

St. Thomas East End Reserves (STEER) Management Plan

A comprehensive review and update of the 2011 STEER Management Plan

US Virgin Islands, 2023



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Table of Contents

| | |
|--|----|
| Executive Summary | 1 |
| 1. Introduction | 4 |
| 1.1 Purpose and Scope | 4 |
| 1.2 Background of STEER Designation and the 2011 Management Plan | 6 |
| 1.3 Governance | 8 |
| 1.4 VI Rules and Regulations of STEER | 9 |
| 1.5 Zoning | 10 |
| 1.6 Right outside of STEER: Upland and Shoreline Impacts | 12 |
| 1.7 Coastal and Social Vulnerability in STEER | 14 |
| 1.8 STEER Uses | 16 |
| 2. Update Process and Outcomes | 19 |
| 2.1 Plan Development Process | 19 |
| 2.2 Vision | 20 |
| 2.3 Mission | 20 |
| 2.4 Goals | 20 |
| 2.5 Target Resources for Conservation | 21 |
| 2.6 Threats | 29 |
| 2.7 Objectives and Strategies | 31 |
| 3. References | 46 |

Figures

| | |
|--|-------|
| Figure 1. The three MRWS of STEER, Cas Cay/Mangrove Lagoon, St. James, and Compass Point Salt Pond | 1, 5 |
| Figure 2. Locations of designated use zones within STEER | 3, 12 |
| Figure 3. STEER location in St. Thomas, USVI | 4 |
| Figure 4. Natural resources of STEER | 6 |
| Figure 5. Areas of Particular Concern in STEER | 8 |
| Figure 6. Delineations and benthic habitats for watersheds draining into STEER | 13 |
| Figure 7. STEER Public Access Points | 14 |
| Figure 8. STEER mangrove vulnerability at 1ft and 2ft sea-level rise and potential areas for mangrove retreat.. | 15 |
| Figure 9. The Social Vulnerability Index of the STEER Watershed | 16 |
| Figure 10. Facilities adjacent to STEER | 18 |
| Figure 11. Conceptual diagram showing the ecosystem services provided by mangrove ecosystems of STEER . | 23 |
| Figure 12. Conceptual diagram showing the ecosystem services provided by seagrass ecosystems of STEER .. | 25 |
| Figure 13. The average coral and macroalgae cover in STEER from 2001 to 2021 (USVI TCRMP) | 28 |

Tables

| | |
|---|-------|
| Table 1. Permitted activities within designated STEER use zones | 3, 12 |
| Table 2. STEER Rules and Regulations | 10 |
| Table 3. Criteria-based ranking systems used to rank threats to STEER Target Resources | 30 |
| Table 4. STEER Threat Ranking Matrix | 31 |
| Table 5. STEER Objectives listed by major threat group (1-6) | 33 |
| Table 6. STEER Objectives and Strategies | 36 |

Appendices

| | |
|--|--|
| APPENDIX A: VI Rules and Regulations that Relate to STEER | |
| APPENDIX B: VI Code that relates to STEER | |
| APPENDIX C: STEER Boundary Coordinates | |
| APPENDIX D: STEER Research | |
| APPENDIX E: 2021-2022 STEER Management Plan Workshop Series Attendees Master List | |
| APPENDIX F: 2021 Public Use Survey | |
| APPENDIX G: Territorial Coral Reef Monitoring Program (TCRMP) STEER Data | |
| APPENDIX H: Mangrove Lagoon Change Over Time Photos | |

List of Acronyms

- **APC:** Area of Particular Concern
- **BMPs:** Best Management Practices
- **CAP (process):** Conservation Action Planning
- **CRCP:** Coral Reef Conservation Program
- **CZM:** Coastal Zone Management
- **DBP:** Division of Building Permits
- **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
- **EPA:** Environmental Protection Agency
- **FOCC:** Friends of Christmas Cove
- **GIS:** Geographic Information System
- **IUCN:** International Union for Conservation of Nature
- **LiDAR:** Light Detection and Ranging
- **MLBB:** Mangrove Lagoon Benner Bay
- **MMES:** Master of Marine and Environmental Science
- **MPAs:** Marine Protected Areas
- **MRWS:** Marine Reserves and Wildlife Sanctuaries
- **MSA:** Marine Protection, Research, and Sanctuaries Act of 1972
- **NOAA:** National Oceanic and Atmospheric Administration
- **NPS:** Non-point source pollution
- **STEER:** St. Thomas East End Reserves
- **STXEEMP:** St. Croix East End Marine Park
- **TRCMP:** Territorial Coral Reef Monitoring Program
- **TNC:** The Nature Conservancy
- **USGS:** U.S. Geological Survey
- **USVI:** U.S. Virgin Islands
- **UVI:** University of the Virgin Islands
- **VIRR:** Virgin Islands Rules and Regulations
- **VIWMA:** Virgin Islands Waste Management Authority

Executive Summary

The 2023 St. Thomas East End Reserves (STEER) Management Plan serves as a 10-year evaluation of the 2011 Plan and provides an updated roadmap to effectively conserve the coastal, marine and cultural resources of STEER. Similar to the 2011 Plan, this updated management plan does not contain any new rules or regulations that do not already exist in Virgin Islands Rules and Regulations or Code.

STEER is comprised of three Marine Reserves and Wildlife Sanctuaries (MRWS): Cas Cay / Mangrove Lagoon, St. James, and Compass Point Salt Pond (Figure 1), and is designed to protect multiple co-dependent and co-located parts of the critical coastal and marine system that offers protection, provision, business, and recreation for Virgin Islanders. STEER encompasses 9.6 km² of socially and ecologically significant coastal, marine, and fisheries resources. These resources include mangrove forests, seagrass meadows, salt ponds, lagoons, reefs, and cays, and STEER is considered to be one of the most valuable fish nurseries for commercial and reef fish remaining on the island.

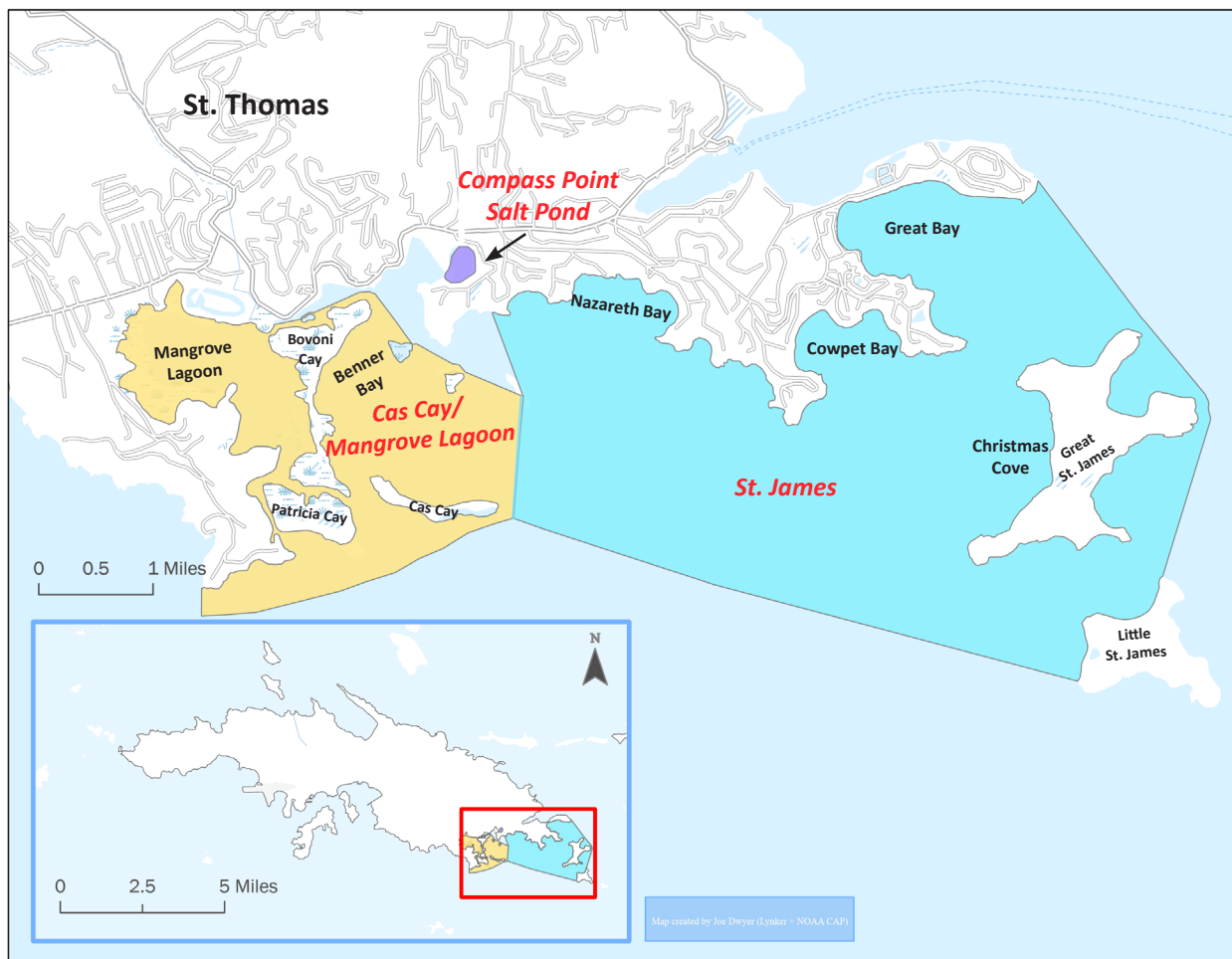


Figure 1. The three MRWS of STEER, Cas Cay/Mangrove Lagoon, St. James, and Compass Point Salt Pond.

VISION:

The STEER Management Plan is a document to outline and develop the resource management, community engagement, and promotion of the responsible and sustainable use of marine ecosystems in STEER for current and future generations.

MISSION:

To conserve the ecological, economic, and cultural assets within STEER for residents and visitors through resource protection and restoration efforts; improved governmental and partner stakeholder collaboration; community education and engagement; and the promotion of environmental stewardship and responsible use of coastal and marine resources.

GOALS:

1. Maintain and improve the conditions of essential coastal and marine habitats and resources in STEER.
2. Mitigate the negative impacts of watershed stressors on the STEER coastal and marine habitats.
3. Strengthen the commitment of DPNR, the STEER Management Council, and partner stakeholders to collaborate on STEER Management Activities.
4. Engage residents and visitors in the purpose and values of STEER through a variety of targeted communication strategies including volunteer and educational activities.
5. Invest in the long-term resilience and viability of STEER for its contribution to the St. Thomas coastal and marine economy without risking the loss of ecosystem services and cultural assets.

The **TARGET RESOURCES** within STEER that this management plan aims to protect, enhance, and restore are:

- Mangroves
- Native Seagrasses
- Compass Point Salt Pond
- Sea and Shorebirds
- Coral Reefs and Hard-bottom Benthic Communities
- Fish and Invertebrates
- Community Access and Sustainable Use

The **THREATS** to these target resources fall into six general threat themes:

- Watershed Stressors and Pollutants
- Trash and Debris (solid waste)
- Ecosystem Imbalance/Fast-Onset Change
- Use Issues
- Active Boat Damage
- Natural Hazards/Changes

STEER USE ZONES:

There are four designated use zones within STEER: General Use, Low-Impact Use, Preservation, and Emergency Anchor/Hurricane Mooring (Figure 2). These zones align with varying conservation goals and responsibilities to ensure preservation, and sustained use, of the natural resources within STEER. Restrictions on motorized watersports, anchoring, and transit depend on the designated zone uses. Picnicking and non-motorized watersports are allowed in all use zones, while camping, hunting, spearfishing, and harvesting of conch, whelk, and lobsters is prohibited in all use zones. Bait fishing and handline fishing is allowed in the General and Low-Impact zones with a permit from the Division of Environmental Enforcement, and scientific research is allowed in all use zones with a permit from the Division of Fish and Wildlife (Table 1).

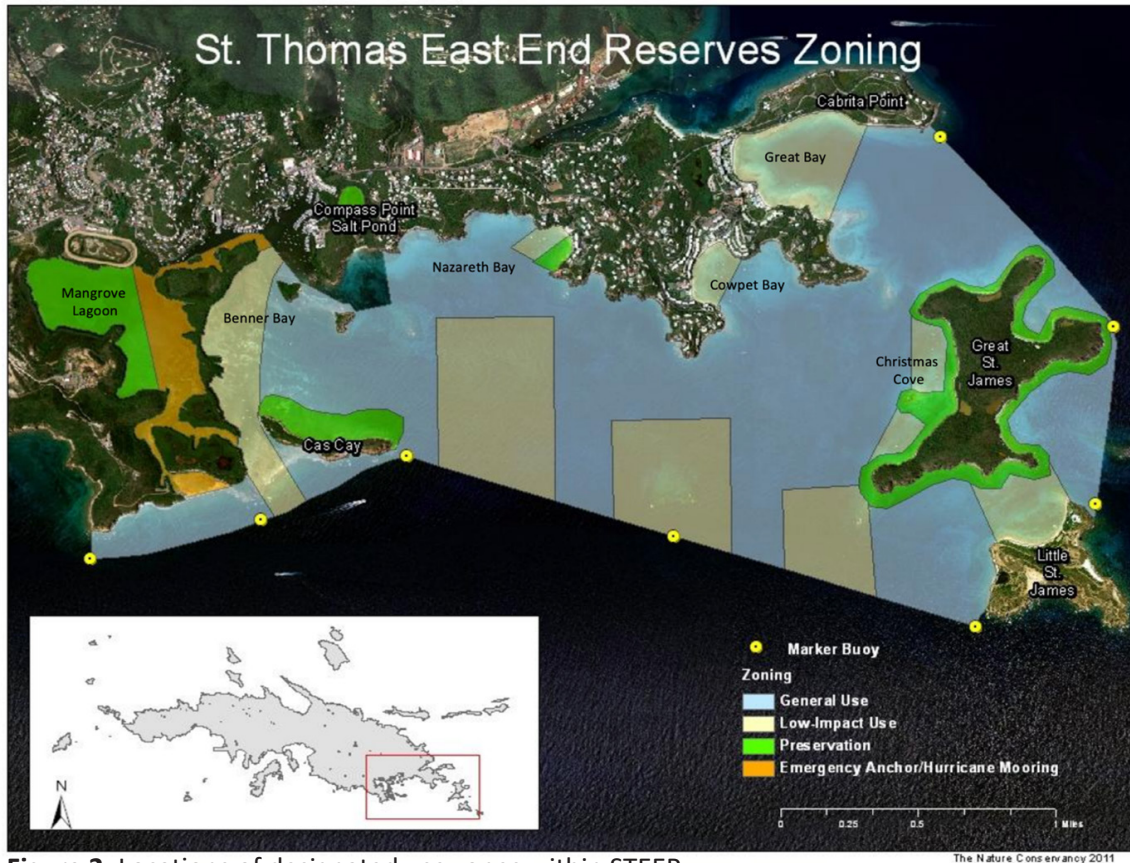


Figure 2. Locations of designated use zones within STEER.

Table 1. Permitted activities within designated STEER use zones

| 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: Seek guidance from DEE permit 2: Seek guidance from DFW permit

1. Introduction

1.1 Purpose and Scope

The St. Thomas East End Reserves, also referred to as STEER, comprises three Marine Reserves and Wildlife Sanctuaries (MRWS): Cas Cay / Mangrove Lagoon, St. James, and Compass Point Salt Pond. STEER is one of two Marine Protected Areas (MPAs) managed locally by the Government of the US Virgin Islands, the other being the St. Croix East End Marine Park (STXEEMP). As part of a larger, territory-wide Virgin Islands Marine Protected Area Network (VIMPAN), STEER (like STXEEMP) is designed to protect multiple co-dependent and co-located parts of the critical coastal and marine system that offers protection, provision, business, and recreation for Virgin Islanders. STEER contains one of the most valuable fish nurseries remaining on St. Thomas. Many species of fish and shellfish, including important commercial and sport fisheries resources like grouper, snapper, conch, and lobster, spend a portion of their life protected in the shallow mangroves and seagrass beds while feeding and growing before populating other marine habitats in the area.

STEER encompasses 9.6 km² of significant coastal, marine, and fisheries resources including mangrove forests, seagrass beds, salt ponds, lagoons, reefs, and cays. Located along the southeastern side of St. Thomas (Figure 3), STEER includes the Compass Point Salt Pond, a salt pond located near Benner Bay; the Cas Cay/ Mangrove Lagoon MRWS, which has Long Point as a western boundary, Nazareth as the eastern boundary and contains Patricia, Bovoni, Rotto and Cas Cays; and the St. James MRWS, which starts at the eastern boundary of the Cas Cay/ Mangrove Lagoon, extends to the northwestern shore of Little St. James encompassing Great St. James to the mean high tide watermark, and reaches Cabrita Point to the north (Figure 1). Within the boundaries 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 (Appendix B: STEER Boundary Coordinates).



Figure 3. STEER location in St. Thomas, USVI.

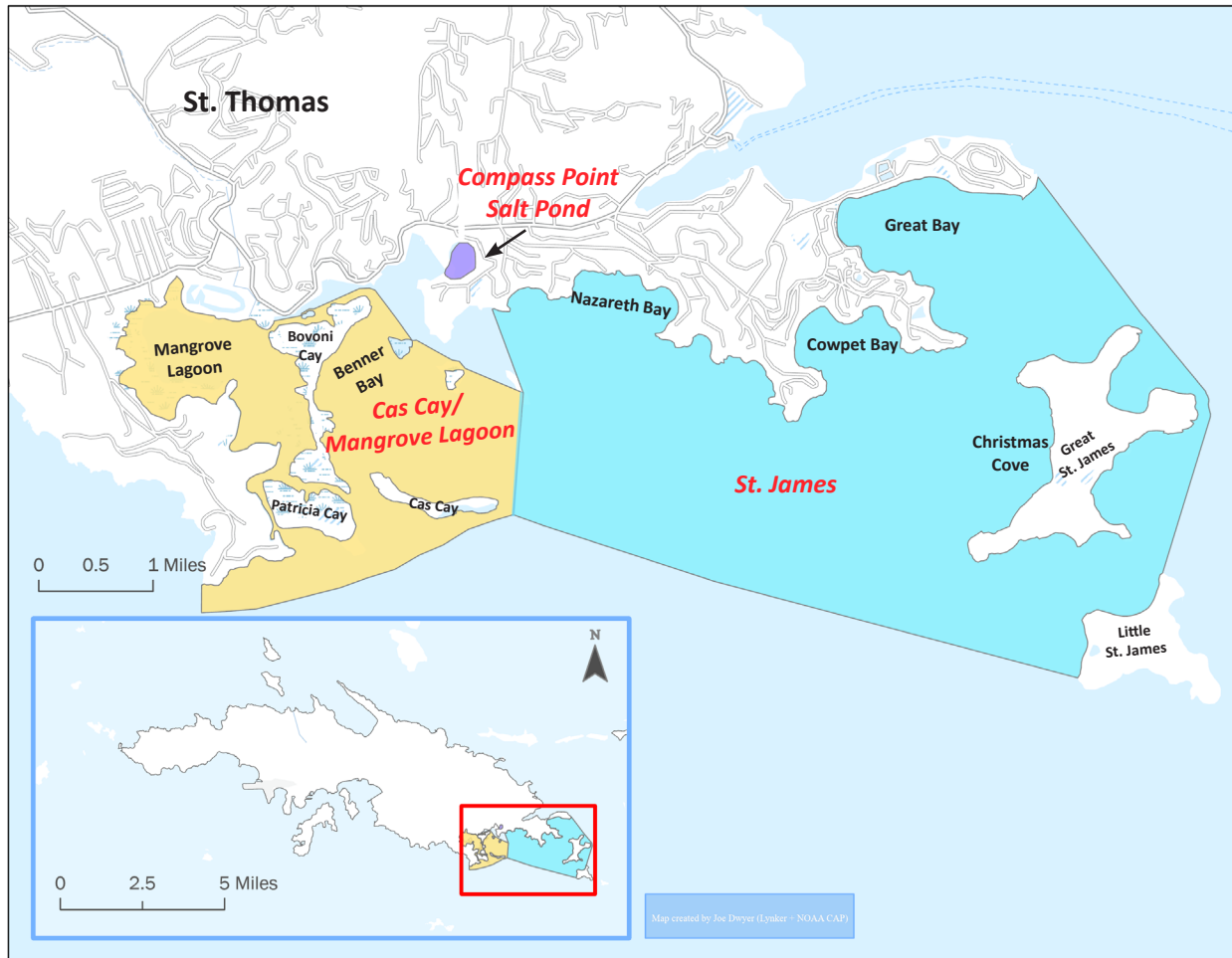


Figure 1. The three MRWS of STEER, Cas Cay/Mangrove Lagoon, St. James, and Compass Point Salt Pond.

Cas Cay/ Mangrove Lagoon:

Dedicated as an Area of Particular Concern (APC) in 1979, Cas Cay/Mangrove Lagoon was the first area in STEER to have established management. Cas Cay/Mangrove Lagoon is located on the western boundary of STEER and is home to most of STEER's mangroves, making this area an extremely valuable ecological asset to the MRWS (Figure 4).

St. James:

St. James is the largest of the three MRWS, taking up the majority of STEER. It has had established management since 1994. The St. James MRWS is the most trafficked part of STEER with recreational and commercial boaters frequenting its waters daily (Figure 4).

Compass Point Salt Pond:

Compass Point Salt Pond is located above the northern boundary of STEER right near Compass Point Marina. It is the smallest of the three MRSW and like St. James, has had established management since 1994. Often overlooked by passing visitors, this salt pond is home to many important ecological resources and wildlife (Figure 4).

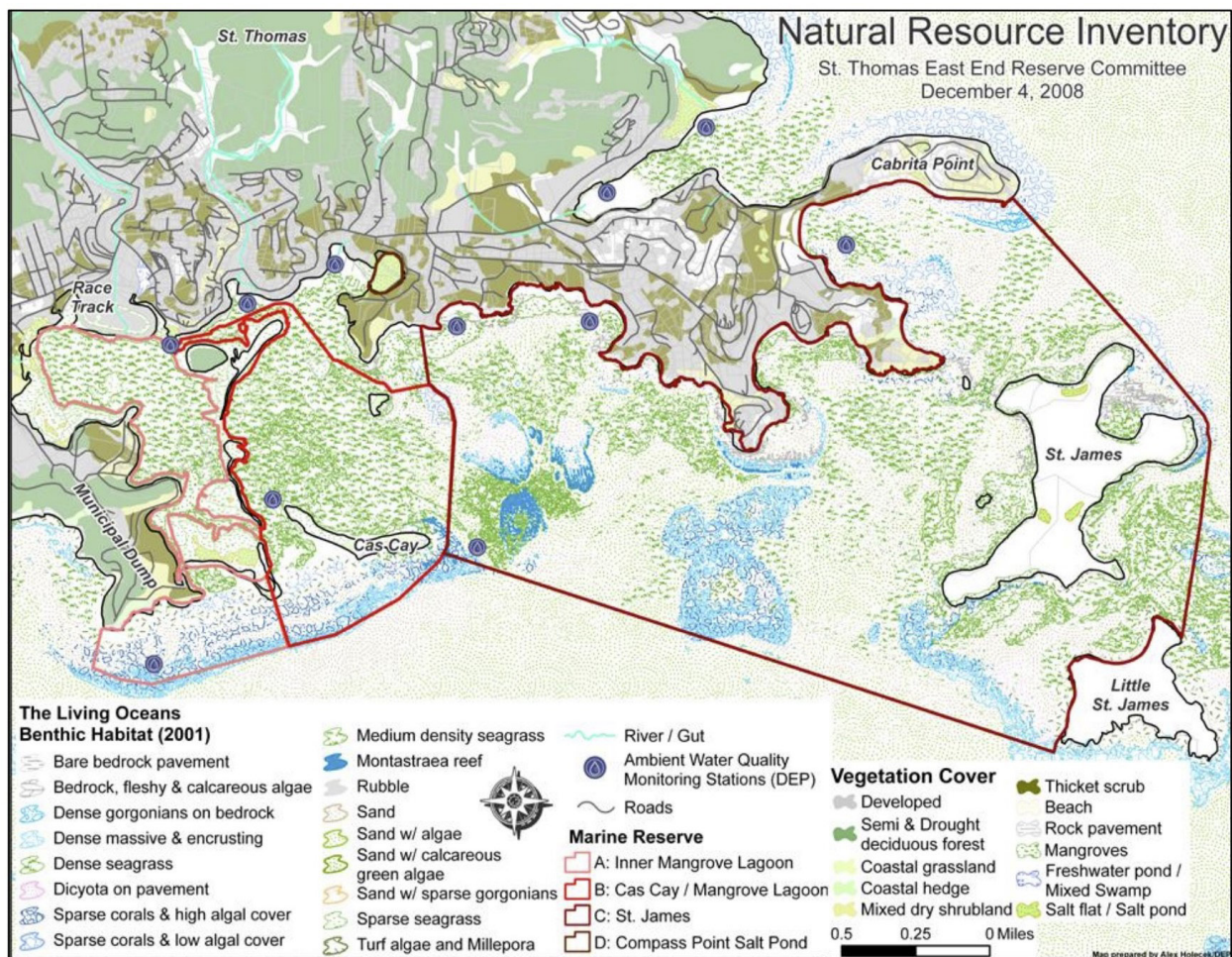


Figure 4. Natural resources of STEER.

As an update to the original 2011 STEER Management Plan, this 2023 Management Plan outlines the long-term vision, mission, and goals for STEER as well as the near-term (5-10 years) management objectives and strategies for the reserves. The Plan is part of an adaptive and iterative management process that aims to guide the sustainable use of the coastal and marine resources within STEER. It is designed to provide guidance in the near term but also to accommodate modifications based on periodic evaluations of management activities and results. This plan should be reviewed and revised with stakeholder input after a period of 5-10 years from the time of approval and commencement of management activities associated with this plan. The purpose of the review is to evaluate the impacts of the management strategies and to consider any emerging or lessening threats and stressors.



1.2 Background of STEER Designation and the 2011 Management Plan



In 1972, the Legislature of the Virgin Islands passed Act 3330 Commercial Fishing Promotion, to develop the commercial fishing industry, and recognized the significance of the marine habitat to the industry and to the livelihoods of the people of the Virgin Islands. As part of the Act, the Department of Conservation and Cultural Affairs (DCCA) which is now the Department of Planning and Natural Resources (DPNR) was mandated to establish 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”. The National Oceanic and Atmospheric Administration (NOAA) Sanctuaries Program Office was tasked with administering the program. Criteria for designation was 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.

In 1979 the area off southeast St. Thomas was identified as a top candidate for designation under the National Marine Sanctuary Program (Figure 5). Criteria used in selecting the area included:

- Ecological value of the area
- Value of the area to 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.

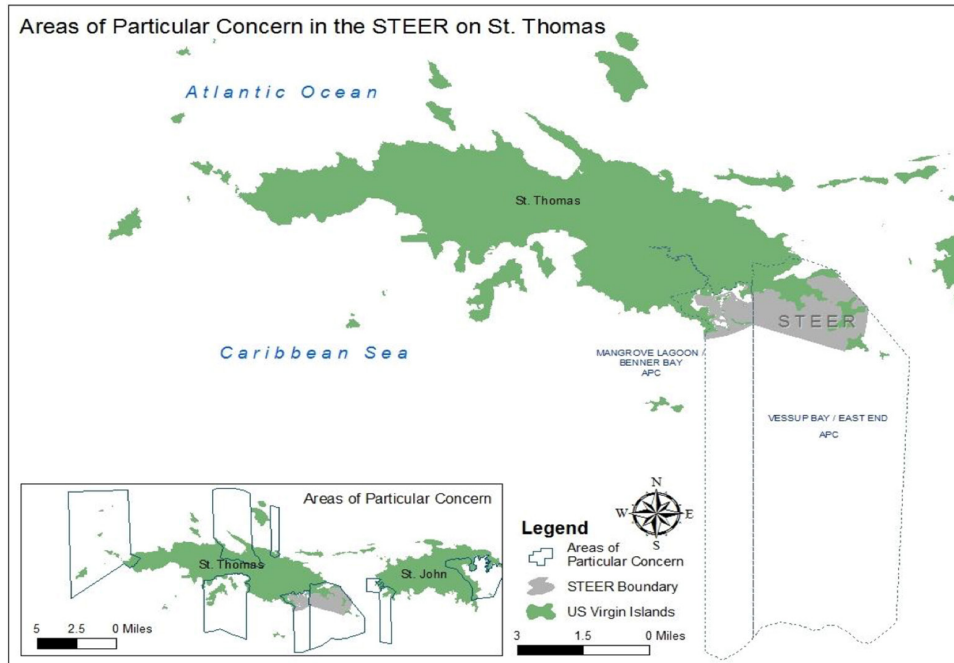


Figure 5. Areas of Particular Concern in STEER.

The Cas Cay/Mangrove Lagoon, St. James and Compass Point Pond Marine Reserves and Wildlife Sanctuaries were all established in 1994 as per The Virgin Islands Code, Title 12, Chapter 1, Subchapter VII, Section 97 which grants the Commissioner of the DPNR the authority to designate or establish marine and wildlife sanctuaries for the purposes of propagating, feeding and protecting birds, fish, and other wildlife. In 2002, Title 12, Chapter 1 of the Virgin Islands Code was amended to include the establishment of the STXEEMP, 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.

In 2008, DPNR 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 significant public outcry against the granting of a permit for such activity and the main concern was that the area was designated as a Marine Reserve and Wildlife Sanctuary. A review of the regulations concluded that a floating bar and restaurant is not specifically prohibited, but that such an activity could not be compatible with the goals outlined in the designation of the area as a reserve. This occasion made clear that a management plan for the area was lacking, and that developing one would create a vision that would help to prevent future applications of this type from occurring in the area. 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) convened to create a comprehensive management plan for 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 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 DEE.

The first STEER Management Plan was completed in 2011 and established the original roadmap to manage and conserve the coastal, marine, and cultural resources of the MRSW. The development of the 2011 Plan followed TNC's Conservation Action Planning (CAP) process which is based on the principles of adaptive management and designed to facilitate and utilize input from stakeholders. Through a series of planning meetings and workshops, the Core Planning Team and the Stakeholder Advisory Group developed goals, identified priority conservation resources, developed an understanding of human activities impacting the resources, and selected the objectives and strategies needed to improve or maintain the resources within STEER.

This 2023 Management Plan serves as the 10-year evaluation of the 2011 Plan, examining the progress made and challenges faced over the years. This update also allows for the identification of new threats and opportunities for improved management of STEER. The update process began in 2020 with an in-depth review and evaluation of the 2011 Plan, workshops and stakeholder meetings throughout 2021 and 2022 and the re-organization of a STEER Advisory Council in 2022 and 2023 to assist in management guidance and activities. The updated Management Plan was completed in January 2023.



1.3 Governance

STEER governance is complicated. It is a small, multi-use area that lacks clear, comprehensive management and oversight; rather, it is subdivided into distinct MRWS areas each subject to different regulations that govern access and activities, which are monitored and/or enforced by different components of DPNR.

STEER is a co-managed MPA that relies on multiple Divisions within DPNR as well as other government partners to help uphold the VI Code relevant to STEER as well as to achieve protected area management goals and objectives. DPNR Divisions involved in STEER include CZM who is responsible for the management of STEER natural resources, Division of Fish and Wild (DFW) who is responsible for monitoring and assessing fish and wildlife resources in STEER, Division of Environmental Protection (DEP) who is responsible for the preservation and quality of air and water resources, and DEE who is responsible for the enforcement of STEER Rules and Regulations. Local institutional partners include the Department of Public Works (DPW), UVI, and the Virgin Island Waste Management Authority (VIWMA).

1.4 VI Rules and Regulations of STEER

The rules and regulations about STEER relate to access and what activities are permitted and not permitted within the boundaries of each reserve. A summary of the Virgin Islands Rules and Regulations applicable to STEER is outlined below in Table 2. The complete rules and regulations that apply to STEER are included in “Appendix A: VI Rules and Regulations that relate to STEER.”

Table 2. STEER Rules and Regulations.

| CAS CAY/MANGROVE LAGOON | |
|--|--|
| Title 12 V.I. R. & Regs. § 94-(b)-2 | It is unlawful for any person to land on or create any disturbance near Cas Cay unless that 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. |
| Title 12 V.I. R. & Regs. § 96-2 | <p>Except under permit or specific authorization from the Commissioner, it is unlawful to:</p> <ul style="list-style-type: none"> • Take or possess any bird, fish, or other wildlife (including any living organism) or part thereof • 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 • Anchor beyond 7 days • Anchor boats without functioning sewage holding tanks • Use any internal combustion engines vessels within Mangrove Lagoon • 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 |
| Title 12 V.I. R. & Regs. § 96-5 | Provided a permit is first obtained from the Commissioner: The use of castnet with a minimum square mesh size of 1/4 inch to capture baitfish (fry) within 50 feet of the north and west shorelines of Cas Cay only |
| ST. JAMES | |
| Title 12 V.I. R. & Regs. § 96-3 | Except under a permit or specific authorization of the Commissioner, it is unlawful to remove any marine or other wildlife. |
| Title 12 V.I. R. & Regs. § 96-4 | <p>Provided a Permit is First Obtained from the Commissioner:</p> <ul style="list-style-type: none"> • Scientific research project-related collection with an approved protocol. • The use of a castnet with a minimum square mesh size of one-quarter (1/4) inch to capture baitfish (“fry”) within fifty (50) feet of the shoreline, except for Cow and Calf rocks. • Fishing with hook and line. |
| COMPASS POINT SALT POND | |
| Title 12 V.I. R. & Regs. § 96-1 | <p>Except under a permit or specific authorization of the Commissioner, it is unlawful to:</p> <ul style="list-style-type: none"> • Use or possess any firearm, air rifle, bow and arrow, or any trap or other contrivance designed to be, or capable of being, used to take birds, fish or other wildlife, or to discharge any firearm or release any arrow into or within the marine reserve and wildlife sanctuary; • bring livestock, dogs, motor vehicles or to play loud electronic music in the marine reserve and wildlife sanctuary: • disturb or take any plant or animal within the marine reserve and wildlife sanctuary. • store, repair, maintain, or construct any vehicle or vessels within the marine reserve and wildlife sanctuary. |

1.5 Zoning

STEER Zoning was determined in 2011 using an inventory of the natural resources within the Reserves and stakeholder input. Channels are marked for boating traffic to assist with safety and slow speed regulations, and additional signage can be found throughout the boundaries of STEER to help users understand which activities are permitted within all areas of the reserve.



The Zones include:

- **General Use Zone:** This area is for recreational and transit uses. Anchoring and extraction of resources are prohibited. Catch and release fishing is allowed with proof of permit.
- **Low-Impact Use Zone:** This area allows for many activities. Anchoring for a maximum of seven [7] days is allowed with a permit from DEE. Extraction of resources and tying boat lines to mangroves ('tying off') is prohibited. Catch and release fishing is allowed with proof of permit.
- **Preservation Zone:** This area is designated for ecological sensitivity compatible with non-motorized craft and passive recreational activities. Motorized watercraft, extraction of any resource (no fishing!), and anchoring is prohibited.
- **Emergency Anchor Zone:** This area is where temporary anchorage is allowed no earlier than 96 hours prior to the projected landfall of a tropical storm or hurricane as this zone is for Preservation otherwise.

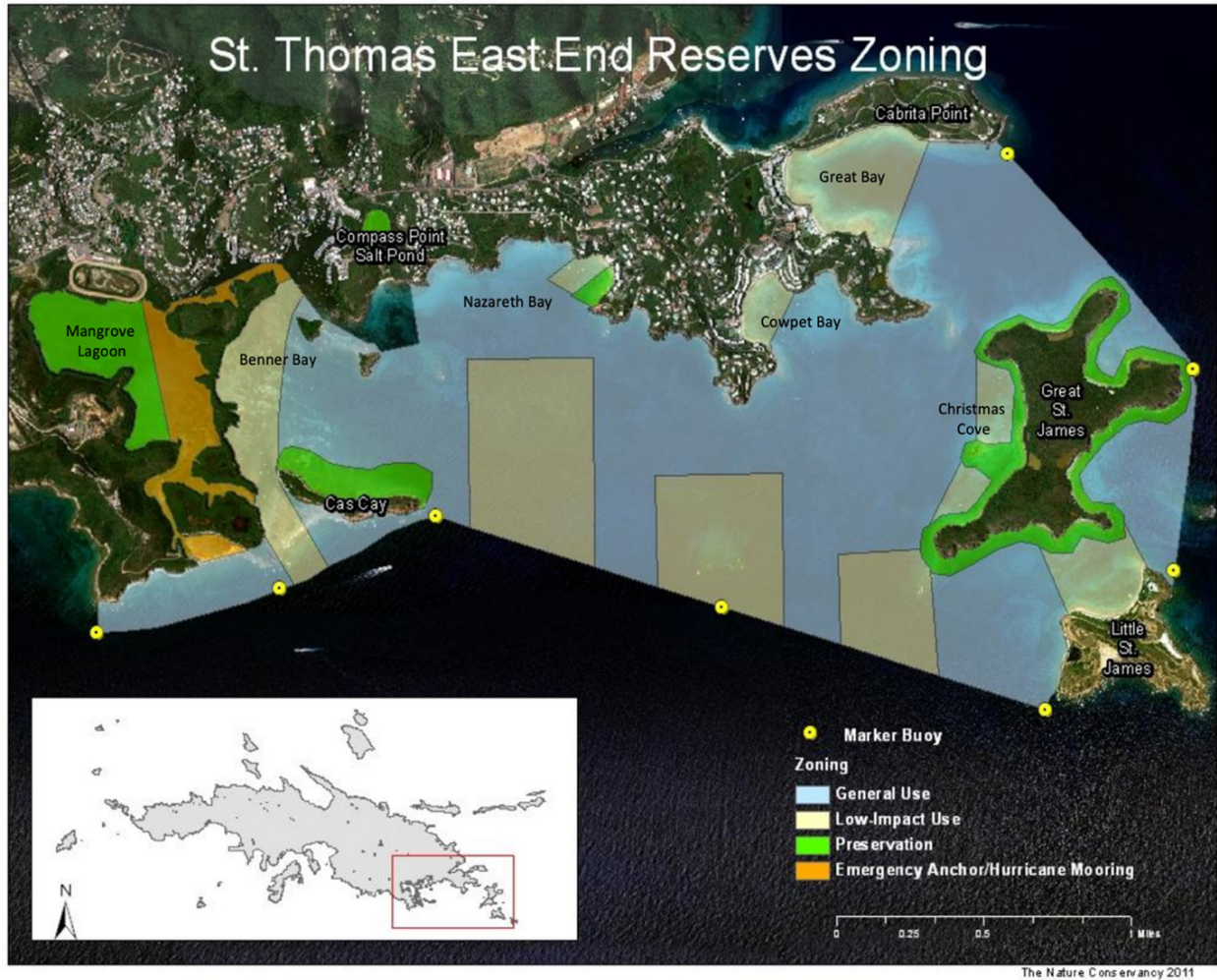


Figure 2. Locations of designated use zones within STEER.

Table 1. Permitted activities within designated STEER use zones.

| 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: Seek guidance from DEE permit 2: Seek guidance from DFW permit

1.6 Right outside of STEER: Upland and Shoreline Impacts

The STEER watershed is 6.2 sq miles of upland area that is arguably one of the most heavily impacted watersheds in the USVI. This watershed includes the entirety of the Jersey Bay watershed (the largest watershed on St Thomas) and a portion of Red Hook Bay Watershed—extending eastward from Bovoni to Cabrita Pt., and northward to the ridgeline above Anna’s Retreat and New Tutu Valley (STEER Watershed Mgmt Plan, 2013) (Figure 6). In 2013, a St. Thomas East End Reserves Watershed Management Plan was created to provide watershed improvement and restoration recommendations to help mitigate some of the negative impacts coming from activities and land uses surrounding STEER. The 2013 STEER Watershed Management Plan is referenced throughout this management plan.

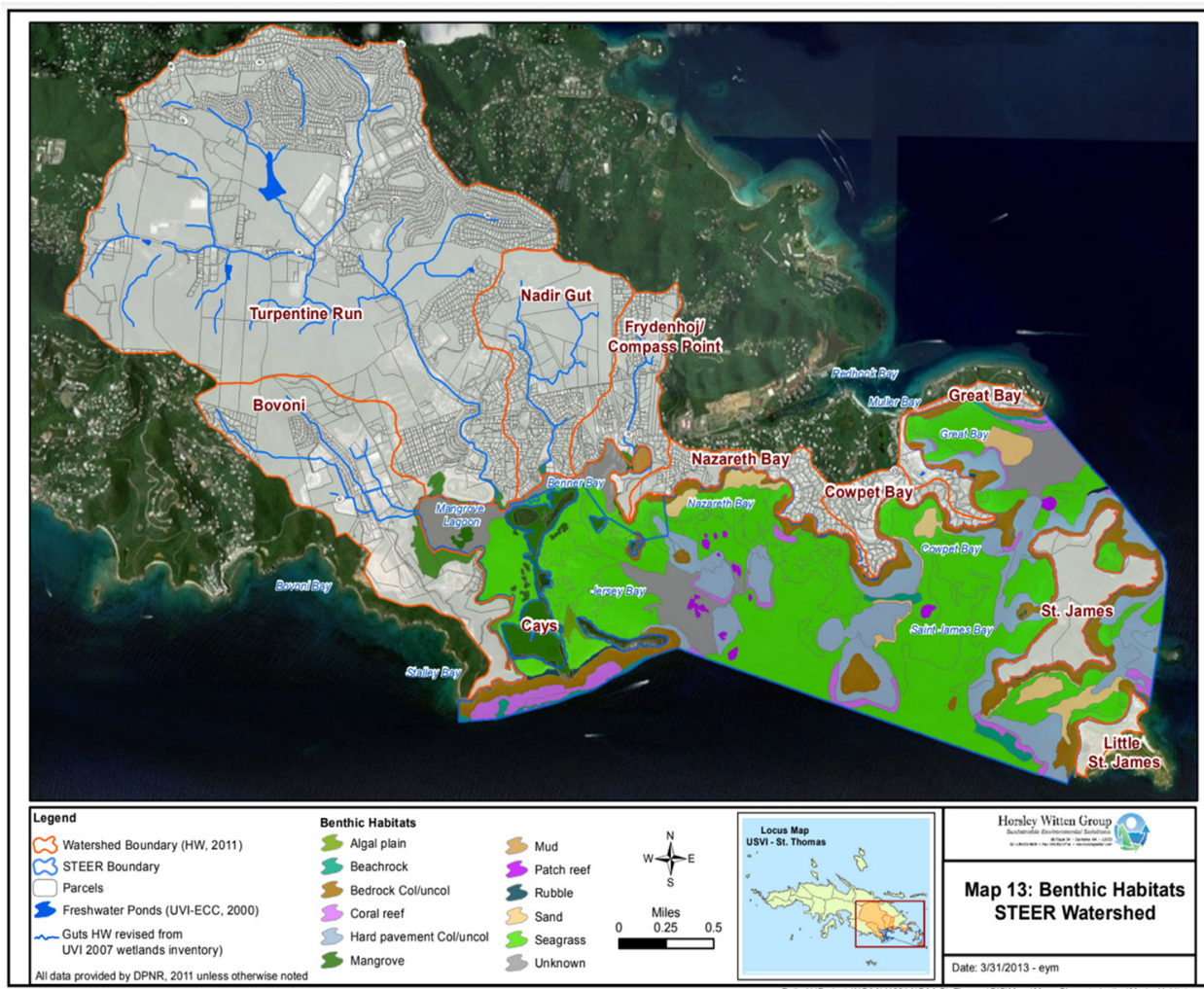


Figure 6. Delineations and benthic habitats for watersheds draining into STEER.

There are six hotels/resorts/condominium associations along the MRWS boundary with reverse osmosis plants, a wastewater treatment plant, fueling facilities, backup 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 Racetrack, bordering the northern portion of the Mangrove Lagoon. There is also an unlined municipal dump, the Bovoni Landfill, which serves both St. John and St. Thomas and borders the western end of STEER.

Photo by: Heather Stewart



Boaters and anglers can access STEER by way of nine marinas and boatyards that lie along the southern shore of St. Thomas. This “Marina Row” was excluded from the physical boundary of the MRWSs; however, due to their proximity and access to the Marine Reserves waters, their practices are critical to the condition of STEER resources and the effectiveness of STEER management. Public boat ramps are located in Benner Bay adjacent to Eco Tours and in Cowpet Bay.

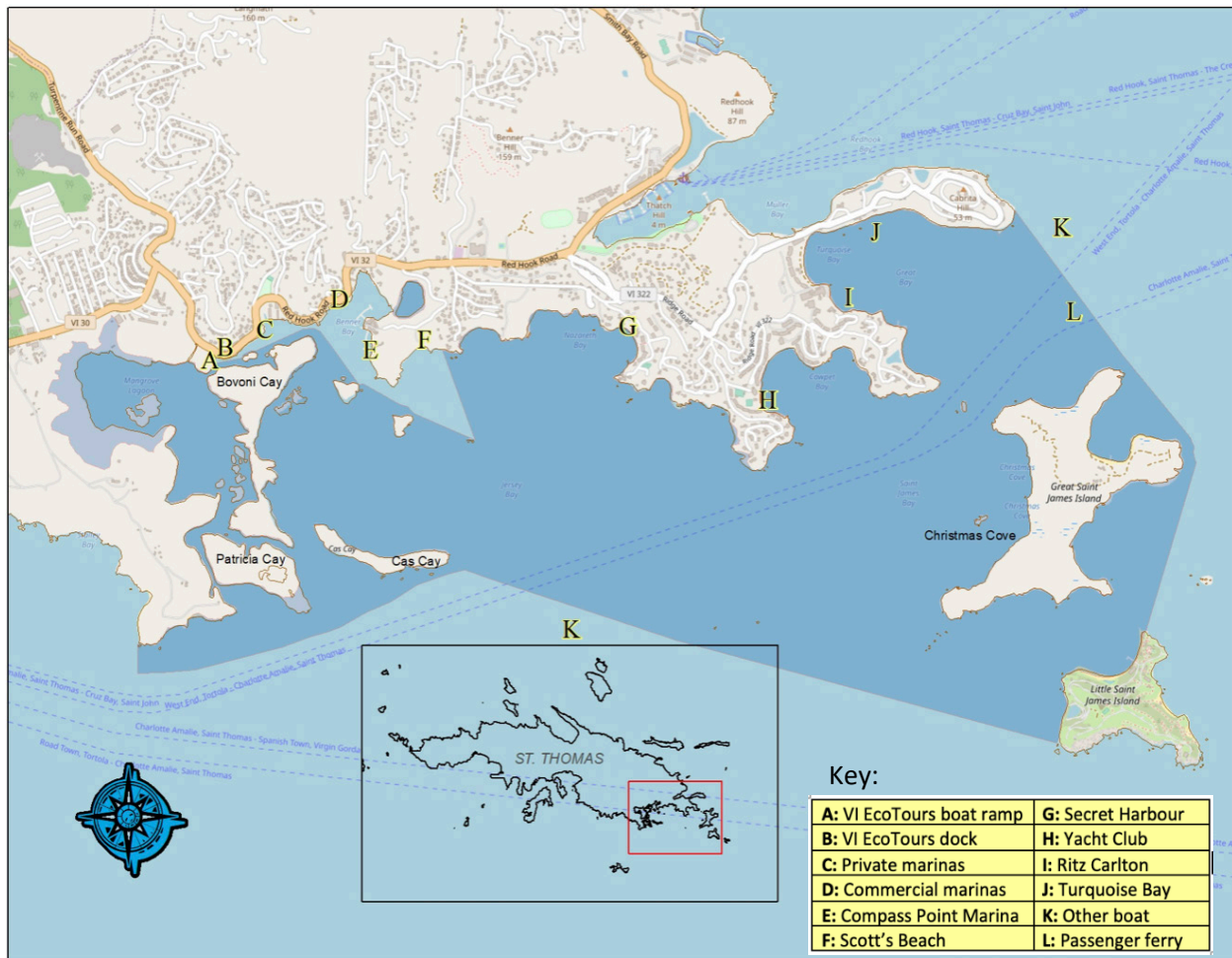


Figure 7. STEER Public Access Points.

1.7 Coastal and Social Vulnerability in STEER

In 2023, with assistance from the University of the Virgin Islands, the vulnerability of the STEER's coastlines and coastal communities were included in two territory-wide studies, the *U.S. Virgin Islands Coastal Vulnerability Index* and the *U.S. Virgin Islands Social Vulnerability Index*, respectively.

Coastal vulnerability is a concept that identifies areas (habitat and infrastructure) that are susceptible to disturbances and damage resulting from coastal hazards such as storm surge, sea-level rise, waves and swells, as well as the characterization of the area, including geomorphology and proximity of development. Using criteria developed by the United States Geological Survey (USGS) the vulnerability of STEER's coastal and shoreline areas to these hazards was calculated. This composite index found that most of the land-water interface of the STEER area is highly vulnerable, particularly to sea-level rise (Figure 8). Over time, the shoreline would attempt to retreat landward as these hazards cause impacts like erosion and flooding. However, currently there are very few undeveloped areas available for this shoreline retreat to occur because of the proximity of infrastructure like the racetrack, landfill, marinas, roads, and other development to the existing waterline. Development near the shore presents obstacles to the capacity for landward migration of the shoreline, and in this case could lead to a significant loss of mangroves and wetland habitats within the STEER.

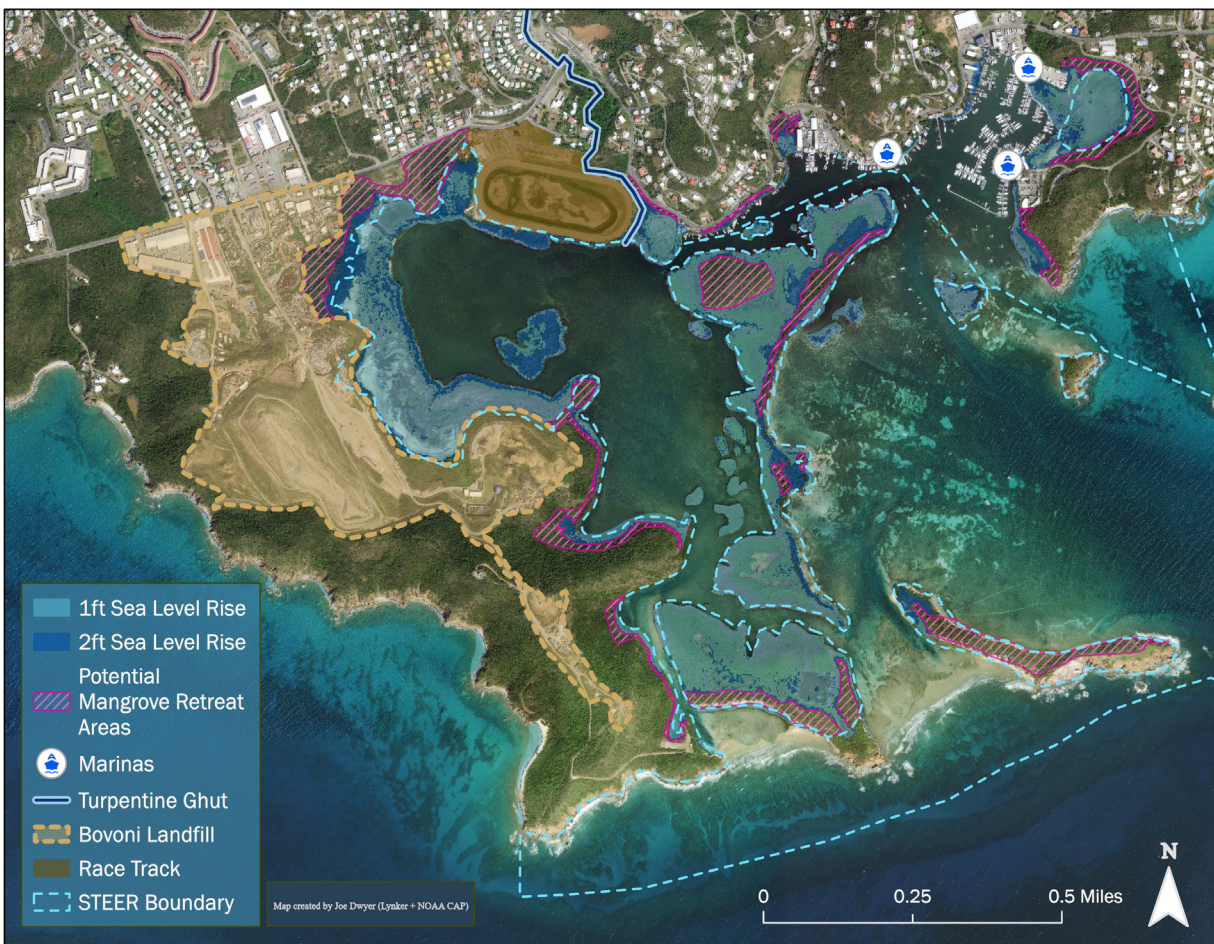


Figure 8. STEER mangrove vulnerability at 1ft and 2ft sea-level rise and potential areas for mangrove retreat.

Social vulnerability refers to individuals or communities that experience negative impacts from factors such as (limited) financial resources, disability, age, racial or ethnic identity, language barriers, or substandard housing or transportation. The socially vulnerable are generally more at risk from the impacts of disasters, such as storms, flooding, drought, and more. According to the USVI's Social Vulnerability Index, the Bovoni area of St Thomas ranked as one of the most socially vulnerable areas in the territory, based on Census data regarding socioeconomic, household composition, racial, and housing and transportation resources. Furthermore, the Bovoni area is of particular concern because the areas of high social vulnerability overlap with areas of high flood risk (Figure 9).

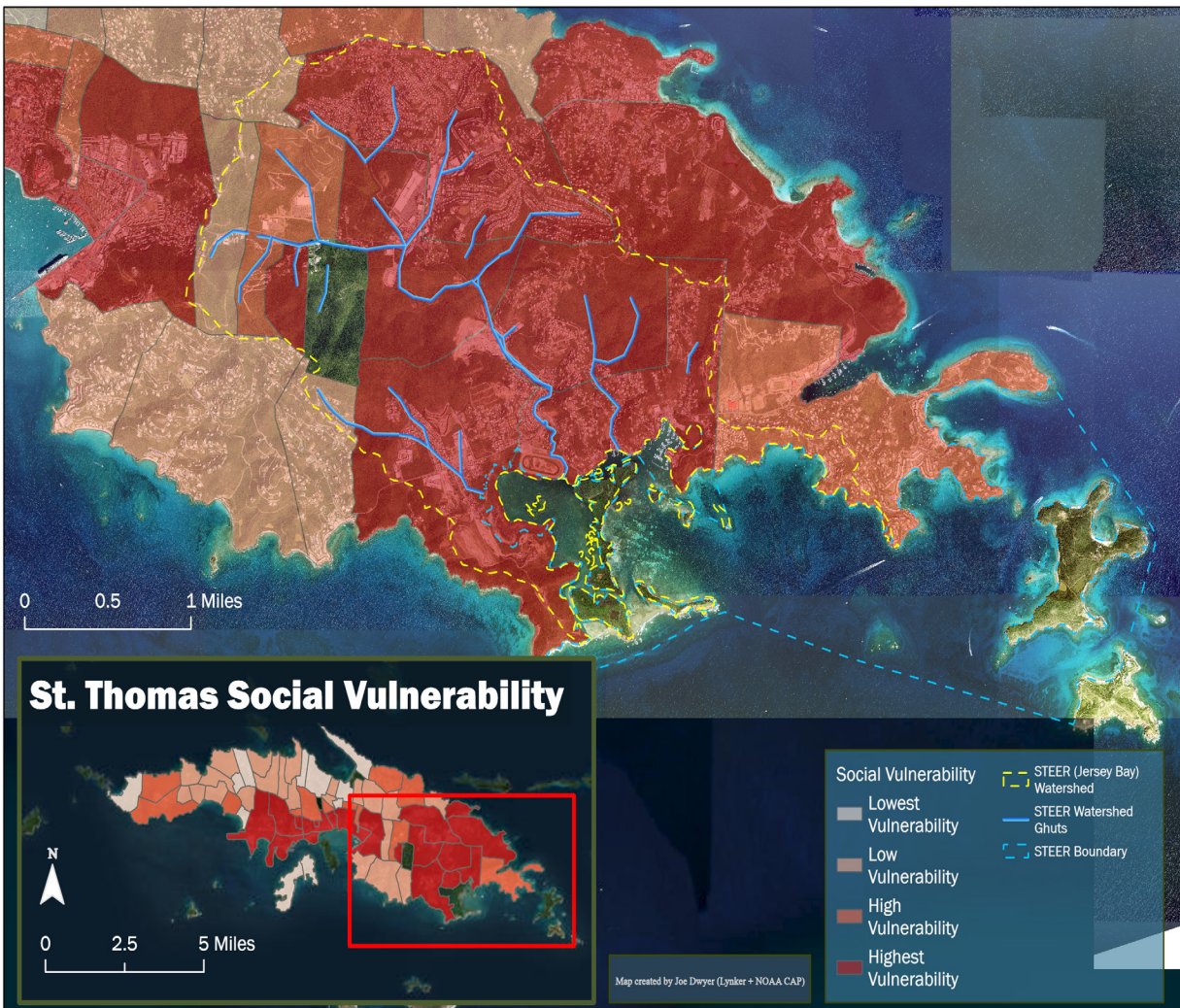
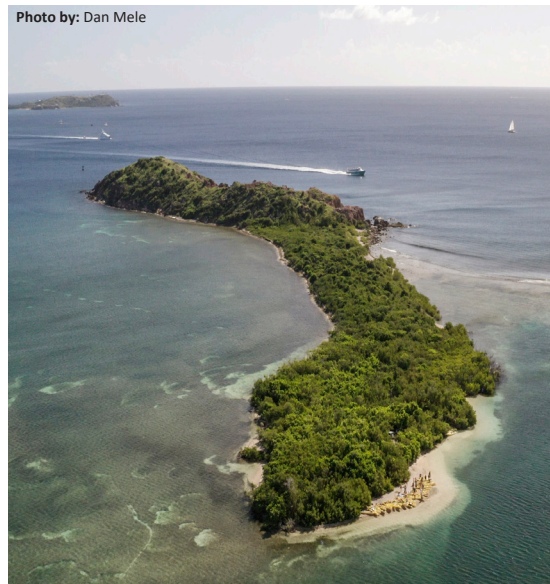


Figure 9. The Social Vulnerability Index of the STEER Watershed.

1.8 STEER Uses

STEER is a busy boating destination, adjacent to several marinas and boat supply businesses. Charter boating, and eco-tourism in the form of kayaking tours, kite surfing, SCUBA diving, swimming, wildlife viewing, snorkeling, and sailing are all popular public uses of STEER, both by residents and visitors. STEER is also directly in the path of the ferries from Charlotte Amalie and St. John or the British Virgin Islands, with large ferry boats passing through its boundaries several times a day.

Recreational use:

The luxurious beaches and coastlines of STEER are popular 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 watersports community partakes in windsurfing, kiteboarding, kayaking, and sailing from public beach access points and swimming areas located at condo and hotel locations such as Vessup Beach, the Ritz Carlton Resort, Secret Harbor, Cowpet Bay East & West, the Anchorage condominiums, The Elysian, Water Point, Cabrita Point, and Deck Point residential areas. In addition, visitors engage in sightseeing excursions on both motorboats and sailing vessels. Bait fishing, hook, and line as well as sport fishing are limited and require DPNR permits.



Widely known as the original boating community in the Virgin Islands, STEER is a gateway for “down island” Caribbean and stateside voyages, where boaters can readily service their boats. Home to the St. Thomas Yacht Club at Cowpet Bay and the annual St Thomas International 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 liveaboards. Private DPNR-permitted moorings are found in STEER.



Commercial Use:

Many of the commercial activities within or adjacent to the boundaries of STEER depend on 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, there is a concentration of seaside hotels, private villa rentals, condominiums, restaurants, and yacht clubs around the STEER coastline. Routes for regularly scheduled inter-island ferry service and commercial barges pass through the St. James Reserve within STEER.

There are powerboat, sail, watersports, and scuba diving businesses. Ecotourism-based businesses also exist along 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 watercraft 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 with permit only) occurs in certain designated areas of STEER.



Figure 10. Facilities adjacent to STEER.

Research and Education:

STEER is convenient and easily accessible by research and educational groups alike, providing opportunities 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 coast, the shore, and commercial/residential uses in the wider watershed area. Over the years, local and federal agencies including DPNR's CZM, DFW, DEP, UVI, NOAA, and TNC have conducted studies within STEER on research topics such as fish communities (Nemeth and Kadison, 2008) and their associated habitats (Bauer et al., 2014), sediment contamination (Clower, 2019), mangroves buffers (Keller et al. 2017) and corals (TCRMP).



From these research efforts, a wealth of information related to the area's fish, turtles, birds, coral reefs, sea grasses, salt pond dynamics, mangroves, and water quality has been collected. Most of the documents associated with past research are available at the DFW Office in Red Hook or see the list of references at the end of this document and the "Appendix D: STEER Research" supplemental to this report for more detailed information.



2. Update Process and Outcomes

2.1 Plan Development Process

The methodology used in the 2011 STEER Management Plan followed TNC’s Conservation Action Planning (CAP) 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 2023 update built upon TNC’s CAP process with a few modifications as decided by CZM and based on available resources as well as accessibility goals for the updated Plan. The update was completed through several planning meetings, a workshop series with technical and local experts, and feedback from key informants and public stakeholders. Facilitated discussions resulted in the development of a refined set of goals, a review and approval of the priority conservation resources, an assessment of any significant changes in human activities impacting the resources, and an updated list of objectives and strategies for improving or maintaining the resources within STEER.

The 2011 STEER Management Plan included a sustainable financial plan, 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 (see 2011 STEER Management Plan) to review the “Sustainable Finance Plan”). During the process of reviewing DPNR capacity and progress toward STEER goals in the past ten years, local managers felt the numbers produced in 2011 did not accurately reflect the realistic number of resources DPNR can allocate to the Reserves. Moving forward, local managers will improve collaboration in order to achieve more with the available resources, and to seek appropriate funding opportunities to better support STEER and its management goals (see Goal 3). Once they have a better understanding of the cost of maintaining STEER, a more realistic financial plan will be developed.



2.2 Vision

The 2023 STEER Vision Statement is an overarching statement of what the STEER Management Plan is trying to achieve and takes both the previous need and ongoing importance of management in the reserves into account. It is designed to be relatively general, visionary, and brief. The updated vision for the STEER Management Plan is:

The STEER Management Plan is a document to outline and develop the resource management, community engagement, and promotion of the responsible and sustainable use of marine ecosystems in the St. Thomas East End Reserves (STEER) for current and future generations.

2.3 Mission

Though the 2011 STEER Management Plan did not have an explicit Mission Statement, managers and experts felt it appropriate that the updated 2023 Management Plan include one. The STEER Mission Statement is a brief summary of what STEER aims to protect and conserve. The Mission lists the five goals of STEER and similar to the Vision, it is founded upon the purpose for the initial establishment of the Reserves' and their continued importance to the community of the US Virgin Islands. The updated STEER Mission is:

To conserve the ecological, economic, and cultural assets within STEER for residents and visitors through resource protection and restoration efforts; improved interdivisional and partner stakeholder collaboration; community education and engagement; and the promotion of environmental stewardship and responsible use of coastal and marine resources.

2.4 Goals

The goals of the 2023 STEER Management Plan are similar to the goals from the 2011 plan; however, they were updated to improve the level of detail and clarity based on recommendations from managers and experts. The goals for STEER express the desired outcomes from the management actions the management plan proposes. The updated management goals of STEER are to:

- 1. Maintain and improve the conditions of essential coastal and marine habitats and resources in STEER.**
- 2. Mitigate the negative impacts of watershed stressors on the STEER coastal and marine habitats.**
- 3. Strengthen the commitment of DPNR, the STEER Management Council, and partner stakeholders to collaborate on STEER Management Activities.**
- 4. Engage residents and visitors in the purpose and values of STEER through a variety of targeted communication strategies including volunteer and educational activities.**
- 5. Invest in the long-term resilience and viability of STEER for its contribution to the St. Thomas coastal and marine economy without risking the loss of ecosystem services and cultural assets.**



2.5 Target Resources for Conservation

The Target resources listed in the 2011 plan were revisited during a series of workshops held throughout 2021 and 2022. During these workshops, resource managers and experts discussed whether the original target resources were still of top priority and whether any new resources needed to be added. These “Targets” provide a basis for all subsequent planning steps, including the determination of plan Objectives and Strategies. 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.

The top **TARGET RESOURCES** were determined to be:

- **Mangroves**
- **Native Seagrasses**
- **Compass Point Salt Pond**
- **Sea and Shorebirds**
- **Coral Reefs and Hard-bottom Benthic Communities**
- **Fish and Invertebrates**
- **Community Access and Sustainable Use**

Resources managers and experts agreed that the Target Resources identified in 2011 are still relevant and should remain priorities in the 2023 Plan. Slight changes were made to the wording of some of the Targets, but otherwise they remain the same. Similar to the 2011 planning process and outcome, workshop participants stated that targeting conservation efforts on the habitats that benefit multiple species is more important than targeting individual species.

The following describes the role of each STEER Conservation Target in the ecosystem, its characteristics, and pressures on these resources.

Mangroves:

Mangroves are salt-tolerant plants that grow along tropical and subtropical coasts. They require warm temperatures, calm nearshore waters, and low-lying coastal land. Of the 80 different species of mangroves, three can be found in STEER, the red mangrove (*Rhizophora mangle*), the black mangrove (*Avicennia germinans*), and the white mangrove (*Laguncularia racemosa*). Mangroves’ unique structures serve several important roles in marine ecosystems (Figure 11). The dense root system, especially prevalent in red mangroves, protects corals and seagrass beds from sedimentation which can stress and smother them. Their roots also provide nutrient-rich detritus, a food source for marine life such as crabs and fish; and provide protection for larvae and juvenile fish. The canopies of mangrove trees provide shelter for various species of shorebirds.



A study conducted in STEER in 2016, emphasized the vital service of ‘buffering’ that mangroves provide at the border between land and sea (Keller et al. 2017). The study concluded that the mangroves around the edges of Mangrove Lagoon slow and prevent heavy metals from entering the lagoon via

groundwater and sediments which serves to protect fish, invertebrates, and coral communities from contamination (Keller et al. 2017). Mangrove lagoons are particularly important to coastal communities in times of severe weather, mangroves are able to absorb high levels of wave energy, which serves to reduce the size and power of storm surges landing on shorelines, thus protecting the land behind them from erosion and exacerbated flooding.



The Cas Cay/Mangrove Lagoon MSRW contains the largest remaining continuous mangrove stand in St. Thomas. Historically a high-traffic coastal hub for boats, this lagoon supports multiple local marine industries from eco-tourism businesses to private and commercial marinas. This region, Mangrove Lagoon-Benner Bay (MLBB), was designated as an APC in 1979 due to potential threats to the ecosystem from its location at the outflow of the largest watershed on the island, its proximity to the unlined Bovoni landfill, and its quickly developing coastline. Encroachment as a result of anthropogenic activity (e.g., road and building development) has limited the extent of the mangrove habitat, particularly

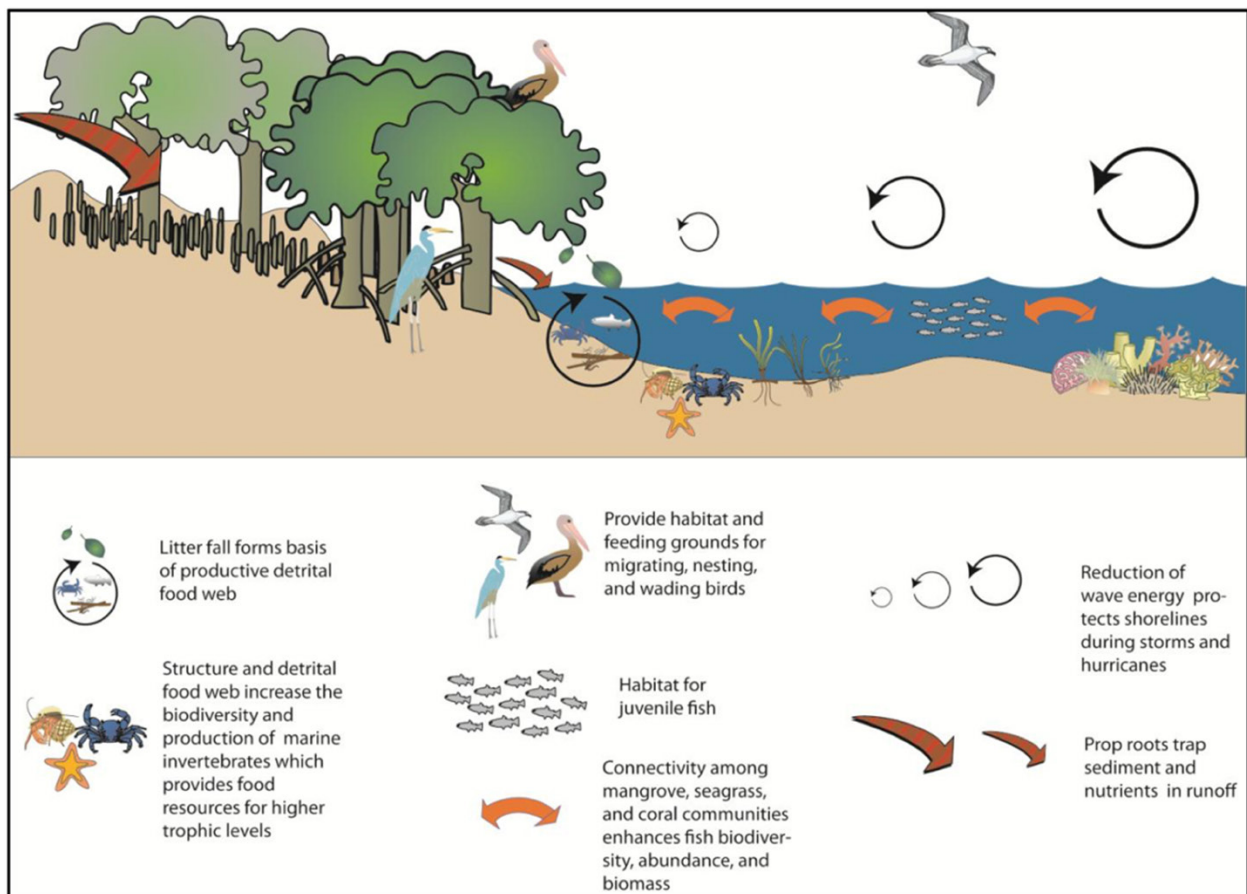


Figure 11. Conceptual diagram showing the ecosystem services provided by mangrove ecosystems of STEER.

along the northern edge of Mangrove Lagoon. The mangrove area in the Inner Mangrove Lagoon was altered during the construction of the Clinton Phipps Racetrack in 1972, leading to significant engineering interventions in the 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 the infilling of the Inner Lagoon. The western edge of Mangrove Lagoon is below the Bovoni landfill and the mangroves along this shoreline often have debris caught within their prop roots and high concentrations of heavy metals in the surrounding sediment (Clower, 2019).



On top of the chronic stressors that mangroves in STEER face, in 2017 the U.S. Virgin Islands were hit with two category 5 hurricanes causing extensive damage across all of the islands. Hurricane Irma had sustained winds of 185 mph and gusts over 220mph, followed by Hurricane Maria 14 days later with peak wind speeds of 172 mph and at least 5-7 inches of rainfall (“Hurricanes Irma and Maria”, n.d.). These hurricanes caused massive destruction to the mangroves within Mangrove Lagoon, denuding them of vegetation, snapping and downing trees, leaving many areas of the lagoon barren and littered with derelict vessels and other marine debris. In the 5 years since the storms, the mangrove stand has been slowly recovering, with damaged trees starting to bloom again and propagules of new growth peeking through dead roots. Although mangrove recovery still has a long way to go, more recent efforts within the Territory have been focusing on mangrove restoration within Mangrove Lagoon with hopes of eventually getting the Lagoon back to its health before the 2017 storms.



Seagrass Beds:

There are multiple seagrass beds and larger, contiguous seagrass meadows located throughout STEER. Tropical seagrass beds are most prevalent in lagoon areas and play an integral role in the well-being of a coastal and marine ecosystem (Figure 12). Often located in the calm, shallow waters between the coastal shoreline and the deeper marine environment further offshore, seagrass beds trap and stabilize sediments from runoff, improving water clarity and UV light penetration for marine habitats, conditions necessary for coral reefs to exist. The extensive root system of seagrass beds mitigates shoreline erosion by collecting and anchoring the loose sand substrate especially prone to nearshore loss during swell and storm events, preventing more extensive and distant shifting of sand deposits. Seagrass also provides important habitat and refuge from predators for juvenile reef fish. In addition, green sea turtles, several herbivorous fish, echinoderms (e.g., sea urchins), mollusks (e.g., conch), and birds feed on the seagrass. An environmental assessment conducted in STEER in 2016, stated that the most common species of seagrass found in the MRWS were manatee grass (*Syringodium filiforme*), turtle grass (*Thalassia testudinum*) and small amounts of shoal grass (*Halodule wrightii*) (Pait et al. 2016). In more recent years the invasive seagrass species, *Halophila stipulacea*, has established a presence throughout the USVI, including in parts of STEER. *Halophila stipulacea* has the ability to outcompete native seagrass species in response to disturbance, making it a potential threat STEER's ecosystem.



Irresponsible boat activities are a major threat to seagrass beds through physical damage or disturbance from anchoring and/or scarring by boat propellers 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 and marine development can also have a significant impact on nearshore seagrass beds, as many construction activities along the coast or in the water can alter water quality conditions. For example, sedimentation plumes caused by the unsettling of seafloor substrate during the construction of docks and marinas or caused by runoff from improper sediment fencing during coastal construction can smother and shade seagrass beds, reducing the plants' access to sunlight for photosynthesis. The changes in water clarity and nutrients can also support growth in marine plants that compete with seagrass for space, like macroalgae and epiphytes, resulting in reduced seagrass cover.

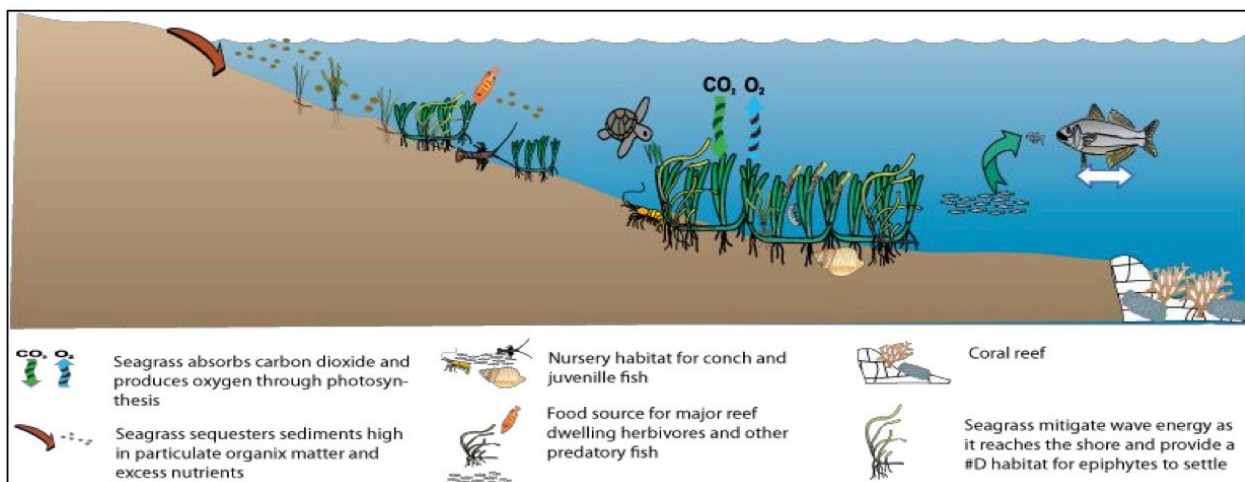


Figure 12. Conceptual diagram showing the ecosystem services provided by seagrass ecosystems of STEER.

Compass Point Salt Pond:

Salt ponds and the specialized salt-tolerant vegetation communities that they support perform various 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 Compass Point Salt Pond and its associated mangrove system provide storm protection, flood mitigation, shoreline stabilization, and shoreline erosion control to Mangrove Lagoon and Benner Bay. It also provides essential foraging, roosting, and nesting site habitat for indigenous and migratory birds such as Forster's Terns (*Sterna forsteri*), Great Blue Heron (*Ardea Herodias*) and on rare occasions American Flamingo (*Phoenicopterus ruber*) and are home to the federally endangered Virgin Islands Tree Boa.

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.

Salt Ponds face a multitude of threats including climate change, natural disasters, invasive species and more. Rising sea levels leave the pond vulnerable to inundation and the impacts of eventual changes in salinity levels. Meanwhile, extended periods of droughts could leave the pond vulnerable to drying out, killing off fish and invertebrate species that live there. Hurricanes have devastating impacts on salt pond systems because they destroy surrounding vegetation, cause flooding due to storm surge, and litter the pond with trash and debris. Impacts from hurricanes Hugo (1989), Marilyn (1995), Irma and Maria (2017) are still visible in the Compass Point Salt Pond today. Invasive species (rats, mongoose, etc.) are a threat to salt pond inhabitants such as the ground-nesting waterbird, White-cheeked pintails (*Anas bahamensis*). Perhaps the biggest threat that the Compass Point Salt Pond faces is input from upland activities. Ongoing sediment runoff and changes to the surrounding landscape have caused a significant degree of infilling, increasing the amount of sediment in the pond and decreasing the level of water it carries. Human encroachment, including light pollution from nearby residences, traffic along the road encircling the pond, noise, and trash are all factors negatively impacting the pond as an ecosystem. With the increased development that has occurred in St. Thomas over the past fifty years, salt ponds are a threatened habitat type in the Virgin Islands.

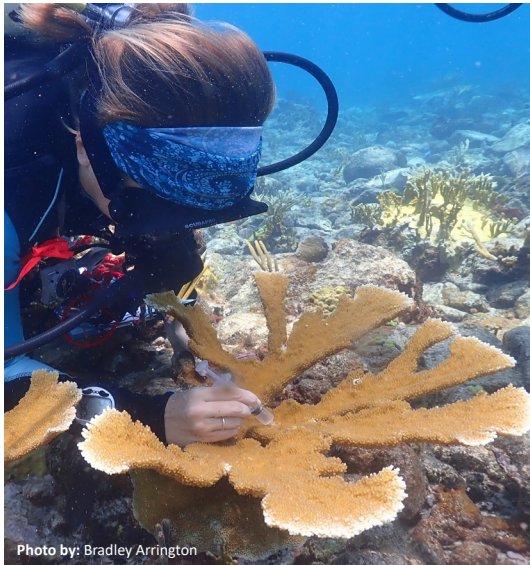


Coral Reefs and Hard-bottom Benthic Communities:

The shallow waters of STEER support a variety of important coral species and hard-bottom benthic communities typical of the USVI and the Lesser Antilles, making it one of the priority sites for the 2020-2025 USVI Coral Reef Management Priorities document (Rothenberger et al., 2019). Animals completing journeys from habitats preferred for juvenile settling such as nearshore mangrove areas, to adult habitats further offshore, 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. Therefore, coral reefs are extremely important in maintaining biodiversity within the Reserves and the surrounding marine habitats. A 2008 environmental marine survey by Nemeth and Kadison, recorded a high diversity of hard corals from numerous studies conducted within STEER, with about 45



species known including threatened species *Acropora palmata* (elkhorn coral) and *Acropora cervicornis* (staghorn coral).



The US Virgin Islands Territorial Coral Reef Monitoring Program (TCRMP) monitors the status and trajectories of coral reefs within the territory, providing data and outputs for public use. TCRMP has two monitoring sites within STEER, Cocus Rock and Little St. James see “Appendix G: Territorial Coral Reef Monitoring Program (TCRMP) STEER Data”. From this data, scientists were able to track the unprecedented warm water temperatures in 2005 that led 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 hardbottom to over 50% for coral reefs composed of dense star coral (*Montastraea*

complex). Since the 2005 bleaching, there have been two other major bleaching events to affect USVI corals, one in 2010 and then again in 2019. Although these events were milder than the 2005 event, the prevalence of bleaching was still 47% in 2010 and 49% in 2019 (TCRMP).

Compounding the impacts of these regional stressors are the local stresses arising from land-based sources of pollution (LBSP) such as sediments, marine-based sources of pollution, toxins, and hydrocarbons. For example, data from the TCRMP site at Cocus Rock illustrates that this site, less than a quarter mile from shore, is in the upper third of silt (sediment) deposition rates for 17 sites across the USVI, and the highest water concentrations in the US Caribbean of a marine



antifouling chemical called Irgarol which is toxic to corals, seagrass, and mangroves, was found in waters of the Mangrove Lagoon (Carbery et al. 2006).

Corals in the USVI and wider Caribbean face a new threat, Stony Coral Tissue Loss Disease (SCTLD). Reported in St. Thomas in 2019, SCTLD is a particularly virulent coral disease that was first documented in Florida in 2014. SCTLD is especially concerning because the outbreak in Florida has continued to spread since 2014, shows no seasonal patterns of slowing (unlike some other coral diseases), is highly transmissible and affects many coral species. The prevalence of SCTLD is high, and so are colony mortality rates. The causative agent of SCTLD is unknown as of 2022. Managers and researchers from the USVI, Florida, NOAA, and several academic institutions are working together to better understand SCTLD and to identify ways to effectively treat impacted corals. The emergence of SCTLD in the USVI highlights some of the challenges facing natural resource managers, and the need for both resources and flexibility to plan and respond to emerging threats and unexpected events in order to maximize the potential for positive outcomes (Rothenberger et al., 2019).

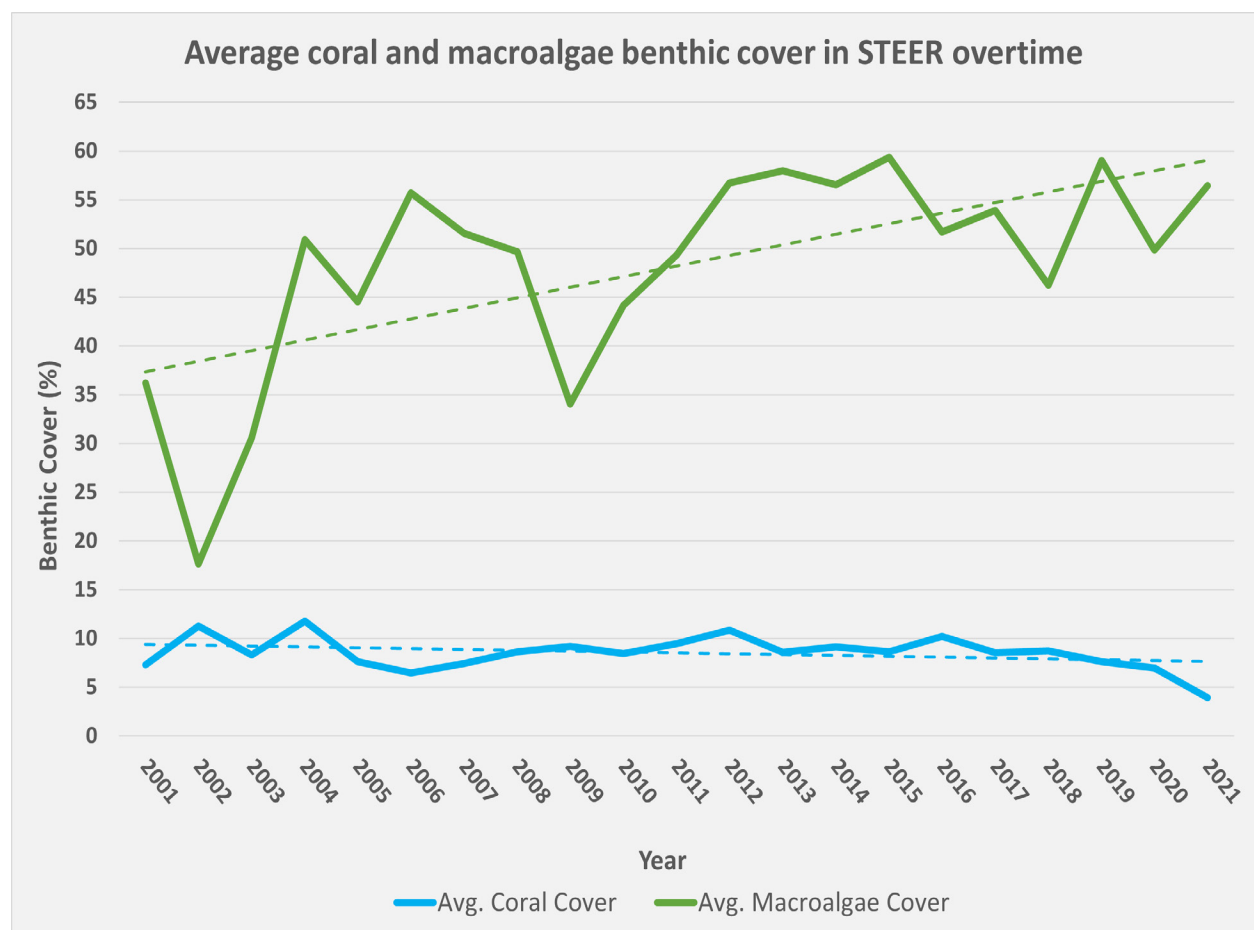
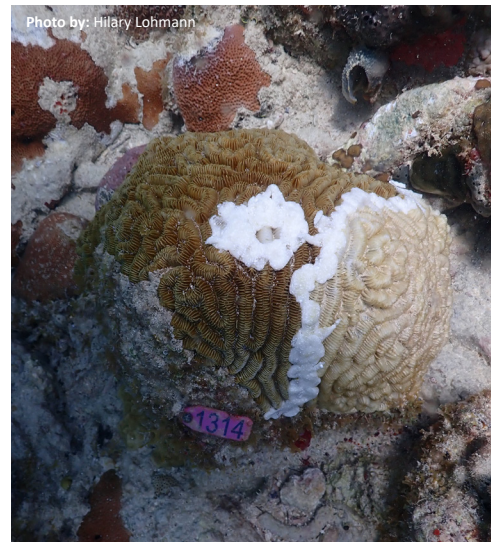


Figure 13. The average coral and macroalgae cover in STEER from 2001 to 2021 (USVI TCRMP).

Fish and Invertebrates:

STEER encompasses several interdependent tropical marine ecosystems including habitat types upon which a wide variety of marine species depend, especially juvenile fish. The diverse marine communities situated southeast of St. Thomas form a highly productive and ecologically significant ecosystem whose preservation and management are important to sustain the region's commercial and recreational fisheries. 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 that are of commercial and recreational value, such as snappers and groupers. It also provides habitat for spiny lobster (*Panulirus argus*) conch (*Strombus gigas*), and whelks (*Cittarium pica*). 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 and providing important nursery habitat.



Photo by: Pauline Walsh Jacobson



Photo by: Pauline Walsh Jacobson

The concern for and perceived decline of fishery and nursery-related resources within STEER can be attributed to a variety of sources. Land-based non-point source pollution such as leachate from the Bovoni dump flow into the mangrove lagoon, marine pollution arrives from boat work at nearby marinas, and pollution and sediment flow into the mangrove lagoon from upland guts, causing the destruction of mangrove roots', important habitat for juvenile fish. Illegal fishing within the area is also a concern. Reduction of pollution and protection of the vital mangrove habitat is critical for the stabilization of fisheries resources within STEER.

Community Access and Sustainable Use:

STEER is a busy boating destination, adjacent to several marinas and boat supply businesses. Charter boating, kayak tours, kite surfing, SCUBA diving, swimming, wildlife viewing, snorkeling, and sailing are all popular human uses of STEER, both by residents and visitors. STEER is also directly in the path of the ferries from Charlotte Amalie and St. John or the British Virgin Islands, with large ferry boats passing through its boundaries several times a day.

Aside from being a busy boating and ecotourism destination, Virgin Island residents have relied on the STEER area for subsistence harvesting of baitfish, lobster, whelk, and conch that were once accessible from the seashore, docks, and private jetties. The harvest of most of these resources is now restricted but permits are available upon request for baitfish collection and hook and line fishing within STEER.

2.6 Threats

Threats, impacts or risks to resources within STEER, can directly impact conservation targets or indirectly impact ecological processes important to sustaining those conservation targets. Knowing the specific threats that impact target resources in STEER is the foundation for formulating specific objectives and strategies needed to help abate these threats as part of management.

The original threats to each conservation target were identified in the first STEER Management Plan using two means: first, the stressors (the impairment or degradation of key ecological attributes of the target, such as reduced nesting success of shore birds) were carefully considered and ranked based on severity and scope. Second, the source of the stress, or the threat (such as predation on nesting shorebirds by rats), was identified. These threats were ranked based on their contribution to causing stress to the target (the threat’s impact) and the irreversibility of the threat (scope of damage from the threat).

A long list of impacts to STEER was developed by stakeholders, resource managers, and experts for the 2011 STEER Management Plan, including those that were pervasive, historical, and others later determined to be minor or secondary concerns. By using a criteria-based ranking of the stresses and threats (Table 3), the direct threats (the sources of the stress) to conservation targets were prioritized so that conservation actions can be directed to make the most impact. This criteria-based ranking of stresses and threats was used again during the 2023 management plan update (see the 2011 Management Plan for further explanation of the process). Over the course of a four-part workshop series, experts and stakeholders agreed on a list of 17 direct threats to STEER. These threats can be grouped into 6 general threat themes:

1. Watershed Stressors and Pollutants
2. Trash and Debris (solid waste)
3. Ecosystem Imbalance/Fast-Onset Change
4. Use Issues
5. Active Boat Damage
6. Natural Hazards/Changes

The following Threat Matrix (Table 4) illustrates the criteria-based ranking system used to prioritize the Threats to STEER Target Resources. Threats are ranked in the matrix based on current knowledge and science. The Threats will be reevaluated and revised in the future according to new information and changing conditions.

Table 3. Criteria-based ranking systems used to rank threats to STEER Target Resources.

| Within 10 years under current circumstances | | |
|---|----------------------------|---------------------------------|
| | Severity of threats impact | Scope of damage from the threat |
| Very High (VH) | Destory or eliminate | Very widespread |
| High (H) | Seriously degrade | Likely widespread |
| Medium (M) | Moderately degrade | Localized |
| Low (L) | Slightly impair | Very localized |
| Not Applicable (**) | Does not apply | Does not apply |

Table 4. STEER Threat Ranking Matrix.

| THREAT THEME | THREATS | TARGETS | | | | | | |
|--|--|-----------|-----------|----------|-------|-------|------------------------|-------------|
| | | Salt Pond | Mangroves | Seagrass | Coral | Birds | Fish and Invertebrates | Access/ Use |
| Watershed Stressors and Pollutants | Upland development and land cover change (e.g., exposed soil and sedimentation, stormwater runoff, and reduced permeability) | VH | VH | H | M | M | M | L |
| | Contaminants and poor water quality (e.g., point source and NPS pollution, nutrients, toxins) | H | H | H | H | L | M | L |
| | Changes to the shoreline and near shore water and sediment circulation patterns | M | H | M | L | L | L | M |
| Trash and Debris (solid waste) | Ocean-based sources of marine debris (e.g., derelict vessels, fishing gear) | L | H | L | L | H | M | L |
| | Land-based sources of marine debris (e.g., solid waste, litter) | L | H | L | L | H | L | L |
| Ecosystem Imbalance/ Fast-Onset Change | Stressors and disease (e.g., SCTLD) | L | L | M | VH | L | L | M |
| | Invasive species (e.g., lionfish, Halophila, rats & mongooses, feral animals) | M | L | VH | M | VH | H | L |
| Use Issues | Illegal harvest | L | L | L | L | L | H | L |
| | Non-compliance with area use and activities | VH | VH | H | H | L | H | M |
| | Low/no active management of STEER | M | M | M | M | L | H | M |
| Active Boat Damage | Anchor damage | ** | L | H | H | ** | ** | L |
| | Groundings | ** | L | H | M | ** | L | L |
| | Vessel sewage | ** | L | M | M | ** | L | M |
| Natural Hazards/ Changes | Sea level rise | H | H | L | L | L | ** | H |
| | Drought | H | H | L | L | H | ** | L |
| | Severe storms | M | VH | H | M | M | M | VH |
| | Increased sea surface temperatures | M | L | M | VH | L | M | L |

2.7 Objectives and Strategies

Management Objectives and Strategies were developed to address the critical threats to STEER's target resources. This is one of the most critical sections of the management plan and will guide activities undertaken in the next 5-10 years of implementation.

For the purposes of STEER management, an **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 5). Core questions asked were, "What do we need to accomplish?" and "How will our objective affect the given threat?"

STEER objectives are then followed by **strategies** (Table 6). A conservation strategy for STEER is a course of action intended to achieve a specific objective (outcome) that abates a threat, and/or enhances the viability of a conservation target. Strategies include the specific actions and activities required to accomplish each objective. In simpler terms, **OBJECTIVE** is where you want to be, and a **STRATEGY** is how you will get there. 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 or multiple threats?" and "Will the strategy accomplish the objective?"

In consideration of feedback from local experts on the updated list of Objectives and Strategies, the 2023 Plan includes a "Top Priority Objective and Strategies" to highlight one major and comprehensive need for improved STEER management focused on long-term monitoring of conditions in STEER, with three main strategies toward accomplishment. This section is an updated and revised version of the "2011 STEER Monitoring Plan" (See 2011 Plan, Table 6), developed to better align with the limitations of available resources for STEER.

These tables need to be regularly reviewed, updated, and amended to reflect new needs or other information that affects adaptive management decisions.

STEER Objectives were written to be **SMART** in order to guide an implementation plan for the next 5-10 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 5-10 years to start to show progress)

Table 5. STEER Objectives listed by major threat group (1-6).

| 1. WATERSHED STRESSORS AND POLLUTANTS | |
|--|---|
| THREAT 1A. Upland development and land cover change (e.g., exposed soil and sedimentation, stormwater runoff, and reduced permeability) | |
| OBJECTIVE 1A.1 | Quantify and characterize the impacts of watershed stressors |
| OBJECTIVE 1A.2 | Protect and restore wetland habitats through land conservation, benthic restoration, and gut corridor enhancements (STEER WMP, 2016) |
| OBJECTIVE 1A.3 | Create a protected areas and watershed database, protocol for updating/analyzing the database and a data sharing plan |
| THREAT 1B. Contaminants and poor water quality (e.g., point source and NPS pollution, nutrients, toxins) | |
| OBJECTIVE 1B.1 | Reduce nutrient and pathogen loading to STEER through improvements to sanitary sewer infrastructure and by addressing inadequacies of privately-operated systems (STEER WSMP, 2016) |
| OBJECTIVE 1B.2 | Reduce contaminant runoff from boat maintenance activities and materials in marinas |
| OBJECTIVE 1B.3 | Improve water circulation within Mangrove Lagoon |
| THREAT 1C. Changes to the shoreline and near shore water and sediment circulation patterns | |
| OBJECTIVE 1C.1 | Minimize impacts of development projects on land-sea boundary to nearshore sand/sediment circulation (erosion, accumulation) |
| 2. TRASH & DEBRIS (SOLID WASTE) | |
| THREAT 2A. Ocean-based sources of marine debris (e.g., derelict vessels, fishing gear) | |
| OBJECTIVE 2A.1 | Prevent and reduce the creation (accumulation) of ocean-based debris including abandoned and derelict vessels (ADV) and abandoned fishing gear, among others (USVI MDAP, 2021) |
| THREAT 2B. Land-based sources of marine debris (e.g., solid waste, litter) | |
| OBJECTIVE 2B.1 | Improve waste management practices and policies to prevent land-based debris from reaching the marine environment (USVI MDAP, 2021) |
| 3. ECOSYSTEM IMBALANCE/FAST-ONSET CHANGE | |
| THREAT 3A. Stressors and disease (e.g., SCTL)D) | |
| OBJECTIVE 3A.1 | Track the presence/impact of nuisance species on STEER resources/assets and stakeholders |
| OBJECTIVE 3A.2 | Mitigate and document the impacts of coral disease |
| OBJECTIVE 3A.3 | Document new and emerging diseases (seagrass, mangroves, etc.) |
| THREAT 3B. Invasive species (e.g., lionfish, Halophila, rats & mongoose, feral animals) | |
| OBJECTIVE 3B.1 | Track the presence/impact of invasive species on STEER resources/assets and stakeholders |
| 4. USE ISSUES | |
| THREAT 4A. Illegal harvest | |
| OBJECTIVE 4A.1 | Understand and quantify the severity of illegal harvest within STEER |
| THREAT 4B. Non-compliance with area use and activities | |
| OBJECTIVE 4B.1 | Improve compliance with area use and activities such as mooring/anchoring, harvest/take and mangrove tie-off |
| OBJECTIVE 4B.2 | Improve Community Awareness and Engagement in STEER |
| OBJECTIVE 4B.3 | Improve communication with marina stakeholders |

| | |
|--|---|
| THREAT 4C. Low/no active management of STEER | |
| OBJECTIVE 4C.1 | Maintain regular communication amongst DPNR, the STEER Management Council and partner agencies |
| OBJECTIVE 4C.2 | Improve co-management between DPNR divisions |
| OBJECTIVE 4C.3 | Understand and quantify the fiscal cost of managing STEER |
| 5.ACTIVE BOAT DAMAGE | |
| THREAT 5A. Anchor damage | |
| OBJECTIVE 5A.1 | Reduce the frequency of vessels dropping anchor outside of designated anchors zones/sandy bottoms |
| OBJECTIVE 5A.2 | Maintain and improve mooring system: transient and private |
| THREAT 5B. Groundings | |
| OBJECTIVE 5B.1 | Reduce the frequency of accidental groundings |
| OBJECTIVE 5B.2 | Improve response time to accidental groundings |
| THREAT 5C. Vessel sewage | |
| OBJECTIVE 5C.1 | Improve options for boaters to dispose of sewage |
| OBJECTIVE 5C.2 | Understand the impact/severity of vessel sewage within the boundaries of STEER |
| 6. NATURAL HAZARDS/CHANGES | |
| THREAT 6A. Sea level rise | |
| OBJECTIVE 6A.1 | Identify risk and assets lost to sea level rise |
| THREAT 6B. Drought | |
| OBJECTIVE 6B.1 | Understand the impacts of droughts to wetlands. |
| THREAT 6C. Severe Storms | |
| OBJECTIVE 6C.1 | Better prepare and respond to severe storm events |
| THREAT 6D. Increased sea surface temperatures | |
| OBJECTIVE 6D.1 | Understand impacts of higher sea surface temperatures on STEER resources |

Top Priority Objective and Strategies:

In order to address Goal 1: Maintain and improve the conditions of essential coastal and marine habitats and resources in STEER and in consideration of all STEER Threats, develop a process for regular assessments of critical STEER resources to track conditions over time.

Priority Strategy 1: *Coordinate UVI researchers and DPNR managers to develop a procedure for sharing relevant updates from local research and data on critical resources in STEER.*

Guiding Questions:

1. What data do different institutions and agencies (e.g. UVI, DFW) collect, for which critical resources, located in which areas of STEER?
2. How/which UVI and DFW data can inform managers on the condition of STEER critical resources?
3. What is the best way for CZM / STEER Coordinator/ STEER Advisory Council to receive STEER-relevant research and data moving forward?
4. How much of STEER resources (habitat types and spatial coverage) does locally available data cover, and what gaps are left that require another strategy for assessment?

Priority Strategy 2: *Develop monitoring protocols for critical STEER habitats and resources.*

Guiding Questions:

1. Where monitoring is feasible, in terms of accessibility and demands on DPNR resources, which sites within STEER best represent the critical habitats of interest and enable an evaluation of the representative biotic communities?
2. Which metrics per critical resource/habitat in STEER are useful, and feasible, for a rapid assessment?
3. When should assessments be conducted, and what is the procedure to plan and execute assessments?

Priority Strategy 3: *Review and adapt management planning activities and resource allocation (budget, staff, etc.) in consideration of monitoring requirements.*

Guiding Questions:

1. What is the data management, analysis, and reporting plan after assessments are completed?
2. What management actions are available in response to habitat and resource change?
3. What magnitude of change will trigger a management action response?



Table 6. STEER Objectives and Strategies.

| <i>Strategy Categories</i> | |
|----------------------------|---|
| Management | |
| Science | |
| Communication/Outreach | |

| 1. WATERSHED STRESSORS | | | | | |
|---|--|--|--|---------------------------------|---|
| Targets: Salt Pond, Mangroves, Seagrass, Coral, Fish and Invertebrates | | | | | |
| Threats | Objectives | Strategies | Appropriate Lead | Eval. Timeline *priority | Eval. 'check-in' Metrics |
| 1A. Upland development and land cover change (e.g., exposed soil and sedimentation, stormwater runoff, and reduced permeability) | 1A.1 Quantify and characterize the impacts of watershed stressors | 1A.1.1. Measure streamflow, concentrations of nutrients, sediments, etc. in Turpentine Gut (Install a stream gauge) | CZM, DEP, UVI | 5*, 10* | (5,10) Stream gauge: is it installed? Is data collected /analyzed? |
| | | 1A.1.2. Quantify water quality and wetland conditions in Mangrove Lagoon as they relate to the Bovoni dump closure. | CZM, DEP, UVI | 5* | (5) Assessments of WQ and/or site condition recently prior to closure? Assessments of WQ and/or site condition recently after closure? |
| | | 1A.1.3. Conduct an ecohydrology study of the STEER watershed. | UVI, DFW | 5, 10 | (5, 10) Proposal developed/submitted (10) Completion of ecohydrology study |
| | 1A.2. Protect and restore wetland habitats through land conservation, benthic restoration, and gut corridor enhancements (STEER WMP, 2016). | 1A.2.1. Enforce USVI Buffer Protection Regulations and gut setback regulations and better mitigate disturbed areas (STEER WMP, 2016). | CZM, DEP Required Partners : DBP, DPW | 5*, 10 | (5, 10) summary report: # inspections, NoVA records, and DPNR reporting app records |
| | | 1A.2.2. Promote conservation easements, land acquisition, and stringent development criteria for land around freshwater and salt ponds (e.g., Herrnhut, Tutu Reservoir, Cabrita Pt.) (STEER WMP, 2016). | CZM, DEP, DFW | 5*, 10 | (5, 10) Conservation easements: how many DPNR applications included easements? How many CZM pre-appl meetings discussed easements? How many permits issued include easement conditions? (5) Land acquisition: Identify priority interest plots (10) Was there any sale of lands? Were there any zone changes? |

| | | | | | |
|--|---|--|--|--------|---|
| | | 1A.2.3. Conduct a characterization and restoration needs assessment of Compass Pt. Salt Pond (STEER WMP, 2016). | CZM, DFW | 5, 10 | (5, 10) Proposal developed/submitted (10) Completion of project |
| | | 1A.2.4. Develop priority gut stabilization and buffer restoration projects (STEER WMP, 2016). | CZM, DEP, DFW Required Partners: DPW | 5, 10 | (5, 10) Characterize gut stabilization needs and areas for buffer restoration projects (10) Completion of restoration project/s |
| | 1A.3. Create a protected areas and watershed database, protocol for updating/analyzing the database and a data sharing plan | 1A.3.1. Add additional DPNR-DEP water sampling locations within STEER. | DEP, CZM, UVI Required Partners: DEP, EPA | 5* | (5) Were DEP sample sites reviewed? Were STEER sampling sites added? |
| | | 1A.3.2. Create a STEER database and geoportal. | CZM | 5* | (5) Is database and geoportal developed? |
| 1B. Contaminants and poor water quality (e.g., point source and NPS pollution, nutrients, toxins) | 1B.1. Reduce nutrient and pathogen loading to STEER through improvements to sanitary sewer infrastructure and by addressing inadequacies of privately-operated systems (STEER WSMP, 2016). | 1B.1.1 Develop a testing plan for nutrient loads, sedimentation and TSS and implement in areas with historically elevated levels. | DEP, UVI Required Partners: DEP | 5, 10 | (5) Has a testing plan been developed? has it been submitted for funding? Has it been funded? (10) Has testing been completed? is testing done regularly? |
| | | 1B.1.2. Test sediment contamination every 5 years (Mangrove Lagoon and Benner Bay). | CZM, DEP, UVI | 5, 10* | (5) Has a testing plan been developed? has it been submitted for funding? Has it been funded? (10) Has testing been completed? is testing done regularly? |
| | | 1B.1.3. Measure metals in the water column in Mangrove Lagoon (install a passive water monitor) | CZM, DEP, UVI | 5, 10* | (5, 10) Proposal developed/submitted/ approved (10) Implementation of project |
| | | 1B.1.4. Provide timely public access to monthly effluent monitoring reports and enforcement actions (post on DPNR website) (STEER WMP, 2016). | DEP | 5 | (5) Is there a DPNR webpage with monthly reports? |

| | | | | | |
|--|--|--|---|---------|--|
| | | 1B.1.5. Map the sanitary sewer and combined sewer network for the Mangrove Lagoon Wastewater Treatment Plant (MLWTP). Collect information on pipe diameter, structural condition, invert elevations, manholes, outfalls, and suspicious discharges (STEER WMP, 2016). | DEP, UVI Required Partners: VIWMA, DPW | 5 | (5) Is there geospatial data of the sanitary sewer network? |
| | | 1B.1.6. Conduct inventory of on-site sewage disposal systems (OSDS) including system type and location, maintenance, and feasibility of sewer connection (STEER WMP, 2016). | DEP, UVI | 5, 10 | (5, 10) Is there geospatial data for OSDS? |
| | | 1B.1.7. Develop an outreach campaign focused on the BMPs for NPS pollution for both public and private sectors (marinas, industrial shops, VIWMA, DPNR, federal agencies). | CZM, DEP | 5*, 10* | (5,10) Are there structured partnerships? What resources do partners have available on best practices for reducing NSP? |
| | 1B.2. Reduce contaminant runoff from boat maintenance activities and materials in marinas | 1B.2.1. Develop an outreach campaign focused on the rules and BMPs of point source pollution for both public and private sectors (marinas, industrial shops, VIWMA, DPNR, federal agencies). | CZM, DEP | 5*, 10* | (5,10) Are there structured partnerships? What resources do partners have available on best practices for reducing point source pollution? Inspections: what permit application activity has there been for marinas? How many inspections occurred at marinas? |
| | 1B.3. Improve water circulation within Mangrove Lagoon | 1B.3.1. Conduct a feasibility study for the opening of Mangrove Lagoon false entrance (STEER WMP, 2016). | CZM, DFW | 5, 10 | (5, 10) Proposal developed/submitted/ approved (10) implementation of project |

| | | | | | |
|--|---|---|-----|-------|---|
| 1C. Changes to the shoreline and near shore water and sediment circulation patterns | 1C.1. Minimize impacts of development projects on land-sea boundary to nearshore sand/sediment circulation | 1C.1.1. For major land and water permit applications, require nearshore water and sediment circulation impact studies and the implementation of mitigation measures when needed. | CZM | 5, 10 | (5, 10) What major L&W applications have occurred? Were nearshore circulation studies required? Were any mitigation measures implemented? If so, how many and what? |
|--|---|---|-----|-------|---|

2. TRASH & DEBRIS (SOLID WASTE)

Targets: Mangroves, Coral, Birds, Fish and Invertebrates

| Threat | Objectives | Strategies | Appropriate Lead | Eval. Timeline *priority | Eval. 'check-in' Metrics |
|--|--|--|----------------------|--------------------------|--|
| 2A. Ocean-based sources of marine debris (e.g., derelict vessels, fishing gear) | 2A.1. Prevent and reduce the creation (accumulation) of ocean-based debris including abandoned and derelict vessels (ADV) and abandoned fishing gear, among others (USVI MDAP, 2021). | 2A.1.1. Participate in the USVI Marine Debris Advisory Group (pg. 25 USVI MDAP, 2021). | CZM, UVI | 5, 10 | (5, 10) Did MDAP meetings occur? Was STEER of focused interest? |
| | | 2A.1.2. Conduct biannual STEER debris cleanups and collect data. | CZM, UVI | 5*, 10 | (5, 10) Did cleanups occur? (how many in STEER, how many in comparable sites?) How much debris collected |
| | | 2A.1.3. Maintain monofilament line disposal bins and collect data on the amount of line removed when emptied at each bin. | DFW | 5, 10 | (5,10) Which DFW bins are located around STEER? What is the state of the disposal bins maintenance program? How often are they emptied? How much line has been removed? |
| | | 2A.1.4. Inventory of ADVs in STEER on a biannual basis and after any major storm events. | CZM, DEE | 5, 10 | (5,10) What geospatial data is there on ADVs in STEER? |
| 2B. Land-based sources of marine debris (e.g., solid waste, litter) | 2B.1. Improve waste management practices and policies to prevent land-based debris from reaching the marine environment (USVI MDAP, 2021). | 2B.1.1. Messaging campaign on the appropriate trash disposal at key locations within the gut corridor and wider STEER Watersheds (STEER WMP, 2016). | CZM, UVI, DPW, VIWMA | 5, 10 | (5,10) What messaging strategies have been developed? What type of partnership activities occurs with which agency partners? (10) Have there been messaging campaigns? If so, what and how many? |
| | | 2B.1.2. Conduct an evaluation of the current STEER bin sites | CZM | 5, 10 | (5,10) Was a bin site evaluation completed? Has Any improvement in the state of STEER bin sites? |

| 3. ECOSYSTEM IMBALANCE/ FAST-ONSET CHANGE | | | | | | |
|--|--|--|---|--------------------------|--|--|
| Targets: Salt Pond, Mangroves, Seagrass, Corals, Birds, Fish and Invertebrates, Access/Use | | | | | | |
| Threat | Objectives | Strategies | Appropriate Lead | Eval. Timeline *priority | Eval. 'check-in' Metrics | |
| 3A. Stressors and disease (e.g., SCTL D) | 3A.1. Track the presence/ impact of nuisance species on STEER resources/ assets and stakeholders | 3A.1.1. Remove/reduce nuisance species according to DFW policies and practices and STEER boundaries. | DFW | 5, 10 | (5,10) Has DFW developed policies and practices? What nuisance species activities have taken place in STEER? | |
| | | 3A.1.2. Conduct a Sargassum impact survey (list of stakeholders, schedule for survey dissemination). | CZM, DFW, UVI | 5*, 10* | (5,10) What are the impacts of Sargassum on STEER stakeholders? Is there consistency with territorial sargassum documents? | |
| | 3A.2. Mitigate and document the impacts of coral disease | 3A.2.1. Conduct in-water treatment of diseased and vulnerable corals and restore disease-impacted reef-building species. | CZM, CORE, UVI | 5, 10 | (5,10) How are SCTL D-susceptible species of coral doing in STEER? | |
| | | 3A.2.2. Conduct research on coral species who have survived SCTL D to better understand species resilience. | UVI, CZM | 5, 10 | (5,10) How are SCTL D-susceptible species of coral doing in STEER? | |
| | 3A.3. Document new and emerging diseases (seagrass, mangroves, etc.) | 3A.3.1. Conduct timely and robust assessment of stressors (e.g. Ramacrusta, disease) that present in STEER. | CZM, DFW | 5, 10 | (5,10) What new stressors/ diseases have been documented? | |
| | 3B. Invasive species (e.g., lionfish, Halophila, rats & mongoose, feral animals) | 3B.1. Track the presence/ impact of invasive species on STEER resources/ assets and stakeholders | 3B.1.1. Remove/ reduce invasive species according to DFW policies and practices and STEER boundaries. | DFW | 5, 10 | (5,10) Has DFW developed policies and practices? What invasive species activities have taken place in STEER? |
| | | | 3B.1.2. Develop a shoreline predator trapping program (with a focus on locally governed MPAs). | CZM, DFW | 5, 10 | (5) what are the impacts of predators on STEER targets? (10) Has a program been developed? |

| 4. USE ISSUES | | | | | |
|---|--|---|---|--------------------------|---|
| Targets: Salt Pond, Mangroves, Seagrass, Corals, Fish and Invertebrates, Access/Use | | | | | |
| Threat | Objectives | Strategies | Appropriate Lead | Eval. Timeline *priority | Eval. 'check-in' Metrics |
| 4A. Illegal harvest | 4A.1. Understand and quantify the severity of illegal harvest within STEER | 4A.1.1. Keep records (names, date, location, incidents) of all fisheries violation incidents (DPNR Reporting App and DEE). | CZM, DEE, DFW Required Partners: DEE | 5*, 10* | (5,10) What is the severity of illegal harvest? How many violation records are there? |
| 4B. Non-compliance with area use and activities | 4B.1. Improve compliance with area use and activities such as mooring/anchoring, harvest/take and mangrove tie-off | 4B.1.1. Document mangrove tie-off non-compliance incidents through monthly patrols and data collection, and DPNR resources (Reporting App and DEE records). | CZM, DEE Required Partners: DEE | 5*, 10* | (5,10) What is the severity of non-compliance? How many violation records are there? |
| | | 4B.1.2. Improve public awareness of STEER rules and regulations through clear and accessible maps. | CZM, DEE, DFW | 5*, 10 | (5,10) What map products exist and where? |
| | | 4B.1.3. Increase signage in areas of high traffic and activity (using results from the STEER Public Use Survey). | CZM, DFW | 5*, 10 | (5,10) What signs exist and where? Where are areas of high traffic and activity? |
| | | 4B.1.4. Improve communication about mangrove tie-off regulations during hurricane season. | CZM, DFW, DEE Required Partners: DEE | 5*, 10 | (5,10) What are communication strategies on mangrove tie-off? |
| | 4B.2. Improve Community Awareness and Engagement in STEER | 4B.2.1. Conduct a Marine Park Audience Analysis. | CZM, UVI | 5*, 10 | (5) Who are the target audiences and stakeholders of STEER? (10) How are the target audiences and stakeholders being engaged in STEER? |

| | | | | | |
|--|---|---|----------|---------|--|
| | | 4B.2.2. Conduct strategic outreach and messaging campaigns to stakeholders in STEER to increase awareness, improve compliance (Use Audience Analysis), and increase public participation in reporting STEER violations using the DPNR Reporting App. | CZM | 5*, 10 | (5,10) What outreach strategies have been developed? Has compliance improved based on incident reports? Have STEER violation reports increased? |
| | | 4B.2.3. Evaluate and adapt Friends of STEER community group to support STEER goals and objectives. | CZM | 5*, 10 | (5) What is the need for and appropriate role of a Friends group to STEER? (10) What does the Friends group look like and what do they do? |
| | | 4B.2.4. Evaluate the role of STEER in a resilient coastal and marine economy and workforce. | CZM, UVI | 5, 10 | (5, 10) What are workforce development opportunities in relation to STEER? |
| | | 4B.2.5. Hold annual STEER Stakeholders Meeting that informs stakeholders on current events, research, and updates pertaining to STEER that took place over that past year. | CZM | 5*, 10 | (5,10) Have there been annual STEER meetings? Who attended and what occurred? |
| | 4B.3. Improve communication with marina stakeholders | 4B.3.1. Provide marinas with easy-to-access STEER and related VIRR information (best practices, rules and regs, local points of contact, etc.). | CZM, DEP | 5*, 10* | (5,10) Who are the main marina stakeholders? Is there a communication strategy with them? What resources do marina stakeholders have (documents, trainings, meetings)? |
| | | 4B.3.2. Hold annual STEER Marina Stakeholders Meeting that informs marinas on current events, research, and updates pertaining to STEER that took place over that past year. | CZM | 5*, 10 | (5,10) Have there been annual STEER meetings? Who attended and what occurred? |

| | | | | | |
|---|--|---|--|---------|--|
| 4C. Low/ no active management of STEER | 4C.1. Maintain regular communication amongst DPNR, the STEER Management Council and partner agencies | 4C.1.1. Acquire/have a STEER coordinator or additional capacity for STEER management activities. | CZM | 5*, 10* | (5,10) Is/has there been a STEER Coordinator? Is/has there been other types of additional capacity? How many times has STEER been included in divisional work/ UVI projects? |
| | 4C.2. Improve co-management between DPNR divisions | 4C.2.1. Hold annual "Status of STEER" DPNR meeting for division-specific reports on STEER related work (use division-specific 'guide to STEER' metrics/activities). | CZM Required Partners: DFW, DEP, DEE | 5*, 10 | (5) Have there been annual DPNR meetings? Have divisions reported annually from their 'Guide to STEER'? (10) How would co-management be characterized? |
| | | 4C.2.2. Support and participate in the VI MPA Network to share ideas, activities, and management best practices with the other locally managed protected area (EEMP). | CZM | 5*, 10 | (5,10) Has the VI MPA Network stayed in communication with one another? What have we learned from the VI MPA Network? |
| | | 4C.2.3. Develop a STEER Costs Characterization Report to categorize MPA costs required to operationalize the management plan based on programmatic areas, conservation targets, and staff time. | CZM | 5*, 10 | (5) Has a STEER Costs Characterization Report been created? Have sources of funding been identified? |
| | 4C.3. Understand and quantify the fiscal cost of managing STEER | 4C.3.1. Evaluate the fiscal cost of actively managing STEER and develop the appropriate budget/ financial plan. | CZM | 5* | (5) What were the cost per project? What were the cost per staff time? |

| 5. ACTIVE BOAT DAMAGE | | | | | |
|---|--|--|--|--------------------------|---|
| Targets: Seagrass, Corals, Fish and Invertebrates, Access/Use | | | | | |
| Threat | Objective | Strategies | Appropriate Lead | Eval. Timeline *priority | Eval. 'check-in' Metrics |
| 5A. Anchor damage | 5A.1. Reduce the frequency of vessels dropping anchor outside of designated anchors zones/ sandy bottoms | 5A.1.1. Use signage to mark areas of important benthic habitats and ecosystems, as well as sandy bottom areas for anchoring. | DFW, CZM Required Partners: USCG? | 5*, 10 | (5,10) Is there signage marking important areas? What are the conditions of the existing STEER signs? |
| | | 5A.1.2. Develop and publicize interactive maps to include habitats and known hazards. | CZM | 5*, 10 | (5,10) What maps of STEER resources and hazards are public? |
| | | 5A.1.3. Connect with the public on best boating practices in STEER. | DEE, CZM | 5, 10 | (5,10) How is the public engaged and informed on best boating practices? |
| | 5A.2. Maintain and improve mooring system: transient and private | 5A.2.1. Maintain the transient mooring system at Christmas Cove. | DFW, CZM | 5*, 10* | (5,10) How many broken/ damaged moorings have been identified and repaired? Have/ how many derelict boats been removed from moorings? |
| | | 5A.2.2. Evaluate Christmas Cove transient mooring systems for potential improvement | DFW, CZM | 5*,10* | (5,10) Are there any recommended improvements? |
| | | 5A.2.3. Create a geospatial database of private moorings in STEER with registration status. | CZM Required Partners: DEE | 5*,10* | (5,10) What data exists on moorings and their use/users? |
| 5B. Groundings | 5B.1. Reduce the frequency of accidental groundings | 5B.1.1. Develop and maintain a database of anchor damage and groundings reported on DPNR Reporting App or other means to inform areas in need of marker buoys/signs. | CZM | 5, 10 | (5,10) What data exists on anchor damage and groundings? What areas have had the most anchor damage and groundings? What marker buoy/signs have been installed? |
| | 5B.2. Improve response time to accidental groundings | 5B.2.1 Support DPNR grounding prevention, rapid response, and removal activities | CZM Required Partners: DEE, DFW | 5, 10 | (5,10) How would DPNR grounding prevention, rapid response, and removal activities (in STEER) be characterized? |

| | | | | | |
|-------------------|--|---|--|---------|--|
| 5C. Vessel sewage | 5C.1. Improve options for boaters to dispose of sewage | 5C.1.1. Assess existing pump-out facilities | CZM, DEP Required Partners: DEP | 5*, 10* | (5,10) what is the state of pump-out facilities in the VI? What data/information exists on existing pump-out facilities? |
| | | 5C.1.2. Assess options for new facilities, including costs | CZM, DEP, DFW Required Partners: DEP | 5*, 10* | (5,10) Which options have been assessed, and to what extent? |
| | 5C.2. Understand the impact/severity of vessel sewage within the boundaries of STEER | 5C.2.1 Study the impacts/severity of vessel sewage in STEER | UVI, NOAA | 5, 10 | (5, 10) Has understanding on the impacts of vessel sewage improved? if so, what are they? |

| 6. NATURAL HAZARDS/CHANGES | | | | | |
|--|---|--|---------------------------------------|--------------------------|---|
| Targets: Salt Pond, Mangroves, Seagrass, Corals, Birds, Fish and Invertebrates, Access/Use | | | | | |
| Threat | Objective | Strategies | Appropriate Lead | Eval. Timeline *priority | Eval. 'check-in' Metrics |
| 6A. Sea level rise | 6A.1. Identify risk and assets lost to sea level rise | 6A.1.1. Map area and assets lost at 1.5ft, 3ft, and 5ft of sea level rise. | CZM, UVI | 5* | (5) what maps of sea level rise exist for STEER area? what assets would be lost at 1.5ft, 3ft, and 5ft of sea level rise? |
| | | 6A.1.2. Identify STEER-boundary areas appropriate/feasible for inland retreat of wetlands. | CZM | 5*, 10* | (5,10) What areas were identified as appropriate/feasible for wetland retreat? |
| 6B. Drought | 6B.1. Understand the impacts of droughts to wetlands | 6B.1.1. Study the impacts of droughts on wetlands. | UVI, DFW | 5, 10 | (5,10) What are the impacts of droughts on wetlands? |
| 6C. Severe Storms | 6C.1. Better prepare and respond to severe storm events | 6C.1.1. Support and participate in mangrove resilience, recovery, and restoration work being done in STEER. | CZM, DFW, UVI | 5*, 10 | (5,10) What have we learned from the UVI-EPSCoR mangrove restoration work? |
| | | 6C.1.2. Improve compliance with proper mangrove tie-off practices before, during and after hurricane season. | CZM, DEE Required Partners: DEE | 5*, 10 | (5,10) How have boaters been engaged about proper mangrove tie-off practices? Has compliance improved? |

| | | | | | |
|-------------------------------------|--|---|----------------------|--------|---|
| | | 6C.1.3. Develop a STEER hazard event impact assessment and response plan. | CZM, UVI, FEMA, HMRP | 5*, 10 | (5,10) is there a hazard response plan for STEER? |
| 6D. Increased sea surface | 6D.1. Understand impacts of higher sea surface temperatures on STEER resources | 6D.1.1. Track water temperatures in STEER. | UVI, CZM | 5, 10 | (5,10) What data exists on water temperatures in STEER? |
| | | 6D.2.1. Study impacts of higher sea surface temperatures on STEER resources. | UVI, CZM | 5, 10 | (5,10) Proposal developed/ submitted/approved? (10) What are the impacts of higher sea surface temperatures? |

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APPENDICES

APPENDIX A. VI RULES AND REGULATIONS THAT RELATE TO STEER

- 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
 - o Section 404 Mooring and Anchoring of Vessels in the Territory
 - o Section 405 Mooring Permits, Fees, Renewals and Cancellations
 - o Section 406 Placing of buoyed mooring; unauthorized use; reassignment; identification
 - o Section 408 Unseaworthy and derelict vessels, houseboats, refuse and pollutants
 - o Section 408a. Prohibition of Houseboats
- VI Code Title 12, Chapter 2, Endangered and Indigenous Species Act

Title 12. Conservation

Chapter 1. Wildlife and Marine Sanctuaries

Subchapter 94. Offshore Islands and Cays to be Administered by the Department

12 V.I. R. & Regs. § 94-1

94-1. Designations.

Title 12 V.I.C. § 94 provides that the Commissioner of Planning and Natural Resources shall issue regulations pertaining to the management, use or control of the offshore islands and cays owned by the Government of the Virgin Islands, including but not limited to, the designation of game preserves and wildlife sanctuaries, and the designation of inviolate sanctuaries where human activities are prohibited. The provisions of Section 94 also include other inland areas which are declared to be wildlife sanctuaries.

12 V.I. R. & Regs. § 94-(b)-1

94-(b)-1. Purpose.

In order for the people of the Virgin Islands and visitors to the Virgin Islands to be able to view nesting seabirds and seabird colonies at close range without risking potential harm to said seabirds, these regulations are promulgated under the authority of the Commissioner's obligation to manage the offshore islands and cays of the Virgin Islands belonging to the Government of the Virgin Islands.

12 V.I. R. & Regs. § 94-(b)-2

94-(b)-2. Prohibitions.

It shall be unlawful for any person to land on or create any disturbance near any island or cay listed in the annex unless that person is

- (a) a governmental employee on official business, or
- (b) an authorized scientist, or
- (c) a licensed seabird guide, or
- (d) a person possessing a valid visitation permit who is escorted by a licensed seabird guide acting within the scope of his license.

ANNEX

The following is a list of the islands and cays belonging to the Government of the Virgin Islands mentioned in this section:

| | | |
|-------------|-------------|------------|
| Capella | Dutchcap | Saba |
| Carval Rock | Flanagan | Shark |
| Cas Cay | Flat | Stevens' |
| Cockroach | Frenchcap | Sula |
| Congo | Kalkun | Turtledove |
| Cricket | Little Flat | |
| Dog | Pelican | |

12 V.I. R. & Regs. § 94-(b)-3
94-(b)-3. Guides; Licenses.

(a) Any person above the age of 18 years who meets the following qualifications and pays the required fee may be issued a seabird guide license. Such license shall be valid for a period of one year from the date of issue. The candidate must be in good health, and

- (1) of good moral character, and
- (2) must be able to swim, and
- (3) must successfully pass a written examination administered by the Fish and Wildlife Division, and
- (4) must demonstrate necessary field skills, and
- (5) must demonstrate a knowledge of the islands and cays, and the natural history of the seabirds found thereon, and,
- (6) must pay the annual fee of \$ 100.

(b) Any person above the age of 18 years who meets the following qualifications and pays the required fee may be issued an assistant seabird guide license. Such license shall be valid for a period of one year from the date of issue. The candidate must be in good health, and

- (1) of good moral character, and
- (2) must be able to swim, and
- (3) must demonstrate necessary field skills, and
- (4) must pay the annual fee of \$ 25.

This is a temporary license and will be phased out as qualified apprentice guides become available.

12 V.I. R. & Regs. § 94-(b)-4
94-(b)-4. Apprenticeship Program.

Any person above the age of 16 years who is enrolled in an apprenticeship program in any high school in the Territory of the Virgin Islands is automatically entitled to be licensed as an apprentice seabird guide if that person meets the following qualifications:

- (a) is in good health, and
- (b) maintains a grade point average satisfactory to the school, and
- (c) makes a least seven (7) trips to islands and cays with a licensed seabird guide and a party of visitors during each of two consecutive twelve-month periods, or under the direct supervision, as a summer employee; of the Division of Fish and Wildlife.
- (d) Any person above the age of 18 who has satisfactorily completed a high school course, and has met the requirements listed under subsections (a)-(c) of this section above shall be issued a seabird guide license. The fee shall be waived for the first twelve-(12-) month period.

12 V.I. R. & Regs. § 94-(b)-6
94-(b)-6. Visitors' Permits.

Upon proper application and payment of the required fee to the Department of Planning and Natural Resources, any person above the age of nine (9) years, if escorted by a licensed seabird guide, may visit one or more designated islands or cays for the purpose of viewing and photographing seabirds. The fee schedule is:

- (a) For regular visitors - \$ 50 per day or \$ 200 per week.
- (b) For students - \$ 10 per day or \$ 50 per week.
- (c) For visitors on special trips - no fee.

12 V.I. R. & Regs. § 94-(b)-7
94-(b)-7. Limitation.

Any licensed seabird guide may escort a party of not more than ten persons, except that such guide, if assisted by an assistant guide or an apprentice guide, may escort a party of not more than eighteen persons.

12 V.I. R. & Regs. § 94-(b)-8
94-(b)-8. Guides; Responsibilities.

It shall be the responsibility of the licensed guide to:

- (a) file a "visit plan" with the Division of Fish and Wildlife showing the times and places where visits are desired, the names and addresses of the visitors, and the license numbers of the guide(s);
- (b) ensure that each person being escorted to an island or cay has in their possession a valid visitor's permit.

Title 12. Conservation
Chapter 1. Wildlife and Marine Sanctuaries
96. Prohibited Acts in Wildlife and Marine Sanctuaries

12 V.I. R. & Regs. § 96-1
96-1. Acts Prohibited in the Compass Point Pond Marine Reserve and Wildlife Sanctuary.

Except under a permit or specific authorization of the Commissioner, it is unlawful to:

- (a) use or possess any firearm, air rifle, bow and arrow, or any trap or other contrivance designed to be, or capable of being, used to take birds, fish or other wildlife, or to discharge any firearm or release any arrow into or within the marine reserve and wildlife sanctuary;
- (b) bring livestock, dogs, motor vehicles or to play loud electronic music in the marine reserve and wildlife sanctuary;
- (c) disturb or take any plant or animal within the marine reserve and wildlife sanctuary.
- (d) store, repair, maintain, or construct any vehicle or vessels within the marine reserve and wildlife sanctuary.

12 V.I. R. & Regs. § 96-2
96-2. Acts Prohibited in the Cas Cay/Mangrove Lagoon Marine Reserve and Wildlife Sanctuary.

Except under a permit or specific authorization of the Commissioner, it is unlawful to:

(a) Water:

- (1) take or possess any bird, fish or other wildlife (including any living organism), or part thereof;
- (2) use or possess any firearm, bow and arrow, or any trap or other contrivance designed to be, or capable of being, used to take fish, birds or other wildlife, or to discharge any firearm or release any arrow into or within the marine reserve and wildlife sanctuary;
- (3) anchor beyond seven (7) days within the boundaries of the marine reserve and wildlife sanctuary;
- (4) anchor boats without functioning sewage holding tanks;
- (5) use in the inner lagoon (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) any internal combustion engine;
- (6) operate any powered vessel in excess of five (5) miles per hour;
- (7) 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 three miles at sea (no new mooring permits will be granted for this area).

(b) Land:

- (1) conduct the following activities:
 - (A) picnicking in/at non-designated areas;
 - (B) camping;
 - (C) hunting;
 - (D) use of fire, except in a self-contained charcoal briquette or gas grill;
 - (E) possession of firearm(s);
 - (F) playing of amplified music;
 - (G) disturbing or removal of any plant, animal or mineral;
 - (H) store, repair, maintain or construct any vessel or vehicle.

12 V.I. R. & Regs. § 96-3

96-3. Acts Prohibited in the St. James Marine Reserve and Wildlife Sanctuary.

Except under a permit or specific authorization of the Commissioner, it is unlawful to remove any marine or other wildlife.

12 V.I. R. & Regs. § 96-4

96-4. Acts Permitted in the St. James Marine Reserve and Wildlife Sanctuary, Provided a Permit is First Obtained from the Commissioner.

- (a) Scientific collecting in support of and for use in a research project with an approved protocol.
- (b) The use of a castnet with a minimum square mesh size of one-quarter (1/4) inch to capture baitfish ("fry") within fifty (50) feet of the shoreline, except for Cow and Calf rocks.
- (c) Fishing with hook and line.

12 V.I. R. & Regs. § 96-5

96-5. Acts Permitted in the Cas Cay/Mangrove Lagoon Marine Reserve and Wildlife Sanctuary, Provided a Permit is First Obtained from the Commissioner.

- (a) The use of a castnet with a minimum square mesh size of one-quarter (1/4) inch to capture baitfish ("fry") within fifty (50) feet of the north and west shorelines of Cas Cay only.

APPENDIX B. VI CODE THAT RELATES TO STEER

Virgin Islands Code (VIC) found at:

<https://advance.lexis.com/container?config=024453JABiMWFjOTk0OS1hNTVILTQ1MDctYmZkOS1mNGRkY2I0ZTg2YzQKAFBvZENhdGFsb2fNaUTUAugmXPqNctTcuqLy&crd=078c4d44-5f04-452a-96c0-74bf-58b01e0c&prid=85388f8e-e576-43a2-8666-f12865dbb323>

Title 12. Conservation

Chapter 1. Wildlife

Subchapter VII. Wildlife and Marine Sanctuaries and Game Preserves

Section 94. Islands and cays to be administered by the Department

(a) The Department of Conservation and Cultural Affairs shall have the authority and responsibility for the management, control and use of all islands and cays off the shores of St. Croix, St. Thomas and St. John, owned by the Government of the United States Virgin Islands.

(b) The Commissioner of Conservation and Cultural Affairs shall issue regulations, not inconsistent with law or other regulations authorized by law pertaining to the management, use or control of the offshore islands and cays owned by the Government of the United States Virgin Islands, including but not limited to, the designation of game preserves and wildlife sanctuaries, and the designation of inviolate sanctuaries where human activities are prohibited. The provisions of this section shall also include other inland areas which are declared to be wildlife sanctuaries.

(c) For the protection of rare or interesting plant species and for other reasons in the public interest, the Commissioner of Conservation and Cultural Affairs may provide for the removal of goats and other animals from the islands and cays indicated in subsection (a) of this section.

(d) Whoever knowingly or willfully—

(1) kills, wounds, captures, takes or destroys any wild bird or game of any description or the eggs, nest or offspring of any such wild bird, or has in his possession or offers for sale or purchase such wild bird or game or the eggs, nest, or offspring of such wild bird or game, or any part thereof, in violation of a regulation issued pursuant to subsection (b) of this section; or

(2) violates any other regulation issued pursuant to subsection (b) of this section pertaining to the management, use and control of the offshore islands and cays owned by the Government of the United States Virgin Islands—

shall be fined not less than \$200 nor more than \$1,000 or imprisoned not more than 60 days or both.

Title 12. Conservation

Chapter 1. Wildlife

Subchapter VII. Wildlife and Marine Sanctuaries and Game Preserves

Section 96. Prohibited acts in wildlife and marine sanctuaries

(a) Except under a permit or specific authorization of the Commissioner of Planning and Natural Resources, it is unlawful in any wildlife or marine sanctuary to:

(1) take or possess any bird, fish or other wildlife, or part thereof;

(2) use or possess any firearm, bow and arrow, or any trap or other contrivance designed to be, or capable of being, used to take birds, fish or other wildlife, or to discharge any firearm or release any arrow into any wildlife or marine sanctuary; or

(3) throw, place, or deposit any waste within any wildlife or marine sanctuary.

(b) The Commissioner of Planning and Natural Resources may promulgate such rules and regulations pursuant to Title 3, chapter 35, VIC, prohibiting such additional acts which may adversely impact upon wildlife or marine sanctuaries or game preserves.

Title 12. Conservation

Chapter 1. Wildlife

Subchapter VII. Wildlife and Marine Sanctuaries and Game Preserves

Section 97. Establishment of wildlife or marine sanctuaries

(a) The Commissioner of Planning and Natural Resources may for the purpose of propagating, feeding and protecting birds, fish and other wildlife:

(1) designate and establish wildlife or marine sanctuaries in addition to those designated in section 94 of this chapter, and public access areas and special management zones within any wildlife or marine sanctuary;

(2) accept on behalf of the Government of the United States Virgin Islands, donations, bequests, gifts of any interest in real property for the purpose of a wildlife or marine sanctuary; and

(3) accept on behalf of the Government of the United States Virgin Islands, donations of birds, fish, amphibians, reptiles and other wildlife and of money given or appropriated for any wildlife or marine sanctuary.

(b) The Commissioner of Planning and Natural Resources shall cause to be prepared suitable signs to be posted under his direction on each territorial game preserve and wildlife and marine sanctuary designating the area as a game preserve or wildlife or marine sanctuary and giving notice of activities prohibited by this chapter or other applicable rules or regulations.

Title 12. Conservation

Chapter 1. Wildlife

Subchapter VII. Wildlife and Marine Sanctuaries and Game Preserves

Section 99. Penalties

Whoever violates any provision of this subchapter shall, if no other penalty is provided herein for such violation, be subject to a fine of not more than \$5000, imprisonment for not more than 30 days, or both

Title 12. Conservation

Chapter 2. Protection of Indigenous, Endangered and Threatened Fish, Wildlife and Plants

Section 101. Purpose

The purpose of this chapter is to protect, conserve, and manage indigenous fish, wildlife and plants, and endangered or threatened species for the ultimate benefit of all United States Virgin Islanders, now and in the future.

Title 12. Conservation

Chapter 2. Protection of Indigenous, Endangered and Threatened Fish, Wildlife and Plants

Section 102. Definitions

For the purpose of this chapter and unless the context otherwise requires:

(a) "Animal life" means any member of any non-domesticated species of the animal kingdom, whether reared in captivity or not, and includes all species occurring within the jurisdiction of the United States Virgin Islands, whether mammal, fish, bird, amphibian, reptile, mollusk, crustacean, arthropod, coelenterate or other invertebrate, and includes any part, product, egg, or offspring thereof, or the carcass or parts thereof.

(b) "Aquarium fish" means any species of freshwater or marine life including, in addition to vertebrates and invertebrates, all species of freshwater and marine plant life, and all corals, whether living or dead, captured or taken for the purpose of display.

(c) "Commission" means the Endangered Species Preservation Commission as created by section 103 of

this chapter.

(d) "Commissioner" means the Commissioner of Planning and Natural Resources.

(e) "Endangered species" means any species of animal life or plants which have been listed by the Federal or Territorial governments as "endangered".

(f) "Exotic species" means any foreign or introduced species.

(g) "Feral species" means domestic animals which have reverted to a wild state. The only birds which might be included in this definition are poultry.

(h) "Fish or wildlife" means any member of the animal kingdom, including without limitation, any mammal, fish, bird (including any migratory, nonmigratory, or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof.

(i) "Indigenous species" means any species of animal life, including migratory animals arriving in the United States Virgin Islands as part of their normal migration, but does not include certain vermin or feral species. The definition also includes all plants occurring and living naturally in the United States Virgin Islands.

(j) "Live rock" means any piece of coral (dead or alive), substrate or other material to which is attached, or which supports, any marine life form of any kind whatsoever.

(k) "Mangrove" means any of three species of woody plants known as "red mangrove" (*Rhizophora mangle*), "black mangrove" (*Avicennia germinans*), and "white mangrove" (*Laguncularia racemosa*).

(l) "Plant" means any freshwater, marine or terrestrial plant and alga, including seeds, roots, and other parts thereof.

(m) "Threatened species" means any species of animal life or plants which have been listed by the Federal or Territorial governments as "threatened".

(n) "Vermin" means certain species of animal life inherently destructive to homes, livestock or crops, and which may be capable of carrying diseases harmful to man. For the purpose of this chapter, these species are: house mouse (*Mus musculus*), mongoose (*Herpestes auropunctatus*), Norway rat (*Rattus norvegicus*), pearly-eyed thrasher (*Margarops fuscatus*) and roof (black) rat (*Rattus rattus*).

Title 12. Conservation

Chapter 2. Protection of Indigenous, Endangered and Threatened Fish, Wildlife and Plants

Section 105. Prohibited activities

(a) No person may take, catch, possess, injure, harass, kill, or attempt to take, catch, possess, injure, harass or kill, or sell or offer for sale, or transport or export, whether or not for sale, any indigenous species, including live rock; except that persons holding valid fishing or hunting licenses, scientific or aquarium collecting permits, or indigenous species retention permits, may operate within the scope and under the terms and conditions expressed in those licenses and permits.

(b) No person may take, catch, or possess, or attempt to take, catch or possess, any specimen of an endangered or threatened species unless such person holds a valid collecting permit from the Federal Government in the case of federally listed species, or a territorial permit in the case of an exclusively territorially listed species.

(c) No person may ship, transport, or export any specimen of an endangered or threatened species, or parts or produce thereof, whether for sale or not, unless such person holds a valid federal permit in the case of a federally listed species, or a valid territorial permit in the case of an exclusively territorially listed species.

(d) It shall be unlawful for any person to import or introduce, or cause the importation or introduction to the United States Virgin Islands of any species of plant or animal which does not naturally occur in the Territory without the express written permission of the Commissioner.

(e) No person may harass, injure or kill, or attempt to do the same, or sell or offer for sale any specimen, or parts or produce of such specimen, of an endangered or threatened species.

(f) No person may prune, cut, remove or otherwise disturb any growth of mangroves, whether on private land or not, unless a permit for such pruning, cutting or removal has been obtained in advance from the Commissioner, and the person is acting within the scope of that permit.

(g) No person may disturb, damage or remove the nest, or contents of any nest, of any indigenous, endangered species. The nests of all seabirds come within the protection of this subsection.

(h) No person may operate a helicopter or fixed-wing aircraft over a seabird rookery on an off lying island or cay at an altitude of less than one thousand (1,000) feet, or approach such island or cay closer than one-half mile, except for regularly scheduled commercial flights which, when in a landing pattern approach to the Cyril E. King Airport, must, for safety reasons, go over Little Saba and Flat Cay, St. Thomas, United States Virgin Islands, at an altitude of less than one thousand (1,000) feet. A concerted flight by seabirds in conjunction with an overflight shall be deemed prima facie evidence of a violation of this subsection.

(i) Nothing in this section shall prevent any duly authorized agent or employee of the Federal or Territorial governments, or person acting under such agent or employee's direct supervision, from performing any and all necessary activities within the scope of that agent's or employee's official duties.

Title 12. Conservation

Chapter 2. Protection of Indigenous, Endangered and Threatened Fish, Wildlife and Plants

Section 106. Permits and licenses

(a) Hunting and fishing.

(1) No hunting license shall be issued except in accordance with Title 12, section 11, Virgin Islands Code.

(2) No commercial fishing license shall be issued except in accordance with Title 12, chapter 9A, Virgin Islands Code.

(b) Scientists and collectors.

(1) In addition to the collection permits authorized under Title 12, section 14, Virgin Islands Code, the Commissioner may issue special permits to:

(A) Collectors for recognized museums, educational institutions, and scientific research organizations;

(B) Persons engaged in bona fide scientific research in connection with such organizations; and

(C) Persons engaged in approved recovery and propagation activities.

(2) Such permits shall be limited to a specific number of specimens of the desired species.

(3) Such permits may be issued only for scientific or educational purposes, or to enhance the recovery or propagation of that species.

(4) Such permits shall be issued free of charge. Specimens collected may not be sold or exchanged for anything of value. A separate transit permit, as described in subsection (d) of this section, shall be required before such specimens may be removed from the Territory.

(c) Aquarium collectors.

(1) The Commissioner may issue permits to aquarists, collectors, and other persons desiring to collect specimens of marine life forms, including live rock, whether or not for sale, and whether or not intended for shipment or export. There are three categories:

(A) A private aquarist collecting, not for sale, but for a personal aquarium of not more than fifty (50) gallons capacity;

(B) A person maintaining an aquarium of any size for a commercial purpose; and

(C) A collector for shipment, export, and sale.

(2) Such permit in all cases must specify the methods of collection to be employed, the place or places where such collection activities will be conducted, any restrictions on the number of each species or numbers of specimens to be taken, any specific requirements for the safe handling and storage of the specimens, and reports to be filed.

(3) Permits issued under subsection (c)(1)(B) and (C) of this section shall contain a schedule of fees based on a percentage of the wholesale market value of the species for which the permit is issued. The fee shall

be not less than ten (10) percent of the established wholesale price of that species in Miami, Florida. Such fees shall be payable in advance and non-refundable.

(d) Transit permits.

(1) Any person desiring to ship or transport any live indigenous species from the Territory shall first obtain a transit permit from the Commissioner.

(2) Such permit shall specify:

(A) The species involved;

(B) The number of specimens of each species;

(C) Any special shipping restrictions;

(D) The name and address of consigner and consignee; and

(E) Evidence that all the necessary fees have been paid.

(e) Mangrove permits.

(1) The policy of the Territory is to prevent a net loss of wetlands to the maximum extent possible.

(2) The Commissioner may issue permits, on a case by case basis, for the pruning, cutting or removal of mangrove trees by species and area, in accordance with Title 12, chapter 21, Virgin Islands Code.

(f) Indigenous species retention permits.

The Commissioner is authorized to issue permits to persons in possession of indigenous species, allowing them to retain such species for the treatment of injury or disease, propagation, or any other purpose consistent with the preservation, protection, conservation and enhancement of such indigenous species.

(g) [Repealed.]

Title 12. Conservation

Chapter 2. Protection of Indigenous, Endangered and Threatened Fish, Wildlife and Plants

Section 107. Penalties

Any person violating any provision of this chapter shall, upon conviction thereof, be subject to a fine of not less than \$100, and not more than \$10,000. Such person may also be sentenced to serve a term in jail of not more than sixty (60) days. For the purpose of assessing the penalty, each specimen of an indigenous species, endangered or threatened animal or plant, or mangrove shall be considered a separate offense.

Title 25. Navigation

Chapter 16. Mooring and Anchoring of Vessels and Houseboats

Section 402. Definitions

(a) The term "Ad-Hoc Community Committee" means a group of persons chosen by the Commissioner from the areas affected to serve as a liaison between the community and the Department.

(b) The term "anchoring" means the temporary securing of a vessel to the bottom of a water body solely by the resistance of an anchor or anchors which are dropped from the vessel, and which are carried aboard as regular equipment when underway.

(c) The term "Commissioner" means the Commissioner of the Department of Planning and Natural Resources, his designee, or any person authorized to act as Commissioner.

(d) The term "Department" means the Department of Planning and Natural Resources.

(e) The term "derelict vessel" or "derelict houseboat" means a vessel or houseboat that has been abandoned, forsaken, or disabled beyond repair.

(f) The term "houseboat" means any type of watercraft used as a floating abode that fails to meet the definition of a vessel as defined in this section or that is used solely for a permanent or temporary abode and not for transportation and navigational purposes. The term does not include boats, yachts, or sailing crafts with hulls designed, built and used primarily for transportation and navigational purposes.

(g) The term "long-term anchoring" means any anchoring for more than 14 days within a 6-month period

in any one location.

(h) The term “mooring” means the place where a buoyant vessel or houseboat is seasonally attached, fixed or fastened to a mooring buoy or other similar device which is not carried aboard a vessel as regular equipment when underway.

(i) The term “multi-vessel status” means the use of one mooring for the purpose of shifting vessels on the assigned mooring or the use of more than one mooring.

(j) The term “owner” means any person who can show by approved documentation that he possesses some legal interest in a vessel or houseboat.

(k) The term “resident agent” means a person residing in the Virgin Islands and authorized by the owner of a vessel to complete mooring application procedures for the owner and one on whom service of process may be made or one authorized by appointment or by law to receive service of process.

(l) The term “short-term anchoring” means any anchoring for less than 14 days within a 6-month period in any one location.

(m) The term “tender” means a secondary vessel attached to or accompanying the moored vessel which is used for the transporting of persons and supplies to and from shore or to another vessel.

(n) The term “unseaworthy vessel” or “unseaworthy houseboat” means a vessel or a houseboat itself or its appliances or appurtenances that are not safe or adequate for the purposes for which they are intended or ordinarily used.

(o) The term “vessel” means every description of watercraft or other artificial contrivance, not more than 150 feet in length, used or capable of being used as means of transportation on water.

(p) The term “water use plan” means a comprehensive policy guide calculated to protect, preserve, develop and regulate the use of territorial water, including but not limited to the designation of areas of particular concern, areas for navigation, safe swimming, anchoring, or mooring of vessels.

Title 25. Navigation

Chapter 16. Mooring and Anchoring of Vessels and Houseboats

Section 404. Mooring and anchoring of vessels in the Territory

(a) The Commissioner shall administer and enforce all laws and regulations relating to the mooring and anchoring of vessels and houseboats within the territorial waters of the Virgin Islands. The Department shall develop and implement a mooring plan, subject to the approval of the Legislature’s Committee on Planning and Natural Resources. A vessel or houseboat is permitted to moor or anchor only in those areas designated by the Department. The Department shall work with the appropriate Ad-Hoc Community Committee for each designated mooring and anchoring area.

(b) No person shall moor a vessel in a designated mooring area unless a permit is authorized by the Department. A mooring shall not be moved or shifted without prior authorization from the Department.

(c) Where a vessel or a houseboat is moored or anchored in violation of the provisions of this chapter or any regulations promulgated hereunder, if the owner or his agent cannot be located through diligent and reasonable efforts, the Department may remove the vessel or houseboat at the owner’s risk and expense. The Department shall address communications to the owner of the vessel to his last known mailing address or to the address of his resident agent. Where the Department does not have information as to the identity or the whereabouts of an owner, the Department shall undertake to notify the owner by the method best calculated, under the circumstances of the particular case, to give actual notice. Reasonable efforts to locate unidentified or absent vessel owners shall include the publication in a newspaper of general circulation throughout the Virgin Islands, the posting of a notice in a conspicuous place at the location of the distressed vessel, and the posting of the notice, where practicable on board the vessel. Except in an emergency, no vessel shall be removed until such notice has been posted for not less than fourteen days. For purposes of this subsection, “emergency” means any situation that presents an imminent endangerment or risk to the public safety, health and welfare, or presents an imminent endangerment

or risk to the environment or property and includes any instance where a vessel obstructs or threatens to obstruct navigation, contributes to air or water pollution or in any other way constitutes a danger or potential danger to the environment.

(d) The Commissioner may limit the applicability of section 405 of this chapter to other governmental departments, agencies, eleemosynary institutions, and organizations engaged in research, teaching and other public services, to inter-island passenger-carrying ferries, or to vessels engaged in full-time commercial fishing. However, the Department shall administer and enforce all laws and regulations relating to the mooring and anchoring of these vessels.

(e) In no event is a vessel or a houseboat or its tenders permitted to extend beyond the limits of the vessel's or houseboat's mooring area.

(f) The Legislature recognizes that for reasons of conservation, recreation, ecology, navigation or aesthetics, the coastal areas require a flexible and modifiable management program responsive to changing social, economic and environmental conditions. Until such time as a water use plan is developed, the Department shall administer programs in a manner consistent with the goals and objectives of this chapter and in a manner responsive to social and environmental needs.

(g) The following are designated as areas of special concern because of their location, the density of existing moorings, anchored vessels or the unusually fragile ecosystem:

(1) Magens Bay, Brewers Bay, Buck and Capella Islands, Christmas Cove, Coki Point Beach, Charlotte Amalie Harbor, the Mangrove Lagoon and Vessup Bay in St. Thomas;

(2) Cruz Bay and Hurricane Hole in St. John; and

(3) Salt River Bay, Christiansted Harbour, and Teaque Bay on St. Croix.

(h) The Department, by regulation, shall designate areas of mooring and long-term anchoring and areas of restricted or limited use. The Department may prohibit any long-term mooring or anchoring at any coastal area within the territorial waters of the Virgin Islands for reasons of health, safety or potential threat to marine life.

(i) The Department, in identifying and designating mooring and anchoring areas, shall consider the following factors:

(1) capability and suitability of the coastal area to support existing or projected use as a mooring or anchoring area;

(A) the size of the area;

(B) bottom topography and relative holding power;

(C) tidal and circulatory characteristics of the area;

(D) exposure to the weather conditions and wind fetch; and

(E) availability of public services.

2) environmental impact on coastal resources;

(3) compatibility of the various uses with adjacent uses or resources;

(4) historical uses of the proposed mooring or anchoring site;

(5) social and economic impact on the proposed site and its residents.

(j) Until such time as a water use plan is developed, the Commissioner shall designate areas of restricted mooring and anchoring adjacent to the ferry docks located in Cruz Bay, St. John and Red Hook, St. Thomas as required to provide for the safe navigation of inter-island passenger ferries and to protect the public safety.

(k) Until such time as a water use plan is developed, the Commissioner shall designate areas of restricted mooring and anchoring adjacent to the Gallows Bay Dock, the Ann E. Abramson Pier on St. Croix and the Edward Wilmoth Blyden Marine Terminal on St. Thomas to provide for the safe navigation of inter-island passenger ferries and to protect the public safety.

Title 25. Navigation

Chapter 16. Mooring and Anchoring of Vessels and Houseboats

Section 405. Mooring and anchoring permits, fees, renewals and cancellations

(a) The owner of each vessel or houseboat mooring or anchoring, or intending to moor or anchor in a designated mooring or anchoring area shall file an application for a mooring or anchoring permit with the Department. In accordance with the procedures and form prescribed by the Department, the owner or owner’s resident agent shall sign the application, include the owner’s mailing address, and submit the annual permit fee as provided in the regulations promulgated under this chapter. All owners of vessels shall pay a fee per foot of vessel, based upon the deck length, to the Department for the use of the mooring or anchor. The fee for the use of the mooring is an annual fee, and the fee for the use of the anchor is a monthly fee. A non-resident owner shall include in the application, the name and mailing address of his designated resident agent. An affidavit executed by the applicant setting forth the facts in support of the applicant’s claim of ownership is required for every initial application.

(b) A permittee shall not sell, lease, assign, rent, or transfer the permit to another person unless authorized in writing by the Commissioner. The Department may grant to licensed charter vessels, vessel repair, vessel brokering and other similar operations, a multivessel mooring permit, which allows temporary assignment for a client’s vessel. The Department shall allow retention of a mooring location during prolonged absences for repairs, extended cruises or for any other legitimate reason, where the permittee applies to the Department, shows sufficient intention to return and pays the fee in advance.

(c) The Commissioner shall not issue a permit for the mooring or long-term anchoring of any vessel not in compliance with Coast Guard requirements for marine sanitation devices.

(d) Where a Coastal Zone Management Permit is in effect in a designated mooring area on the date of enactment of this chapter, if the permittee so notifies the Department before the application date for mooring permit issuance, he retains the use of the mooring until his Coastal Zone Management Permit expires.

(e) The annual vessel mooring fees and the monthly vessel anchoring fees are as established in Schedules I and II of this subsection.

SCHEDULE I. VESSEL MOORING FEE BY CLASS

| CLASS | LENGTH | TYPE/USE | FEE (PER FOOT) |
|-----------|---|-----------------------|----------------|
| CLASS A | Less than 16` | Pleasure | \$10.00 |
| | | Commercial | \$20.00 |
| CLASS I | 16` to less than 26` | Pleasure | \$10.00 |
| | | Live-Aboard/Houseboat | \$15.00 |
| | | Commercial | \$20.00 |
| CLASS II | 26` to less than 40` | Pleasure | \$10.00 |
| | | Live-Aboard/Houseboat | \$15.00 |
| | | Commercial | \$20.00 |
| CLASS III | 40` to less than 65` | Pleasure | \$10.00 |
| | | Live-Aboard/Houseboat | \$15.00 |
| | | Commercial | \$20.00 |
| CLASS IV | Greater than 65` Environmental Impact Fee | Pleasure | \$10.00 |
| | | Live-Aboard/Houseboat | \$15.00 |
| | | Commercial | \$20.00 |
| | | | |

SCHEDULE II. VESSEL ANCHORING FEE BY CLASS

| CLASS | LENGTH | TYPE/USE | FEE (PER FOOT) |
|-----------|---|-----------------------|----------------|
| CLASS A | Less than 16` | Pleasure | \$2.00 |
| | | Commercial | \$3.00 |
| CLASS I | 16` to less than 26` | Pleasure | \$2.00 |
| | | Live-Aboard/Houseboat | \$3.00 |
| | | Commercial | \$3.00 |
| CLASS II | 26` to less than 40` | Pleasure | \$2.00 |
| | | Live-Aboard/Houseboat | \$3.00 |
| | | Commercial | \$3.00 |
| CLASS III | 40` to less than 65` | Pleasure | \$2.00 |
| | | Live-Aboard/Houseboat | \$3.00 |
| | | Commercial | \$3.00 |
| CLASS IV | Greater than 65` Environmental Impact Fee | Pleasure | \$2.00 |
| | | Live-Aboard/Houseboat | \$3.00 |
| | | Commercial | \$3.00 |
| | | | |

(f) A permittee may cancel his permit by either: 1) notifying the Department in writing, or 2) by some other act which is inconsistent with his continued use of the permit.

(g) Every mooring permit continues in full force and effect from the first day of July for a period of one year ending on the last day of June, unless sooner terminated or discontinued in accordance with the provisions of this chapter or regulations promulgated hereunder. All permit fees paid under this section are deposited into the Natural Resources Reclamation Fund as established by Title 12, chapter 21, section 911, Virgin Islands Code.

(h) Fifty percent of the fees collected pursuant to subsection (e) of this section must be covered over into the Natural Resources Reclamation Fund under title 12 Virgin Islands Code, chapter 21, section 911(f) (4), and fifty percent is designated for the marine enforcement unit under the Department of Planning & Natural Resources.

(i) Other fees.

The Department shall charge:

(1) a Marine Event Permit Fee of \$100.00 for permit processing; and

(2) a \$500.00 fee for any requested enforcement vessel assistance.

(3) For purposes of paragraph (1), "Marine Event" means any event held on the water which would require a permit.

Title 25. Navigation

Chapter 16. Mooring and Anchoring of Vessels and Houseboats

Section 406. Placing of buoyed mooring; unauthorized use; reassignment; identification

(a) The Department shall designate the placement site for every mooring in the designated mooring areas and shall prescribe standards for the type of ground tackle and the scope ratio to be used by each vessel or houseboat. Until the Department develops an alternative to the existing arrangement, the permittee shall construct the mooring in a seaman-like manner for the vessel and conditions in the bay or harbor. Engine blocks may not be used as ground tackle. The permittee shall place a ground tackle having a free floating buoy on the surface by at least twelve (12) inches with proper identification, including their permittee's

number. Ground tackle remains the property of the permittee. All responsibility and liability for the mooring of a vessel or houseboat remains with the permittee.

(b) The Department retains the right to reassign mooring or anchoring space, either temporarily or permanently, when in the best interests of the public, including but not limited to, harbor improvements and emergencies, and where more efficient or equitable utilization of mooring areas would result. The permittee shall move in accordance with the reassignment order within 30 days of the date of the order. The Department shall send by mail, to the owner's mailing address, a written notice of the reassignment order requiring a return receipt or, where the owner is a non-resident of the Virgin Islands, to the mailing address of the owner's resident agent.

(c) A fine of fifty dollars (\$50) per day shall be assessed against the owner of the vessel and against the vessel, jointly and severally, for each and every day beyond the thirty-day period that the vessel and the ground tackle remain in the mooring location.

(d) Unauthorized use of a mooring may result in a fine of not more than five hundred dollars (\$500) assessed against the vessel's owner and the vessel, jointly and severally

Title 25. Navigation

Chapter 16. Mooring and Anchoring of Vessels and Houseboats

Section 408. Unseaworthy and derelict vessels, houseboats, refuse and pollutants

(a) No person shall moor or anchor a derelict or unseaworthy vessel or houseboat in a designated mooring or anchoring area. No permit shall be granted for any vessel or houseboat considered by the Department to be unseaworthy or derelict. The Department may remove an unseaworthy or derelict vessel or houseboat in accordance with the provisions of section 404 of this chapter.

(b) The owner of a vessel or houseboat sunk or wrecked within the designated mooring or anchoring area is responsible for marking its position and providing for the raising and disposition of the vessel or houseboat within thirty (30) days. The owner shall be liable for any damage to public property, to the environment, and to other vessels or houseboats caused by the owner's vessel or houseboat. Whenever a designated mooring or anchoring area is obstructed or endangered by a sunken or wrecked vessel or houseboat, and the obstruction or wreck has existed for more than thirty (30) days, or whenever the abandonment can be legally established, the Department, after having given reasonable public notice of not less than thirty (30) days, may remove and dispose of the sunken or wrecked vessel or houseboat; provided, however, that the Department may act sooner if said vessel or houseboat is determined to be a hazard to the marine traffic or the environment. The cost of removal shall be borne by the owner or resident agent.

(c) No person shall throw, discard, discharge or deposit refuse of any kind into the shoreline areas or territorial waters of the Virgin Islands. No person shall dump or discharge pollutants such as gas, oil, petroleum products, sewage, or any other pollutants into the territorial waters of the Virgin Islands. Any person who discharges, dumps, or deposits refuse or pollutants in violation of this chapter shall immediately remove or arrange for the removal of such refuse or pollutants to the Department's satisfaction. If the vessel's owner or the person responsible for the violation fails to so act, the Department may arrange for removal and clean-up and may contract with and retain agents for such purpose, and the costs thereof, shall be borne by the owner and any person responsible for the discharge, discarding, dumping, or depositing of the refuse or pollutants.

(d) The owner of a vessel or houseboat is responsible for keeping the vessel or houseboat and the mooring area in a clean and orderly condition. No person shall conduct any maintenance or conditioning activity, including but not limited to, spray painting, sand blasting, sanding, paint removal, or other activity, that the Department would consider as having an adverse impact on the air and water quality, or on other vessels in the mooring or anchoring area, or would be in violation of any Federal or Territorial law or regulation.

(e) Except as provided in section 409 of this chapter, any person who violates the provisions of this section

may be fined an amount not to exceed \$10,000 for each offense.

Title 25. Navigation

Chapter 16. Mooring and Anchoring of Vessels and Houseboats

Section 408a. Prohibition of houseboats

Upon the enactment of this chapter, the Department shall not grant or issue any mooring or anchoring permit to the owner or resident agent of a houseboat. Not later than six (6) months after enactment of this chapter and after due notice by the Department, houseboats are prohibited in the mooring and anchoring areas of the territorial waters of the Virgin Islands.

Title 25. Navigation

Chapter 16. Mooring and Anchoring of Vessels and Houseboats

Section 409. Noncompliance

(a) Failure to comply with any provision of this chapter or any regulation hereunder may result in suspension of the mooring permit and such suspension continues until such time as the permittee is in compliance. The owner or resident agent may appeal and the Commissioner shall grant a review of the suspension order if it is requested in writing within fifteen (15) days of the order. Any decision of the Commissioner may be appealed to the Superior Court of the Virgin Islands, the appellant shall serve written notice of the appeal with the Office of the Commissioner and the Attorney General. The suspension, unless delayed by the court, shall begin no later than thirty (30) days after the deadline for appeal to the Commissioner has passed by mailing or delivering to the owner or resident agent a copy of said order. After the permit is in fact suspended, the permittee shall immediately vacate the mooring or anchoring area assigned to him by the Department and the Department may assign the mooring to another permittee. Once the permittee is in compliance, the suspension shall be terminated and the mooring permit continues in full force and effect.

(b) Any penalty imposed under this chapter is in addition to the suspension of a mooring or anchoring permit as authorized by this chapter, and to any confiscation or forfeiture proceedings authorized under this chapter.

(c) Any owner of a sunken or wrecked vessel or houseboat in the designated mooring or anchoring areas who fails to comply with the provisions of this chapter shall be liable for damage caused by the vessel or houseboat as well as any other penalty provided by law, and the Department may dispose of the vessel or houseboat of any owner in noncompliance.

(d) Failure to comply with the provisions of section 407 of this chapter shall result in a fine not to exceed \$1,000 for the first offense and not to exceed \$5,000 for each subsequent offense.

(e) Failure to move in accordance with a mooring or anchoring reassignment order under this chapter shall result in a fine of \$50 per day assessed against the owner of the vessel and against the vessel, jointly and severally, for every day beyond the thirty (30) day grace period that the vessel remains in the mooring or anchoring location in violation of the order.

(f) Any owner or resident agent who discharges pollutants of any kind into the shoreline areas or Territorial waters in violation of section 408 of this chapter shall be fined in an amount not to exceed \$10,000, except that for the unlawful discharge of oil or other pollutants as defined in Title 12, chapter 17, Virgin Islands Code, violators shall be assessed civil penalties pursuant to the provisions of that chapter

APPENDIX C. STEER BOUNDARY COORDINATES

NW corner:

64°52'55.564" W 18°19'0.64" N

NE corner:

64°49'55.554" W 18°19'25.825" N

SE corner:

64°52'34.095" W 18°17'59.536" N

SW corner:

64°49'48.535" W 18°17'51.279" N

APPENDIX D. STEER RESEARCH

Published

An Assessment of Contaminant Body Burdens in the Coral (*Porites astreoides*) and Queen Conch (*Strombus gigas*) from the St. Thomas East End Reserves (STEER)

Apeti, D.A., A.L. Mason, S.I. Hartwell, A.S. Pait, L.J. Bauer, C.F.G. Jeffrey, A.M. Hoffman, F.R. Galdo Jr, and S.J. Pittman. 2014. An assessment of contaminant body burdens in the coral (*Porites astreoides*) and queen conch (*Strombus gigas*) from the St. Thomas East End Reserves (STEER). NOAA Technical Memorandum NOS/NCCOS 177. Silver Spring, MD. 37pp.

https://www.researchgate.net/publication/328687970_An_Assessment_of_Contaminant_Body_Burdens_in_the_Coral_Porites_astreoides_and_Queen_Conch_Strombus_gigas_from_the_St_Thomas_East_End_Reserves_STEER

As part of the joint effort between the US Virgin Islands Department of Planning and Natural Resources and the NOAA Centers for Coastal and Ocean Science (NCCOS), to conduct a Reserves-wide impact assessment of landbased sources of pollution and effects in the St. Thomas East End Reserves (STEER), contaminant body burdens in coral (*Porites astreoides*) and conch (*Strombus gigas*) were assessed. Samples of coral and conch were collected from five previously identified strata and analyzed for more than 150 chemical contaminants including heavy metals (e.g. cadmium, copper, mercury and zinc) and organic contaminants (e.g. polycyclic aromatic hydrocarbons, polychlorinated biphenyls and pesticides). Chemical body burdens varied broadly in both coral and conch tissue. Chemical body burden levels found in coral and conch from the STEER were put into context by comparing values to published data from other reef locations. The levels of contaminants found in coral from the STEER were mostly within similar concentration ranges, as reported in corals from other reef areas in the Caribbean. A strong manganese to lead correlation was seen, and may indicate terrigenous sources for this metal found in the coral.

Conch from the STEER had lower contaminant body burdens relative to published data on conch from south Florida and some other areas of the Caribbean. Where available, contaminant body burdens in conch were compared to FDA maximum permissible action levels for molluscan shellfish consumption. The conch samples from the STEER had contaminant body burdens lower than their available respective FDA action levels. A significant correlation between higher concentrations of butyltins closer to shore existed for conch, despite relatively low overall concentrations as compared to previous results from the region.

Characterization of Fish Communities and Associated Benthic Habitats in the St. Thomas East End Reserves (STEER)

Bauer, L.J., J. Vander Pluym, C.F.G. Jeffrey, C. Caldow, A.M. Hoffman, and A.V. Uhrin. 2014. Characterization of Fish Communities and Associated Benthic Habitats in the St. Thomas East End Reserves (STEER). NOAA Technical Memorandum 185. Silver Spring, MD. 67 pp.

<https://repository.library.noaa.gov/view/noaa/14281>

Located at the southeastern end of St. Thomas, U.S. Virgin Islands (USVI), the St. Thomas East End Reserves (STEER) is a collection of several existing protected areas, including Cas Cay/Mangrove Lagoon, St. James, and Compass Point Salt Pond Marine Reserves and Wildlife Sanctuaries (MRWS). The marine areas of the STEER include a diverse array of habitats, including coral reefs, lagoons, seagrass beds, and mangrove forests, which support numerous fish and shellfish species. In addition, STEER is an important

recreational and commercial resource for the island of St. Thomas. The adjacent watershed is considered highly impacted and urbanized, with numerous sources of point and non-point pollution, leading to concerns about potential contamination and its effects on marine resources. To fill knowledge gaps and inform management of the STEER, several complementary projects were developed in coordination with STEER's Core Management Team, including an assessment of biological communities and chemical contamination within the STEER.

In support of this work, field surveys were conducted in June 2012 across coral reef, unconsolidated sediment and mangrove habitats to characterize the fish and benthic communities in the STEER marine ecosystem. Sites were randomly selected within strata to ensure coverage entire study region. A total of 80 sites were surveyed during the two-week field mission, including nine in hardbottom areas outside the STEER boundaries that were of interest to natural resource managers. The surveys of benthic habitats, fish communities, marine debris, and macroinvertebrates were conducted within 25x4 m transects (100m²) along a random heading.

Turf algae dominated the biotic composition of hardbottom sites, followed by macroalgae, hard (scleractinian) sponges, cyanobacteria & filamentous algae, and soft corals (gorgonians). Hard coral cover averaged 5.2%, with the greatest coverage observed in the southern study area, particularly on the southwest reef tract near Long Point. Mustard hill coral (*Porites astreoides*) was the most abundant species, followed by boulder star coral (*Orbicella annularis* complex), lesser starlet coral (*Siderastrea radians*), symmetrical brain coral (*Pseudodiploriastrigosa*), massive starlet coral (*Siderastrea siderea*), and finger coral (*P. porites*). Percent cover at mangrove and unconsolidated sediment locations was comprised mostly of seagrass and macroalgae, with smaller amounts of other benthic flora and fauna.

Mangrove sites exhibited the highest mean total fish density whereas mean levels of biomass were highest on hardbottom. Locations with both high density and biomass included sites on hardbottom adjacent to Cow and Calf Rocks, a patch reef southwest of Great St. James Island, a mangrove site near the false entrance to Mangrove Lagoon, and on the southwest reef tract near Long Point, outside the STEER boundary. Species composition varied across benthic habitats within the STEER. Species such as schoolmaster, gray snapper, and herring were most often associated with mangroves, while groupers and surgeonfish were more closely associated with coral reef and hardbottom. Other species, such as yellowtail snapper, were present throughout the STEER, but size-frequency patterns differed across habitat types. In general, both benthic and fish community metrics in the STEER were similar to other U.S. Caribbean monitoring locations sampled with the same methodology.

Benthic Habitats of Fish Bay, Coral Bay and the St. Thomas East End Reserve

Costa, B.M., M.S. Kendall, K. Edwards, G. Kagesten, and T.A. Battista. 2013. Benthic habitats of Fish Bay, Coral Bay and the St. Thomas East End Reserve. NOAA Technical Memorandum NOS NCCOS 175. Silver Spring, MD. 68 pp.

<https://repository.library.noaa.gov/view/noaa/794>

NOAA's National Centers for Coastal Ocean Science Biogeography Branch has mapped and characterized large portions of the coral reef ecosystems inside the U.S. coastal and territorial waters, including the U.S. Caribbean. The complementary protocols used in these efforts have enabled scientists and managers to quantitatively and qualitatively compare marine ecosystems in tropical U.S. waters. The Biogeography Branch used similar protocols to generate new benthic habitat maps for Fish Bay, Coral Bay and the St. Thomas East End Reserve (STEER). While this mapping effort marks the third time that some of these shallow-water habitats (≤ 40 m) have been mapped, it is the first time that nearly 100% of the

seafloor has been characterized in each of these areas. It is also the first time that high-resolution imagery describing seafloor depth has been collected in each of these areas. Consequently, these datasets provide new information describing the distribution of coral reef ecosystems and serve as a spatial baseline for monitoring change in the Fish Bay, Coral Bay and the STEER.

Benthic habitat maps were developed for approximately 64.3 km² of the seafloor in and around Fish Bay, Coral Bay and the STEER. Twenty-seven percent (17.5 km²) of these habitat maps describe the seafloor inside the boundaries of the STEER, the Virgin Islands National Park and the Virgin Islands Coral Reef National Monument. The remaining 73% (46.8 km²) describe the seafloor outside of these MPA boundaries. These habitat maps were developed using a combination of semi-automated and manual classification methods. Habitats were interpreted from aerial photographs and LiDAR (Light Detection and Ranging) imagery. In total, 155 distinct combinations of habitat classes describing the geology and biology of the seafloor were identified from the source imagery.

Unconsolidated sediments dominate these three areas, with rhodoliths being the most common habitat on the bank/shelf and sand colonized by seagrass being most common habitat inside Fish Bay, Coral Bay and the STEER's boundary. Live coral cover rarely exceeded 10%, only constituting 6.5% of the total mapped area. Most of the habitat features with high amounts of live coral cover were located outside of existing marine protected area boundaries. The overall accuracies (corrected for proportional bias) for these habitat map were 93.0% for major structure, 75.1% for detailed structure, 86.2% for percent hardbottom, 86.5% for major cover and 74.5% for detailed cover. The live coral and dominant coral type classes had 83.3% and 88.2% thematic accuracies respectively, although these classes should be used with caution. These numbers are similar to the other benthic habitat maps created by NCCOS's Biogeography Branch. As a result, these digital map products can be used with confidence by scientists and resource managers for a multitude of different applications.

An assessment of butyltins and metals in sediment cores from the St. Thomas East End Reserves, USVI
Hartwell, S. I., Apeti, D. A., Mason, A. L., & Pait, A. S. (2016). An assessment of butyltins and metals in sediment cores from the St. Thomas East End Reserves, Usvi. *Environmental Monitoring and Assessment*, 188(11).

<https://repository.library.noaa.gov/view/noaa/16055>

Tributyltin (TBT) concentrations near a marina complex in Benner Bay on St. Thomas, US Virgin Islands, were elevated relative to other areas in a larger study of the southeastern shore of the island. At the request of the USVI Coastal Zone Management Program, sediment cores and surface sediment samples were collected to better define the extent and history of TBT deposition in the vicinity of Benner Bay. The sediment cores were sectioned into 2-cm intervals and dated with ²¹⁰Pb and ¹³⁷Cs. The core sections and the surface samples were analyzed for butyltins and 16 elements. Deposition rates varied from 0.07–5.0 mm/year, and were highest in the marina complex. Core ages ranged from 54 to 200 years. The bottoms of the cores contained shell hash, but the top layers all consisted of much finer material. Surface concentrations of TBT exceeded 2000 ng Sn/g (dry weight) at two locations. At a depth of 8 cm TBT exceeded 8800 ng Sn/g in the marina complex sediment. Based on the ratio of tributyltin to total butyltins, it appears that the marina sediments are the source of contamination of the surrounding area. There is evidence that vessels from neighboring islands may also be a source of fresh TBT. Copper concentrations increase over time up to the present. Gradients of virtually all metals and metalloids extended away from the marina complex. NOAA sediment quality guidelines were exceeded for As, Pb, Cu, Zn, and Hg.

Mangroves buffer marine protected area from impacts of Bovoni Landfill, St. Thomas, United States

Virgin Islands

Keller, J. A., Wilson Grimes, K., Reeve, A. S., & Platenberg, R. (2017). Mangroves buffer marine protected area from impacts of Bovoni Landfill, St. Thomas, United States Virgin Islands. *Wetlands Ecology and Management*, 25(5), 563–582.

<https://link.springer.com/article/10.1007/s11273-017-9536-0>

One of the many ecosystem services that mangrove systems provide is their ability to act as buffers between the land and sea, protecting human development from storm surges while also trapping terrestrial pollutants. In St. Thomas, United States Virgin Islands, an ecologically-important mangrove system sits between Bovoni Landfill and a marine protected area, the St. Thomas East End Reserves. To characterize the physical processes driving this mangrove system, groundwater hydraulic head, sediment cores, sediment surface temperatures, and water and sediment chemistry were analyzed. Hydraulic head data from January to November 2014 were used to determine vertical and horizontal groundwater flow directions. Water and sediment samples were tested for heavy metals potentially originating from Bovoni Landfill. Stratigraphic context was provided by the sediment cores and used to infer past environmental conditions. Subsamples were taken from these cores and analyzed for dry bulk density, organic matter content (through loss on ignition), and heavy metals using electron microscopy. Vertical groundwater velocity and sediment porosity were determined by calibrating a one-dimensional finite-difference heat transport model to near-surface temperature data from depths of 0, 7, 14, and 21 cm. Groundwater was found to flow from the terrestrial upland, through the mangroves, and toward the ocean for the majority of the study. Flow reversal was seen after long periods of little precipitation. In the surface and shallow groundwater samples, trace metal concentrations were measured from 23 to 105 µg/L for Cr, Ni, Sn, and Zn. Sediment samples collected near the landfill contained Bi, Cr, Sn, Ti, and Zn. Very slow flushing of sediment pore water was indicated by the vertical groundwater velocities produced from the heat transport model, which ranged from $\pm 10^{-7}$ to $\pm 10^{-9}$ m/s. This study revealed that the mangrove system is an important buffer system protecting the outer lagoon of the marine protected area from terrestrial contaminants via sediment trapping and slowing of water fluxes from the upland area into the lagoon. The results presented here can be used as a baseline for future studies and are relevant to local managers and to landfill closure plans.

An assessment of nutrients and sedimentation in the St. Thomas East End Reserves, US Virgin Islands

Pait AS, Galdo FR Jr, Ian Hartwell S, Apeti DA, Mason AL. An assessment of nutrients and sedimentation in the St. Thomas East End Reserves, US Virgin Islands. *Environ Monit Assess*. 2018 Apr 9;190(5):270.

<https://pubmed.ncbi.nlm.nih.gov/29633032/>

Nutrients and sedimentation were monitored for approximately 2 years at six sites in the St. Thomas East End Reserves (STEER), St. Thomas, USVI, as part of a NOAA project to develop an integrated environmental assessment. Concentrations of ammonium (NH₄⁺) and dissolved inorganic nitrogen (DIN) were higher in Mangrove Lagoon and Benner Bay in the western portion of STEER than in the other sites further east (i.e., Cowpet Bay, Rotto Cay, St. James, and Little St. James). There was no correlation between rainfall and nutrient concentrations. Using a set of suggested nutrient thresholds that have been developed to indicate the potential for the overgrowth of algae on reefs, approximately 60% of the samples collected in STEER were above the threshold for orthophosphate (HPO₄⁼), while 55% of samples were above the DIN threshold. Benner Bay had the highest sedimentation rate of any site monitored in STEER, including Mangrove Lagoon. There was also an east to west and a north to south gradient in sedimentation, indicative of higher sedimentation rates in the western, more populated areas surrounding STEER, and sites closer to the shore of the main island of St. Thomas. Although none of the sites had a

mean or average sedimentation rate above a suggested sedimentation threshold, the mean sedimentation rate in Benner Bay was just below the threshold.

An Assessment of Nutrients, Sedimentation, and Total Suspended Solids (TSS) in the St. Thomas East End Reserves (STEER)

Pait, A.S., F.R. Galdo Jr, S.I. Hartwell, A.L. Mason, D.A. Apeti, C.F.G. Jeffrey, A.M. Hoffman, and S.J. Pittman. 2015. An assessment of nutrients, sedimentation, and total suspended solids (TSS) in the St. Thomas East End Reserves (STEER). NOAA Technical Memorandum NOS/NCCOS 184. Silver Spring, MD. 66pp.

<https://repository.library.noaa.gov/view/noaa/942>

This is the fifth report from a project to assess land-based sources of pollution (LBSP) and their effects, and to characterize the biological community within the St. Thomas East End Reserves (STEER) in St. Thomas, USVI. Here we summarize the results of nearly two years of monthly monitoring for nutrients, sedimentation, and total suspended solids (TSS) at six sites in the STEER.

Concentrations of nutrients in the western part of the STEER and in nearshore areas were significantly higher than in the rest of the STEER. Specifically, ammonium (NH₄⁺), nitrite (NO₂⁻), and dissolved inorganic nitrogen (DIN) were higher in Mangrove Lagoon and Benner Bay than the other sites (i.e., Cowpet Bay, Rotto Cay, Saint James Island, and Little St. James Island). There did not appear to be a correlation between rainfall and nutrients. Using a set of nutrient concentrations, above which may be associated with the overgrowth of algae on reefs, approximately 60% of the samples collected in the STEER were above the threshold for orthophosphate (HPO₄⁼), while 55% of samples were above the DIN threshold, indicating the reefs in the STEER may be at risk to blooms of macroalgae and phytoplankton, as a result of these elevated concentrations.

Benner Bay had the highest sedimentation rate of any site in the STEER, including Mangrove Lagoon. There was also an east to west and a north to south gradient in sedimentation, indicative of higher sedimentation rates in the western, more populated areas surrounding the STEER, and in the more nearshore sites. Rainfall was not correlated with sedimentation. Although none of the sites had a mean or average sedimentation rate above a proposed threshold that could indicate impacts to coral reefs, the mean sedimentation rate in Benner Bay was just below the proposed threshold.

TSS also tended to be higher in the western and nearshore areas of the STEER. There appeared to be no correlation between rainfall and TSS in the STEER. Finally, none of the sites had a mean TSS value that exceeded a threshold above which has been shown to impact coral reefs, although the mean Benner Bay TSS during the study was close to the threshold.

An Integrated Environmental Assessment of the St. Thomas East End Reserves (STEER)

Pait, A.S., S.I. Hartwell, L.J. Bauer, D.A. Apeti, and A.L. Mason. 2016. An Integrated Environmental Assessment of the St. Thomas East End Reserves (STEER). NOAA Technical Memorandum NOS NCCOS 202. Silver Spring, MD. 219 pp.

<https://www.coris.noaa.gov/activities/STEER/welcome.html>

The St. Thomas East End Reserves, or STEER, is a collection of Marine Reserves and Wildlife Sanctuaries (MRWS) located on the southeastern end of the island of St. Thomas, U.S. Virgin Islands. With an area of approximately 9.6 km², the STEER contains extensive mangroves and seagrass beds, along with coral reefs, lagoons and cays. Within the surrounding watershed are numerous marinas and hotels/

resorts, a landfill serving both St. Thomas and St. John, an EPA Superfund site, residential areas with individual sewage treatment systems, and in the nearshore environment live-aboard and derelict boats, all of which can be sources of pollution to the STEER.

Discussions with environmental managers from the USVI Department of Planning and Natural Resources (DPNR) at a meeting in 2009 highlighted the STEER as a priority area. It was noted during these discussions that the input of pollutants to the STEER, many from land-based sources of pollution (LBSP) were thought to be impacting the health of the natural resources living there. DPNR managers also noted there were significant data and information gaps, particularly in terms of the chemical contaminants present, their concentrations, and effects, along with the overall health of the biological communities within the STEER. To address these needs, NOAA/NCCOS' Center for Coastal Monitoring and Assessment (CCMA) worked with DPNR and other local partners to design a project that was subsequently funded by NOAA's Coral Reef Conservation Program (CRCP), to develop an integrated chemical and biological characterization of the STEER. Partners in the project included the USVI DPNR Divisions of Coastal Zone Management, Fish and Wildlife, and Environmental Protection, along with the University of the Virgin Islands, and The Nature Conservancy.

In 2011, sediment samples were collected throughout the STEER using a stratified random sampling design and subsequently analyzed for chemical contaminants, toxicity, and benthic infaunal community condition. This approach allowed for statistical comparisons between the strata established in the STEER. Beginning in 2012, the University of the Virgin Islands began monthly monitoring of nutrients, sedimentation and total suspended solids (TSS) at selected targeted sites. Also in 2012, the first-ever biological survey of the entire STEER was conducted by CCMA, NCCOS' Center for Coastal Fisheries and Habitat Research (CCFHR) and The Nature Conservancy SCUBA divers. During that field mission, samples of coral and conch were also collected at targeted sites, for analysis of chemical contaminants.

Results from the analysis of sediments collected in 2011 indicated elevated levels of certain contaminants in northern Benner Bay. A series of follow-up conversations with DPNR managers resulted in additional fieldwork, in which both surface and sediment core samples were collected and analyzed for chemical contaminants in 2013.

The results from the project in the STEER are contained in this report, which is organized into 10 chapters, representing the interrelated studies conducted with local partners. Chapter 1 provides background information on the project and an overview of the study area. Chapter 2 describes the benthic habitat mapping effort, which resulted in a revised high-resolution map of the benthic environments in the STEER. Chapter 3 presents the results from the survey of fish communities and associated benthic habitats. Chapter 4 summarizes the first-ever quantification of sediment contaminants and sediment toxicity throughout the STEER. Chapter 5 presents the results of a follow-up effort in northern Benner Bay, to better characterize the distribution of contaminants in surface sediments, and through sediment coring, assess chemical contaminants in deeper, older sediments. Chapter 6 contains an assessment of water-soluble contaminants at six sites in the STEER, including an upstream site in Turpentine Gut, using a series of passive water samplers. Chapter 7 summarizes the results of work to analyze coral, conch, and fish samples for chemical contaminants. Chapter 8 presents a histologic examination of tissues from the coral *Porites astreoides*, the same coral species analyzed for chemical contaminants. Chapter 9 summarizes the results of monitoring nutrients, sedimentation and total suspended sediments at six sites throughout the STEER for nearly two years. Finally, Chapter 10 provides a summary from the project along with a series of conclusions.

An Assessment of Chemical Contaminants Detected in Passive Water Samplers Deployed in the St. Thomas East End Reserves (STEER)

Pait, A.S., S.I. Hartwell, A.L. Mason, F.R. Galdo, Jr., R.A. Warner, C.F.G. Jeffrey, A.M. Hoffman, D.A. Apeti, and S.J. Pittman. 2013. An assessment of chemical contaminants detected in passive water samplers deployed in the St. Thomas East End Reserves (STEER). NOAA Technical Memorandum NOS/NCCOS 157. Silver Spring, MD. 22 pp.

https://www.ncei.noaa.gov/data/oceans/coris/library/NOAA/CRCP/project/20414/STEER-POCIS-Report_FINAL.pdf

This report is the second in a series from a project to assess land-based sources of pollution (LBSP) and effects in the St. Thomas East End Reserves (STEER) in St. Thomas, USVI, and is the result of a collaborative effort between NOAA's National Centers for Coastal Ocean Science, the USVI Department of Planning and Natural Resources, the University of the Virgin Islands, and The Nature Conservancy.

Passive water samplers (POCIS) were deployed in the STEER in February 2012. Developed by the US Geological Survey (USGS) as a tool to detect the presence of water soluble contaminants in the environment, POCIS samplers were deployed in the STEER at five locations. In addition to the February 2012 deployment, the results from an earlier POCIS deployment in May 2010 in Turpentine Gut, a perennial freshwater stream which drains to the STEER, are also reported.

A total of 26 stormwater contaminants were detected at least once during the February 2012 deployment in the STEER. Detections were high enough to estimate ambient water concentrations for nine contaminants using USGS sampling rate values. From the May 2010 deployment in Turpentine Gut, 31 stormwater contaminants were detected, and ambient water concentrations could be estimated for 17 compounds.

Ambient water concentrations were estimated for a number of contaminants including the detergent/surfactant metabolite 4-tertoctylphenol, phthalate ester plasticizers DEHP and DEP, bromoform, personal care products including menthol, indole, n,n-diethyltoluamide (DEET), along with the animal/plant sterol cholesterol, and the plant sterol beta-sitosterol. Only DEHP appeared to have exceeded a water quality guideline for the protection of aquatic organisms.

An Assessment of Chemical Contaminants, Toxicity and Benthic Infauna in Sediments from the St. Thomas East End Reserves (STEER)

Pait, A.S., S.I. Hartwell, A.L. Mason, R.A. Warner, C.F.G. Jeffrey, A.M. Hoffman, D.A. Apeti, F.R. Galdo Jr., and S.J. Pittman. 2013. An assessment of chemical contaminants, toxicity, and benthic infauna in sediments from the St. Thomas East End Reserves (STEER). NOAA Technical Memorandum NOS NCCOS 156. Silver Spring, MD. 70 pp.

<https://repository.library.noaa.gov/view/noaa/2713>

This report contains a chemical and biological characterization of sediments from the St. Thomas East End Reserves (STEER) in St. Thomas, U.S. Virgin Islands (USVI). The STEER Management Plan (published in 2011) identified chemical contaminants and habitat loss as high or very high threats and called for characterization of chemical contaminants as well as an assessment of their effects on natural resources. The baseline information contained in this report on chemical contaminants, toxicity, and benthic infaunal community composition can be used to assess current conditions, as well as the efficacy of future restoration activities.

In this phase of the project, 185 chemical contaminants, including a number of organic (e.g., hydrocarbons and pesticides) and inorganic (e.g., metals) compounds, were analyzed from 24 sites in the STEER. Sediments were also analyzed using a series of toxicity bioassays, including amphipod mortality, sea urchin fertilization impairment, and the cytochrome P450 Human Reporter Gene System (HRGS), along with a characterization of the benthic infaunal community.

Higher levels of chemical contaminants were found in Mangrove Lagoon and Benner Bay in the western portion of the study area than in the eastern area. The concentrations of polychlorinated biphenyls (PCBs), DDT (dichlorodiphenyltrichloroethane), chlordane, zinc, copper, lead, and mercury were above a NOAA sediment quality guideline at one or more sites, indicating impacts may be present in more sensitive species or life stages in the benthic environment. Copper at one site in Benner Bay, however, was above a NOAA guideline indicating that effects on benthic organisms were likely. The antifoulant boat hull ingredient tributyltin, or TBT, was found at the third-highest concentration in the history of NOAA's National Status and Trends (NS&T) Program, which monitors the Nation's coastal and estuarine waters for chemical contaminants and bioeffects. Unfortunately, there do not appear to be any established sediment quality guidelines for TBT. Results of the bioassays indicated significant sediment toxicity in Mangrove Lagoon and Benner Bay using multiple tests. The benthic infaunal communities in Mangrove Lagoon and Benner Bay appeared severely diminished.

Unpublished

Groundwater flow paths in the mangrove system surrounding Bovoni Landfill with the St. Thomas East End Reserves (STEER) a pilot study

Kristin Wilson, Ph.D., Andrew Reeve, Ph.D., Renata Platenberg, Ph.D.

The St. Thomas East End Reserve (STEER) includes 9.6 km² of "significant coastal, marine and fisheries resources" on the southeastern end of St. Thomas. Mangrove Lagoon, within STEER, contains the island's largest intact stand of mangroves and is considered one of St. Thomas' most important fish nurseries and an eco-tourism locations. Bovoni Landfill, an unlined landfill in operation since 1979 and under consent decree for non-compliance since 2012, abuts Mangrove Lagoon on the western edge of STEER. Water that infiltrates and percolates through landfill waste, produces leachate, a liquid that can contaminate groundwater, compromising human and ecological health. This pilot study measures groundwater chemistry, flowpaths, and flux rates across the mangrove system adjacent to Bovoni Landfill within Mangrove Lagoon and STEER. Preliminary results from hydraulic head data indicate that shallow groundwater flows toward the center of the mangrove swamp, where open water occurs. Hydraulic head measured in deeper wells indicates flow toward the southern portion of the wetland and outward toward the ocean. The majority of the sites have upward hydraulic gradients, indicating groundwater is discharging to the mangrove swamp. Rapid increases in water levels were recorded in data logging pressure sensors on January 28, February 22, February 26, 2014 indicating rapid influx of water into the mangrove swamp occurs during the highest tides and during high rainfall events. Water chemistry data (total dissolved nitrogen and heavy metals (zinc, chromium, lead, nickel, and tin)) reveal that surface water pathways may be more important in the delivery of contaminants to the mangrove fringe than groundwater pathways. Future work should: (1) continue monitoring efforts to understand the relationship between groundwater flowpaths and standing dead mangrove and open-water features, (2) increase the spatial and temporal resolution of water chemistry sampling, (3) process archived geologic cores to better understand potential stratigraphic controls of groundwater flowpaths, and (4) use computer models like USGS SEAWAT and FiPy to test alternative assumptions regarding groundwater flow. These findings are of direct management concern to STEER, Virgin Islands Waste Management Authority, Department of Planning and Natural Resources, and the Environmental Protection Agency.

An investigation into the temporal and spatial trends of contaminants in Mangrove Lagoon, St. Thomas East End Reserves (STEER), U.S. Virgin Islands

Thesis: P. Owen Clower

Mangroves provide many important ecosystem services. One of these includes the interception of land-based sources of pollutants thereby protecting nearshore waters, though this has rarely been field-tested. These pollutants include polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT) and its degradation products, butyltins, and trace metals. These pollutants can be dangerous to organisms and the environment; some, even in low concentrations. The St. Thomas East End Reserves (STEER) is a marine protected area on the east of St. Thomas and contains Mangrove Lagoon. Previous work shows Mangrove Lagoon to contain toxic levels of some contaminants, however, uncertainty remains in the degree to which mangroves intercept land-based sources of contaminants, the distribution of those contaminants in mangrove and lagoon sediments, sources and pathways of the contaminants, and potential effects of Hurricanes Irma and Maria on the distribution and concentrations of those contaminants. Therefore, this study seeks to: (1) explore if mangroves in Mangrove Lagoon provide an ecosystem service by intercepting land-based sources of pollutants, (2) document the current distribution of contaminants in both mangrove and lagoon sediments within Mangrove Lagoon to better determine potential sources and pathways of pollution, and (3) understand the effect that two Category five hurricanes, Irma and Maria, which impacted the U.S. Virgin Islands in September of 2017, had on contaminant concentrations in Mangrove Lagoon. A total of 38 surface sediment samples (upper 0-5cm) were collected in July 2018 (19 paired lagoon and mangrove samples). Seven of the lagoon locations were ones that had been previously sampled in 2010-2011 by Pait et al. (2014). All samples were sent to TDI Brooks International and analyzed for sediment grain size, tributyltin (TBT), copper, arsenic, zinc, mercury, silver, and eleven other metals. The 7 re-sampled sites were also analyzed for PAHs, PCBs, and DDT to allow for additional historical comparisons. To compare concentrations of contaminants between 2010-2011 and 2018 a paired t-test was used, and a matched pairs t-test was used to analyze the concentrations of contaminants between mangrove and lagoon sediment. A Wilcoxon's-signed rank test was used if assumptions of a t-test were not met. Concentrations at potentially toxic levels in Mangrove Lagoon were assessed by comparing contaminant concentrations to stated National Oceanic & Atmospheric Administration Sediment Quality Guidelines Effects Range-low (ERL) and Effects Range-Median (ERM) values for each contaminant. Contaminants in Mangrove Lagoon currently exceed toxic concentrations for most samples. Across the 38 samples taken in 2018, 31 of them exceeded at least one ERL threshold and 16 samples exceeded at least two ERL thresholds. ERL thresholds were exceeded for copper (29/38), arsenic (14/38), zinc (6/38), mercury (2/38), and silver (2/38); zinc recorded one sample above the ERM (M15). Most contaminant levels did not significantly differ between mangrove and lagoon samples. Only, aluminum ($p=0.0072$), cadmium ($p=0.0014$), silver ($p=0.0288$), nickel ($p=0.0012$), and iron ($p=0.0160$) had greater concentrations in lagoon sediment, while antimony ($p=0.0002$) had a greater concentration in mangrove sediments. Hurricanes Irma and Maria did not seem to impact contaminant levels in Mangrove Lagoon. Only selenium ($p=0.016$), mercury ($p=0.0416$), chromium ($p=0.0312$), silicon ($p=0.0063$), and TBT ($p=0.0430$) had significantly higher concentrations in 2010-2011, compared to 2018. Together, these results show sustained contamination of Mangrove Lagoon, but that conditions are improving as contaminant concentrations that exceeded ERL thresholds were less than historical values for re-sampled sites. Further, mangroves in this system may not be intercepting pollutants which may be for a variety of reasons including, the long history of historical pollution, and the increase in dead and damaged mangroves after Hurricanes Irma and Maria. Action, such as following the 2013 STEER Management Plan, needs to be taken to curb continued contaminant input into this important marine protected area.

APPENDIX E. 2021-2022 STEER MANAGEMENT PLAN WORKSHOP SERIES ATTENDEES MASTER LIST

In 2021-2022 DPNR CZM hosted a STEER Management Plan Update Workshop Series where four workshops were held with technical and local experts to guide appropriate revisions to the 2011 plan.

Hosts: Kerrin Toner (NOAA Coastal Management Fellow), Hilary Lohmann (Coastal Resilience Coordinator)

DPNR

Jean-Pierre Oriol (Commissioner)

CZM

Marlon Hibbert (Director)

Kristina Edwards (Education and Outreach Coordinator)

Pedro Nieves (GIS Specialist)

Anita Nibbs (Environmental Planner III)

Caroline Pott (STX East End Marine Park Coordinator)

DFW

Nicole Angeli (Director)

Sennai Habtes (Chief of Fisheries)

Lincoln Critchley (Wildlife Biologist III)

Julia Plotkin (Environmental Specialist I)

Danielle Olive (Fisheries Biologist I)

DEP

Austin F. Callwood (Director)

Mary Stiehler (Environmental Program Manager)

UVI

Kristin Wilson Grimes (Ph.D., Research Assistant Professor)

Richard Nemeth (Ph.D., Research Professor)

Allie Durdall (Watershed and Marine Technician)

NOAA

Leslie Henderson (USVI CZ/Coral Management Liaison)

Tony Pait (Ph.D. Environmental Toxicologist)

US FWS

Jaime Yrigoyen (Fish and Wildlife Biologist)

Felix Lopez (Ecologist/Contaminants Specialist)

Blue Flag

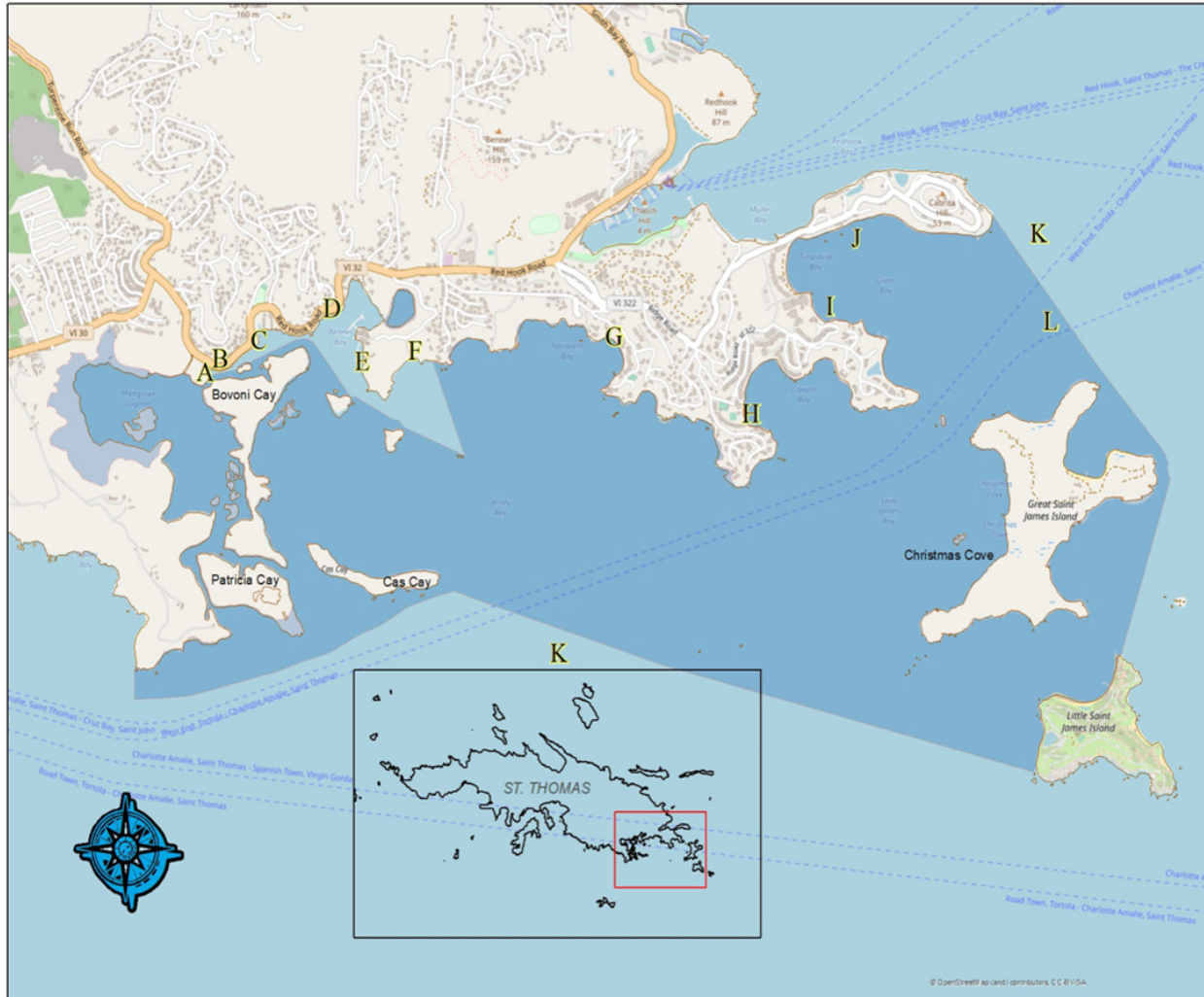
Valerie Peters (Executive Director)

2011 STEER Core Team

Anne Marine Hoffman

Jeanne Brown

APPENDIX F. 2021 PUBLIC USE SURVEY



The St. Thomas East End Reserves (STEER) is indicated in the darker blue area of the map.

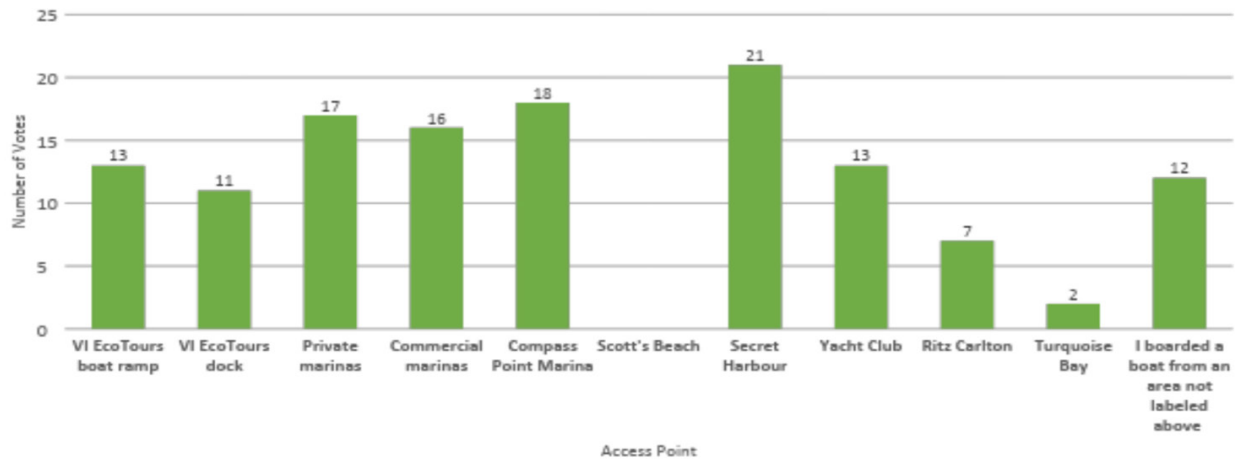
This voluntary public survey gives DPNR an idea of the types and popularity of different activities happening in and around STEER. Understanding the activities enjoyed in and around STEER informs opportunities for messaging, citizen science, and how people relate to the environment.

From where do you access the waters indicated as STEER? Check all that apply.*

Use the letter labels on the map for reference.

| | | |
|---|---|---|
| <input type="checkbox"/> A- VI EcoTours boat ramp | <input type="checkbox"/> B- VI EcoTours dock | <input type="checkbox"/> C- Private marinas |
| <input type="checkbox"/> D- Commercial marinas | <input type="checkbox"/> E- Compass Point Marina | <input type="checkbox"/> F- Scott's Beach |
| <input type="checkbox"/> G- Secret Harbour | <input type="checkbox"/> H- Yacht Club | <input type="checkbox"/> I- Ritz Carlton |
| <input type="checkbox"/> J- Turquoise Bay | <input type="checkbox"/> K- I boarded a boat from an area not labeled above | <input type="checkbox"/> L- passenger ferry |
| <input type="checkbox"/> Other | | |

From where do you access the waters indicated as STEER?

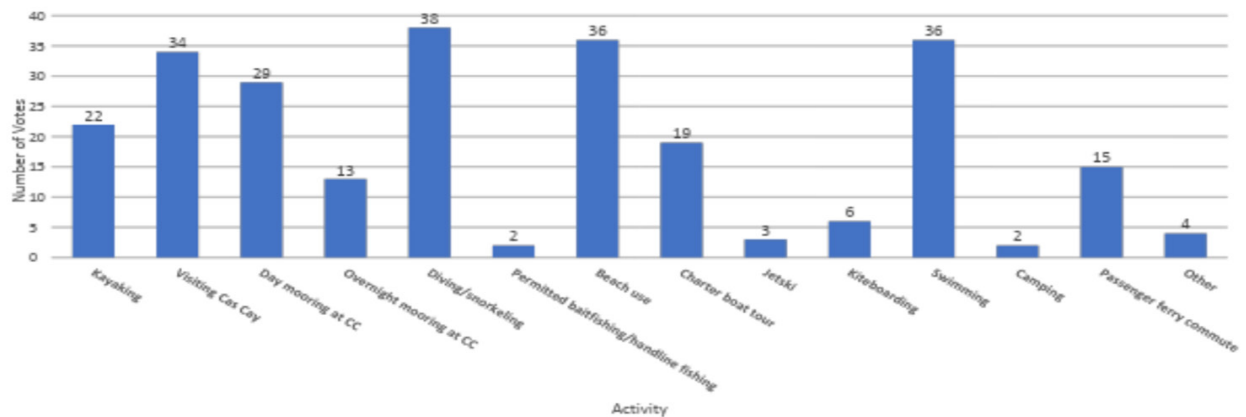


What activities do you do in the area indicated as STEER? Check all that apply.*

Use the labeled areas on the map for reference.

| | | |
|---|--|--|
| <input type="checkbox"/> Kayaking | <input type="checkbox"/> Visiting Cas Cay | |
| <input type="checkbox"/> Day mooring at Christmas Cove | | |
| <input type="checkbox"/> Overnight mooring at Christmas Cove | <input type="checkbox"/> Diving/snorkeling | |
| <input type="checkbox"/> Baitfishing/handline fishing (permit required) | <input type="checkbox"/> Beach use | |
| <input type="checkbox"/> Charter boat tour | <input type="checkbox"/> Jet ski | <input type="checkbox"/> Kiteboarding |
| <input type="checkbox"/> Swimming | <input type="checkbox"/> Camping | <input type="checkbox"/> Passenger ferry commute |
| <input type="checkbox"/> Other | | |

What activities do you do in the area indicated as STEER?

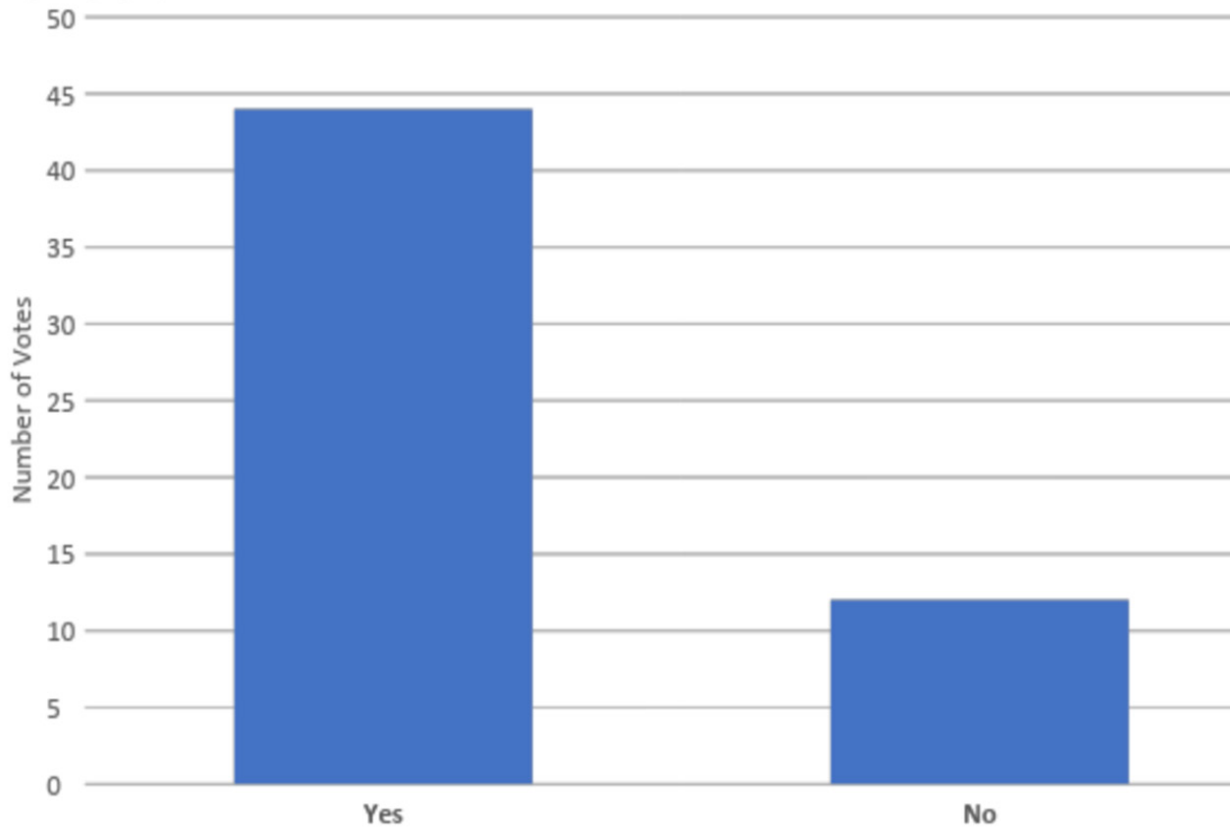


Did you know that STEER is a protected area?

Yes

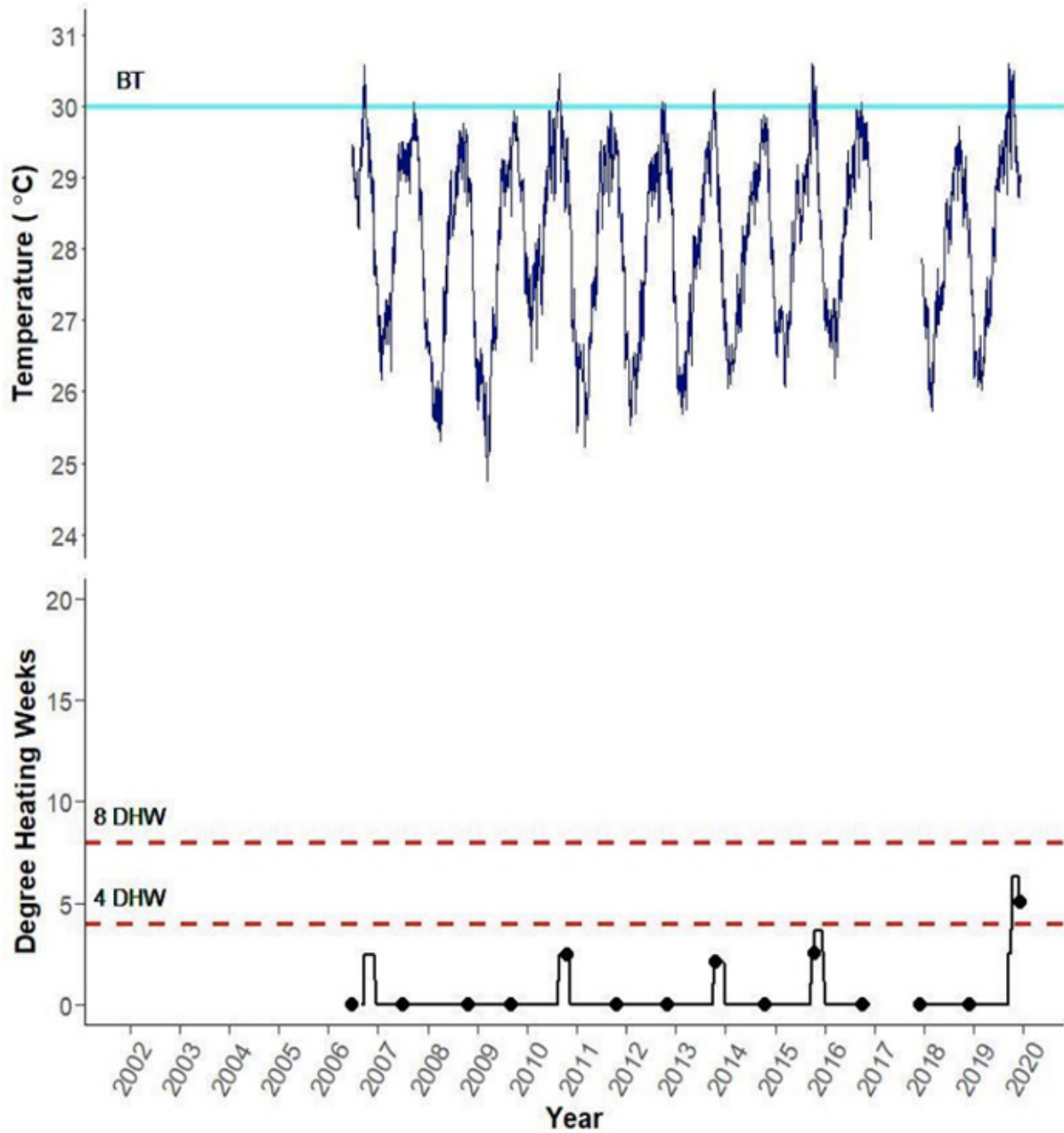
No

Did you know that STEER is a protected area?

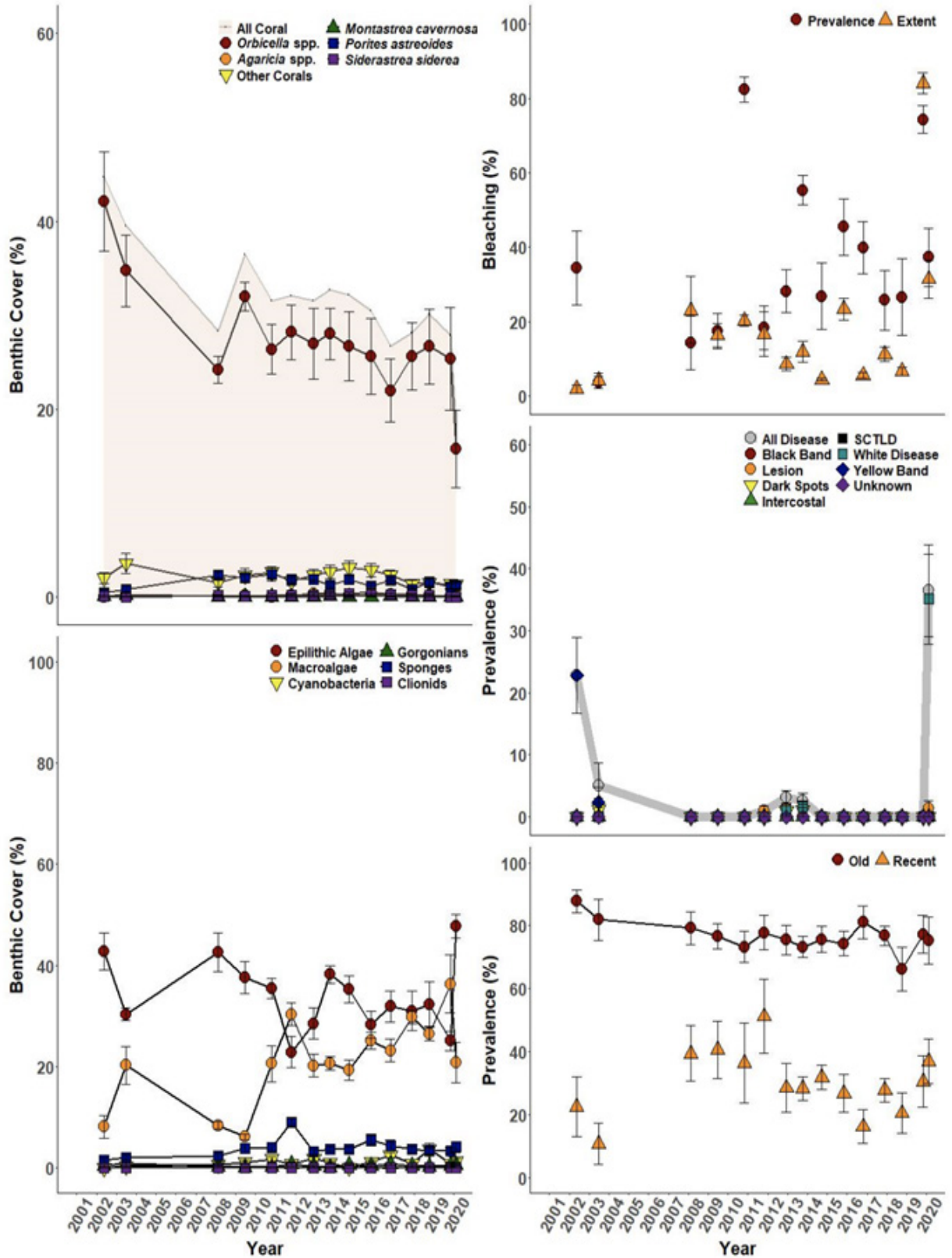


APPENDIX G. TERRITORIAL CORAL REEF MONITORING PROGRAM (TCRMP) STEER DATA
COCULUS ROCK

Coculus Rock benthic temperature record (7m depth)



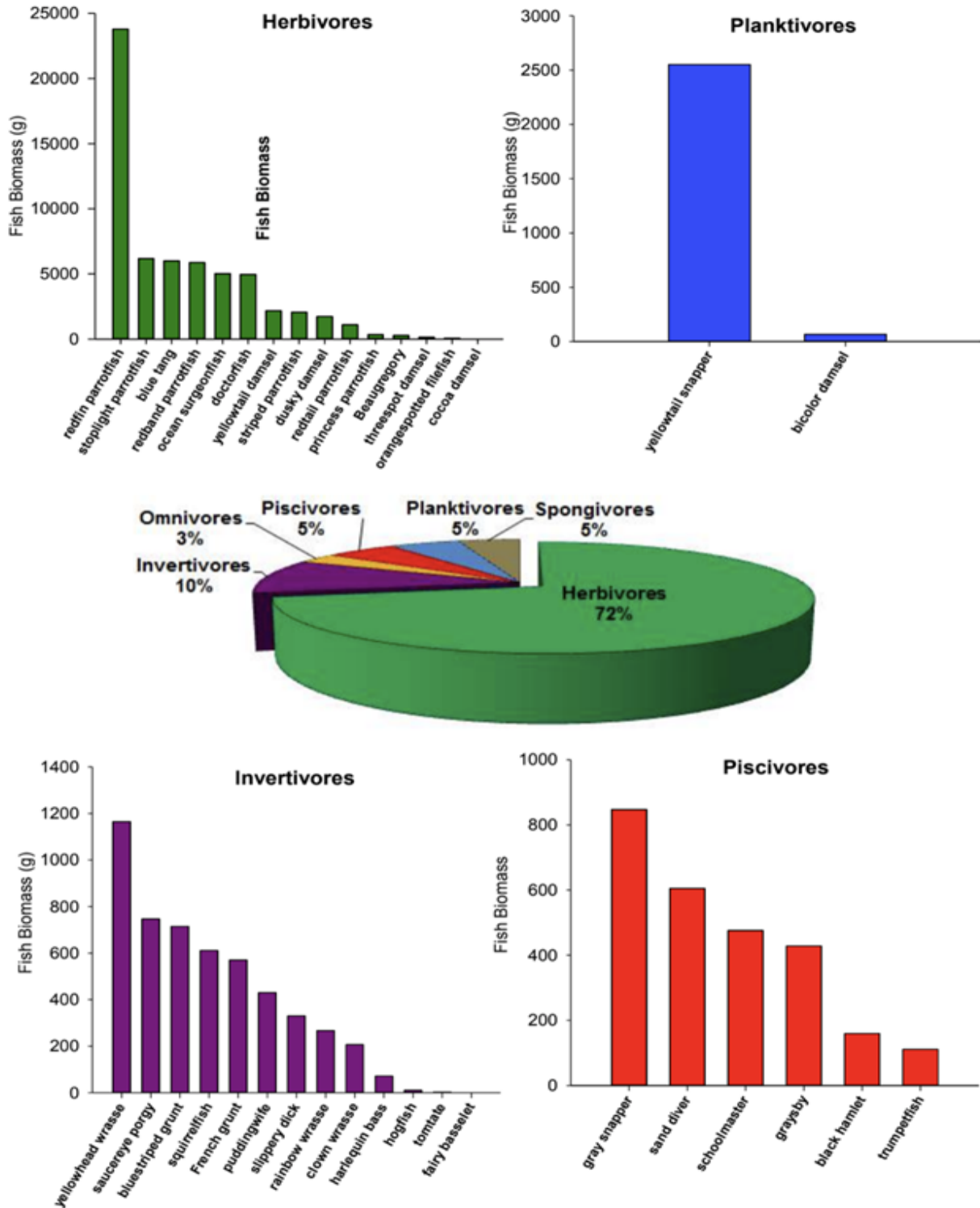
Coculus Rock benthic cover and coral health through time (mean \pm SE).



Coculus Rock Fish Communities

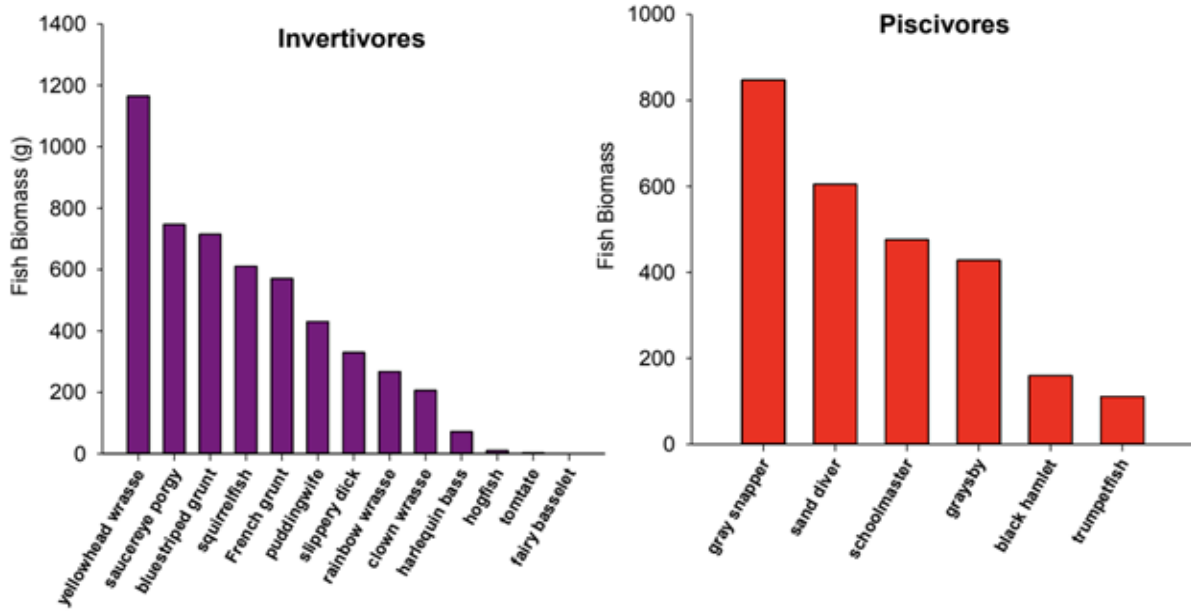
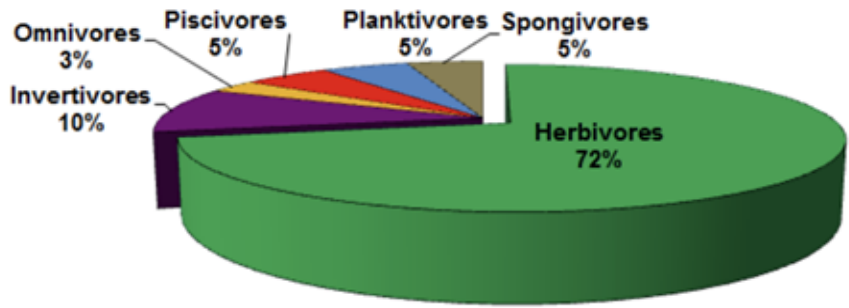
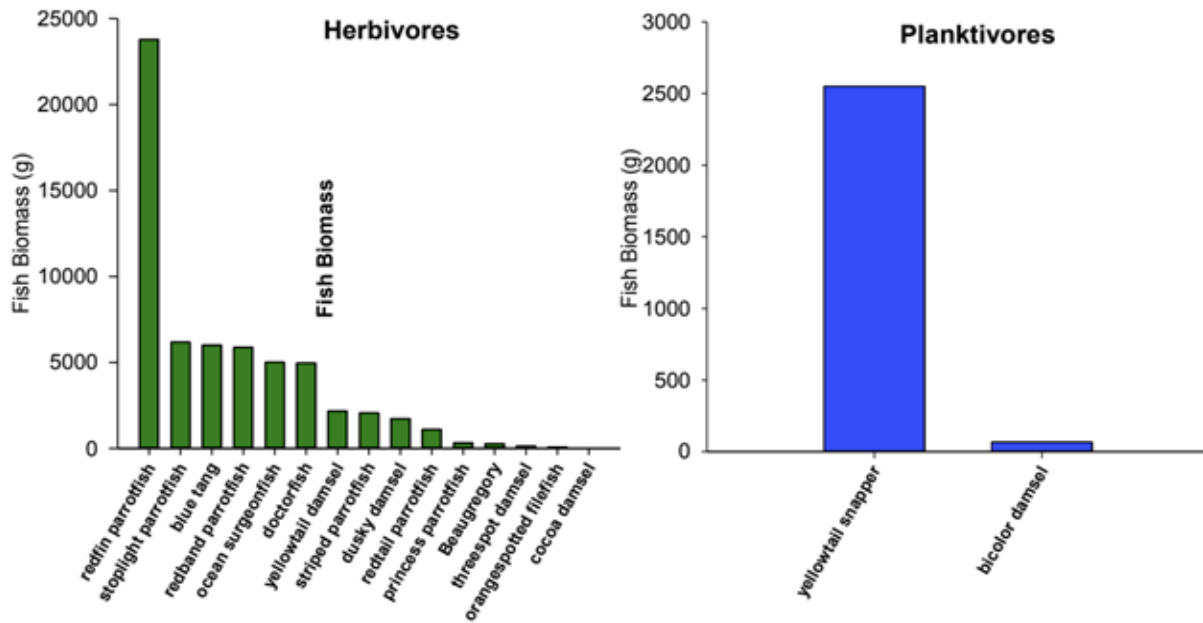
2012

The Coculus Rock fish community by absolute and relative biomass.



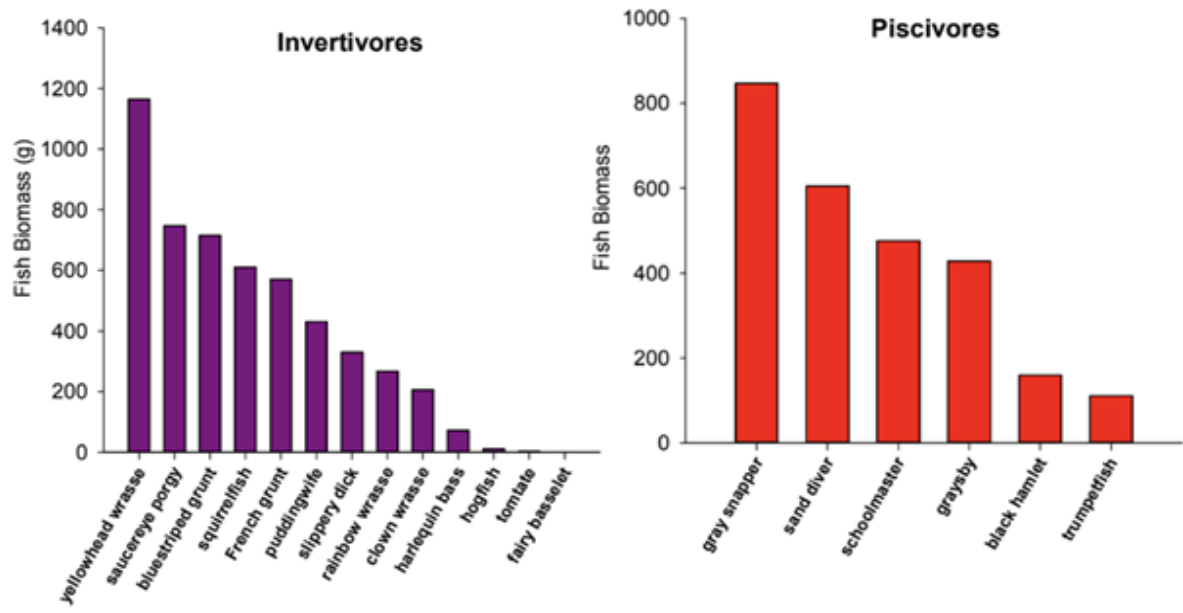
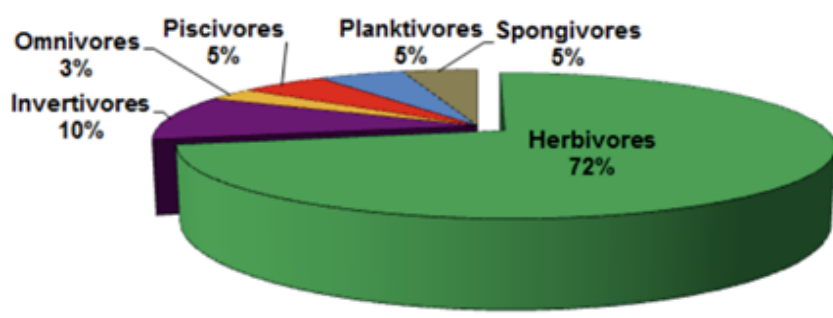
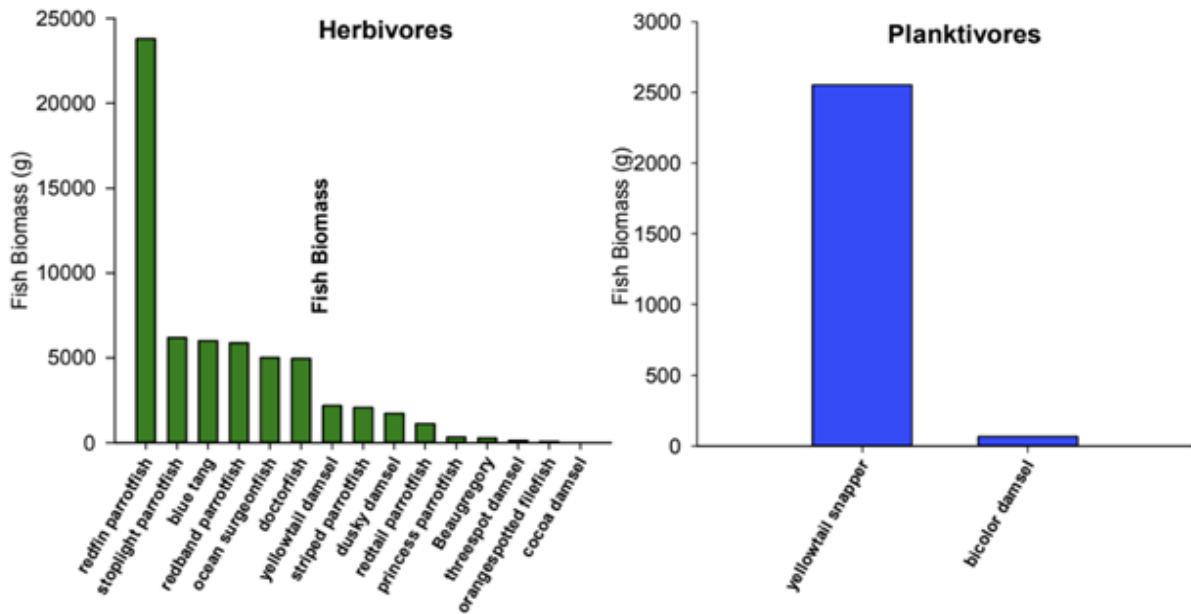
2014

The Cocolus Rock fish community by absolute and relative biomass.



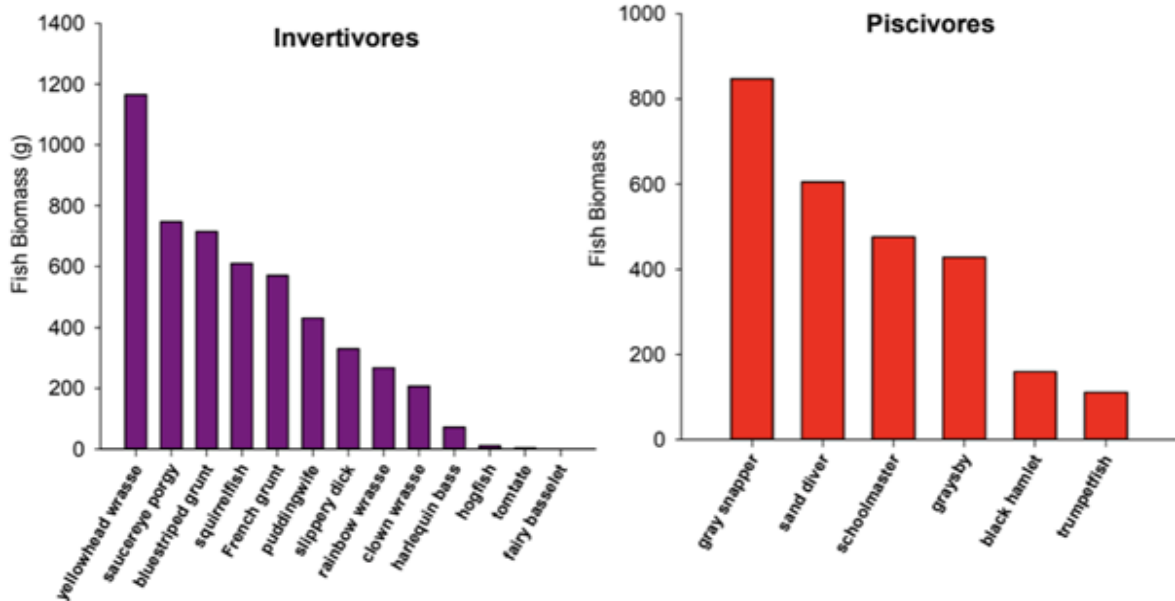
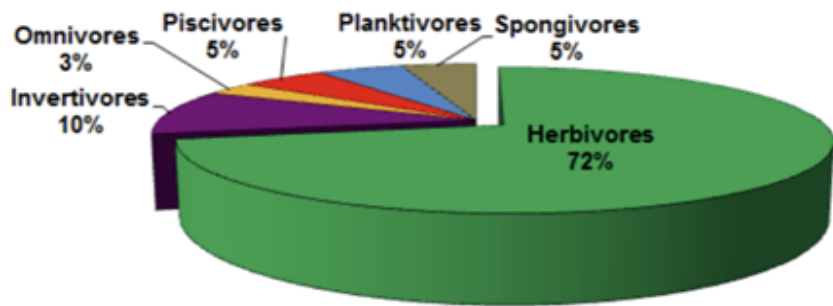
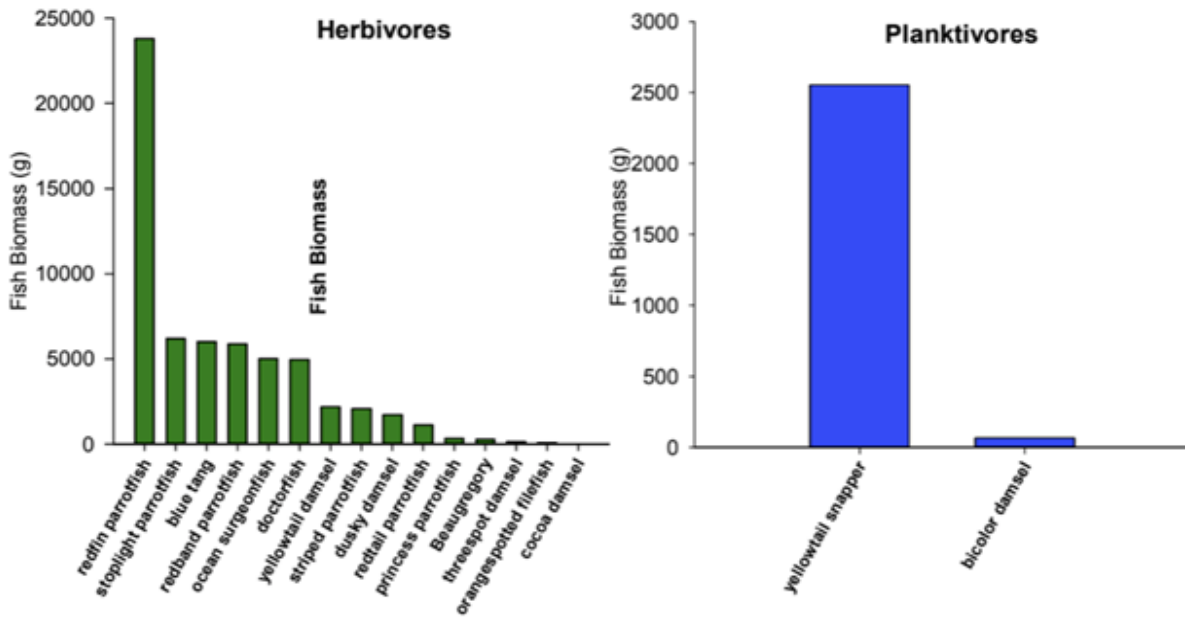
2015

The Cocolus Rock fish community by absolute and relative biomass.



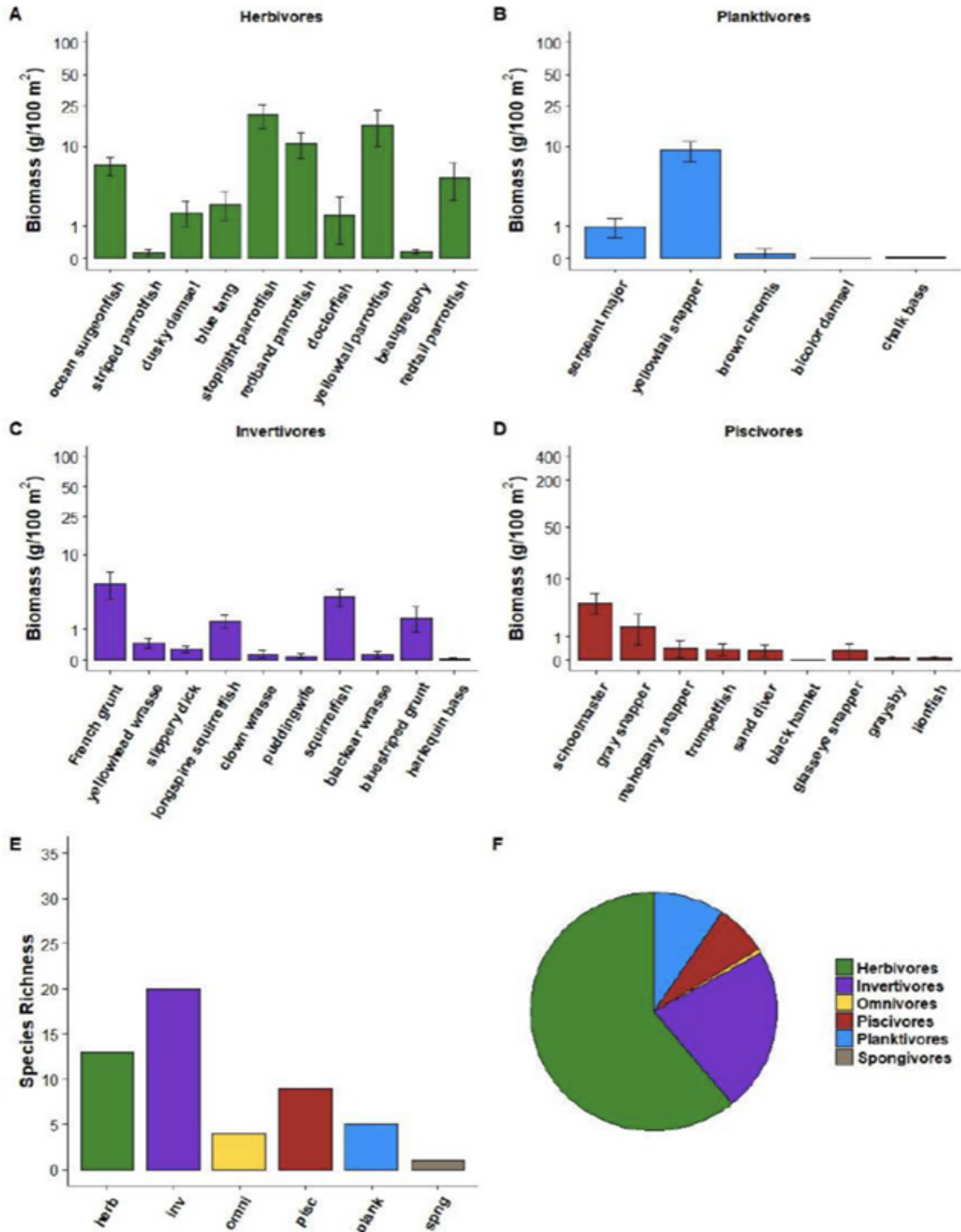
2016

The Cocolus Rock fish community by absolute and relative biomass.



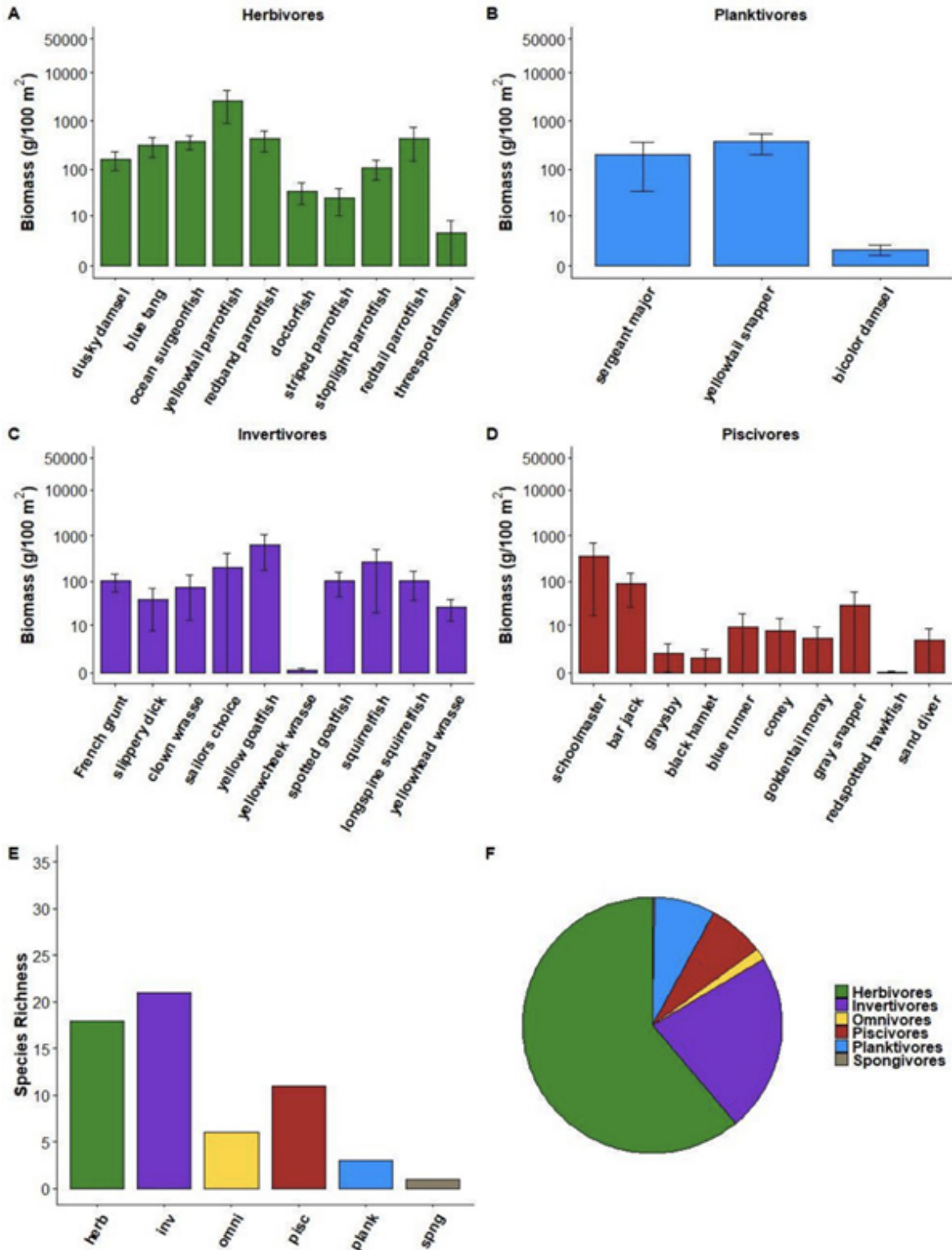
2018

The Coculus Rock fish community as (A-D) average biomass per trophic group with the most common species shown in order on the x-axis, (E) species richness, and (F) relative community composition by total biomass. Note that biomass is a log scale.



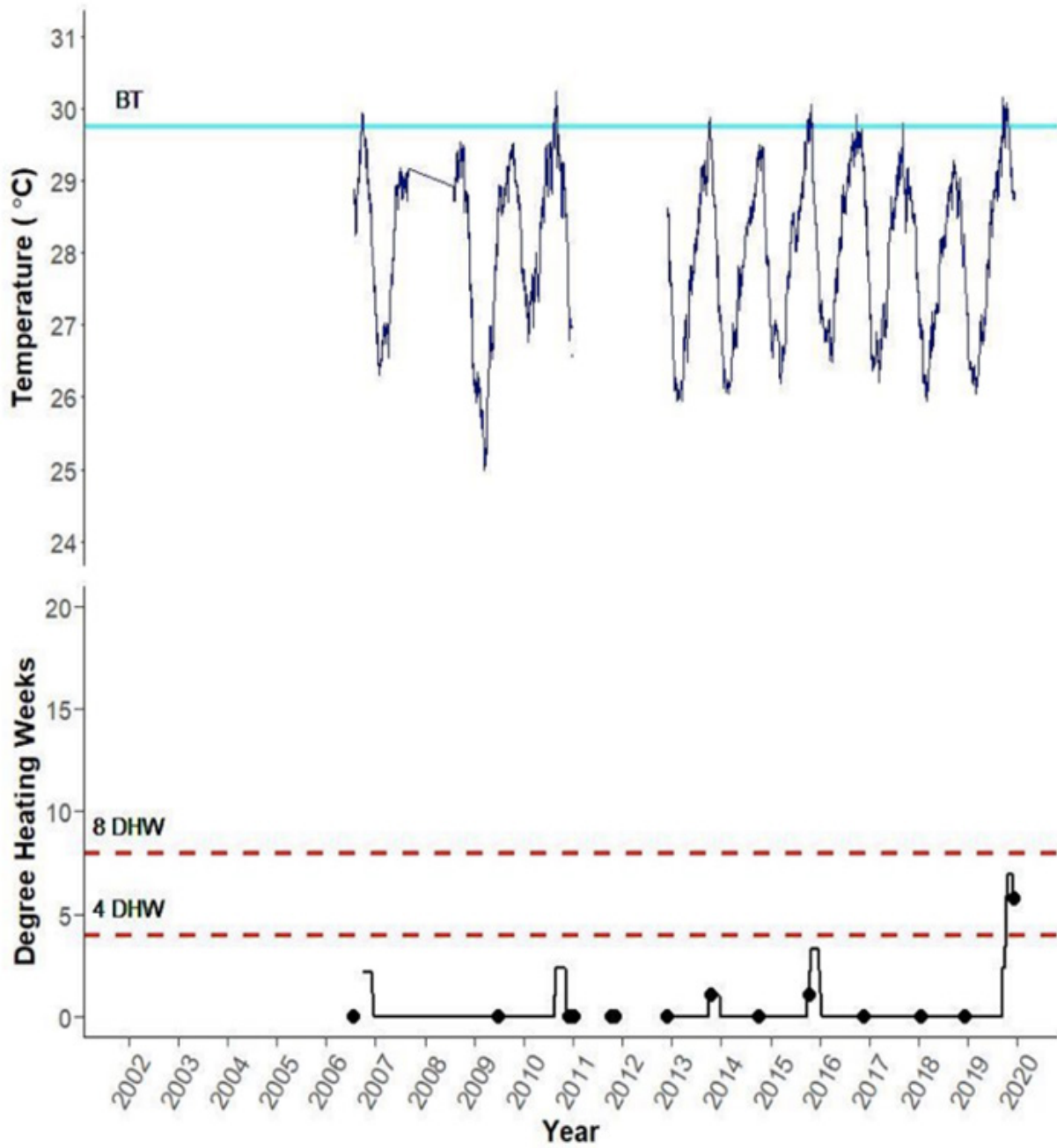
2019

The Coculus Rock fish community as (A-D) average biomass per trophic group with the most common species shown in order on the x-axis, (E) species richness, and (F) relative community composition by total biomass. Note that biomass is a log scale.

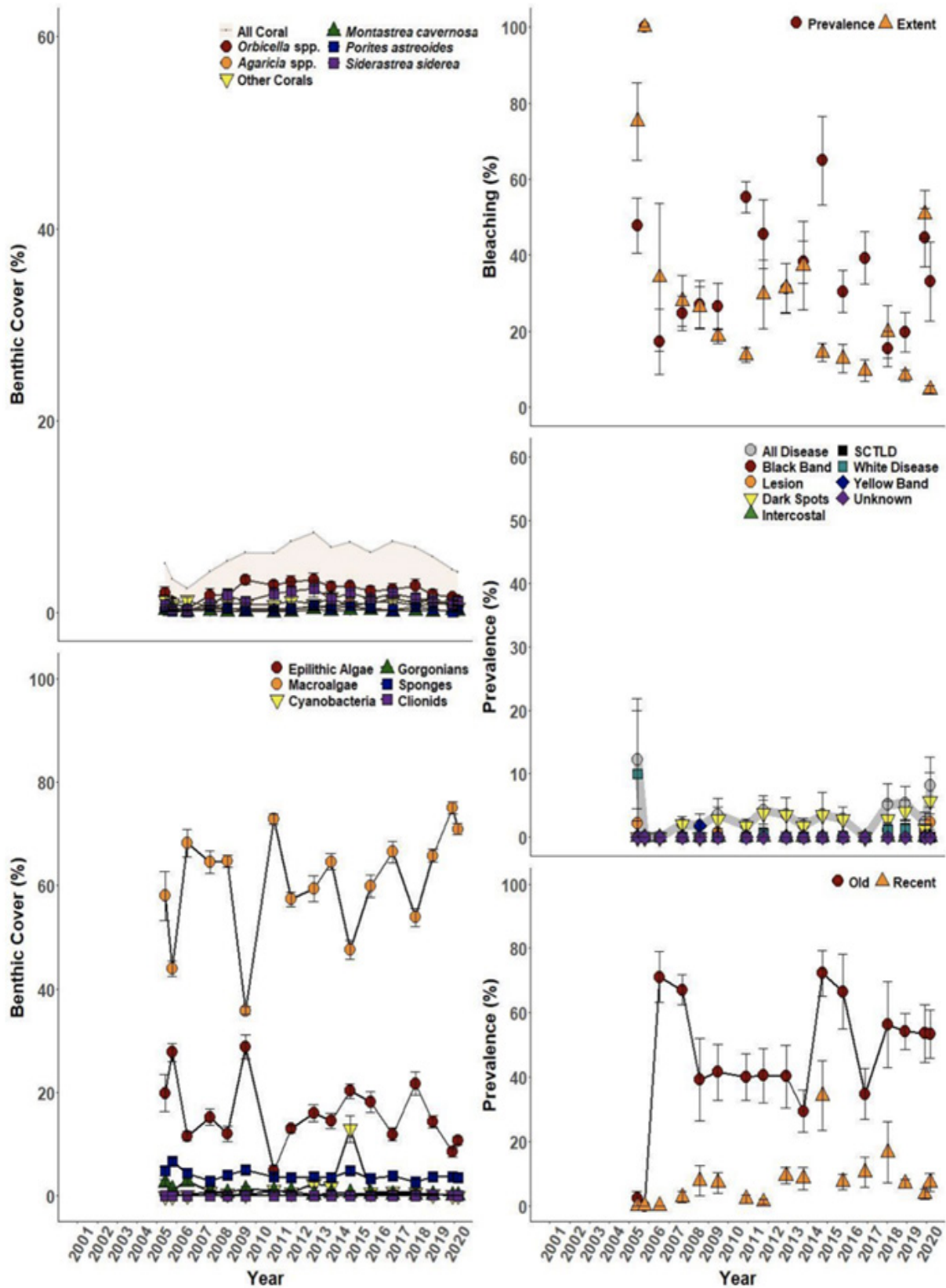


LITTLE ST. JAMES

Little St. James benthic temperature record (19 m depth).

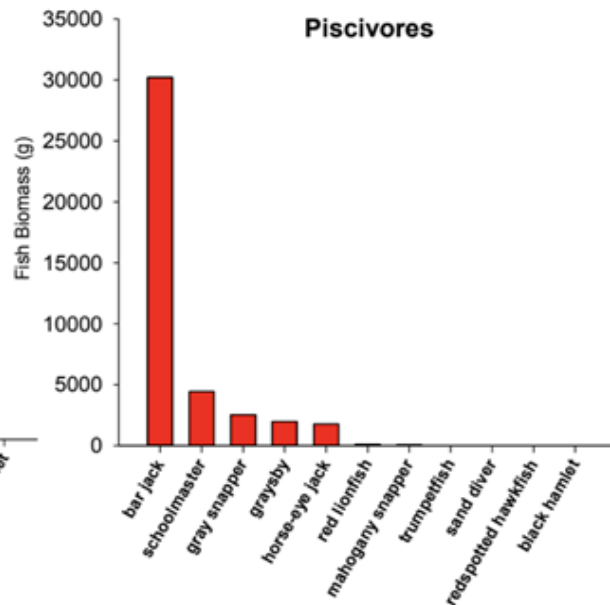
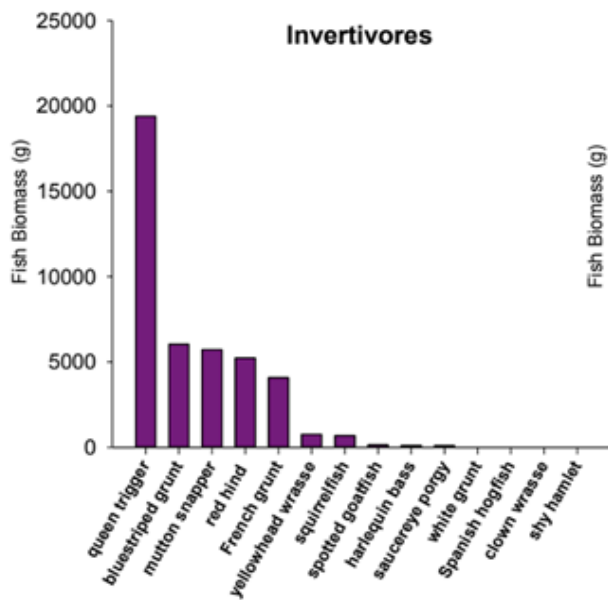
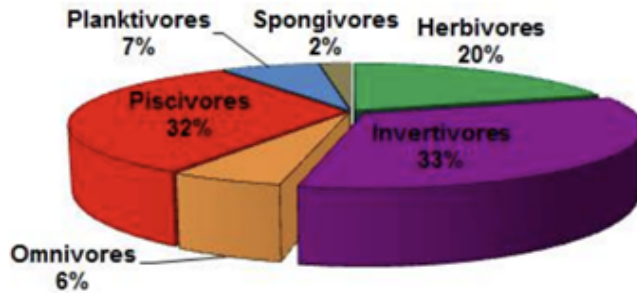
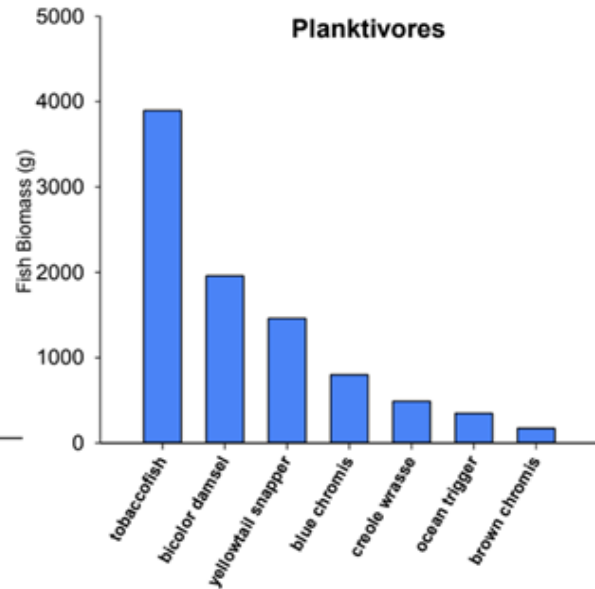
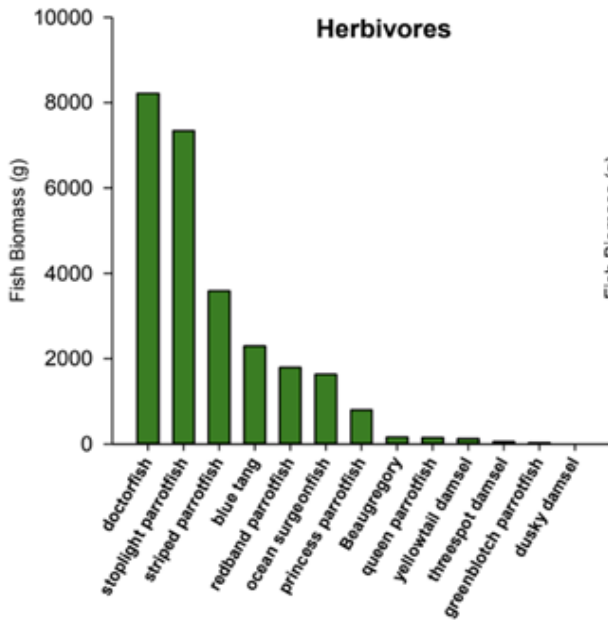


Little St. James benthic cover and coral health through time (mean \pm SE).



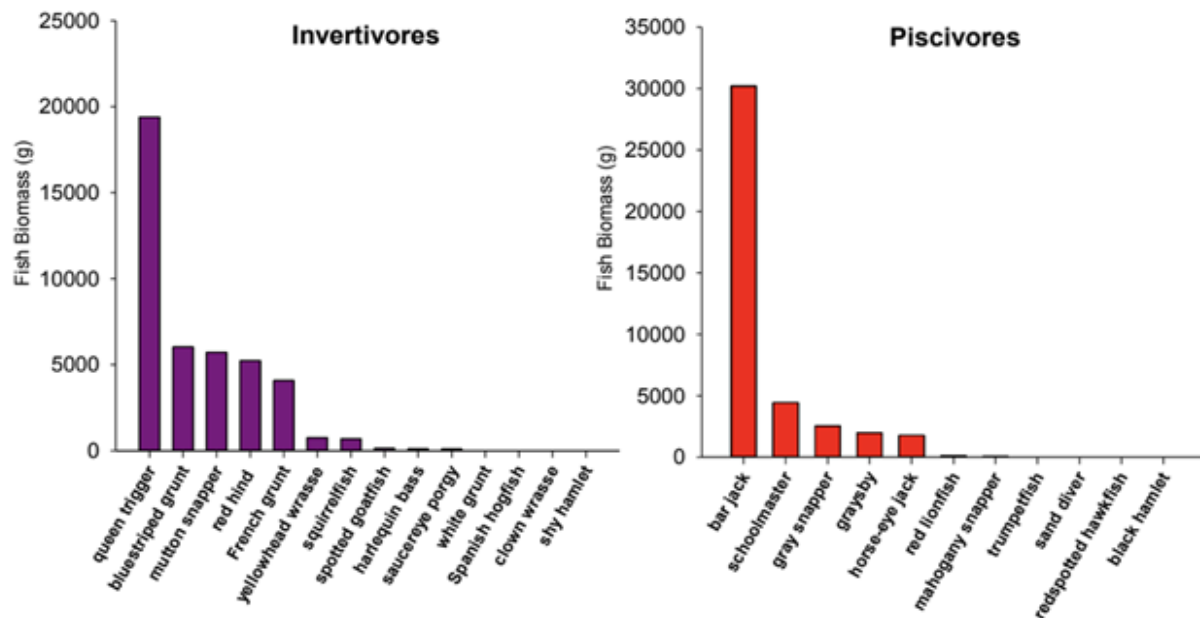
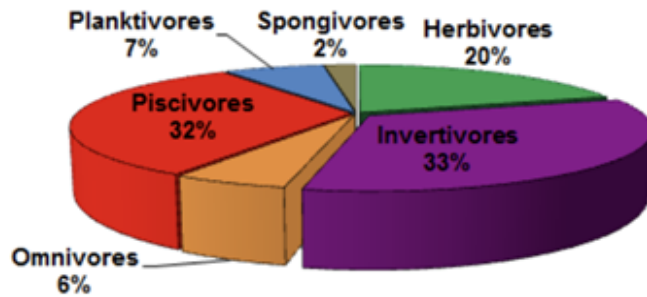
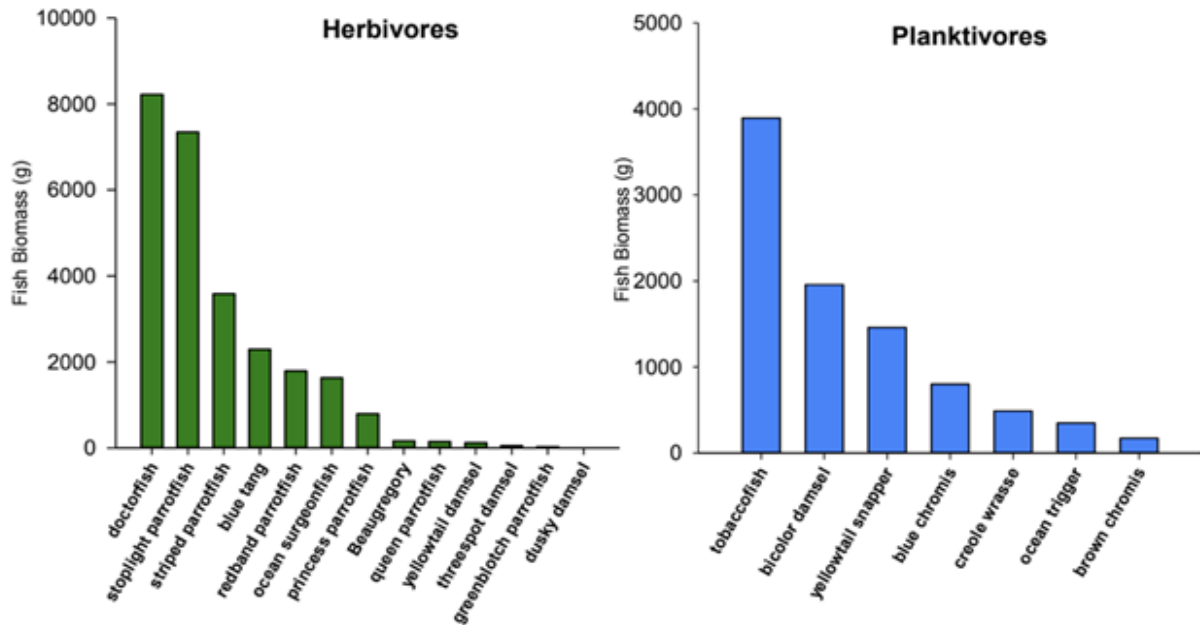
Little St. James Fish Communities

2012



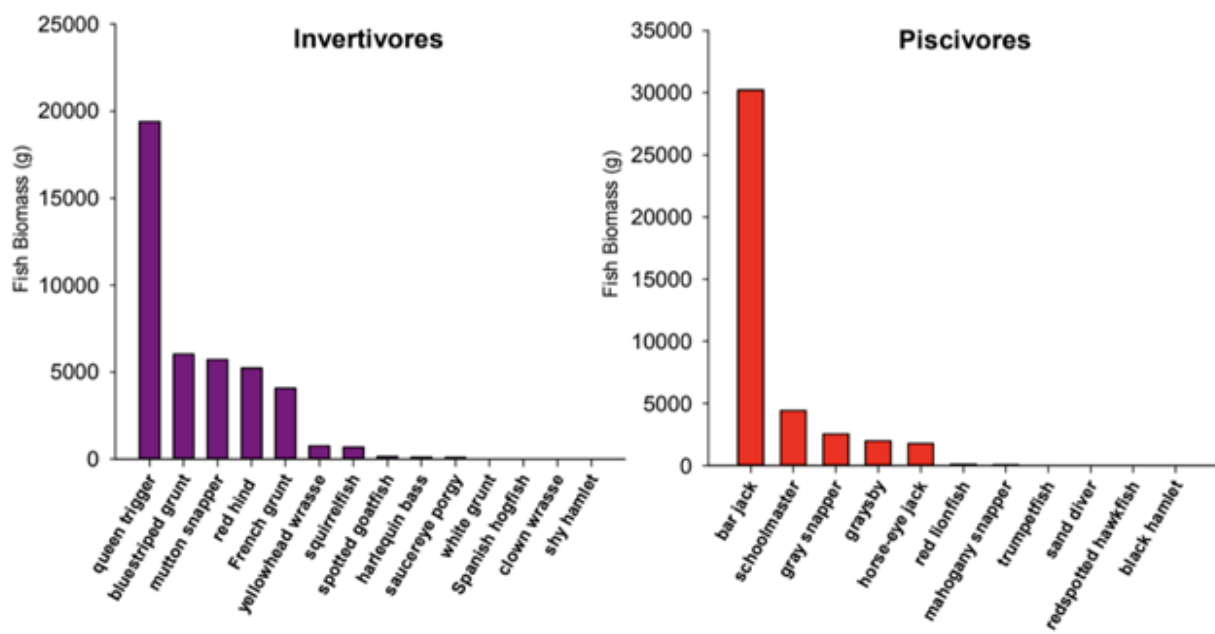
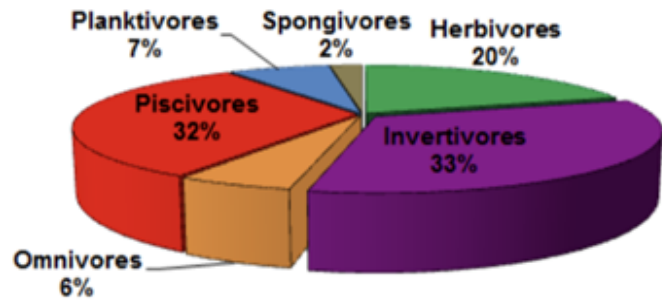
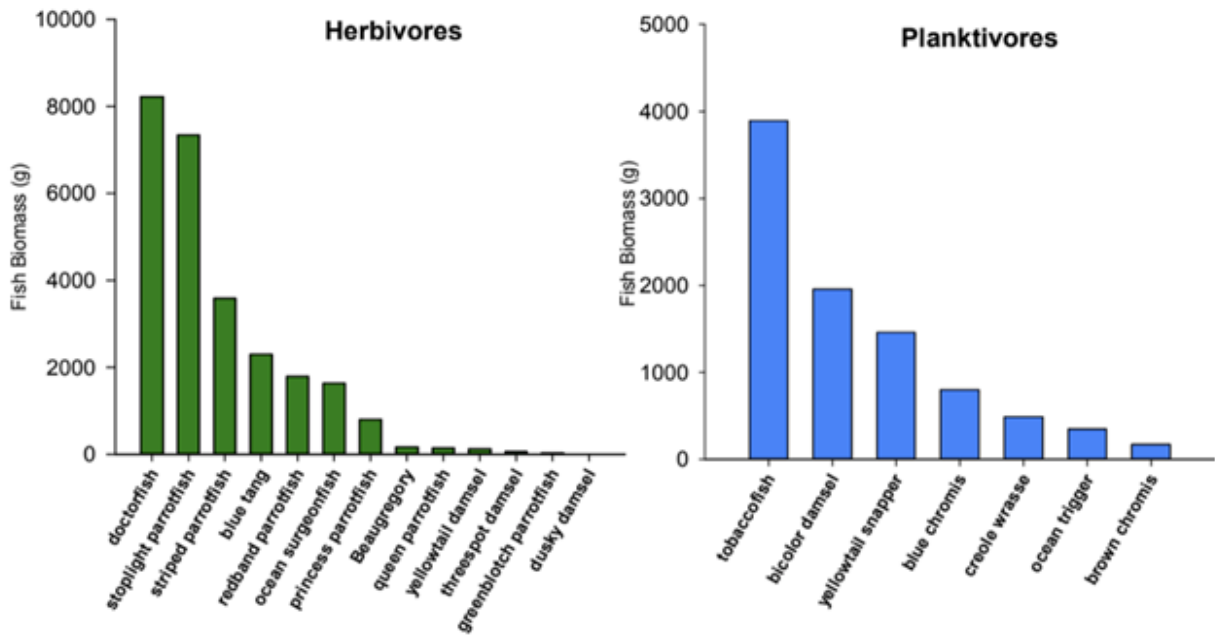
2014

The Little St. James fish community by absolute and relative biomass.



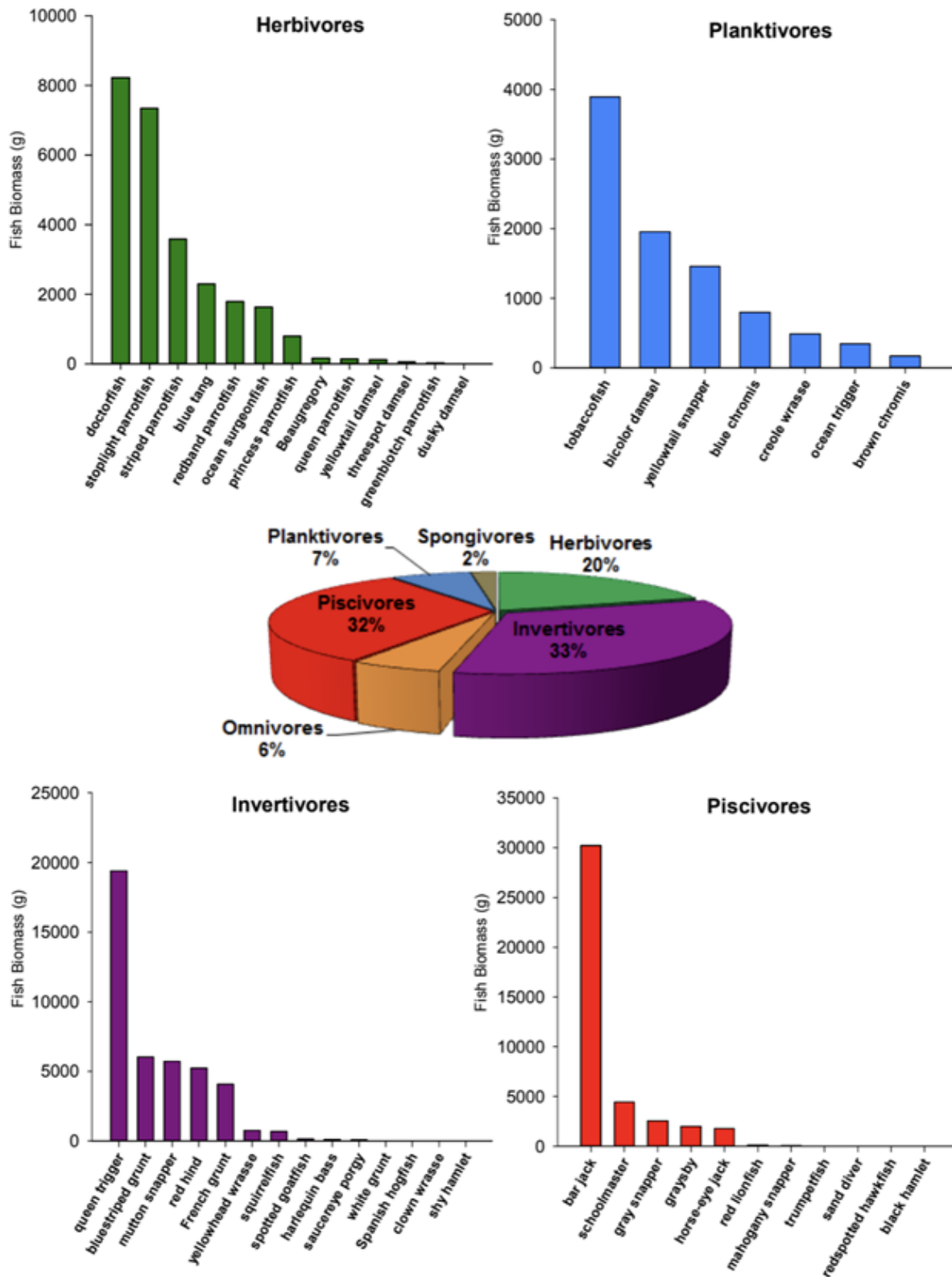
2015

The Little St. James fish community by absolute and relative biomass.



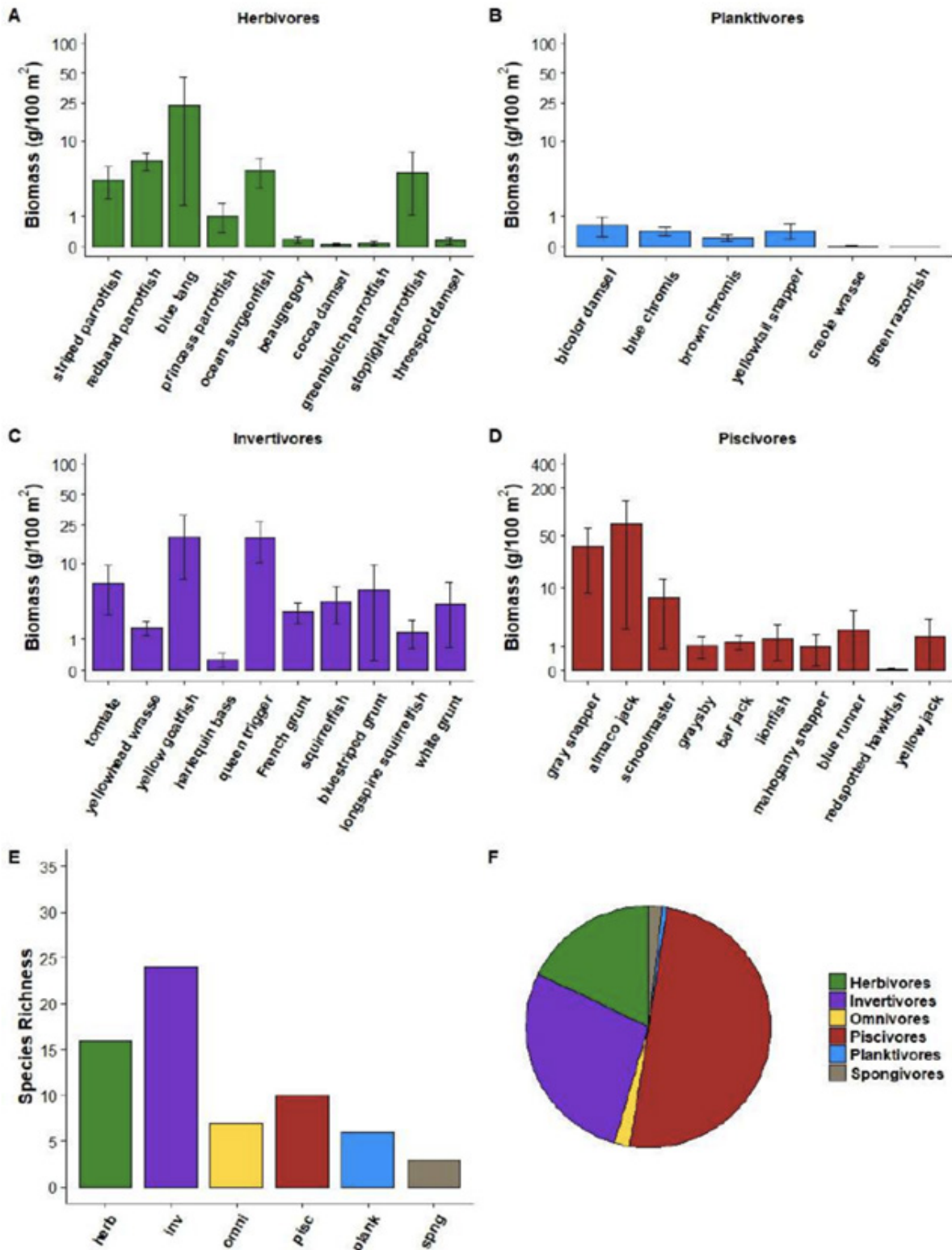
2016

The Little St. James fish community by absolute and relative biomass.



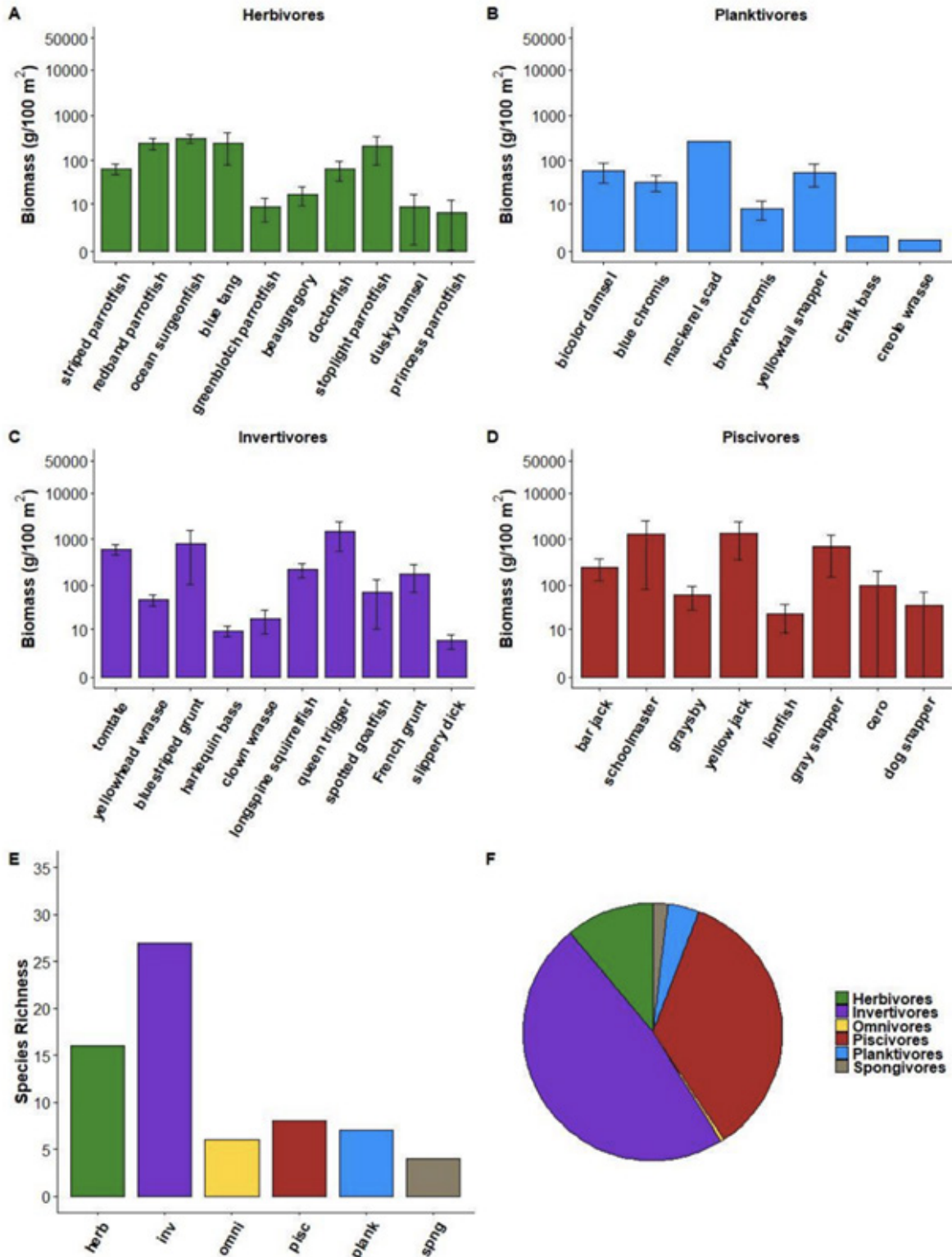
2018

The Little St. James fish community as (A-D) average biomass per trophic group with the most common species shown in order on the x-axis, (E) species richness, and (F) relative community composition by total biomass. Note that biomass is a log scale.



2019

The Little St. James fish community as (A-D) average biomass per trophic group with the most common species shown in order on the x-axis, (E) species richness, and (F) relative community composition by total biomass. Note that biomass is a log scale.



APPENDIX H. MANGROVE LAGOON CHANGE OVER TIME PHOTOS

March 2002



Sept. 2002



Nov. 2003



Oct. 2004



STEER MANAGEMENT PLAN

Nov. 2006



May 2007



STEER MANAGEMENT PLAN

Aug. 2009



Feb. 2013



STEER MANAGEMENT PLAN

July 2013



March 2014



April 2014



Dec. 2014



Oct. 2016



Feb. 2017



May 2017



Aug. 2017 - pre Hurricanes Irma and Maria



Sept. 2017 - post Hurricanes Irma and Maria



Sept. 2017 - post Hurricanes Irma and Maria



Nov. 2017



Feb. 2018



STEER MANAGEMENT PLAN

March 2018



July 2018



STEER MANAGEMENT PLAN

Dec. 2018



April 2019



STEER MANAGEMENT PLAN

Aug. 2019



Nov. 2019



Jan. 2020



March 2020



April 2020



May 2020



Oct. 2020



Jan. 2021



STEER MANAGEMENT PLAN

May 2021



Sept. 2021



STEER MANAGEMENT PLAN

Oct. 2021



Dec. 2021



April 2022



May 2022



June 2022



July 2022



STEER MANAGEMENT PLAN

Dec. 2022

