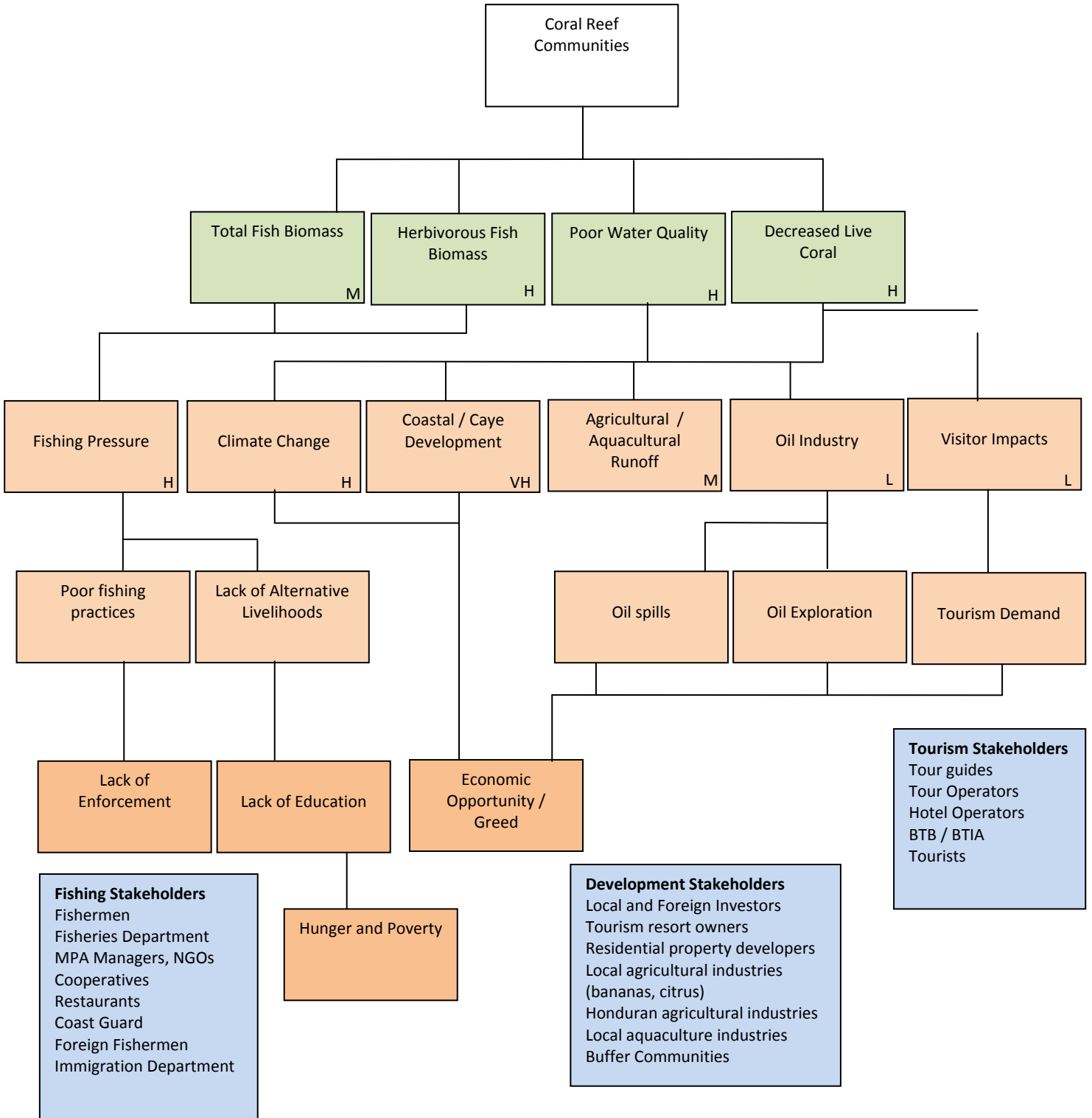
Situation Analysis per Conservation Target



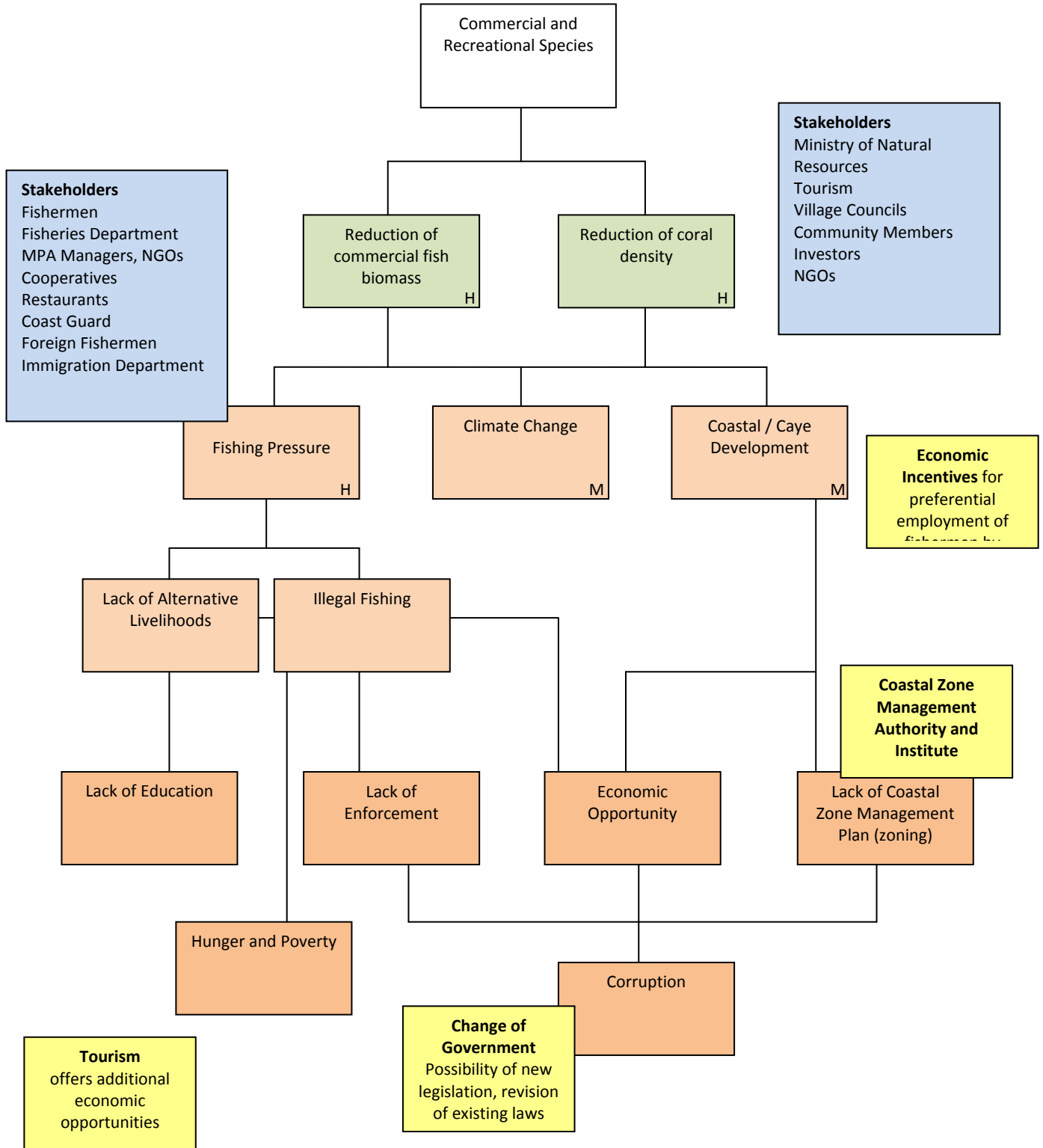


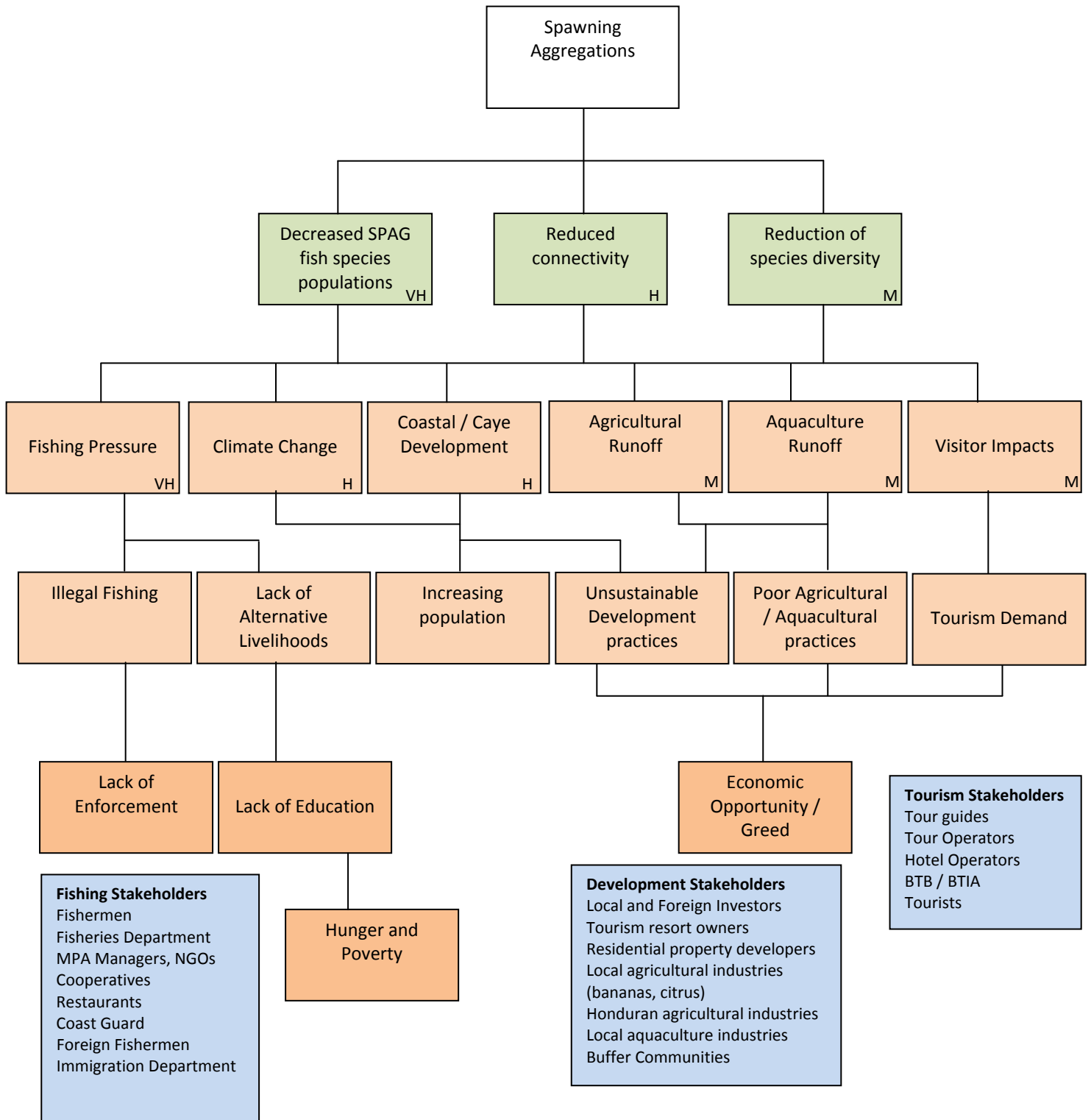




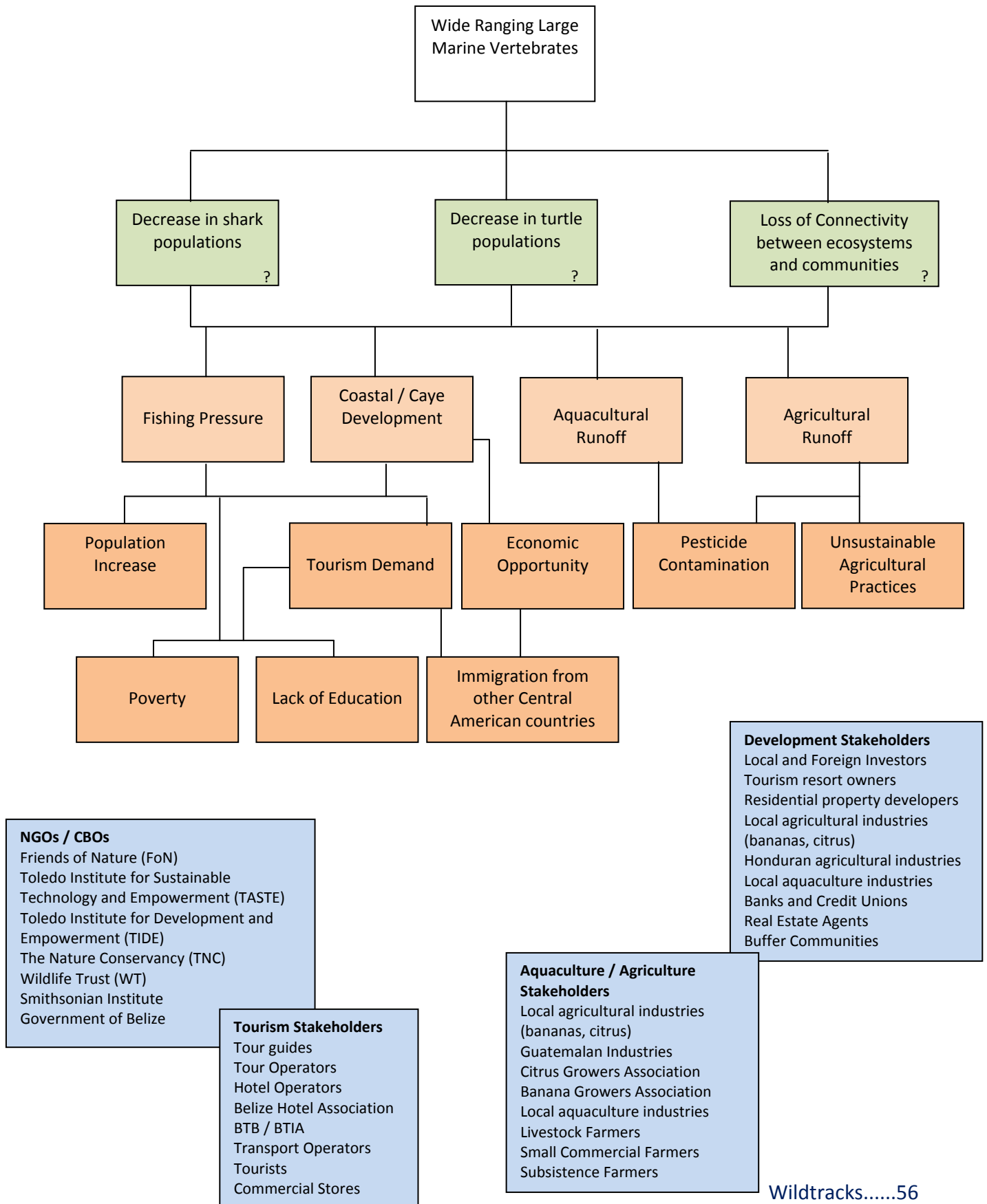


Conservation Target: Commercial and Recreational Species





Conservation Target: Wide Ranging Large Marine Vertebrates



Annex 4: Objectives and Strategic Actions - Southern Belize Reef Complex

Objective 1	By 2013, illegal fishing activities within the SBRC will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level.
Strategic action	Develop and implement public awareness program
Strategic action	Implement / enforce policies & regulations
Strategic action	Implement an effective, standardized monitoring and data management program for the SBRC area
Strategic action	Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
Strategic action	Create an alternative livelihood program for fisher folk within the SBRC
Objective 2	By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet Environmental Impact Assessment, Environmental Compliance Plan and best practices standards, with independent monitoring in place
Strategic action	Develop or adopt best practices guidelines and certification programmes relating to coastal developments, and engage relevant stakeholders for implementation
Strategic action	Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area
Strategic action	Implement / enforce policies & regulations
Strategic action	Implement an effective, standardized monitoring and data management program for the SBRC area
Strategic action	Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
Strategic action	Develop and implement public awareness program
Objective 3	By 2013, all marine protected areas within SBRC will be able to obtain 50% of their annual budget through a secured diversified funding base - user fees, government, endowment, concessions, and environmental tax
Strategic action	Develop and implement financial sustainability mechanisms
Strategic action	Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area
Strategic action	Develop and implement public awareness program

Objective 4	By 2013, the level of agricultural contamination impacting the SBRC will be reduced from 2008 levels, through collaboration with other organizations and agencies that influence agro-chemical use and application
Strategic action	Ensure support of initiatives towards reducing agrochemical contamination of runoff into SBRC
Strategic action	Implement an effective, standardized monitoring and data management program for the SBRC area
Strategic action	Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
Strategic action	Develop and implement public awareness program
Strategic action	Implement / enforce policies & regulations
Strategic action	Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area
Strategic action	Develop or adopt best practices guidelines and certification programs relating to coastal developments, and engage relevant stakeholders for implementation
Objective 5	By 2013, the management agencies of the SBRC will have the legal framework and institutional capacity to undertake effective management of marine resources
Strategic action	Review and enhance administrative structure of co-management institution
Strategic action	Engaging APAMO/NPAC in completing the development of the legal co-management framework and standard co-management agreement.
Strategic action	Development of mechanisms for integrating local participation and capacity building of local expertise
Strategic action	Implement / enforce policies & regulations
Strategic action	Develop and implement financial sustainability mechanisms
Strategic action	Implement an effective, standardized monitoring and data management program for the SBRC area
Strategic action	Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
Strategic action	
Objective 6	By 2015, at least 50% of coral reefs and mangroves resilient to climate change located within the SBRC will be effectively protected.
Strategic action	Develop and implement coral reef and mangrove restoration programs
Strategic action	Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area
Strategic action	Identify and protect nursery grounds (for all marine species) from extraction / damage
Strategic action	Implement / enforce policies & regulations
Strategic action	Implement an effective, standardized monitoring and data management program for the SBRC area
Strategic action	Develop and implement public awareness program
Strategic action	Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area

Objective 7	By 2019, 20% of the current area of degraded littoral forest & sandy beaches within the SBRC will be restored
Strategic action	Implement a restoration process for littoral forest and beach communities
Strategic action	Identify and protect nursery grounds (for all marine species) from extraction / damage
Strategic action	Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area
Strategic action	Develop or adopt best practices guidelines and certification programs relating to coastal developments, and engage relevant stakeholders for implementation
Strategic action	Implement / enforce policies & regulations
Strategic action	Implement an effective, standardized monitoring and data management program for the SBRC area
Strategic action	Develop and implement public awareness program
Objective 8	By 2019, populations of commercial / recreational species are increased by 20% from current stock assessments as a result of effective management
Strategic action	Conduct an assessment of the fish stock within the SBRC
Strategic action	Implement / enforce policies & regulations
Strategic action	Identify and protect nursery grounds (for all marine species) from extraction / damage
Strategic action	Implement an effective, standardized monitoring and data management program for the SBRC area
Strategic action	Create an alternative livelihood program for fisher folk within the SBRC
Strategic action	Develop and implement coral reef and mangrove restoration programs
Strategic action	Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
Strategic action	Develop and implement public awareness program
Objective 9	By 2019, populations of fish at Spawning Aggregation Sites will be stabilized & sustained within the SBRC through good resource-use practices
Strategic action	Implement / enforce policies & regulations
Strategic action	Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area
Strategic action	Identify and protect nursery grounds (for all marine species) from extraction / damage
Strategic action	Create an alternative livelihood program for fisher folk within the SBRC
Strategic action	Implement an effective, standardized monitoring and data management program for the SBRC area
Strategic action	Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
Strategic action	Develop and implement public awareness program

Objective 10	By 2019, the condition and extent of coral reef communities will be improved by 10%, through development and implementation of a coral reef restoration program and associated public awareness activities
Strategic action	Implement / enforce policies & regulations
Strategic action	Identify and protect nursery grounds (for all marine species) from extraction / damage
Strategic action	Develop and implement public awareness program
Strategic action	Develop and implement coral reef and mangrove restoration programs
Strategic action	Create an alternative livelihood program for fisher folk within the SBRC
Strategic action	Implement an effective, standardized monitoring and data management program for the SBRC area
Strategic action	Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
Objective 11	By 2014, all marine protected areas within the Southern Belize Reef Complex will have at least 20% of their area designated as no-take
Strategic action	Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area
Strategic action	Develop and implement public awareness program
Strategic action	Implement / enforce policies & regulations
Strategic action	Implement an effective, standardized monitoring and data management program for the SBRC area
Objective 12	By 2010, all petroleum-associated activities -transportation, exploration and extraction - within SBRC will comply with international and national environmental regulations and safety standards
Strategic action	Lobby for creation / adoption of navigation and oil exploration / extraction standards as needed, and enforce all such regulations
Strategic action	Develop or adopt best practices guidelines and certification programs relating to coastal developments, and engage relevant stakeholders for implementation
Strategic action	Implement / enforce policies & regulations
Strategic action	Lobby CZMAI, local and national Gov. Representatives and agencies for policy and zoning for the SBRC area
Strategic action	Develop and implement public awareness program
Strategic action	Create and adopt Contingency Plan for oil spills within the SBRC

Annex Five: Monitoring Framework for the Southern Belize Reef Complex

Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
Very High Priority							
% decrease in illegal fishing	<p>Targets Commercial / Recreational Species Spawning Aggregations</p> <p>Threats Fishing pressure Poor fishing practices</p>	<ul style="list-style-type: none"> ▪ By 2013 illegal fishing activities within the Southern Belize Reef Complex will be reduced to a level comparable with the Gladden Spit Marine Reserve’s 2008 level. ▪ By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management ▪ By 2019, populations of fish at Spawning Aggregation Sites will be stabilized & sustained within the SBRC through good resource-use practices 	Proportion of prosecutions to capture: Capture logs vs. Prosecution NB: Suggest Name and Shame digital log per infraction as a mechanism to reduce infractions	<p>Priority Very High</p> <p>Status Ongoing</p>	Quarterly / Annual summary	All MPAs	PA managers Fisheries Dept
Biomass of commercial fish	Commercial / Recreational Species	<ul style="list-style-type: none"> ▪ By 2013 illegal fishing activities within the Southern Belize Reef Complex will be reduced to a level comparable with the Gladden Spit Marine Reserve’s 2008 level. ▪ By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management 	LAMP protocol / AGGRA /MBRS	<p>Priority Very High</p> <p>Status Ongoing</p>	Four times a year (February, May, Sept., Dec.)	Inside and outside each protected area	Ranger, biologist , community researchers. SEA, Fisheries Dept

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
Very High Priority (continued)							
Water quality	<p>Targets Mangroves Coastal Lagoon and Estuaries Seagrass Coral Reefs</p> <p>Threats Coastal / caye development Aquaculture Agricultural runoff Climate change Oil spills</p>	<ul style="list-style-type: none"> ▪ By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place ▪ By 2015 at least 50% of coral reefs and mangroves resilient to climate change located within the SBRC will be effectively protected. ▪ By 2019, the condition and extent of coral reef communities will be improved by 10% , through development and implementation of a coral reef restoration programme and associated public awareness activities 	<p>Water parameters Including: Total dissolved oxygen Nutrients (PO4) – total, inorganic, organic Nitrogen (NO4) - total, inorganic, organic Phytoplankton – remote sensing – chlorophyll spectrum in the water Mangroves: Turbidity, DO2, nitrates, phosphates (3), chlorophyll, E. coli, pesticides Already partly underway: SEA partnerships (Sean Ledwin, etc.) , need to define parameters and methodologies Coral: Water sampling Dissolved oxygen, Salinity, Turbidity, pH, Chlorophyll Coral: Water temperature Data loggers</p>	<p>Priority Very High Status Some ongoing Some planned</p>	<p>General: First flux rain fall, Dry season Mangrove s: Twice yearly Coral: Weekly, and in times of flooding (extremes) Temperat ure: Daily</p>	<p>Seagrass: Current monitoring sites – 30 sites within PL Monitoring in other highlighted lagoon / estuary areas Mangroves: Pelican Cayes, Gladden Spit (re. Rendezvous), Hopkins / Sittee River coast, Blueground Range, Saps, South of Mango Creek Coral / Temperature: 2 in each marine reserve</p>	<p>SEA Fisheries Dept DOE CZMAI ?</p>
Conch density	<p>Targets Commercial / Recreational Species</p> <p>Threats Poor fishing practices Fishing pressure</p>	<ul style="list-style-type: none"> ▪ By 2013 illegal fishing activities within the Southern Belize Reef Complex will be reduced to a level comparable with the Gladden Spit Marine Reserve’s 2008 level. ▪ By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management 	<p>Modified LAMP protocol</p>	<p>Priority Very High Status Ongoing</p>	<p>Four times a year - February, May, Sept., December</p>	<p>Inside and outside each protected area</p>	<p>Ranger, biologist , community researchers. SEA, Fisheries Dept</p>

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
Very High Priority (continued)							
Extent of coastal vegetation on Placencia Lagoon	<p>Targets Coastal Lagoons and Estuaries</p> <p>Threats Coastal / cay development</p>	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place 	<p>Needs baseline</p> <p>Presence absence mapped from aerial photos / satellite imagery</p>	<p>Priority Very High</p> <p>Status Planned</p>	Every two years	Placencia Lagoon (and other coastal lagoons)	SEA
Average Catch per man-hour (Catch per unit effort)	Commercial / Recreational Species	<ul style="list-style-type: none"> By 2013 illegal fishing activities within the Southern Belize Reef Complex will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level. By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management 	Monitoring of landings, direct interviews with fishermen particularly those that are focused on a single fishery, direct counts of fish lobster, conch catch. Fisheries CPUE of Mutton and Yellow Tail Snapper for SPAG site monitoring	<p>Priority Very High</p> <p>Status Planned</p>	Monthly (TBD for Mutton and YT Snapper)	Everywhere inside and outside marine reserves. For SPAG sites, Gladden Spit and Sapodilla Cayes	SEA; Fisheries Dept, UB/ERI
High Priority							
% live coral cover	<p>Targets Coral Reef Communities</p> <p>Threats Coastal / caye development Agricultural runoff Aquaculture Oil spills Poor fishing practices Fishing pressure</p>	<ul style="list-style-type: none"> By 2015 at least 50% of coral reefs and mangroves resilient to climate change located within the SBRC will be effectively protected. By 2019, the condition and extent of coral reef communities will be improved by 10% , through development and implementation of a coral reef restoration programme and associated public awareness activities 	MBRS Methodology Recent and old	<p>Priority High</p> <p>Status Ongoing</p>	Annual	SCMR 3 NTZ (no take zone), 3 GUZ (general use zone), 3 out: GSMR 2 ntz, 3, guz, 3 outside; LBC 2 in 2 outside; SWCMR 3 ntz, 3 guz, 3 outside	SEA SWCMR Fisheries Dept

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
High Priority (continued)							
% seagrass cover	<p>Targets Coastal Lagoon and Estuaries Seagrass</p> <p>Threats</p>	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place By 2013, the level of agricultural contamination impacting the SBRC will be reduced from the current 2008 levels to x (TBD by other organizations - WWF) through collaboration with other organizations that influence agro-chemical use and application 	Seagrass monitoring protocol: % cover of sea grass in shallow marine areas, coastal lagoons and estuaries Baseline: Accurate mapping of seagrass extent through satellite imagery and groundtruthing	<p>Priority High</p> <p>Status Ongoing</p>	Biannual	Placencia Lagoon (and other coastal lagoons) Marine Seagrass	SEA, SeagrassNet
Biomass of adult fish	<p>Targets Coral Reef Communities Commercial / Recreational Species Spawning Aggregations</p> <p>Threats Poor fishing practices Fishing pressure</p>	<ul style="list-style-type: none"> By 2013 illegal fishing activities within the Southern Belize Reef Complex will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level. By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management By 2019, populations of fish at Spawning Aggregation Sites will be stabilized & sustained within the SBRC through good resource-use practices 	LAMP protocol / AGGRA / Modified MBRS protocol	<p>Priority High</p> <p>Status Ongoing</p>	Annual	SCMR 3 NTZ (no take zone), 3 GUZ (general use zone), 3 out: GSMR 2 ntz, 3, guz, 3 outside; LBC 2 in 2 outside; SWCMR 3 ntz, 3 guz, 3 outside	SEA Fisheries Dept

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
High Priority (continued)							
% recent coral mortality	<p>Targets Coral Reef Communities</p> <p>Threats Coastal / caye development Agricultural runoff Aquaculture Oil spills Poor fishing practices Fishing pressure</p>	<ul style="list-style-type: none"> ▪ By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place ▪ By 2013, the level of agricultural contamination impacting the SBRC will be reduced from the current 2008 levels to x (TBD by other organizations - WWF) through collaboration with other organizations that influence agro-chemical use and application ▪ By 2015 at least 50% of coral reefs and mangroves resilient to climate change located within the SBRC will be effectively protected. ▪ By 2019, the condition and extent of coral reef communities will be improved by 10% , through development and implementation of a coral reef restoration programme and associated public awareness activities 	MBRS methodology / AGGRA / Bar drop	<p>Priority High</p> <p>Status Ongoing</p>	Annual	SCMR 3 NTZ (no take zone), 3 GUZ (general use zone), 3 out: GSMR 2 ntz, 3, guz, 3 outside; LBC 2 in 2 outside; SWCMR 3 ntz, 3 guz, 3 outside	SEA Fisheries Dept.

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
High Priority (continued)							
Diadema density	Targets Coral Reef Communities Threats	<ul style="list-style-type: none"> By 2019, the condition and extent of coral reef communities will be improved by 10% , through development and implementation of a coral reef restoration programme and associated public awareness activities 	Modified MBRS protocol	Priority High Status Ongoing	Annual	SCMR 3 NTZ (no take zone), 3 GUZ (general use zone), 3 out: GSMR 2 ntz, 3, guz, 3 outside; LBC 2 in 2 outside; SWCMR 3 ntz, 3 guz, 3 outside	SEA
% increase in fish abundance from designated baseline	Targets Spawning Aggregation Sites Threats Poor fishing practices Fishing pressure Visitor impacts	<ul style="list-style-type: none"> By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management By 2019, populations of fish at Spawning Aggregation Sites will be stabilized & sustained within the SBRC through good resource-use practices 	MBRS Spawning Aggregation Site Monitoring Protocols - Focused on Cubera*, Dog , Mutton* and Yellow-tail* Snapper, Nassau Grouper, Jack (*revision of protocol for these species)	Priority High Status Ongoing	Annually, May to October. Six days a month based on lunar phase and species	Gladden Spit and Sapodilla Cayes	SEA
Number of petroleum associated activities that comply with international and national environmental standards	Targets Littoral Forest Coastal Lagoons and Estuaries Seagrass Coral Reef Communities Threats Oil Spill Oil Exploration and Drilling	<ul style="list-style-type: none"> By 2010, all petroleum-associated activities - transportation, exploration and extraction - within SBRC will comply with international and national environmental regulations and safety standards 	Annual assessment of petroleum associated activities and whether they comply with international and national environmental regulations	Priority High Status Planned	Annual assessment	SBRC	SEA; DoE

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
Number of large, adult fish species at SPAG sites	<p>Targets Spawning Aggregation Sites</p> <p>Threats Poor fishing practices Fishing pressure Visitor impacts</p>	<ul style="list-style-type: none"> By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management By 2019, populations of fish at Spawning Aggregation Sites will be stabilized & sustained within the SBRC through good resource-use practices 	MBRS Spawning Aggregation Site Monitoring Protocols - Focused on Cubera*, Dog , Mutton* and Yellow-tail* Snapper, Nassau Grouper, Jack (*revision of protocol for these species)	<p>Priority High</p> <p>Status Ongoing</p>	Monthly: 6 days based on lunar phase and species	Gladden Spit and Sapodilla Cayes	SEA; Fisheries Dept, UB/ERI
Number of petroleum associated activities that comply with international and national environmental standards	<p>Targets Littoral Forest Coastal Lagoons and Estuaries Seagrass Coral Reef Communities</p> <p>Threats Oil Spill Oil Exploration and Drilling</p>	<ul style="list-style-type: none"> By 2010, all petroleum-associated activities - transportation, exploration and extraction - within SBRC will comply with international and national environmental regulations and safety standards 	Annual assessment of petroleum associated activities and whether they comply with international and national environmental regulations	<p>Priority High</p> <p>Status Planned</p>	Annual assessment	SBRC	SEA; DoE
Parrotfish Density	<p>Targets Coral Reef Communities</p> <p>Threats Poor fishing practices</p>	<ul style="list-style-type: none"> By 2013 illegal fishing activities within the Southern Belize Reef Complex will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level. By 2019, the condition and extent of coral reef communities will be improved by 10% , through development and implementation of a coral reef restoration programme and associated public awareness activities 	Modified MBRS protocol / LAMP/ AGGRA	<p>Priority High</p> <p>Status Ongoing</p>	Annual	SCMR 3 NTZ etc.	SEA

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
High Priority (continued)							
% agricultural industry that has changed behaviour since public awareness	Targets Coastal Lagoons and Estuaries Seagrass Threats Agricultural runoff	▪ By 2013, the level of agricultural contamination impacting the SBRC will be reduced from the current 2008 levels to x (TBD by other organizations - WWF) through collaboration with other organizations that influence agro-chemical use and application	Pre and post survey, working with terrestrial partners Assumption: Assume they are telling the truth	Priority High Status Planned	Every Two Years	Southern Coastal Plain farming sector	Terrestrial focused partners
% area in natural condition	Targets Littoral Forest / Sandy Beaches Threats Coastal / caye development	▪ By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place	Aerial photography – interpretation. Field reports / inspections (site level) from ongoing MPA patrols. Done at same time as for mangrove monitoring	Priority High Status Planned	Annually	SBRC...all coastal areas and cayes	SEA
% sampling sites where agricultural contamination levels are lower than baseline (TBD)	Targets Coastal Lagoons and Estuaries Mangroves Sea grass Coral Reef Communities Commercial and Recreational Species Spawning Aggregations Wide Ranging Large Marine Vertebrates Threats Agricultural runoff	▪ By 2013, the level of agricultural contamination impacting the SBRC will be reduced from the current 2008 levels to x (TBD by other organizations - WWF) through collaboration with other organizations that influence agro-chemical use and application	Tissue sampling of mangrove oysters / sediment feeders (crabs species - Calinectis) for contaminants (Wriscs?). Sediment sampling. Assumption is that there is a baseline available – WWF – that can be shared WWF; MBRS	Priority High Status Planned	Once every two years	Sampling sites along two transects from shore to east Monkey River - Sapodilla Cayes Sittie River – east cayes	SEA, UB, WWF

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
High Priority (continued)							
% vertical evasion in relation to visitor activities	Targets Spawning Aggregation Sites Threats Visitor	<ul style="list-style-type: none"> By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management By 2019, populations of fish at Spawning Aggregation Sites will be stabilized & sustained within the SBRC through good resource-use practices 	Video monitoring in relation to boat/diver activities – methodologies to be developed	Priority High Status Planned	Annual during March - June	Gladden Spit	SEA
Abundance of juvenile fish	Targets Coastal Lagoons and Estuaries Commercial / Recreational Species Mangroves Spawning Aggregations Threats Coastal / caye development Fishing pressure	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management 	3 seine net trawls per site, identification to general type (not species)..photographs for more accurate species information. MBRS (need to re-visit to cover relevant species: snappers, grouper, grunts, etc. Recruit data sheet. AGRRA – ditto	Priority High Status Planned	Twice a year – once during wet season, once during dry season, time with spawning cycle	Coastal: Seine Bight area? Mango Creek area? West of airstrip, Placencia Lagoon (and mouth), Drunken Caye area, immediate top of PL, Monkey River area. Specific mangrove nursery sites Cayes: False Caye, Frank’s Caye (Saps), Twin Cayes + Blueground Range, Pelican Cayes, Tobacco Range, Specific mangrove nursery sites	SEA

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
High Priority (continued)							
Abundance of juvenile fish (nursery functionality)	<p>Targets Commercial / recreational species Spawning Aggregations</p> <p>Threats Coastal / caye development Fishing pressure Poor fishing practices</p>	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management 	<p>3 seine net trawls per site, identification to general type (not species)..photographs for more accurate species information. MBRS (need to re-visit to cover relevant species: snappers, grouper, grunts, etc. Recruit data sheet.</p> <p>AGRRA – ditto No current status / baseline</p>	<p>Priority High Status Planned</p>	<p>Twice a year – once during wet season, once during dry season, time with spawning cycle</p>	<p>Coastal: Seine Bight area? Mango Creek area? West of airstrip, Placencia Lagoon (and mouth), Drunken Caye area, immediate top of PL, Monkey River Specific mangrove nursery sites Cayes: False Caye, Frank’s Caye (Saps), Twin Cayes + Blueground Range, Pelican Cayes, Tobacco Range</p>	SEA
Abundance of turtle nests	<p>Targets Littoral Forest / Sandy Beaches Wide Ranging Large Marine Vertebrates</p> <p>Threats Coastal / caye development</p>	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place 	<p>Nest & crawl counts,</p> <p>Needs a big public awareness programme in tandem with monitoring, to bring in extensive public reporting, guidelines for best practices, etc. Involve interested citizens</p>	<p>Priority High Status Planned</p>	<p>Annual, May-October</p>	<p>All known nesting beaches</p>	<p>Fisheries SEA WCS Wildlife Trust GPWS Management Team Tour guides</p>
Total area of littoral forest / sandy beaches	<p>Targets Littoral Forest / Sandy Beaches</p> <p>Threats Coastal / Caye development</p>	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place 	<p>Aerial photography – interpretation.</p> <p>Field reports / inspections (site level) from ongoing MPA patrols. Done at same time as for mangrove monitoring</p>	<p>Priority High Status Planned</p>	<p>Annual</p>	<p>SBRC – entire area All coastal land and cayes Overflight with ground truthing. Quarterly meeting/ Fisheries reports. Concerned citizens</p>	<p>MPA staff SEA Fisheries FD DOE Geology / Petroleum</p>

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
High Priority (continued)							
Total area of mangrove ecosystems	Targets Mangroves Threats Coastal / Caye development	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place 	Aerial photography – interpretation. Spectral analysis of satellite mapping – if done correctly Field reports / inspections (site level) from ongoing MPA patrols	Priority High Status Planned	Annually Quarterly meeting / reports from patrols.	SBRC – entire area All coastal land and cayes	SEA
Medium Priority							
Abundance per shark species (including whale sharks)	Targets Wide Ranging Large Marine Vertebrates Threats Poor fishing practices Fishing pressure		Long line, drum line and set line surveys. For whale sharks - Photo ID, Ecocean. Average number of whale shark sightings at Gladden Spit per unit effort on key days	Priority Medium Status Ongoing	Every five years (next survey in 2010)	Throughout SBRC	WCS
Number of licensed commercial fishers commonly found in and out MPA's	Targets Commercial / Recreational Species Threats Fishing pressure Poor fishing practices	<ul style="list-style-type: none"> By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management By 2019, populations of fish at Spawning Aggregation Sites will be stabilized & sustained within the SBRC through good resource-use practices 	From rangers reports / logs	Priority Medium Status Ongoing	Monthly	In every marine reserve in SBRC;	Rangers; Fisheries Dept

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
Medium Priority (continued)							
% coastal / caye developments that meet best practices standards	<p>Targets Littoral Forest / Sandy Beach Mangrove</p> <p>Threats Coastal / caye development</p>	<ul style="list-style-type: none"> ▪ By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place ▪ By 2019 restore 20% of the current degraded areas in the littoral forest & sandy beaches within the SBRC ▪ By 2019, the condition and extent of coral reef communities will be improved by 10% , through development and implementation of a coral reef restoration programme and associated public awareness activities 	<p>Aquaculture Industry: Data from independent certifier (SEA?) under WWF, Wegmans, Whole foods. See WWF indicators...can we use these?</p> <p>Residential / Hotel best practices standards: Which standards? eg. World Heritage Alliance or sustainable tourism, WCS Best Practices guidelines, Rainforest Alliance, BEST, URI (as developed for Quintana Roo)</p> <p>Ref. clearance of vegetation, use of native species in landscaping, etc.</p> <p>% of lagoon-side properties with adequate solid waste and water treatment Door to door survey of lagoon-side properties (questionnaire)...could be incorporated into socio-economic survey.</p> <p>Adequate = septic tank / soak away meet standards Grey water disposal system...or better. WCS? URI / Quintana Roo. Coral / ICRAN Assumption that the system is working well</p>	<p>Priority Medium Status Ongoing</p>	Once every three years	Office-based plus site visits with a structured assessment tool. Coastal and caye	SEA

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
High Priority (continued)							
Average Catch per Year per boat - Recreational (Bonefish, permit)	<p>Targets Commercial / Recreational Species</p> <p>Threats Poor fishing practices Fishing pressure</p>	<ul style="list-style-type: none"> By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management 	Direct reports collected from fishing guides.	<p>Priority Medium</p> <p>Status Planned</p>	Monthly	In every marine reserve in SBRC	Biologists; SEA
% SBRC MPAs considered to have >75% effective management	<p>Targets Mangrove Coastal Lagoons and Estuaries Coral Reef Communities Commercial / Recreational Species Spawning Aggregations Wide Ranging Large Marine Vertebrates</p> <p>Threats Poor fishing practices Fishing pressure</p>	<ul style="list-style-type: none"> By 2013, all marine protected areas within SBRC will be able to obtain 50% of their annual budget through a secured diversified funding base (user fees, government, endowment, concessions, and environmental tax) By 2013, the management agencies of the SBRC will have the legal framework and institutional capacity to undertake effective management of marine resources 	<p>NPAPSP assessment of management effectiveness</p> <p>MBRS protocol</p>	<p>Priority Medium</p> <p>Status Planned</p>	Once every two years	All MPAs of the SBRC	SEA, Fisheries Dept
% survey sites that show an increased Integrated Healthy Reef Index	<p>Targets Coral Reef Communities</p> <p>Threats Coastal / caye development Agricultural runoff Aquaculture Oil spills Poor fishing practices Fishing pressure</p>	<ul style="list-style-type: none"> By 2015 at least 50% of coral reefs and mangroves resilient to climate change located within the SBRC will be effectively protected. 	Evaluation of the IRHI Index (protocol includes ten indicators)	<p>Priority Medium</p> <p>Status Planned</p>	Every two years	SCMR 3 NTZ 3 GUZ (general use zone), 3 out: GSMR 2 ntz, 3, guz, 3 outside; LBC 2 in 2 outside; SWCMR 3 ntz, 3 guz, 3 outside	SEA Healthy Reefs

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
Medium Priority (continued)							
Abundance and diversity of resident and migratory birds	<p>Targets Littoral Forest / Sandy Beaches</p> <p>Threats Coastal / caye development</p>	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place 	Point counts and transects Nest counts eg. for osprey	<p>Priority Medium</p> <p>Status Planned</p>	Twice yearly: fall & spring migration	Saps: Hunting Caye, Little Water Caye, Pelican Cayes, Bird Caye, Blueground Range, Hopkins, Sittee Point, Placencia	SEA, community participants, birders, BAS, PFB, FD, UB, Lee Jones to guide process
Number of coral recruits	<p>Targets Coral Reef Communities Commercial / Recreational Species</p> <p>Threats Poor fishing practices Climate change Fishing pressure</p>	<ul style="list-style-type: none"> By 2015 at least 50% of coral reefs and mangroves resilient to climate change located within the SBRC will be effectively protected. By 2019, the condition and extent of coral reef communities will be improved by 10% , through development and implementation of a coral reef restoration programme and associated public awareness activities 	AGGRA / modified MBRS methodology	<p>Priority Medium</p> <p>Status Planned</p>	Annual	SCMR 3 NTZ (no take zone), 3 GUZ (general use zone), 3 out: GSMR 2 ntz, 3, guz, 3 outside; LBC 2 in 2 outside; SWCMR 3 ntz, 3 guz, 3 outside	SEA biologists SWCMR – Fisheries Dept
% degraded Littoral Forest /Sandy Beach restored	<p>Targets Littoral Forest / Sandy Beaches Wide Ranging Marine Vertebrates (Marine Turtles)</p> <p>Threats Coastal / caye development</p>	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place 	Site visits, mapping	<p>Priority Medium</p> <p>Status Not Planned</p>	Annual	At all site-restoration project sites	SEA FD Fisheries Developers

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
Low Priority							
% whale sharks showing site fidelity at Gladden Spit across the years	Targets Wide Ranging Large Marine Vertebrates Threats Visitor Impacts		Photo ID; Acoustic Tagging	Priority Low Status Ongoing	Annual during March - June (to October)	Gladden Spit	SEA, WCS, PTGA
% increase in abundance of goliath grouper in coastal lagoons from baseline	Targets Coastal Lagoons and Estuaries Threats Poor fishing practices Fishing pressure	<ul style="list-style-type: none"> ▪ By 2013 illegal fishing activities within the Southern Belize Reef Complex will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level. ▪ By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place ▪ By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management 	Baseline: 2006 / 2007 Placencia Lagoon / Sapodilla Lagoon Using R. Graham's protocols and sample sites	Priority Low Status Ongoing	Every five years	Placencia Lagoon Sapodilla Lagoon	WCS, SEA
Number of shark species (diversity)	Targets Wide Ranging Large Marine Vertebrates Commercial / Recreational Species Threats Poor fishing practices Fishing pressure	<ul style="list-style-type: none"> ▪ By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management 	Long line, drum line and set line surveys	Priority Low Status Ongoing	Every five years (next survey in 2010)	Throughout SBRC	WCS

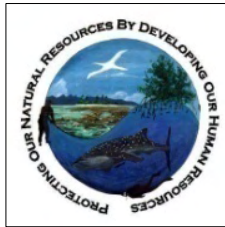
Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
Low Priority (continued)							
Diversity of species at SPAG sites	Targets Spawning Aggregation Sites Commercial / Recreation Species Threats Poor fishing practices Fishing pressure	<ul style="list-style-type: none"> ▪ By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management ▪ By 2019, populations of fish at Spawning Aggregation Sites will be stabilized & sustained within the SBRC through good resource-use practices 	MBRS Spawning Aggregation Site Monitoring Protocols - Focused on Cubera*, Dog, Mutton* and Yellow-tail* Snapper, Nassau Grouper, Jack (*revision of protocol for these species)	Priority Low Status Ongoing	Annual May to October	All targeted locations	SEA Fisheries Dept
% survey sites showing coral reef bleaching	Targets Coral Reef Communities Threats Climate Change	<ul style="list-style-type: none"> ▪ By 2015 at least 50% of coral reefs and mangroves resilient to climate change located within the SBRC will be effectively protected. 	Assumption: Baseline data is available from WWF that can be shared	Priority Low Status Planned	2011 and 2015	CMR 3 NTZ (no take zone), 3 GUZ (general use zone), 3 out: GSMR 2 ntz, 3, guz, 3 outside; LBC 2 in 2 outside; SWCMR 3 ntz, 3 guz, 3 outside	SEA, WWF
% resilient reefs identified in 2006 WWF/TNC rapid reef assessment that are included in no take zones	Coral Reef Communities	<ul style="list-style-type: none"> ▪ By 2015 at least 50% of coral reefs and mangroves resilient to climate change located within the SBRC will be effectively protected. 	GIS analysis, WWF mapping info	Priority Low Status Planned	2011 and 2015	SCMR 3 NTZ (no take zone), 3 GUZ (general use zone), 3 out: GSMR 2 ntz, 3, guz, 3 outside; LBC 2 in 2 outside; SWCMR 3 ntz, 3 guz, 3 outside	SEA, TNC, WWF

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
Low Priority (continued)							
% epiphytic cover of seagrass	<p>Targets Coastal Lagoon and Estuaries Seagrass</p> <p>Threats Agricultural runoff</p>	<ul style="list-style-type: none"> ▪ By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place ▪ By 2013, the level of agricultural contamination impacting the SBRC will be reduced from the current 2008 levels to x (TBD by other organizations - WWF) through collaboration with other organizations that influence agro-chemical use and application 	<p>% algal and other epiphyte cover of seagrass</p> <p>See MBRS protocol</p> <p>Underwater camera shots of half meter square</p>	<p>Priority Low</p> <p>Status Planned</p>	4 times a year	Placencia Lagoon Two sites – Bugle Caye and off Placencia coastline. Two sites in areas of concern – Pelican Cayes, river mouth (Monkey River / Sittee River)	SEA
Average travel distance recorded per wide ranging sharks and turtles	<p>Targets Wide Ranging Large Marine Vertebrates</p> <p>Threats Poor fishing practices</p>		Data from WCS Acoustic tagging programme (Rachel Graham)	<p>Priority Low</p> <p>Status Planned ongoing</p>	Ongoing for whale sharks	WCS Acoustic tagging programme sites	WCS
Number of feeding areas/source for whale sharks	<p>Targets Wide Ranging Large Marine Vertebrates</p> <p>Threats</p>		Maintain updated records of known feeding locations for whale sharks. Observation, field reports (biologists, tourism sector, mpa staff). Need protocol for reporting	<p>Priority Low</p> <p>Status Planned</p>		SBRC	SEA WCS Other stakeholders

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
Number of manatee in Placencia Lagoon	<p>Targets Coastal Lagoons and Estuaries</p> <p>Threats Coastal / Caye Development Visitor Impacts</p>	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place 	Aerial and boat surveys. Survey by overflight (Lighthawk?), though turbid conditions make it hard to get an accurate count	<p>Priority Low</p> <p>Status Planned</p>	Annual	Coastal areas including Placencia Lagoon and other coastal lagoons	SEA
Number of warnings per patrolling unit effort (per hour of patrol) in newly defined no-take zones	<p>Targets Commercial / Recreational Species</p> <p>Threats Poor fishing practices Fishing pressure</p>	<ul style="list-style-type: none"> By 2013 illegal fishing activities within the Southern Belize Reef Complex will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level. By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management 	Ranger reports; In new no-take zones	<p>Priority Low</p> <p>Status Planned</p>	Monthly	Reports from throughout the SBRC	Rangers; Fisheries Dept.
Ratio of live:dead mangroves	<p>Targets Mangrove Coastal Lagoons and Estuaries</p> <p>Threats Coastal / caye development</p>	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, + independent monitoring in place 	Gives an indication of the health of the mangrove – site specific surveys	<p>Priority Low</p> <p>Status Planned</p>	Baseline needed	Targeted at areas of concern	SEA

Monitoring Framework for the Southern Belize Reef Complex (continued)							
Indicators	Conservation Targets / Threats	Objectives	Methods	Priority / Status	Frequency and Timing	Location	Who monitors
Low Priority (continued)							
Seagrass density (site level)	<p>Targets Coastal Lagoon and Estuaries Seagrass</p> <p>Threats Coastal / caye development Agricultural runoff</p>	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place By 2013, the level of agricultural contamination impacting the SBRC will be reduced from the current 2008 levels to x (TBD by other organizations - WWF) through collaboration with other organizations that influence agro-chemical use and application 	<p>% cover sea grass + biomass (0.5m square quadrat) for coastal lagoons and estuaries. Ongoing at 2 locations but needs to be expanded</p> <p>SeagrassNet protocol for % cover and biomass</p>	<p>Priority Low Status Planned</p>	<p>4 times a year</p> <p>Two sites – Bugle Caye and off Placencia coastline. Two sites in areas of concern – Pelican Cayes, river mouth (Monkey River / Sittee River)</p>	<p>Placencia Lagoon</p> <p>Two sites – Bugle Caye and off Placencia coastline. Two sites in areas of concern – Pelican Cayes, river mouth (Monkey River / Sittee River)</p>	SEA
Level of fragmentation within littoral forest system	<p>Targets Littoral Forest / Sandy Beaches</p> <p>Threats Coastal / caye development</p>	<ul style="list-style-type: none"> By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place 	<p>Aerial photography – interpretation.</p> <p>Field reports / inspections (site level) from ongoing MPA patrols.</p> <p>Done at same time as for mangrove monitoring</p>	<p>Priority Low Status Not Planned</p>	<p>Annual (costly, as includes cayes as well)</p> <p>Quarterly meeting / reports.</p>	<p>SBRC – entire area...all coastal land and cayes</p>	SEA

Annex Six: Core Planning Team



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The Core Planning Team is charged with planning the stakeholder workshops, and reviewing and verifying the information emanating from these workshops. The members are as follows:

1. Lindsay Garbutt (FoN)
2. Jocelyn Finch (FON)
3. Christina Garcia (FoN/TASTE)
4. Jack Nightingale (TASTE)
5. Lyndon Rodney (Fisheries Department)
6. Saul Cruz (Forest Department)
7. Juan Carlos Villagrán (TNC)
8. Julie Stockbridge (TNC)
9. Paul Walker (CAP Consultant)
10. Zoe Walker (CAP Consultant)

Annex Seven: SBRC Charter for the Conservation Action Planning Process

Southern Belize Reef Complex

Charter

Conservation Action Planning (CAP)

Southern Belize Reef Complex

1. Introduction:

The Atlantic coast of Mesoamerica has the second longest barrier reef in the World, stretching from the Yucatan to the south of Belize. The Mesoamerican Barrier Reef, one of the most diverse ecosystems on earth, is considered outstanding on a global scale, and recommended as a priority for conservation (Olson & Dinerstein, 1998; Roberts, 2001, Kramer and Kramer, 2002). With its low population and relatively low rate of coastal development, Belize is recognized for having some of the least impacted reef areas in the region, and the highest diversity of fish species (ReefBase, 2006).

The Southern Belize Reef Complex (SBRC) stretches southwards from Riversdale to the Port Honduras Marine Reserve, and eastwards from the coastline of Belize to the outer reef. This broad lagoon, filled with a variety of reef structures – faroes, pinnacles and patch reefs – characterizes this complex, with an assemblage of ecosystems of remarkable biodiversity and beauty, as well as of great scientific value and importance for many species of conservation concern, among them the critically endangered hawksbill turtle (*Eretmochelys imbricata*) and goliath grouper (*Epinephelus itajara*), and the endangered green and loggerhead turtles (*Chelonia mydas* and *Caretta caretta*) (IUCN. 2008).

The SBRC encompasses four protected areas (Laughing Bird Caye National Park, Sapodilla Cayes Marine Reserve, Gladden Spit and Silk Cayes Marine Reserve, and South Water Caye Marine Reserve), as well as at least four critical spawning aggregation sites (three sites on the Sapodilla Caye Marine Reserve, and a fourth, Gladden Spit, the largest aggregation known in the Mesamerican Reef ecoregion). Three of these protected areas – Laughing Bird Caye National park, South Water Caye and Sapodilla Cayes Marine Reserves - are part of a serial nomination of seven sites that have been recognized as components of the Belize Barrier Reef System - World Heritage Site, as representative of the Belize Barrier Reef Reserve System, under criteria (iii), based on the classic examples of fringing, barrier and atoll reef types.

Also included within the project area is the Placencia Lagoon, partially separated from the coastal waters by a long, sand spit peninsula that has attracted significant development impacts.

2. Background:

Friends of Nature

Friends of Nature (FoN) is a non-government organization which was registered under the NGO Act with the Government of Belize in 1996. Formerly known as the Friends of Laughing Bird Caye (FOLBC), FoN was formed by a small coalition of dive guides, fishermen, tour guides and business people in response to the threat of tourism development in the area. Since its creation, FoN has taken a practical, hands-on approach to addressing marine conservation and coastal management of the southern coastal zone and the Southern Reef Complex of Belize.

FoN has co-management responsibility with the Forest Department and the Fisheries Department, respectively, for day-to-day management of Laughing Bird Caye National Park (LBCNP) and Gladden Spit & Silk Cayes Marine Reserve (GSSCMR). Under the co-management agreements with the GOB, FoN assumes control of zoning enforcement, the behaviour of users and is authorized to police within the zones.

FoN's current Board of Directors had 12 members representing the six coastal communities that have traditionally used the area and: Placencia, Monkey River, Independence, Seine Bight, Sittee River and Hopkins. There is also an appointed advisory committee formed from representatives of the villages in the area to assist in formulating policy on management. The organization currently has a staff of 16 including administrative and outreach personnel, biologist and rangers.

Over the past seventeen years FoN has been working with community members to improve management of their marine resources. The organization takes pride in its continued success in both management and community involvement, and hopes to continue to engage users in successful management of Belize's important marine protected areas through important programs such as science and monitoring, enforcement and environmental education and outreach.

Toledo Association for Sustainable Tourism and Empowerment

The Toledo Association for Sustainable Tourism and Empowerment (TASTE), established in April 2000, is a registered non-governmental organization formed by the members of BTIA-Toledo for the specific purpose of co-managing the Sapodilla Caye Marine Reserve (SCMR), and with the mission of assisting in the sustainable and appropriate development of the Toledo District and its citizens and to preserve the health of its marine environment.

TASTE consists of a board of directors/founding members, a management team for the SCMR and an advisory committee, and focuses on educators, indigenous people, low-income farmers, fishermen, marginalized women and youth.

TASTE and the Fisheries Department signed a collaborative co-management agreement for the SCMR in 2001, with the Fisheries Department taking on the role of day-to-day management of the marine reserve. Since the signing of the co-management agreement, TASTE has provided financial, technical and other support to ensure improved management of the valuable resources contained within the SCMR, and in 2003, the co-management agreement was revised to give TASTE more responsibility, allowing it to play a more active role in engaging local community members as well as improving infrastructure and assisting with science and monitoring at the reserve.

Southern Environmental Association

Friends of Nature and the Toledo Association for Sustainable Tourism and Empowerment are currently collaborating to form the Southern Environmental Association (SEA), which will be responsible for the management of the two parks co-managed by FoN (Gladden Spit Silk Cayes Marine Reserve and Laughing Bird Caye National Park); and the protected area co-managed by TASTE, (Sapodilla Cayes Marine Reserve). This new organization, SEA, is currently going through a strategic planning process with the goal of taking full management authority for the three parks in September of 2008, with better integration of system-level monitoring, enforcement and community involvement. SEA. Both organizations view this as a positive step towards improving the effectiveness of marine protected areas management across southern Belize.

3. Goal:

Effective management of the SBRC is strengthened through a participatory Conservation Action Planning Process, drawing on the collective knowledge of stakeholders to develop strategy recommendations that will guide management for the next ten years.

4. Objectives:

- To ensure the proper management of the Southern Belize Reef Complex (SBRC) so that they function as an integrated matrix of ecosystem types at a seascape level
- To ensure that the SBRC functions as a replicable model of how protected areas working within an ecologically interconnected and interdependent area can jointly achieve conservation and sustainable use objectives
- To create a model of inter-institutional collaboration among the relevant agencies and other stakeholders within the SBRC
- To conserve and properly manage the marine habitats within the SBRC for sustainable use and ecological integrity.
- To safeguard the SBRC’s ecosystem functions as they relate to climate change and natural disaster mitigation and adaptation
- To prepare a Conservation Action Plan for the SBRC
- To set the stage for the SBRC to function as a viable demonstration of a working conservation corridor

5. Responsible/Lead Agencies:

- **Friends of Nature (FON):**

Key People:	Post	Roles and Responsibilities in CAP Process:
Lindsay Garbutt	Executive Director	<ul style="list-style-type: none"> ▪ Oversees the SBRC-CAP project for FON
Jocelyn Finch	Technical Coordinator	<ul style="list-style-type: none"> ▪ Represents FON on the Core Planning Team ▪ Primary liaison with the SBRC-CAP consultants ▪ Serves as SBRC-CAP Coordinator
Nigel Martinez		<ul style="list-style-type: none"> • Coordinates SBRC-CAP logistics
Christina Garcia	Biologist	<ul style="list-style-type: none"> • Same as Jocelyn

▪ **Toledo Association for Sustainable Tourism (TASTE)**

Key People:	Post	Roles and Responsibilities in CAP Process:
Jack Nightingale	Executive Director	<ul style="list-style-type: none"> ▪ Liaises with the SBRC-CAP process ▪ Member of the Core Planning Team

▪ **The CAP Consultants:**

Key People:	Post	Roles and Responsibilities in CAP Process:
Paul and Zoe Walker	Local CAP Consultants	<ul style="list-style-type: none"> ▪ Consultant for the SBRC-CAP process ▪ Liaises with FON, and TNC personnel assigned to the CAP process ▪ Maintains a close working relationship with relevant FON and TASTE project staff ▪ Organizes the technical components of the SBRC-CAP workshops ▪ Prepares reports (including updating CAP EXCEL Workbook) as required by the CAP process

▪ **TNC:**

Key People:	Post	Roles and Responsibilities in CAP Process:
Alejandro Martinez	Country Director	<ul style="list-style-type: none"> ▪ Oversees the SBRC-CAP project for TNC
Nestor Windevoxhel	MAR Program Director	<ul style="list-style-type: none"> ▪ Co-facilitates the CAP Workshops
Julie Stockbridge	Marine Conservation Project Manager	<ul style="list-style-type: none"> ▪ Member of the Core Planning Team ▪ Oversees the execution of the SBRC-CAP consultancy contract ▪ Maintains coordination with TNC, FON, and Consultants ▪ Co-facilitates the CAP workshops ▪ Represents TNC-Belize on the Core Planning Team
Juan Carlos Villagran	MAR Program Coordinator	<ul style="list-style-type: none"> ▪ Guides the execution of the SBRC-CAP process ▪ Co-facilitates the CAP workshops ▪ Member of the Core Planning Team

▪ **Fisheries Department**

Key People:	Post	Roles and Responsibilities in CAP Process:
Lyndon Rodney	Fisheries Officer	<ul style="list-style-type: none"> ▪ Member of Core Planning Team ▪ Co-management partner ▪ Represents Belize Fisheries Department in the SBRC-CAP Process

▪ **Forest Department**

Key People:	Post	Roles and Responsibilities in CAP Process:
Saul Cruz	Conservation Officer	<ul style="list-style-type: none"> ▪ Member of Core Planning Team ▪ Co-management partner ▪ Represents Belize Forest Department in the SBRC-CAP Process

6. Core Planning Team Composition:

The Core Planning Team is charged with planning the stakeholder workshops, and reviewing and verifying the information emanating from these workshops. The members are comprised as follows:

- | | |
|----------------------------------|---|
| 1. Lindsay Garbutt (FoN) | 6. Jocelyn Finch (FON) |
| 2. Jack Nightingale (TASTE) | 7. Christina Garcia (FoN/TASTE) |
| 3. Juan Carlos Villagrán (TNC) | 8. Lyndon Rodney (Fisheries Department) |
| 4. Julie Stockbridge (TNC) | 9. Paul Walker (CAP Consultant) |
| 5. Saul Cruz (Forest Department) | 10. Zoe Walker (CAP Consultant) |

7. Methodology:

The Conservation Action Planning (CAP) process will be the primary tool that will be used to prepare the Conservation Action Plan for the SBRC.

All the work will be carried out during the stakeholder workshops. The work constitutes the following:

- Define conservation targets
- Assess viability of these targets
- Identify critical threats
- Conduct situation analysis
- Develop strategies
- Establish measures
- Develop work plans

8. Products:

- Conservation Action Plan document for the SBRC, including the following components:
 - Interim reports on conservation targets and viabilities, threats and stakeholder analysis, strategy prioritization, and monitoring and evaluation
 - Quarterly written updates of CAP Plan
 - CAP Strategy and detailed Work Plans
 - Monitoring and Evaluation mechanism

9. Expected Outcomes:

Specific expected outcomes are as follows

Outcome 1: Greater collaboration amongst stakeholders within the SBRC

Outcome 2: A shared vision amongst relevant agencies and other stakeholders within the SBRC is guiding the implementation of a complementary set of conservation and management strategies and plans

Outcome 3: The financial and social sustainability of the protected area system within the SBRC is strengthened and provides widespread benefits to the communities at large

10. Timeline:

General Timeframe: May 2008 to November 2008

Date for Workshop #1 (**Define Targets and Assess Viability**): May 6-7, 2008
(Core Team meetings on May 5th and 8th)
Venue – Robert’s Grove

Date for Workshop #2 (**Threats and Situation Analysis**): June 3-4 (1.5 days), 2008
(Core Team meetings on 2nd and 5th)

Date for Workshop #3 (**Developing Strategies**): July 29th-30th, 2008
(Core Team meetings on 28th and 29th)

Date for Workshop #4 (**Establishing Measures and Developing Work Plans**): August 19th-20th, 2008
(Core Team meetings on 18th and 21st)

Note #1: Dates for extraordinary meetings of the Core Planning Team are to be set as needed.

Agreement

We, the undersigned, agree to the above Charter

Lindsay Garbutt
Friends of Nature

Jack Nightingale,
Toledo Association for Sustainable Tourism

Forest Department,
Ministry of Natural Resources

Belize Fisheries Department
Ministry of Agriculture and Fisheries

Julie Stockbridge
The Nature Conservancy

Dated: _____ August, 2008

Annex Eight: List of Participants

Name		Organization	Workshop			
			1	2	3	4
1.	Jack Alford	Fisheries				
2.	Nicole Auil-Gomez	Wildlife Trust				
3.	Ed Berry	PCSD				
4.	Marvin Blades	Dept. of Agriculture				
5.	Stephen Burgess	Student				
6.	Lisa Carne	Teacher / Biologist				
7.	Daniel Castellanos	Fisherman				
8.	Shalini Cawich	WWF				
9.	Saleem Chan	TIDE				
10.	Juan Chub	Fisheries				
11.	Saul Cruz	FD				
12.	Eloy Cuevas	Monkey River TGA				
13.	Wilbur Dubon	Student				
14.	Glen Eiley	PTGA				
15.	Tricia Fields	Student				
16.	Jocelyn Finch	SEA				
17.	Dennis Garbutt	SEA				
18.	Lindsay Garbutt	FON				
19.	Christina Garcia	TASTE/FON/SEA				
20.	Denise Garcia	SEA				
21.	Linda Garcia	FON				

Name		Organization	Workshop			
			1	2	3	4
22.	Rachel Graham	WCS				
23.	Oscar Gutierrez	Student				
24.	Jason Guy	Fisheries				
25.	Jessica Herrera	Student				
26.	Godwin Humes	Fisheries				
27.	Keith Jacobs	Fisherman				
28.	Victor Jacobs	TASTE				
29.	Sean Ledwin	Univ of Michigan				
30.	Yuvanny Leonardo	TIGA / Pugola				
31.	Celia Mahung	TIDE				
32.	Isaias Majil	Fisheries				
33.	Alex Martinex	Student				
34.	Clifford Martinez	Dept of Agriculture				
35.	Edwin Martinez	Earthwatch				
36.	Melanie McField	Healthy Reefs / Smithsonian				
37.	Justino Mendez	FON				
38.	Adolphus Moliwasa	FON				
39.	Imani Morrison	Oak Foundation				
40.	George Murray	FON / Independence				
41.	Dwight Neal	Consultant				
42.	Jack Nightingale	SEA				
43.	Samuel Novelo	Fisheries				
44.	Shayne Pech	FON				

Name		Organization	Workshop			
			1	2	3	4
45.	David Perera	FD				
46.	Lauren Pidot	Univ of Michigan				
47.	Elizabeth Piteaf	NAVCO				
48.	Patty Ramirez	Placencia Tour Op Assoc				
49.	Nicanor Requena	TNC				
50.	Lyndon Rodney	Fisheries				
51.	Tim Smith	FON / WWF				
52.	Julie Stockbridge	TNC				
53.	Mary Toy	PCSD				
54.	Adrian Vernon	Consultant				
55.	Juan Carlos Villagran	TNC				
56.	Nestor Windevoxhel	TNC				
57.	Paul Walker	Wildtracks				
58.	Zoe Walker	Wildtracks				
59.	Brian Young	FON				
60.	Carlton (Jack) Young	Placencia Coop				
61.	Salvador Zabaneh	FON				

Annex Nine

Maps

