ST. THOMAS EAST END RESERVES MANAGEMENT PLAN

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St. Thomas, U.S. Virgin Islands



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(see supplement document "STEER Management Plan: Appendices")

List of Acronyms

- AGRRA: Atlantic and Gulf Rapid Reef Assessment
- APC: Area of Particular Concern
- BMPs: Best Management Practices
- CAP (process): Conservation Action Planning
- CRCP: Coral Reef Conservation Program
- CWA: Clean Water Act
- CWP: Center for Watershed Protection
- CZM: Coastal Zone Management
- DCCA: Department of Conservation and Cultural Affairs
- DEE: Division of Environmental Enforcement
- DEP: Division of Environmental Protection
- DFW: Division of Fish & Wildlife
- DPNR: Department of Planning and Natural Resources
- EIS: Environmental Impact Statement
- EPA: Environmental Protection Agency
- FOCC: Friends of Christmas Cove
- FTE: Full-time employee
- GIS: Geographic Information System
- IUCN: International Union for Conservation of Nature
- LiDAR: Light Detection and Ranging
- MLBB: Mangrove Lagoon Benner Bay
- MMES: Masters of Marine and Environmental Science
- MPAs: Marine Protected Areas
- MRWS: Marine Reserves and Wildlife Sanctuaries
- MSA: Marine Protection, Research and Sanctuaries Act of 1972
- MSDs: Marine Sanitation Device
- NASA: National Aeronautics and Space Administration
- NMFS: National Marine Fisheries Service
- NOAA: National Oceanic and Atmospheric Administration
- NP: Non-point source pollution
- NPS: National Park Service
- PA: Protected Area
- PS: point source pollution
- SLR: Sea level rise
- STEER: St. Thomas East End Reserves
- STT: St. Thomas, VI
- STXEEMP: St. Croix East End Marine Park
- TNC: The Nature Conservancy
- USFWS: U.S. Fish and Wildlife Service
- USGS: U.S. Geological Survey
- USVI: U.S. Virgin Islands
- UVI: University of the Virgin Islands
- VIMAS: Virgin Islands Marine Advisory Service
- VINE: Virgin Islands Network of Environmental Educators
- VIRR: Virgin Islands Rules and Regulations
- VIWMA: Virgin Islands Waste Management Authority

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EXECUTIVE SUMMARY

This Management Plan contains the roadmap for effectively conserving the coastal and marine natural and cultural resources of the southeast end of St. Thomas. It does not contain any new rule or regulation that does not already exist in Virgin Islands Code. By creating a new territorial marine protected area, collectively deemed the St. Thomas East End Reserves (STEER), several existing protected areas (Cas Cay / Mangrove Lagoon, St James, and Compass Point Marine Reserves and Wildlife Sanctuaries) will be protected as one comprehensive management unit. In recognition of the importance of adjacent natural and cultural resources as well as the imminent threats to them, a collaborative planning process between the STEER community and the Virgin Islands Department of Planning and Natural Resources (DPNR), University of the Virgin Islands (UVI), and The Nature Conservancy (TNC) was initiated in May 2008 to develop this management plan to provide the long term vision for the area and guide near-term (3-5 years) objectives and activities.

The intent of the STEER Management Plan is to outline the steps needed *to restore and maintain a functional coastal ecosystem that promotes sustainable recreational opportunities and compatible commercial uses with community engagement through effective management.*

The TARGETED RESOURCES in STEER that this plan aims to protect, enhance and restore are:

- **MANGROVES**
- **SEAGRASS BEDS**
- **COMPASS POINT SALT POND**
- **SEA AND SHORE BIRDS**
- **CORAL REEF COMMUNITIES**
- **NURSERY AND FISHERIES RESOURCES**
- **COMPATIBLE AND SUSTAINABLE USE AND ENJOYMENT**

The THREATS to these targets fall into nine general themes:

1. Land-based Sources of Pollution
2. Climate Change
3. Habitat Loss
4. Unsustainable or Illegal Fish Harvest
5. Predators of Sea and Shore Birds
6. Incompatible Use Issues
7. Trash and Debris
8. Physical Damage from Boats
9. Marine-based Sources of Pollution

STRATEGIES developed to abate these threats or restore a targeted resource revolve around:

- Improved watershed and storm water management
- Increased coordination of permitting, regulation and enforcement of non-point and point-source pollution and coastal development to prevent habitat loss and sedimentation
- Improving enforcement of existing coastal rules and regulations
- Community outreach
- Developing a climate change adaptation plan
- Creation of a moorings program within STEER
- Developing a Zone and Mooring Plan for recreational and commercial activities
- Improve bird nesting success and survival rates by reducing predation by introduced species and entanglement by discarded monofilament
- Restoration activities

The primary components of this Management Plan are:

1) An outline of **STRATEGIES AND ACTION STEPS** aimed to abate threats to these resources or to restore the targeted resources to acceptable and functional levels.

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2) A **MONITORING PLAN** to accompany the management strategies to inform managers, researchers, funding sources, and Virgin Islanders of the effectiveness of activities to the benefit of the resources.

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3) A **SUSTAINABLE FINANCE PLAN** that identifies the financial need and resources for the management and operation of STEER.

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4) A **ZONE AND MOORING PLAN** which clearly delineates the designated allowed maritime, recreational and commercial uses with corresponding regulations, and a mooring and anchoring plan.

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5) Relevant **BACKGROUND INFORMATION** necessary for guiding the management of STEER including legislative structure, current uses and status of the resources, studies, and involved parties.

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INTRODUCTION

1.1 Purpose and Scope

View from St. Thomas east end overlooking STEER, R. Platenberg

This Management Plan was developed for the **Cas Cay / Mangrove Lagoon, St James, and Compass Point Marine Reserves and Wildlife Sanctuaries (MRWS)** collectively referred to as the St. Thomas East End Reserves, or "STEER". Prior to the development of this Management Plan, the most recent plan, written in 1993, focused solely on the Cas Cay/Mangrove Lagoon MRWS, but was not authorized by the managing authority nor has it been implemented. STEER is one of the various forms of protected areas throughout the marine and coastal environment of the U.S. Virgin Islands (USVI). Of the system of protected areas managed by the Territorial Government of the USVI, this area is the most recent, along with the St. Croix East End Marine Park (STXEEMP). As part of a larger, territory-wide system of Marine Protected Areas (MPAs), STXEEMP and STEER are designed to protect the system of coastal resources including mangroves, seagrass beds, coral reef communities and other critical marine habitats.

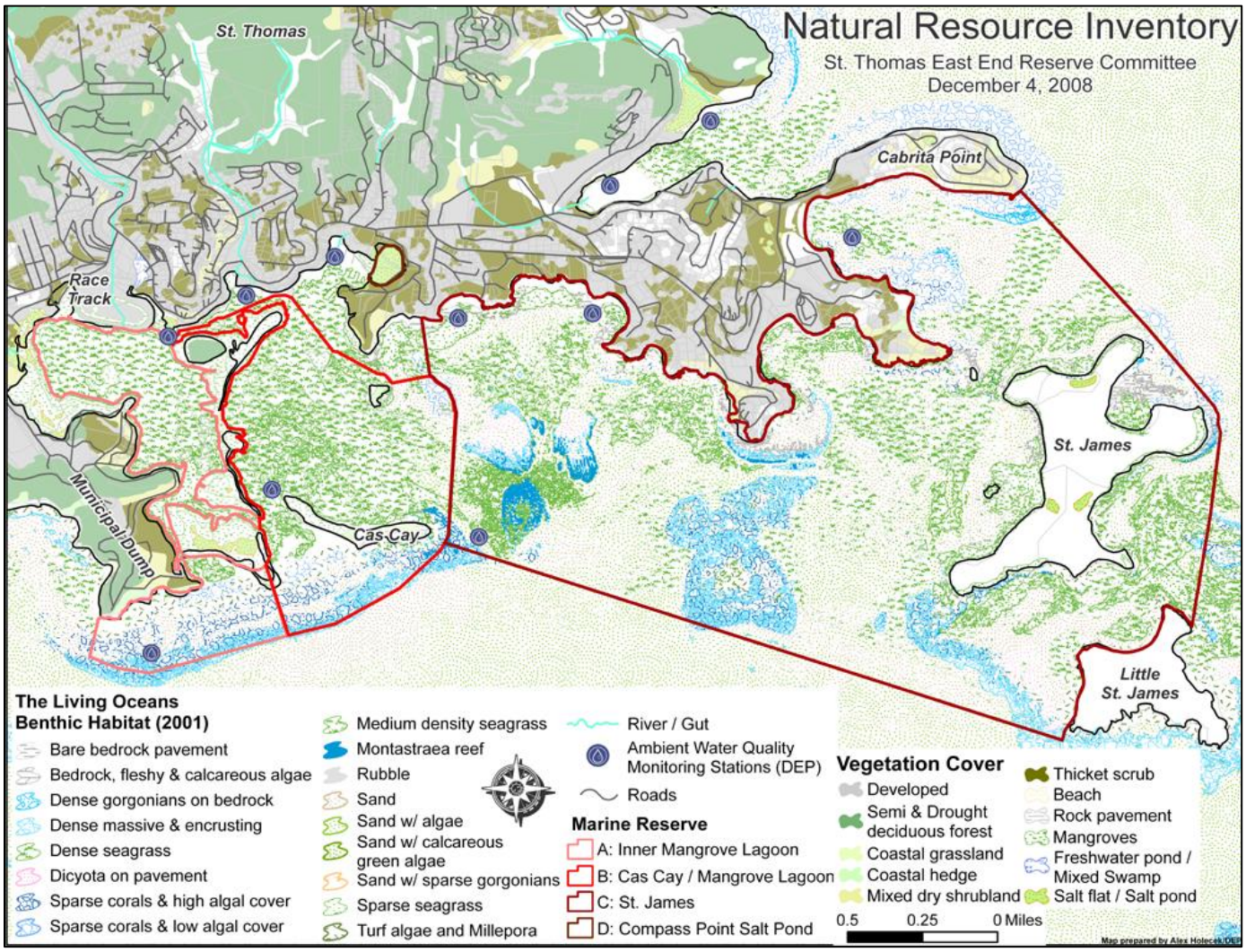

Figure 1: Marine Reserve Wildlife Sanctuaries and natural resources of STEER

The MPAs described in this Plan encompass 9.6 km^2 of significant coastal, marine and fisheries resources, including mangrove forests, salt ponds, lagoons, reefs and cays. Located at the southeastern end of St. Thomas, STEER is thought to be one of the most valuable fish nursery areas remaining on St. Thomas. Many species of fish and shellfish, including important commercial and sport fisheries resources, spend a portion of their life protected in the shallow mangrove and seagrass beds while feeding and growing before populating other marine habitats in the area. These natural resource-rich areas were declared Areas of Particular Concern (APCs) in 1979, specifically the Mangrove Lagoon/Benner Bay APC and Vessup Bay APC (*Figure 2: Areas of Particular Concern in STEER*). APCs identified in Figure 2 include both terrestrial and marine areas.

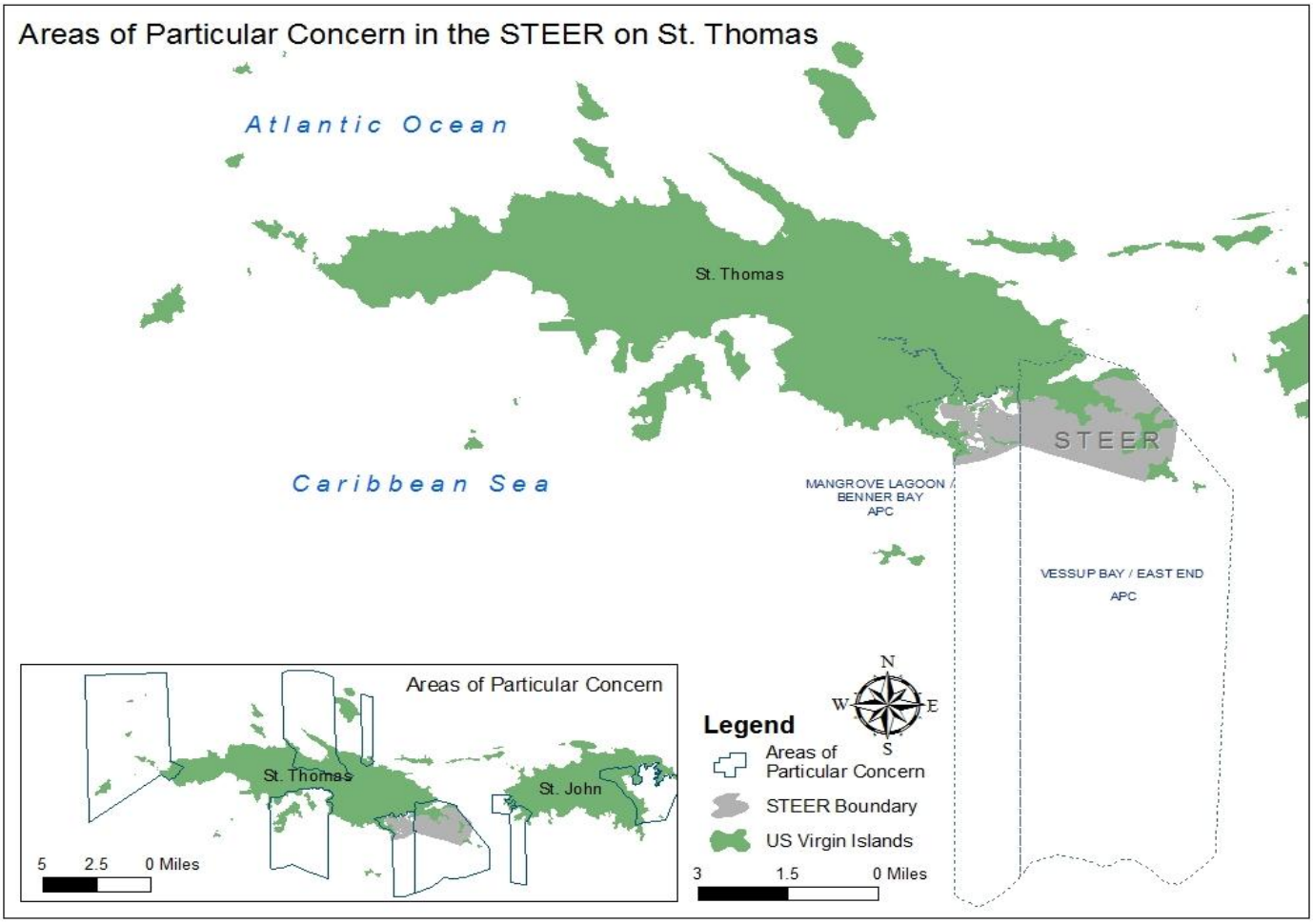

Figure 2: Areas of Particular Concern in STEER

This Management Plan is designed to provide the long-term vision for STEER and guide near-term (3-5 years) objectives and activities. It does not contain any new rules or regulations that do not already exist in the Virgin Islands Code. Components include a management activity plan (including monitoring for effectiveness), a financial business plan, and a zone and mooring plan. The Plan is part of an adaptive and iterative management process, ultimately leading to the sustainable use of the coastal and marine resources in STEER. It is designed to provide guidance in the near-term, but is also open to modifications based on periodic evaluation of management activities and results. The monitoring program included in the Plan is designed to provide the framework for the evaluation of the effectiveness of the management actions. Each action undertaken by management will be evaluated to ensure that it is achieving the objectives set forth throughout this plan. This plan should be revised with stakeholder input after a period of five years from the time of approval and commencement of management activities to reflect the results of the monitoring program. Specific sections, such as the strategic actions, will be reviewed on a more frequent basis to adapt to changes.

1.2 Legislative Authority

The Virgin Islands Code, Title 12, Chapter 1, Section 97 grants the Commissioner of the Department of Planning and Natural Resources (DPNR) the authority to designate or establish marine and wildlife sanctuaries for the purposes of propagating, feeding and protecting birds, fish and other wildlife. It is under this authority that the Cas Cay/Mangrove Lagoon, St. James and Compass Point Pond Marine Reserves and Wildlife Sanctuaries were all established in 1994.

In 2002, Title 12, Chapter 1 of the Virgin Islands Code was amended to include the establishment of the St. Croix East End Marine Park, and to allow for the future designation of other marine parks. Section 98(b) of the Code grants the Virgin Islands Coastal Zone Management Commission (the Commission) the authority to establish other marine parks in the Virgin Islands as part of a territorial park system; further, the Commission may promulgate rules and regulations pertaining to the management of such designated areas under the authority of section 98(d) (3) of the VI Code.

1.3 Background of STEER Designation and the 2011 Management Plan

In 1972, the Legislature of the Virgin Islands (Legislature) passed Act 3330, Commercial Fishing Promotion, which was aimed to develop the commercial fishing industry and recognize the significance of the marine habitat to the industry, and its importance to the livelihood of the people of the Virgin Islands (DCCA, 1979). As part of the Act, the Department of Conservation and Cultural Affairs (DCCA) was mandated to establish necessary fishery management programs. In that same year, Congress passed the Marine Protection, Research and Sanctuaries Act of 1972 (MSA), which would allow for the designation of marine sanctuaries for "the purpose of preserving or restoring their conservational, recreational, ecological, or aesthetic values" (DCCA, 1979). The National Oceanic and Atmospheric Administration (NOAA) Sanctuaries Program Office was tasked with administering the program. Criteria for designation were commonly based on areas with distinctive and important habitat, species and ecosystems, although sometimes areas were designated to preserve distinctive resources where conflicts between human uses and conservation required comprehensive management planning guidelines.

As early as 1979, the area off southeast St. Thomas was identified as a top candidate for designation under the National Marine Sanctuary Program. Criteria used in selecting the area included:

- Ecological value of the area
- Value of the area for scientific research
- Ability of the area to support fisheries
- Ability to maintain recreational use of the area

It was determined that the area's ecological, cultural, recreational and aesthetic importance to the people of the Virgin Islands would require increased management for the protection of the multiple resource uses. Although many years have passed since the investigation into the area off the southeast of St. Thomas, many of the concerns for the area remain today. The areas were given some protection when designated MRWSs, but functional management of the area has been non-existent.

Hawksbill sea turtle, R. Platenberg

In 2008, DPNR-Division of Coastal Zone Management (CZM) received an application submitted by WT Enterprises to moor a vessel in Christmas Cove on Great St. James Island and operate it as a floating bar and restaurant. There was tremendous public outcry against the granting of a permit for such activity. The main reason cited was that the area was designated as a Marine Reserve and Wildlife Sanctuary. After reviewing the regulations, a floating bar and restaurant were not specifically prohibited, but most believed that such an activity could not foster the goals outlined in the designation of the area as a reserve. It was clear that a management plan for the area was lacking; one that would identify a vision for the area and prevent future applications of this type from occurring. As a result, in April 2008, DPNR, the University of the Virgin Islands (UVI), The Nature Conservancy (TNC), and a community group called the Friends of Christmas Cove (FOCC) partnered to create a management plan for all the designated MRWSs on St. Thomas' east end.

Coincidentally, activities undertaken by DPNR's Division of Environmental Enforcement (DEE) to remove derelict and unpermitted vessels from the MRWSs in the spring of 2008 drew further attention to the need for a management plan for the area. This endeavor by DPNR's DEE happened to coincide with the early formation of the Core Planning Team to spearhead the drafting of a comprehensive area Management Plan for STEER and the identification of stakeholders to provide input in the planning process. Community attention and support for a Zone and Mooring Plan grew as a result of the highly publicized actions by DPNR's DEE.

By creating a management plan for the area, clear conservation goals are established, resource management can be achieved, and the area can be managed under the Virgin Islands Territorial Park System.

1.4 Rules and Regulations of STEER

A summary of the Virgin Islands Rules and Regulations (VIRR) and Virgin Islands Code applicable to STEER is outlined in the table below (*Table 1*). The complete rules and regulations that apply to STEER are included in *Appendix A: "Relevant STEER Rules and Regulations."* The applicable rules and regulations include:

- VIRR Title 12, Chapter 1, Subchapter 94: Islands and Cays
- VIRR Title 12, Chapter 1, Subchapter 96: Prohibited Acts in Wildlife and Marine Sanctuaries
- VIRR Title 25 Navigation, Chapter 16: Mooring of Vessels and Houseboats
    - Section 404 Mooring and Anchoring of Vessels in the Territory
    - Section 405 Mooring Permits, Fees, Renewals and Cancellations
    - Section 406 Placing of buoyed mooring; unauthorized use; reassignment; identification
    - Section 408 Unseaworthy and derelict vessels, houseboats, refuse and pollutants
    - Section 408a. Prohibition of Houseboats
- VI Code Title 12, Chapter 2, Endangered and Indigenous Species Act

Table 1. Summary of MRWS Rules and Regulations applicable to STEER

Cas Cay Marine Reserve and Wildlife Sanctuary	**VIRR Title 12 Chapter 1, Subchapter 94, Islands and Cays**	It is unlawful for any person to land on or create disturbance near any island or cay listed in the Annex unless the person is a governmental employee on official business, an authorized scientist, a licensed seabird guide, or a person possessing a valid visitation permit who is escorted by a licensed seabird guide acting within the scope of his license. (Subchapter 94, Section 94(b)-1) (Islands and cays listed in the Annex include Capella, Carval Rock, Cas Cay, Cockroach, Congo, Cricket, Dog, Dutchcap, Flanagan, Flat, Frenchcap, Kalkun, Little Flat, Pelican, Saba, Shark, Stevens', Sula, Turtledove.) With the exception of Cas Cay which was bequeathed to the Government of the Virgin Islands "for the exclusive use as a bird sanctuary, and for the purpose of preserving the cay in its natural state for the perpetual enjoyment of the people of the Virgin Islands."
	Subchapter 96, Section 96-2	*Prohibited Activities within the Cas Cay MRWS:* Except under permit or specific authorization from the Commissioner, it is unlawful to: • Take or possess any bird, fish, or other wildlife (including any living organism) or part thereof • Unlawful to use, possession or discharge of any firearm, air rifle, bow and arrow, or any trap or other contrivance designed for or capable of taking birds, fish or other wildlife into or within the Marine Reserve and Wildlife Sanctuary. • Anchor beyond 7 days within the boundaries of the Marine

		Reserve and Wildlife Sanctuary • Anchor boats without functioning sewage holding tanks • Use in the inner lagoon any internal combustion engine *(Inner lagoon is defined as the area within the Marine Reserve and Wildlife Sanctuary west of a line from Turpentine Run to the eastern end of Patricia Cay)* • Operate any powered vessel in excess of 5 miles per hour • Moor any vessel after July 1, 1996. Vessels with current mooring permits must have a functioning holding tank capable of being discharged at a pump-out facility or beyond 3 miles at sea. (No new mooring permits will be granted for this area) • Picnic in/at non-designated areas, camp hunt, use of fire (except in self-contained charcoal-briquette or gas grill), possession of firearms, playing of amplified music, disturbing or removal of any plant, animal or mineral, store, repair, maintain, or construct any vessel or vehicle
	Subchapter 96, Section 96-5	*Permitted Activities within the Cas Cay MRWS:* Acts permitted, provided a permit is first obtained from the Commissioner: • The use of castnet with a minimum square mesh size of ¼ inch to capture baitfish (fry) within 50 feet of the north and west shorelines of Cas Cay only
Mangrove Lagoon Marine Reserve and Wildlife Sanctuary	**Subchapter 96, Section 96-2**	*Prohibited Activities within the Mangrove Lagoon MRWS:* Except under permit or specific authorization from the Commissioner, it is unlawful to: • Take or possess any bird, fish, or other wildlife (including any living organism) or part thereof • Unlawful to use, possession or discharge of any firearm, air rifle, bow and arrow, or any trap or other contrivance designed for or capable of taking birds, fish or other wildlife into or within the Marine Reserve and Wildlife Sanctuary • Anchor beyond 7 days within the boundaries of the Marine Reserve and Wildlife Sanctuary • Anchor boats without functioning sewage holding tanks • Use in the inner lagoon any internal combustion engine Operate any powered vessel in excess of 5 miles per hour • Moor any vessel after July 1, 1996. Vessels with current mooring permits must have a functioning holding tank capable of being discharged at a pump-out facility or beyond 3 miles at sea. (No new mooring permits will be granted for this area) • Picnic in/at non-designated areas, camp hunt, use of fire (except in self-contained charcoal-briquette or gas grill), possession of firearms, playing of amplified music, disturbing or removal of any plant, animal or mineral, store, repair,

		maintain, or construct any vessel or vehicle
Compass Point Pond Marine Reserve and Wildlife Sanctuary	**VIRR Title 12, Chapter 1, Subchapter 96, Prohibited Acts in Wildlife and Marine Sanctuaries**	*Prohibited Activities within the Compass Point Pond MRWS:* • Unlawful to use, possession or discharge of any firearm, air rifle, bow and arrow, or any trap or other contrivance designed for or capable of taking birds, fish or other wildlife into or within the Marine Reserve and Wildlife Sanctuary • Unlawful to bring livestock, dogs, motor vehicles or to play loud electronic music in Marine Reserve and Wildlife Sanctuary • Unlawful to disturb or take and plant or animal within the Marine Reserve and Wildlife Sanctuary • Unlawful to store, repair, maintain or construct any vehicle or vessels within the Marine Reserve and Wildlife Sanctuary
St. James Marine Reserve and Wildlife Sanctuary	**Subchapter 96, Section 96-3**	*Prohibited Activities within the St. James MRWS:* • It is unlawful to remove any marine or other wildlife without a permit or specific authorization from the Commissioner
	Subchapter 96, Section 96-4	*Permitted Activities within the St. James MRWS:* Acts permitted, provided a permit is first obtained from the Commissioner: • Scientific collecting in support of and for use in a research project with an approved protocol • The use of castnet with a minimum square mesh size of ¼ inch to capture baitfish (fry) within 50 feet of the shoreline, except for Cow and Calf rocks • Fishing with hook and line

Various Federal regulations also apply to STEER including, but not limited to, the Essential Fish Habitat Amendment to the Magnusen-Stevens Fishery Conservation and Management Act, the Endangered Species Act, the Migratory Bird Treaty Act and the Clean Water Act.

1.5 Location, Access and Facilities

The MRWSs described in this Plan, collectively referred to as STEER, encompass 9.6 km^2 of significant coastal, marine and fisheries resources, including mangrove forests, salt ponds, lagoons, reefs and cays (*Figure 1: Marine Reserve Wildlife Sanctuaries and natural resources of STEER*). Located at the southeastern end of St. Thomas, the area spans 39 km (24 miles) of coastline consisting of mangroves, sandy beaches, rocky headlands, rocky shores, and developed shoreline. STEER includes the Compass Point Pond, a salt pond located near Benner Bay. The Cas Cay/ Mangrove Lagoon MRWS has Long Point as a western boundary, Nazareth as the eastern boundary and contains Patricia, Bovoni, Rotto

and Cas Cays. The St. James MRWS starts at the eastern boundary of the Cas Cay/ Mangrove Lagoon, to the northwestern shore of Little St. James, encompassing Great St. James to the mean high tide watermark, and reaching to Cabrita Point. (Please see *Figure 3. Watershed map of STEER* and *Appendix B: STEER Boundary Coordinates,* for the boundary coordinates and descriptions of STEER and the zones contained within.)

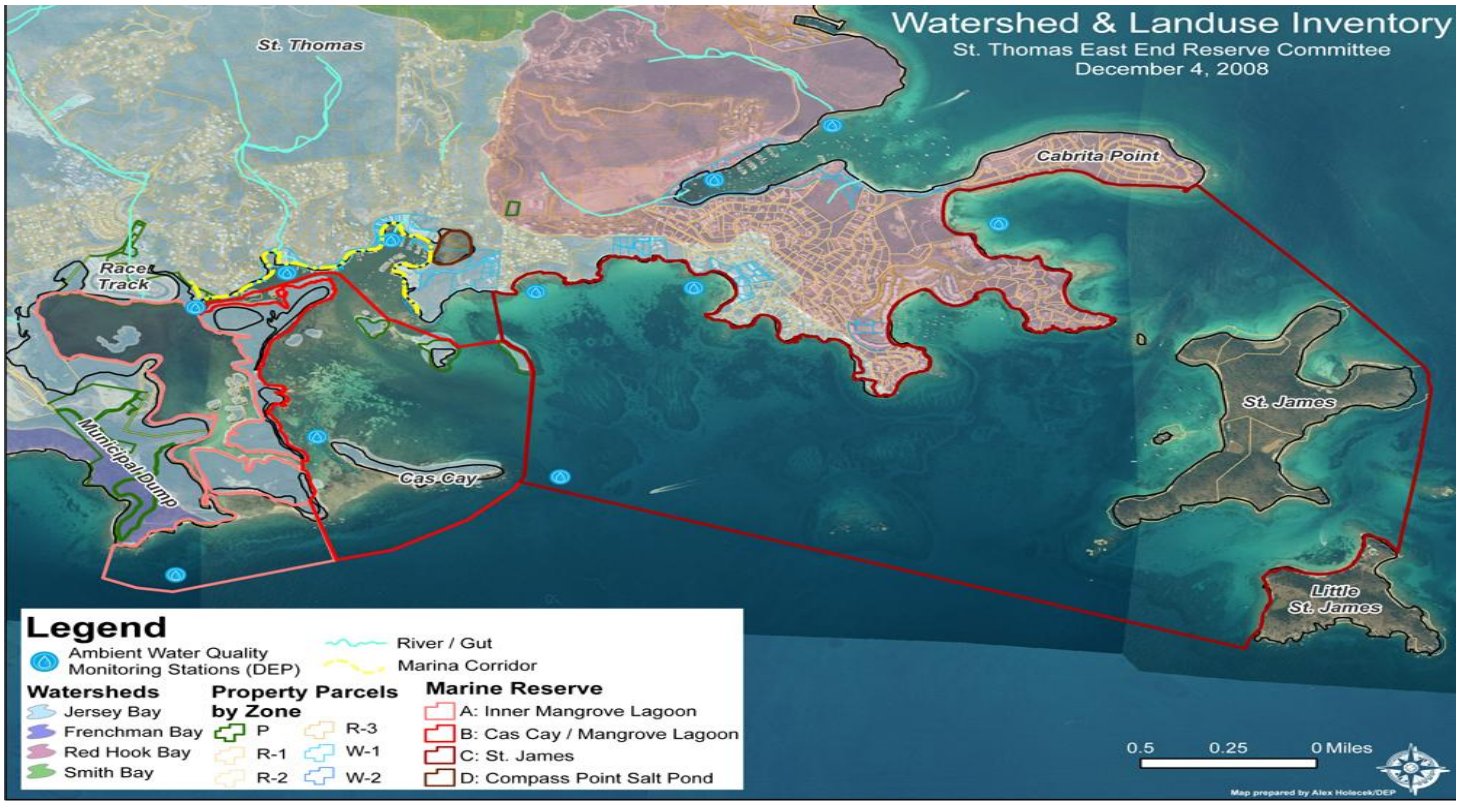

Figure 3: Watershed Map of STEER

There are five private offshore cays (Little St. James, Great St. James, Current Rock, and Patricia, Rotto, and Fish cays), two public owned offshore keys (Cas and Bovoni cays), and Cow and Calf Rocks within STEER. Several adjacent watersheds impact STEER, including Red Hook Bay, Jersey Bay, and Frenchman Bay watersheds.

Bovoni Landfill overlooking Inner Mangrove Lagoon, R. Platenberg

There are six hotels /resorts/condominium associations along the Marine Reserves boundary (*Figure 4*: *Facilities Adjacent to STEER*) with reverse osmosis plants, a waste water treatment plant, fueling facilities, back-up generators, and public access points to the water. In addition, a large housing community in Estate Bovoni is located just north of the Clinton Fipps Race track, directly north of the Mangrove Lagoon. The municipal landfill for both St. John and St. Thomas borders the western end of STEER.

Boaters and anglers alike can access STEER by way of nine marinas and boat yards that lie along the southern shore of St. Thomas. This "Marine Row" was not included in the original physical boundary of the MRWSs; however due to their proximity and access for the Marine Reserves waters their practices are critical to this Management Plan. Some public ramps are located at Benner Bay adjacent to Eco-Tours and Cowpet Bay.

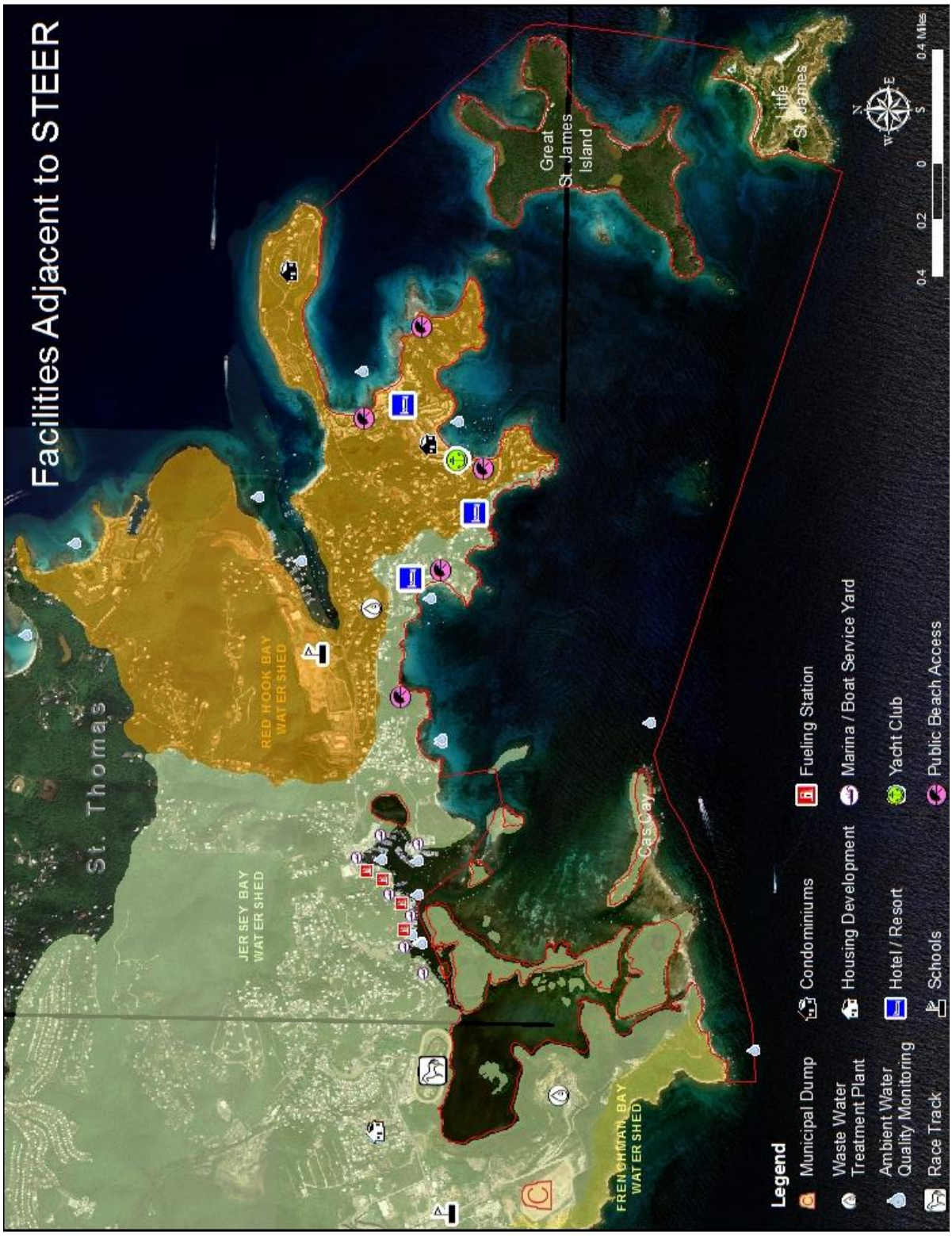

Figure 4: Facilities Adjacent to STEER

1.6 Current Socio-economic Uses of STEER

Recreational use:

Recreational exploration of STEER, R. Platenberg

The luxurious beaches and coastlines of STEER are favored sites for snorkeling and scuba diving, for both residents and visitors, particularly at Cas Cay, Christmas Cove, Great Bay, and Cow and Calf Rocks. An active recreational water sports community partakes in windsurfing, kite boarding, kayaking, and sailing from public beach access points and swimming areas located at condo and hotel locations such as Vessup Beach, Ritz Carlton, Secret Harbor, Cowpet Bay East & West, Anchorage, The Elysian, Water Point, Cabrita Point and Deck Point residential areas. In addition, visitors engage in sightseeing excursions on both motor boats and sailing vessels. Bait fishing, hook and line as well as sport fishing are limited and require DPNR permits.

Vista into Reserve, R. Platenberg

Widely known as the original boating community in the Virgin Islands, STEER is a gateway for "down-island" and stateside voyages, where boaters can readily service their boats (*Appendix C: "Adjacent Commercial Entities"*). Home to the St. Thomas Yacht Club at Cowpet Bay and the annual ROLEX regatta, STEER is a world renowned destination for the charter boat and private yacht industry including powerboats, sailing vessels and fishing charters. An active residential boating community has developed in STEER, including overnight stays as well as full time and seasonal live-aboards. Private DPNR-permitted moorings as well as personal moorings are found in STEER. As part of the management for the area, permanent mooring buoys will be installed in STEER to help prevent anchor damage to coral reefs, seagrass beds and mangroves.

Commercial Use:

Ritz Carlton, R. Platenberg

Many of the commercial activities within or adjacent to the boundaries of STEER support the traditional and recreational uses of the area. Because the southeast area of St. Thomas is convenient to a major airport, downtown Charlotte Amalie, Red Hook, St. John and the British Virgin Islands, a concentration of seaside hotels, private villa rentals, condominiums, restaurants, and yacht clubs are all concentrated around the STEER coastline. Routes for regularly scheduled inter-island ferry service and commercial barges pass through the St. James Reserve within STEER.

Sailboats moored at Cas Cay, R. Platenberg

There are powerboat, sail, water sports equipment and scuba diving businesses. Ecotourism-based businesses also exist within STEER, one of which provides kayak tours of the mangrove lagoon. The majority of St. Thomas marinas and boatyards bordering the Reserves provide various marine related services (although the marine facilities are not within the boundaries of the Reserves, all water craft must enter and exit via the Reserves waters). The St. Thomas Yacht Club in Cowpet Bay has moorings available to its members on a fee basis. Limited fishing (bait fishing with cast net as well as hook and line by permit only) occurs in STEER.

Research and Education:

Seagrass monitoring in STEER, MMES 2009

STEER is convenient and easily accessible by research and educational groups alike. Over the years, USVI resource agencies including DPNR's CZM, Division of Fish & Wildlife (DFW), Division of Environmental Protection (DEP), and UVI have gathered a wealth of information related to the area's fish, turtle, bird, coral reefs, sea grasses, salt pond dynamics, mangroves and water quality. More recently, UVI's Center for Marine and Environmental Studies, NOAA, Gulf of Mexico Foundation and TNC have also been active in research, restoration and management initiatives.

Most of the documents associated with past research are available at the DFW Office in Red Hook or see list of references at the end of this document and the "*Appendix D: STEER Documents, Studies, and Papers*" supplemental to this report for more detailed information.

The diverse habitats in STEER provide a research opportunity for undergraduate and graduate students, visiting researchers from off-island, as well as elementary and secondary school students to study the relationships between the ocean, the reef, the shore, and commercial/residential uses in the area. There is expressed interest in "citizen science" opportunities whereby tour operators, residents,

park visitors, and guests participate in monitoring of marine habitats as part of their marine park experience.

Community Perceptions:

A survey was distributed to participants at the 2009 Earth Day clean up event located at the locally known "bridge to nowhere," an area of land adjacent to STEER and within the Jersey Bay watershed, and usually encumbered by large amounts of roadside waste and debris. The purpose of the survey was to gather information about community perceptions, understanding, and attitudes towards the Jersey Bay watershed.

Review of the STEER map, VIMAS

Out of the 60 individuals surveyed, 29 of them indicated as living in or near the Jersey Bay watershed. When asked why this watershed was important, the popular responses were: "it contains habitat for rare St. Thomas wildlife such as freshwater shrimp and wetland birds," "it is home to many different kinds of plants," and "it is an area for storm water catchment and groundwater recharge." The top issues in the Jersey Bay watershed were "sediment run-off," "dumping," "sewage outfall," and "development." When asked what they would do to prevent further watershed pollution if given assistance, the most popular choices made were "volunteer for community environmental programs," "report commercial polluters," and "plant trees" (see *Appendix E: "Bridge to Nowhere Survey Results"* for complete survey and results).

While the survey was not widely distributed in the USVI, these results do indicate that there is a concern for the current health of the STEER watershed and adjacent areas, and that residents are interested in, and willing to participate in the conservation mission and goals of STEER.

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II. CONSERVATION ACTION PLAN (CAP)

2.1 Plan Development Process

STEER Stakeholder meeting, VIMAS

The initiative to build a comprehensive management plan for STEER began in the spring of 2008. The development of the Plan followed The Nature Conservancy's Conservation Action Planning (CAP Process) as a mechanism to develop a strategic vision and management plan for the Reserves (TNC 2007). The CAP methodology has been utilized and tested by TNC and its partners for over fifteen years and has resulted in effective management plans for hundreds of protected areas around the world. CAP is based on the principles of adaptive management and is designed to facilitate and utilize input from stakeholders.

The CAP is implemented through a series of planning meetings and workshops with the Core Planning Team and the Stakeholder Advisory Group. Facilitated discussions result in the development of goals, identification of priority conservation resources and their condition, understanding of human activities impacting the resources, and selection of objectives and strategies for improving or maintaining the resources within STEER. The process of working through CAP for protected areas results in a comprehensive management plan based on a solid ecological foundation focused on specific and attainable strategies for biodiversity conservation and threat abatement. The original St. Croix East End Marine Park Management Plan was also developed using early CAP principles. Ultimately, the process can address capacity issues and promote a financial plan for monitoring and evaluation***. Most importantly, the CAP process results in the creation of an overall work plan for local management authorities and related agencies to translate into annual work plans.***

The sustainable financial plan for STEER as contained within this Management Plan (page 84 and *Appendix F: "Full Sustainable Finance Plan")* was developed using World Wildlife Foundation's financial modeling template and TNC's methods of Integrated Strategic and Financial Planning following Conservation Finance Alliance methods and the Convention of Biological Diversity Programme of Work on Protected Areas. This included a finance gap assessment, which aided in the development of a realistic work plan, with associated costs. The resulting financial model provides comprehensive, long-term estimates of costs of each program, as well as potential sources of revenue. The total costs, revenue estimates and gap analyses derived from the model provide the components for developing sustainable funding vehicles and fundraising proposals.

The Management Plan was developed by the VI-DPNR (the Management Authority), UVI, and TNC with funding from NOAA and the US Fish and Wildlife Service (USFWS). Personnel of DPNR's Divisions of CZM, DFW, DEP, and DEE contributed to the drafting of the plan as did faculty and students of the UVI

and Friends of Christmas Cove. This process relied heavily on community expertise, with a series of community workshops held to generate input and ideas from the Stakeholder Advisory Group, special interest groups, and other regional experts during consultation meetings and workshops (see *Appendix G: "Core Drafting Team and Stakeholders"* for list of Core Planning Team and Stakeholder Advisory Group members involved). A brief description of the process that guided the workshops (CAP) and the timeline of the series of meetings and workshops held are included in *Appendix H: "CAP Process, Timeline, Meetings and Workshops."*

The STEER CAP process also benefited from conducting a multitude of broad community engagement activities including: Bridge to Nowhere Earth Day Clean-Up 2009, Reef Fest Exhibit 2009, Boating Safety Booth, STEER/Cleansweeps Mangrove Restoration/ VI Waste Management Authority-Youth Environmental Services summer program, UVI high school mangrove/seagrass monitoring demonstration, several radio shows, publishing of a factsheet, inclusion in recent USVI legislators environmental briefing book, utilization of Google Groups communication tool (STEER Stakeholders 2009), delivery of watershed socio-economic survey to resident focus group, web-based posting of documents, and periodic newspaper articles. Conducted by Core Steering Team members and targeted for the wider St. Thomas Community, these activities served as opportunities to build support and awareness for the plan, a starting point for adding societal and natural resource conservation value to the area, imperative to the successful implementation of the plan.

Bridge to Nowhere, Earth Day Clean-Up Poster

2.2 Vision

The aim of STEER's vision statement is a very brief summary of what STEER management is trying to achieve. It was based on the reason the Reserves were originally established and why they continue to be important today. It was designed to be:

- **Relatively General** - Broadly defined to encompass all possible project activities
- **Visionary** - Inspirational in outlining the desired change in the state of the targets toward which the project is working
- **Brief** - Simple and succinct so that that all project participants can describe the vision

A statement of the vision the community has for STEER was collaboratively written by the Core Steering Team and the Stakeholder group in a series of steps across two meetings. The steps included asking participants: "What is significant about the place?" What is important to you?" and "What do you want STEER to look like in 20 years?" A list of statements was produced, forming the basis for the vision that was vetted at several subsequent stakeholder meetings. The resulting vision for STEER is:

To restore and maintain a functional coastal ecosystem that promotes sustainable recreational opportunities and compatible commercial uses with community engagement through effective management.

Community members working together at a trash clean-up, VIMAS

CAP Process in action, VIMAS

2.3 Goals

The goals for the activities planned for the management of STEER were developed using a similar approach of stakeholder input, review, editing, and building consensus over a series of meetings. Most of what was originally expressed in the visioning process but not captured in the vision, such as specifically promoting research in the area, was incorporated into the goals. The resulting management goals of STEER are:

GOAL #1 ***Bolster natural resource condition*** by utilizing ecosystem-based management principles that aim to conserve watersheds and adjacent marine habitats critical to our island's fishery and tourism resources.

GOAL #2 ***Adopt effective management*** models that incorporate research and planning, to elevate STEER status into the USVI Territorial Park System marine protected area network.

GOAL #3 ***Inspire the community to support and participate*** in STEER management through community engagement opportunities, educational activities, and a variety of communication strategies.

GOAL #4 ***Fortify widespread socio-economic benefits***, while respecting traditional use and cultural values.

2.4 Conservation Resources (TARGETS)

The resources within STEER that stakeholders, resource managers and experts feel are to be the primary targets of our conservation efforts were identified in a series of workshops. These "Targets" provide a basis for all subsequent planning steps, including the determination of indicators and creation of monitoring plans to gauge the effectiveness of management of STEER. Conservation targets can be thought of as the resources that are important or unique to STEER that need to be protected whether they are natural, cultural, or socio-economic.

From a long list of all desired targets of protection, the top targets were determined to be:

- **MANGROVES**
- **SEAGRASS BEDS**
- **COMPASS POINT SALT POND**
- **SEA AND SHORE BIRDS**
- **CORAL REEF COMMUNITIES**
- **NURSERY AND FISHERIES RESOURCES**
- **COMPATIBLE AND SUSTAINABLE USE AND ENJOYMENT**

All participants in the CAP process have felt strongly that ***improved water quality*** should be a primary target for conservation action within STEER. However, in subsequent steps, we realized that improvement of water quality, as an attribute for all of the above listed targets, would benefit all seven targets. ***Improved water quality is thereby considered not only a target for conservation strategies and action, but also an overarching aim for STEER.*** It also serves as an important indicator of improvement in the status of the targets. Participants felt confident that water quality is a major theme of action for this Management Plan.

Furthermore, from a long list of species identified as targets to protect (such as conch, fiddler crabs, certain seabirds, parrotfish, etc.) we felt that targeting conservation efforts on the habitats that these species need to thrive will likely improve the status of these species within STEER. This can be gauged by measuring presence, population levels, biomass, or status of these species as indicators of successful management of the targets (Section 2.7 Monitoring and Evaluation of Effectiveness page 62).

For comparison, the following lists important habitats and features of STEER that were at one point identified in various legislative, scientific and historical documents and formed the basis for designation of the MRWSs on the east end of St. Thomas:

- *The Reserves contain six offshore cays that are considered St. Thomas' most important assets due to their pristine state. It was noted that the cays total almost 300 acres of which only 15 are public; Cas Cay was bequeathed to the VI government "for the exclusive use as a bird sanctuary, and for the purpose of preserving the cay in its natural state for the perpetual enjoyment of the people of the Virgin Islands."*
- *The mangroves in Jersey Bay are considered the most significant mangrove area in the VI and the last remaining such area on St. Thomas. The primary significant ecological function of these mangroves is as nursery and feeding ground of important finfish and invertebrate fisheries, and as a filtering agent for the runoff from adjoining watersheds. The mangrove system also provides valuable shoreline protection and shelter for boats during emergency weather events.*
- *Salt ponds (includes coastal salt ponds found in Great St. James).*
- *Coral reefs with their important ecological and recreational value.*
- *Sea grasses, also serving as nursery and feeding grounds for fishes.*
- *Guts (stormwater drainages with riparian habitat) in the adjacent watersheds.*
- *Recreational resources which play a major role in the lives of Virgin Islanders and have become important economic resources as well.*

For a more comprehensive list of species commonly associated with STEER, see Appendix D or The Comprehensive Wildlife Conservation Strategy for the Virgin Islands at vifishandwildlife.com

Bird nest, R. Platenberg

Great Egret, S. Sorentino

The following describes the role of STEER conservation Targets in the ecosystem, their characteristics, status and extent, and pressures on these resources. For more comprehensive background, studies, and references, please see "*Appendix D: STEER Documents, Studies, and Papers.*"

Figure 5: STEER Habitats

2.4.1 Mangroves

(For a more extensive description of mangroves in the USVI, see Appendix I: STEER Targets: Long Versions)

Mangroves are salt-tolerant plants that grow along tropical and sub-tropical coasts. They require warm temperatures, calm near shore waters, and low-lying coastal land. Their unique structures serve several important roles in marine ecosystems. The dense root system, especially prevalent in the red mangroves, protects coral by filtering land-based sediment that would otherwise flow into the ocean and obstruct sunlight from reaching the coral. The roots also provide nutrient-rich detritus and protection for larvae and juvenile fish, resulting in an ideal fish and shellfish breeding ground and nursery. Mangrove trees are also home to various species of birds. Furthermore, mangroves are valuable to humans, especially in times of severe weather. The roots are able to absorb high levels of wave energy; and boaters often protect their boats by docking them within the mangroves. The mangroves also protect the land behind them from erosion and flooding.

STEER is adjacent to the largest mangrove stand on St. Thomas and includes the lagoon at the western end of the Reserves within its boundaries (*Figure 5: STEER Habitats*). This lagoon not only supports local tourism business but also is commercially important for marine related business and has historically been a fishing and boating hub. This region, the Mangrove Lagoon-Benner Bay (MLBB), has been designated one of six APCs on St. Thomas due to potential threats to the ecosystem from its location beneath the largest watershed on the island and proximity to the Bovoni landfill. Encroachment as a result of anthropogenic activity (e.g., development) often limits the extent of the mangrove habitat, particularly along the northern edge of the mangrove lagoon. The mangrove delta in the Inner Mangrove Lagoon was altered during the construction of the Clinton Phipps racetrack leading to a channelization of the Turpentine Run drainage. This has both reduced the habitat extent of the mangroves in the northern portion of the Mangrove Lagoon and led to much of the sediment being delivered from the watershed down Turpentine Run and its tributaries, bypassing most of the mangroves and resulting in infilling of the Inner Lagoon. The western edge of the MLBB is below the Bovoni landfill and the mangroves along this shoreline often have debris caught within their prop roots. Leaching from the dump also could potentially influence the growth and productivity of the mangroves along this region of the Reserves. There is an absence of invertebrate communities on the prop roots and in the sediments near the mangroves that may reduce the number of juvenile fish and birds that can effectively use this region as a feeding ground. Both improper mooring to mangroves and derelict vessels moved during storms and hurricanes can damage the most shoreward portions of the mangrove stands within STEER and affect both the recovery of the mangroves and the extension of nursery and feeding habitat available for commercially and ecologically important species.

Red Mangrove, S. Sorentino

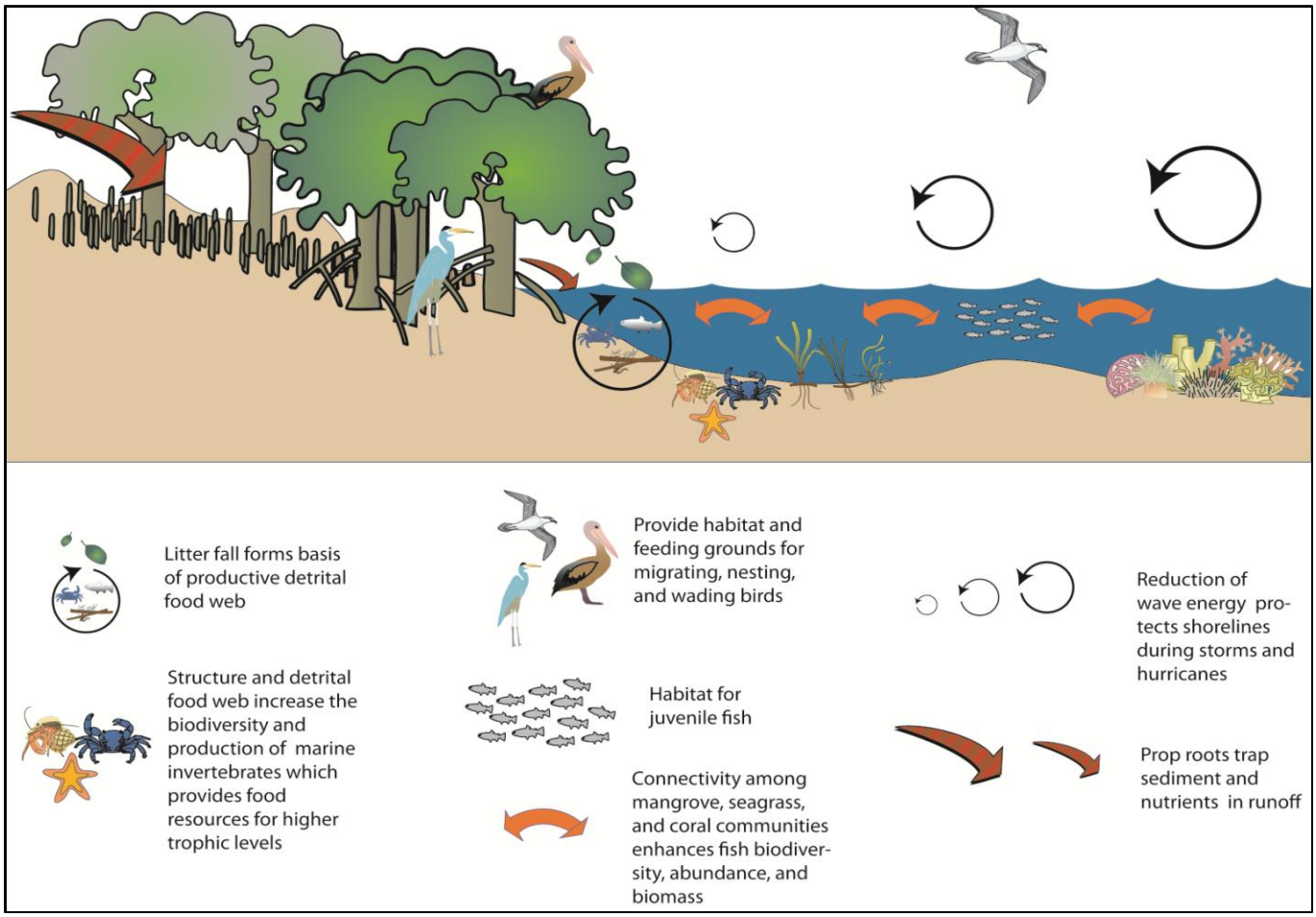


Figure 6: Conceptual diagram showing the ecosystem services provided by mangrove ecosystems of STEER

2.4.2 Seagrass Beds

(For a more extensive description of seagrasses in the USVI, see Appendix I: STEER Targets: Long Versions)

Seagrass beds are most prevalent in lagoon areas and play an integral role in the well-being of a marine ecosystem. Seagrass beds trap and stabilize sediment, resulting in better water clarity and light penetration, conditions necessary for coral reefs to flourish. The extensive root system of seagrass beds limits erosion by holding the sand substrate together, preventing extensive shifting of sand during storms. Seagrass also provides important habitat and refuge from predators for juvenile reef fish. Furthermore, green sea turtles, several herbivorous fish, echinoderms, mollusks, and birds feed on the seagrass.

Seagrass habitat next to mangrove roots, R. Platenberg

Seagrass beds are located throughout STEER. The major threat to seagrass beds is direct physical damage or disturbance done by boat anchoring in seagrass habitat and to a lesser degree by prop scarring by boats in the shallow waters of the Reserves. Anchoring within seagrass beds in particular can cause extensive damage by creating 'blowout' holes that can migrate and expand after the initial disturbance, taking years to recover. Coastal development can also have a major impact on nearshore eelgrass beds, especially the construction of docks and marinas that project into the shallow waters and shade any seagrass present. Activities that can alter water quality conditions are another major threat to seagrass habitats within the Reserves. The changes in water clarity and nutrients can favor macroalgal and epiphytic growth that reduces seagrass cover.

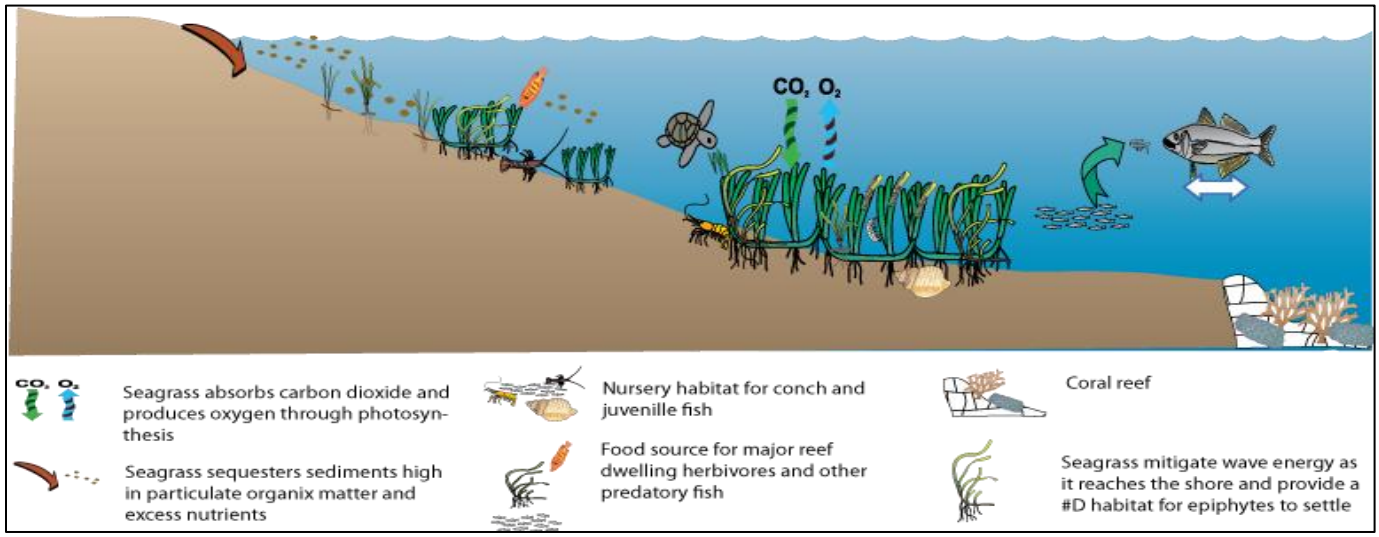


Figure 7: Conceptual diagram showing the ecosystem services provided by seagrass ecosystems of STEER

2.4.3 Compass Point Salt Pond

(For a more extensive description of Compass Point Salt Pond in the USVI, see Appendix I: STEER Targets: Long Versions)

Compass Point Salt Pond, R. Platenberg

Salt ponds and the specialized salt-tolerant vegetation communities that they support perform a variety of biological, hydrologic and water quality functions. These ponds act as catchment basins for runoff, debris, and pollutants, thus protecting coral and seagrass beds in the marine environment. The indirect functions of salt ponds and their associated mangrove systems include the provision of storm protection, flood mitigation, shoreline stabilization, and shoreline erosion control. Salt ponds provide an essential foraging, roosting and nesting site habitat for indigenous and migratory birds and are home to the federally endangered Virgin Islands Tree Boa.

Input from upland activities is the most significant threat to salt pond ecosystems. Mangroves may be affected by rising water levels as a result of global climate change. Human encroachment prevents the mangroves from moving up the shore. Hurricanes can have devastating impacts on mangroves and salt pond systems, and impacts from hurricanes Hugo (1989) and Marilyn (1995) are still visible today. The pond and associated wildlife are impacted by human encroachment, including light pollution from nearby residences, traffic along the road encircling the pond, noise, and trash. Mammalian predators pose a significant threat to ground nesting waterbirds. The pond is impacted by ongoing sediment runoff and changes to the surrounding landscape, which has caused a significant degree of infilling. With the increased development that has occurred in St. Thomas over the past thirty years, salt ponds are an endangered habitat type in the Virgin Islands.

Terrestrial Resources Within STEER:

Terrestrial resources, such as deer and boas, use islands and cays contained within STEER. The Zenaida Dove (Zenaida aurita), a Virgin Islands game species, nests and feeds on Cas Cay. White-tailed Deer (Odocoileus virginianus) swim between the islands and use them for foraging and possible breeding. The federally endangered Virgin Islands Tree Boa, *Epicrates granti*, also has essential habitat on the East End of St. Thomas.

2.4.4 Sea and Shore Birds

(For a more extensive description of sea and shore birds in the USVI, see Appendix I: STEER Targets: Long Versions)

STEER is considered a biodiversity "hotspot" for bird species in part due to the existence of the rich fisheries resources, the largest intact mangrove system in the northern Virgin Islands comprising the Mangrove Lagoon and Jersey Bay, the presence of the Compass Point Salt Pond and the salt ponds on Great St. James, and numerous other breeding, roosting and nesting areas. The Zenaida Dove (*Zenaida aurita*), a Virgin Islands game species, nests and feeds on Cas Cay.

The primary threat to birds in this area is from predation by introduced species, such as rats, mongooses and feral cats. Sea and shore birds on St. Thomas are also often the victim of entanglement by discarded fishing line and hooks. Furthermore, loss of the mangrove and salt pond coastal habitats in STEER due to encroachment, sedimentation, or sea level rise poses a significant threat to the birds of STEER.

Ruddy Turnstone, R. Platenberg

2.4.5 Coral Reef and Hard-bottom Benthic Communities

(For a more extensive description of coral reef communities in the USVI, see Appendix I: STEER Targets: Long Versions)

The network of habitats found within STEER shelters and supports commercially, recreationally and ecologically important species, and coral reefs form an important component of this network. The shallow waters of STEER support a variety of coral species and hard-bottom benthic communities typical of the USVI and Lesser Antilles. Animals completing movements from juvenile settling habitats, such as extensive mangrove areas, to adult habitats, such as offshore reefs, encounter a variety of coral reef habitats within STEER. Also, fishes and invertebrates that forage in seagrass and macroalgae beds at night use the reef as shelter during the daytime. Thus, coral reefs add to the richness of life within the Reserves and the surrounding marine habitats. A high diversity of hard corals has been recorded from numerous studies conducted within STEER, with about 45 species known. Among the recorded species in the reserve, threatened *Acropora palmata* (elkhorn coral) and *Acropora cervicornis* (staghorn coral) are plentiful in shallow aggregations. In 2006, the United States listed elkhorn and staghorn coral as vulnerable under the Endangered Species Act due to their widespread decline throughout their Caribbean range. In 2009, NOAA's National Marine Fisheries Service was petitioned to review 82 coral species, 8 of which are found in the Caribbean, to determine whether they should be listed under the Endangered Species Act. As of the publication date of this document, NOAA is still reviewing the listing of the following Caribbean species: *Agaricia lamarcki* (lamarck's sheet coral), *Montastraea annularis* (boulder star coral), *Montastraea faveolata* (mountainous star coral), *Montastraea franksi*, *Dendrogyra cylindrus* (pillar coral), *Dichocoenia stokesii (*elliptical star coral or pineapple coral), *Mycetophyllia ferox* (rough cactus coral), *Oculina varicose* (large ivory coral, ivory bush coral, ivory tree coral).

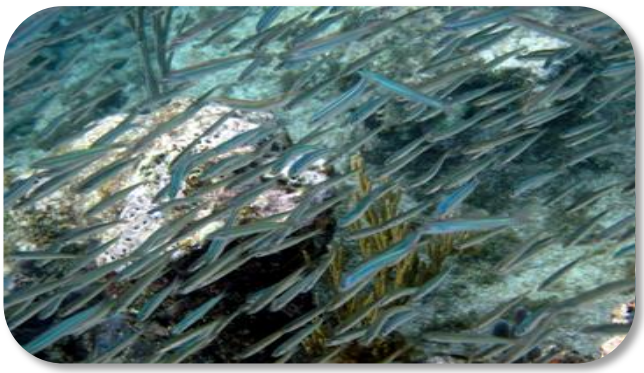
Coral reef at Christmas Cove, S. Kadison

In 2005, unprecedented warm water temperatures lead to coral bleaching and a subsequent disease outbreak that caused a 40% decrease in shallow water coral cover throughout the USVI. Corals within STEER were also susceptible to this event with losses on the order of 15% for mixed coral communities on hard bottom to over 50% for coral reefs composed of dense star coral (*Montastraea complex)*. Superimposed on these regional stressors are the local stresses arising from land-based sources of pollution, such as sediments, to marine-based sources of pollution, such as toxins and hydrocarbons, to direct destruction of reef habitats, such as anchor damage. As examples, a long-term coral monitoring site at Coculus Rock is in the upper third of silt deposition rates for 17 sites across the USVI, and the

highest water concentrations in the US Caribbean of Irgarol, a marine anti-fouling chemical toxic to corals, seagrass, and mangroves, was found in waters of the mangrove lagoon (Carbery *et al.* 2006). It is not known how fishing, a recognized disturbance to the ecology of coral reefs, affects corals in STEER, as fishing is restricted and currently unmonitored. However, regional depletion of fisheries species may have impacts, even within marine protected area borders. Of particular concern is the reduction in number of large parrotfish and other herbivores which keep the growth of macroalgae in check, thus allowing for growth of new corals in an already-threatened ecosystem.

2.4.6 Nursery and Fisheries Resources

(For a more extensive description of nursery &fisheries resources in the USVI, see Appendix I: STEER Targets: Long Versions)



Bait fish, R. Platenberg

STEER encompasses diverse tropical marine ecosystems including numerous habitat types on which a wide variety of marine species depend, especially juvenile fish species. The diverse marine communities situated southeast of St. Thomas form a highly productive and ecologically significant ecosystem whose preservation and management is important to sustain the region's fisheries (commercial and recreational). Several species of reef and pelagic fish spend part of their life cycle in the habitats within STEER. The mangrove lagoon, which includes Bovoni Cay, Cas Cay, and Patricia Cay, is the most extensive red mangrove system remaining in the Virgin Islands. This area is a major nursery for many species of reef fish of commercial and recreational value, such as snappers and groupers. It also provides habitat for spiny lobster and conch. Other recreational fish, such as tarpon, bonefish and snook spend the majority of their life cycle in the STEER lagoon. The marine sanctuary also contains large expanses of seagrass flats and colonized hardbottom which are habitats for many species of juvenile fish and mollusks, such as wrasses, snappers, and conch. STEER contributes to a viable commercial fishery and sport fishing industry by protecting a portion of the spawning stock from exploitation.

Juvenile Fish, S. Kadison

Many factors can be attributed to the source of decline or cause concern for fishery and nursery resources within STEER. Land based sources of pollution such as leachate from the Bovoni dump flowing into the mangrove lagoon, marine pollution from nearby marinas, pollution flowing into the mangrove lagoon from upland guts, direct removal of mangrove prop root shelter habitat for juvenile

fish, and illegal fishing within the area are all a major concern. Reduction of pollution and protection of the vital mangrove habitat is critical for a stabilization of fisheries resources within STEER.

2.4.7 Compatible and Sustainable Use and Enjoyment

Recreation in the Inner Mangrove Lagoon, R. Platenberg

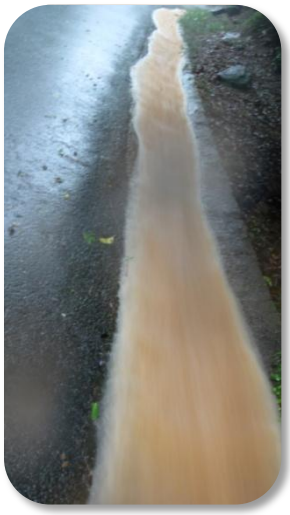
STEER is a busy boating destination, adjacent to several marinas and boat supply businesses. Charter boating, eco-tourism in the form of kayaking tours, kite surfing, SCUBA diving, swimming, wildlife viewing, snorkeling, and sailing are all popular human uses of STEER, both by residents and visitors.

There has been an increasing conflict of use as the density of boaters, visitors and businesses increase in the area. The ferries from Charlotte Amalie and St. John or the British Virgin Islands pass directly through STEER. Traditionally, Virgin Island residents relied on the STEER area for subsistence harvesting of baitfish, lobster, whelk, and conch that were accessible from the seashore, docks and private jetties, although now harvest is restricted to permitted baitfish collection and hand line fishing only. Access to STEER from the shore has been altered, limiting traditional use of the area. Further, residents worry that a lack of transparency in the actions of the management authority (DPNR) conflict with the peaceful enjoyment of the area. STEER Stakeholders have expressed a desire that when dealing with people and boats in the Reserves, it is better to educate and mitigate rather than eliminate.

2.5 Threats

Trash and debris in water, R. Platenberg

Threats to resources, also considered impacts or risks, can be something that directly impacts a conservation target or indirectly impacts an ecological process important to sustaining the conservation target. Knowing the threats that impact the resources forms the basis for formulating strategies and activities for the management of STEER.



Stormwater runoff, A. Holecek

The threats to conservation targets were identified by two means: first the stresses (similar to *symptoms* observed for a target, such as reduced nesting success of shore birds) were carefully considered. These stresses, the impairment or degradation of key ecological attributes of the target, were ranked based on the severity and scope of the stress. Then, the source of the symptom, or the **threat** (such as predation on nesting shorebirds by rats), was identified. These threats were ranked based on the contribution the threat had in causing stress to the target and the irreversibility of the threat. See sidebar for more information on stresses, threats and the criteria to rank these.

At first iteration, stakeholders, resource managers and experts identified a long list of impacts to STEER, including ones that were pervasive, historical, and others later determined to be minor or secondary concerns. By using criteria-based ranking of the stresses and threats, the direct threats to targets were prioritized so that conservation actions can be directed where they are most needed. This is important because in any given management or conservation area, there are always many activities that can be undertaken, but what can be accomplished to truly address critical threats are limited by energy, resources

Ranking Stresses

Level and geographic scope of damage reasonably expected within 10 years under current circumstances

Severity of Impact (likely to…)

- **Very High-** Destroy or eliminate
- **High-** Seriously degrade
- **Medium-** Moderately degrade
- **Low** - Slightly impair

Scope of Damage

- **Very High-** Very widespread (throughout target's occurrences)
- **High-** Likely widespread (at many sites)
- **Medium-** Localized (at some sites)
- **Low-** Very localized (at few sites)

Ranking Sources of Stress (THREATS)

Reasonably expected within 10 years under current circumstances

Contribution

- **Very High-** Very large contributor
- **High-** Large
- **Medium-** Moderate
- **Low-** Small

Irreversibility -- *reversibility of the stress caused by the source*

- **Very High-** Not reversible, for all intents and purposes
- **High-** Reversible, but not practically affordable
- **Medium-** Reversible with reasonable commitment of resources
- **Low-** Easily reversible at relatively low cost

and time. All threats identified during the 2008-2009 CAP process have been recorded so that during later review and assessment of management activities, these threats can be considered for future action if still applicable. For example, reduced tranquility within the Cas/Cay, Mangrove Lagoon area was identified as a source of stress to sea birds in the area. This stress, and the source of the stress (the *threat* of the nearby firing range, motorized boats, human disturbance, and large parties), were later determined to not be a current critical threat to the sea and shore birds, whereas the introduction of predators to bird nesting grounds *is* considered a critical threat to this target.

Many iterations later, after considering what the current critical threats are to the STEER targets, a list of 20 direct threats was determined. These can be grouped into 9 general themes (listed in general order of significance):

1) **Land-based Sources of Pollution** (especially sedimentation, but also includes any contaminant in stormwater runoff and point-sources of pollution such as from boat yards)
2) **Habitat Loss**
3) **Climate Change**
4) **Unsustainable or Illegal Fish Harvest**
5) **Predators of Sea and Shore Birds**
6) **Incompatible Use Issues**
7) **Trash and Debris**
8) **Physical Damage from Boats**
9) **Marine-based Sources of Pollution**

The following threat matrix (*Table 2*), demonstrating the use of ranking of the sources of stress to targets, shows how overall impacts to resources elevate targets to require the most attention for conservation, protection or restoration (e.g., the Compass Point Salt Pond), or abatement of critical threats (e.g., land-based pollution). Threats are ranked in the matrix based on existing 2010-2011 knowledge and science. The threats will be reevaluated and revised in the future according to new information and changing conditions.

Derelict vessel, J. Brown

Table 2. STEER Threat Ranking Matrix

THREAT THEME	Threats (20)	TARGETS--> (7) Salt Pond	Birds	Coral	Sea-grass	Fish (juv)	Use/ Access	Man-grove	Summary Threat Rating
Land-based Sources of Pollution	Impaired watershed / upland development, Point-Source & NPS contaminated stormwater runoff (sediment, nutrients, toxins)	Very High	Medium	High	High	High			Very High
	Sedimentation (road building, development, exposed soils, improper stormwater drainage, airborne sediments, dredging, beach nourishment with fine sand)	Very High		High	High	High			High
Climate Change	Climate Change: Increased sea surface temp			High					Medium
	Climate Change: Sea level rise, change in precipitation	Very High		High					High
Habitat Loss	Direct habitat removal/ Encroachment	High			Medium	High		Low	High
	Marine Expansion (slips, docks)		High		Medium	High			High
	Derelict vessels and boat wrecks (groundings)			Low	Low			Low	Low
	Dredging for marina				Medium				Low
Fish Harvest	Illegal harvest inside STEER					Medium			Low
	Loss of herbivores			Very High					High
Predators	Predators from dump, boats, shoreline (feral animals, rats and mongooses)		High						Medium
Use Issues	Lack of public acesss						High		Medium
	No transparency with DPNR						Low		Low
Trash and Debris	Derelict vessels and boat wrecks (groundings)			Low	Low			Low	Low
	Land-based Trash and Debris	Medium	Medium	Low	Low			Low	Medium
	Marine debris (monofilament)		Medium						Low
Physical Damage: Boats	Anchor damage			Low	Low				Low
	Groundings			Low	Low				Low
Marine Pollution	Hydrocarbon pollution from commercial vessels passing through					Medium			Low
	Vessel sewage (nutrients and bacteria)			Medium	Low	Low			Low
		Very High	High	High	High	High	Medium	Low	Very High

2.6 Conservation Objectives Strategies and Action Steps

Participants in the STEER CAP process developed objectives, strategies and action steps to address the critical threats. *This is one of the most critical sections of the management plan and will guide activities undertaken in the next 1-2 critical years of early implementation as well as longer-term (5 year) intentions for conservation.*

The **objective** is a specific statement that details the desired accomplishments or outcomes of a particular set of activities within a project, typically set for *abatement of critical threats* and for *restoration of degraded key ecological attributes* (*Table 3*). Core questions asked were, "What do we need to accomplish?", and "How will our objective affect the given threat?"

The objectives then led us to **strategies** for STEER (*Table 4*). A conservation strategy is a broad course of action intended to achieve a specific objective (outcome) that abates a threat, and/or enhances the viability of a conservation target. A strategy will include the activities required to accomplish each objective, and the specific **action steps** required to complete each strategic action (*Table 5*). Core questions asked to determine what our strategies should be were, "What is the most effective way to achieve the results we stated in our objective?" What is the most effective way to abate this threat (threat = source + stresses it causes) or multiple threats?" and "Will the strategic actions accomplish the objective?"

The objectives were written to be **SMART** which guides us into an implementation plan for the next five years.

SPECIFIC (What area? What targets will this benefit? Focus on linkage to a specific threat.)

MEASUREABLE (How will we know that we've reached our objective?)

ACHIEVABLE, REALISTIC (Within capacity and our timeframe?)

RESULTS ORIENTED (Success! Gets us to the desired status and rating for the target and improves the target)

TIME-BOUND (establishes 5 years to start to show progress. Can also suggest an objective of longer-term viability to reach by 5-40 yrs.)

*An **OBJECTIVE** is where you want to be. A **STRATEGY** is how you will get there.* In some cases, strategies or action steps were considered well before an objective was formulated. In this case, the group determined if such strategies would still get us where we needed to be with a target, and could we develop a SMART objective (see box, above) to guide us.

For now, the use of "TBD" or "X" written into an objective is acceptable until we know what our measure for success will be; finding the answer most likely becomes Action Step #1- a research priority.

The following tables show priority ranked strategies for STEER and the Objectives-Strategies-Action Steps. As this is the meat and bones of the Management Plan; these tables need to be constantly reviewed, updated, and likely amended to reflect new needs or other information that can feed into management decisions. Periodic updates will be necessary as activities progress, or as priorities change.

Table 3. STEER Objectives listed by major threat group (1-9) or management area (10, 11)

1. LAND-BASED SOURCES OF POLLUTION	
Threat: Impaired watershed	**Targets: Salt Pond, Seagrass, Coral, Birds, Fishery Resources**
Objective 1.1	***To reduce sediment and nutrient inputs from land-based sources of pollution on the marine environment by 15% by 2015, and reduce to within acceptable limits by 2020.***
Objective 1.2	***To reduce the amount of contaminants entering into the Inner Mangrove Lagoon by 15% by 2015, and restore water clarity to a minimum of 2 meters depth by 2020.***
Objective 1.3	***Reduce sediment input into Compass Point Pond by _TBD_% by 2015, increase resilience to climate change, and restore balance in hydrology by 2020.***
2. CLIMATE CHANGE	
Threat: Climate Change: sea level rise, precipitation, sea surface temperature	**Targets: Salt Pond, Corals, Seagrass, Mangroves, Fishery Resources, Birds**
Objective 2.1	***By 2020, create a Climate Change Adaptation Strategy Plan for Salt Ponds, Corals, Seagrasses, Mangroves, Birds, and Fisheries Resources for STEER.***
3. HABITAT LOSS	
Threat: Coastal habitat loss from direct habitat removal/expansion, marine expansion, dredging.	**Targets: Salt Pond, Seagrass, Fisheries resources, Mangroves**
Objective 3.1	***Reduce loss of marine and adjacent shoreline habitat due to development and boat damage by 90% by 2015.***
4. UNSUSTAINABLE OR ILLEGAL FISH HARVEST	
Threat: Illegal harvest inside STEER	**Targets: fish (illegal fishing), coral (loss of herbivores)**
Objective 4.1	***To reduce all un-permitted take (fish, whelk, conch, lobster) in STEER waters by 2015.***
Threat: Loss of herbivores	**Targets: fish (illegal fishing), coral (loss of herbivores)**
Objective 4.2	***To reduce overall herbivore fishing in the territory to maintain healthy populations of herbivorous fishes inside protected areas by 2015.***
5. PREDATORS OF SEA AND SHORE BIRDS	
Threat: Predation on Birds	**Targets: Birds**
Objective 5.1	***To reduce impact of predators (cats, rats and mongooses) on bird population during the breeding season on Cas Cay by 50%, by Bovoni Cay by 50%, and Great St. James by _TBD_% by 2015***
6. INCOMPATIBLE USE ISSUES	
Threat: Lack of Public Access	**Targets: User groups**
Objective 6.1	***Improve the access of shoreline resources to the general public from _TBD_# entry points to _TBD_# of entry points by 2015 in a manner that is protective of existing coastal habitat.***
Threat: Limited transparency with DPNR	**Targets: User Groups**
Objective 6.2	***By increasing public participation in decisions made by DPNR, public satisfaction of local governance increases by 50% by 2015.***
7. TRASH AND DEBRIS	
Threat: Monofilament on bird health	**Targets: Birds, (secondarily Coral)**
Objective 7.1	***By 2015, reduce the incidence of entanglement by monofilament of susceptible bird aggregations (nesting, brooding, feeding colonies) within STEER by _TBD_%, and eliminate monofilament found entangled on corals and mangroves.***
Threat: Solid waste entering Compass Point Pond and vicinity	**Targets: Birds, Coral, Salt Pond**

Objective 7.2	***By 2015, eliminate solid waste in and in a perimeter of 100 meters of the Compass Point Salt Pond by 100% on an annual, regular basis.***
Threat: derelict vessels and large marine debris.	**Targets: Birds, Coral, Seagrass, Mangroves**
Objective 7.3	***By 2010, and every year thereafter, derelict vessels and large marine debris which threaten mangroves, seagrass beds, or coral habitat have been removed from STEER.***
8. PHYSICAL DAMAGE FROM BOATS	
Threat: Anchor Damage	**Targets: Seagrass, Corals**
Objective 8.1	***Reduce the number of boats anchoring on coral and seagrass by 90% by 2015.***
Threat: Accidental Groundings	**Targets: Seagrass, Corals**
Objective 8.2	***Reduce the incidence of accidental groundings within STEER by 50% by 2015.***
9. MARINE-BASED SOURCES OF POLLUTION	
Threat: Vessel Sewage (nutrients and bacteria)	**Targets: Coral, Seagrass, Fisheries Resources**
Objective 9.1	***Reduce the amount of pump-out (blackwater and graywater) pumped into STEER by 90% by 2015.***
Objective 9.2	***Reduce the input of point (illicit discharge) and non-point sources of pollution (level TBD; see below) from marinas and boats by 2015 to improve the health of seagrass communities and the function of nursery habitats.***
Threat: Hydrocarbons from passing boats	**Targets: Fisheries Resources**
Objective 9.3	***To reduce hydrocarbons, noise, wake from larger commercial vessel by _TBD_% by 2020.***
10. CAPACITY/IMPLEMENTATION	
Capacity / Implementation: Governance of STEER	
Objective 10.1	***By December, 2015, STEER is designated as a Park as part of the Territory Marine Park System.***
Objective 10.2	***Establish STEER Advisory Board by December 2011.***
Objective 10.3	***STEER Management Plan Adopted by Fall, 2011.***
Objective 10.4	***Develop staffing capacity for STEER***
Objective 10.5	***Create "Friends of STEER" non-profit organization and merge with "Friends of Christmas Cove" by 2011.***
Capacity / Implementation: Enforcement	
Objective 10.6	***Increase the knowledge, presence and effectiveness of patrolling, surveying and enforcing personnel in STEER by 2015 and thereby reduce the number of illegal or incompatible activities in and adjacent to STEEER by 50%.***
11. EDUCAITON AND OUTREACH PROGRAM	
Education and Outreach Program	
Objective 11.1	***By 2011, an Education and Outreach program is established with dedicated personnel and funding to meet the needs of STEER education and outreach to match the objectives stated above.***

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Table 4. Summary of Strategies for STEER ranked by priority, impact and feasibility

Strategies identified by priority are color coded to identify rank (red= high priority, yellow=medium priority, green= low priority).

Threat	**Strategy**
Impaired watershed	Strategy 1.1.A: Redesign a comprehensive USVI non-point source (NP) and point-source (PS) pollution permitting, regulatory and enforcement program
	Strategy 1.1.B: Watershed and Stormwater Management: Partner with public and private sector to reduce NP
Coastal habitat loss	Strategy 3.1.B: Develop more stringent regulations for shoreline and insular development
	Strategy 3.1.A: Regulate development in STEER and nearby habitats
Illegal harvest-fish	Strategy 4.1.A: Enforce existing regulations in STEER waters
Lack of public access	Strategy 6.1.B: Zone Use Plan: Recreational and Commercial
Monofilament-bird	Strategy 7.1.C: Establish bird entanglement response network
	Strategy 7.1.B: Community outreach
Anchor Damage	Strategy 8.1.A: Create buoy mooring system in popular boating areas containing coral and seagrass habitat within STEER
Accidental groundings	Strategy 8.2.A: Devise groundings team network for rapid response
Impaired watershed	Strategy 1.2.B: Improve water circulation/flow within Inner Mangrove Lagoon
	Strategy 1.2.A: Determine the contaminants in the lagoon
Coastal habitat loss	Strategy 3.1.C: Research priority: collect baseline data: coral coverage, seagrass, mangroves, shoreline habitat
	Strategy 3.1.D: Reduce habitat loss on Great St. James due to development
Predation on Birds	Strategy 5.1.A: Develop shoreline predator trapping program
Monofilament-bird	Strategy 7.1.A: Reduce monofilament

Accidental groundings	Remove grounded boats (See 7.3: Removal of Derelict Vessels)
	Strategy 8.2.A: Groundings prevention, rapid response and removal
Vessel Sewage	Strategy 9.1.A: Establish/ Advocate on-board treatment and/or Pump-Out Program for STEER
Impaired watershed	Strategy 1.3.A: Restoration of Compass Point Salt Pond
Coastal habitat loss	Strategy 3.1.E: Reduce loss of mangroves due to coastal development within or adjacent to STEER
Lack of public access	Strategy 6.1.A: Public Access Program to improve existing public access points and identify new access points
Derelict vessels	Strategy 7.3.A: Develop a derelict vessel reporting and removal system
Solid waste-Compass Pt. Salt Pond	Strategy 7.2.A: Develop trash prevention program
Vessel Sewage	Strategy 9.2.A: Promote Blue Flag Program (Clean Marina Program)
Hydrocarbons-passing vessels	Strategy 9.3.A: Re-route ferry boats, barges through Great/Little St. James

Table 5. STEER Action Steps

Strategies (listed on left column) are color coded to identify rank from high (red), to yellow (medium), to green (low) priority.

Strategy		Strategic Actions	When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
1. LAND-BASED SOURCES OF POLLUTION							
Threat: Impaired watershed				**Targets: Salt Pond, Seagrass, Coral, Birds, Fishery Resources**			
Objective 1.1	***To reduce sediment and nutrient inputs from land-based sources of pollution on the marine environment by 15% by 2015, and reduce to within acceptable limits (Total Maximum Daily Load) by 2020.***						
Strategy 1.1.A: Redesign a comprehensive USVI Non-Point Source and Point Source pollution permitting, regulatory and enforcement program.	**1**	Reach out to Division heads to discuss watershed issues, shared concerns, means to improve watershed management	2012	STEER, CZM, DEP, Health, VIWMA, DEE, DFW	Engaging regulatory partners with jurisdiction within STEER watersheds to discuss how to improve permitting	When completed- Report on actions 1-3	
	2	Evaluate effectiveness of permitting, regulation (more comprehensive, reduce redundancies, gaps, inefficiencies)	2012	CZM	Document inefficiencies, make recommendations and priorities	When completed- Report on actions 1-3	MMES Master's project
	3	Examine existing laws (fill resources gaps and rewrite regulations)	2012	CZM	Foster the revision of local stormwater regulations to decrease runoff potential off of steep slopes	When completed- Report on actions 1-3	MMES Master's project
	4	Engage leadership (Commissioner, Division heads)	2010	CZM, STEER	Reallocation of resources to the gaps	Initial reach completed. Ongoing outreach being conducted.	
	5	Improve enforcement (of regulations)	2015	DEE	1) Fewer violations, increased compliance 2)Reduction of contaminants (sediments, nutrients, contaminants)	When completed	Improved water quality in degraded areas to enhance marine habitat. (Link: Habitat Loss)

Strategy	Strategic Actions		When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
Strategy 1.1.B: Watershed and Stormwater Management: Partner with public and private sector (marinas, industrial shops, VIWMA, DPNR, federal agencies) to reduce non-point source pollution sources.	**1**	Partner with NOAA's Coral Reef Conservation Program and the National Centers for Coastal Ocean Science to develop a baseline assessment of chemical contaminants and bioeffects present in Mangrove Lagoon and STEER (metals, nutrients, bacteria, hydrocarbons, etc.)	2011	NOAA (Tony Pait), STEER, TNC, DEP	Multi agencies and community members engaged. Specific contaminants and bioeffects on biota determined. NP and PS identified recommendations for BMPs. Baseline levels relative to water quality standards and published impacts on target species (seagrass, invertebrates, juvenile fish, bait fish)	Final report and manuscripts on contaminant levels and bioeffects in STEER. Will include a quantification of sediment contaminants present, and the toxicity of those sediments. Will also include an assessment of water soluble contaminants.	NOAA Contaminants project approved for funding (Tony Pait, Ian Hartwell, Andrew Mason, Chris Jeffrey, and Simon Pittman).
	2	Create a long-term sampling and monitoring protocol that will be representative of all the possible land-based sediment pollution impacts, must include parameters like chl-*a*	2011	As result of Tony Pait's project, EPA, DEP	A cost-effective monitoring program developed to track changes in pollutant concentrations annually to semi-annually.	Report is created and used in the Territory	Initially, there may not be enough capacity for this monitoring program which may require identifying collaborators and/or external funding sources. Identify sources of contaminants.
	3	Conduct a Watershed Study: Partner with NOAA Restoration Center, CWP to do watershed and gut assessment; identify areas where BMPs could be implemented to reduce runoff	2011	NOAA Rest Center, Center Watershed Studies	Recommend BMPs, zoning scheme, identify programs. Identify, through studies, a green zone (area adjacent that affects the watershed,)	Potential point sources of pollution identified from baseline studies. Define water quality objectives (the TBD above) from this baseline study and analysis	Can/should we dredge to offset sedimentation? Research sediment trapping options. Limit bare dirt in watershed. Find effective construction runoff containment. Analyze septic systems and soil percolation tests along watershed, share results of inspection,

Strategy		Strategic Actions	When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
							and retrofit
	4	Create/change buffer-legalize "green zone": a. Work with the legislature b. Change STEER boundaries	2015	STEER Management	Create limited or defined use zones around most susceptible shallow water seagrass and coral communities to minimize additional stressors to these targets	Jurisdiction on STEER Management expanded	Watershed management. Distribution of boat use within the Reserves. Change set back at water's edge to 150 ft. Stop marina expansion in mangrove lagoon until significant overall habitat improvement is made.
	5	Enforcement (of stormwater and point source discharge, regulations, green zone)	2015	DEE	Dedicated stormwater discharge surveillance, patrol	Annual reports	Inspect/regulate reverse osmosis discharge and determine impact.
Objective 1.2	***To reduce the amount of contaminants entering into the Inner Mangrove Lagoon by 15% by 2015, and restore water clarity to a minimum of 2 meters depth by 2020.***						
Strategy 1.2.A: Determine the contaminants in the lagoon.	**1**	See Strategy 1.1.B. Actions 1-3				Monitor if habitat improves/degrades	
Strategy 1.2.B: Improve water circulation/flow within Inner Mangrove Lagoon.	**1**	Obtain report from Fish and Wildlife that contains the history of the second-false entrance and historical water exchange rate	2011	DFW	Determine history of success, lessons learned	Summary document	DFW (F16- sport fish restoration) - has been done before.
	2	Write to Army Corps of Engineers or other federal agency for potential funding and execution of project	2011	U.S. Army Corp of Engineers	Initiate funding and permitting	When completed	Potential sources of funding include NOAA, ASACE
	3	Create EIS for opening. Permit requirements may require additional studies.	2011	STEER, DFW	Meet requirements for permitting	Permits secured	

Strategy	Strategic Actions		When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
	4	Create/list scenarios for engineering	2011	Consultant	A work plan is developed	Work Plan	Funding in place for a 2 year grant from USFWS.
	5	Look for funding from Fish and Wildlife	2011	STEER, DFW	Funding in place	Completed. Funding in place for a 2 year grant from USFWS.	
	6	Open up second false entrance	2012	Engineer contractor	Water flow into the Lagoon increases, allowing more flushing of land-based sources of pollution	Reduction in amount of sediments, contaminants staying in Lagoon. Ultimately see a shift back to seagrass.	Consider negative impacts as well, watch for erosion
	7	Continual monitoring: Effects on water quality and habitat loss	2015	STEER, DFW	Monitor habitat and water quality over time, specifically in regards to landfill closure and the new Waste to Energy Plant. Keep abreast of pending development	Determine long-term sustainability of actions	May increase habitat for fish
Objective 1.3	***Reduce sediment input into Compass Point Pond by _TBD_% by 2015, increase resilience to climate change, and restore balance in hydrology by 2020.***						
Strategy 1.3.A: Restoration of Compass Point Salt Pond.	**1**	Determine current sediment input and acceptable hydrologic ratios (salt, fresh, sediments)	2011	DFW, visiting researchers	Results indicate that actions need to be taken		Contact Denise Rennis who may have data
	2	Identify the history of projects in the area (in the channel)	2011	DFW	Have history of success, lessons learned	Summary document	DFW, restoration grants
	3	Determine the current quality and extent of the vegetative buffer and fringe to address impacts of climate change	2011	NOAA, DFW, UVI	Study completed	Study completed	

Strategy		Strategic Actions	When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
	4	Restore the hydrology (dredging, sediment traps, upstream BMP's, etc.)	2015	NOAA Rest Center	Compass Point Salt Pond is functional - will need yearly data collection	Water flow, sediment input measured	Need to continually open channel? Dredge? Until have hydrology restored
	5	Expand the mangrove fringe—address climate change models from Strategy Plan	2013	STEER	Compass Point Salt Pond in sustained state of renewal	Buffer expanded to maximum limits	
	6	Remove trash, remove invasive species, replant wetland vegetation	Annual	STEER, DFW, UVI, Volunteers	Community engaged, health of salt pond maintained	Annual reports	
2. CLIMATE CHANGE							
Strategy		**Strategic Actions**	**When**	**Who**	**Outputs (mgt plan implementation)**	**Measures**	**Other Considerations**
Threat: Climate Change: sea level rise, precipitation, sea surface temperature				**Targets: Salt Pond, Corals, Seagrass, Mangroves, Fishery Resources, Birds**			
Objective 2.1		***By 2020, create a Climate Change Adaptation Strategy Plan for Salt Ponds, Corals, Seagrasses, Mangroves, Birds, and Fisheries Resources for STEER.***					
Strategy 2.1: Create a Climate Change Adaptation Strategy Plan.	**1**	Establish historical sea-level rise, historical shoreline erosion and change in STEER	2011	NOAA, USGS, NASA, TNC, UVI	Baseline information	Report available to researchers	UVI Master's? Funding? NOAA's mangrove project?
	2	Conduct a resilience survey- corals, seagrass, mangroves	2015	NOAA Coral Watch or IUCN, UVI, CZM	Resilience of coral reefs, seagrasses, mangroves in STEER assessed	Report presented to managers	Funding + team of coral and fish experts

Strategy	Strategic Actions		When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
	3	Model threats- develop spatial vulnerability and spatial risk models and scenarios SLR + storm surge, precipitation and land inputs, sea surface temperature	2015	TNC, Contractor	These models will answer the following questions: What areas are going to be impacted? What features are going to be impacted and to what extent?	Scenarios Visualization Tools- web based, maps, report; Tools presented to leaders, used by advisors	MacArthur Foundation (funding). Consider Jersey Bay barrier islands to mitigate storm surge damage, enhance fish habitats, and protect corals and seagrasses. Incidentally would protect inner mangrove lagoon from vessels seeking shelter further in.
	4	Conduct a vulnerability and cost assessment	2015	TNC, Contractor	Prioritization of vulnerable coastal sites to SLR, precip, temp	Study	probability surfaces that capture refugia, SLR, gradients and buffering existing parks to improve resilience
	5	Prepare recommendations and priorities for report; Identify CC Adaption Measures that can be considered a full list based on research and survey of climate change experts	2015	TNC, Contractor	Possible CC adaption measures researched, reviewed in the literature, surveyed	Climate Adaptation Plan: List of potential adaptation measures with "no regrets", "justified", and "reactionary vs. anticipatory"	
	6	Identify funding for priority projects	2011	STEER, TNC	Evaluate and select CC adaption actions based on a robust evaluation using both science and socioeconomic indicators	Climate Adaptation Plan: Funding Action Plan	MacArthur Foundation (funding)

Strategy		Strategic Actions	When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
	7	Establish the need and educate audience	2015	TNC, Contractor	After visualizing, modeling and describing the threat, then the public and government understand the importance of implementing CC adaption actions.	Workshop, leaders informed	
	8	Influence/recommend policy - national adaptation - PA Systems	2012	STEER, TNC	Advocate roll-up from national scale to international platform-encourage for funding, international policy. TNC support will be through capacity building and technology transfer.	USVI Leaders attend global Climate Change Forums, advocate for protection of islands resources	
3. HABITAT LOSS							
Strategy		**Strategic Actions**	**When**	**Who**	**Outputs (mgt plan implementation)**	**Measures**	**Other Considerations**
Threat: Coastal habitat loss from direct habitat removal/expansion, marine expansion, dredging.				**Targets: Salt Pond, Seagrass, Fisheries resources, Mangroves**			
Objective 3.1		***Reduce loss of marine and adjacent shoreline habitat due to development and boat damage by 90% by 2015.***					
Strategy 3.1A: Regulate development in STEER and nearby habitats.	**1**	Determine current enforcement capacity	2010	STEER	Identify existing regulations	Summary report	
	2	Educate existing enforcement	2012	STEER	enforcement updated on STEER issues	DEE staff trained	
	3	Enforce existing regulations	2009	DEE	Development is compatible with STEER	Increase in number of regulations enforced	Ongoing effort
	4	Community education	2010	STEER	Local community, residents, developers informed	Fewer incidents of infractions	

Strategy		Strategic Actions	When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
Strategy 3.1.B: Develop more stringent regulations for shoreline and insular development.	**1**	Research best practice guidelines in other jurisdictions	2011	Rutgers Study	Recommendations made	Report on regulations	
	2	Amend zoning laws: See Land-Based Strategy 1.1.B, Action Step 4	2015	DPNR	DPNR has comprehensive land water use plan	Land and Water Use Plan	
	3	Develop insular smart growth policies	2020	DPNR	Increase wetland buffer on permits, BMPs for sediment reduction, Conservation easements for habitat protection, Clustering of buildings, common structures, Restrict/control use of exotic plants, pets	Policies are implemented	
	4	Develop regulations specifically relating to impact of docks and piers on marine habitats	2015	DPNR, CZM	Marine protection	Regulations in place	
Strategy 3.1.C: Research priority: collect baseline data: coral coverage, seagrass, mangroves, shoreline habitat.	**1**	Benthic survey/ground-truth NOAA benthic, GIS coastline/aerial imagery: Cas Cay, Jersey Bay, Christmas Cove	2011	NOAA, UVI	a. Map extent seagrass, mangroves, corals, salt pond and compare with historical data. a. Establish a goal for habitat extent based on those data	Report	Completed
	2	Establishment of monitoring plan	2011	NOAA, UVI, STEER, TNC. Partners	Monitor success: every 5 years repeat surveys, acquire any new imagery/LIDAR	Report	
Strategy 3.1.D: Reduce habitat loss on Great St. James	**1**	Collect baseline data for St. James	2013	STEER, DFW, UVI, NOAA	Boa, wetland bird surveys. Verify extent of wetlands, mangroves	Wildlife inventory, report	

Strategy		Strategic Actions	When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
due to development.	**2**	Engage Great St. James developers and landowners to minimize habitat loss	March, 2010	STEER, DPNR	Greater buy-in from local landowners and developers	Summary report	any changes to regulation to cays has high likelihood- DFW request to limit development
	3	Influence key decision makers regarding offshore Cays	2011	STEER, Stakeholders	Amend zoning laws for stricter guidelines for offshore cays	Action taken by decision makers	Urge CZM, Planning to not allow rezoning, sub-dividing parcels, or variances
	4	SEE 3.1.A, 3.1.B					
Strategy 3.1.E: Reduce loss of mangroves due to coastal development within or adjacent to STEER.	**1**	Control/enforce pruning or trimming of mangroves around marinas, docks	2010	STEER, DFW	Signage, presence of DEE, community buy-in	Lower incidence of mangrove loss	Bump up Enforcement
	2	Enforce no net loss of wetlands policy	2012	DEE	Wetlands given higher conservation consideration	Incidence of infractions lower	
4. UNSUSTAINABLE OR ILLEGAL FISH HARVEST							
Strategy		**Strategic Actions**	**When**	**Who**	**Outputs (mgt plan implementation)**	**Measures**	**Other Considerations**
Threat: Illegal harvest inside STEER				**Targets: fish (illegal fishing), coral (loss of herbivores)**			
Objective 4.1		***To reduce all un-permitted take (fish, whelk, conch, lobster) in STEER waters by 2015.***					
Strategy 4.1.A: Enforce existing regulations in STEER waters.	**1**	Determine current level of harvesting (legal and illegal)	2012	DFW, MMES grad, TNC Vol	Which groups are involved in fishing: commercial vs. subsistence? Which species are being fished? Are bait fish stocks decreasing?	Report	Funding, need to take a tactful approach to documenting illegal activities. DEE issues permits.
	2	Publicize existing regulations through workshops, brochures, PSA's	2010	STEER, CZM, DFW, Sea Grant, TNC	STEER users are more informed	Pre-post attitude surveys	Signs already exist- need more signs?
	3	Determine current enforcement capabilities	2010	STEER, DEE	Assessment and recommendations	Formal statement of the enforcement capacity to	Endorsement from DPNR Commissioner,

Strategy		Strategic Actions	When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
						take to policy makers	no funding required
	4	Educate current enforcement officers	2009, yearly	STEER, DFW, CZM, DEP, DEE	Enforcement officers trained in STEER fishery (and other) issues	Pre-post knowledge surveys	NOAA/NMFS? USFWS (Mike Evans) needs to be frequent (6 mo.) Additional Indicator: Increased enforcement activity: # stations, patrolling hours
	5	Determine feasibility of eliminating all take	2013	STEER, DFW	Assessment and recommendations	Report on recommendations	Discussion occurs once enforcement is effective, STEER Mgt Entity is in place, etc.
Strategy 4.1.B: Designate STEER waters a no take zone by 2020 (eliminate bait fishing and hand lining).	**1**	Educate community on benefits of no take areas					
	2	Work with senators to create legislation			Eliminate bait fishing, Eliminate hand lining		
Threat: Loss of herbivores				**Targets: fish (illegal fishing), coral (loss of herbivores)**			
Objective 4.2	***To reduce overall herbivore fishing in the territory to maintain healthy populations of herbivorous fishes inside protected areas by _TBD_% by 2015.***						
5. PREDATORS OF SEA AND SHORE BIRDS							
Strategy		**Strategic Actions**	**When**	**Who**	**Outputs (mgt plan implementation)**	**Measures**	**Other Considerations**
Threat: Predation on Birds				**Targets: Birds**			
Objective 5.1	***To reduce impact of predators (cats, rats and mongooses) on bird population during the breeding season on Cas Cay by 50%, by Bovoni Cay by 50%, and Great St. James by _TBD_% by 2015***						

Strategy		Strategic Actions	When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
Strategy 5.1: Develop shoreline predator trapping program.	1	Determine baseline predator population and sources (boats, dump, etc.) & bird vulnerability assessment	2012	DFW, Master's Student, C.C.	Baseline # of rats, Baseline breeding range and success of bird species of concern	Report of predator and bird study	Does not need to occur in sequence, need boat, Precise periods of vulnerability for certain birds (breeding period, nesting location)
	2	Develop the Participatory Program: Training of local businesses, involvement of Health Dep't, Waste Mgt, Funding, Incentives, outreach	2013	STEER	Engage the community and increase community education	# of businesses, and volunteers are setting traps	Cannot extend program to marinas, etc. under Federal funding, thus support from a Program, Need a motivation scheme for businesses. Use boaters in/adjacent to STEER to help trap, educate
	3	DFW Program: Initiate control efforts -trapping, poisons	Dec 09 (Cas)	VIDFW	Reduce rats, other predators on Cays, Cas first (predator impact on birds reduced)	# predators trapped	Restricted scope of funding, trapping will control but not eliminate, proximity to landfill is issue for total eradication

6. INCOMPATIBLE USE ISSUES

Strategy	Strategic Actions	When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
Threat: Lack of Public Access			**Targets: User groups**			
Objective 6.1	***Improve the access of shoreline resources to the general public from _TBD_# entry points to _TBD_# of entry points by 2015.***					

Strategy		Strategic Actions	When	Who	Outputs (mgt plan implementation)	Measures	Other Considerations
Strategy 6.1.A: Public Access Program to improve existing public access points, identify new access points.	**1**	Determine current access points, parking, boat launch, public information displays	2009	STEER, CZM	Completed document with recommendations. Ensure that existing habitat is not adversely impacted by new entry points.	Document with map	
	2	VI Government purchase coastal easements (CELP)	2015	DPNR- CZM	CZM has management of significant natural and cultural coastal areas	Purchase of key STEER coastal parcels	
	3	Renovate and restore public access ramps to the sea and create more.	2012	DPNR- DFW	Public has better access to the resources of STEER	X# of boat ramps, other access points improved	DFW, boat ramp money
Strategy 6.1.B: Zone Use Plan: Recreational and Commercial.	**1**	Develop map with stakeholders	2009	STEER, CZM	A map that stakeholders agree upon sets out clear use areas that reduces conflict and established equality in use of resources	Map with accompanying plan	There are already zones as defined by STXEEMP Act (Territory's Marine Protected Areas).
	2	Limit Use to carrying capacity	2012	DPNR, STEER, DEE	Resources protected, aesthetics maintained	Reports on average # of people using resource (Cas Cay, X-Mas Cove)	Need carrying capacity study. Assumption: people comply
	3	Education (i.e. snorkel awareness)	2012	STEER, CZM	Public practices conservation while in STEER	# of people reached	i.e. snorkel awareness education
Threat: Limited transparency with DPNR				**Targets: User groups**			
Objective 6.2		***By increasing public participation in decisions made by DPNR, public satisfaction of local governance increases by 50% by 2015.***					
Strategy 6.2:	**1**	Permitting, moorings, boat registration computerized		DEE		Ease in getting permits	

7. TRASH AND DEBRIS							
Strategy	**Strategic Actions**		**When**	**Who**	**Outputs (mgt plan implementation)**	**Measures**	**Other Considerations**
Threat: Monofilament on bird health				**Targets: Birds, (secondarily Coral)**			
Objective 7.1	***By 2015, reduce the incidence of entanglement by monofilament of susceptible bird aggregations (nesting, brooding, feeding colonies) and other wildlife within STEER by _TBD_%, and eliminate monofilament found entangled on corals and other habitat.***						
Strategy 7.1.A: Reduce monofilament.	**1**	Determine amount and distribution of monofilament, etc. (such as polypropylene float lines and netting) found in the shoreline habitats and STEER in conjunction with clean-up	2013	Volunteers, Sea Grant, CZM, DFW, STEER, TNC, UVI (MMES)	Map of density of monofilament, etc., removal of	Current level of entanglement of birds in STEER, #lbs removed	Certain bird species or behaviors making them more susceptible to entanglement in STEER.
	2	In-water research (general) Permit conditions made to also document monofilament and debris	2013	DFW, CZM (coral collecting)	Increased information/documentation of the presence and location of threats (lionfish, debris, bleaching, monofilament)	Reporting system in place and information made available to STEER	Contact DFW permits: inform of the changes
	3	Mapping of the most popular access points for hook and line fishing as source of monofilament	2013	CZM, stakeholder input, DFW, MMES grad, TNC Vol	See fishing impact study	Study	As part of 4.1 Fishing Assessment
	4	Receptacles for discarded/unwanted monofilament	2011	VIWMA, DFW (Aquatic Education)	Increased proper discarding of monofilament etc.	#lbs in trash receptacles	Follow up: pick up of trash (VIWMA, Volunteers, Reef Rangers)

Strategy 7.1.B: Community outreach.	**1**	Provide information to shore fishermen, sport fishing (commercial, charter, recreational), boaters about the dangers of monofilament to bird populations and provide alternatives and a reporting system, alternatives to avoid this threat.	2009	DFW	Identifying the shore, commercial, recreational and charter fishermen.	Pre and post surveys to determine how informed and involved fishermen are.	Ongoing.
Strategy 7.1.C: Establish bird entanglement response network.	**1**	Identify and train personnel in proper disentanglement of birds	Oct-10	Volunteers, DFW, Humane Soc, Rehabers FL, Coral World	-Fishing outside the Reserves:	# of people trained	Was done for STJ. Follow up with Humane Soc- rehab center: sites, logistics. FUNDING: other sources than Feds
	2	Establish response system	ongoing	Volunteers, DFW, Humane Soc, Rehabers FL, Coral World	commercial rod, reel, bait fishing		bird rehab to include entanglement
	3	Monitor shoreline and marine areas for entangled birds		Volunteers, DFW, Humane Soc, Rehabers FL, Coral World	charter recreational sport fishing NOAA Restoration Center		at same time as activity 1 above

Threat: Solid waste entering Compass Point Pond and vicinity				Targets: Birds, Coral, Salt Pond			
Objective 7.2	***By 2015, eliminate solid waste in and in a perimeter of 100 meters of the Compass Point Salt Pond by 100% on an annual, regular basis.***						
Strategy 7.2.A: Develop trash prevention program.	**1**	Identify source of trash	2012	VIWMA, STEER	Collection of VIWMA docs, understanding of source of trash, reduce trash	Obtain VIWMA documentation, target sources	Ed/outreach. need additional resources. clean ups are possible
	2	Engage VIWMA, Community associations, Compass Point Marina for prevention	2012	STEER	More compliance, less trash	before and after # lbs trash	Determine existing regulations and management agency that is responsible. Need dumpsters along Compass Point Pond Road, from Good Luck Grocery to Red Hook. Improve regulation/ enforcement for local business,
	3	Secure support and funding for twice-annual trash clean-ups (minimum)	March and Sept, annual	Volunteers, Schools, Community Service	Dedicated program to pick-up trash	# of people involved, # lbs trash	VIWMA- summer kids program (YES), East End beautification program. Check with Sea Grant Outreach Coordinator. Have private enterprises pay for garbage collection.
	4	Provide trash and recycling deposits, a pick-up system, follow up of pick up	2011	STEER, VIWMA	Deposited trash is removed	No overflowing trash receptacles	Limited space available. Go door-to-door along Compass Pt. Road
	5	Community education including informational signs.	2012	STEER, CZM, DFW, Sea Grant, TNC	Informed community	Compliance (visual surveys # of incidents of throwing trash pre and post)	Include in overall Ed and Outreach. Engage school groups, local businesses, landowners, and boaters

Threat: derelict vessels and large marine debris.				Targets: Birds, Coral, Seagrass, Mangroves			
Objective 7.3	***By 2010, and every year thereafter, derelict vessels and large marine debris which threaten mangroves, seagrass beds, or coral habitat have been removed from STEER.***						
Strategy 7.3.A: Develop a derelict vessel reporting and removal system.	**1**	Provide reporting system for the documentation of derelict vessels	2011	STEER, Contractor, DEE, DFW, CZM	Derelict vessels reported	Central reporting system in place, is being used	Need to know if operable: what is the call tree? DEE, Coast Guard (notified)
	2	Secure funding for regular marine debris removal as necessary	2013	Sea Grant, Gov's Office, NOAA, Sea Tow (through NOAA grant)?	funding, rapid response to remove threat	# of $$ available	Coast Guard funding? Sometimes DEE has funding. NOAA? Gulf Mex Foundation?
	3	Remove existing derelicts	ongoing	DPNR, Sea Tow	Reduction of incidence of derelict vessels	# of derelict vessels removed vs. remaining	Need to be careful about removal damage- Depends on mechanism, payment, priority on case-by-case
	3	Provide training to DEE	2009	DEE completed NOAA FL training	DEE trained, applied methods to removal	DEE remove x# of derelict /year	DEE follows paper trail, determine owner, put up for auction.
	4	Determine before-impacts and after-benefits.	as needed	STEER, DEE, DFW, UVI, CZM, TNC	Measure impact of threat and effectiveness of removal	Documentation of improvement of resources	need long-term monitoring to gauge slow recovery

8. PHYSICAL DAMAGE FROM BOATS							
Strategy	**Strategic Actions**		**When**	**Who**	**Outputs (mgt plan implementation)**	**Measures**	**Other Considerations**
Threat: Anchor Damage				**Targets: Seagrass, Corals**			
Objective 8.1	***Reduce the number of boats anchoring on coral and seagrass by 90% by 2015.***						
Strategy 8.1.A: Create buoy mooring system in popular boating areas containing coral and seagrass habitat within STEER.	**1**	Conduct survey of boat use patterns and coral and seagrass affected by anchoring	2010	DFW, STEER	Monitoring of high use areas to look for further damage, Determine priority sites for mooring buoys	Report	Carrying capacity of boaters in area, Extent of coral damaged, Post-removal effects on seagrass at Cas (from Oct '08)
	2	Development of Moorings Plan or Recommendations/ Policies	2009	STEER, DEE	Better policies for protection of seagrass and coral	If changes recommended, legislative approval, then the Plan is in place	Keep separate from STEER MP. System for determining use of moorings, collecting fees. Need to consider repercussions from stakeholders. Reporting means and penalties for infractions? (EX. Lovango: 1sq ft. coral = $250 (?))
	3	Development of Moorings Plan: Placement	2010	STEER, DEE, Stakeholders	Identified placement for future buoy installation	Plan	95% of plan will be accepted, except for Cas Cay- will depend on what policies change? Information from baseline survey will contribute.
	4	Buoy installation	2009	DFW, CZM	Mooring (and boundary) buoys in place, enhanced mooring capacity	X # of buoys installed	Buoys installed in Christmas Cove. Bovoni Cay Hurricane Mooring System installed

	5	Public outreach regarding proper use of moorings, guidelines, etc.	2010	DFW, Sea Grant, CZM, TNC	Buoys used, less anchoring	X # of buoys used vs. anchoring on seagrass/coral	Public awareness
	6	Semi-annual maintenance of moorings	continuous	DFW, Contractor	Continuous maintenance	Maintenance log: #'s of buoys checked, needing repair, repairs occurring	Funding
	7	Monitoring of activities and coral in affected areas post buoy installation	continuous	DFW, UVI, TNC, Volunteers, DEP	Effectiveness measures	Incidence of coral, seagrass damaged	Continuous monitoring, DEP RARE funding
	8	Engage "Host Boat" in spreading message, reporting on compliance		STEER	Bay host system established. Increased enforcement, outreach	# of boat owners reached	Following formation of STEER Mgt Committee. Keeps records, collects fees if any, work with enforcement
Threat: Accidental Groundings				**Targets: Seagrass, Corals**			
Objective 8.2	***Reduce the incidence of accidental groundings within STEER by 50% by 2015.***						
Strategy 8.2.A: Groundings prevention, rapid response and removal.	**1**	Prevent groundings with installation of navigational buoys and/or daymark system on pilings for channel	2012	DFW, Contractor, CZM	Mooring (and boundary) buoys in place	X # of buoys installed	Coast Guard inspection required
	2	Devise groundings team network for rapid response	2011	DPNR Groundings Team	Team response is immediate	Response time	Clear identification of call tree, including CG in case of hazmat, VI Reef Resilience Plan
	3	Remove grounded boats (See 7.3: Removal of Derelict Vessels)	ASAP	DPNR Groundings Team, CZM, DFW, contractor	Threat removed quickly with least amount of damage	# of days grounded, assessment of damages	Restoration of damaged corals. Need to be careful about removal damage- DEPENDS on mechanism, payment, priority on case-by-case.

9. MARINE-BASED POLLUTION							
Strategy	**Strategic Actions**		**When**	**Who**	**Outputs (mgt plan implementation)**	**Measures**	**Other Considerations**
Threat: Vessel Sewage (nutrients and bacteria)				**Targets: Coral, Seagrass, Fisheries Resources**			
Objective 9.1	***Reduce the amount of pump-out (blackwater and graywater) pumped into STEER by 90% by 2015.***						
Strategy 9.1.A: Establish/ Advocate on-board treatment and/or Pump-Out Program for STEER.	**1**	Assess existing pump-out facilities, boats with on-board treatment, transfer options to understand needs	2011	CZM, UVI	Existing pump out facilities within STEER identified (capacity and potential need, determined by number of boats)	Pump-out at Compass Pt.	Understanding of why boaters do not use existing pump-out facilities. Disposal of pump-out is an issue.
	2	Develop incentives for boats to get composters or MSD (III).	2011	STEER, DPNR, CZM UVI	Boaters are compliant	report # of boats being registered with on-board tanks	
	3	Determine alternatives for facilities, assess costs, funding?	2011	STEER, DPNR, CZM UVI	Funding identified for pump out business	Funding sought	Find funding/partners for additional pump-out facilities. EPA Beach Grant: funding for pump out vessel?
	4	Establish additional pump-out facilities	2020	STEER, DPNR, CZM UVI	an appropriate number of pump-out stations to accommodate the quantity and spatial distribution of boaters in STEER	Additional pump-out in/near STEER	STEER as non-profit to provide funding for mobile and land-based pump outs with fixed sizes and rates
	5	Discuss with enforcement the establishment of regulations regarding vessel registration with proof of receipts and functional holding tanks, and alternatives to holding tanks- including composting, incinerating	2012	STEER, DPNR, CZM UVI	Enforcement with education	Pamphlet given at registration with locations listed and potential fines	Enforcement will link future boat registration (Aug '10) with on-board- STEER can do- grant submission thru DFW? Mandate pump out facilities (full time access) to any marina

		or other non-discharge systems(all considered Type3 MSDs), as well as treated discharge systems (Types 1 & 2 MSDs)					with more than x# of slips or X# of sq. ft. of submerged lands. Clearly state whether treated discharge is permitted.
	6	Keep records of use to gauge effectiveness (increase in pump-out facility use = decrease in illegal pump-out?)	2012	STEER, pump-out facility owner	Record kept	Records	
	7	Incorporate incentives for marinas to have pump out facility for public, as part of Clean Marina Program	2012	STEER, DPNR, CZM UVI	Businesses buy-in to program	Marinas have pump-out facilities	Private funding? Post reasonable prices for pump out and/or gallons. Encourage composters or other non-discharge treatment.
Objective 9.2	***Reduce the input of point (illicit discharge) and non-point sources of pollution by _TBD%_ from marinas and boats by 2015 to improve the health of seagrass communities and the function of nursery habitats.***						
Strategy 9.2.A: Promote Blue Flag Program and Clean Marina Program.	**1**	Adopt Clean Marina Program Plans to STEER	2015	NOAA (financial incentive program), EPA (CWA),	Plan outlines ways marinas are involved in the protection of the environment	# of marinas participating	Understand that Clean Marina Program already required (federal). Oppose further marina expansion
	2	Assess the threat and issues arising from marinas in STEER- why aren't marinas compliant?	2011	STEER	Information on how to proceed	Summary report	Why it's working and what we need to do?
	3	Engage marinas and enforcement	2012	STEER, DEE	Marinas adjacent to STEER active in VI's CM Program, have spill response plans and solutions to issues such as bilge cleaning facilities.	# of infractions decrease and Blue Flag members increase	Create incentives or compliance programs (fly a flag, get a plaque). Provide reporting or info chain

							from public to STEER to law enforcement. Provide means for community to assist in clean-up.
	4	Ensure containment: filters, treatment, booms, fuel cups, spill equipment at docking stations	2015	STEER, DPNR	Speedy response of enforcement to diesel or oil slicks, Spills cleaned up.	Summary report	Env sub-committee of HTA completed Blue Flag feasibility study. Blue Flag "National Jury". Organizations on board include DPNR, Megan's, etc. Marinas in STEER can join.
Threat: Hydrocarbons from passing boats				**Targets: Fisheries Resources**			
Objective 9.3	***To reduce hydrocarbons, noise, wake from larger commercial vessels***						
Strategy 9.3: Re-route ferry boats, barges through Great/Little St. James-	**1**	Begin to address ferries, speed boats, large tankers and barges. Also option to limit speed vs. rerouting					Would fall under existing regulations? Need enforcement. Perhaps a citizen-led initiative

10. CAPACITY/IMPLEMENTATION							
Strategy	**Strategic Actions**		**When**	**Who**	**Outputs (mgt plan implementation)**	**Measures**	**Other Considerations**
Capacity / Implementation: Governance of STEER							
Objective 10.1	***By December, 2015, STEER is designated as a Park as part of the Territory Marine Park System.***						
Strategy 10.1: Designate as Park	**1**	Draft justification document	2015	STEER Core	Draft Justification Document: 1) Enforcement- need structure to give attention to needs of the area 2) Cultural resource- will be more accepted as such 3) As a Park, can consider making Cas Cay decent campground with controlled visitation 4) Enhance designation will elevate importance of watershed management 5) Gets departments to work together ("how are you going to contribute to make this a healthy Park?") 6) Unifies the 3 MRWS's 7) More leverage	document ready	
	2	Discuss with CZM Director	2015	CZM	Director comments, approves	ready for commissioner	
	3	CZM to Commissioner	2015	CZM		Commissioner approves	

				Director			
	4	CZM takes to CZM Commission	2015	Commissioner			
	5	Governor Approval	Before elections	CZM-through DPNR process	Park established		
Capacity / Implementation: Governance of STEER							
Objective 10.2	***Establish STEER Advisory Board by July, 2011.***						
Strategy 10.2: Establish interim STEER management group.	**1**	Establish STEER management group (such as Friends of STEER?)	2011	Raise funds for STEER staff			Board? Such as Magen's Bay MA? Friends of STEER?
	2	Meet Quarterly, Monthly?	2011	Use of Advisory Board/ Committee			
	3	Develop a business plan for the agency	2012				
Capacity / Implementation: Governance of STEER							
Objective 10.3	***STEER Management Plan Adopted by Fall, 2011.***						
Strategy 10.3: Management Plan through Government House.	**1**	Finish draft	Sept 2010			Completed	
	2	Public Input	Oct 2010			Completed	
	3	Submit to CZM Commission	2011			CZM signs off on Mgt Plan	
Capacity / Implementation: Governance of STEER							
Objective 10.4	***Develop staffing capacity for STEER***						
Strategy 10.4: Staffing.	**1**	Coordinator hired for Territorial Park System	2011		STEER Coordinator hired by TNC.	Completed.	Overall coordinator for the Territory's Parks (STXEEMP, STEER) OR: Coordinator for

							STEER
	2	Rangers (4)					Rangers/surveillance staff: IDEAL: up to 4 ($200,000) Need to get enforcement training (CZM staff- can issue cease and desist orders)
	3	Education /Outreach Specialist			delved out to CZM Outreach Eventually have a Full Time Employee (FTE)		Build 20% into CZM outreach position? Could possibly coordinate with VINE to make STEER outreach a special project of theirs until FTE is hired
	4	STEER Marine Biologist			Eventually have a FTE on this- funding from		
	5	Bayhosts					
Capacity / Implementation: Governance of STEER							
Objective 10.5	***Create "Friends of STEER" non-profit organization and merge with "Friends of Christmas Cove" by 2011***						
Strategy 10.5: Create "Friends of STEER".	**1**	Identify mechanism for Friends of STEER	2011				
	2	Engage public	2011				
	3	Develop a charter for Friends of STEER	2011				Made up of a civilian review board?
Capacity / Implementation: Enforcement							
Objective 10.6	***Increase the knowledge, presence and effectiveness of patrolling, surveying and enforcing personnel in STEER by 2015 and thereby reduce the number of illegal or incompatible activities in and adjacent to STEEER by 50%.***						

Strategy 10.6: Increase enforcement program in STEER.	**1**	Raise funds for STEER rangers					
	2	Get funding for enforcement infrastructure (dock, boat, office, vehicles, dive gear)			Raise funds for STEER patrol boat's		Already is a dedicated slip at Compass Pt. Marina
	3	Establish effective patrol practices			Educated on STEER regulations, issues	Create a list of infractions/threats-illegal activity --database used as an indicator for measuring education and outreach efforts or effectiveness of the park in general, see below	Add or enhance citizen enforcement role.
	4	Establish STEER enforcement plan			Study STEER infractions Identify priority for enforcement ID what rangers can do, what Bayhosts can do, rest to DEE		
	5	Have at least (1) dedicated enforcement officer for STEER					Can build dedicated FTE into grants for DEE, then officers work with Rangers (STXEEMP did fund 2 ½ time officers)

11. EDUCATION AND OUTREACH PROGRAM							
Strategy	**Strategic Actions**		**When**	**Who**	**Outputs (mgt plan implementation)**	**Measures**	**Other Considerations**
Education and Outreach Program							
Objective 11.1	***By 2011, an Education and Outreach program is established with dedicated personnel and funding to meet the needs of STEER education and outreach to match the objectives stated above.***						
Strategy 11.1: Increase stakeholder awareness (give people a chance to change their behavior). Target residents and tourists (boat rentals, charter yacht.	**1**	Pamphlets on moorings and anchoring zones (where they are, why they need to be used, regulations, how to anchor properly, etc.)	Jun-10	DFW	Public informed of critical habitat, ways to protect resources , mooring program, rules and regs	Pamphlets distributed to boaters, public. COMPLETED.	DFW is doing this as part of grant- may limit the amount or rules/regs that can be included. Recommendation to require boaters docked/moored in STEER to read signs and materials
	2	Other outreach: STEER website; don't step on corals; reduce use of oxybenzone containing sunscreens when in water near corals, video, radio	2012	STEEER	Heightened sense of awareness by public of STEER, increased access to STEER information.	STEER media materials	Dependent on STEER staff? Funding? Target outreach to tourists- inform of usage zones, buoys, use of kayak or sailboats, damage of corals from walking or groundings
	3	STEER logo competition	2011	STEER	Engage local school groups, raise awareness of STEER	Logo determined	
	4	Create Volunteer Monitoring Program	2011	STEER	Community Outreach	Volunteer network established	Part of Friends of STEER?
	5	Develop Education and Outreach Strategic Plan	2011	STEER, TNC	Strategic plan outlining Ed/Outreach needs, funding, schedule, etc.	Plan in place	Need to reach youth.
	6	Signage in shore side and in watershed					In heavy use areas to help control/direct traffic
	7	Adopt a Road program			Beautification		Engage Boy Scouts

2.7 Monitoring and Evaluation of Effectiveness

A *Monitoring Plan* was developed to assess the status of the resources STEER aims to protect and to evaluate the effectiveness of some of the strategies proposed in this Management Plan. This involved deciding how STEER management will measure results. Having a plan for monitoring will enable managers to see whether a strategy is working as planned and thus whether adjustments will be needed. It also helps keep an eye on those targets or threats we are not acting on at the moment, but may need to consider in the future. This Plan needs to be constantly reviewed, updated, and likely amended to reflect new needs or other information that can feed into management decisions. Periodic updates will be necessary as cost estimates, funding, and results are determined.

The Plan contains essential elements needed to track the resources and strategies; indicators, methods, frequency and timing, and costs (among others). These are tied back to the Objectives and Strategies of the Plan (*see section 2.6 Conservation Objectives Strategies and Action Steps*).

Indicators can be quantitative measures or qualitative observations. Good indicators meet the following criteria:

- Measurable: Able to be recorded and analyzed in quantitative or in discreet qualitative terms.
- Clear: Presented or described in such a way that its meaning will be the same to all people.
- Sensitive: Changing proportionately in response to actual changes in the condition or item being measured.

Methods are specific techniques used to collect data to measure an indicator. Good methods meet the following criteria:

- Accurate: Gives minimal or no error.
- Reliable: Results obtained using the methods are consistently repeatable.
- Cost-Effective: Not overly expensive for the data the method yields or for the resources available to the project.
- Feasible: Project team has people who can use the method, as well as the material and financial resources to use the method.
- Appropriate: Appropriate to the environmental, cultural, and political context of the project.

Table 6. STEER Monitoring Plan, shows monitoring needs as listed in order of importance. The status assessment for each of the seven STEER Targets is listed first (in blue boxes), and then other monitoring for strategy or program effectiveness follows. When using the plan, please pay particular attention to the priority monitoring needs, the frequency of monitoring, and the status of this activity. Contact persons are members of the Core Planning Team (*Appendix G: "Core Drafting Team and Stakeholders"*) or others the Core Planning Team will know how to contact.

Additionally, *Initial Research Needs* were determined and recorded in the following table. Research that is needed may provide baseline data prior to implementation of STEER strategies or data that will help guide other monitoring methods.

A note on water quality testing: DPNR Division of Environmental Protection has 13 Ambient Water Quality Monitoring Stations within the various Reserves boundaries. Water is sampled quarterly and field measurements include pH, salinity, dissolved oxygen, turbidity, temperature, and any unusual sights or smells. Likewise, samples are tested at Ocean Systems Laboratory for fecal coliforms, enterococci bacteria, as well as turbidity. *Chlorophyll a* was identified as a measurement of water quality. Combined EPA and VI code ambient water quality standards indicate that fecal coliform counts over 70µg/L are unsuitable for swimming. STEER waters are designated as Class B, or suitable for contact recreation. However, the waters have been listed as "impaired" by the EPA and have some restrictions concerning temporal exposure to humans after significant storm events.

Testing should focus on the following areas:

- Cas Cay – to get baseline, currently no boats allowed
- Marina – detect any improvement when Pump Out requirements start
- Inner lagoon – baseline for opening of channel, or dump closure, energy plant, etc.
- Christmas Cove – baseline
- Others – salinity at desalinization outfall points

The document listing the sources for Mangrove Lagoon and Benner Bay's Impaired Water Body Listing can be found at:
http://www.dpnr.gov.vi/dep/pubs/17602-FINAL_MLBB_TMDL_05_24_05.pdf

For more background information see:
http://www.epa.gov/waterscience/standards/wqslibrary/territories/usvi_wqs.pdf and
http://dpnr.gov.vi/dep/1-dec-intent.htm

Another thrust for monitoring of effectiveness of the Reserves, could include residents' attitudes, behaviors, perceptions, knowledge, etc. of the Reserves' mission and goals, and of the STEER environment, prior to and post-installation of STEER. This could be a major duty of the Education and Outreach staff- coordinating an awareness campaign and evaluating how humans are/are not changing in relation to this STEER establishment.

Table 6. STEER Monitoring Plan

STEER MONITORING PLAN (2010-2015)													
Target(s)	**Threat(s) Category**	**Strategy or Program**	**Indicator**	**Methods**	**Needs/ Status** (already being done? Completed?)	***PRIORITY***	**Frequency and Timing**	**Location**	**Who monitors (who to contact)**	**Resources needed, annual cost**	**Funding Source**	**Detailed monitoring plan completed? (date + citation)**	**Last updated summary/ analysis report (date + citation)**
Mangrove	Climate change (sea level rise), direct removal of derelict boats, development (sediment), boats tied up to roots, toxins, trash	***Status of resource***	Density, diameter, biomass, spatial representation	Field measurements, tagging studies of seedlings, infrared mapping. Permanent plots (randomly chosen in Spring 2009)	1x completed MMES spring 2009. Next update in 2011.	**Very High**	Every other year (need to check for plots' tags every year)	Inner Mangrove Lagoon, Benner Bay	UVI MMES (Tyler Smith), ***volunteers***	~$500	UVI-MMES	MMES 2009	MMES 2009

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	*PRIORITY*	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
Seagrass	Water quality, sedimentation, climate change (sea level rise), anchor damage, habitat loss, trash/debris	***Status of resource***	Diversity, shoot density, distribution, seagrass:algae ratio	Field measurements, permanent quadrats (randomly chosen), photo-CPE, indicators of algae:seagrass ratio at certain locations (Inner Mangrove)	1x completed MMES spring 2009. Next update in 2011. DFW to conduct benthic habitat survey on X-Mas Cove twice a year for 3 years.	**Very High**	MMES: Every other year DFW: 2x year in X-Mas Cove, start June 2010	Selected permanent sites	UVI - MMES (Tyler Smith), DPNR-DFW ***volunteers***	MMES Students ~$1000. (SCUBA, days/people) DFW Survey Annual Cost: ~$14,300. (survey, supplies, staff time.)	UVI-MMES USFWS Sport Fish Restoration "Steer" grant	MMES 2009	MMES 2009

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	*PRIORITY*	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
Corals	Water quality, sediment, climate change (sea level rise and increase sea surface temperature), anchor and grounding damage, loss of herbivores, trash, vessel sewage	***Status of resource***	Species composition, % live coral cover, disease, partial mortality, herbivory, lionfish presence, water temperature	Field measurements (AGRRA, UVI, EPA's Bio monitoring), permanent quadrats	X-Mas Cove study (Nemeth and Kadison, March 2008), Tyler Smith permanent monitoring stations, EPA at a few locations (March 2009)	**Very High**	4x/yr. (Smith), every year (MMES)	Permanent sites: X-Mas Cove, Secret Harbor, Cas Cay, Bovoni Cay, Great Bay, False Entrance, Cowpet Bay	Tyler Smith, EPA, UVI, MMES	Scuba, days/people, boats: $5000?	UVI-MMES, EPA	AGRRA, TSmith, EPA	***NEEDS TO BE COMPILED***

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	PRIORITY	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
Fish	WQ, sediment, habitat loss, illegal fishing, vessel sewage	***Status of resource***	1) Juvenile fish diversity 2) # invertebrates/ areas 3) baitfish biomass	1) traps 2) lobster/conch surveys 3) lunar sampling	DFW (Shenell 2009) ***NEEDS TO BE DONE***	**Very High**	Every year (ideal, but labor intensive)	Mangrove area, base it on background study (see research needs)	DFW, ***volunteers***	Labor intensive: DFW juvenile fish survey annual cost at least $40,000 but it could be much greater	USFWS Sport fish Restoration Grant	DFW survey from July 2008 until June 2009, completion report submitted in November 2009	***NEEDS TO BE COMPILED***
Birds	Predators, reduced baitfish, loss of habitat, debris/trash and monofilament, WQ	***Status of resource***	1) Baseline #'s, 2) breeding success, 3) migratory bird counts	1) 1x Survey, 2) depends on location, 3) 2x year survey	DFW ***NEEDS TO BE DONE***	**Very High**	1) 1x/yr. 2) 1 time 3) 2x/yr.	Cays	DFW	$5-10K	USFWS grants?		***NEEDS TO BE DONE***

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	*PRIORITY*	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
Compass Pt. Salt Pond	Impaired watershed, WQ, sediment, climate change-sea level rise, habitat loss, trash	***Status of resource***	Size of pond and buffer, associated species (fiddler crabs), contaminants such as toxins and metals in sediments that could be affecting fishery resources in the pond, incidence of fish kills in the pond	GIS and aerial photographs, quadrats for species ID/counts, sediment testing	Have 2007 & historical photos, DFW doing physical assessment, species indicators contaminants study ***NEEDS TO BE DONE***	**Very High**	1x, then every 3-5 years	Compass Pt. Salt Pond	DFW	Surveys: time, $ 2,000 (~$54,000 for restoration includes staff time, geologist, and dredging for FY10)	USFWS and NOAA	Jerecki 2003, Rennis *et al.* 2006, Stengal 1998	*NEEDS TO BE COMPILED*

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	*PRIORITY*	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
Sustainable use/Access	Lack of access, DPNR issues	***Status of resource***	Public satisfaction, access & use	Public survey (NPS or STXEEMP user survey), socio-economic studies, observe use types, frequency	Started by UVI), part of 2010 NOAA study	**Very High**	1x, then 4 year later	STEER+ watershed	UVI	$ time	UVI, NOAA	NPS or STXEEMP user survey?	*NEEDS TO BE DONE*

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	*PRIORITY*	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
ALL Targets	Impaired watershed	BMPs in watershed, pollution prevention/ regulation strategies	Improved water quality in guts, marine environment	Targeted sampling, offshore gradient, random strat design	DEP: nutrients, sediment, bacteria	**Very High**	Targeted sampling Y1, then extend to offshore gradient	Targeted: 1) Inner Mangrove Lagoon, 2) marine row, 3) Turpentine Run gut outflow, 4) Compass Pt. outflow	NOAA (Tony Pait), DEP, EPA	$$	NOAA CRCP	Tony Pait proposal, Guanica Watershed contaminants study, DEP, EPA recorded acceptable standards	*NEEDS TO BE DONE*
Fisheries	Water quality	BMPs in watershed, pollution prevention/ regulatio	Contaminant load in fish, invertebrates	Bioassays	***NEEDS TO BE DONE***	**Very High**	1x	STEER	NOAA (Tony Pait)	$$. Second year of project (if funded) would	NOAA CRCP	Tony Pait proposal, Guanica Watershed contaminants	*NEEDS TO BE DONE*

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	*PRIORITY*	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
		n								include biota		study.	
Seagrass	Habitat Loss	Habitat loss regulation, enforcement	Extent of seagrass: historical, current, after disturbance	1) benthic mapping 2) ground-truthing extent	1999 NOAA maps, Living oceans maps. Update **NEEDS TO BE DONE**	**Very High**	1x (NOAA) then 2-3 years or after disturbance event	STEER, or at disturbance event	NOAA (Simon Pitman)		NOAA	NOAA	
Corals	Climate Change: increase sea surface temperature	Bleaching response plan	Bleaching	Map and measure the extent bleaching, partial mortality	Need to be done when have bleaching or suspected bleaching event	**High**	At bleaching event	At fixed locations (see status monitoring for corals)	Bleaching response team (TNC, UVI, DPNR)	Scuba, days/people, boats: $5000?	TNC? NOAA?	Florida Reef Resilience	

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	*PRIORITY*	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
Fisheries	Illegal harvest	Outreach: directed signs updating or modifying permitting information, enforcement	Illegal harvest- Who? Where? When? Frequency? Formalize public role in monitoring - volunteer, organize watchers, multiple call in points	Obtain permits records, create summary report, observational study (optional)	***NEEDS TO BE DONE***	**High**	One time	STEER	Enforcement -- Student project? --Aquatic heritage (Simon, Shaun, Chris)	Cheap			*NEEDS TO BE DONE*

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	*PRIORITY*	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
Salt Ponds	Climate change	Restore flow in Compass Pt. Pond	Balance of FW flow and sediment input	1) measure sediment depth 2) determine where, how much input	1) Done (DFW) 2) do after restoration	**Medium**	1) 2x annually (wet/dry) 2)after action	Compass Pt. Salt Pond	DFW, Yale visiting students?, MMES internship? Contract ?	$$ contract ? Equipment	Need grant	Jerecki 2003, Rennis *et al.* 2006, Stengal 1998	*NEEDS TO BE DONE*
Seagrass, Corals	1) accidental boat grounding	1) groundings removal	1) Incidence of scarring /recent mortality	1) photo document, GPS accidental	Whole STEER needs to be done.	**Medium**	60 days after X-Mas Cove	X-Mas Cove, at disturbance,	DFW Buoys program, DPNR	Scuba, days/people, boats :	DFW Buoys grants, NOAA	In DFW buoy proposal: following	NPS-Tom Kelly-has

STEER MONITORING PLAN (2010-2015)													
Target(s)	**Threat(s) Category**	**Strategy or Program**	**Indicator**	**Methods**	**Needs/ Status** (already being done? Completed?)	***PRIORITY***	**Frequency and Timing**	**Location**	**Who monitors (who to contact)**	**Resources needed, annual cost**	**Funding Source**	**Detailed monitoring plan completed? (date + citation)**	**Last updated summary/ analysis report (date + citation)**
	2) anchor damage	2) Buoys Program	(corals, seagrass) 2) Seagrass shoot density in anchoring areas vs. adjacent to newly established buoys	damage 2) underwater sampling with transects, quadrats at randomly selected, permanent sampling locations	(X-Mas Cove being done by DFW) Sea Tow or Sophia has data?		mooring installation + benthic survey every 6 months for 3 years. Or after disturbance event	following removal of derelict vessels	Response (Will Coles, Kent, Coast Guard), Sea Tow (groundings), volunteers	$5000?	restoration, DFW new STEER grant# F-25-1, Project #FZ0SF, DFW could write grant to continue with a long-term study of this area.	Rafe Boulon NPS STJ protocols, FL methods for grounding removal	records for years before moorings

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	*PRIORITY*	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
Seagrass, Corals	Derelict vessels	Derelict vessel removal	# of derelict vessels removed, response time to removal	Obtain Sea Tow, Enforcement records	***NEEDS TO BE DONE***	**Medium**	1x/yr. at year end	STEER	Enforcement	Cheap	DFW might be able to write a grant or add it to the USFWS STEER grant F-25-1 for derelict vessel removal in STEER via USFWS or NOAA funds.	Enforcement?	

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	*PRIORITY*	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
Mangrove	Climate Change: sea level rise	Climate Change adaptation plan	1)Extent of possible migration 2) species composition	1) Model SLR 2) studies on mangrove reaction to SLR	1) TNC will be working on this 2) Compilation of past data needed + new project by Simon Pittman	**Medium**	1) 1x 2) over an extended period of time	STEER	TNC (Jeanne), NOAA (Simon), DEP (Noorhasan)	$$$	NOAA, TNC	Florida/PR studies, SLR studies, IUCN Mangrove resilience	
Birds	Predators	Trapping Program	Drop in # rats, mongoose, cats following trapping How bad is the rat	Track the number caught in traps per month until eradicated	Need to be done as internship	**Medium**	Compilation of data that is constantly collecte	Cas Cay, Bovoni cay	DFW, Volunteers	Cheap			*NEEDS TO BE DONE*

STEER MONITORING PLAN (2010-2015)

Target(s)	Threat(s) Category	Strategy or Program	Indicator	Methods	Needs/ Status (already being done? Completed?)	*PRIORITY*	Frequency and Timing	Location	Who monitors (who to contact)	Resources needed, annual cost	Funding Source	Detailed monitoring plan completed? (date + citation)	Last updated summary/ analysis report (date + citation)
			problem?	(or controlled), determine if see a drop.			d						
Birds	Monofilament	Outreach, tracking monofilament threat	1) # of incidents of monofilament entanglement 2) source of monofilament - how much collected? Where?	1) Compile reports of survey & photo documentation of monofilament entanglement of birds in the area 2) Keep spatial record of monofilam	Need to be done as internship	**Medium**	Compilation of data that is constantly collected	STEER and surrounding bird areas of STT, Ritz cleanup of shore	DFW (This topic will be addressed at all (or most) of the recreational fishing tournaments captains meetings to make fishers	Cheap		require monofilament reporting in permitting for research	*NEEDS TO BE DONE*

STEER MONITORING PLAN (2010-2015)													
Target(s)	**Threat(s) Category**	**Strategy or Program**	**Indicator**	**Methods**	**Needs/ Status** (already being done? Completed?)	***PRIORITY***	**Frequency and Timing**	**Location**	**Who monitors (who to contact)**	**Resources needed, annual cost**	**Funding Source**	**Detailed monitoring plan completed? (date + citation)**	**Last updated summary/ analysis report (date + citation)**
				ent collected in trash clean ups 3) interview fishermen-					aware of the problem				

Table 7. STEER Initial Research Needs

STEER INITIAL RESEARCH NEEDS (2010)													
Target(s)	**Threat Category**	**Strategy or Program**	**Indicator**	**Methods**	**Needs/ Status** (already being done? Completed?)	***PRIORITY***	**Frequency and Timing**	**Location**	**Who monitors (who to contact)**	**Resources needed, annual cost**	**Funding Source**	**Detailed monitoring plan completed? (date + citation)**	**Last updated summary/ analysis report (date + citation)**
Birds, mangrove, seagrass	Disturbance	Baseline: Carrying Capacity @ Cas Cay and Mangrove Lagoon	Acceptable # of visitors/day	Conduct observation on given day + during peak use: get record of number of people/boats at Cas Cay, Inner Lagoon. Record Ecotours effect, if any, on resource including: birds flushing, proximity to nests, inexperienced snorkelers damaging resources (corals, Increase sedimentation from people	Need to obtain standards from similar studies (NPS?), in VI code? How did DEE determine CC in Secret harbor? Management recommendations for regulating number of people, limits of	**Very High**	1 time	Cas Cay, adjacent mangroves	MMES Students	cheap	UVI?	NPS?	

STEER INITIAL RESEARCH NEEDS (2010)													
Target(s)	**Threat Category**	**Strategy or Program**	**Indicator**	**Methods**	**Needs/ Status** (already being done? Completed?)	***PRIORITY***	**Frequency and Timing**	**Location**	**Who monitors (who to contact)**	**Resources needed, annual cost**	**Funding Source**	**Detailed monitoring plan completed? (date + citation)**	**Last updated summary/ analysis report (date + citation)**
				churning up bottom, etc., incidence of pulling boats ashore Cas Cay	disturbance, etc.								
Coral	Disturbance, anchoring, trash	Baseline: Carrying Capacity @ Christmas Cove	Acceptable # of boats , visitors / day	Conduct observation on given day + during peak use, determine preferred sites	Obtain standards from similar studies (NPS?)	**Very High**	1 time	Christmas Cove	Kostas? Drew?	cheap	UVI?	NPS?	
ALL Targets	Impaired watershed	Baseline: Watershed Study	Baseline study of flow and source of inputs, recommended BMPs	Need watershed study done via NOAA /CWP, Restoration recommendations	***NEEDS TO BE DONE***	**Very High**	1 time	STEER watershed	CZM: NOAA or CWP	$?	NOAA?		
Fisheries	Harvest, habitat loss, pollution	Baseline: need monitoring plan for nursery, baitfish	ID where to monitor	Do background research on recruitment frequency, reproductive periods & test in field	Background references	**High**	1x	STEER	Student project				

STEER INITIAL RESEARCH NEEDS (2010)													
Target(s)	**Threat Category**	**Strategy or Program**	**Indicator**	**Methods**	**Needs/ Status** (already being done? Completed?)	***PRIORITY***	**Frequency and Timing**	**Location**	**Who monitors (who to contact)**	**Resources needed, annual cost**	**Funding Source**	**Detailed monitoring plan completed? (date + citation)**	**Last updated summary/ analysis report (date + citation)**
Birds	Predators, habitat loss, monofilament	Baseline: birds population study	1) ID where birds are 2) species list 3) migratory species	Conduct bioblitz inventory with volunteers or contract for a study	Needs to be done	**Medium**	1) 1x/yr. study 2) 1x 3) 2x/yr. (spring, fall)	STER	DFW	Volunteer or contract	DFW?		
Compass Point Salt Pond	Watershed, habitat loss, climate change	Baseline: indicator species	Seasonal difference in indicator species (Fiddler crabs)	Do background research, field study	Needs to be done	**Medium**	1x	Compass Point Salt Pond	DFW	Student	DFW?		
Coral	Groundings, climate change	Restoration	Suitable hard bottom-potential/historical critical habitat	NOAA benthic mapping, ground-truthing	***NEEDS TO BE DONE***	**Med/Low**	1x, then 2-3 years	STEER					

2.8 Zone and Mooring Plan

A Proposed Zoning and Mooring Plan was compiled from an inventory of the natural resources within STEER as well as with stakeholder input. Channels are marked for boating traffic to assist with minimizing wake; however additional signage and moorings will be added to assist users with locations designated for certain types of permitted activities within STEER.

Stakeholders at work, J. Brown

The Zones include:

General Use Zone: Area where surface waters are kept clear for recreational and transit uses. Anchoring and extraction of resources are prohibited.

Low-Impact Use Zone: Area where anchoring is allowed with a permit for a maximum of seven [7] days. Extraction of resources is prohibited as is tying to mangroves.

Preservation Zone: Area where motorized watercraft, extraction of any resource, and anchoring is prohibited. Area designated for ecological sensitivity compatible with non-motorized craft and passive recreational activities.

Emergency Anchor / Hurricane Mooring Zone: Area where hurricane moorings are located and temporary anchorages are allowed only during major storm events as this zone is kept in Preservation otherwise.

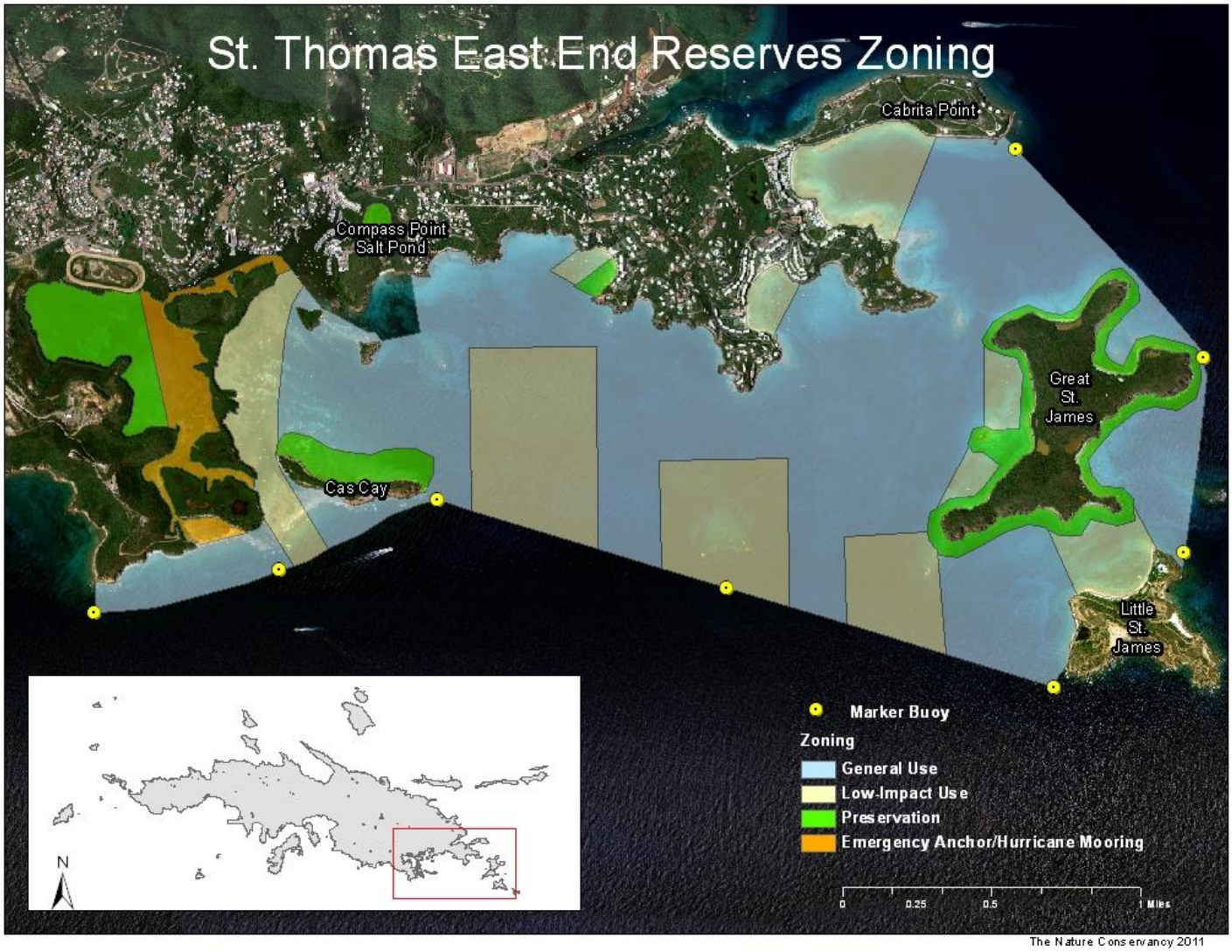

Figure 7: Proposed STEER Use Zones

Table 8. STEER Activities Guide

Activity	General Use	Low-Impact Use	Preservation	Emergency Anchor
Motorized watersports	✓	✓	✗	✗
Non-motorized watersports	✓	✓	✓	✓
Baitfishing	Permit[1]	Permit[1]	✗	✗
Handline fishing	Permit[1]	Permit[1]	✗	✗
Anchoring	✓	✓	✗	✓
Harvesting (whelk, conch, lobster)	✗	✗	✗	✗
Scientific research	Permit[2]	Permit[2]	Permit[2]	Permit[2]
Picnicking	✓	✓	✓	✓
Hunting	✗	✗	✗	✗
Spearfishing	✗	✗	✗	✗
Transit	✓	✗	✗	✗
Camping	✗	✗	✗	✗

1-Contact Division of Environmental Enforcement: (340) 774-3320; 2-Contact Division of Fish and Wildlife: (340) 775-6762

III. SUSTAINABLE FINANCE PLAN

3.1 Summary of the STEER Sustainable Finance Plan

(Full Sustainable Finance Plan can be found in Appendix F.)

INTRODUCTION

Although the MRWSs that make up STEER are legally protected entities, they have had little management and oversight. The various divisions of DPNR are stretched thin and in some cases receive federal funding only for certain activities that do not include protected area management. It is proposed that STEER be established as a marine park with a dedicated management body to enforce the laws, conduct scientific monitoring and habitat restoration and educate and engage stakeholders. One of the main obstacles to creating STEER is a lack of financial and human resources. The Sustainable Finance Plan uses business planning methodology, adapted for protected areas, to address these issues and lays the foundation for achieving financial sustainability. The plan identifies the operational and investment needs of STEER, the available resources if any and proposes a portfolio of financial mechanisms to fund these needs. The funding will have to come from a variety of sources including government, concessions and private donations as well as larger scale fund raising programs down the road. The cost will be significant but conservation of the STEER area is in the best interest of the residents, the private sector and the government as it contributes enormously to the tourism industry, which is the main economic activity of the island, and also provides ecosystem services that are extremely costly if not impossible to replace and that benefit the entire St. Thomas community.

MARKET ANALYSIS

Direct Use Benefits

According to the U.S. Virgin Islands 2004-2005 Visitor Exit Survey for Air Visitors and Cruise Visitors, "Tourism is the largest industry in the USVI and the major source of income and employment. The industry generates some $4 billion in total economic impact and accounts for 30% of the workforce. Direct gross expenditure by visitors was $1.5 billion." (Dorsett, 2005, p. xi). The average expenditure of a cruise visitor was $306 (Dorsett, 2005, pp. xi-xii). Much of the tourism activity in St. Thomas occurs in the East End. The beautiful setting is a major draw for sailors and other tourists who go snorkeling, diving, kayaking, or who stay in the hotels along the coastline.

About 24% of all air visitors chose to stay in a hotel operating adjacent to the Reserves (Dorsett, 2005, p. 32). Christmas Cove, one of the most popular sailing spots, is also a popular spot for local residents, boaters from the BVI's and Puerto Rico and other tourists. Observational data compiled from people who live and work in STEER estimate that about 20 boats per day anchor at Christmas Cove during the high season (Nemeth and Kadison, 2008) and three to four charter boats use the area with an average of 45 people per day. The VI Eco Tours operates within the Cas Cay Mangrove Lagoon Sanctuary and

has about 10,000 visitors per year mostly from cruise ships but also including 1,000 students. The yacht clubs and other private mooring areas that operate within STEER boundaries generate revenue for the government in the form of mooring permit fees and boat registration fees as well as in membership dues that support the clubs. The various private moorings, which total 150 within STEER, and the dock slips provide revenue for the DEE as do the boat permits for CZM. This information however is not digitized and neither the DEE nor CZM were able to provide the figures.

Indirect Use Benefit

Coral reefs, mangroves, seagrass beds, and salt ponds provide important habitat for marine and terrestrial wildlife but they also provide important ecosystem services that keep the waters clean and clear, protect the coastline against erosion and waves, and offer nursery grounds for fish and other marine life to develop. It is these outcomes that the tourism and fishing industries depend on. The following section outlines the estimates of their economic value in the form of the subsequent tourism and fishing revenue they support, as well as their other functions.

Estimates of the economic value of coral reefs range from $100,000 to $600,000 per sq km and between $200,000 to $900,000 per sq. km for mangroves. (Wells, 2006, p. 5). This range depends on how close the reefs and mangroves are to developed centers of tourism, fishing etc. The value of seagrass beds are estimated at $350,000 per sq. km (Loney, 2009). Data on sq. km area for STEER are limited to coral reef/colonized hard bottom and seagrass beds. **Using these estimates of coral reef and seagrass cover, the lower bound (partial) value of STEER totals $3.4 million per year.** The valuation techniques are based on many assumptions and do not include other values that are very hard to quantify such as the aesthetic value of the ocean to residents, the potential pharmaceutical values of coral reefs, the value of biodiversity, and the replacement costs of the ecosystem services. What is known is that the value of the marine resources within STEER is immensely important to the tourism industry in St. Thomas due to the ecosystem services they provide free of charge. It is in the USVI's interest to invest in STEER so that these resources are better protected today so that future generations will be able to enjoy and benefit from them.

FINANCIAL ANALYSIS

Historical Expenditure and Funding

STEER has had some scientific monitoring and other conservation activities within its boundaries by the DFW, DEP, UVI and other groups but it has never had a management agency of its own. It is difficult to track historical expenditure as many of the programs implemented by DFW or DEP were part of larger island wide or territory wide programs where the expenditure within STEER was not tracked. DFW staff estimated that $100,000 has been spent on STEER within their department over the last 10 years, and up to $233,000 in current grant spending is going toward STEER projects.

Once STEER is set up with a managing body, it is recommended that it have its own financial system, with its own line item in the USVI government rather than having it be part of CZM's financial accounts. It is also recommended that STEER track the funding received, any revenue generated and expenditure in annual budgets. These budgets should be structured using the activity based accounting system which is an accounting method used to determine expenditure by specific activities or program areas rather than along more traditional budgeting structures. This provides a view into how money is spent in the various functions of the management agency. It includes staff and operating expenses (recurrent) as well as investment expenditure organized by functional area. Please refer to Annex I, Table I in the full Sustainable Finance Plan to better understand the various functional areas. (Appendix F)

Financial Needs Analysis

It is assumed that the Divisions of DPNR that have been working in the area will continue to do so and their budgets will remain the same so any funding needs for STEER will be in addition and separate from that work. The following presents the needs of STEER described by various stakeholder interviews. The needs analysis uses the Activity Based Accounting method and determines the operational needs at a critical and optimal level. Mission critical can be defined as the level of operations and the amount of resources that are necessary to meet the most important of the park's goals and objectives. Mission optimal is defined as the level of operations and the amount of resources that are necessary to fully meet the goals and objectives of the park's program areas.

STEER needs a management entity and an operational structure. This requires the hiring of staff, office space and many other investments to get the park up and running. The following chart provides the recurring needs of the system at the critical and optimal level. The needs are greatest in the resource management and protection category and the management and administration category. The former category includes activities related to patrol and enforcement, scientific monitoring and research, as well as wildlife management and habitat restoration. **The total needs for the park total $808,000 at a critical level and $976,000 at an optimal level.** This includes 7.5 full time staff at the critical level made up of a marine park director, a marine biologist, an education and outreach coordinator, an administrative assistant, two and a half interpretive ranger positions and a full time DEE officer. The figure increases to 9 full time staff at the optimal level by increasing interpretive rangers from 2.5 to 4.

If investments are included the figures increase to $1.8 million and $2.5 million respectively. Included in investments are several large baseline studies that will help in monitoring the natural resources and conservation efforts of STEER. The Financial Summary Table is in Annex I, Table II found in the full Sustainable Finance Plan in Appendix F. For the list of investments please refer to Annex I, Table III.

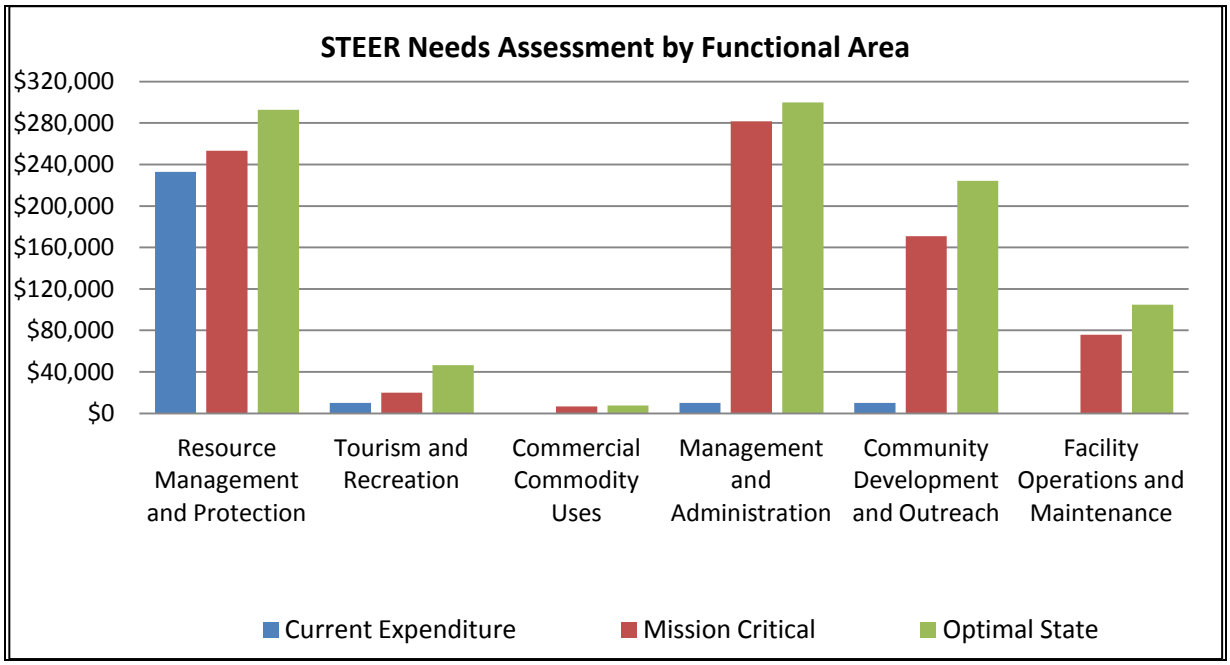

Figure 8: STEER Needs Assessment by Functional Area

The financial needs analysis can be projected forward ten years based on an estimate of the recurrent costs adjusted for inflation and based on an estimate of when the investments will be implemented. In ten years, STEER will need $1.1 million at a critical level and $1.3 million at an optimal level, however the first three years when the major infrastructural and research investments will need to be made will require much more. Year 1 requires $1.7 million (critical) and $2.3 million (optimal).

FINANCIAL STRATEGY

STEER has many basic needs and will require a diverse source of revenue to meet its conservation goals. In developing a sustainable financial strategy one of the first areas to examine is the feasibility of potential financial mechanisms. The feasibility of any potential source of funding is evaluated by examining how difficult it would be to implement, the certainty or volatility of the revenue stream and the potential revenue generation. The cost recovery must not exceed the total revenue generated. Any financial mechanism must also comply with the goals and objectives of the Park. In analyzing the financial mechanisms in the context of STEER, ten were identified as having potential. They were then rated by the above criteria. The following table presents the results.

Table 9. Financial Strategy Ranking for STEER

Financial Mechanism	Potential for revenue generation	Certainty of revenue stream	Complexity of implementation	Overall Value
Rating (1 is low, 2 is medium, 3 is high)	*1, 2, 3*	*1, 2, 3*	*-1, -2, -3*	
Fines	1	2	-1	2
Government Contribution	3	3	-2	**4**
Membership Dues	2	2	-1	**3**
Park User Fees	2	2	-2	2
PA Trust	3	3	-2	**4**
Payments for Environmental Services	1	1	-3	-1
Environmental Entrance Fee	3	2	-3	2
Concession fees, Permits and Licenses	1	3	-1	**3**
Private donations	2	2	-1	**3**
Special Commercial Uses	1	2	-1	2

Feasibility Analysis and Potential Revenue Projections

The most potential financial mechanisms were determined through research as well as a stakeholder review. Federal Funding, PA Trust, Concession Fees, Permits and Licenses, Membership Dues and Private Donations to a fiduciary body such as Friends of STEER were seen to be the most feasible by stakeholders and an Environmental Entrance Fee was determined to have high revenue generation potential. The establishment of a protected area trust was seen as an important tool to mitigate volatility in revenue generation and act as a pass through for all revenue generated by the marine park ensuring that this revenue is re-invested into conservation activities**. Revenue projections for the most feasible financial mechanisms total $645,000 per year and $4.6 million per year for future, more complex financial mechanisms. The former does not cover the critical recurrent needs of $808,000 nor the investment costs.** Therefore, the local government will also have to contribute and other potentially more difficult financial mechanisms will have to be implemented. The following table summarizes the potential revenue projections and compares the projections to the critical and optimal funding gap.

Table 10. Potential Revenue, Critical and Optimal Funding for STEER

Funding Mechanisms	Fee $	No. of people	Total
Membership Dues	20	5,000	100,000
Private Donations	1000, 10000	50, 10	150,000
Fines	1000	5	5000
Permits for research, photography, filming, special events	250	10	2,500
Concessions: Tours, Vending	300	5	1,500
Concessions: Hotels, Condo Complexes, Rentals Co's	1,200	30	36,000
Federal Funding	25	500	350,000
Total			**645,000**
Future Potential Funding Mechanisms for a PAS			
Cruise Ship Environmental Fee	1	1,918,000	1,918,000
Air Tourism Environmental Fee	5	511,000	2,555,000
Protected Area Trust			150,000
Total			**4,623,000**
Critical Gap of STEER including investments			**1,772,000**
Optimal Gap of STEER including investments			**2,513,000**

3.2 Management Structure and Implementation:

Establishment of a Park, Board, Capacity and Staffing

Based on input and suggestions from stakeholders, one of the best means to get started on building a management structure for STEER in the near-term is to develop a Friends of STEER voluntary, non-governmental group which is organized with a board that functions based on performance standards. This group would start by writing proposals for grants to set up a funding mechanism, and develop the protected area trust for long-term financing. A head tax from visitors could be used to seed the PA Trust.

Suggested staff for STEER:

1) Coordinator:
    a. Overall coordinator for the Territory's Parks (STXEEMP, STEER)
    b. OR: Coordinator for STEER
2) Rangers/surveillance staff:
    a. IDEAL: up to 4 ($200,000)
        - Need to get enforcement training (CZM staff- can issue cease and desist orders)
    b. can build dedicated FTE into grants for DEE, then officers work with Rangers
        - (STXEEMP did fund 2 ½ time officers- didn't work)
3) Education and Outreach:
    a. Eventually have a Full Time Employee (FTE) on this
    b. Build 20% into the St. Thomas CZM education and outreach coordinator position? Could possibly coordinate with VINE to make STEER outreach a special project of theirs until FTE is hired
4) Marine Biologist
    a. Eventually have a FTE on this
5) Bayhosts

CHALLENGES TO IMPLEMENTATION

One of the main challenges to implementation of a sustainable finance plan for STEER is the negative view local stakeholders have of governmental management and their reticence to pay fees. The negative view is affirmed in studies such as the "History of Protected Area Initiatives in the U.S. Virgin Islands" (Towle, 2003) that outlines the difficulties the USVI has had in implementing effective protected area systems and the NOAA review of the Coastal Zone Management Program (Office of Ocean and Coastal Resource Management, 2009), which highlights staffing and project implementation issues. Hiring staff has been a major challenge for the STXEEMP in the past. The process is long and laborious and many qualified applicants cannot wait such a long time to be hired. The same may happen for STEER. If a semi-autonomous body were created, perhaps they could implement a different hiring procedure that improves upon the government hiring process. In addition, applicants for the Interpretive Ranger positions are supposed to be fishermen and other users of the area but

often times they do not have the academic qualifications. More training needs to be available for fishermen to be able to qualify for conservation type jobs.

The Wildlife Sanctuaries and Marine Reserves in the East End are currently more like "paper parks" with very little conservation and protection. It will likely take quite a number of years for STEER to be a well-functioning and effective protected area, especially if hiring issues are not resolved. This may discourage stakeholders from paying fees or donating money in that they may not "see" any tangible benefits from the establishment of STEER and its managing entity. Already local residents, especially business owners, feel that they already pay too much in fees to the government. Marine users feel they are unfairly targeted for revenue generation in parks despite the fact that they are not the main polluters but rather protectors of the marine environment. The load should be shared by marine and terrestrial users and by those having the greatest impact on the marine resources. Before implementing any fees, STEER and CZM will have to have significant stakeholder participation in the development of the fee system. The establishment of a semi-autonomous body to manage STEER, with a financial system set up to ensure that money raised for the park goes towards conservation efforts, would help in raising support.

The establishment of a semi-autonomous body to manage all territory wide protected areas under local government control could streamline conservation efforts but new legislation would have to be passed to create the agency as well as to create a PA Trust for marine as well as terrestrial protected areas. This could be a long process, especially if there is resistance from local government bodies. In addition, a semi-autonomous body would have to generate its own revenue and this too would require strong government support and cooperation as well as support from local residents. It would also require an investment of time and resources to get the financial mechanisms implemented. This means that conservation efforts and protected area initiatives would have to be priorities for the government, which is challenging even in the best of times when governments have competing interests such as education and economic development.

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APPENDICES

See accompanying document:

STEER (2011) *St. Thomas East End Reserves Management Plan: Appendices*. St. Thomas, USVI