

The United States Virgin Islands

TERRITORIAL CORAL REEF MONITORING PROGRAM



ANNUAL REPORT

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The Division of Coastal Zone Management, USVI Department of Planning and Natural Resources



The Coral Reef Conservation Program, National Oceanic and Atmospheric Administration



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INDEX

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INDEX

INDEX OF TABLES	XIII
MISSION	14
OUR VISION	14
OBJECTIVES	14
EXECUTIVE SUMMARY	15
CORAL REEFS OF THE VIRGIN ISLANDS: MANGEMENT ACTIONS NEEDED	15
CORAL REEFS OF THE VIRGIN ISLANDS: POSITIVE SIGNS	18
THE IMPACT OF HURRICANE IRMA AND HURRICANE MARIA ON CORAL HABITATS OF THE US VIRGIN ISLANDS	21
UPDATE: INVASION OF THE INDO-PACIFIC RED LIONFISH	27
IMPROVED SIGNS FOR THE THREATENED NASSAU GROUPER	32
EMERGENCE OF THE INVASIVE RED ALGAE <i>RAMICRUSTA</i> SPP.	36
INTRODUCTION	41
OBJECTIVES FOR MONITORING CORAL REEFS	44
METHODS	48
BENTHIC ASSESSMENTS	48
FISH CENSUS	54
TERRITORIAL CORAL REEF MONITORING SUMMARY	56
BENTHIC COMMUNITIES AND CORAL REEF HEALTH	57
CORAL COVER	57
EPILITHIC ALGAL COMMUNITY COVER	61
MACROALGAL COVER	63

INDEX

FILAMENTOUS CYANOBACTERIA	65
GORGONIAN AND ANTIPATHARIAN COVER	67
SPONGE COVER	69
FISH COMMUNITIES	71
FISH ABUNDANCE	74
FISH BIOMASS	76
BLACK SPINY SEA URCHIN <i>DIADEMA ANTILLARUM</i>	79
SITE SUMMARIES	81
RATIONALE	81
SITE SUMMMARY ELEMENTS	81
ST. CROIX	85
BUCK ISLAND, ST. CROIX	87
CANE BAY	93
CANE BAY DEEP	99
CASTLE	105
EAGLE RAY	111
GREAT POND	117
JACKS BAY	123
KINGS CORNER	131
LANG BANK EAST END MARINE PARK	137
LANG BANK RED HIND FISH SPAWNING AGGREGATION	143
MUTTON SNAPPER	149
SALT RIVER WEST	155
SALT RIVER DEEP	161
SPRAT HOLE	167
ST. JOHN	173
CORAL BAY	175

INDEX

FISH BAY	181
MERI SHOAL	187
ST. THOMAS	193
BLACK POINT	195
BOTANY BAY	202
BREWERS BAY	208
BUCK ISLAND, ST. THOMAS	214
COCULUS ROCK	220
COLLEGE SHOAL	226
FLAT CAY	232
GINSBURGS FRINGE	238
GRAMMANIK TIGER	244
HIND BANK	250
LITTLE SAINT JAMES	256
MAGENS BAY	262
SAVANA ISLAND	269
SEAHORSE COTTAGE SHOAL	275
SOUTH CAPELLA	281
SOUTH WATER	287
LITERATURE CITED	293

Index of Figures

Figure 1. Partially bleached and recovering colony of <i>Siderastrea siderea</i> at Flat Cay, St. Thomas (Nov. 12, 2005).....	16
Figure 3. The damaged research infrastructure and coral reefs of the US Virgin Islands following Hurricanes Irma and Maria in September 2017.....	22
Figure 5. Modeled surface (top) and seafloor (bottom) orbital velocities over Hurricane Irma (left) and Hurricane Maria (right).	23
Figure 6. Coral reef habitats potentially damaged by storms ($>2 \text{ m s}^{-1}$ seafloor velocity).....	24
Figure 7. Proportions of coral reef habitat potentially damaged by storms (seafloor velocity $> 2 \text{ m s}^{-1}$) by depth category and island group (NUSVI = northern USVI – St. John and St. Thomas; STX = St. Croix).....	25
Figure 8. Indo-Pacific red lionfish (<i>Pterois volitans</i>) on Seahorse Cottage Shoal, 2017; depth 22m.....	28
Figure 9. The abundance ($\pm$ SEM) of red lionfish on TCRMP transects from 2011 to 2018.....	31
Figure 10. Nassau grouper on the Grammanik Bank, St. Thomas during spawning season.....	32
Figure 11. Nassau grouper observed across all northern USVI sites on belt transects, conducted annually from 2003-2017.....	33
Figure 12. Maximum number of Nassau grouper observed on a single point count during the spawning season (January- April) on the Grammanik Bank from 2002 through 2018.....	35
Figure 13. Representative photos of <i>Ramircrusta</i> spp. overgrowing <i>Orbicella faveolata</i> (A), <i>Orbicella annularis</i> (B), <i>Orbicella annularis</i> (C), and <i>Millepora alcicornis</i> (D) at the TCRMP location Savana.	37
Figure 14. Abundance of <i>Ramircrusta</i> sp. presence in non-overlapping video clips at TCRMP locations in 2016.	38
Figure 15. Benthic cover ($\pm$ SEM) of <i>Ramircrusta</i> sp., coral, epilithic algae community, and fleshy macroalgae at Savana from 2003-2016.	39
Figure 16. Locations of Territorial Coral Reef Monitoring Sites in the US Virgin Islands. Boundaries indicate federal and territorial marine protected areas.....	46
Figure 17. A screen grab of benthic video used for the determination of percent cover of coral reef organisms and non-living substrate.....	50
Figure 18. Coral cover ($\pm$ SE) across TCRMP monitoring sites over time.....	60
Figure 19. Epilithic Algal Community cover ($\pm$ SE) across TCRMP monitoring sites over time.	62
Figure 20. Macroalgae cover ($\pm$ SE) across TCRMP monitoring sites over time.	64
Figure 21. Filamentous cyanobacteria cover ($\pm$ SE) across TCRMP monitoring sites over time.....	66

INDEX

Figure 22. Gorgonian and Antipatharian cover ($\pm$ SE) across TCRMP monitoring sites over time.....	68
Figure 23. Sponge cover ($\pm$ SE) across TCRMP monitoring sites over time.....	70
Figure 24. Fish abundance ($\pm$ SE) across TCRMP monitoring sites over time. St. Croix sites are to the left and northern USVI to the right on the x-axis.....	75
Figure 25. Mean fish biomass ($\pm$ SE) across TCRMP monitoring sites over time. St. Croix sites are to the left and northern USVI to the right on the x-axis.....	77
Figure 26. Mean abundance ($\pm$???) of fish counted on surveys conducted at eight sites before and after the 2017 hurricanes. Abundance was lower at most sites both directly after the storms and several months later. Pre-storm data for St. James is from 2016. Numbers above bars indicate sample size.	78
Figure 27. Mean biomass ($\pm$???) of fish on surveys conducted at eight sites before and after the 2017 hurricanes. Biomass appeared to drop after the storms but increased to pre-storm levels by April 2018. Pre-storm data for St. James is from 2016. Numbers above bars indicate sample size.	78
Figure 28. Abundance of the black spiny sea urchin (<i>Diadema antillarum</i>) at TCRMP monitoring sites. Note the log scale.....	80
Figure 29. The Buck Island, St. Croix. (top) Position in the Buck Island Reef National Monument. (right)A representative photo.	87
Figure 30. Buck Island, St. Croix benthic temperatures (14 m depth). Data provided by the National Park Service (site BUIS_SFR)	88
Figure 31. Buck Island, St. Croix. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	89
Figure 32. Buck Island, St. Croix benthic cover and coral health through time (mean $\pm$ SE).....	90
Figure 33. The Buck Island, St. Croix fish community by absolute and relative biomass.....	92
Figure 34. Cane Bay. (top) Location. (right) A representative photo of the reef.	93
Figure 35. Cane Bay benthic temperatures (8 m depth)	94
Figure 36. Cane Bay. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	95
Figure 37. Cane Bay benthic cover and coral health through time (mean $\pm$ SE).....	96
Figure 38. The Cane Bay fish community by absolute and relative biomass.....	98
Figure 39. Cane Bay Deep. (top) Location. (right) A representative photo of the reef during the 2005 bleaching event. Bleached colonies are 0.5 – 3 m wide.....	99
Figure 40. Cane Bay Deep temperature (39 m depth).....	100
Figure 41. Cane Bay Deep. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	101

INDEX

Figure 42. Cane Bay Deep benthic cover and coral health through time (mean $\pm$ SE).....	102
Figure 43. The Cane Bay Deep fish community by absolute and relative biomass.....	104
Figure 44. Castle. (top) Location. (right) A representative photo of the reef.....	105
Figure 45. Castle benthic temperatures (9 m depth).....	106
Figure 46. Castle. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	107
Figure 47. Castle benthic cover and coral health through time (mean $\pm$ SE).....	108
Figure 48. The Castle fish community by absolute and relative biomass.....	110
Figure 49. Eagle Ray. (top) Location. (right) A representative photo of the reef.....	111
Figure 50. Eagle Ray benthic temperature at 9 m depth.....	112
Figure 51. Eagle Ray. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	113
Figure 52. Eagle Ray benthic cover and coral health through time (mean $\pm$ SE).....	114
Figure 53. The Eagle Ray fish community by absolute and relative biomass.....	116
Figure 54. Great Pond. (top) Location. (right) A representative photo of the reef.....	117
Figure 55. Great Pond benthic temperature (5 m depth).....	118
Figure 56. Great Pond (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	119
Figure 57. Great Pond benthic cover and coral health through time (mean $\pm$ SE).....	120
Figure 58. The Great Pond fish community by absolute and relative biomass.....	122
Figure 59. Jacks Bay. (top) Location. (right) A representative photo of the reef.....	124
Figure 60. Jacks Bay benthic temperature at 12 m depth.....	125
Figure 61. Jacks Bay (left) relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	126
Figure 62. Jacks Bay benthic cover and coral health through time (mean $\pm$ SE).....	127
Figure 63. The Jacks Bay fish community by absolute and relative biomass.....	129
Figure 64. Kings Corner. (top) Location. (right) A representative photo of the reef with a school of lane snapper (<i>Lutjanus synagris</i>).....	131
Figure 65. Kings Corner benthic temperature (17 m depth).....	132
Figure 66. Kings Corner (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	133
Figure 67. Kings Corner benthic cover and coral health through time (mean $\pm$ SE).....	134
Figure 68. The Kings Corner fish community by absolute and relative biomass.....	136

INDEX

Figure 69. Lang Bank EEMP. (top) Location. (right) A representative photo of the reef.....	137
Figure 70. Lang Bank EEMP benthic temperature (28 m depth).....	138
Figure 71. Lang Bank East End Marine Park (left) relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	139
Figure 72. Lang Bank EEMP benthic cover and coral health through time (mean $\pm$ SE).....	140
Figure 73. The Lang Bank EEMP fish community by absolute and relative biomass.....	142
Figure 74. Lang Bank Red Hind FSA. (top) Location. (right) A representative photo of the reef.....	143
Figure 75. Lang Bank Hind current speed (left) and benthic temperature (right; 33 m depth)	144
Figure 76. Lang Bank Red Hind FSA (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	145
Figure 77. Lang Bank Red Hind FSA benthic cover and coral health through time (mean $\pm$ SE).....	146
Figure 78. The Lang Bank Red Hind FSA fish community by absolute and relative biomass.....	148
Figure 79. Mutton Snapper. (top) Location. (right) A representative photo of the reef taken in 2014.....	149
Figure 80. Mutton Snapper benthic temperature record at 23 m (left) and 39 m depth (right).	150
Figure 81. Mutton Snapper (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	151
Figure 82. Mutton Snapper benthic cover and coral health through time (mean $\pm$ SE).	152
Figure 83. The Mutton Snapper fish community by absolute and relative biomass.	154
Figure 84. Salt River. (top) Location. (right) A representative photo of the reef with TCRMP researcher recording coral health data (Oct. 1, 2015).....	155
Figure 85. Salt River West surface-benthic temperature record 5m depths. Data provided by the NOAA ICON monitoring network.	156
Figure 86. Salt River West (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	157
Figure 87. Salt River West benthic cover and coral health through time (mean $\pm$ SE).....	158
Figure 88. The Salt River West fish community by absolute and relative biomass.....	160
Figure 89. Salt River Deep. (top) Location. (right) A representative photo of the reef with TCRMP team (Oct. 1, 2015).	161
Figure 90. Salt River Deep benthic temperature at 30 m depth (left) and 40 m depth (right).....	162
Figure 91. Salt River Deep (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	163
Figure 92. Salt River Deep benthic cover and coral health through time (mean $\pm$ SE).	164
Figure 93. The Salt River Deep fish community by absolute and relative biomass.	166

INDEX

Figure 94. Sprat Hole. (top) Location. (right) A representative photo of the reef.....	167
Figure 95. Sprat Hole benthic temperature (7 m depth).....	168
Figure 96. Sprat Hole (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	169
Figure 97. Sprat Hole benthic cover and coral health through time (mean $\pm$ SE).....	170
Figure 98. The Sprat Hole fish community by absolute and relative biomass.....	172
Figure 99. Coral Bay. (top) Location. (right) A representative photo of the reef.....	175
Figure 100. Coral Bay benthic temperature (9 m depth).....	176
Figure 101. Coral Bay (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	177
Figure 102. Coral Bay benthic cover and coral health through time (mean $\pm$ SE).....	178
Figure 103. The Coral Bay fish community by absolute and relative biomass.....	180
Figure 104. Fish Bay. (top) Location. (right) A representative photo of the reef.....	181
Figure 105. Fish Bay benthic temperature record (6 m depth).....	182
Figure 106. Fish Bay (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	183
Figure 107. Fish Bay benthic cover and coral health through time (mean $\pm$ SE).....	184
Figure 108. The Fish Bay fish community by absolute and relative biomass.....	186
Figure 109. Meri Shoal. (top) Location. (right) A representative photo of the reef during the 2005 coral bleaching event (Oct. 6, 2005). The brain coral in the foreground is 1.8 m wide.....	187
Figure 110. Meri Shoal benthic temperature record (30 m depth).....	188
Figure 111. Meri Shoal (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	189
Figure 112. Meri Shoal benthic cover and coral health through time (mean $\pm$ SE).....	190
Figure 113. The Meri Shoal fish community by absolute and relative biomass.....	192
Figure 114. Black Point. (top) Location. (right) A representative photo of the reef.....	195
Figure 115. Black point current speed and benthic temperature record (8 m depth).....	196
Figure 116. Black Point chlorophyll (left) and turbidity (right) record (16 m depth).....	197
Figure 117. Black Point. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	198
Figure 118. Black Point benthic cover and coral health through time (mean $\pm$ SE).....	199
Figure 119. The Black Point fish community by absolute and relative biomass.....	201
Figure 120. Botany Bay. (top) Location. (right) A representative photo of the reef.....	202

INDEX

Figure 121. Botany Bay benthic temperature record (11 m depth).....	203
Figure 122. A large colony of pillar coral (<i>Dendrogyra cylindricus</i>) dislodge, toppled, and diseased after the 2009 swell event (Botany Bay, June 25, 2009).....	203
Figure 123. Botany Bay. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	204
Figure 124. Botany Bay benthic cover and coral health through time (mean $\pm$ SE).....	205
Figure 125. The Botany Bay fish community by absolute and relative biomass.....	207
Figure 126. Brewers Bay. (top) Location. (right) A representative photo of the reef.....	208
Figure 127. Brewers Bay. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	210
Figure 128. Brewers Bay benthic cover and coral health through time (mean $\pm$ SE).....	211
Figure 129. The Brewers Bay fish community by absolute and relative biomass.	213
Figure 130. Buck Island, St. Thomas. (top) Location. (right) A representative photo of the reef.	214
Figure 131. Buck Island, St. Thomas benthic temperature record (12 m depth).	215
Figure 132. Buck Island, St. Thomas. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	216
Figure 133. Buck Island, St. Thomas benthic cover and coral health through time (mean $\pm$ SE).	217
Figure 134. The Buck Island, St. Thomas fish community by absolute and relative biomass.	219
Figure 135. Cocus Rock. (top) Location. (right) A representative photo of the reef showing the aggregation of redfin parrotfish.....	220
Figure 136. Cocus Rock benthic temperature record (7 m depth).	221
Figure 137. Cocus Rock. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	222
Figure 138. Cocus Rock benthic cover and coral health through time (mean $\pm$ SE).	223
Figure 139. The Cocus Rock fish community by absolute and relative biomass.	225
Figure 140. College Shoal. (top) Location. (right) A representative photo of the reef.....	226
Figure 141. College Shoal benthic temperature record (29 m depth).	227
Figure 142. College Shoal (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	228
Figure 143. College Shoal benthic cover and coral health through time (mean $\pm$ SE).....	229
Figure 144. The College Shoal fish community by absolute and relative biomass.....	231
Figure 145. Flat Cay. (top) Location. (right) A representative photo of the reef.....	232
Figure 146. Flat Cay benthic current speed (left) and temperature record (right) (14 m depth).	233

INDEX

Figure 147. Flat Cay (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	234
Figure 148. Flat Cay benthic cover and coral health through time (mean $\pm$ SE).	235
Figure 149. The Flat Cay fish community by absolute and relative biomass.	237
Figure 150. Ginsburgs Fringe. (top) Location. (right) A representative photo of the reef showing whorled lettuce coral colonies up to 7m in width and research diver filming permanent transect in background (Nov. 13, 2015).....	238
Figure 151. Ginsburgs Fringe current speed (50 m depth) and benthic temperature (63 m depth). BT = bleaching threshold ; DHW = degree heating weeks	239
Figure 152. Ginsburgs Fringe. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	240
Figure 153. Ginsburgs Fringe benthic cover through time (mean $\pm$ SE).	241
Figure 154. The Ginsburgs Fringe fish community by absolute and relative biomass.	243
Figure 155. Grammanik Tiger (top) Location. (right) A representative photo of the reef.....	244
Figure 156. Grammanik Tiger benthic currents speed and temperature record (38 m depth).	245
Figure 157. Grammanik Tiger FSA. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	246
Figure 158. Grammanik Tiger benthic cover and coral health through time (mean $\pm$ SE).	247
Figure 159. The Grammanik Tiger fish community by absolute and relative biomass.	249
Figure 160. Hind Bank (top) Location. (right) A representative photo of the reef.	250
Figure 161. (top) Hind Bank benthic current speed (40m depth). (bottom) Benthic temperature record at 40 m depth.	251
Figure 162. Hind Bank. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	252
Figure 163. Hind Bank benthic cover and coral health through time (mean $\pm$ SE).	253
Figure 164. The Hind Bank East fish community by absolute and relative biomass.	255
Figure 165. Little St. James. (top) Location. (right) A representative photo of the reef with derelict fish trap	256
Figure 166. Little St. James benthic temperature record (19 m depth).	257
Figure 167. Little St. James. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	258
Figure 168. Little St. James benthic cover and coral health through time (mean $\pm$ SE).	259
Figure 169. The Little St. James fish community by absolute and relative biomass.....	261

INDEX

Figure 170. Magens Bay. (top) Location. (right) A representative photo of the reef.....	262
Figure 171. Magens Bay current speed and benthic temperature record (9 m depth).	263
Figure 172. Magens Bay chlorophyll (left) and turbidity (right) record (16 m depth).	264
Figure 173. Magens Bay. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	265
Figure 174. Magens Bay benthic cover and coral health through time (mean $\pm$ SE).	266
Figure 175. The Magens Bay fish community by absolute and relative biomass.	268
Figure 176. Savana. (top) Location. (right) A representative photo of the reef showing large colonies of <i>Orbicella faveolata</i> (Nov. 17, 2015).	269
Figure 177. Savana benthic temperature record (10 m depth).	270
Figure 178. Savana Island. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	271
Figure 179. Savana Island benthic cover and coral health through time (mean $\pm$ SE).	272
Figure 180. The Savana Island fish community by absolute and relative biomass.	274
Figure 181. Seahorse Cottage Shoal. (top) Location. (right) A representative photo of the reef.....	275
Figure 182. Seahorse benthic temperature record (21 m depth).	276
Figure 183. Seahorse Cottage Shoal. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	277
Figure 184. Seahorse Cottage Shoal benthic cover and coral health through time (mean $\pm$ SE).	278
Figure 185. The Seahorse Cottage Shoal fish community by absolute and relative biomass.....	280
Figure 186. South Capella. (top) Location. (right) The reef with a derelict Antillean fish trap in Transect #1.	281
Figure 187. South Capella benthic temperature record (24 m depth).	282
Figure 188. South Capella. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	283
Figure 189. South Capella benthic cover and coral health through time (mean $\pm$ SE).	284
Figure 190. The South Capella fish community by absolute and relative biomass.	286
Figure 191. South Water. (top) Location. (right) A representative photo of the reef.	287
Figure 192. South Water benthic temperature record (24 m depth).	288
Figure 193. South Water. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.....	289
Figure 194. South Water benthic cover and coral health through time (mean $\pm$ SE).	290
Figure 195. The South Water fish community by absolute and relative biomass.	292

Index of Tables

<i>Table 1. TCRMP site reef complex type, location coordinates (decimal degrees; WGS 1984), and depths. FSA = Fish Spawning Aggregation. EEMP = East End Marine Park.</i>	<i>51</i>
<i>Table 2. TCRMP site sampling data (benthic/health) and type of sampling. Pre and post-storms sample dates refer to surveys completed prior to the passage of Hurricanes Irma (9/6/17) and Maria (9/19/17). Incomplete surveys indicated by “-” while completed surveys indicated by “X”.....</i>	<i>52</i>
<i>Table 3. The 2017/18 species richness for belt transects and roving diver surveys (RDS). Sites are divided into nearshore, offshore, and mesophotic sites as described in the text.</i>	<i>73</i>

MISSION

Mission



OUR VISION

To provide critical information on the status and threats to all Virgin Islands coral reef ecosystems, increasing management effectiveness and improving basic and applied coral reef research

OBJECTIVES

- Monitor the **status and trajectories** of coral reefs across a majority of habitats and threats, including land-based sources of pollution & thermal stress
- Link changes in coral reef health with specific stressors, indicating specific **management interventions** most effective for preserving reefs
- Integrate assessments of understudied **mesophotic coral reef ecosystems** and **threatened species** in the USVI
- Provide data, outputs, and advice to stakeholders and create a **nexus of information** for reef research

EXECUTIVE SUMMARY

Executive Summary

Coral reefs in the Caribbean are facing a dramatic decline and are at a crossroads. Management decisions made today will affect the goods and services that reefs provide for decades to come. The government of the United States Virgin Islands (USVI), in coordination with the NOAA Coral Reef Conservation Program and the University of the Virgin Islands, implemented the **Territorial Coral Reef Monitoring Program (TCRMP)**. The TCRMP has established baseline conditions and temporal trends of coral reefs and fish populations and has identified threats that will influence the future reef health and development.

A major focus of the TCRMP is to provide information that can lead to more effective management strategies that balance the immediate needs of the Virgin Island's population with preservation and sustainability of coral reefs and the renewable goods and services they provide.

The intent of this report is to distill monitoring data into actionable information that can guide management decisions and inform the public and policy-makers about areas that need further effort. This executive summary presents information on threats to USVI reefs that require management intervention/action as well as positive signs that can inform our understanding of sustainability.

CORAL REEFS OF THE VIRGIN ISLANDS: MANAGEMENT ACTIONS NEEDED

The TCRMP data has identified threats to USVI coral reef ecosystems that need increased management attention if reef corals are to persist in a condition that is equal to or better than current conditions.

Coral Reef Bleaching. High thermal stress caused by climate change is currently the greatest threat to USVI coral reef ecosystems. The 2005 coral bleaching event caused the

EXECUTIVE SUMMARY

largest loss of coral in the documented history of the USVI, with a 50% decline in coral cover in shallow waters less than 25m/85' deep (Smith et al. 2013b; Smith et al. 2016a). This event surpassed all known modern impacts from physical damage (storms and anchoring), ecosystem changes (fishing and disease), and pollution (terrestrial sediments and toxins). These events are predicted to increase with a warming planet, troubling news for the USVI.

While local management actions cannot remove impacts to reefs from global warming, reefs that are otherwise less stressed by land-based sources of pollution, fishing, and/or physical damage are known to recover more quickly from bleaching. Hence, local management actions that promote seascape-wide coral reef health offer the best strategy for sustainable reefs. We can also identify areas that are naturally more resistant to thermal stress and offer these areas further protection, since they offer insurance against the worst possible future outcomes for USVI reefs.

Figure 1. Partially bleached and recovering colony of *Siderastrea siderea* at Flat Cay, St. Thomas (Nov. 12, 2005).



EXECUTIVE SUMMARY

Overfishing. There are clear indications that reefs of the USVI are suffering the effects of overexploitation of reef resources, although there are also positive signs. The entire district of St. Croix has an extremely low abundance of commercially important grouper species, including the threatened Nassau grouper (Kadison et al. 2017). In St. John and St. Thomas, many common species have completely or nearly disappeared from nearshore waters in the last 30 years. For example, a study conducted by Rogers et al. (1982) on the southwest coast of St. Thomas during the airport runway expansion (1979-1981) found a variety of species that are no longer encountered or are rare, including the black, Nassau, tiger, and yellowfin groupers, as well as the federally protected parrotfish species blue, midnight, and rainbow. A study by Randall (1963) also found high relative abundances of groupers and threatened parrotfish on the south coast of St. John. Rebuilding these fish stocks will require comprehensive life-history information for target species, a willingness to find strategies to rebuild stocks, and partnerships between commercial and recreational fishers, community stakeholders and managers.

Land-Based Source of Pollution. The steep hillsides of the USVI are natural conduits for run-off during heavy rain events and in many instances there is little interception of materials before they reach the sea and impact coral reefs. When tropical soils are naturally disturbed or altered through human activity, they can erode and release fine-grained silt and clay particles. In the USVI, these fine-grained particles are quickly transported to coral reefs where they can block sunlight, directly smother corals, or increase the growth of organisms that compete with corals for space. There is evidence from the TCRMP that terrestrial sediments are having large negative impacts on nearshore coral reefs by increasing mortality of ecologically important corals (Henderson et al. in press).

EXECUTIVE SUMMARY

CORAL REEFS OF THE VIRGIN ISLANDS: POSITIVE SIGNS

Despite the incredible declines in reef health witnessed since the inception of the TCRMP in 2001, there are many positive signs for the USVI that should be highlighted. These successes offer lessons that can be applied to troubled reefs and may indicate refuge areas where we might “double-down” on current management strategies.

Reef Refuges. The USVI is blessed, perhaps uniquely for the Caribbean, with extensive areas of deep bank and slope reefs that may be buffered from the direct impacts of local pressures (Smith et al. 2019a,b). The mesophotic (pronounced: me-zo-photik; meaning; “middle-light”) reefs of the USVI are the best developed in the Caribbean from what is currently known. Mesophotic Coral Ecosystem (MCE) bank reefs with high populations of star corals (*Orbicella* spp.), which have recently been listed as threatened on the United States Endangered Species List (NOAA 2014), form extensive tracts on the south shelf of St. John and St. Thomas, from the British Virgin Islands to Vieques, Puerto Rico. Well-formed, but patchier mesophotic boulder coral reefs also form on the Lang Bank, St. Croix and the northern Puerto Rican Shelf. The lower MCE consists mostly of lettuce corals (primarily *Agaricia undata*) and form a semi-continuous ring on steep slopes and walls at depths between 50-70m. These reef are isolated from some local impacts, but may be susceptible to global climate change (see below).

In federal waters some of these areas are wholly or partly protected from fishing of ecologically important species that help maintain reef health. These include the Red Hind Marine Conservation District (est. 1999), the Grammanik Bank Seasonally Closed Area (est. 2005), and the Lang Bank Red Hind Seasonally Closed Area (est. 1993). However, extensively developed mesophotic reef in unprotected territorial waters also exist near the island of French Cap and Sail Rock, St. Thomas District. It is important that these areas are identified, their threats assessed, and they are incorporated into the territorial and federal management planning process.

EXECUTIVE SUMMARY

Rebounding Fisheries Species. There are positive signs of recovery for certain fish species in some areas. At the Grammanik Bank grouper spawning aggregation site there have been increasing numbers of Nassau grouper present for annual spawning (Kadison et al. 2010; Jackson et al. 2014) and a red hind aggregation in the Red Hind Marine Conservation District (MCD) has dramatically rebounded (Nemeth 2005). Red hind caught in the fishery on the south side of St. Thomas are more numerous and larger (D. Olsen, pers. comm.). In 2015 there was a recruitment pulse of juvenile Nassau grouper to shallow nearshore environments of St. Thomas and St. John in 2015. In Brewers Bay, St. Thomas over 70 juvenile Nassau grouper were recorded (R. Nemeth, unpub. data), increasing evidence that the reproductive population is contributing to the recovery of the species. It is also the impression of the authors that stocks of grouper and snapper are increasing in the MCD, although TCRMP measurements are confounded to some degree by the rotating array of aggregating fishes. Other territorial and federal closed areas in St. Croix, St. John, and St. Thomas are more recently established and may not show effects for several years. Although uncommon, Nassau grouper have been seen around St. Croix since 2011, a positive sign. For species that are completely protected from fishing (Nassau grouper and blue, midnight, and rainbow parrotfish), educational campaigns for recreational and commercial fisherman are critical, as awareness of regulations appears to be lacking (Authors, unpub. obs.).

Land-based source of pollution. While development of steep island slopes has continued despite current regulations intended to prevent sediments from entering nearshore waters, research has identified key targets for restoration and some effective habitat restoration best-management practices. Results from TCRMP research suggest that there are certain levels of silt-laden terrestrial run-off that are damaging to corals, providing a target for reductions of sediment in the marine environment (Henderson et al. 2019). Unpaved road segments have been implicated as the worst culprits in the production of sediment-laden run-off (Ramos-Scharrón and MacDonald 2007b) and this provides a

EXECUTIVE SUMMARY

clear target for where management can be most effectively applied. Restoration of watersheds has shown that implementation of best-management practices and control structures can be effective in reducing sedimentation. For example, the American Recovery and Reinvestment Act project “USVI Coastal Habitat Restoration Through Watershed Stabilization” showed promising results (Virgin Islands Resource Conservation and Development Council; P.I. M. Taylor).

This report presents results of the 17th year of monitoring on reefs surrounding St. Croix, St. John, and St. Thomas (years 2001-2018). *This year of monitoring was impacted by the passage of Hurricane Irma and Hurricane Maria in September 2017, before the initiation of monitoring. Due to heavy damage to the territory and to the UVI marine science facilities, in particular, monitoring scheduled for October – December 2017 was not completed until the spring of 2018.*

Monitoring sites were distributed across the insular platform in depths from 5 to 63 m (16 – 220') in an effort to capture the diversity of reef types present in the Virgin Islands. Long-term data is presented from 33 sites. While not exhaustive, the TCRMP is generally representative of the geographic areas and variety of reef types in the USVI. Digital video and diver surveys were used to quantify benthic cover and coral health at 14 permanent sites surrounding the island of St. Croix and 19 permanent sites on the Puerto Rican Shelf surrounding the island of St. John and St. Thomas. In addition, at 32 of these sites sea urchin density and fish community structure were evaluated.

All data is now available at the TCRMP website and updated annually after quality control:

<https://sites.google.com/site/usvitcrmp/home>