



Marine Benthic Communities: Coral Reef Monitoring at Salt River Bay National Historical Park and Ecological Preserve, St. Croix, U.S. Virgin Islands

2022

Importance: *A critical resource for fisheries, tourism and marine biodiversity*

Coral reef communities within Salt River Bay National Historical Park and Ecological Preserve (NHP&EP) consist of stony corals, octocorals (e.g., sea fans), sponges, and algae. Reefs support incredible marine biodiversity and provide habitat for a multitude of fish species, lobsters, sea turtles, and other creatures. Coral reefs also play a vital economic role by supporting fisheries and tourism, creating sand for beaches, providing a source for pharmaceutical bioprospecting, and protecting shorelines from erosion. Coral reefs are negatively affected by rising seawater temperatures that cause “bleaching,” coral diseases, storms, and ocean acidification. Local stressors include vessel groundings, over-fishing, damaging fishing methods (i.e. fish traps), sediment runoff, nutrient enrichment, contaminants, and abrasion and fracturing of coral reefs by debris or careless snorkelers and divers. Due to the importance of coral reef ecosystems to biodiversity and society, and the many threats they face, President Bill Clinton established a Coral Reef Initiative through Executive Order 13089 to prioritize the health of coral reefs, including those that fall within National Park boundaries.

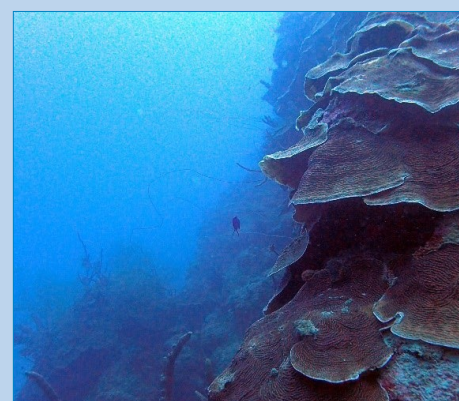


Figure 2. Steep walls and large plate corals (*Agaricia* and *Undaria* spp.) are found in Salt River Canyon. NPS photo / SFCN.



Figure 1. Aerial image of monitoring sites in Salt River Bay NHP&EP (green boundary).

Long-term Monitoring: *Site monitored annually since 2012*

The South River Bay NHP&EP was created in 1992 and is co-managed by the National Park Service and the Government of the Virgin Islands. The South Florida/Caribbean Network (SFCN) has monitored this site annually since April 2012. The site is 26,437 square meters (284,565.6 square feet) and consists of 20 randomly-placed permanent transects. The site is in three sections that also include the steep walls of Salt River Canyon (Figure 1 and 2): Canyon West Wall, Canyon East Wall, and Northwest Spur and Groove. These areas were constrained to less than or equal to 33 meters (108.3 feet) depth and were chosen because of relatively high coral cover, reef complexity, and historical significance. The 10-meter (32.8 feet) transects are monitored annually using underwater video. Percent cover of living coral by species, macroalgae, turf and coralline algae, octocorals, and sponges is quantified. Data on coral disease, bleaching, water temperature, and long-spined sea urchins are also collected.

Status and Trends: *Stony coral tissue loss disease becomes major driver of change on reef*

While coral cover remained relatively constant despite the passing of two category 5 hurricanes (Irma and Maria) in September 2017, live stony coral cover decreased in 2021 and 2022, primarily due to the arrival of stony coral tissue loss disease (SCTLD; Figure 3). Stony coral tissue loss disease is an extremely virulent and lethal coral disease affecting many of the major reef building corals, including several species listed as “threatened” on the U.S. Endangered Species Act.



Status and Trends (continued): Stony coral tissue loss disease becomes major driver of change on reef

Coverage of coral genera considered highly susceptible to SCTLD (*Meandrina*, *Colpophyllia*, *Pseudodiploria*, and *Diploria*) has declined to nearly zero, while moderately susceptible corals (*Orbicella*, *Montastrea*, *Stephanocoenia*, *Siderastrea*, and *Mycetophyllia*) have exhibited a steep decline, losing over 60% of their coverage since their peak (as measured in our monitoring) in 2019 (Figure 4). The canyon in Salt River contains some of the largest plate corals (*Agaricia* and *Undaria* spp.) found among any SFCN monitoring sites (Figure 2). Fortunately, these species seem to have a low vulnerability to SCTLD and their cover has remained consistent through April 2022. A three-year continuous water temperature record shows daily variability and seasonal warming and cooling trends at reef depth, with temperatures exceeding the critical bleaching threshold in summer/early fall months each year (Figure 5). Since 2012, water temperatures have exceeded the theoretical bleaching threshold (29.5°C [85.1°F]) during seven of the 10 summers monitored (Figure 6). While a direct hit by a strong hurricane can physically damage a reef, storm events reduce water temperature at reef depth and can alleviate thermal stress. Note that data collection occurs in April 2022, hence 2022 data does not include the temperature recorded during the warmest time of 2022 (August through October).

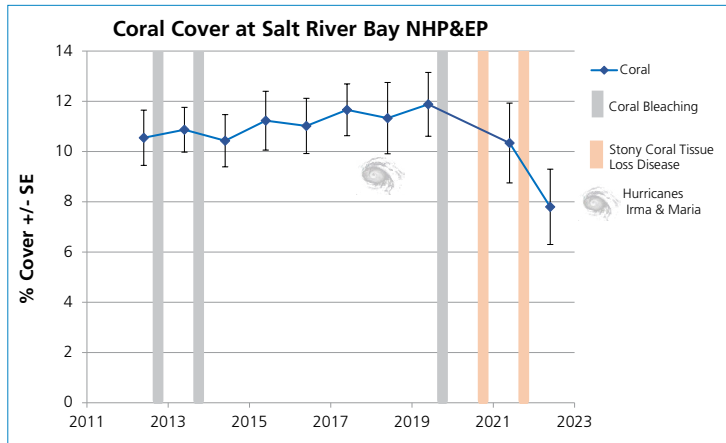


Figure 3. Mean annual percent live stony coral cover $\pm$ standard error (SE) in Salt River Bay National Historical Park and Ecological Preserve.

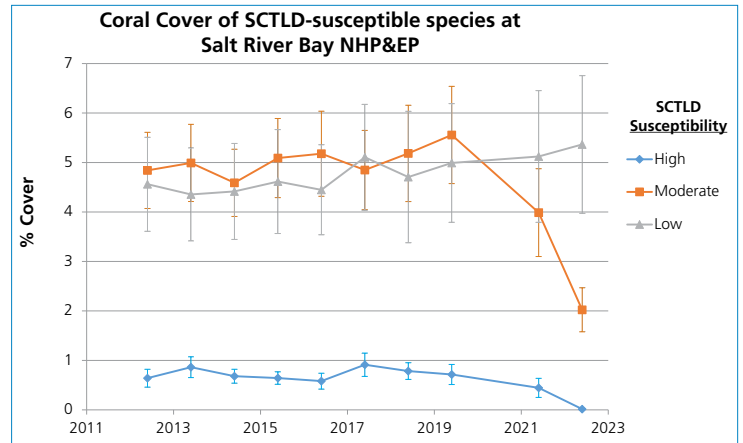


Figure 4. Mean annual percent live coral cover ($\pm$ SE) of species of various susceptibilities to SCTLD: high (*Meandrina*, *Colpophyllia*, *Pseudodiploria*, and *Diploria* spp.), moderate (*Orbicella*, *Montastrea*, *Stephanocoenia*, *Siderastrea*, *Mycetophyllia* spp.), and low (*Porities*, *Agaricia*, *Undaria*, *Madracis*, and *Millepora* spp.).

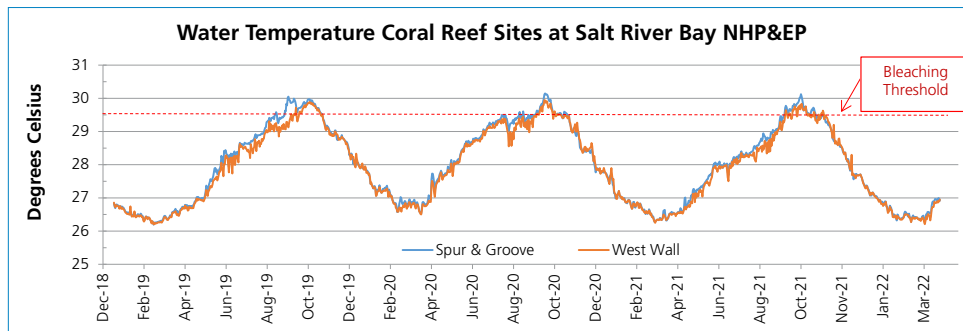


Figure 5. Salt River Bay National Historic Park and Ecological Preserve water temperature summary graphs showing data from two locations since 2019. A bleaching stress threshold of 29.5°C (85.1°F) is shown. Note data shown do not include 2022 season of thermal maximum (August–October).

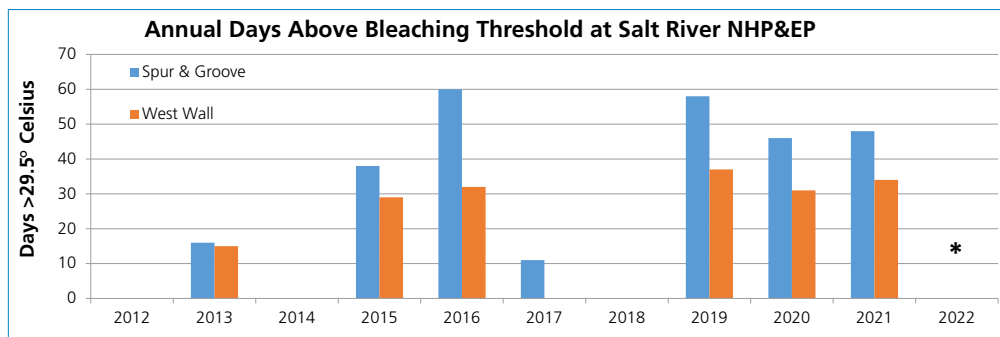


Figure 6. Salt River Bay National Historic Park and Ecological Preserve water temperature summary graph showing data from two locations since 2012. Cumulative number of days in a year that mean daily water temperature was above the bleaching threshold of 29.5°C (85.1°F). *Note data shown do not include 2022 season of thermal maximum (August–October).

