

SOUTH NORTHERN REGION COASTAL ZONE MANAGEMENT GUIDELINES

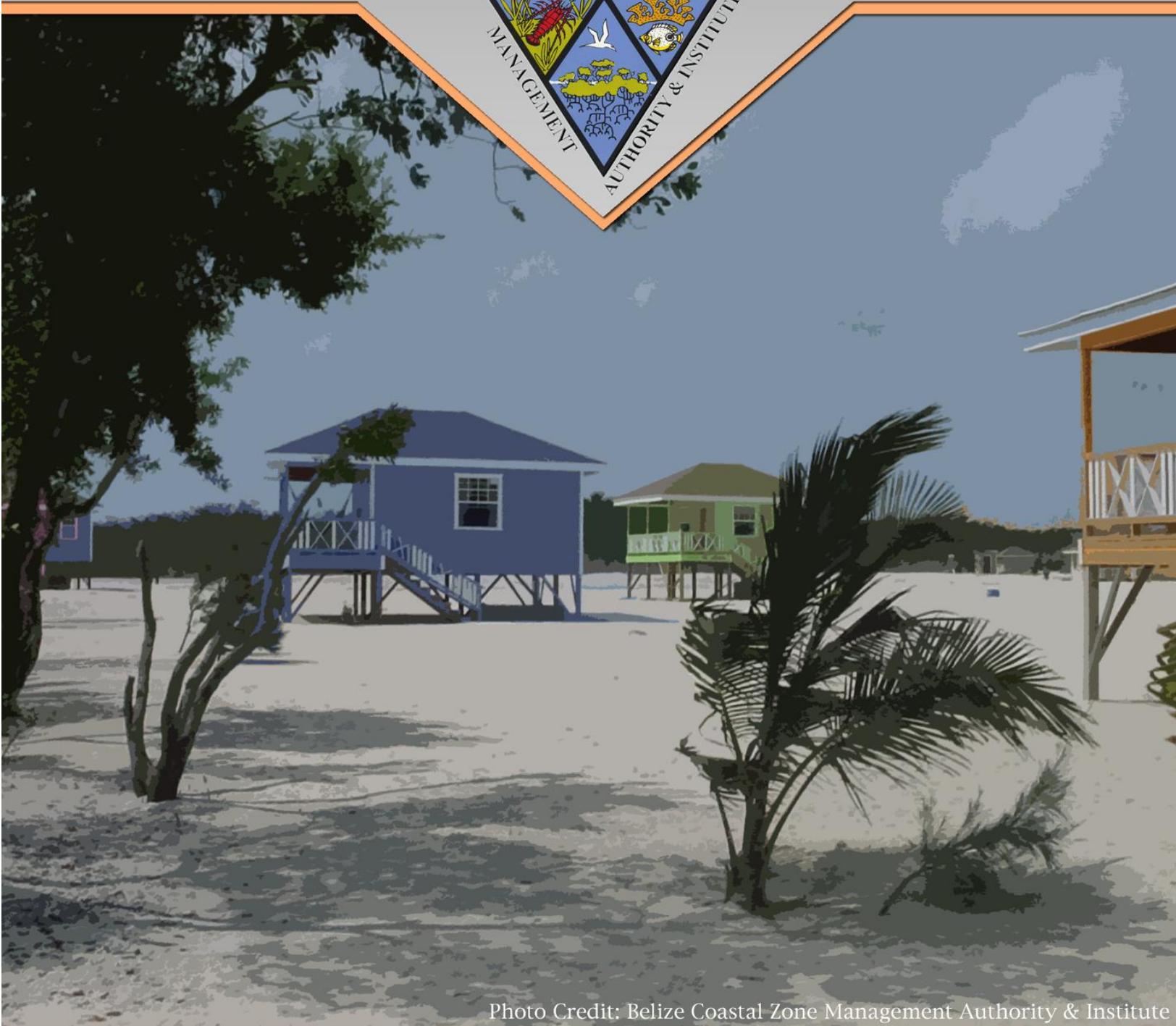


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Coastal Zone Management Authority & Institute
2015



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Agencies:

Archives Department
Belize Tourist Board
Belize Port Authority
Department of Environment
Lands and Surveys Department
Geology and Petroleum Department
Ministry of Economic Development
Wildlife Conservation Society

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Nolan Jackson	Reef's End Lodge
Nidia Ramirez	South Water Caye Marine Reserve
Basilio Zabaneh	Land Owner
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Yvonne Hartshorn	Alpha & Omega Belize Real Estate
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Rosella Zabaneh	Blue Marlin Lodge
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The following individuals of the South Northern region participated in CZMAI's coastal planning consultations, and are thus acknowledged for their valuable input towards revising and updating the coastal zone management guidelines for the region. These individuals are namely:

South Northern Region Consultee List (2012):

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Steven Hewitt	Thatch Caye Resort
LaBelle Saucier	Stann Creek Tour Guides Association/ C& G Tours
Jorge Rosado	South Water Caye Landowners Association
Julian Lewis	Friends of Gra Gra Lagoon
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draft of the Belize Integrated Coastal Zone Management Plan document. The meeting for the South Northern Region was held in Dangriga Town on Thursday June 6th, 2013, and had participation from the following individuals:

Public consultations 2013:

Glenn Cayetano	Fisherman
Alice Bowman	Hotelier – Pelican Beach Resort
Matthew James	CONCH
George Herrera	Fisherman
Howard Melendez	Dangriga Town Council
Tony Fajardo	Fisherman
Arthur Matthews	Citizen
Carlene Sanchez	Blue Marlin Resort
Rennick Jackson	Statistical Institute of Belize
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LIST OF ACRONYMS

CZAC	Coastal Zone Advisory Council
CZMAI	Coastal Zone Management Authority & Institute
DOE	Department of Environment
EIA	Environmental Impact Assessment
GOB	Government of Belize
HRA	Habitat Risk Assessment
LUA	Land Utilization Authority
Marine InVEST	Marine Integrated Valuation of Ecosystem Services and Trade-off
SNRCAC	South Northern Coastal Advisory Committee
STP	Sustainable Tourism Master Plan
SWMP	Solid Waste Management Plan

GLOSSARY OF TERMS

Certain technical terms have been used in the text of these guidelines. The following represents an explanation of such terms that were not provided within the text.

Artisanal/Subsistence Fishing means traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amount of capital and energy, relatively small fishing vessels (if any), making short fishing trips, close to shore, mainly for local consumption.

Building Height means the recommended maximum building height that should be allowed for each building to be measured from ground level to roof

Building Setback means the recommended minimum distance that should be allowed between buildings or between buildings and site boundaries

Commerce means the storage and retail of consumer goods

Commercial Development means land use involving the construction of a building or buildings that are used solely for commerce and business activities by the owners or others to the exclusion of all other uses within the density requirements of these guidelines

Commercial Fishing means the harvesting of fish, either in whole or in part, for sale, barter or trade.

Conservation means the retention of the natural features but with allowance of limited non-disruptive development

Conservation Area means areas including the 66ft reserve and other reserves, canal buffers, water bodies, flood prone lands; areas with ecological significance such as mangrove wetlands,

Community Facilities means Spaces set aside in large residential or commercial subdivisions for public purposes. They may include facilities such as public parking lots, schools, cemeteries, churches, public sporting areas, youth centers, police stations or health facilities

Coverage any building, including balconies and verandas, and expressed as a percentage of total lot size

Density means a level of development within a site, as measured by the number of lots per acre, number of dwelling units per acre, or maximum site coverage

Development means any activity which involves mining, engineering or building operations or change of use of land or building in, under, over or on land

Dwelling Unit means a living area consisting of contiguous rooms intended for convenient, long-term occupancy by one family and providing complete, independent facilities for living, eating, cooking, sleeping and sanitation

Fish camp means a building that is permanently or temporarily used for ancillary housing, trap-making and storage, boat repair and docking by full or part time commercial fishermen as licensed by the Fisheries Department,

Habitable Room means any room except that used for a kitchen or bathroom

Land means all incorporeal hereditaments of every tenure or description that are either permanently or temporarily above the surface of the sea, whether through natural or man-made activity. The seabed, while not 'physical' land, is defined as National Land

Liquid Waste means grey water from bath, basin and sink and sewage waste that consist mainly from discharge of body waste.

Lots acre should be subdivided and alienated

Low-Density Development means development of a site that does not exceed 20 dwelling units per acre, 6 lots per acre and a maximum site coverage of 50 percent

Low-Impact Development means an ecologically-friendly approach to site development and storm water management that mitigates development impacts to land, water and air; through conserving natural systems and hydrologic functions of the site. Site development includes residential dwelling units and community facilities and impervious surface cover is a maximum of 30 percent of total cover

Marina means a mooring facility for four or more recreational vessels

Maximum Human Carrying Capacity means the maximum population size of humans that the environment can sustain indefinitely, given the food, habitat, water and other necessities available in the environment.

Maximum Number of Floors means the recommended maximum number of floors a building should have, including attics or roof space designed for habitation

Maximum Number of Lots means the recommended maximum number of lots in which an acre of land can be subdivided and alienated

Maximum Habitable Rooms means the recommended maximum number of rooms to be allowed and measured per acre of land

Maximum Building Coverage means the recommended maximum ground coverage of any building including balconies and verandahs and expressed as a percentage of total lot size

Maximum Site Clearance means the recommended maximum amount of land that should be allowed to be cleared and expressed as a percentage of the total site area

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Coastal Zone Management Authority & Institute 2015

Medium-Density Development means development of a site that does not exceed 40 dwelling units per acre, 8 lots per acre and a maximum site coverage of 66 percent

Medium-Impact Development means an ecologically-friendly approach to site development and storm water management that mitigates development impacts to land, water and air; through conserving natural systems and hydrologic functions of the site. Site development includes a combination of residential dwelling units, community facilities and commercial activities, and impervious surface cover is a maximum of 50 percent of total cover

Minimum Lot Size means the recommended smallest size a parcel of land should be allowed to be alienated

National Land means all lands, including cayes and parts thereof not already located or granted and also includes any lands which have been, or may hereafter become, escheated to, leased by, or otherwise acquired by the Government;

Piers per Site means the recommended number of piers that should be allowed to be constructed on any site

Primary Land Use means the recommended preferred use of the site

Residential Development means land use that involves the construction of a building or buildings that are used solely for permanent or temporary domiciles by the owners or others on a non-commercial basis to the exclusion of all other uses within the density requirements of these guidelines

Resort means a building, buildings or site which offers accommodation and general amenities to visitors with other uses such as bars, restaurants, general storage and repair facilities and docking

Secondary land Use means the recommended next preferred use to be applied to the site either in conjunction with the primary land use or as an alternative to the primary land use if that is not applicable

Solid Waste means any unwanted material that is useless, thrown away or discarded

Swamp means an area of very shallow lagoon with mud, savannah or very low vegetation

Utility means the service and infrastructure used for the supply of energy, water, communication and waste disposal

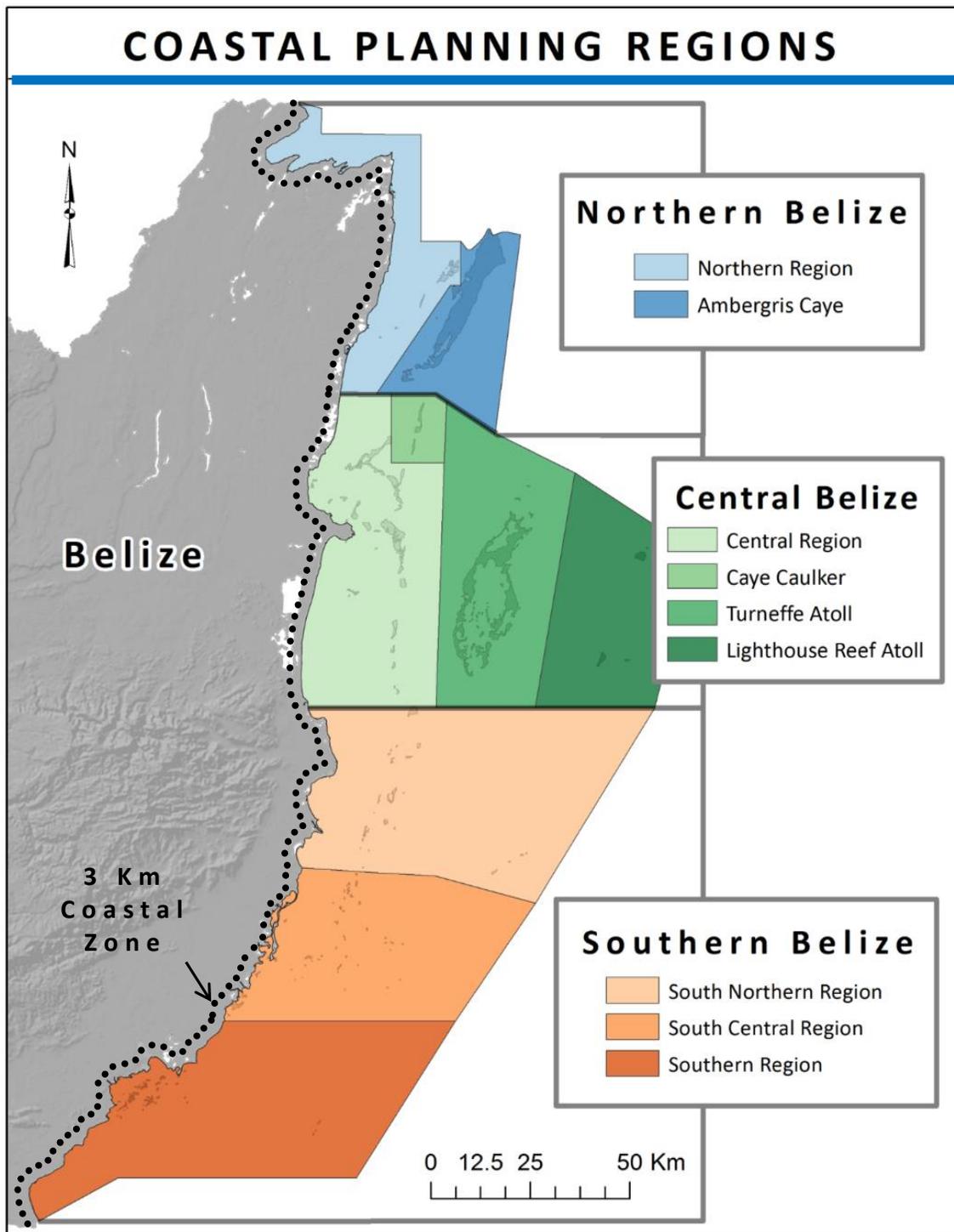
PREAMBLE

The Belize Coastal Zone Management Authority and Institute (CZMAI), a statutory body established by the Coastal Zone Management (CZM) Act of 1998, is tasked with the broad responsibility of assisting with the development of policies, strategies and guidelines for the improved management and sustainable use of the country's coastal resources at a national level. In keeping with its mandate to prepare an integrated coastal zone management plan, the agency has developed regional coastal zone management guidelines to provide support for planned development and resource management along the coastline and offshore areas of the entire country. These guidelines have been prepared for nine (9) coastal planning regions (**See Map 1**), which were demarcated based on commonalities, geographic definition and regional characteristics. The coastal zone management guidelines will help to integrate management efforts across the land-sea interface.

The South Northern Region Coastal Zone Management Guideline was developed in conjunction with the stakeholders of the communities within the South Northern Region. The South Northern Region; which encompasses the coastal communities of Dangriga Town, Sittee River, Hopkins and Commerce Bight; is relatively undeveloped and known for its rich diverse flora and fauna as well as its sensitive and pristine ecosystems. Using the expert subjective information from stakeholders in addition to the best available objective data, CZMAI was able to produce this guideline with the following goals:

1. Encourage and promote the sustainable development of coastal and offshore areas within the South Northern Region that will promote economic growth while simultaneously ensuring ecosystem stability and the efficient delivery of ecosystem services.
2. Protect and preserve the traditional way of life of the stakeholders within the South Northern Region
3. Ensure sustainability of coastal resources by identifying areas in need of conservation and reducing user conflicts

These goals are culturally informed, and rooted, where possible, on sound science and local knowledge. These guidelines represent the views and recommendations of the stakeholders of the South Northern Region. They are also a response towards addressing the management gaps identified by stakeholder communities through an extensive consultation process. The coastal zone management guidelines will ensure that human use of the coastal region occurs in consideration of the carrying capacity of the environment in addition to other ecological, cultural, social and economic development priorities of the region. These guidelines will aid policy development for integrated coastal zone management. They will be implemented by all those agencies that have legal mandates and/or permitting powers that impact resource utilization in the coastal zone of Belize, in partnership with this region's stakeholder groups.



Map 1: Coastal Planning Regions of Belize

1.0 INTRODUCTION

The South Northern region, includes coastal communities of Dangriga, Hopkins, Freetown Sibun and Sittee River, and a wide array of islands with varying sizes, shapes, elevations, topography, geological history, substrate, flora and faunal composition. These cayes are also varied in terms of development status and development potential. Communities and cayes included within the region can be seen in Table 1.

Table 1: Coastal Communities and Cayes within the South Northern Region

Coastal Communities:	
Dangriga Town	Hopkins
Freetown Sibun	Sittee River
Cayes:	
Southern Long Caye	Glory Caye
Mosquito Caye	Sandfly Caye Range
Garbutt Caye	Cross Caye
Columbus Caye	Tobacco Caye Range
Coco Plum Caye Range	Man of War Caye
Ragged Caye	Rockers Caye
Twin Caye Range	South Water Caye
Carrie Bow Caye	Curlew Caye
Northeast Caye	Long Caye
Middle Caye	Southwest Caye #1
Southwest Caye #2	Blue Ground Range
Stewart Caye	Bread and Butter Caye
Wee Wee Caye	Crows Nest Caye

The region contains two marine reserves, namely the South Water Caye Marine Reserve and the Glovers Reef Marine Reserve. Both of these reserves are also World Heritage Sites. It is a rich and diverse habitat in both the terrestrial and aquatic province. The species of animals range from corals to fishes, conch and lobster, sea turtles and birds, and dolphins and crocodiles. The plant species include mangroves and sea grasses.

The coastal zone management guidelines have been prepared with a view to guiding current and future development activities on the coastline and all the cayes that lie in the region. The guidelines are based on provisions set out in the National Integrated Coastal Zone Management Strategy for Belize 2003 for sustainable coastal area use and management. The policy recommendations include, but are not limited to, the following: fishing and tourism development, land use planning and development management, land tenure, conservation of natural resources, mineral extraction, waste disposal, and national strategic consideration.

2.0 REGION BOUNDARIES

Location and Geographic Definition

The South Northern Region is one of nine regions into which the coastal zone has been demarcated. It encompasses approximately 3318.14 sq. kilometres of land and sea and can be described as the area enclosed within the following UTM 16 coordinates. It is situated north of the Placencia/Laughing Bird Cayes Region, south of the Central, Turneffe and Lighthouse Reef Atoll regions, and extends 3km inward from the eastern coast of the Stann Creek district. (See **Maps 2,3,4, 5, & 6**)

Point 1: (1889654 N, 359787 E)

Point 2: (1890051 N, 450010 E)

Point 3: (1840309 N, 419979 E)

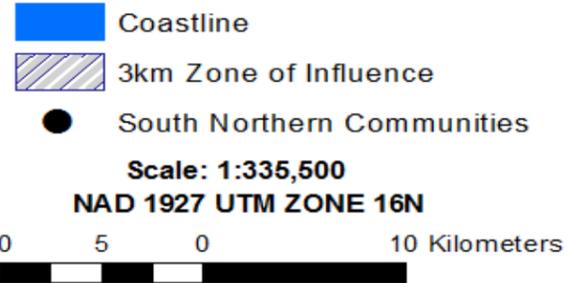
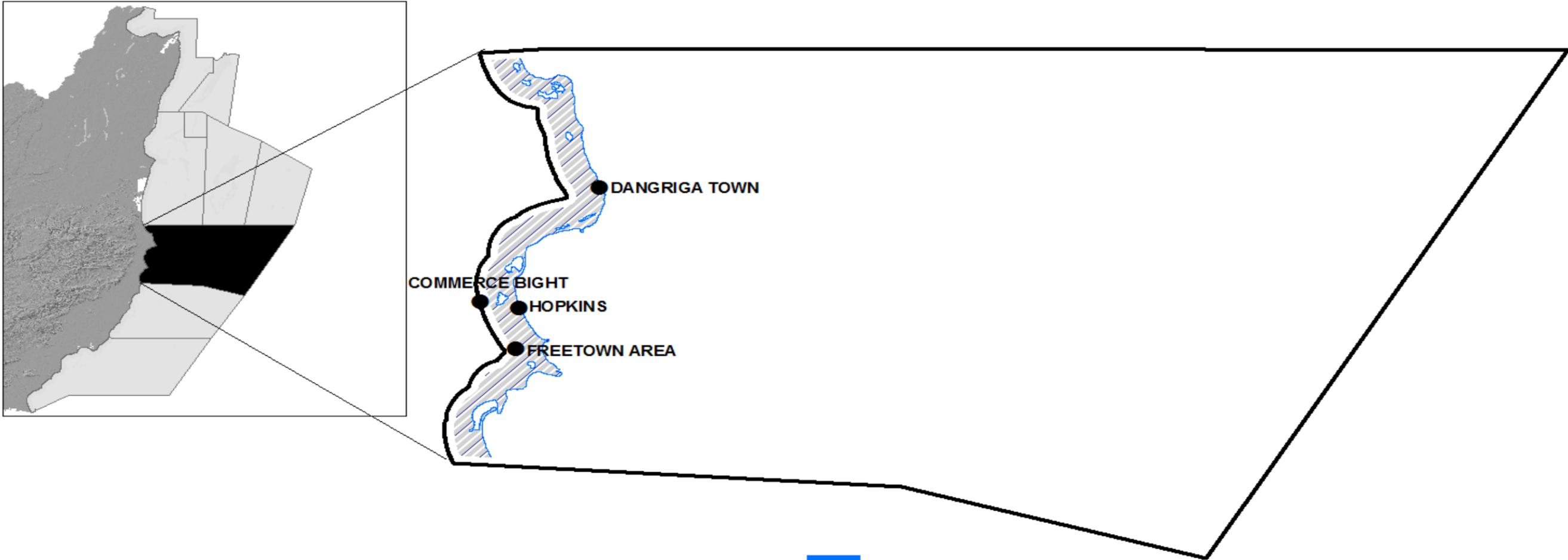
Point 4: (1847056 N, 395109 E)

Point 5: (1849438 N, 357670 E)

Regional Context

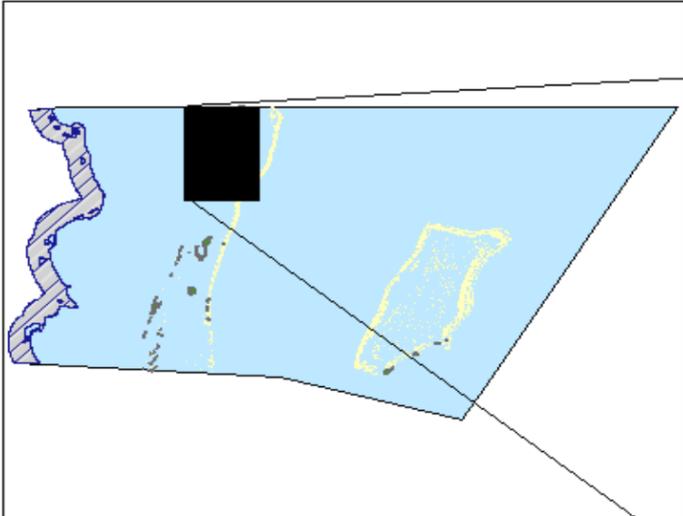
The South Northern Region is made up of approximately twenty two (22) cayes and range of cayes strung in a west to east direction and comprising approximately 3165.95 sq. kilometres of terrestrial and aquatic environment including flats and reefs of which 4.7 sq.km or 0.15% is terrestrial and 3161.25 acres or 99.74 % is aquatic. Within the aquatic area are the Glover's Reef Marine Reserve and a portion of the South Water Caye Marine Reserve. The mainland portion ranges from just south of Mullins River to North of Riversdale.

SOUTH NORTHERN COASTAL ZONE PLANNING REGION



Map 2: South Northern Region Coastal Zone Planning Region

SOUTH NORTHERN CAYES NORTHERN SUB-REGION



Caye
 Caribbean Sea

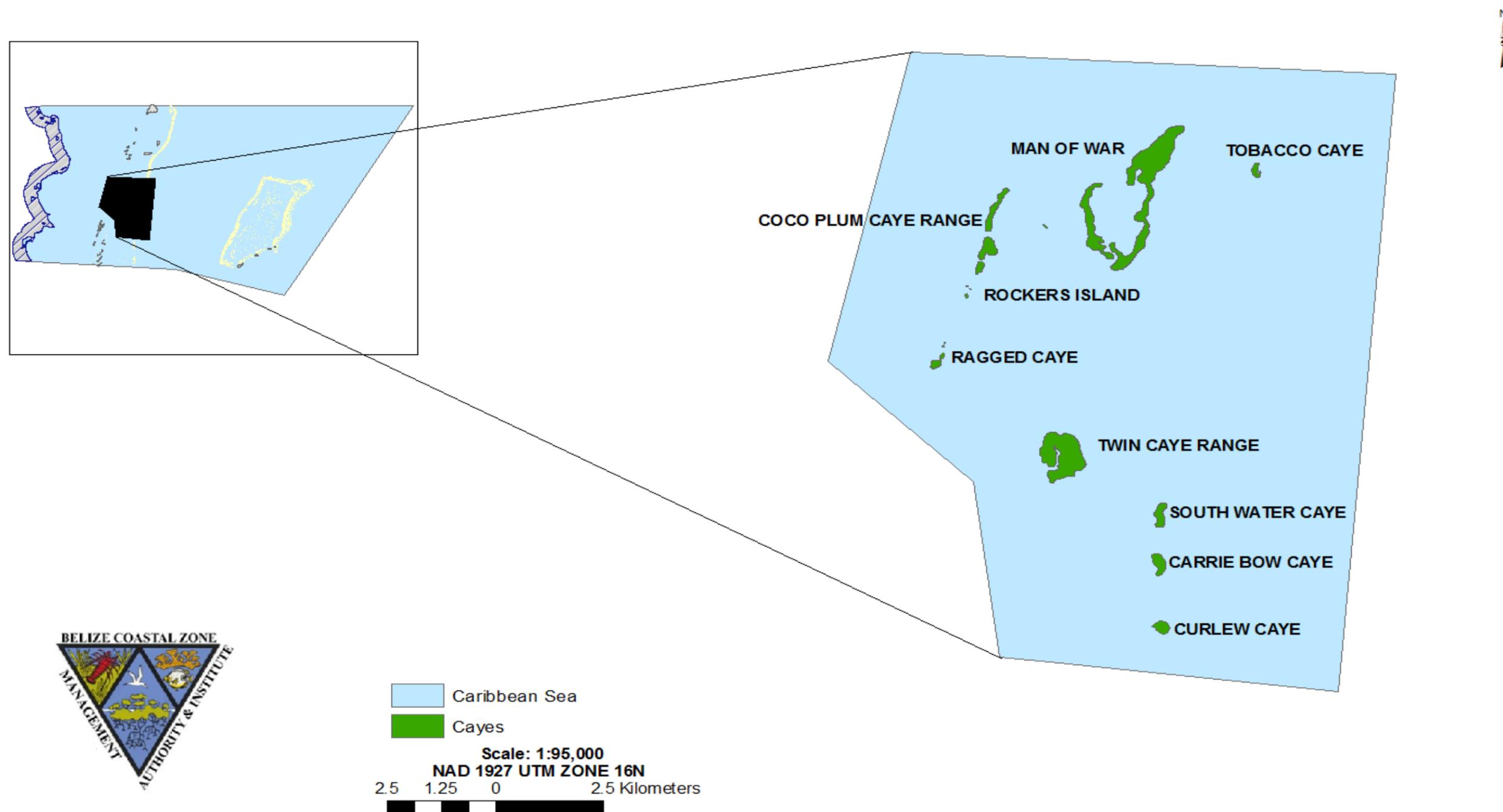
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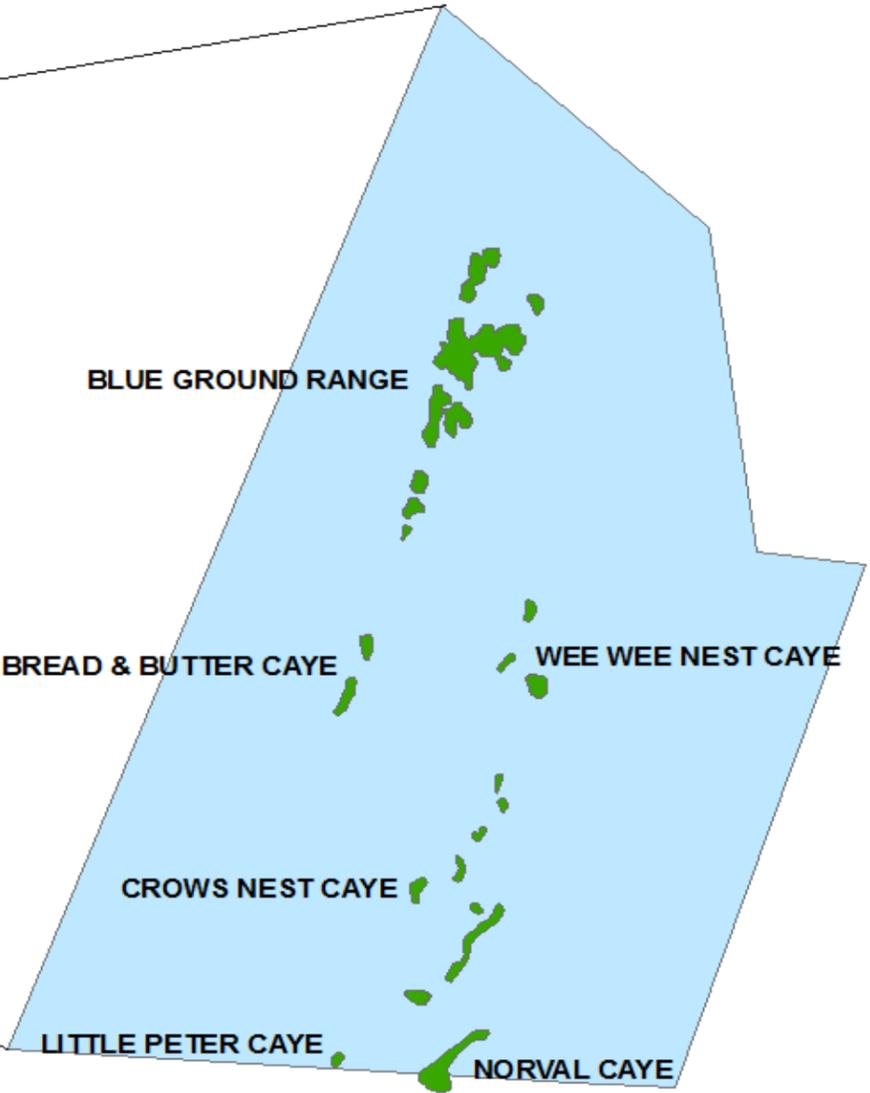
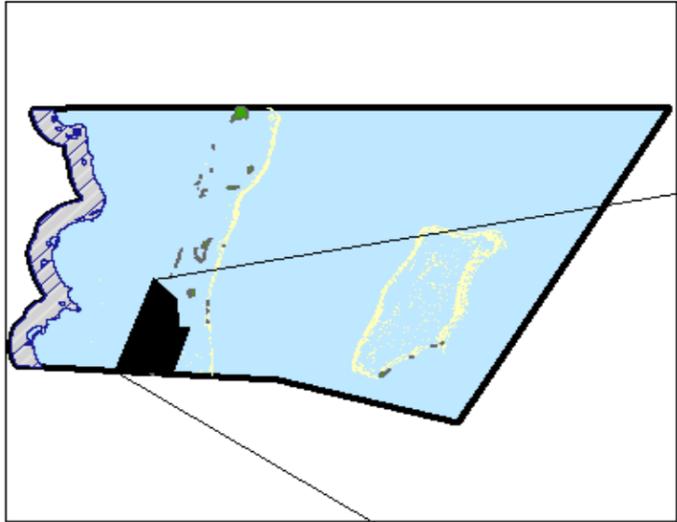
Map 3: South Northern Region Cayes (Northern Sub-region)

SOUTH NORTHERN CAYES: CENTRAL SUB-REGION



Map 4: South Northern Region Cayes (Central Sub-Region)

SOUTH NORTHERN CAYES SOUTHERN SUB-REGION



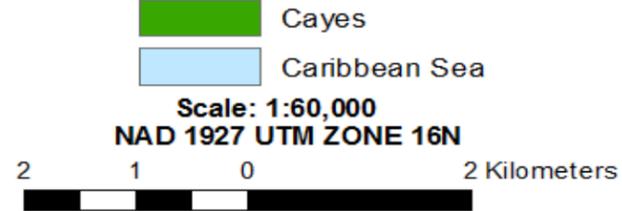
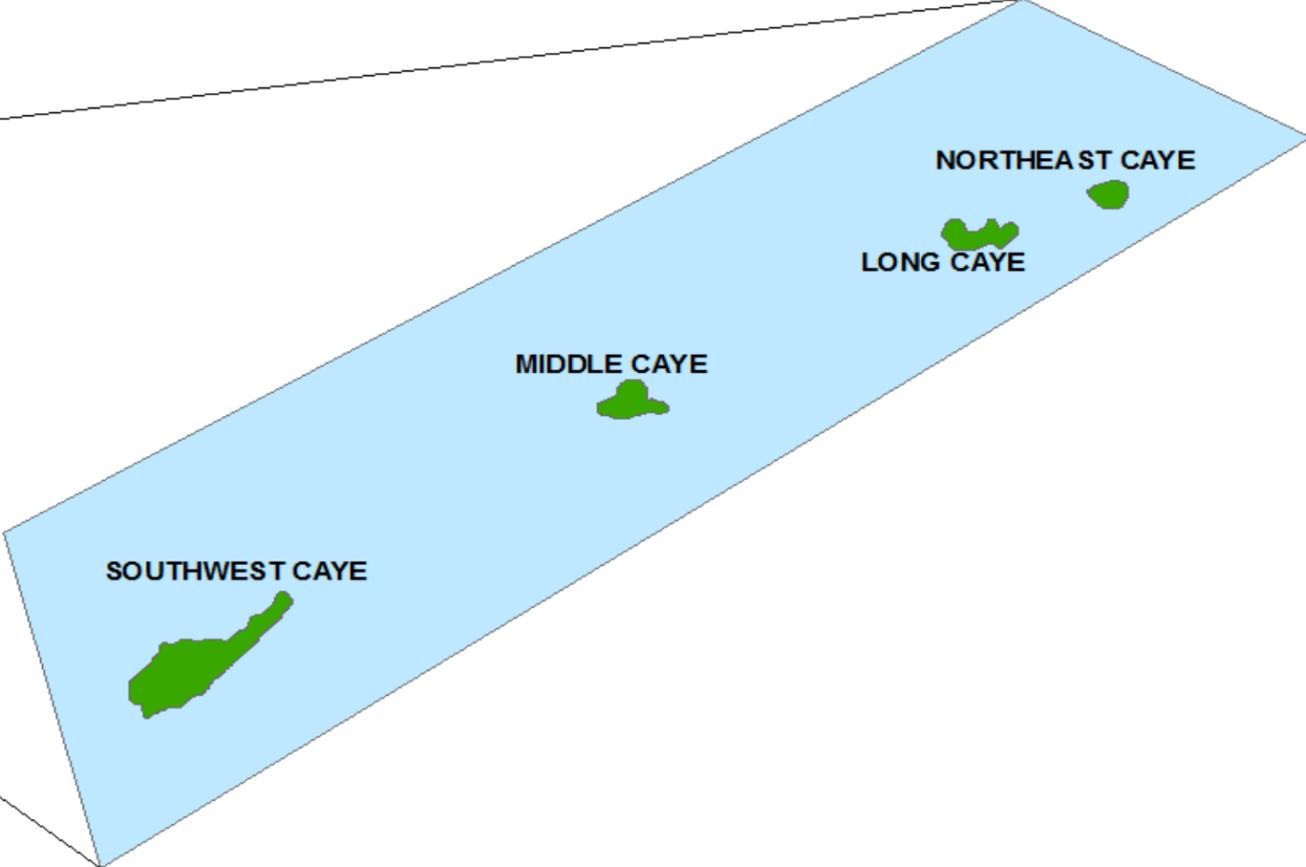
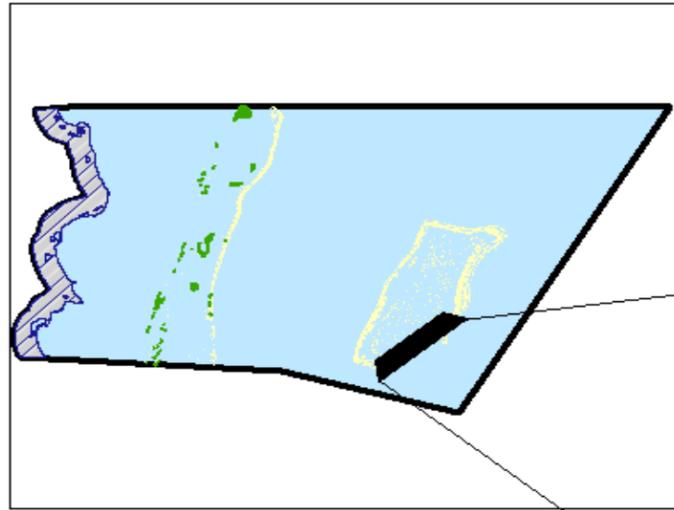
■ Cayes
■ Caribbean Sea
Scale: 1:85,000

NAD 1927 UTM ZONE 16N



Map 5: South Northern Region Cayes (Southern Sub-Region)

SOUTH NORTHERN CAYES EASTERN SUB-REGION



Map 6: South Northern Region Cayes (Eastern Sub-region)

3.0 OBJECTIVES

The management of the South Northern Region region's coastal zone must be linked to the goals and aspirations of the people of Belize, particularly the residents of the district of Toledo. Consequently, it must be intrinsically tied to the socio-economic, cultural and other basic needs of the people of the south and of Belize, and their use and demand for land and marine resources. Thus the key objectives of the South Northern Region region coastal zone management guidelines may be summarized as follows:

1. Protecting the fishing resources and traditional fishing rights, especially for the fisher folk from the communities of Dangriga, Hopkins, Sittie River and Freetown Sibun.
2. Promoting orderly and sustainable development, based on suitable land use planning, and with effective management guidelines that will meet the needs of current and future generations
3. Maintaining and protecting on going and future conservation, recreational and tourism areas and uses
4. Preventing inappropriate high-impact, unsustainable developments that are incompatible with community needs
5. Protecting and preserving significant national and international natural features and ecological biodiversity of special interest or uniqueness that define the character and scientific importance of the South Northern coastal zone
6. Preserving the social and cultural values of the people and communities of the region that are connected to the environment
7. Fostering and supporting a continued partnership among stakeholders for managing the coastal resources
8. Establishing a framework for regulating the development and use of resource of the region through the continuation of CZMAI's coastal planning program activities and coastal advisory committee process

4.0 LEGISLATIVE AND INSTITUTIONAL FRAMEWORK FOR INTEGRATED COASTAL ZONE MANAGEMENT IN BELIZE

The Coastal Zone Management Act, hereinafter referred to as “the Act”, was enacted in 1998 and has been described as reflective of the trend in legislation in Belize towards more accountability and transparency for government actions, and more direct participation by the public in decision making, particularly public resources. The intent of the Act is to promote the sustainable development of coastal and ocean areas through coordination of existing legislation affecting coastal resources and through building capacity and expertise to manage coastal resources. The main purpose of the Act is to:

- Provide for the improvement of coastal zone management in Belize through the establishment of a Coastal Zone Management Authority and a Coastal Zone Management Institute;
- Provide for the establishment of a Board of Directors to control and manage the affairs of the Authority;
- Provide for the preparation of a Coastal Zone Management (CZM) Plan;
- Provide for the establishment of mechanisms to improve monitoring of various activities within the coastal zone;
- Provide for the payment of fees and charges related to the use of the coastal zone and
- Provide for matters connected therewith and incidental thereto

The Coastal Zone Management Authority is the policy making and planning institution for coastal zone management. Its functions are primarily in the realm of planning, advising, cooperating, collaborating and monitoring. It is given no jurisdiction to permit or regulate activities which may affect the sustainable development of the coastal zone. The Coastal Zone Management Institute is the research and technical arm of the Authority. As is indicated above, the Coastal Zone Management Authority is mandated to develop a comprehensive Coastal Zone Management (CZM) Plan for Belize. The CZM Plan is to be developed by the Chief Executive Officer (CEO) of the Authority through consultation with all affected government agencies, non-governmental agencies, statutory bodies and the private sector. The Act mandates that the plan address certain areas. These include:

- Guidelines to be used in determining the suitability of particular development activities in the coastal zone;

- Guidelines for the general monitoring of the coastal zone, including its biological species, communities and habitats;
- Proposals, including existing proposals from Government agencies, relating to the coastal zone that deal with the following subjects:
 - Land use
 - Planning for the establishment of marine protected areas and for the conservation of threatened or potentially threatened or endangered species;
 - Preservation and management of the scenic, cultural and other natural resources;
 - Recreation and tourism;
 - Monitoring of the environment and natural resources, mineral extraction, living resources, human settlements, agriculture, aquaculture, and industry
- Proposals for the reservation of land or water in the coastal zone for certain uses, or for the prohibition of certain activities in certain areas of the coastal zone;
- Recommendation for the improvement of public education as well as public participation in the management of coastal resources;
- Recommendations for strengthening governmental policies and powers and the conduct of research for the purposes of coastal resources conservation and management

The process for approval of the CZM Plan is as follows: The Act requires the CEO of the Authority to submit the CZM Plan to the Board of the Authority, who has sixty days to make modifications. Thereafter, the Board is to notify the public of the availability of the CZM Plan by an order published in the Gazette. Any member of the public may submit comments within sixty days. Upon completion of the sixty days, the Board may approve the CZM Plan, subject to modifications, if they deem it fit in regard to the comments submitted, and then submit the same to the Minister for approval. The Minister, after approving the CZM Plan, shall table it in the House of Representatives for approval by the House by affirmative resolution. Subsequent to approval by the House, the CZM Plan must be published in three consecutive issues of the Gazette. The CZM Plan is to come into operation on the date of the last publication or such later date as may be specified therein. The Act requires the CZM Plan to be revised during the four year period after it comes into operation.

It was agreed by the CZMAI that the CZM Plan would be developed in phases, with the first phase being the development of an Integrated Coastal Zone Management Strategy document, which underwent extensive public consultation. It was endorsed by the cabinet in 2003, and is an official policy document of CZMAI. The second phase involved the formulation of cayes development guidelines for eight of the nine coastal planning regions into which the coastal zone

has been sub-divided by the CZMAI. This subdivision was based on geographical, biological, administrative and economic similarities. The Ambergris Caye Development Master Plan serves as a guide for regulating the use and development of land in the Ambergris Caye Planning Region. See Map 1 for the definition of the nine coastal planning regions.

The management guidelines were formulated using the Cayes Development Policy (2001) as a framework. During 2010-2012, the cayes development guidelines were updated to include new information on the cayes, but also to include human use of the coastline and marine waters. As such, the development guidelines have been renamed the coastal zone management guidelines. Thus, the Integrated Coastal Zone Management Strategy (2003), together with the coastal zone management guidelines for the nine coastal planning regions, contributes to the development of the comprehensive Integrated Coastal Zone Management Plan.

5.0 GUIDING PRINCIPLES

It is important that the coastal zone management guidelines for the region be formulated as a part of a sustainable plan geared towards contributing to national, regional and local development policies, goals and aspirations. They must therefore be holistic and pragmatic, yet underpinned by certain fundamental principles. These can be detailed as follows:

Principle 1:- *Recognition that the South Northern Region needs special protection and management because of its physical, economic, scientific, cultural and aesthetic attributes*

Principle 2:- *Recognition of the need to avoid placing undue strain on the terrestrial and aquatic environment of the region by ensuring that proposed development activities do not exceed the carrying capacity of the region*

Principle 3:- *Recognition of the rights and interests of traditional users and stakeholders while acknowledging the national development policy which promotes tourism and job creation*

Principle 4:- *Recognition that environmental concerns are best handled with the participation of all concerned stakeholders at all levels and from all sectors*

Principle 5:- *Recognition that planning guidelines represent a preventative and precautionary approach to environmental degradation and a tool for pursuing sustainable development of the region*

6.0 SECTORAL ISSUES AND POLICIES

These policies are organized into ten sectors that address current and potential issues within the Southern coastal zone, and provide recommendations from stakeholders. They include: Fishing, Marine Tourism, Land-Use, Dredging, Sensitive Habitats, Utilities, Pollution Control, Conservation, Social Amenities & Recreation and Research & Education. They were developed by the South Northern Region Coastal Advisory Committee in consultation with the communities of Dangriga, Hopkins, Freetown Sibun, Sittie River and the Coastal Zone Management Authority & Institute.

6.1 *Fishing*

Fishing has traditionally been an important component of the economy of South Northern Region. The cayes and their surrounding waters have provided a steady source of fishing for centuries. The waters and the coral reef system act as both fishing and breeding grounds, augmented by the presence of deep waters and extensive flats between the cayes. Fishermen, for economic and recreational reasons, from Sarteneja, Belize City, Punta Gorda and Dangriga utilize the resources of the region. While the region is rich in fishing resources, illegal and unregulated fishing activities have been threatening the fish stocks. Fishermen from Guatemala and Honduras are known to also encroach on these fishing grounds. The use of gill nets has also been problematic. In order to ensure that fishing remains a viable industry and continues to remain a viable economic activity in the region, improved fisheries management in the region must be implemented. The usury rights of both groups of fishermen.

The total spiny lobster coverage for this region was determined to be approximately 1000 km². Using InVEST's ecosystem service model for Spiny Lobster, it was estimated that under the current scenario the exports of tail meat amounts to 55,528 lbs, and generating revenue of approximately BZ \$1.4 million (**Fig 4, Appendix**). In addition, model results suggest that a conservation zoning scheme could increase catch to 73,064 lbs; and generate an annual revenue of BZ \$1.9 million by 2025. However, a development zoning scheme would drastically decrease exports to 11,053 lbs and generating annual revenue of only BZ \$294 thousand by 2025. The model results indicate that the proposed zoning (Informed Management) scheme for this region could increase export in the amount of 62,431 lbs, generating annual revenue of BZ \$1.6 million by 2025. This represents a 17% increase from 2010 returns.

Compared to the Informed Management Zoning Scheme (**Map 7**), the Conservation Zoning Scheme is the better option for maintaining increased lobster catch and revenue through to 2025. This is mainly attributed to the fact that under the Conservation Zoning Scheme, habitats that support the lobster fishery are under relatively less stress from human activity than in the Informed Management scheme. However, while the zoning scheme under a Conservation Scenario is good for habitats and the provision of important ecosystem services, such as protein from lobster, significantly less human activities occur in this zoning scheme. Although there may be some loss to habitat quality and lobster production, the Informed Management zoning scheme

represents a balance between managing the resources of the coastal zone and the continued allocation of areas for human use through to 2025.

In discussing the results of the InVEST ecosystem models, and in particular the lobster fishery model, there is the need to consider limitations of the model, which are highlighted below:

- Population growth parameters are nationwide, not region-specific
- Habitat dependencies are obligatory (e.g., habitat substitutability is not explicit represented).
- The population responds to change in habitat quantity (i.e., areal extent of mangrove, seagrass, and coral reef), not quality of those habitats.
- The fishery is assumed to take place at the start of the year, before natural mortality
- The model assumes near knife-edge selectivity in harvest function
- Harvest selectivity (and catchability) is invariant, such that technological improvements to gear or changes in fishing practices are not modeled.
- Market operations are fixed, such that they do not vary in response to amount of harvest, shifts in market or consumer preference, or technological changes.
- Climate change impacts are not directly accounted for in model

Additional information on how this model works can be found in **Appendix B.4** of the Belize Integrated Coastal Zone Management Plan.

INFORMED MANAGEMENT ZONING SCHEME FOR FISHING: SOUTH NORTHERN REGION



Map 7: Informed Management Zoning Scheme for Fishing in the Southern Region

Table 2: Framework for Implementing Informed Fisheries Management in the South Northern Region

ZONE	CHARACTERISTICS OF ZONE	SCHEDULE OF PERMITTED USES			SCHEDULE OF RESTRICTED USES	SUPPORTING NATIONAL POLICIES	IMPLEMENTING AGENCY
		Dominant	Compatible	Regulated			
Fishing	Marine area defined for the extraction of fish for food and commercial trade, except for sport fishing which only involves the catch and release of fish	1.Sportfishing(bone fish, tarpon, permit); 2.Wild capture of commercial fish species using only permitted fishing gear 3. Subsistence fishing using traditional fishing gear 3. Wild capture of invasive species	Marine recreation and eco-tourism Passage/entry of fishing vessels Research and Education within marine reserves Establishment of fish pots and traps Seaweed culture	Sport fishing Commercial fishing Research and Education	1. Illegal extraction of catch and release species, endangered marine species and organisms under seasonal management regime; 2.Extraction within legally specified “no-take”/replenishment zones 3. Dredging 4. Use of prohibited fishing gear 5. Trawling 6. Shipping and navigation 7. Dumping of solid and liquid wastes 8. Oil exploration and extraction	Fisheries Act Coastal Zone Management Act	Fisheries Department Coastal Zone Management Authority

The Fisheries Act, administered under the Fisheries Department, is the principal governing legislation to regulate the fishing industry (**Table 2 above**), and is directly concerned with maintaining sustainable fish stocks and protecting the marine and freshwater environments. In order to protect the fishing resources of the South Northern Region, including the Glover's Reef and South Water Cayes area, and the user rights of the traditional fishing communities, the following action steps are recommended, to complement the existing Fisheries regulations and to enhance regional management of the fisheries resources.

Recommended Actions:

1. Protect the ecological integrity of the spawning and traditional fishing grounds of the region, as well as the interests and user rights of the traditional Belizean fishermen of the region
2. Assess the implementation of the catch shares pilot program at Glovers Reef Marine Reserve and expand the program to wider area of the region, in consultation with all affected groups and individuals. With priority being encouraging and promoting the usage of the area by traditional fishers.
3. Zone the usage of gill nets, especially along the coastline. In general, it should not be used within 5 miles of the barmouth. If discontinued altogether alternative livelihoods should be presented to the fishermen of the region.
4. Patrolling efforts for the region by the Fisheries Department and other enforcement agencies must be frequent and coordinated in order to deter the use of illegal fishing and fishing practices. Violators must be punished according to the severity of the crime committed.
5. Establish a national policy for 'security of tenure' for MPA license holder to ensure that in the death the license can be assumed by an immediate family member.
6. Explore and promote the sportfishing industry in the region to open new markets and sources of income.

6.2 *Marine Tourism and Recreation*

Tourism is a vibrant economic activity in the South Northern region and opportunities abound within the sector. It is an alternative to fishing and other income generating activities, and contributes substantially to the national economy. Many of the cayes within the region are being used for tourism and recreational purposes, such as Tobacco, South Water, Coco Plum, Northeast, Long and Southwest Cayes. Over the past two decades, particularly with the aggressive marketing of tourism, and promotion of the World Heritage Status of the area, the number of users of the region has multiplied tremendously. However, if not planned and managed correctly, tourism activities can result in destructive and devastating damage to the natural environment.

The National Sustainable Tourism Master Plan recommends the construction of various new resort developments along the coast from Dangriga Town to north of Riversdale. The primary tourism product being sun and beach tourism as well as nautical tourism. Pocket cruise tourism, culture tourism and ecotourism and adventure tourism were identified as secondary tourism products. Nautical tourism is recommended for Hopkins and Sittee River. The model for development forecasts the creation of 1,335 new hotel rooms by 2030.

InVEST Recreation and Tourism ecosystem service model results suggest this region is projected to experience an increase in its tourist visitation by 2025 (**Fig 5, Appendix**). Currently, 322 thousand people visit this region generating revenue of BZ \$37 million annually. In a conservation future scenario, InVEST Recreation model results indicate that there may be an increase in tourist visitation to approximately 462 thousand, generating annual revenue of BZ \$51 million. (**Fig 6, Appendix**) In a development future scenario, there would also be a decrease in the current tourist visitation to approximately 292 thousand, and generating annual revenue of BZ \$32 million. In the proposed Informed Management scenario (**Map 8**), InVEST Recreation model results indicate that there will also be an increase in tourist visitation to approximately 479 thousand and that tourist expenditure would generate an annual revenue of BZ \$82 million. The supporting framework for implementing the Informed Management Zoning Scheme for marine recreation and tourism is outlined in **Table 3**.

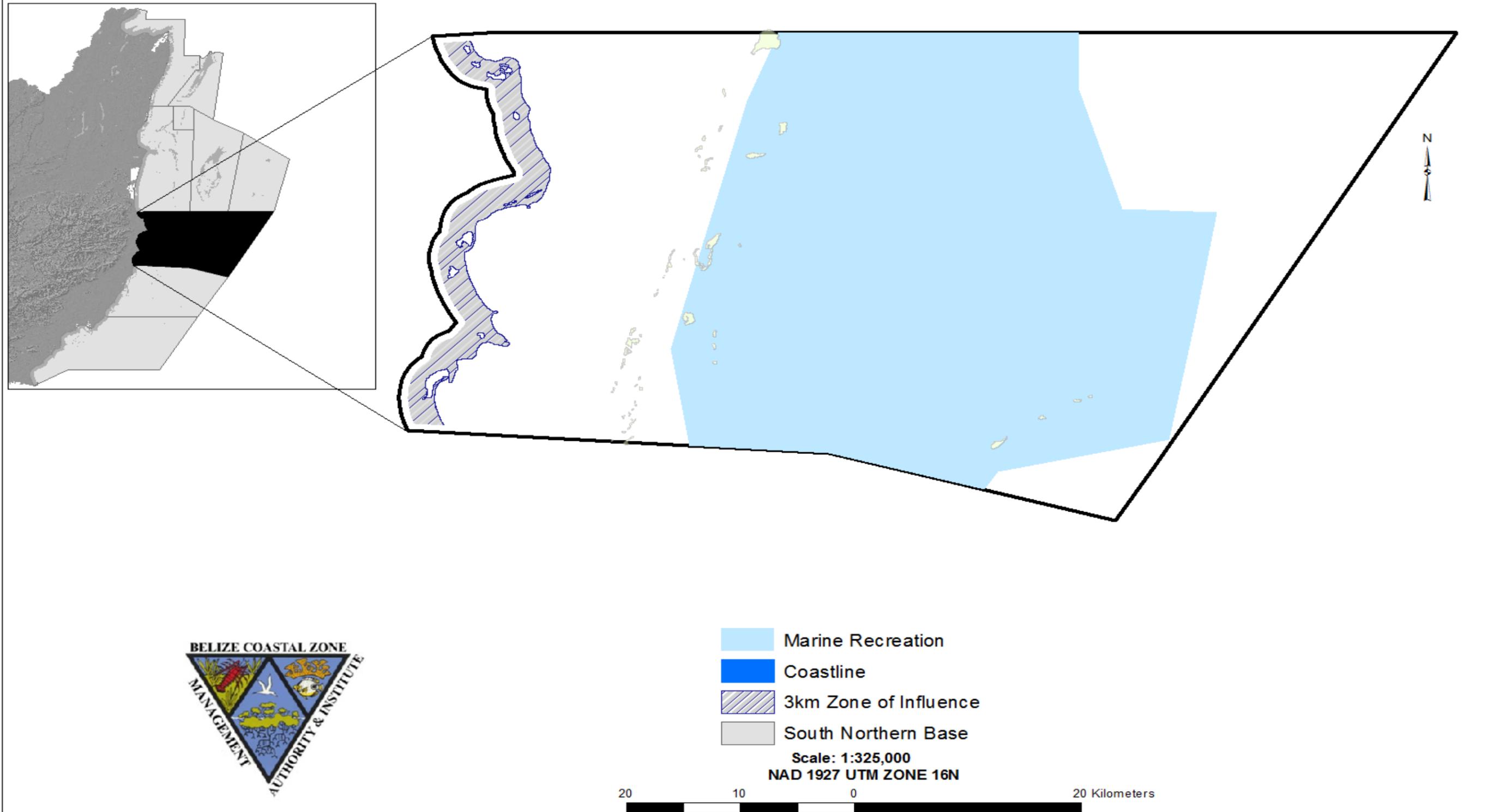
In discussing the results of the InVEST ecosystem models, and in particular the recreation model, there is the need to consider limitations of the model, which are highlighted below:

- The model assumes that people will respond similarly in the future to the attributes that serve as predictors in the model. In other words, the assumption is that people in the future will continue to be drawn to or repelled by a given attributes to the same degree as currently.
- Some of the attributes that are used as predictors of visitation are representations of areas managed for particular human use (e.g. transportation). The model assumes that future management of the zones and the type of activities that they represent are similar to current.
- Since there are no fine-scale data on the distribution of visitors to Belize, we use photo-person-days as a proxy for the relative density of actual person-days of recreation across the coastal zone.

- Climate change impacts are not directly accounted for in model

Additional information on how this model works can be found in **Appendix B.3** of the Belize Integrated Coastal Zone Management Plan.

INFORMED MANAGEMENT ZONING SCHEME FOR MARINE RECREATION: SOUTH NORTHERN REGION



Map 8: Informed Management Zoning Scheme for Marine Recreation in the Southern Region

Table 3: Framework for Implementing Informed Marine Recreation in the South Northern Region

ZONE	CHARACTERISTICS OF ZONE	SCHEDULE OF PERMITTED USES			SCHEDULE OF RESTRICTED USES	SUPPORTING NATIONAL POLICIES	IMPLEMENTING AGENCY
		Dominant	Compatible	Regulated			
Marine Recreation	Marine areas especially suited to swimming, snorkeling, diving, kayaking, surfing, jet skiing, kite boarding, and other water sports	1. Swimming 2. Snorkeling 3. Diving 4. Kayaking 5. Surfing, 6. Jet skiing, 7. Kite boarding 8. Other water sports	Passage/entry of water taxis, tour boats, cruise vessels Research and education within marine protected areas Sport fishing	Research and Education Eco-tourism activities within marine protected areas Sport fishing	1. Commercial fishing 2. Establishment of fish pens/cages, mariculture 3. Oil exploration and extraction 4. Dredging 5. Passage of commercial fishing vessels 6. Shipping and navigation 7. Trawling 8. Dumping of solid and liquid wastes from ships and boats	Belize Tourism Board Act Fisheries Act Coastal Zone Management Act Hotel and Tourist Accommodation Act National Sustainable Tourism Master Plan	Belize Tourism Board Fisheries Department Coastal Zone Management Authority

Recommended Actions:

1. Confine land use assignments for resort type development to those areas where they already exist with minimal scope for intensification or new development
2. Enforce the maximum carrying human capacity for those areas under stress because of over-use or point use and likely to be impacted negatively from excessive human activity which does not involve mining, engineering, building or re-building operations
3. Combine ecological and nature-based tourism and non-damaging traditional economic generating activities are combined with conservation policies in those ecologically sensitive but potentially attractive natural environments which are also traditional fishing grounds
4. Implement the recommendations for tourism management for this region as prescribed in the National Sustainable Tourism Master Plan.
5. Encourage the participation of local stakeholders in new industries surrounding new resort developments.

6.3 *Land-Use*

Most of the lands in the region are low lying. However, there are several cayes, particularly the cayes on the reef, Tobacco, South Water and Carrie Bow and on the atoll, Northeast, Long, Middle and Southwest Cayes, which have elevated land. Land use in the region can be categorized in one of the following: Residential; Resort and Research/Scientific Station and Undeveloped. While some of the cayes are elevated or have high firm land, and their soil profile suggests their suitability for development activity, their ecological sensitivity, protected status, and world heritage designation in the instances of Glovers Reef and South Water Caye, directs that a precautionary approach be applied to future development of the region. This entails that development be more toward conservation and low intensity residential activity. Thus the inner cayes are zoned primarily for conservation use, which is in keeping with the designations of the management plan of the region, and the outer cayes as a combination of commercial and conservation, in recognition of existing uses and objects of the marine reserve. These are Residential, (Cross and Garbutt Cayes) Commercial (Tobacco, Coco Plum, South water, Northeast, Long and South west Cayes) and Conservation(Middle, Curlew, Carrie Bow, Twin, Rockers Island, Tobacco Range, Sand fly, Columbus and Southern Long Cayes). –

In the case of privately held undeveloped lands, the development standards presented within these guidelines presents the most sustainable and appropriate future land use. Although the CZMAI recognizes the right of the landowner to develop their land in any matter they see fit there must be measures in place to steer future development in order to ensure sustained ecosystem services. Therefore, in the case of these lands, if there is no development activity within the first five (5) years of the passage of this planning document then all future development activities, after the time period, **MUST** follow development standards as outlined within this coastal development guideline.

6.3.1 Coastal Development Standards

The existing standards for subdivision of land (Land Utilization Act, Chapter 188 of the Substantive Laws of Belize, Revised Edition 2000) did not anticipate the magnitude of urban expansion, tourism and other development that Belize has experienced over the past decade. In 2010, the National Guidelines for Subdivision and Consolidation of Land in Belize was revised to address such issues and provide transparency and equitability to the process of subdividing and developing land. Although revised, the amendments made were general in scope and lacked the specificity needed for sensitive areas such as the cayes and atolls. Therefore CZMAI recommends the following from the National Subdivision Regulations as standards for developing within **3 km** of the **mainland coastline** of the South Northern Region. The framework for implementing the zoning scheme for the development of coastal lands is found in **Table 4**.

Table 4: Framework for Implementing Informed Coastal Development in the South Northern Region

ZONE	CHARACTERISTICS OF ZONE	SCHEDULE OF PERMITTED USES			SCHEDULE OF RESTRICTED USES	SUPPORTING NATIONAL POLICIES	IMPLEMENTING AGENCY
		Dominant	Compatible	Regulated			
Coastal Development	Residential settlements, infrastructure, commercial/economic activities on land above water within 3km buffer of the coastline and offshore cayes	1. Expansion of existing communities 2. Small-medium scale residential development 3. Small-medium scale commercial development 4. Community facilities 5. Supporting infrastructure	Small-scale, light industry Tourism facilities, such as small guest houses Subsistence agriculture production, and landscaping with decorative, native, non-invasive crops	Subdivision of land Establishment of small and medium-scale commercial and light-industrial development Establishment of residential expansion Solid and liquid waste management	1. Large-scale coastal agriculture production 2. Coastal aquaculture 3. Dumping of solid, toxic, hazardous waste and untreated liquid wastes, including grey water and sewage 4. Commercial or light-industrial development within residential zone 5. Residential development within commercial or light industrial development zone 6. Squatting/informal settling 7. Unregulated clearing of mangrove forest, including the conversion of mangrove areas into other uses 8. Oil exploration, extraction and establishment of oil refinery 9. Dredging and Mining	Belize Building Act Cayes Development Policy Coastal Zone Management Act Environmental Protection Act Forest Act Hotels and Tourist Accommodation Act Housing and Town Planning Act Land Utilization Act Mines and Minerals Act Solid Waste Management Authority Act Water and Sewerage Act	Central Building Authority Coastal Zone Management Authority Coastal Zone Management Authority Department of the Environment Forest Department Belize Tourism Board Ministry of Housing Land Utilization Authority Mining Unit, Ministry of Natural Resources Solid Waste Management Authority Belize Water Services Limited

The National Sustainable Tourism Master Plan for Belize 2030 (NSTMP) recommends **low to moderate development** for the South Northern Region. Within the South Northern Region there are numerous new developments proposed for the area between Dangriga Town and north of Riversdale. Infill and completion of existing infrastructure is recommended for Dangriga Town and Hopkins and a new development North of Maya King River up to Sapodilla. Building densities under an Informed Management Zoning Scheme (**See Maps 9 & 10**) for these areas are recommended to be 20 units/acre – 50 units/hectare which is consistent with Residential (R2) development standards. New low density resorts are recommended for False Sittee point, around the point (south Hopkins) and Commerce Bight. Building densities recommended are around 4 units/acre – 10 units/hectare. This is consistent with Residential (R1) development standards. Finally north of Riversdale there is the construction of an international airport with recommended development standards consistent with Commercial (C2) developments also medium level densities (40 – 100 units/hectare) was recommended for this area.

Residential Development: Land use in which housing predominates, as opposed to industrial and commercial areas. Housing may vary significantly between, and through, residential areas. These include single-family housing and multi-family residential. These areas are also characterized by lower lots per acre and units per acre.

Low Density Residential development is recommended for **False Sittee point, around the point (south Hopkins) and Commerce Bight**

Medium Density Residential development is recommended for **Dangriga Town, Hopkins and the area North of Maya King River up to Sapodilla**

Table 5: Residential Development Standards for Coastal Communities within the South Northern Region

Residential Development Standards		
<i>Subdivision Criteria</i>	<i>Development Standards</i>	
Density	Low Density (R1)	Medium Density (R2)
Lot Size	4 lots per acre (0.25 acre; 10,890 sq.ft.; 1,012 sq.m; 1210 sq.yd.)	6 lots per acre (0.167 acre; 7275 sq.ft.; 676 sq.m.; 808 sq.yd.)
Permitted Use	Single Family Residential Detached	Single and Multi Family Residential
Secondary Use	Institution, Conservation, Parks/Playground	Commercial Low Density, Institution, Conservation, Parks/Playground
Net Density (dwelling units per area)	4 dwelling units/acre	20 dwelling units/acre 120 guestbeds/acre
Width/Length Ratio	1:3	1:2
Minimum Setbacks:		
Front:	8 feet	6 feet
Side:	8 feet	6 feet
Back:	15 feet	12 feet
Max. Site Coverage (Percentage)	33%	50%
Minimum Frontage	65 feet	50 feet
Car Parking	1 per dwelling	1 per dwelling
Services	Water & Sewerage or Septic Tank, Electricity	Water & Sewerage or Septic Tank, Electricity

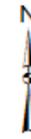
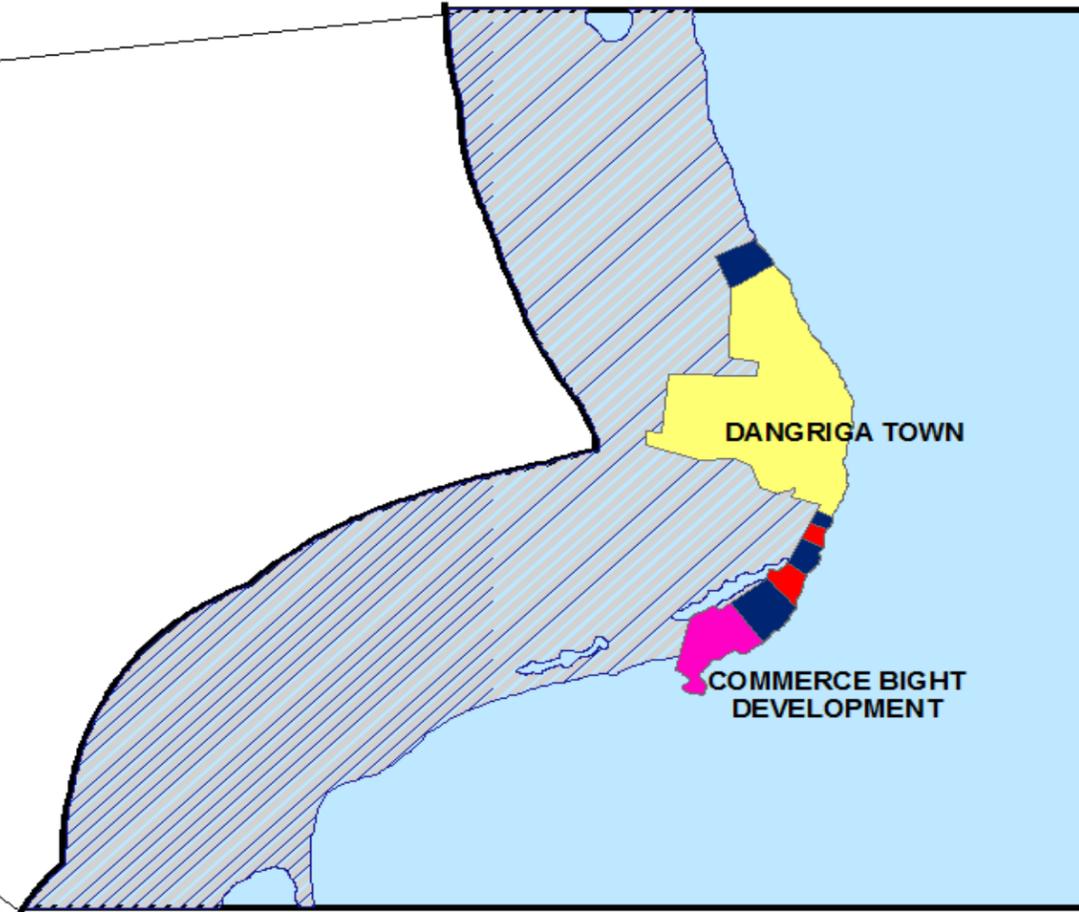
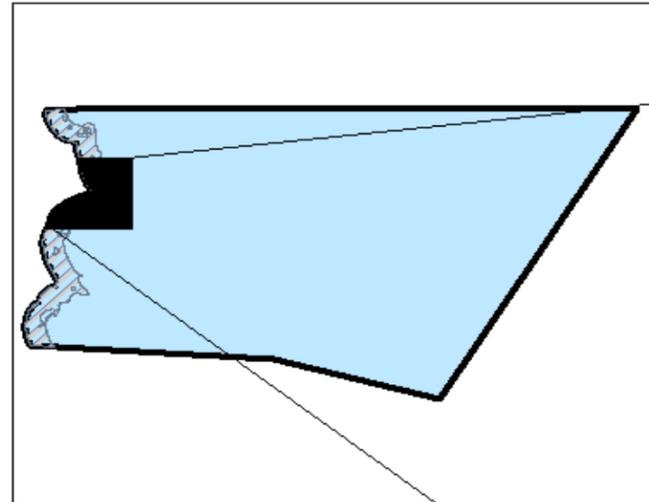
Commercial Development: Land use in which income is generated and commerce is predominant. Includes shops, stores, hotels, office buildings, and warehouses.

Commercial (C2) development standards are recommended for the area north of Riversdale for the construction of the international airport.

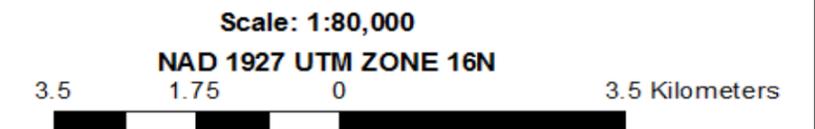
Table 6: Commercial Development Standards for Coastal Communities within the South Northern Region

Commercial Development Standards	
<i>Subdivision Criteria</i>	<i>Development Standards</i>
Density	Medium Density (C2)
Lot Size	6 lots per acre (0.5 acre; 21,780 sq.ft.; 2,023 sq.m.; 2,420 sq.yd.)
Permitted Use	Conservation Low Density, Other Goods & Services, Offices
Secondary Use	R1, R2, Institution, Conservation Park/Playground, Commercial Low Density
Net Density (dwelling units per area)	NA
Width/Length Ratio	1:3
Minimum Setbacks:	
Front:	4 feet
Side:	4 feet
Back:	10 feet
Max. Site Coverage (Percentage)	60%
Minimum Frontage	50 feet
Services	Water & Sewerage or Septic Tank, Electricity

INFORMED MANAGEMENT ZONING SCHEME FOR COASTAL DEVELOPMENT: SOUTH NORTHERN REGION

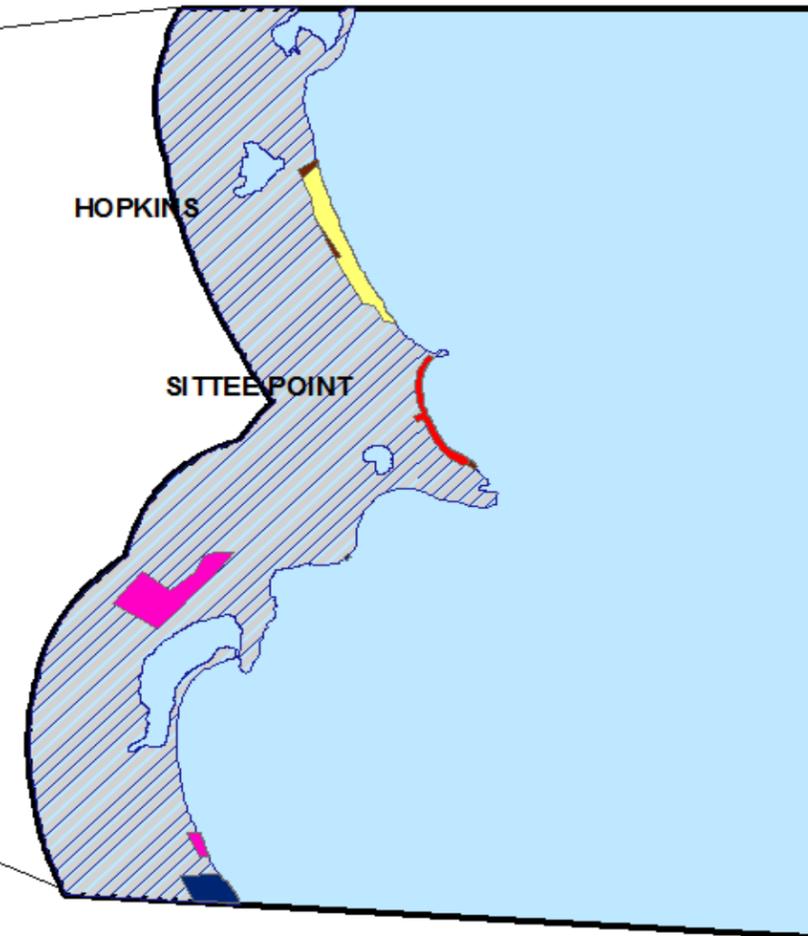
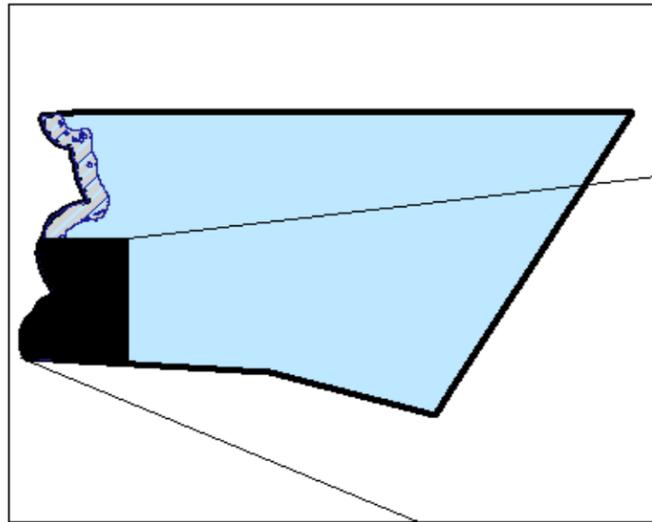


- Existing Low Density Town Residential
- Existing Medium Density Town Residential
- Existing Low Density Residential Commercial
- Future Medium Density Town Commercial
- 3km Zone of Influence

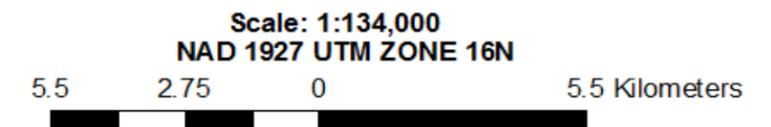


Map 9: Informed Management Zoning Scheme for Coastal Development in the South Northern Region (Northern Portion)

INFORMED MANAGEMENT ZONING SCHEME FOR COASTAL DEVELOPMENT: SOUTH NORTHERN REGION



- Existing Low Density Residential
- Existing Medium Density Commercial
- Existing Village Low Density Residential
- Future Low Density Commercial
- Future Medium Density Commercial
- 3km Zone of Influence



Map 10: Informed Management Zoning Scheme for Coastal Development in the South Northern Region (Southern Section)

Institutional Use and Community Facilities:

Land use in which public services and social upliftment predominates. Includes schools, community centers, public health clinics, libraries, embassies, police stations, and other public agencies. Also additional spaces set aside in large residential or commercial subdivisions for public purposes including public parking, cemeteries, churches, sporting areas, police stations, etc. **(Table 7)**

Table 7: Institutional and Community Facilities Development Standards for Coastal Communities within the South Northern Region

Subdivision Criteria	Development Standard
Building Setbacks: Front: Side: Back:	25 feet 12 feet 15 feet
Maximum Site Coverage	40%
Permitted Use	Education, Health, Religious, Community Centre etc.
Secondary Use	Conservation & Parks/Playground
Minimum Frontage	1/6 of Perimeter of Lot
Services	Water & Sewerage or Septic Tank, Electricity

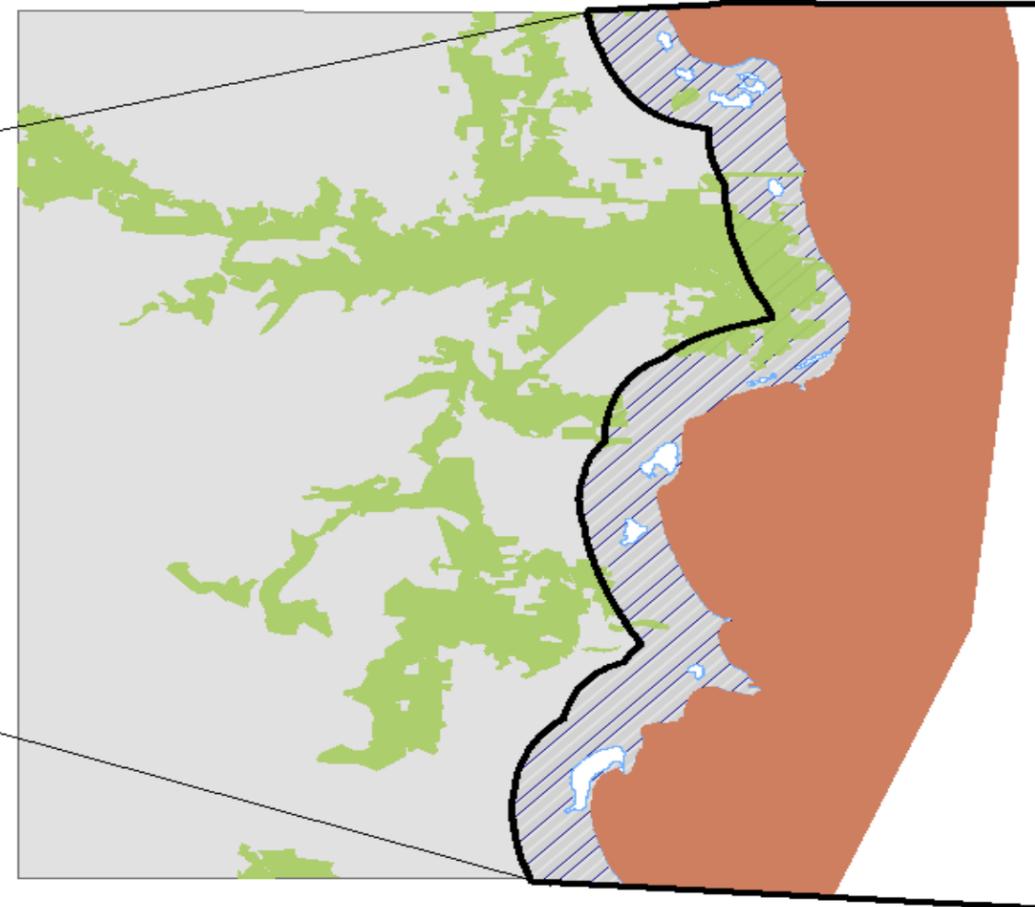
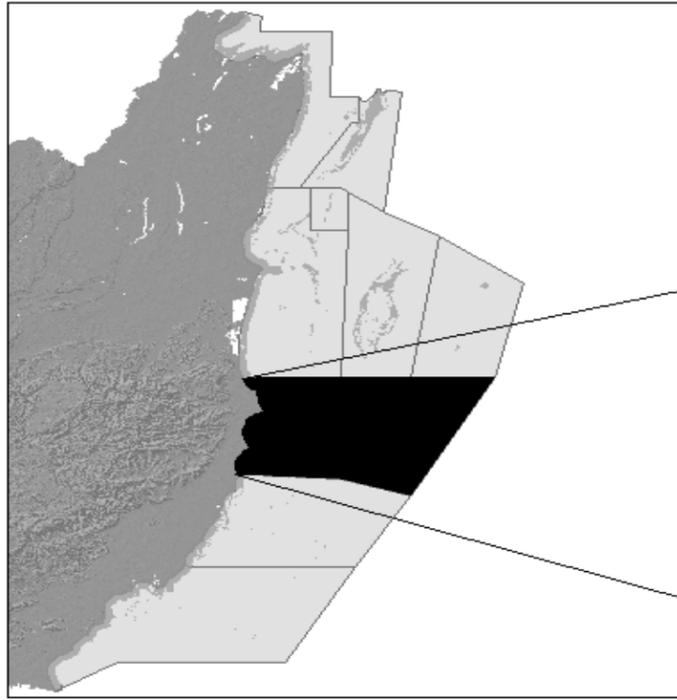
6.3.2 Coastal Agriculture Development

In addition to residential and commercial development, coastal agriculture has been identified as a potential use of lands within the 3km coastline of the South Northern region (**Map 9**). This type of development includes land use in which the production of food, feed, livestock and poultry, fruits and vegetables, and horticultural crops are raised, grown, or produced for commercial purposes. Development standards for coastal agriculture are found in **Table 8**. The framework for implementing the zoning scheme for the development of coastal lands for agriculture production can be found below in **Table 9**. Areas zoned for Coastal Agriculture can be seen in **Map 11**.

Table 8: Coastal Agriculture Development Standards for Coastal Communities within the South Northern Region

Subdivision Criteria	Development Standards	
	Low Density	Medium Density
Density	Low Density	Medium Density
Minimum Size	25 acres	5 acres
Permitted Use	Crop Growing and Harvesting	Crop Growing and Harvesting
Secondary Use	Light Industry, Conservation, Parks/Playground, R1, C1, Institution	Light Industry, Conservation, Parks/Playground, R1, C1, Institution
Width/Length Ratio	1:8	1:6
Services	Water & Sewerage or Septic Tank, Electricity	Water & Sewerage or Septic Tank, Electricity

INFORMED MANAGEMENT ZONING SCHEME FOR COASTAL AGRICULTURE: SOUTH NORTHERN REGION



- Runoff
- Existing Coastal Agriculture
- Coastline
- 3km Zone of Influence
- South Northern Base

Scale: 1:290,000
NAD 1927 UTM ZONE 16N

Map 11: Informed Management Zoning Scheme for Coastal Agriculture in the South Northern Region

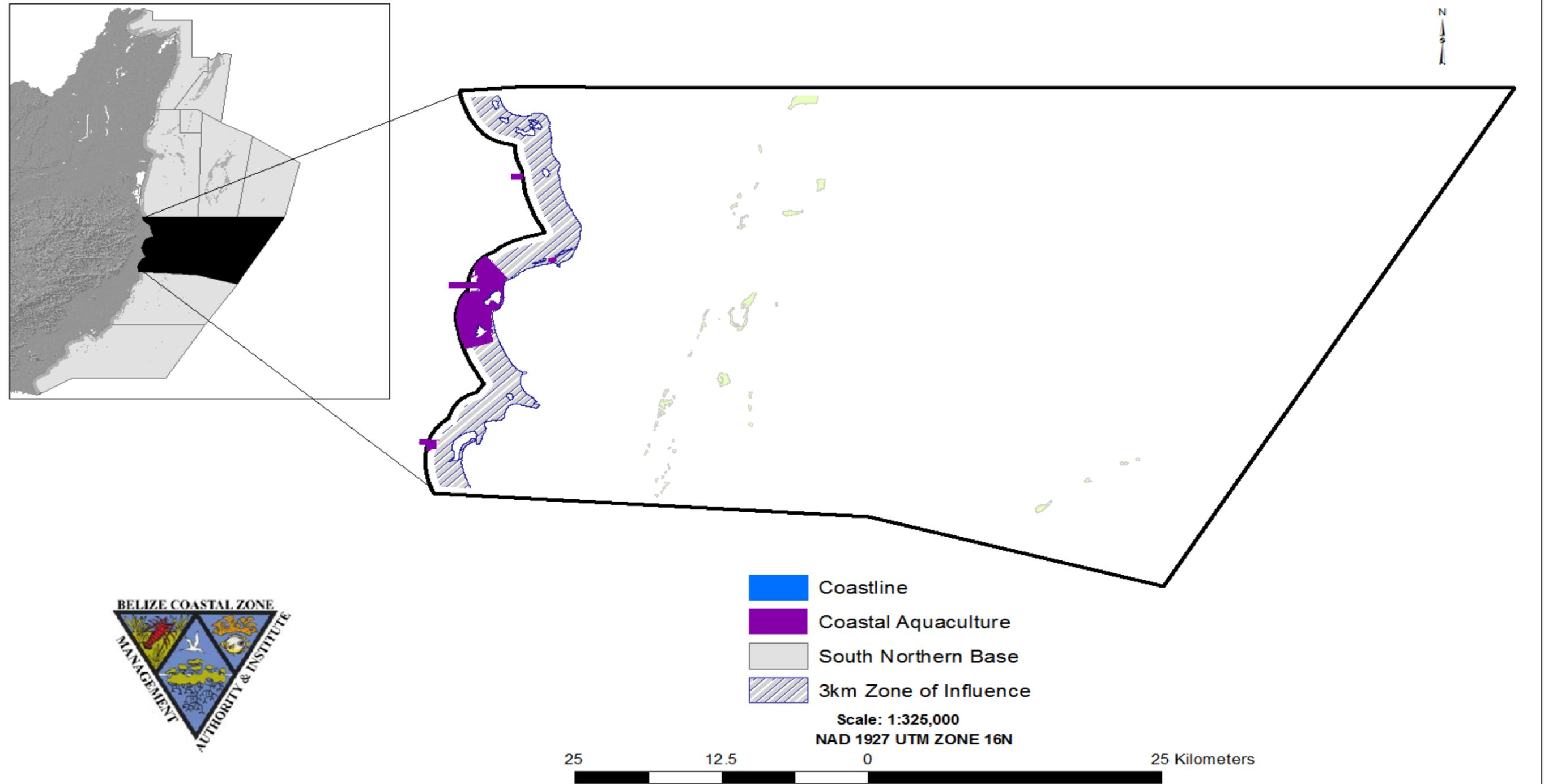
Table 9: Framework for Implementing Informed Coastal Agriculture in the South Northern Region

ZONE	CHARACTERISTICS OF ZONE	SCHEDULE OF PERMITTED USES			SCHEDULE OF RESTRICTED USES	SUPPORTING NATIONAL POLICIES	IMPLEMENTING AGENCY
		Dominant	Compatible	Regulated			
Coastal Agriculture	Coastal lands with fertile, irrigable soil especially suited for agricultural production of crops, and rearing of livestock for local consumption and export revenue	1. Production of crops such as banana, citrus, papaya, sugar cane, etc 2. Production of meat and livestock	Living quarters for employees and/or owners of agricultural company Research and education	Subdivision of land for agricultural purposes Application of agrochemicals	1. Use of unregistered agrochemicals (pesticides and fertilizers) 2. Use of registered agrochemicals (pesticides and fertilizers) outside of the legally prescribed limit 3. Oil exploration, extraction and establishment of oil refinery 4. Mining and dredging 5. Disposal of hazardous and toxic chemicals, solid wastes, untreated liquid wastes 6. Squatting/informal settling 7. Unregulated land clearing, 8. Fish farming, coastal aquaculture	Banana Industry Act Belize Agricultural Health Authority Act Citrus (Processing and Production) Act Environmental Protection Act Land Utilization Act Meat and Livestock Act Papaya Growers Association Act Pesticides Control Board Act Sugar Cane Industry (Control) Act	Banana Control Board Ministry of Agriculture Belize Agricultural Health Authority Citrus Control Board Ministry of Agriculture Department of the Environment Land Utilization Authority Ministry of Agriculture Ministry of Agriculture Pesticides Control Board Ministry of Agriculture

6.3.3 Coastal Aquaculture Development

The coastal lands within the South Northern coastal zone that have been zoned for land-based aquaculture (**Map 12**) fall within Zone 3 of the National Aquaculture Policy (2005). Zone 3 areas represent inland areas available for aquaculture development that are classified as “moderately suited” to food production of ornamental livestock not consumed as food by virtue of having “Mixed-Quality Fresh & Marine Water Resources Suited to Land Based Systems”. These areas are already surrounded by existing agriculture and the areas identified that are free from pesticide pollution. The aquaculture policy recommends small to large scale freshwater developments in the South Northern region involving the **maximum** cultivation of 160 hectares of land. Surface water requirement is between 0.04 - 40 cubic meters per minute. The framework for implementing the zoning scheme for the development of coastal lands for aquaculture production can be found below in **Table 10**.

INFORMED MANAGEMENT ZONING SCHEME FOR COASTAL AQUACULTURE: SOUTH NORTHERN REGION



Map 12: Informed Management Scheme for Coastal Aquaculture Development in the South Northern Region

Table 10: Framework for Implementing Informed Coastal Aquaculture in the South Northern Region

ZONE	CHARACTERISTICS OF ZONE	SCHEDULE OF PERMITTED USES			SCHEDULE OF RESTRICTED USES	SUPPORTING NATIONAL POLICIES	IMPLEMENTING AGENCY
		Dominant	Compatible	Regulated			
Coastal Aquaculture	Coastal lands especially suited for the culture of farm-raised fish via land-based pond systems	1. Construction of land-based pond systems for farming of non-invasive species	1. Office spaces, living quarters for employees and/or owners of aquaculture farms 2. Supporting facilities for culturing of species, such as hatcheries and nurseries 3. Mangrove planting	Subdivision of land for aquaculture purposes Fishpond operations	1. Use of unregistered chemicals and biological materials, such as antibiotics 2. Use of registered chemicals and antibiotics outside of the legally prescribed limit 3. Oil exploration, extraction and establishment of oil refinery 4. Mining and dredging 5. Disposal of hazardous and biological wastes 6. Release of untreated liquid wastes 6. Squatting/informal settling 7. Unregulated land clearing, and alteration of mangrove forests	Environmental Protection Act Fisheries Act National Aquaculture Policy (Draft)	Department of the Environment Fisheries Department Aquaculture Unit, Ministry of Agriculture

6.3.4 Cayes Development Standards

Development on cayes and atolls require specific building standards since these areas are closer in proximity to important sensitive habitats such as sea grass beds, mangroves and coral reefs. Ad hoc or uncontrolled development in these areas can have severe negative effects on surrounding ecosystems. For example the construction and proliferation of piers can cause destruction of the beach, sea grass bed and seabed and sedimentation, particularly if they are positioned on the windward side. Furthermore, the movement of debris during storms from buildings constructed on piers can be dangerous.

Sustainable development is crucial in maintaining our natural resources and the benefits that Belizeans receive from them. Proper planning is required for this to be achieved. For example, currently there are not enough docking facilities for boaters and fisher folks across the southern region. Thus, docking is done all over the place. It could be that the development of a new purpose built dock might provide material for beach reclamation via a controlled dredging program. Space is needed for bars/restaurants/rest area and boardwalks. This would facilitate more recreational space for locals and tourists.

In 2004, CZMAI produced a set of development guidelines for the cayes within each planning region. These development guidelines were produced in consultation with stakeholders from each planning region along with technical input from government relevant agencies. Within the document land use classes were developed along with accompanying standards for the varying degrees of development that can occur on a Caye. Use classes were also assigned to each Caye according to suitability. The use class categories developed include residential, commercial and conservation, representing the various degrees of development intensities allows on cayes. Therefore CZMAI recommends the following as development standards for developing **the cayes** within the South Northern Region:

Land tenure of the cayes within the South Northern region is a combination of private and state ownership (See **Table 11**): Summary of Land Tenure of the South Northern Region Cayes). Those lands which are nationally owned should remain as such as this state of affairs provides the opportunity for decision-makers to have greater input in land management concerns. Where land is private property, the right to alienate and develop must be recognized, but regulated to ensure that the subdivision of land subscribes to guidelines which ensure that the resulting parcels can sustain the type of permitted development activity. The seabed is national land and thus any proposals to develop the seabed or to construct piers, marinas and seawalls within this region needs to receive clearance from the Lands Department and Department of Environment. This action is particularly relevant in the case of the seabed within the South Water Caye Marine Reserve and Glovers Reef Marine Reserve, which has zonation with areas under a non-extractive regime, under the Fisheries Department.

Table 11: Summary of Land Tenure for Cayes in the South Northern Region

Land Tenure and Ownership of the Cayes in the Southern Region							
Name of Caye	National		Lease		Private Property		Total Size (acres)
	Size (acres)	%	Size	%	Size	%	
Glory Caye	1.00	100	0	0	0	0	1.00
Southern Long Caye	380.00	95.2	19.42	4.8	0	0	400
Mosquito Caye	0	0	0	0	6.84	100	6.84
Sandfly Caye	96.13	75.7	26.78	21.1	4.06	3.2	127
Garbutt's Caye	0	0	0	0	4.6	100	4.6
Columbus Caye	17.44	17.6	39.54	40.4	41.18	42	98
Cross Caye	68.48	85.6	6.78	8.4	4.8	6	80
Coco Plum Caye/Range	13.02	29.6	9.38	21.3	21.61	49.1	44
Tobacco Range	82.58	58.7	27.99	10.2	71.32	29.7	140.69
Tobacco Caye	0	0	0	0	5.86	100	5.86
Man-O-War Caye	1	100	0	0	0	0	1
Ragged Caye	0	0	0	0	2.33	100	2.33
Rockers Caye	1.5	100	0	0	0	0	1.5
Twin Cayes	74	77.9	13.83	14.6	7.12	7.5	95
South Water Caye	0	0	0	0	13.27	100	13.27
Carrie Bow Caye	0	0	0	0	1	100	1
Curlew Caye	0.5	100	0	0	0	0	0.5
Glovers Reef Caye (5)	0	0	0	0	56.08	100	56.08
Blue Ground/ Cockney Range	34	678	8.35	16.7	7.68	15.3	50
Stewart Caye	12	100	0	0	0	0	12
Bread and Butter Caye	14	100	0	0	0	0	14
Wee Wee Caye	5.16	86	.84	14	0	0	6
Spruce/Crow's Nest Caye	0	0	0	0	1.10	100	1.1
TOTAL	786.81		153.91		254.44		1266.17

The development potential of the cayes is a function of the size, ecological sensitivity and level of exposure. The cayes that were unsuitable or limited in their development prospects are the smaller and more ecologically sensitive cayes in exposed locations. Ecological sensitivity relates both to the aquatic environment and the terrestrial province. In general, both the coral reef areas of the aquatic environment and the mangrove dominated areas of the terrestrial province, with particular faunal associations such as bird nesting sites, are sensitive.

The development status of the cayes in the Dangriga area ranged from developed to situations where cayes were uninhabited or only temporarily inhabited. The development potential of the cayes that are either undeveloped or not fully developed is a direct function of the “ecological sensitivity” of the area. This is predicated on the extent and nature of the current development in the area, as well as the policy focus of the relevant natural resource management agencies of the Government of Belize (GOB) to encourage and support developments that are amenable to the natural environment, and whose ecological impacts are within the „carrying capacity” of the environment.

The ecological sensitivity of a particular area is based on the „health status” and ecological fragility of the flora and fauna in the near shore waters of the cayes, as well as on the land-based flora and fauna inhabiting the cayes. The most sensitive areas in relation to sub-tidal near shore waters are areas that are richly invested with reef building corals and sea grass beds. Other sub tidal areas of note in this regard are critical habitats, such as spawning and nursery areas for fish. Areas of heightened sensitivity in regard to the terrestrial areas are vegetation that stabilize shore lines and makes special contribution to critical life stages of fauna in the area such as mangroves, which are important nursery ground for a wide variety of fin-fishes and invertebrates such as the Spiny Lobster (*Panulirus argus*) and the Queen Conch (*Strombus gigas*). Survival of these species are also linked to the sea grass beds/shallow reef beds of loose sand. This is particular to the reef from **South water Caye to the north pointer reef and the reef east of Cross Caye pass Columbus up to Emily and from Cross Caye to Tobacco Caye**. Terrestrial areas of special note are those providing a habitat for fauna to perform critical life functions such as nesting and breeding areas. This is of particular note for a number of seabirds occurring in the Dangriga area. The developments on the Dangriga cayes are either residential in nature, or they are based on recreational tourism, fishing, and research and education. The cayes that are developed, that is, **Tobacco Caye, Southwater Caye Carrie Bow Caye, Long Caye and Southwest Caye # II**, are all located in a coral dominated environment on the ‘barrier platform’, in the immediate lee of the reef crest of the main barrier reef and on the atoll. This is an ecologically sensitive environment, and although no systematic ecological impact survey or carrying capacity studies have been undertaken, the visual impact of the saturated development coverage these cayes have would invariably lead one to err on the side of caution. In this regard, it is strongly recommended that further developments be limited on these cayes. The other cayes that is developed and for which no further development is advisable is **Wee Wee Caye**, which is the site of an education and research facility. This Caye has developed on a patch reef system that is surrounded by coral patches and sea grass beds.

Cayes that are located in areas that are dominated by coral reef and sea grass beds, and that are either too low lying and inappropriate to accommodate development due to their small sizes or both are: **Stewart Caye, Man-of-War Caye, Ragged Caye and Curlew Caye.** **Man-of-War Caye** is also inappropriate for development due to the presence of nesting colonies of Frigate Bird or Man-of-War (*Fregata magnificens*) and the Brown Booby Bird (*Sula leucogaster*).

Cayes that are considered least suitable for development due also to their low lying nature but in effect are mangrove wetland systems or unique biodiversity and sensitive ecologies are: **Mosquito, Columbus, Twin, Sand –Fly, Southern, Garbutt, lower Tobacco Range, Ragged, Stewart, Bread and Butter, lower Crows Nest and Middle Cayes) and those not suitable are (Glory, upper Crows Nest, Blue ground Range, Curlew, upper Tobacco Range, Rockers Island and Mosquito Cayes.)** In the case of **Twin Cayes**, it is the headquarters and ranger station of the South Water Caye Marine Reserve. Apart from falling within the boundaries of the protected area, the Twin Cayes area is know as a spawning area for the Jew Fish (*Epinephelus itajara*), an important commercial fin-fish species which is increasingly rare and a declining fishery resource.

The cayes that are considered most suitable for development are **Coco Plum and Cross Cayes.** The former one is one of the larger more stable cayes, and not generally known to support any nesting or roosting sites for sea birds or within any sensitive ecological environment. However, more detailed soil testing may be required prior to any major development activity.

For Cayes within the South Northern Region, only one category is assigned. That is Residential I to **Cross and Garbutt Cayes**

Residential Development: Recommended for General residential purposes – permanent residence, vacation home, time share, fisherman camps and other home industries (**Table 12**):

Table 12: Standards for Residential Development on Cayes Within the South Northern Region

Subdivision Criteria	Development Standard
Primary Use	Residential
Secondary Use	Conservation
Minimum Lot Size	1 acre
Maximum # of lots per acre	1
Net Housing Density	1 house per acre
Maximum # of Habitable Rooms/acre	5
Maximum Building Coverage	5%
Maximum Site Clearance	50%
Building Setback Front	25 ft
Building Setback Side	25 ft
Building Setback Back	50 ft
Between Buildings	30 ft
Building Height	28 ft
Maximum # of Floors	2
# of Pier per site	1

For Cayes in the South Northern Region only Commercial I apply. These are for cayes which are already developed as resorts. That is, **Coco-plum, Tobacco, South water, South west, Long and Northeast Cayes.**

Commercial Development: Recommended for accommodations and associated services – hotels, resorts, motels, guesthouses; associated bars, shops, offices, entertainment facilities, marinas, gas stations/pumps (**Table 13**)

Table 13: Standards for Commercial Development on Cayes Within the South Northern Region

Subdivision Criteria	Development Standard
Primary Use	Commercial
Secondary Use	Residential
Minimum Lot Size	1 acre
Maximum # of lots per acre	1
Net Housing Density	4 units per acre
Maximum # of Habitable Rooms/acre	8
Maximum Building Coverage	10%
Maximum Site Clearance	30%
Building Setback Front	50 ft
Building Setback Side	30 ft
Building Setback Back	50 ft
Between Buildings	30 ft
Building Height	28 ft
Maximum # of Floors	2
# of Pier per site	1

Southwater Caye and Glovers Reef Atoll are marine reserves and World Heritage Sites. They both have protected status. However, the contribution of the other cayes to the protection of the mainland from storm surges, the linkages to the fishing and tourism industries, its scientific and economic opportunities and its relationship to the survival of the barrier reef cannot be avoided. Furthermore, the unique biodiversity and social and cultural importance of some of the Cayes mandates that particular areas of the Dangriga Cayes Region to remain in their natural state. To facilitate this, it is recommended that certain areas be zoned for Conservation Use (**Maps 13, 14, 15, & 16**):

Conservation Development: Not recommended for major development but can accommodate very small scale infrastructure – Research stations, low scale ecotourism lodge, residential/fisherman’s camps with temporary structures. (**Table 14**)

Cayes assigned **Conservation I** land use category are: **upper Tobacco Caye Range, Curlew Caye and Blue Ground Range.**

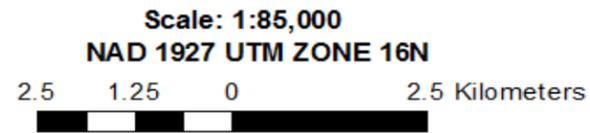
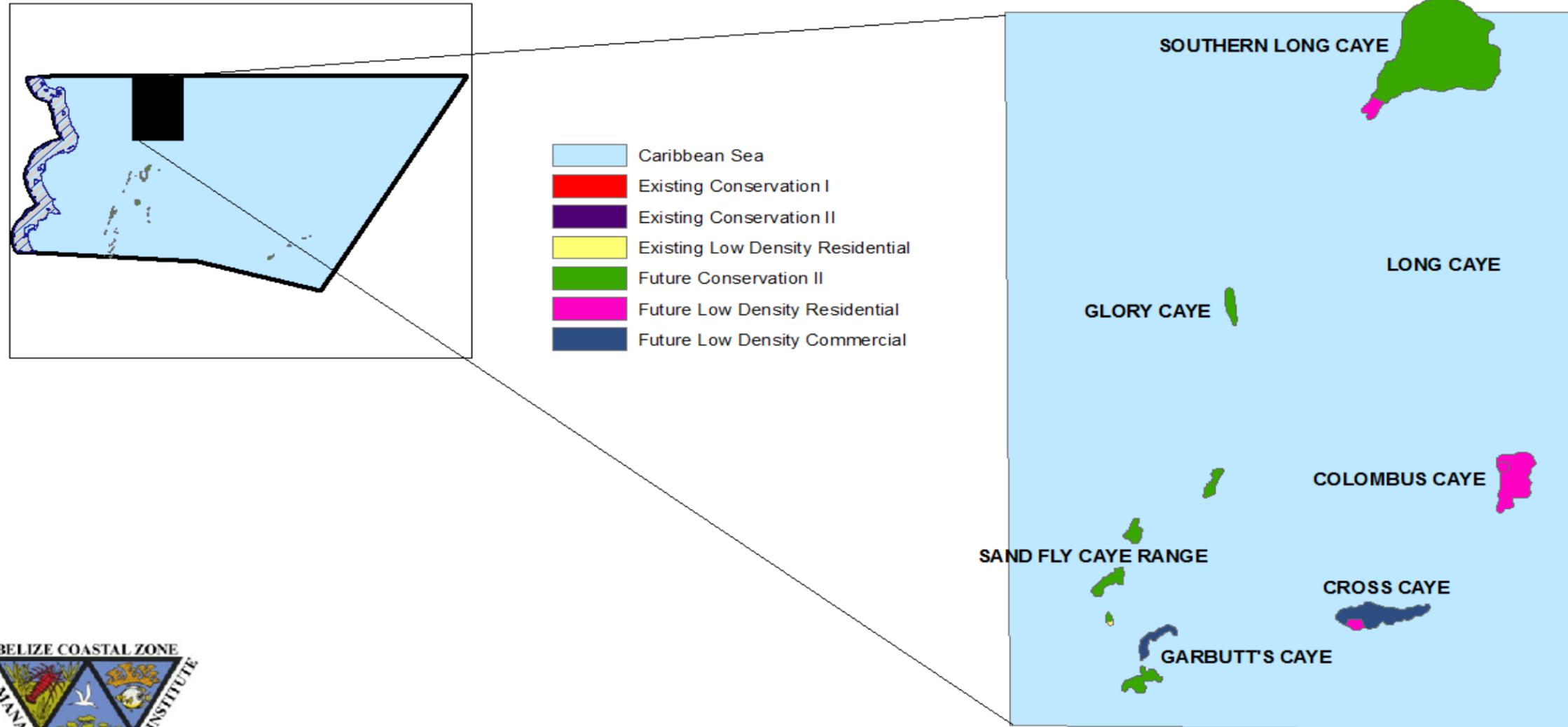
Cayes assigned **Conservation II** land use category are: **Southern Long Caye, Glory Caye,9 Columbus Caye, Sand Fly Range, lower Tobacco Caye Range, Rockers Island, Ragged Caye,**

Twin Caye Range, Carrie Bow Caye, Stewart Caye, Bread and Butter Caye, Wee Wee Caye, Crows Nest Caye and Middle Caye.

Table 14: Standards for Conservation Development on Cayes Within the South Northern Region

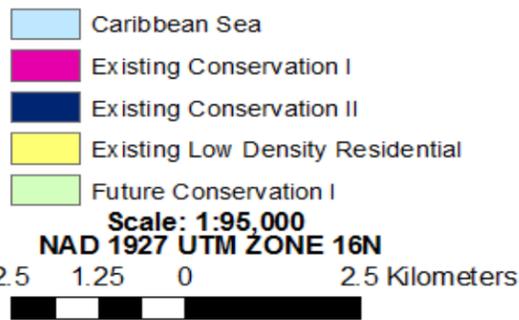
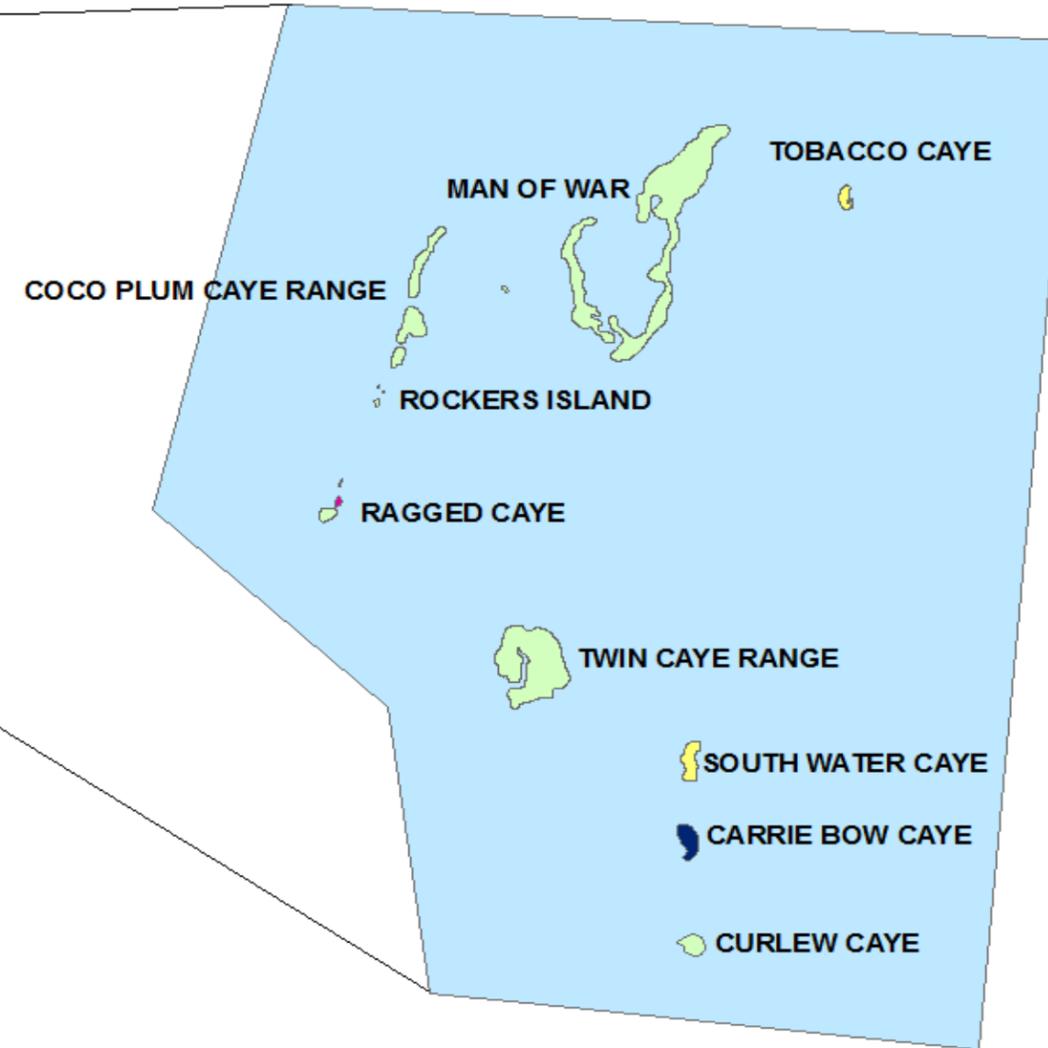
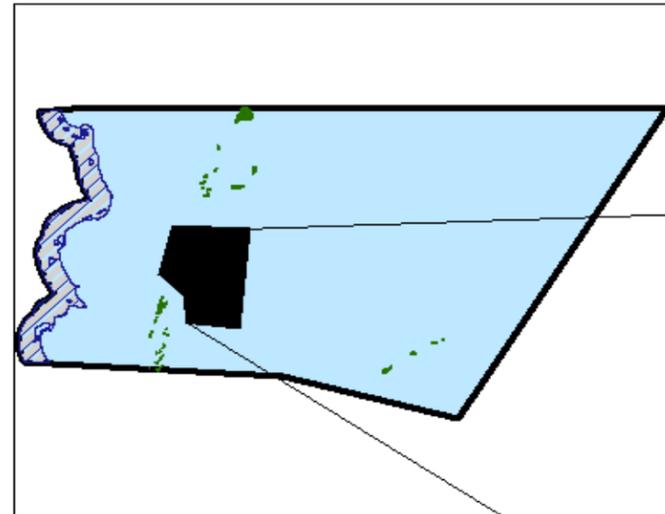
Subdivision Criteria	Development Standards	
	Conservation I	Conservation II
Use Category	Conservation I	Conservation II
Primary Use	Conservation	Conservation
Secondary Use	Fisherman Camp	Residential I
Minimum Lot Size	1 acre	1 acre
Net Housing Density	2 per acre	2 per acre
Maximum # of Habitable Rooms/acre	4	4
Maximum Building Coverage	4%	6%
Maximum Site Clearance	50%	50%
Building Setback Front	50 ft	50 ft
Building Setback Side	25 ft	25 ft
Building Setback Back	50 ft	50 ft
Between Buildings	25 ft	25 ft
Building Height	28 ft	28 ft
Maximum # of Floors	2	2
# of Pier per site	1	1

INFORMED MANAGEMENT ZONING SCHEME FOR DEVELOPMENT OF CAYES: NORTHERN SUB-REGION



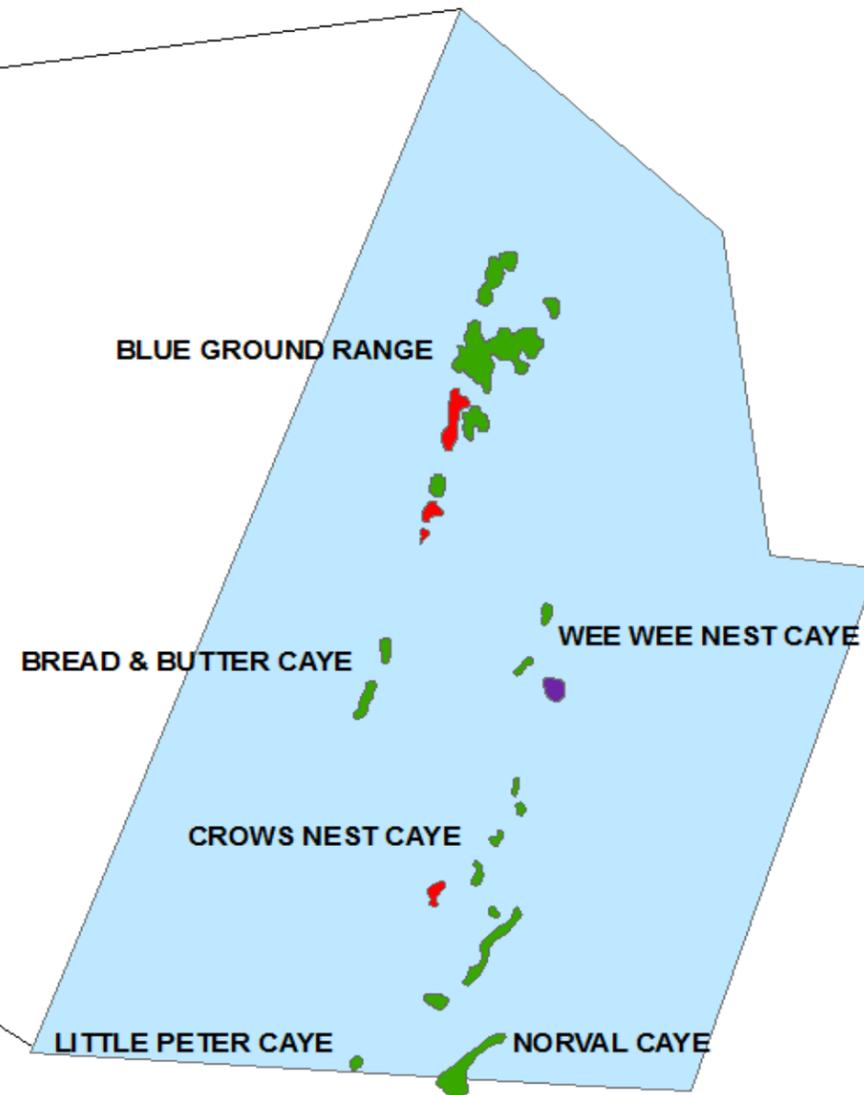
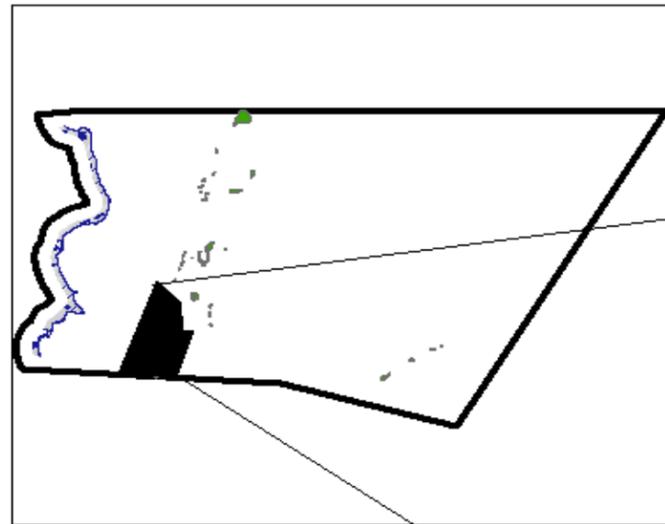
Map 13: Informed Management Scheme for Development of Cayes in the Northern Sub-region

INFORMED MANAGEMENT FOR DEVELOPMENT OF CAYES: CENTRAL SUB-REGION



Map 14: Informed Management Zoning Scheme for Development of Cayes in the Central Sub-region

INFORMED MANAGEMENT ZONING SCHEME FOR DEVELOPMENT OF CAYES: SOUTHERN SUB-REGION

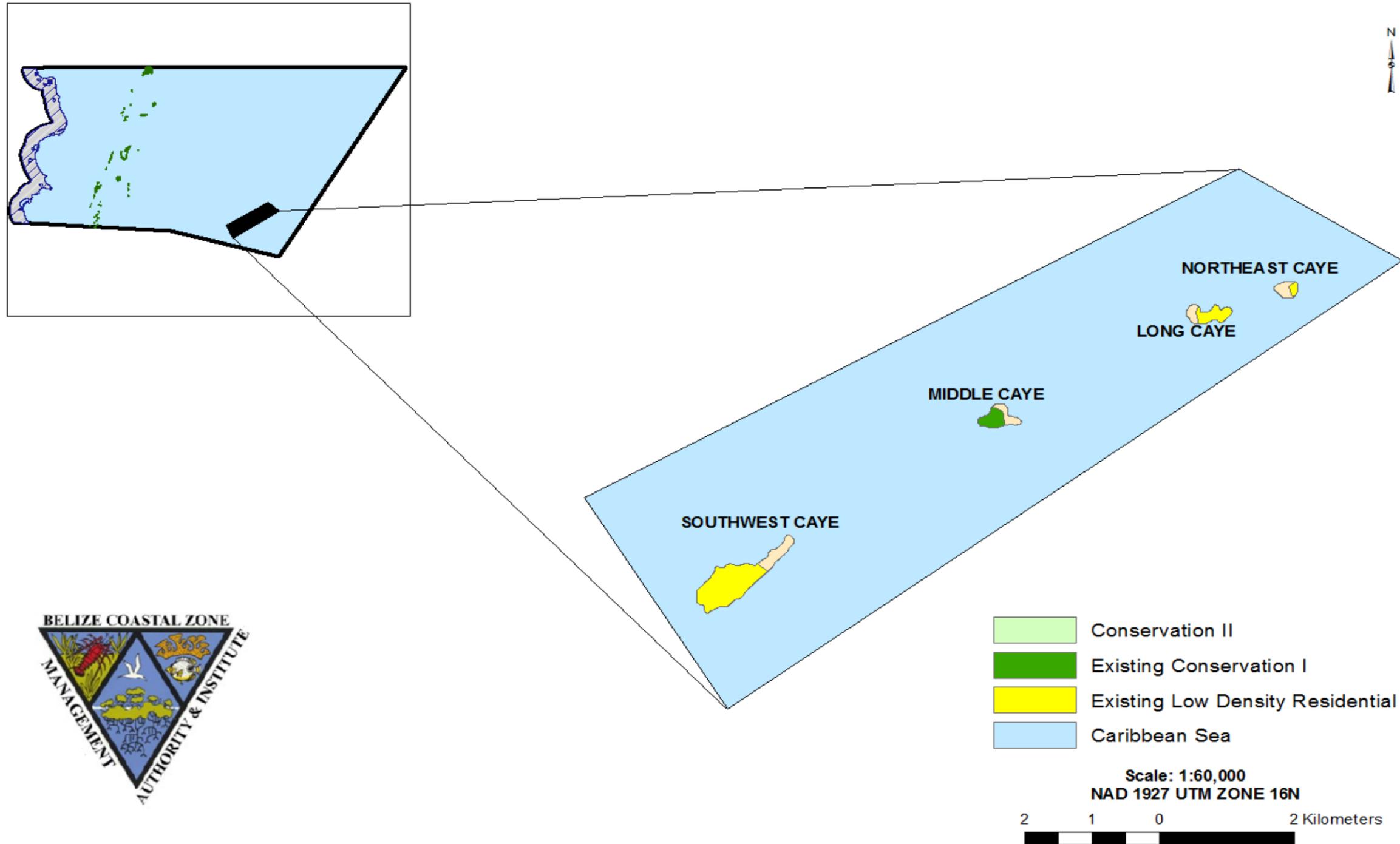


- Caribbean Sea
- Existing Conservation II
- Existing Low Density Residential
- Future Conservation I

Scale: 1:95,000
NAD 1927 UTM ZONE 16N
 2.5 1.25 0 2.5 Kilometers

Map 15: Informed Management Zoning Scheme for Development of Cayes in the Southern Sub-region

INFORMED MANAGEMENT ZONING SCHEME FOR DEVELOPMENT OF CAYES: EASTERN SUB-REGION



Map 16: Informed Management Zoning Scheme for Development of Cayes in the Eastern Sub-region

Recommended Actions:

1. Increased collaboration among local stakeholders, interest groups and the agencies responsible for land allocation, including the conditions applied to lease approval and the regulation of lot sizes
2. Limit the number of piers per property or caye
3. Prohibit the construction of buildings on piers
4. Preserve remaining crown lands in the region
5. All new developments must be constructed using the standards developed by LUA and CZMAI in the creation of these management guidelines.
6. Although permitted, coastal agriculture and aquaculture activities must be closely monitored and not allowed to occur near important watersheds and lagoons. Relating to this, proper pesticide use and waste water disposal is key to ensuring that the marine environment is not polluted. Therefore enforcement agencies will be required to conduct regular water testing.

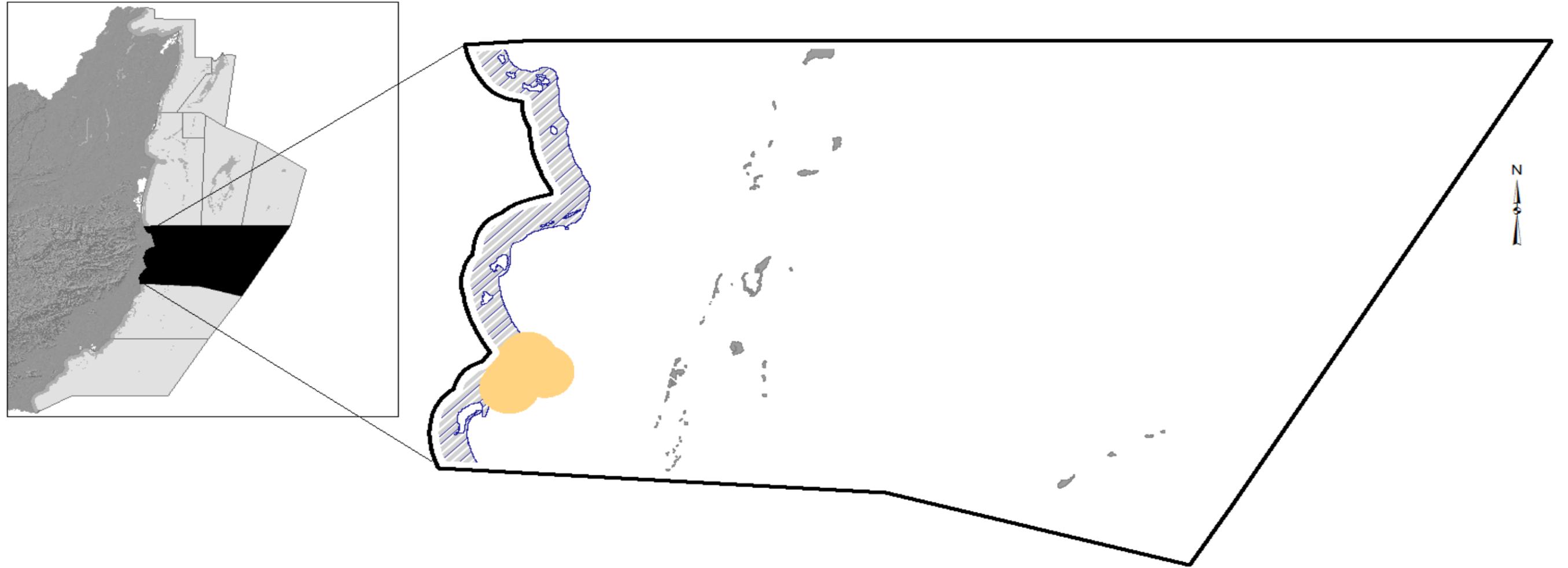
6.4 Marine Dredging and Mineral Extraction

Dredging and sand mining can have disastrous effects on the habitats of particular species and on other economic and recreational use of the region. Significant dredging activity in the region has been noted and there is concern that the pattern of dredging or sand mining activity to increase land mass or land rehabilitation, particularly post storm disruption, may be extended into the future. Requests must be carefully monitored by the Geology and Petroleum Department and other relevant permitting agencies in order to avoid these potential impacts.

Recommended Actions:

1. Discourage dredging activity outside of Informed Management Marine Dredging Zoning Scheme for this region (**Map 17**). Requests for land rehabilitation activities associated with post-storm disruption of land mass must be reviewed on a case by case basis. The precautionary approach must be use in respect of approvals, and the activity must not disrupt the marine ecosystems or impact negatively on existing uses by other individuals or operations, and must be approved by the Department of the Environment and National Environmental Appraisal Committee
1. Ensure that fees collected for the issuing of dredging permits are allocated to the local town or village councils to mitigate effects of nearby dredging activities.

INFORMED MANAGEMENT ZONING SCHEME FOR MARINE DREDGING: SOUTH NORTHERN REGION



- Coastline
- Marine Dredging
- South Northern Base
- 3km Zone of Influence

Scale: 1:325,000
NAD 1927 UTM ZONE 16N

20 10 0 20 Kilometers

Map 17: Informed Management Zoning Scheme for Marine Dredging in the South Northern Region

Table 15: Framework for Implementing Informed Management Marine Dredging Scheme

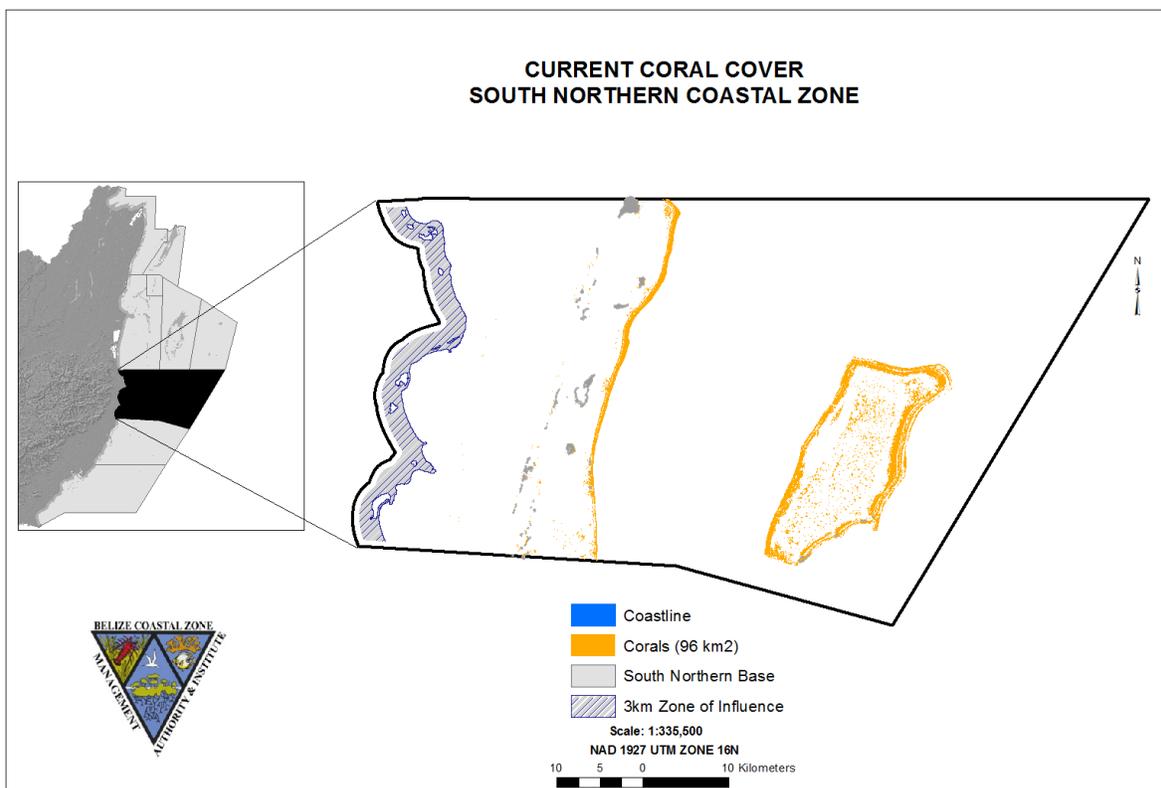
ZONE	CHARACTERISTICS OF ZONE	SCHEDULE OF PERMITTED USES			SCHEDULE OF RESTRICTED USES	SUPPORTING NATIONAL POLICIES	IMPLEMENTING AGENCY
		Dominant	Compatible	Regulated			
Dredging	Areas for the excavation of bottom sediments for the maintenance of navigable waterways and ports of entry	1. Excavation of bottom sediments for the maintenance of navigational lanes and ports of entry	1. Shipping and navigation; passage/entry of commercial vessels	Sediment extraction	1. Aquaculture 2. Disposal of solid and liquid wastes 3. Disturbance and destruction marine ecosystems, including but not limited to, coral reef system, seagrass beds, etc 4. Marine recreation 5. Fishing 6. Extraction of petroleum 7. Extraction of water from natural salt pans	Environmental Protection Act Mines and Minerals Act Marine Dredging Policy (Draft) Land Utilization Act	Department of the Environment Mining Unit, Ministry of Natural Resources Land Utilization Authority

6.5 Sensitive Habitats

The South Northern region contains rich and diverse habitat. These habitats include those found in both the terrestrial areas, as well as the sub-surface or aquatic province. The species of animals range from corals, to fishes, sea turtles, crocodile and dolphins. Plant species includes land-based or emergent forms such as mangroves and those on the seafloor as the sea grasses.

6.5.1 Corals

There are two principal types of reef systems in the waters of the region. These include a barrier reef system, popularly known as the Belize Barrier Reef Reserve System, and is characterized by a prominent reef crest. The second type of reef system is referred to as a patch reef system. The patch reefs are generally found on gently raised sub-tidal promontories in the immediate area of the back-reef, as well as the shallower areas of the barrier lagoon, including the nearshore areas surrounding various cayes. The reef crest is characterized by semi-emergent coral forms. The deeper fore reef areas are dominated by branching, bolder-type and plate-like corals. The reef crest and back-reef areas are characterized by palmate and bolder-type coral forms.



Map 18: Coral Cover within the South Northern Region

Coral cover in this region is about 98 square kilometres (**Map 16**). Results of the InVEST Habitat Risk Assessment (HRA) model suggest that currently 3.4% of the region’s corals are at low risk, 96.08% at medium risk, and 0.53% at high risk (**Fig. 1**). The results also suggest that in a Conservation Zoning Scheme no corals would be at high risk. There would also be proportionately less corals at medium risk than in the current. According to HRA model results, corals that were formerly at medium risk in the current scenario would be at low risk in a future Conservation Zoning Scheme, making the total percentage of corals at low risk in this scenario 20.06%, and at medium risk 79.94% (**Fig. 1**). In a Development Zoning Scheme, HRA model results suggest that the threat to corals would become increasingly higher. Only 3.39% of corals would be at low risk whereas 15.38% and 81.23% of present corals would be at medium and high risk, respectively (**Fig. 1**). In the proposed Informed Management Zoning Scheme, HRA results are indicating that no corals would be at high risk, 0.2% of present corals would be at low risk, and 99.8% at medium risk (**Fig. 1**).

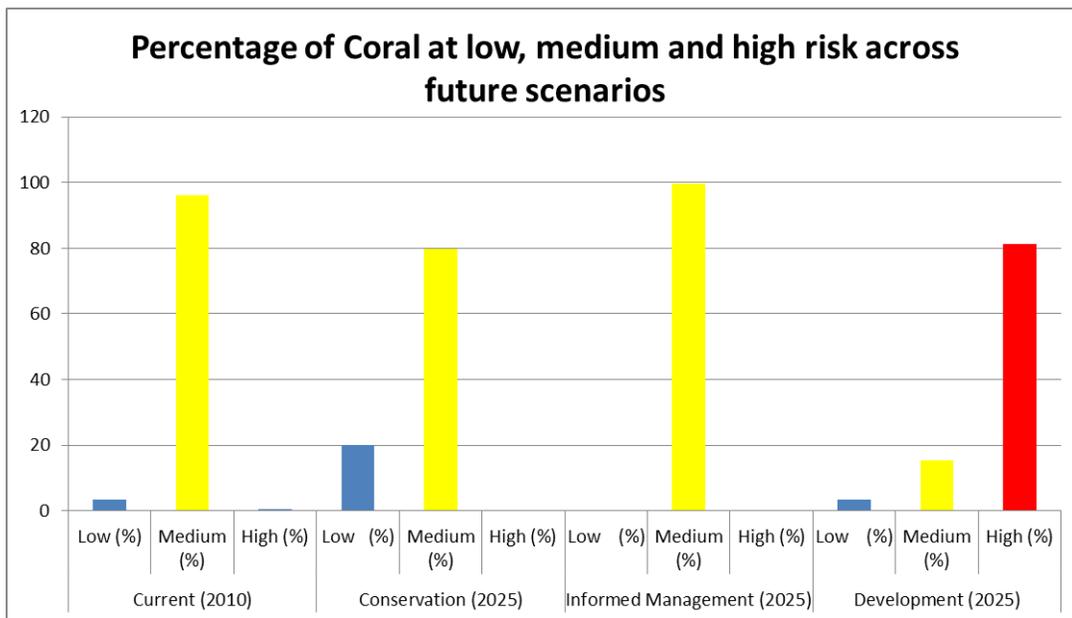
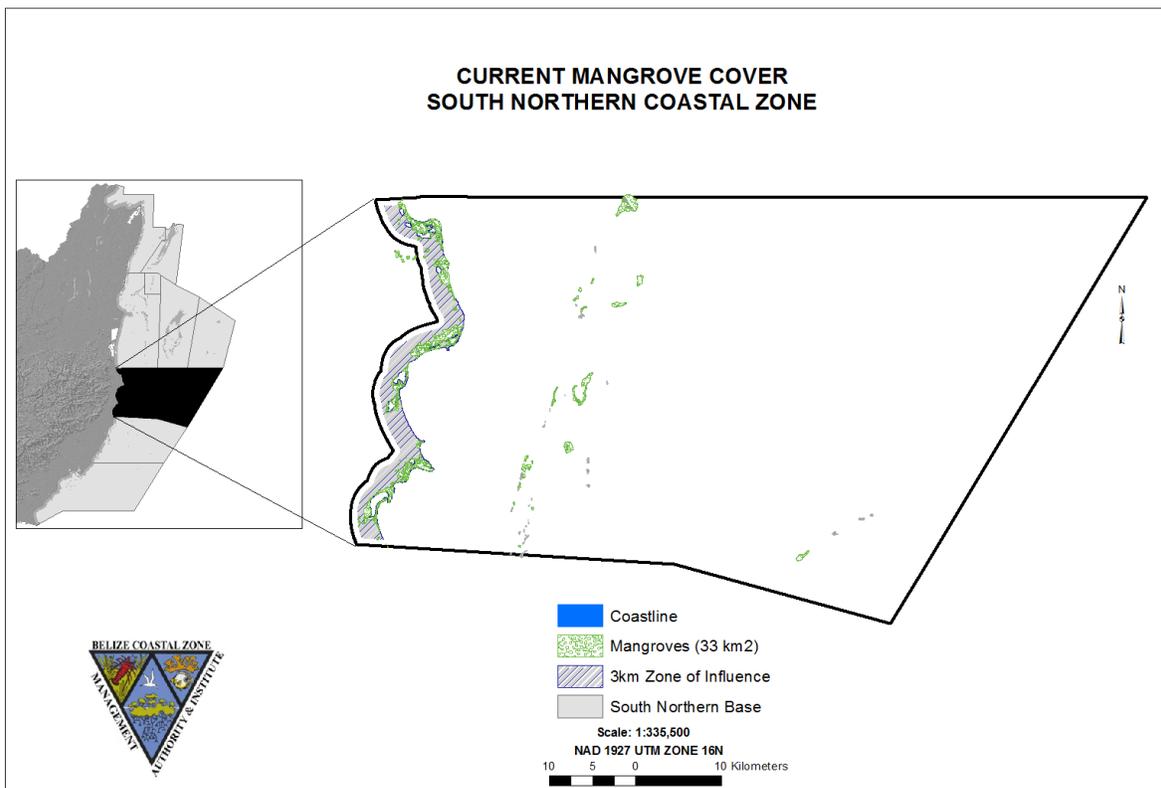


Figure 1: Risk to Corals in the South Northern Region by Scenario

6.5.2 Mangroves

The dominant intertidal or wetland species in the region is mangrove. These include the Red Mangrove (*Rhizophora mangle*), the White Mangrove (*Laguncularia racemosa*) and the Black Mangrove (*Avicennia germinans*). The mangrove-associate species such as the Button Wood (*Conocarpus erectus*), and the Poisonwood (*Metopium brownie*) are also found on a number of the cayes, especially those that have not been overtaken by development. Other frequently encountered woody vegetation on the cayes that are either untouched by development or that have not been fully developed, are the Red Gumbo Limbo (*Bursera simaruba*), the Wild Cocoplum (*Hirtella Americana*) and the Genip (*Grias cauliflora*).



Map 19: Mangrove Cover within the South Northern Region

In this region, the total mangrove cover is approximately 31 square kilometers (**Map 17**). Results of the InVEST Habitat Risk Assessment (HRA) model suggest that currently 27.22% of the region’s mangroves are at low risk, 57.34% at medium risk, and 15.44% at high risk (**Fig. 2**). The results also suggest that in a Conservation Zoning Scheme no mangroves would be at high risk. There would also be proportionately less mangrove at medium risk than in the current. According to HRA model results, mangroves that were formerly at medium risk in the current would be at low risk in a future Conservation Zoning Scheme, making the total percentage of mangroves at low risk in this scenario 57.67%, and at medium risk 42.33% (**Fig. 2**). In a Development Zoning Scheme, HRA model results suggest that the threat to mangroves would become increasingly higher. 2.71% of mangroves would be at low risk whereas 35.68% and 61.62% of present mangrove would be at medium and high risk, respectively (**Fig. 2**). In the proposed Informed Management Zoning Scheme, HRA results are indicating that no mangroves would be at high risk, 45.11% of present mangroves would be at low risk, and 54.89% of medium risk (**Fig.2**).

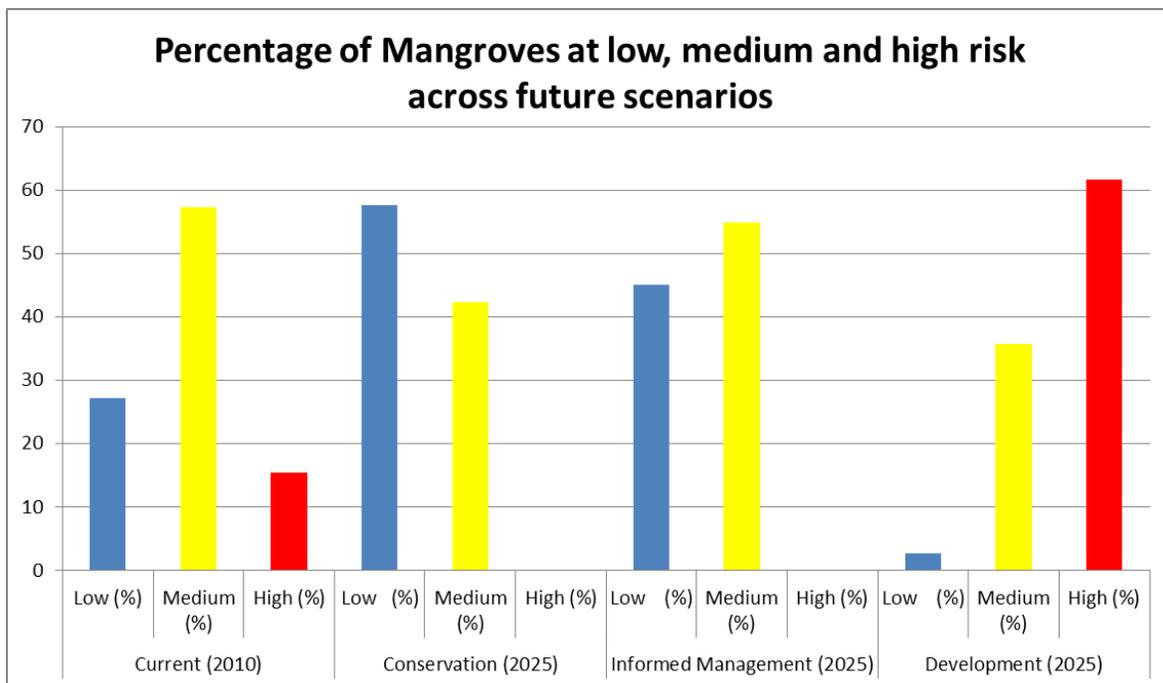
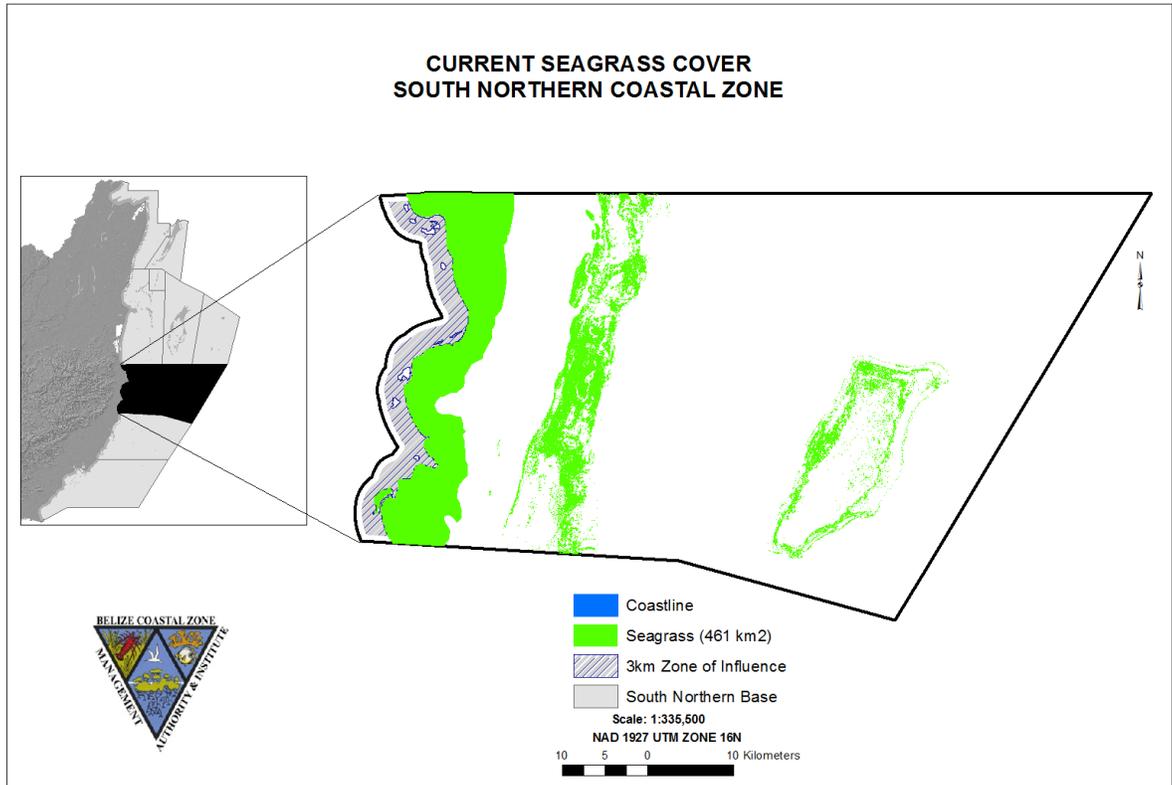


Figure 2: Risk to Mangroves in the South Northern Region by Scenario

6.5.3 Seagrass

Seagrass beds dominate much of the areas of the barrier lagoon, including the waters around the patch reefs and near-shore areas of the cayes, as well as the shallower and less turbid areas of the shelf lagoon. The predominant species is the Turtle Grass (*Thalassia testudinum*). Other sea grass species found in the area, particularly near the cayes and intermingled with the Turtle Grass (*Thalassia testudinum*) are the Manatee Grass (*Syringodium filiforme*) and Halodule (*Halodule wrightii*).



Map 20: Seagrass Cover in the South Northern Region

The total seagrass cover for the South Central region is approximately 98 square kilometres (**Map 18**). Based on the Habitat Risk Assessment (HRA) conducted for this region, approximately 0.24% of the region’s seagrass are currently at low risk, 73.59% at medium risk, and 26.17% at high risk (**Fig. 3**). In a Conservation Zoning Scheme, HRA model results suggest a dramatic reversal of the level of risk to current seagrass in this region whereby only 2.21% of seagrass would be at high risk, 14.08% of seagrass would be at low risk and 83.72% at medium risk in 2025 (**Fig. 3**). In a Development Zoning Scheme, model results suggest that 92.55% of present seagrass would be at high risk. This zoning scheme also represents the only scenario in which seagrass are at high risk. The results also suggest that in the Development Zoning Scheme, 7.22% of seagrass would be at medium risk and 0.23% at low risk in 2025 respectively (**Fig. 3**). In the proposed Informed Management Zoning Scheme, the HRA model results suggest an improvement in the amount of seagrass that are currently at risk. Under this zoning scheme, 93.54% of present seagrass would be at medium risk. Additionally, the model results reveal that under this zoning scheme, 0.09% of present seagrass would be at low risk and 6.37% at high risk in 2025 (**Fig. 3**).

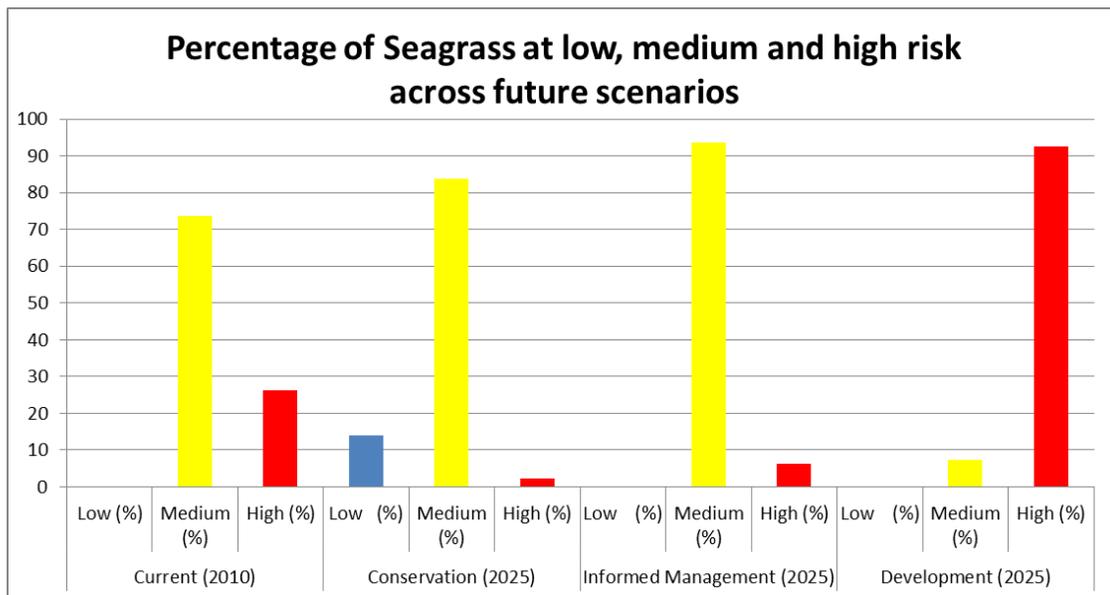


Figure 3: Risk to Seagrass in the South Northern Region by Scenario

In discussing the results of the InVEST ecosystem models, and in particular the habitat risk assessment model, there is the need to consider limitations of the model, which are highlighted below:

- Results are should be interpreted on a relative scale within a study region and across habitats and stressors, but not to results from separate analyses.
- Results do not reflect the effects of past human activities.
- Results are based on equal weighting of criteria unless the user weights the criteria by importance or data quality.
- Cumulative risk is additive (rather than synergistic or antagonistic).

South Northern Region Coastal Zone Management Guidelines

- Climate change impacts are not directly accounted for in model

Additional information on how this model works can be found in **Appendix B.1** of the Belize Integrated Coastal Zone Management Plan.

Recommended Actions:

1. Implement the Informed Management Zoning Scheme to limit certain activities, such as dredging, in specific areas in order to reduce the impacts to sensitive habitats

6.6 Utilities

6.6.1 Energy

Energy for the mainland areas in this region is supplied by the Belize Electricity Limited (BEL). Energy for the cayes is supplied through several sources, namely, generator, wind, solar and butane. Fisherman camps use mostly butane lamps while the resorts, research station, residential/ vacation and residential employment homes use mostly generators, in combination with either wind or solar.

6.6.2 Water

Water supply for mainland South Northern region is acquired from the public water supply system provided by the Belize Water Services (BWS), bottled water suppliers and basic roof catchment. On the cayes, the primary source of water is from the rain, possibly because of the costs which cover basic catchment roof and rudimentary storage systems as against elaborate roofs and storage systems. Other water sources include bottled water, water from the public supply system from the mainland, the latter mainly during the dry season, and water produced through reverse osmosis and from wells.

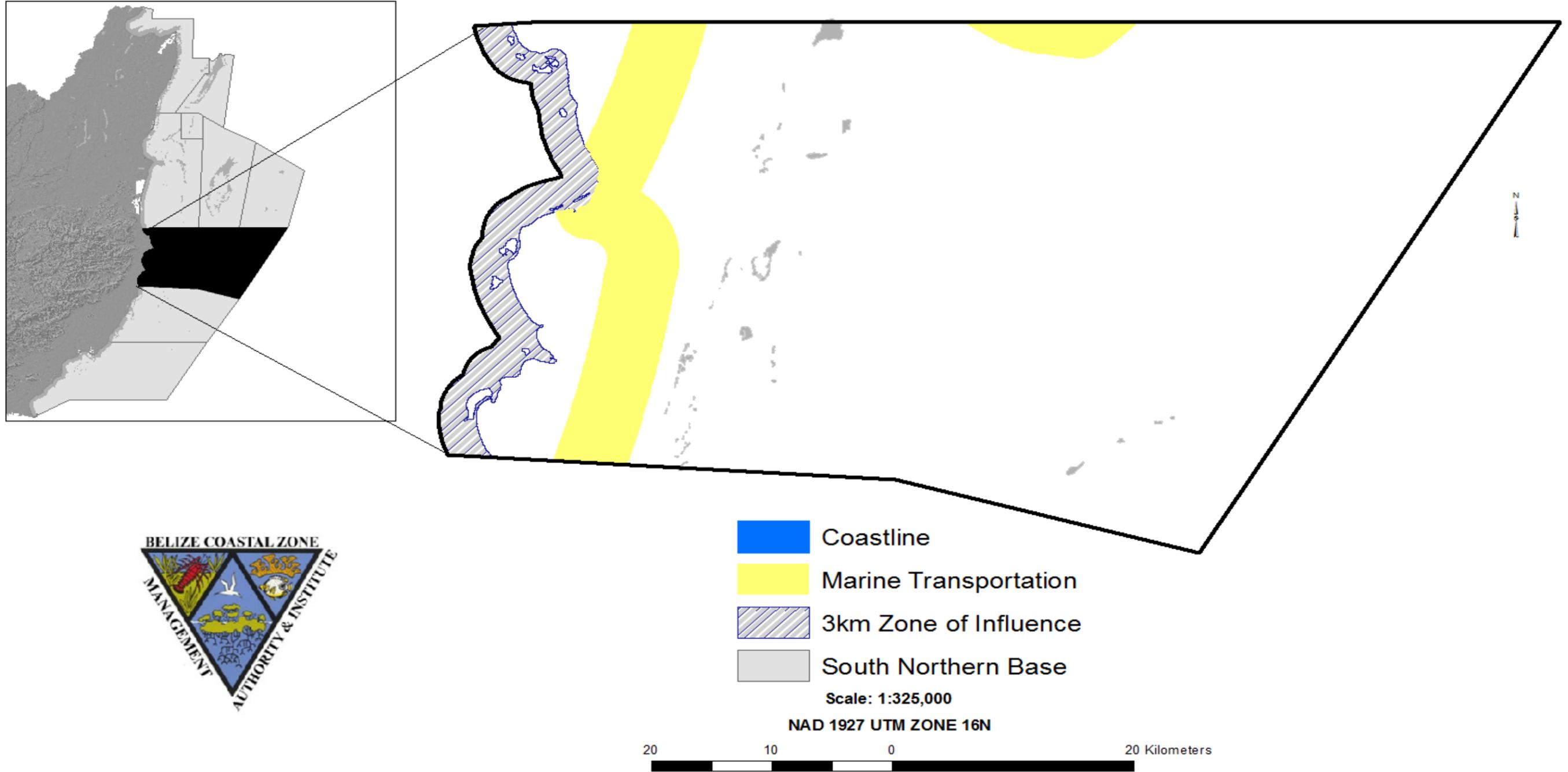
6.6.3 Marine Transportation

To 2030, development in this region is expected to increase with the construction of several new low to medium density resorts recommended in the NSTMP. Therefore transportation in and out of these areas will be necessary by both land and sea. For land travel new roads will need to be constructed linking these areas to already existing road infrastructure. In terms of the marine environment, lighthouses, buoys and markers should be placed in the sea to direct vessels and humans away from fragile and sensitive ecosystems. As such, the coastal zone management guidelines were formulated to attach as conditions to development approvals for the placement of walkways, lighthouses, buoys, and markers on sea and land. However with increased traffic in the area a centralized enforcement agency such as the Port of Belize and/or Belize Coast Guard will need to be present to enforce boating speeds and standards. More specifically, the Commerce Bight area is an area of consideration for such port facilities/upgrades. Also, there might be special consideration for aerodrome development in this region, Specifically in Dangriga Town.

Recommended Actions:

1. Close collaboration with relevant agencies to ensure that energy and water supply are provided through environmentally friendly means.
2. As developments begin construction enforcement agencies must be present to ensure that increased activity does not disturb sensitive ecosystems

INFORMED MANAGEMENT ZONING SCHEME FOR MARINE TRANSPORTATION: SOUTH NORTHERN REGION



Map 21: Informed Management Zoning Scheme for Marine Transportation in the South Northern Region

Table 16: Framework for Implementing Informed Marine Transportation in the South Northern Region

ZONE	CHARACTERISTICS OF ZONE	SCHEDULE OF PERMITTED USES			SCHEDULE OF RESTRICTED USES	SUPPORTING NATIONAL POLICIES	IMPLEMENTING AGENCY
		Dominant	Compatible	Regulated			
Marine Transportation	Marine area delineated for the use of watercraft, such as water taxis, cruise ships, etc, to transport people, goods and cargo between multiple destinations	1.Shipping operation activities 2. Port development and operation 3. Vessel traffic use	Dredging for the maintenance of navigational lanes and ports of entry	Passage/entry of vessels Operation and construction of ports	1. Fishing 2. Marine recreational activities 3. Anchoring that leads to disturbance and destruction marine habitats, including but not limited to, coral reef system, seagrass beds, etc 4. Exploration and extraction of petroleum 5. Construction of any illegal structure that would obstruct shipping and navigation 6. Disposal of solid and liquid wastes from boats and ships 7. Transportation of illegal goods, such as drugs and weapons, and human trafficking	Belize Port Authority Act Belize National Coast Guard Service Act Customs Regulation Act Defence Act Environmental Protection Act Harbours and Merchant Shipping Act Immigration Act Maritime Areas Act Marine Dredging Policy (Draft) Mines and Minerals Act	Belize Port Authority Belize National Coast Guard Customs Department Belize Defence Force Department of the Environment Belize Port Authority Immigration Department Ministry of Foreign Affairs Mining Unit, Ministry of Natural Resources Geology and Petroleum Department

6.7 Pollution Control

Presently, solid waste generated on the mainland is disposed off at the municipal dumpsite. There is concern that Dangriga garbage dump site is located near a creek and that leachate from the site is entering the Gra Gra Lagoon National Park. In terms of solid wastes generated on the cayes, and in particular on the fisherman camps, the practice has been to disposed of them mainly by burying inorganic non-recyclables, burning and organic waste while waste such as paper and some plastics are disposed of by incineration or used for land filling. The resorts transport some of their waste to mainland Dangriga. At the research stations, particularly WCS at Middle Caye, the garbage is separated in to compost, where the waste vegetables and fruits are mixed and used to reconstitute soil for plants and other trees, and some plastics and glass products are transported to mainland Dangriga.

There is concern that septic tanks located in close proximity to the coastline are contributing to poor water quality by means of inadequately treated sewage. At the fish camps, sewage waste is disposed of in latrines located on piers over the sea, in the mangrove interior or on the edge of the mangroves. Due to very low usage, impact of the waste is insignificant due to the relatively high volume of and assimilative capacity of the surrounding seawater. The resorts and more developed cayes dispose of their waste by individual septic tanks and soak aways and compost. There is some uncertainty as to where septic tank effluent was disposed in absorption fields. Grey water is mostly disposed directly into the soil, or in containment (soak-away) for the more developed cayes. The waste loads that enter into the coastal and marine areas from both the agriculture runoff and aquaculture section is a huge concern in this region. Wastes from citrus and banana crops, and shrimp farms are believed to be compromising water quality.

Soak-aways and Septic Tanks on Coastal Mainland

The Central Building Authority (CBA) is the agency mandated by the Belize Building Act 2003 to control building operations in the interest of public safety and health. In 2010, CBA produced detailed specifications for the construction of soak-aways and septic tanks for residential and other low impact buildings. Detailed diagrams found within the document can be found in the Appendices sections at the end of this document. A summary of required specifications for septic tanks servicing residential and other low impact buildings can be seen in Table 16. The CZMAI recommends that these standards be used for construction of septic tanks and soak-aways on the **coastal mainland**.

Table 17: Specifications for Residential Low Impact Septic Tanks and Soak-a-ways

Max # Of Persons Served	Liquid Capacity Of Tank		Internal Dimensions							
			Length (L)		Width (W)		Liquid Depth (Ld)		Total Depth (H)	
			FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
	GALLONS (Approx.)	CUBIC FT.								
4	500	67	6	0	3	0	4	0	5	2
6	600	81	7	0	3	0	4	0	5	2
8	750	101	7	0	3	6	4	0	5	2
10	900	121	7	6	3	6	4	6	5	8
12	1100	148	8	6	4	0	4	6	5	8
14	1300	174	10	0	4	0	4	6	5	8
16	1500	201	10	0	4	6	4	6	5	8

Treatment of Wastes on Cayes

Due to the fragile nature of the cayes and atolls septic tanks and soak-aways are not recommended as a means of handling household waste. Also, since there are no established solid waste management on cayes the CZMAI recommends the following based on the Long Caye Eco-Guidelines produced by Pleasure Island Limited for the handling of waste on **cayes**:

- Human waste must be treated with composting toilets. Septic tanks, cesspools and sewers should be prohibited.
- Gray water must be treated, and all dwellings and buildings must have a gray water treatment system approved by DOE before construction.
- Organic wastes must be collected and disposed of in composting bins.
- However possible, recycling and garbage separation is encouraged.
- Frequent removal of solid waste from the cayes for treatment and proper disposal on the mainland.

Recommended Actions:

1. Implement the National Solid Waste Management Plan (SWMP) recommendations for this region in order to improve solid waste management. The leachate originating from the Dangriga dump site must be monitored to ensure that it is not entering and affecting the Gra Gra Lagoon National Park
2. Ensure that development applications include as a component management plans for both solid and liquid wastes
3. Close collaboration among the relevant agencies to ensure that the solid and liquid waste disposal management activities are carried out through environmentally friendly mechanisms
4. Conduct water quality tests on a regular basis to monitor effluents, especially the creeks
5. Construct septic tanks three feet above ground for houses built close the shoreline to minimize flooding of the sewer system during major storm events
6. Develop incentive programs to encourage fishers to collect solid waste dumped on cayes and in the marine environment
7. Require DOE inspection of sewage treatment systems on cayes.

6.8 *Social Amenities*

At the South Northern region consultations, stakeholders identified beach reclamation and overall upkeep of beaches in Dangriga as a major problem. Due to recent construction in Dangriga, many of the beach area has become littered with construction debris leaving stakeholders without necessary leisure space. This also effectively eliminates any potential sun and beach tourism that could occur in Dangriga town. Also mentioned was the opening of the barmouth in Dangriga town. As a result of a combination of low tide and rapid sedimentation, the bar mouth in Dangriga town is constantly closed. Therefore sea access is cut off which affects the livelihoods of many families as fishing remain a top income earner in Dangriga. In the past, the town council would pay to have the barmouth cleared once a year, however this practice was determined as not lucrative since sand removed could not be sold due to saturation by sea water. Therefore this practice was discontinued leaving many stakeholders at the mercy of the tides for movement in and out of Dangriga Town.

Recommended Actions:

1. Government must allocate fund to efforts for the reclamation of shoreline in southern Belize.
2. Thorough research must be done prior to the issuance of dredging permits in order to prevent further increase in erosion rates and decrease harmful sedimentation.
3. Allocate funding for Dangriga town council to clear the barmouth area annually in order to ensure livelihoods of stake holders.

6.9 Conservation

South Water Caye and Glovers Reef are marine reserves and World Heritage Sites. They both have protected status. However, the contribution of the other cayes to the protection of the mainland from storm surges, the linkages to the fishing and tourism industries, its scientific and economic opportunities and its relationship to the survival of the barrier reef cannot be avoided. Furthermore, the unique biodiversity and social and cultural importance of some of the Cayes mandates that particular areas of the Dangriga Cayes Region to remain in their natural state.

An obstacle to conservation identified by the stakeholders of the south northern region is land tenure. Many privately owned properties are located within ecologically sensitive areas along watersheds and lagoons that are important for surrounding ecosystems. Currently, there are no legal mechanisms through which the government can steer development of these privately owned properties. However, the stakeholders have identified Conservation Covenants as a mechanism through which the government can enter into legally binding agreements with private land owners to regulate or restrict the development of these properties.

Conservation Covenants can be either positive (requires land owner to perform actions that will keep the status of the property environmentally stable) or negative (restricts land owner from performing certain actions considered detrimental to the surrounding ecosystem), and in return land owners receive compensation in the form of easements or tax incentives. For example, in Australia, land owners that enter into a conservation covenant and received capital proceeds (money, land, etc.) are eligible for Capital Gains Tax treatment. Those that didn't can also receive Capital Gains Tax treatment as well as income tax deductions.

In 2009, the Ya'axché Conservation Trust and Belize Association of Private Protected Areas presented the Conservation Covenant Act to government. This act was not passed into law on the grounds that:

1. Only the current land owner is bound to the burden of the covenant. Subsequent land owners are not obligated to enter into a similar agreement.
2. The only way in which the burden of the covenant can be perpetuated with the land is if the original covenant touches or concerns the land, the original covenantee was the legal owner of the land benefitted, and the subsequent owner has the same interest in the land. However, very often this is not the case and there are no legal mechanisms to ensure it.
3. In order to receive benefits from the agreement, land owner must have another parcel of land nearby.

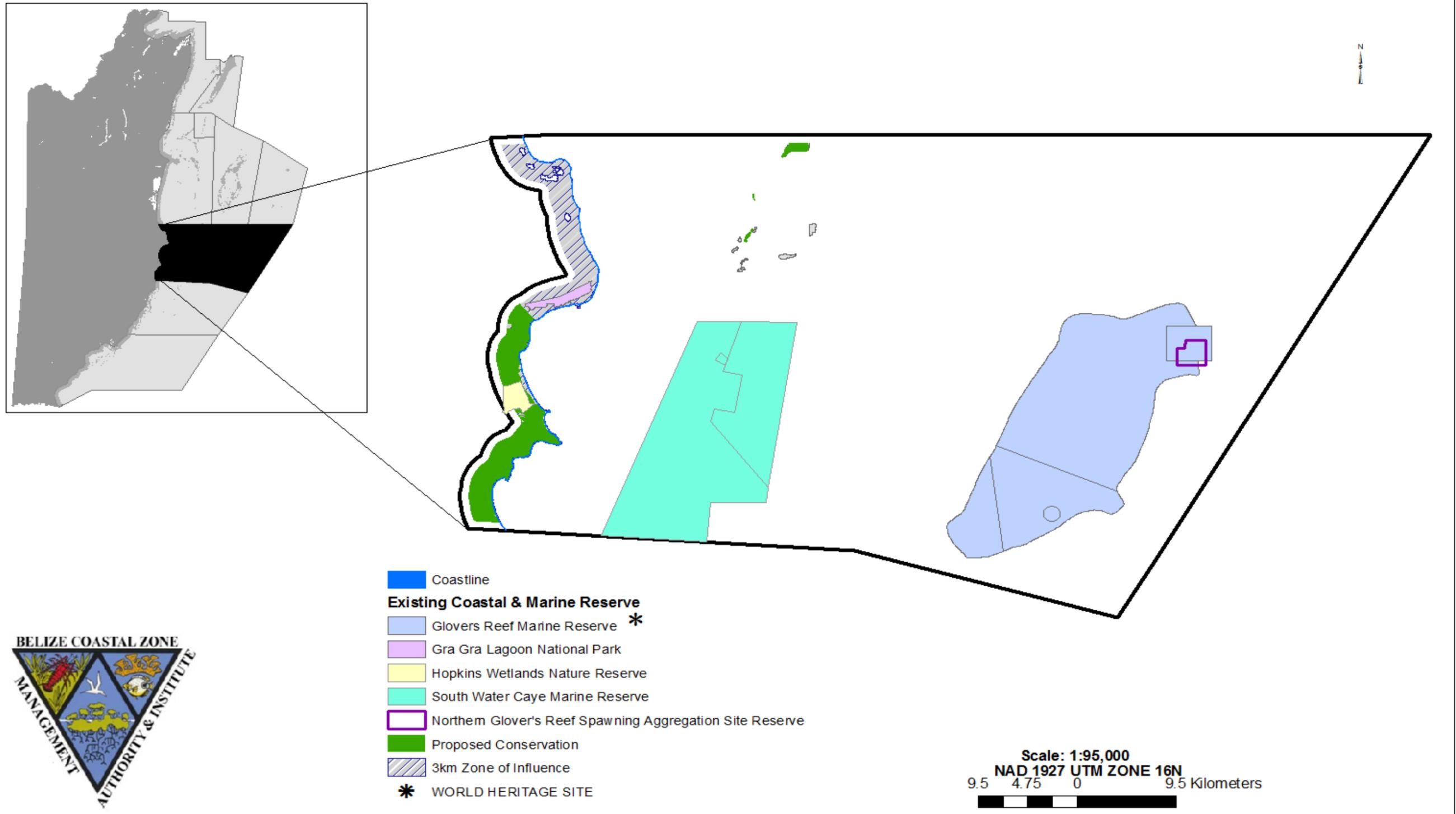
The Government has acknowledged that improving legal enforcement mechanism is key in promoting conservation efforts. Therefore improvements must be made on the legislative framework of the Conservation Covenant as well as legally enforceable economic incentives for parties involved. Improvements required are as follows:

1. Recognize negative covenants for conservation
2. Recognize covenants in gross
3. Ensure that rights of third-party enforcement are binding to subsequent land owners
4. Allow for conservation covenants to be for a specific period of time and subject to variation and termination to add flexibility.

Recommended Actions:

1. Provide the foundation for the protection and preservation of the priority cays named above
2. Provide a foundation for any management plan which may be conceived for the region
3. Encourage stakeholders participation in the monitoring of the application of the planning guidelines
4. Ensure the continuity of conservation efforts for the entire region, including the wetland area in Hopkins Village
5. Provide foundation for any new initiatives for protected areas for the region through land use assignment provisions
6. Complement existing management plans for the two protected areas in the region

INFORMED MANAGEMENT ZONING SCHEME FOR CONSERVATION: SOUTH NORTHERN REGION



Map 22: Informed Management Zoning Scheme for Conservation in the South Northern Region

Table 18: Framework for Implementing Informed Management Conservation Scheme

ZONE	CHARACTERISTICS OF ZONE	SCHEDULE OF PERMITTED USES			SCHEDULE OF RESTRICTED USES	SUPPORTING NATIONAL POLICIES	IMPLEMENTING AGENCY
		Dominant	Compatible	Regulated			
Marine Conservation	Coastal and marine areas delineated for the retention of critical habitats and ecosystems for a diversity of marine life, fish spawning aggregation sites, replenishment zones, biodiversity areas	<ol style="list-style-type: none"> 1. Coastal and marine reserves 2. Breeding, spawning, feeding area for marine life 3. Replenishment zones 4. Seagrass rehabilitation 5. Mangrove planting 6. Foraging area for manatees, dolphins, crocodiles 7. Nesting beaches for sea turtles 	<ol style="list-style-type: none"> 1. Research and education 2. Marine Recreation and Tourism 	<ol style="list-style-type: none"> Tourism and recreation (snorkeling and diving) Research and education Establishment of new reserves 	<ol style="list-style-type: none"> 1. Fishing within “no-take”/replenishment zones, and spawning aggregation sites 2. Development of shoals 3. Anchoring that leads to disturbance and destruction marine habitats, including but not limited to, coral reef system, seagrass beds, mangrove forests, etc 4. Exploration and extraction of petroleum 6. Disposal of solid and liquid wastes from boats and ships 7. Shipping 	Belize Port Authority Act Belize National Coast Guard Service Act Customs Regulation Act Defence Act Environmental Protection Act Harbours and Merchant Shipping Act Immigration Act Maritime Areas Act Marine Dredging Policy (Draft) Mines and Minerals Act	Belize Port Authority Belize National Coast Guard Customs Department Belize Defence Force Department of the Environment Belize Port Authority Immigration Department Ministry of Foreign Affairs Mining Unit, Ministry of Natural Resources Geology and Petroleum Department

6.10 Scientific Research and Education

Erosion has been identified as a major threat to the stakeholders and residence of the South Northern Region. All of which has been attributed to mining operations that have occurred throughout the region over the past 10 – 15 years which have caused changes in the natural flow of sediments that replenish beaches and shorelines. Although it is impossible to plan or prevent the effects of natural processes such as erosion. There are scientifically proven methods of reclaiming shoreline by natural and unnatural means that may help to mitigate this high rate of erosion. However, it will require contracting consultants to assess the erosion problem in the region in order to determine which method would be most effective and efficient. Therefore funds must be available for specialists to aid in addressing this major problem as it not only pertains to just the south northern region but the entire southern portion of the country.

The management plans for South Water Caye Marine Reserve and Glovers Reef Atoll Marine Reserve all call for an integrated research and monitoring programme for the region as a strategy to maintain the long-term ecological integrity of biological diversity and sustainable resource use by dependent communities. These management plans also outline a framework for effective integrated research and monitoring of conservation targets, the development of a data management facility and the incorporation of community involvement from the buffer communities. .

Recommended Actions:

1. Implement the recommended research and educational activities for the region as outlined in the management plans for South Water Marine Reserve and Glovers Reef Atoll Marine Reserve.
2. Government must allocate fund to efforts for the reclamation of shoreline in southern Belize.
3. Thorough research must be done prior to the issuance of dredging permits in order to prevent further increase in erosion rates.

7.0 IMPLEMENTATION STRATEGY

The South Northern Region Coastal Zone Management Guidelines form a part of the Belize Integrated Coastal Zone Management Plan being developed by the CZMAI. After approval of the Plan by CZMAI's Board of Directors, it will be offered to the House of Representatives for endorsement. Implementation of these coastal management guidelines will be undertaken through two mechanisms: (a) centralized statutory control through the various Government departments, and (b) localized community and stakeholder participation. Following the mechanism of centralized statutory control, the regulatory and permitting agencies with management mandates for the coastal zone will implement the specific policy actions and informed management spatial zoning scheme that are recommended in the Plan.

While the government agencies have the authority of the law to back up its procedures, it is constrained by limited resources. In several instances, however, local NGOs and community-based stakeholder organizations have greater access to, and knowledge of, local conditions and activities, though they have no statutory powers to either assist or control development beyond those available through the Village Councils and Towns Councils Acts. For this reason, it is recommended that localized community and stakeholder participation complement the management efforts of centralized government and statutory agencies in implementing integrated coastal zone management. The South Northern Region Coastal Advisory Committee (SNRCAC), and other interested stakeholders of this region, will work closely with the Coastal Zone Advisory Council (CZAC) regarding monitoring and implementation of the guidelines.

Objectives of the South Northern Region CAC include, *inter alia*, contributing to the drafting of the coastal zone management guidelines for their coastal region, supporting their initial approval, and monitoring and reporting to the Coastal Zone Advisory Council (CZAC) on the implementation of the guidelines. This means that the Committee will be expected to undertake the following tasks:

1. Develop, assess and approve the draft guidelines;
2. Forward the approved draft guidelines to CZMAI for approval;
3. Monitor the implementation and effectiveness of the guidelines;
4. Identify the appropriate time for a review of all or part of the guidelines;
5. Review and update the guidelines.

Planning is a continual process of recommendation, participation, implementation and review. These guidelines shall be monitored on a continual basis in order to establish its strengths and weaknesses. Through a management planning mechanism, the SNRCAC, along with CZMAI, will regularly update the guidelines, which will hopefully set a good example of representative, cooperative and adaptive management that is environmentally sound, rational and equitable.

Additional studies are needed in liaison with the relevant authorities and region's stakeholders. Such studies should reveal information which may help to further support sustainable development and to address the social, cultural and economic human use of the region and its resources.

The reformation of the Coastal Advisory Committee for this region is recommended subsequent to Cabinet's adoption of the Belize Integrated Coastal Zone Management Plan. The South Northern Region CAC would be locally based and largely constituted of voluntary organizations charged with the role of monitoring the state of the coast and development of the region, making reports and recommendations on issues they identify. The proposed membership of the reformed South Northern Region CAC is drawn from the following sources:

- Village councils of Sittee River, Hopkins and Commerce Bight;
- Dangriga Town Council
- Stann Creek Fishermen Association;
- Dangriga Tour Guide Association;
- Northern Fishermen Cooperative Society;
- National Fishermen Cooperative Association;
- National Garifuna Council;
- Ecumenical High School;
- Fisheries Department;
- Lands and Surveys Department;
- Geology and Petroleum Department;
- Forest Department ; and
- Dangriga Chapter, Belize Tourism Industry Association

8.0 CONCLUSIONS

South Northern Region Coastal Zone Management Guidelines

Belize Integrated Coastal Zone Management Plan
Coastal Zone Management Authority & Institute 2015

The coastal zone management guidelines recommended for the region are not intended to be rigid, as changing socio-economic, cultural and environmental conditions may necessitate modifications. Similarly, changing shapes of the cayes and the health of habitats of the terrestrial and aquatic environments may also require this. As well, land tenure needs to be clarified.

Noteworthy however, is that it has resulted in the identification of sites for uses which may not otherwise have been considered for such, and the disqualification of sites for intended uses not conducive to sustainable development. This can transfer and disperse certain activities from accumulated point impacts, to the wider and other areas to reduce the pressures on environments that apparently are under stress from over use.

It is hopeful that the objectives outlined at the beginning can be realized through the recommended sector policies and management guidelines. More importantly though, is that the formulation of coastal zone management guidelines is a starting point to ensuring the sustainable use and development of the South Northern Region.

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10.0 APPENDICES

10.1 BACKGROUND

The coastal zone is one of Belize's greatest assets and its magnificent Barrier Reef Reserve System is a renowned World Heritage Site. It is the longest barrier reef in the Western Hemisphere, extending approximately 280 km from the northern to southern borders of the country (Cooper et al. 2009). Belize's coastal zone has complex and dynamic marine ecosystems that support innumerable ecological processes and a vast array of marine life and habitats. In addition to its important ecosystem functions, the coastal zone is vital to the Belizean way of life. The highly productive coastal zone is the resource base for a broad range of economic activities. In fact, approximately thirty-percent of the country's gross domestic product is directly linked to these commercial activities that take place within the coastal zone (Cho 2005). The coastal zone also has important social and cultural values to the Belizean people, especially to approximately 40% of the population that reside on the coast and in offshore areas (SIB 2010).

Over the past decades, rapid economic development and population growth have taken place in the coastal zone and inland areas of Belize. World-renowned snorkeling and diving draw over 800,000 tourists to the region annually, driving the construction of new development (BTB 2008). These occurrences have led to increasing pressures on coastal and marine resources, with implications to the livelihoods of those that depend upon them. These anthropogenic threats stem from various developmental activities associated with tourism and recreational facilities, population growth and expansion, utility supply, dredging and mineral extraction, land clearance, pollution, waste disposal, fisheries and aquaculture. These threats are compounded by natural hazards, global warming, rising sea levels, and the vulnerability of sensitive ecological systems to climate change. Thus, it is imperative now more than ever to ensure that the coastal zone is utilized in a manner that will continue to support important ecological functions, as well as social, cultural and economic prosperity for current and future generations.

For many years, and even today, management of the Belizean coastal zone has been under the regime of sectoral planning. However, The need for an integrated approach to optimally manage Belize's coastal resources was made resoundingly clear at a historic meeting in 1989 when a wide cross-section of stakeholders from various sectors, including scientists, marine managers, private sector, and coastal communities converged in San Pedro, Ambergris Caye (Gibson 1989). Integrated coastal zone management (ICZM) brings together all decision-making agencies to ensure integration among their policies and management plans, to ultimately improve and maintain the quality of coastal and marine ecosystems. A defining feature of Belize's ICZM plan is balancing national economic development needs with conservation priorities within a spatially defined area over a specified timeframe. The development of site-specific coastal zone management guidelines, as a component of the Belize ICZM Plan, serves as a means to guide management decisions and to form the basis on which decisions are made to regulate the development and use of coastal and marine resources within the coastal zone.

South Northern Region Coastal Zone Management Guidelines

10.2 SUMMARY OF ENABLING LEGISLATION AND IMPLEMENTING AGENCIES FOR ENFORCEMENT OF THE INFORMED MANAGEMENT ZONING SCHEME

The various governmental organizations and agencies with management mandates for the coastal zone that are needed to implement these guidelines, to synchronize the efforts of the CZMAI via the Belize Integrated Coastal Zone Management Plan, and to strengthen inter-agency coordination for integrated coastal zone management include:

Banana Control Board – The Banana Industry Act requires applications for the cultivation of designated areas for banana production for the region. The South Northern Region CAC should be included in any discussion on policy formulation on banana production as it affects the region.

Belize Agricultural Health Authority – The Belize Agricultural Health Authority Act requires applications for licenses, permits or certificates to import and export animal products, animal feed, and plant products into and out of Belize following inspection as it affects the region. The South Northern Region CAC should be included in any discussion on policy formulation on agricultural import and export as it affects the region.

Belize Port Authority – The Belize Port Authority Act requires applications for boat and captain licenses and for the construction and operation of private ports for the region. Also, The Harbors and Merchant Shipping Act requires the Authority to regulate the passage of vessels in and out of Belizean waters as well as the maintenance and delineation of vessel routes, lighthouses and wharfs. The South Northern Region CAC should be included in any discussion on policy formulation on vessel licencing and shipping as it affects the region

Belize Tourist Board – The Belize Tourist Board Act requires applications for hotel licenses for the region. The South Northern Region CAC should be included in any discussion on policy formulation on hotel development as it affects the region.

Belize Trade and Investment Development Service (BELTRAIDE) – The Belize Trade and Investment Development Service Act requires that foreign trade and investment be liaised through the BELTRAIDE organization. The South Northern Region CAC should be included in any discussion on policy formulation on major developments as it affects the region.

Central Building Authority – The Housing and Town Planning Act provides for the regulation of the use and development of land through qualitative measures that is, building densities, land use class assignments etc. However, it does not address the structural integrity of buildings, a component of the development. The Central Building Authority, by way of the Belize Building Act, is legislated specifically to address this, and provides for the appointment of Local Building Authorities to administrate the Act. Thus, the Southern Region CAC can be appointed as the Local

Building Authority for the South Northern Region. However, this may require strengthening the South Northern Region CAC with technical expertise to do this. The alternative is to coordinate this function with the Town and Village Councils of Dangriga, Hopkins, and Commerce Bight.

Dangriga Town Council – The Town Councils Act requires applications for liquor licenses for the region. The South Northern Region CAC should be included in any discussion on policy formulation on issuing of liquor licenses as it affects the region.

Department of Environment – The Environmental Protection Act requires applications for environmental clearance for the region. The South Northern Region CAC should be included in any discussion on policy formulation on environmental protection as it affects the region.

Fisheries Department – The Fisheries Act requires applications for fishing license for the region. The South Northern Region CAC should be included in any discussion on policy formulation on fisheries as it affects the region.

Forest Department – The Forest Act requires applications for the removal of mangroves in coastal areas for the region. The National Parks System Act requires the establishment of National Parks, Nature Reserves, Wildlife Sanctuaries, and Natural Monuments to preserve ecologically important and sensitive areas. The Wildlife Protection Act empowers the Forest Department to determine species to be prohibited from hunting practices as it sees fit. The South Northern Region CAC should be included in any discussion on policy formulation on mangrove removal and designation of protective status to sensitive areas and species as it affects the region.

Geology & Petroleum Department, Ministry of Energy, Science & Technology, and Public Utilities – The Petroleum Act requires applications for oil exploration and issuing of parcel contracts for the region. The South Northern Region CAC should be included in any discussion on policy formulation on petroleum activities as it affects the region.

Hydrology Unit, Ministry of Natural Resources and Agriculture - The Water Industry Act requires all entities to apply for a Water Abstraction License where the water source is limited to a natural water body: surface or groundwater. The South Central Region CAC should be included in any discussion on policy formulation on water use as it affects the region.

Lands and Surveys Department - The Land Utilization Act requires applications for subdivisions for the region, any demarcation of special development areas, any allocation of land in the coastal region, this includes any construction on seabed. The South Northern Region CAC should be included in any discussion on policy formulation on land as it affects the region.

Meat and Livestock Commission – The Meat and Livestock Act requires applications for the rearing, breeding, sale and exportation of meat and livestock for the region. The South Northern Region CAC should be included in any discussion on policy formulation on the sale of meat and livestock as it affects the region.

Mining Unit, Ministry of Natural Resources & the Environment – The Mines and Minerals Act requires applications for dredging, oil exploration and sand mining permits for the region. The South Northern Region CAC should be included in any discussion on policy formulation on dredging and oil exploration as it affects the region.

Ministry of Health – The Public Health Act requires the Director of Health to make arrangements for health inspectors to enforce building and health standards for the region. The South Northern Region CAC should be included in any discussion on policy formulation on public safety as it affects the region.

Ministry of Housing and Urban Development – The Ministry of Housing & Urban Development formulates policy for housing and human settlements. Its added function is to assist with the alleviation of poverty due to urban growth. The Ministry coordinates planning and development control functions through municipal bodies. The Ministry also provides the services of Planners, Building inspectors and Engineers to provide the required necessary assistance. In accordance with Section 6 of the Act, the South Northern Region CAC can be delegated the powers and duties of the Central Housing and Planning Authority (CHPA) with regard to approving, with or without conditions, and prohibiting further development in the region as well as powers to serve prohibition notices. This delegation should be supported by the Solicitor General’s Office or an Attorney at Law for the enforcement of the provisions of the Act.

National Emergency Management Organization – The National Emergency Management Act requires that sites be declared as vulnerable areas for the region and policy formulation on disaster management be effectuated. The South Northern Region CAC should be included in any discussion on policy formulation on issues of national preparedness as it affects the region.

Pesticide Control Board – The Pesticide Control Act requires applications for the importation, manufacturing, sale and storage of restricted pesticides for the region. The South Northern Region CAC should be included in any discussion on policy formulation on pesticide use as it affects the region.

Solid Waste Management Authority – The Solid Waste Management Act requires the Solid Waste Management Authority to make arrangements for garbage collection or the engagement of contractors for the region. The South Northern Region CAC should be included in any discussion on policy formulation on garbage collection as it affects the region.

10.3 CHECKLIST FOR HUMAN USE/DEVELOPMENT OF THE COASTAL ZONE

DEVELOPMENT ACTIVITY/HUMAN USE	POSSIBLE AGENCIES
1. Coastal Agriculture	
Governing Legislation/Policy:	
Banana Industry Act	<input type="radio"/> Banana Control Board <input type="radio"/> Banana Growers Association <input type="radio"/> Ministry of Agriculture
Belize Agricultural Health Authority Act	<input type="radio"/> Belize Agricultural Health Authority
Citrus (Processing and Production) Act	<input type="radio"/> Citrus Control Board <input type="radio"/> Citrus Growers Association <input type="radio"/> Ministry of Agriculture
Environmental Protection Act	<input type="radio"/> Department of the Environment
Land Utilization Act	<input type="radio"/> Land Utilization Authority <input type="radio"/> Ministry of Natural Resources
Meat and Livestock Act	<input type="radio"/> Belize Livestock Producers Association <input type="radio"/> Belize Agricultural Health Authority <input type="radio"/> Ministry of Agriculture
Papaya Growers Association Act	<input type="radio"/> Papaya Growers Association <input type="radio"/> Ministry of Agriculture
Pesticide Control Board Act	<input type="radio"/> Pesticide Control Board <input type="radio"/> Ministry of Agriculture
Sugar Cane Industry (Control) Act	<input type="radio"/> Belize Sugar Cane Board <input type="radio"/> Ministry of Agriculture
DEVELOPMENT ACTIVITY/HUMAN USE	RESPONSIBLE AGENCIES
2. Coastal Aquaculture	

Governing Legislation/Policy:

Fisheries Act	<input type="radio"/> Fisheries Department
National Aquaculture Policy (Draft)	<input type="radio"/> Aquaculture Unit, Ministry of Agriculture
Environmental Protection Act	<input type="radio"/> Department of the Environment
Belize Trade and Investment Promotion Service Act	<input type="radio"/> Belize Trade and Investment

DEVELOPMENT USE	ACTIVITY/HUMAN	RESPONSIBLE AGENCIES
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3. Coastal Development**Governing Legislation/Policy:**

Belize Building Act	<input type="radio"/> Central Building Authority
Belize City Council Act	<input type="radio"/> Belize City Council
Belize Trade and Investment Promotion Service Act	<input type="radio"/> Belize Trade and Investment Development Services
Cayes Development Policy Coastal Zone Management Act	<input type="radio"/> Coastal Zone Management Authority
Disaster Preparedness and Response Act	<input type="radio"/> National Emergency Management Organization
Electricity Act	<input type="radio"/> Belize Electricity Limited
Environmental Protection Act	<input type="radio"/> Department of the Environment
Forest Subsidiary Act	<input type="radio"/> Forest Department
Hotels and Tourist Accommodation Act	<input type="radio"/> Belize Tourism Board
Housing and Town Planning Act	<input type="radio"/> Ministry of Housing
Land Utilization Act	<input type="radio"/> Land Utilization Authority

Mines and Minerals Act	<input type="radio"/> Mining Unit, Ministry of Natural Resources
Private Works Construction Act	<input type="radio"/> Ministry of Works and Transport
Public Health Act	<input type="radio"/> Ministry of Health
Public Utilities Commission Act	<input type="radio"/> Public Utilities Commission
Solid Waste Management Authority Act	<input type="radio"/> Solid Waste Management Authority
Telecommunications Act	<input type="radio"/> Belize Telemedia Limited
Town Councils Act	<input type="radio"/> Town Councils
Trade Licensing Act	<input type="radio"/> City/Town Councils
Water and Sewerage Act	<input type="radio"/> Belize Water Services Limited
Water Industry Act	<input type="radio"/> Hydrology Unit, Ministry of Natural Resources & Agriculture

DEVELOPMENT ACTIVITY/HUMAN USE	RESPONSIBLE AGENCIES
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4. Conservation

Governing Legislation/Policy:

Fisheries Act	<input type="radio"/> Fisheries Department
Forest Act	<input type="radio"/> Forest Department
Private Forests (Conservation) Act	<input type="radio"/> Forest Department
National Parks System Act	<input type="radio"/> Ministry of Forestry, Fisheries and Sustainable Development
National Protected Areas Policy and System Plan	<input type="radio"/> National Protected Areas Secretariat
Wildlife Protection Act	<input type="radio"/> Forest Department
Coastal Zone Management Act	<input type="radio"/> Coastal Zone Management Authority

DEVELOPMENT ACTIVITY/HUMAN USE	RESPONSIBLE AGENCIES
5. Marine Dredging Governing Legislation/Policy: Mines and Minerals Act	<input type="radio"/> Mining Unit, Ministry of Natural Resources
Dredging Policy	<input type="radio"/> Geology and Petroleum Department
Environmental Protection Act	<input type="radio"/> Department of the Environment
DEVELOPMENT ACTIVITY/HUMAN USE	RESPONSIBLE AGENCIES
6. Fishing Governing Legislation/Policy: Fisheries Act	<input type="radio"/> Fisheries Department
Coastal Zone Management Act	<input type="radio"/> Coastal Zone Management Authority
DEVELOPMENT ACTIVITY/HUMAN USE	RESPONSIBLE AGENCIES
7. Marine Transportation Governing Legislation/Policy: Belize Port Authority Act Harbours and Merchant Shipping Act	<input type="radio"/> Belize Port Authority
Private Works Construction Act	<input type="radio"/> Ministry of Works and Transport
Customs Regulation Act	<input type="radio"/> Belize Customs Department
Maritime Areas Act	<input type="radio"/> Ministry of Foreign Affairs
Defence Act	<input type="radio"/> Belize Defence Force
Immigration Act	<input type="radio"/> Immigration Department
Dredging Policy	<input type="radio"/> Mining Unit, Ministry of Natural Resources
Environmental Protection Act	<input type="radio"/> Department of the Environment
DEVELOPMENT ACTIVITY/HUMAN USE	RESPONSIBLE AGENCIES
8. Marine Recreation Governing Legislation/Policy: Fisheries Act	<input type="radio"/> Fisheries Department

Ancient Monuments and Antiquities Act	<input type="radio"/> Archaeology Department
National Institute of Culture and History Act	<input type="radio"/> National Institute of Culture and History
Belize Tourism Board Act	<input type="radio"/> Belize Tourism Board
Public Health Act	<input type="radio"/> Ministry of Health
DEVELOPMENT ACTIVITY/HUMAN USE	RESPONSIBLE AGENCIES
9. Oil Exploration	
Governing Legislation/Policy:	
Environmental Protection Act	<input type="radio"/> Department of the Environment
Petroleum Act	<input type="radio"/> Geology and Petroleum Department

10.4 FIGURES

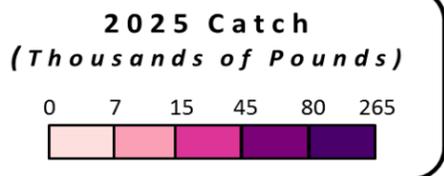
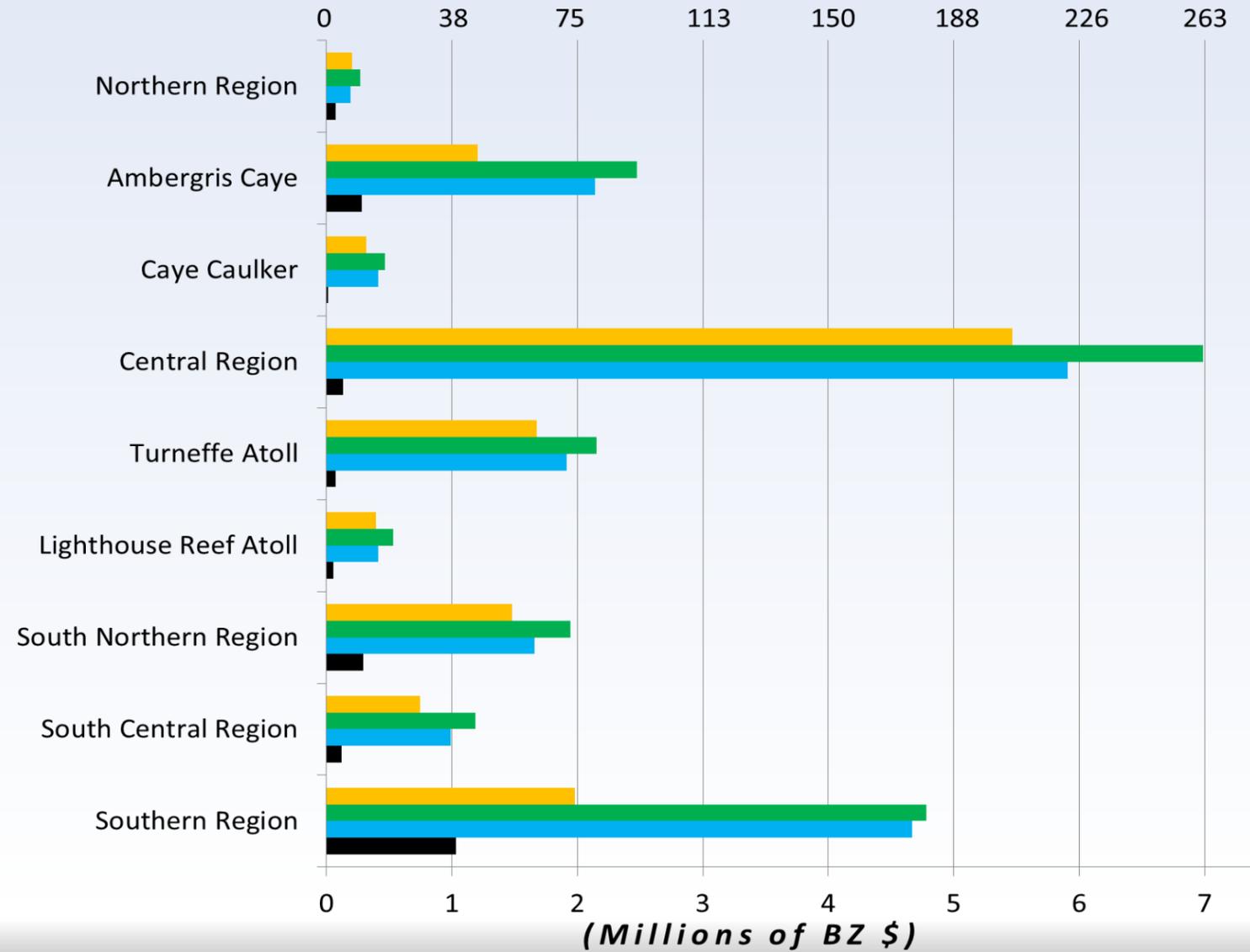
LOBSTER FISHERIES

SCENARIOS

- Current
- Conservation
- Informed Management
- Development

Catch and Revenue by Coastal Planning Region (Current & 2025)

(Thousands of Pounds)



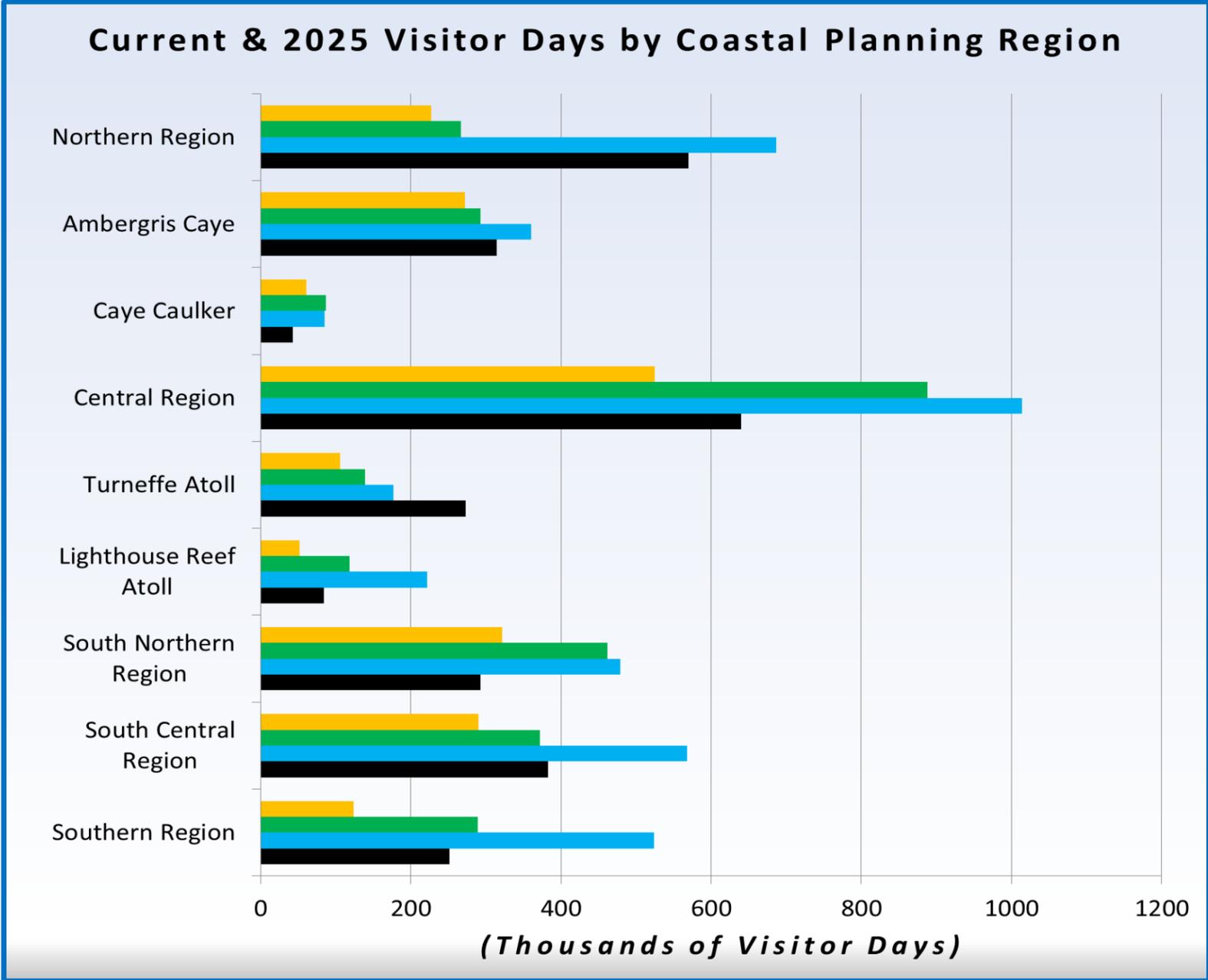
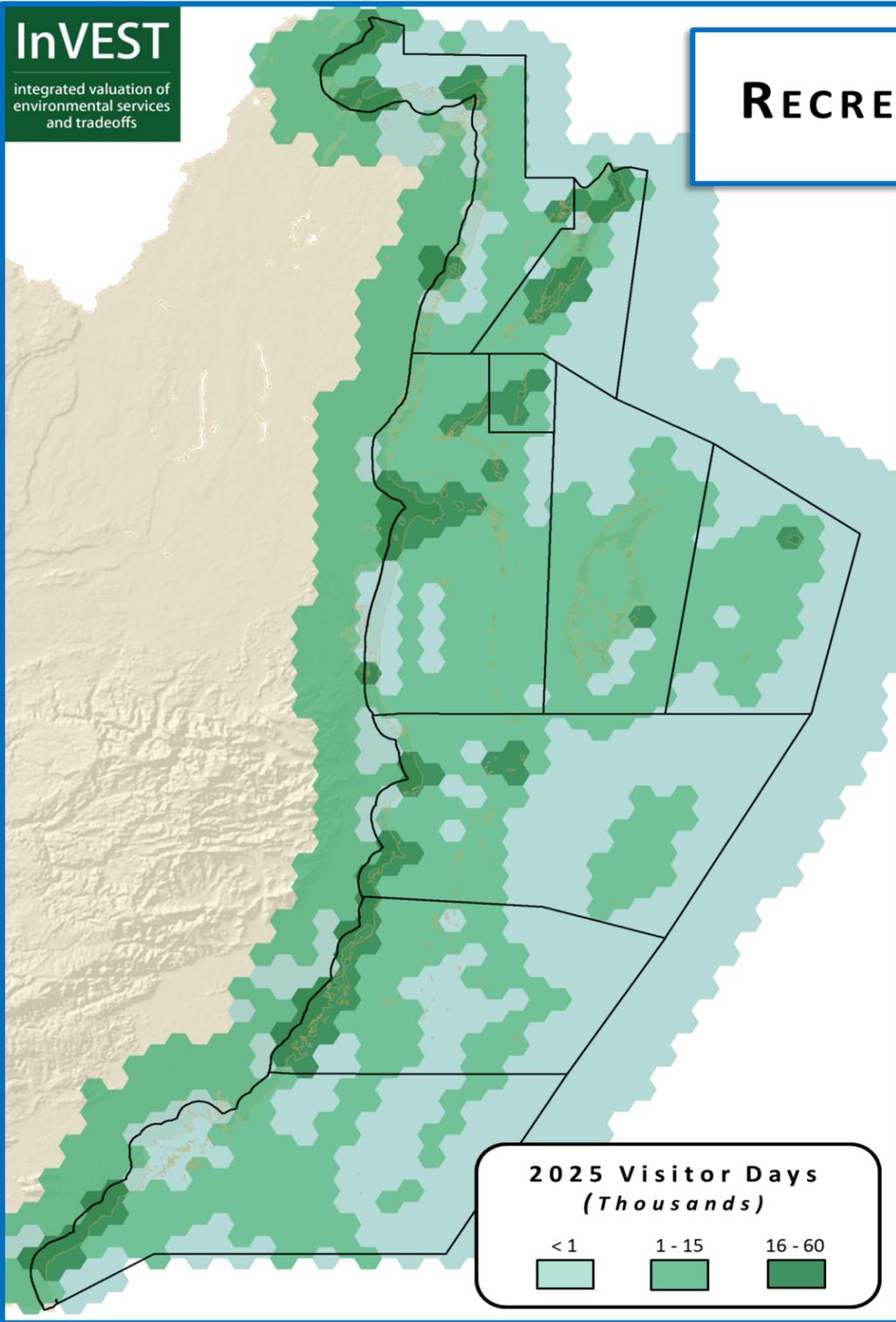
INFORMED MANAGEMENT

Figure 4: Lobster Fisheries Catch and Revenue by Scenario

RECREATION

SCENARIOS

- Current
- Conservation
- Informed Management
- Development



INFORMED MANAGEMENT

Figure 5: Annual Visitation for Marine Tourism and Recreation by Scenario

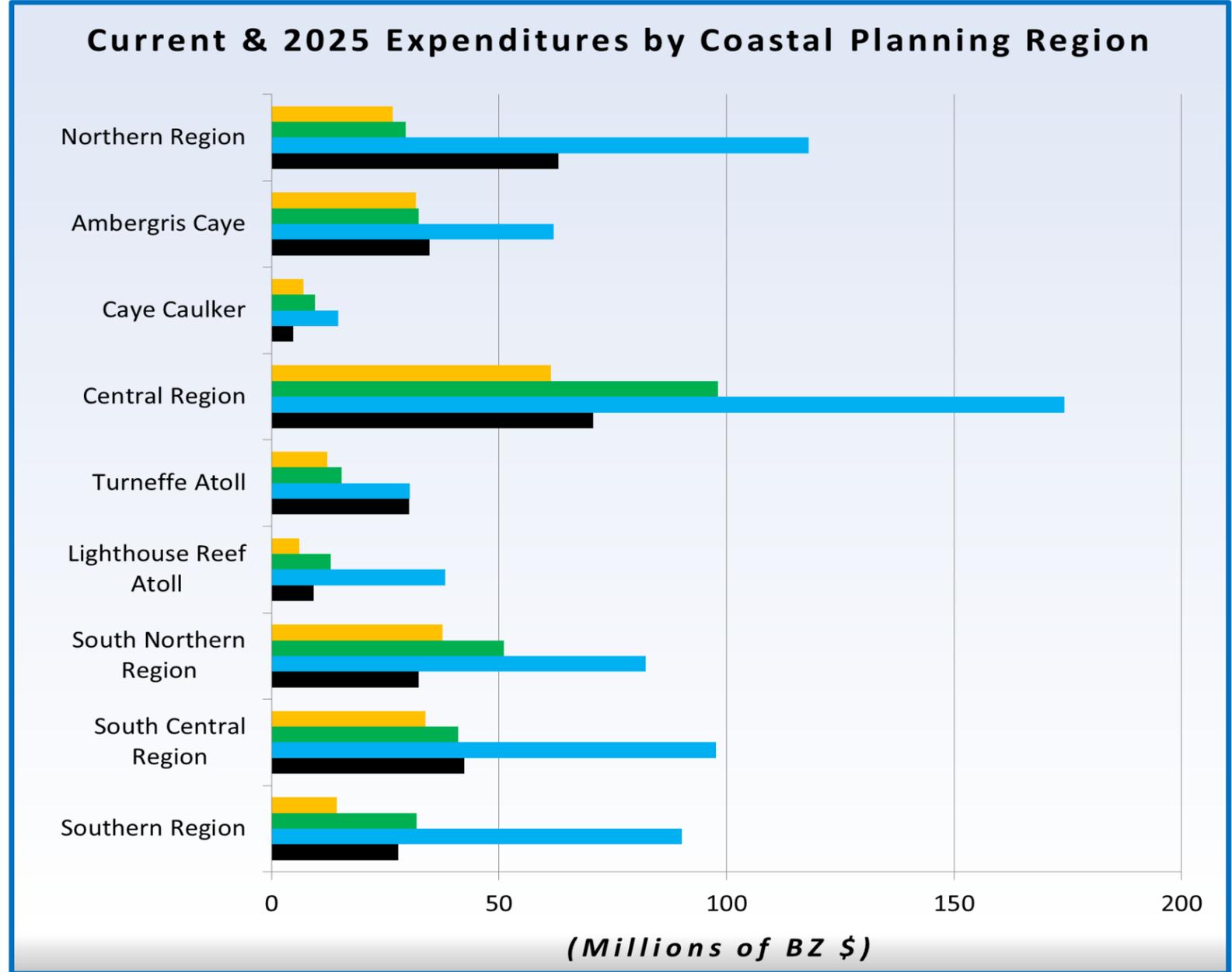
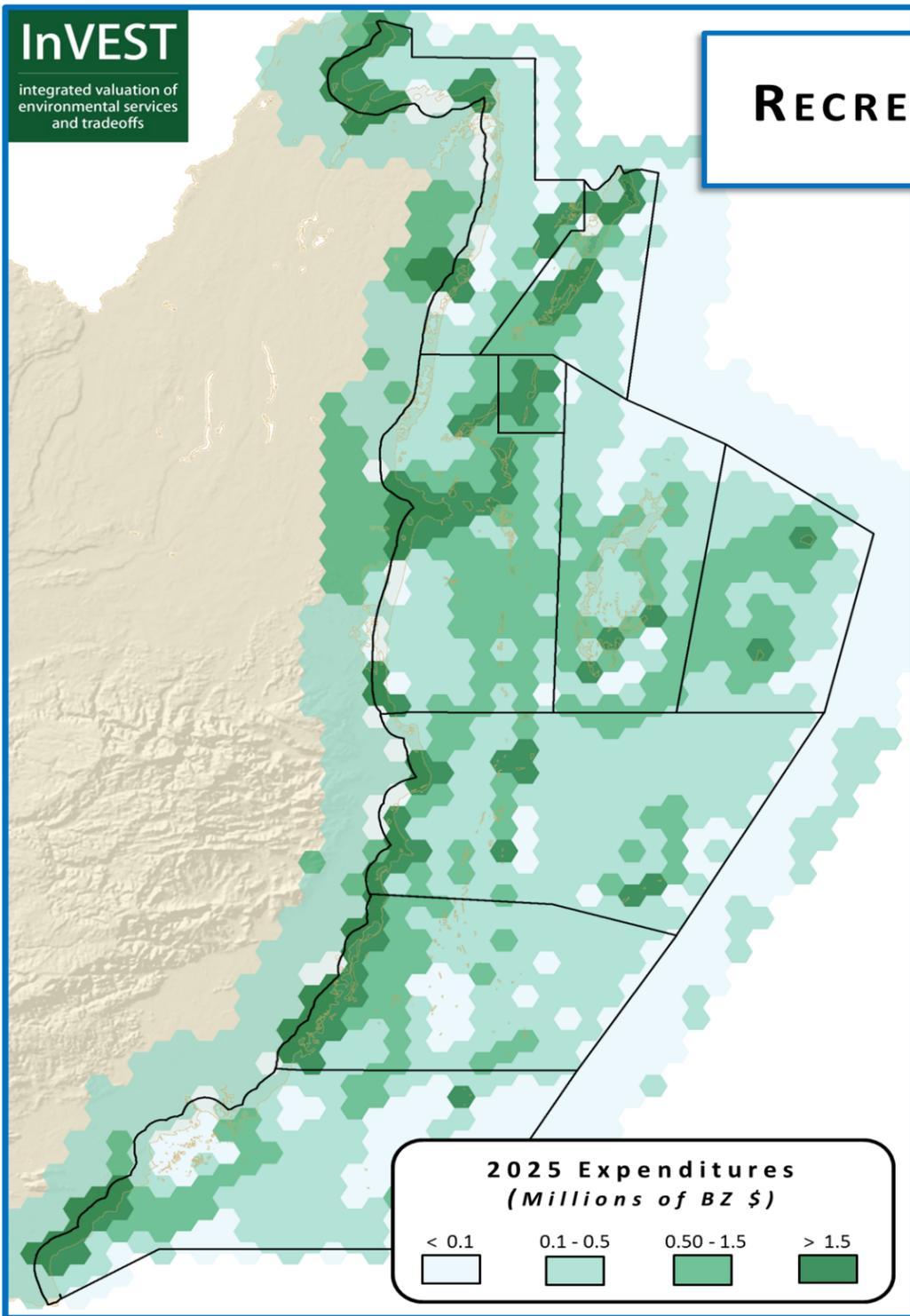
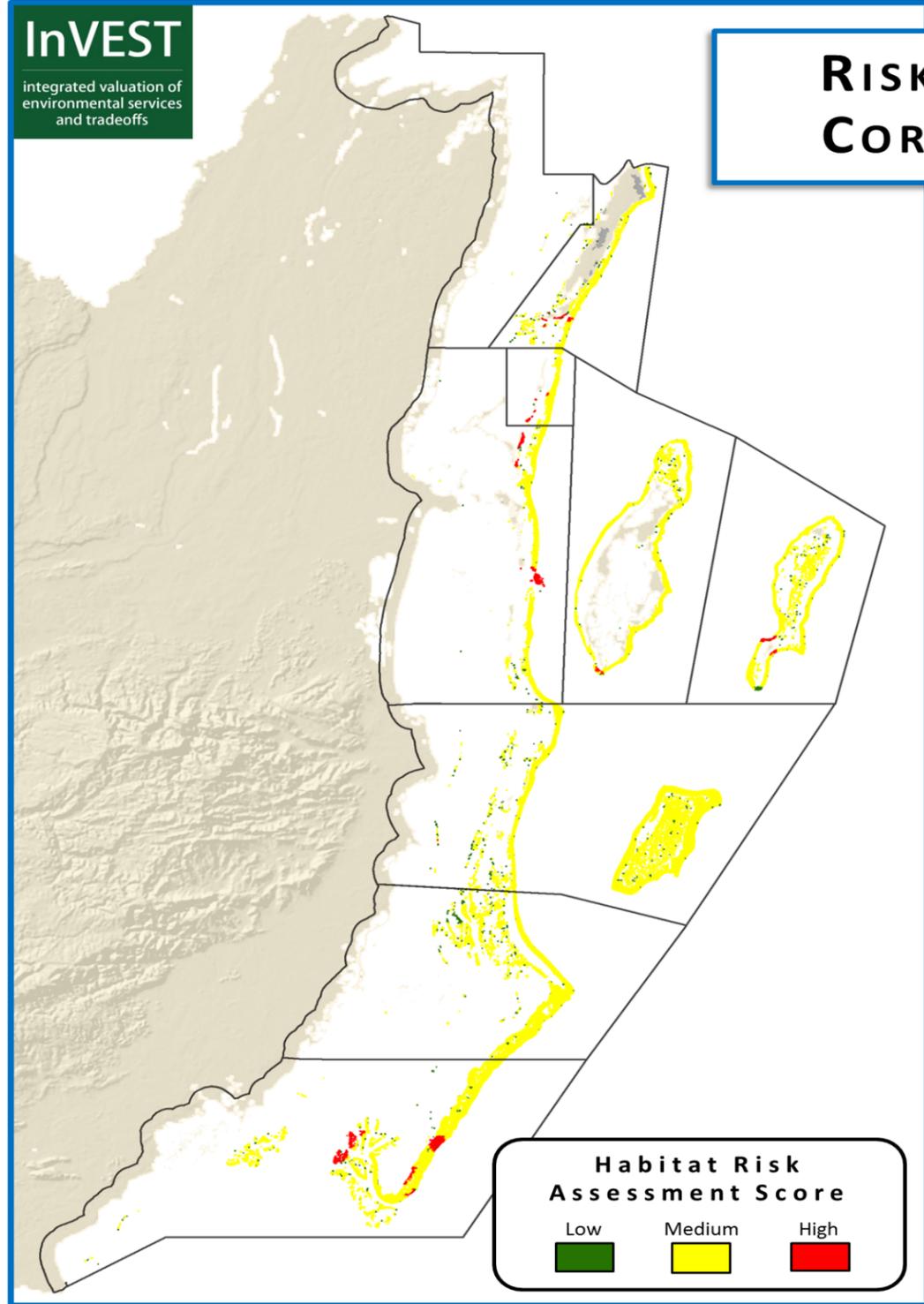


Figure 6: Annual Expenditures for Marine Tourism and Recreation by Scenario

**RISK TO
CORALS**



INFORMED MANAGEMENT

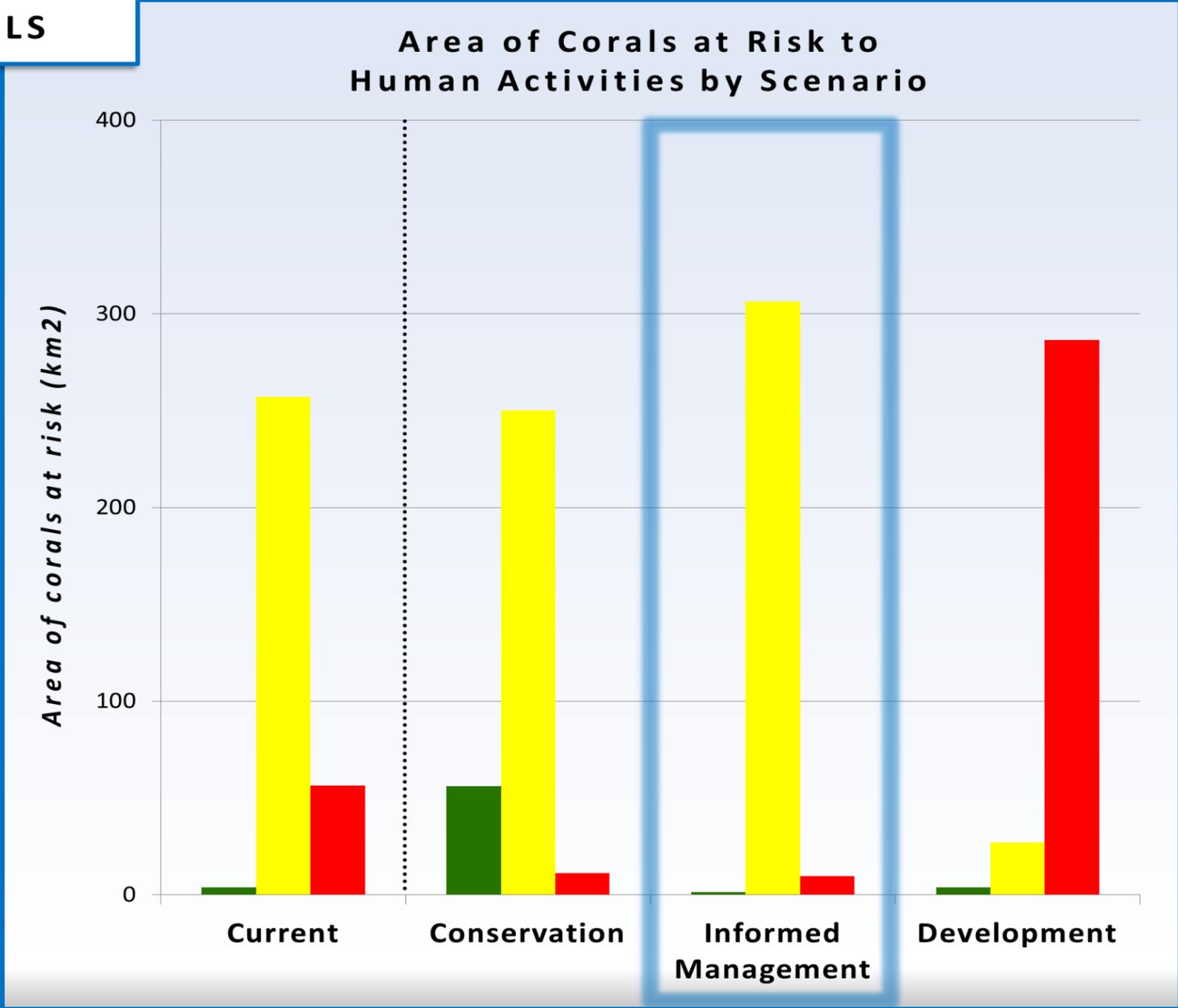
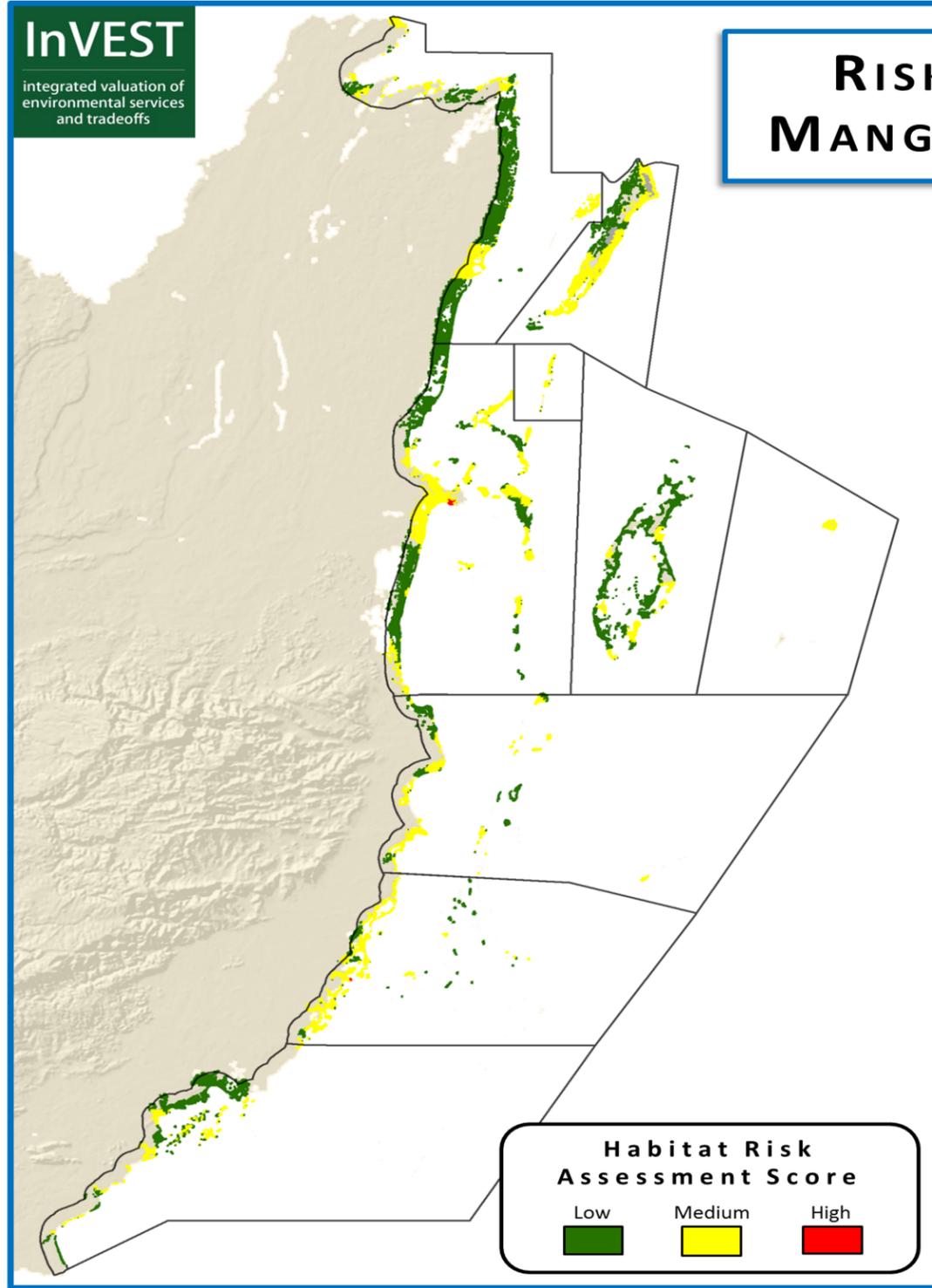


Figure 7: Area of Corals at Risk from Human Activities by Scenario

**RISK TO
MANGROVES**



INFORMED MANAGEMENT

**Area of Mangroves at Risk to
Human Activities by Scenario**

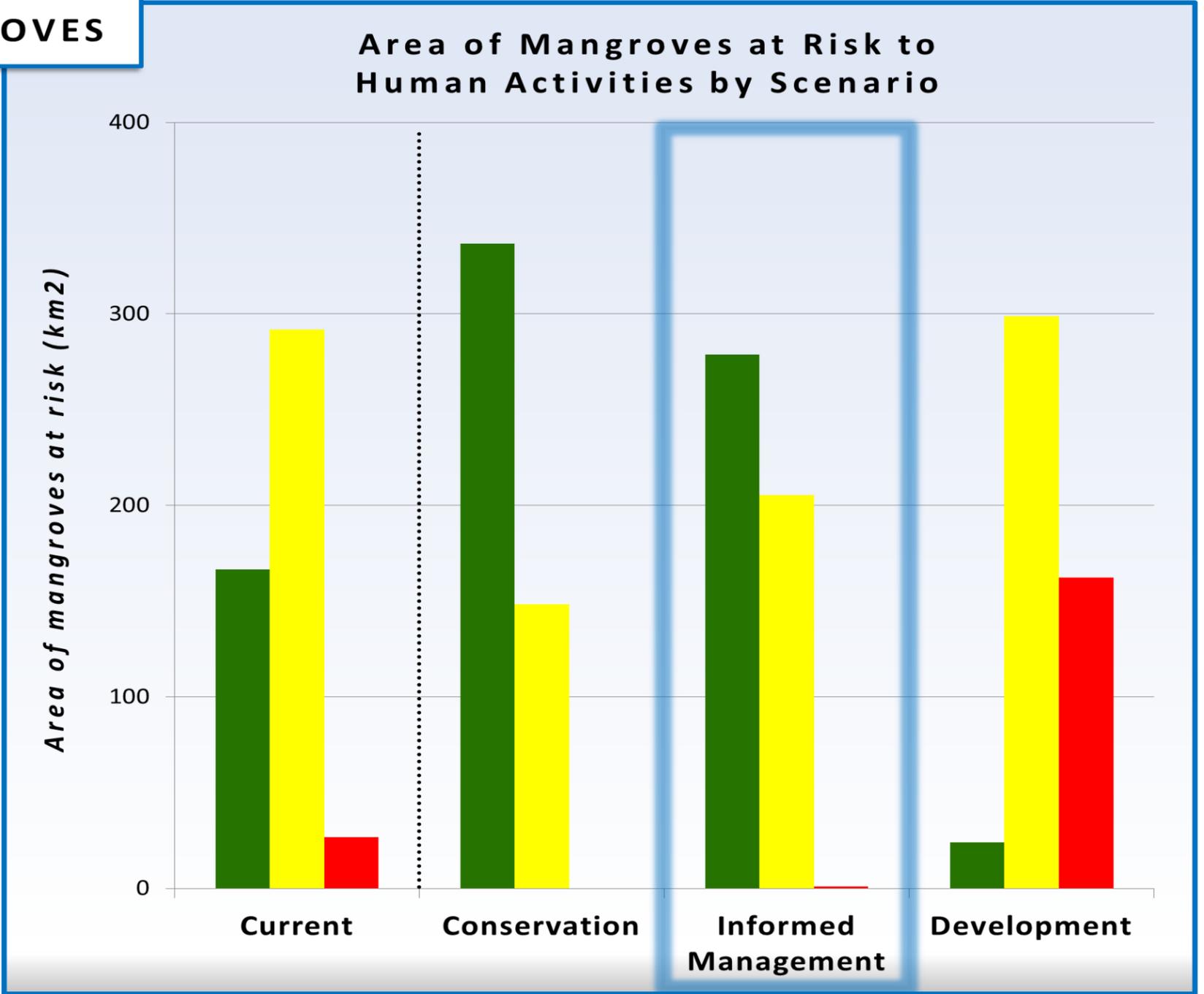
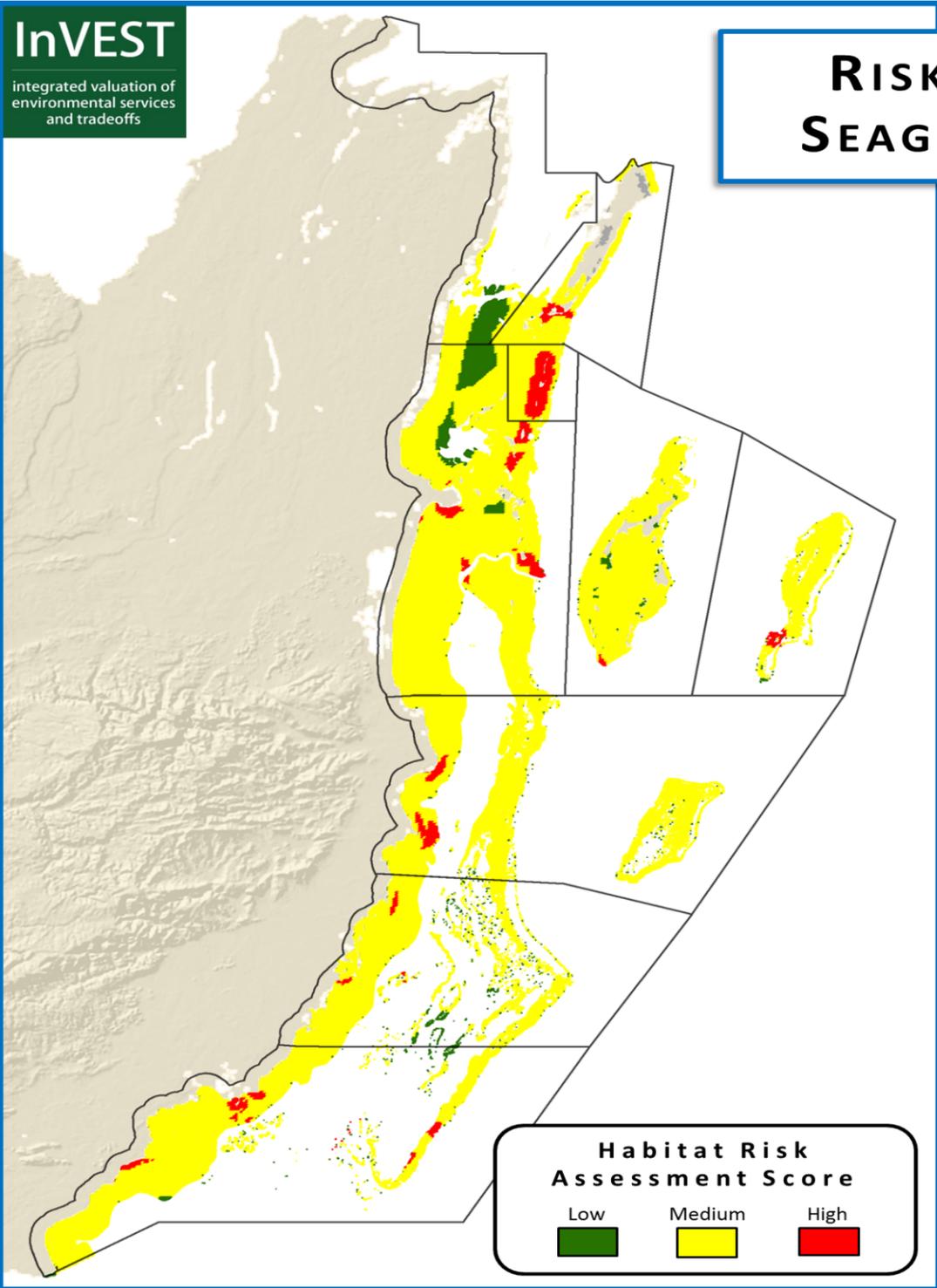
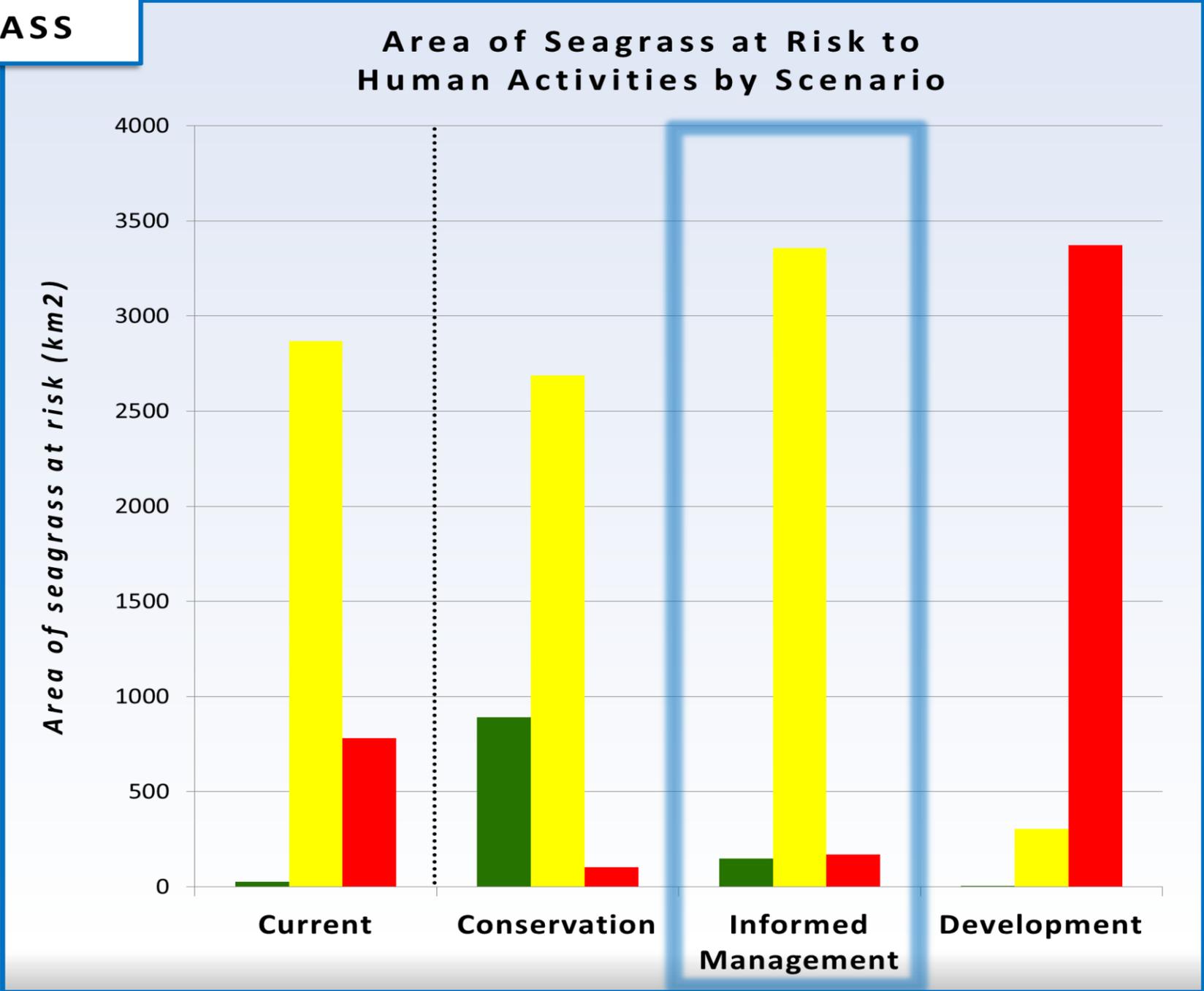


Figure 8: Area of Mangroves at Risk from Human Activities by Scenario

**RISK TO
SEAGRASS**

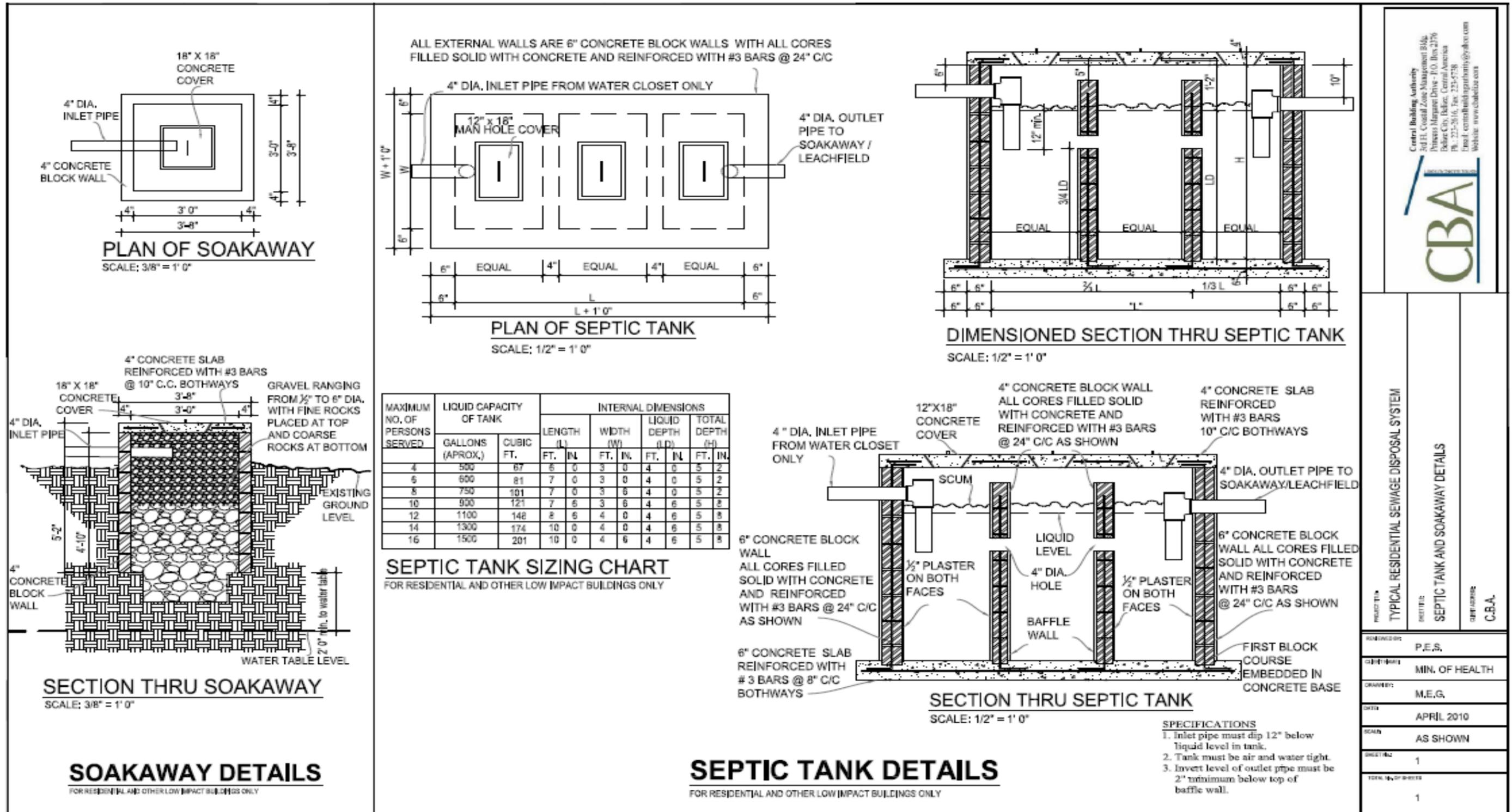


**Area of Seagrass at Risk to
Human Activities by Scenario**



INFORMED MANAGEMENT

Figure 9: Area of Seagrass at Risk from Human Activities by Scenario



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Email: centralbuildingauthority@cbca.com
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PROJECT TITLE
TYPICAL RESIDENTIAL SEWAGE DISPOSAL SYSTEM

DRAWN BY
SEPTIC TANK AND SOAKAWAY DETAILS

CHECKED BY
C.B.A.

DESIGNED BY	P.E.S.
APPROVED BY	MIN. OF HEALTH
DRAWN BY	M.E.G.
DATE	APRIL 2010
SCALE	AS SHOWN
SHEET NO.	1
TOTAL NO. OF SHEETS	1

Figure 10: Septic Tank and Soakaway Details for Residential and Low-Impact Buildings