

St. Thomas

SITE SUMMARIES

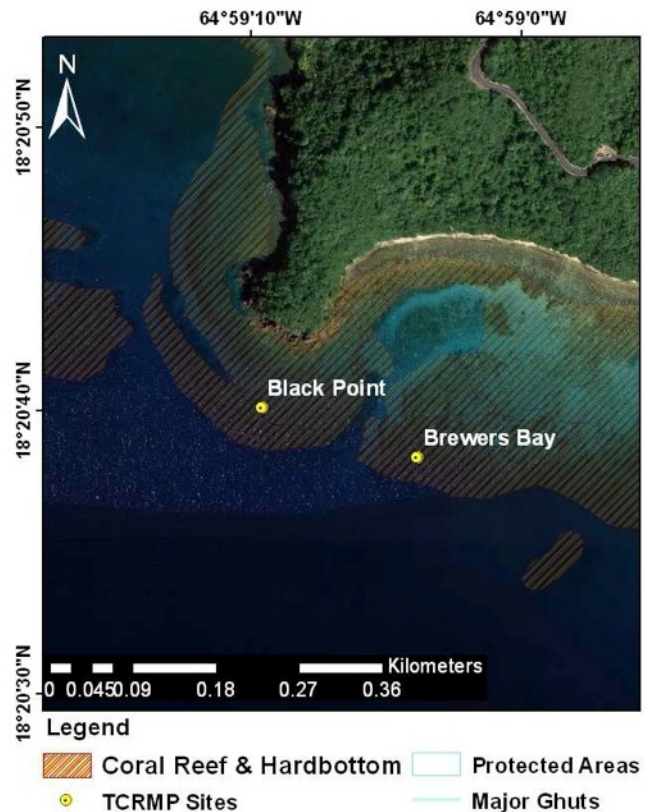
BLACK POINT

Description. Black Point is a nearshore fringing reef located at the mouth of Brewers Bay along the southwest coast of St. Thomas in water depths of 7 – 17 m. The reef has a sharp break in slope leading to a steep escarpment that terminates in a sediment plain at the reef base. Black Point appears to be a true reef with a well-developed carbonate framework over bedrock. Black Point has been monitored since 2003, with permanent benthic transects installed in 2007. A ciguatera fish poisoning study with monthly sampling has been ongoing since 2009.

Outstanding Feature. Black Point supports a fish spawning aggregation of striped parrotfish (*Scarus iserti*) with daily afternoon mating at the edge of the upper reef break.

Threats. Black Point is subjected to land-based sources of pollution and tends to have turbid water and overgrowth by heterotrophic organisms, such as sponges. Recreational/artisanal fishers with handline and spear frequently fish this site.

Figure 114. Black Point. (top) Location. (right) A representative photo of the reef.



BLACK POINT

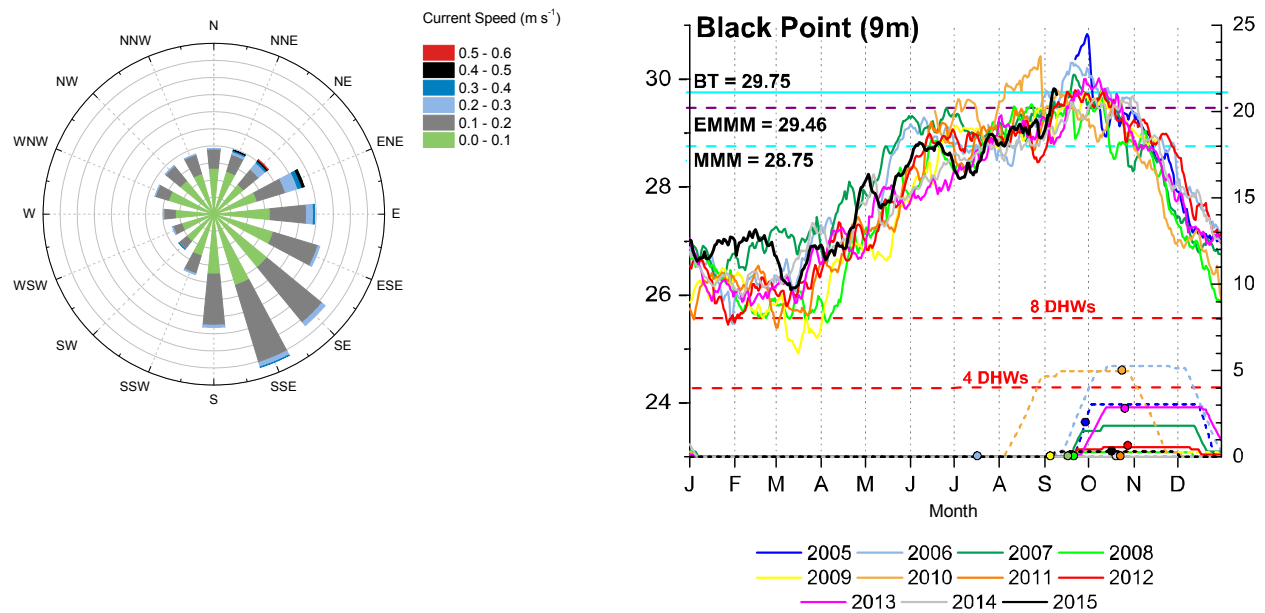


Figure 115. Black point current speed and benthic temperature record (8 m depth).

Physical Characteristics.

Current. Black Point has restricted water flow dominated by weak currents running counter or orthogonally to the left of the dominant wind direction. This may indicate that there is a counter flowing eddy from Perseverance Bay to the west that impinges on the headland. Current data are based on average data taken every 30 min. (11/29/06 to 3/1/2007) and hourly (4/19/07 to 9/5/07).

Temperature. Black Point has low circulation and relatively high mean temperatures with very low day-to-day variability.

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Chlorophyll & Turbidity. Chlorophyll tends to be high at Black Point, likely due to inputs of land-based nutrients that fuel pelagic productivity. There also exists a very prominent tidal signature that reflects switching source currents at the reef.

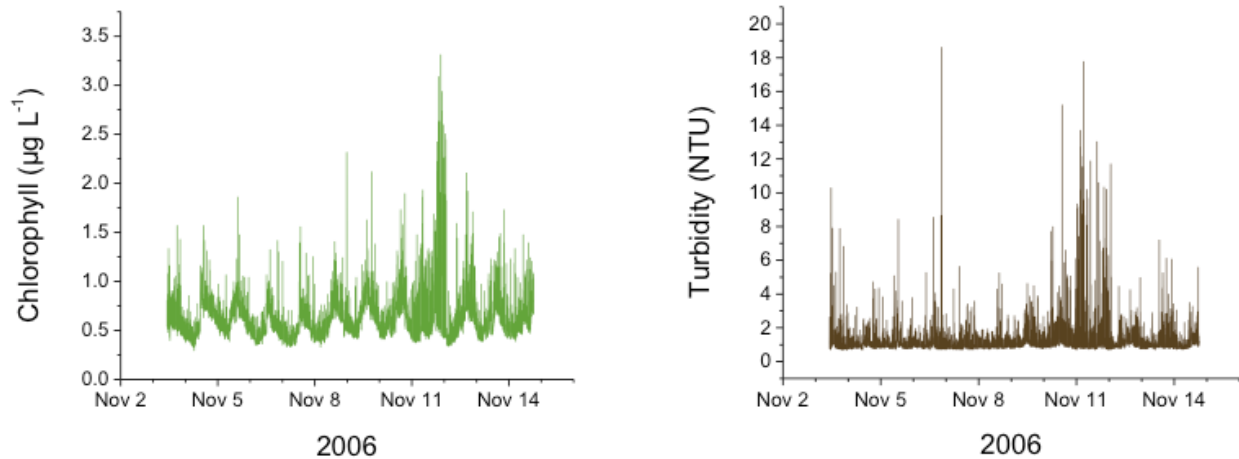


Figure 116. Black Point chlorophyll (left) and turbidity (right) record (16 m depth).

BLACK POINT

Benthic Community. Black Point supports a very diverse coral community with very equal representation by many coral species. However, large colonies (> 100 cm diameter) of *Orbicella annularis* and *Orbicella faveolata* occur on the eastern edge of the site, with a few occurring within transects. This coral community lost 40.5% of its coral cover in the 2005 bleaching event; however, by 2011 it had regained 103.5% of its coral cover. The algal community at Black Point is co-dominated by epilithic algae and the macroalga *Dictyota* spp..

Coral Health. Black Point corals were severely affected during the 2005 bleaching event with nearly all colonies bleached over 100% of the colony surface. The prevalence of coral diseases was moderate with dark spots disease predominating. However, white disease outbreaks occurred at least twice over the sampling period. Old partial mortality became very prevalent after the 2005 coral bleaching event and subsided in the following two years.

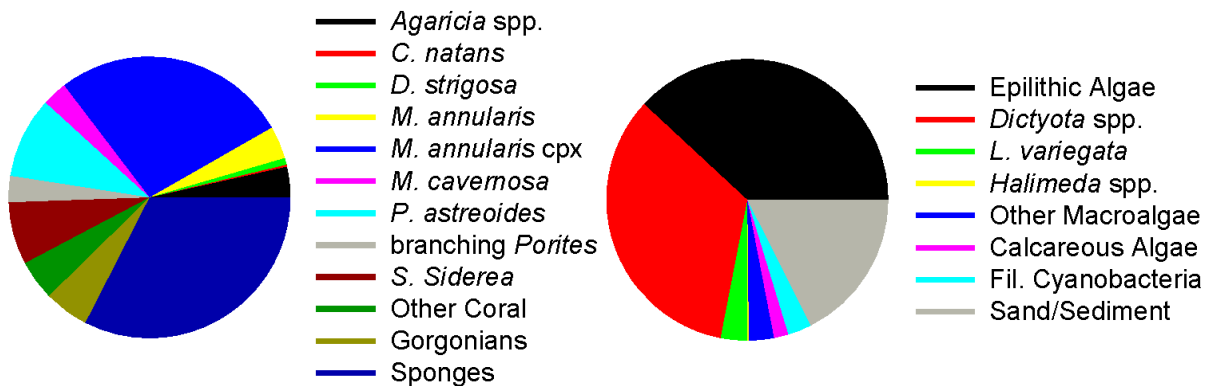


Figure 117. Black Point. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.

SITE SUMMARIES

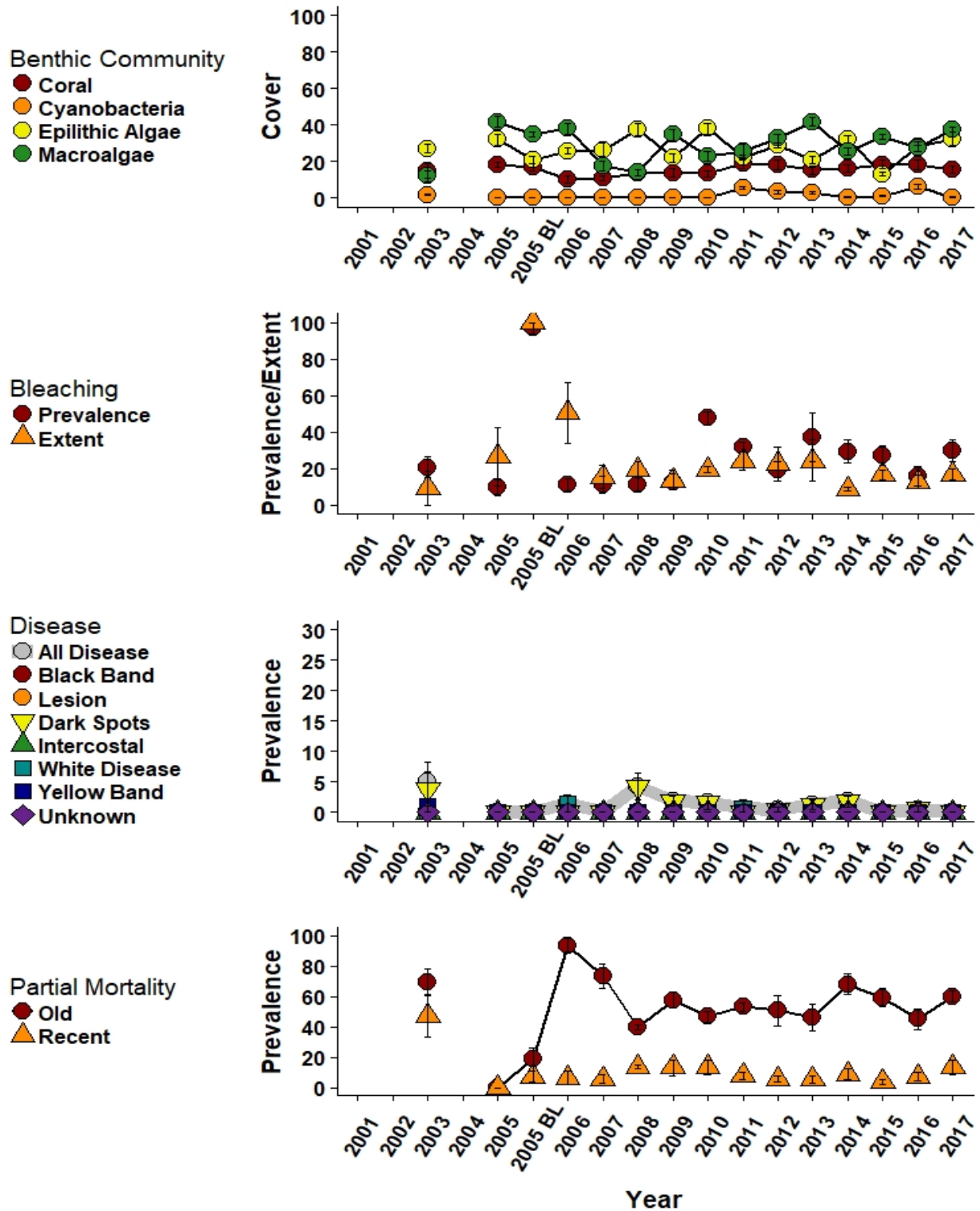


Figure 118. Black Point benthic cover and coral health through time (mean $\pm$ SE).

BLACK POINT

Fish Community. Black Point is highly dominated by herbivores. Juvenile parrotfish and damselfish are numerous. Brown chromis are equally abundant. The site is turbid and holds very few large fish, although the very occasional cubera snapper, Nassau grouper, or yellowfin grouper can be spotted, a rarity for nearshore areas of the USVI. These individuals are always observed near the eastern edge of the site where the reef is undercut and caves have formed. A resident mutton snapper (or two) is regularly observed cruising the sand line at the bottom of the reef. Hamlets are diverse and common. The black hamlet is especially abundant. In the mid to late afternoon, striped parrotfish (*Scarus iserti*) spawn at Black Point. They can be seen swimming along the reef edge in large groups beginning in the early afternoon. Spawning goes in to the late afternoon and involves tens of fish. Black Point is close to shore and is not fished by commercial traps often; however, divers can swim to the reef from the beach to spearfish. It is notably lacking of resident large edible fish.

SITE SUMMARIES

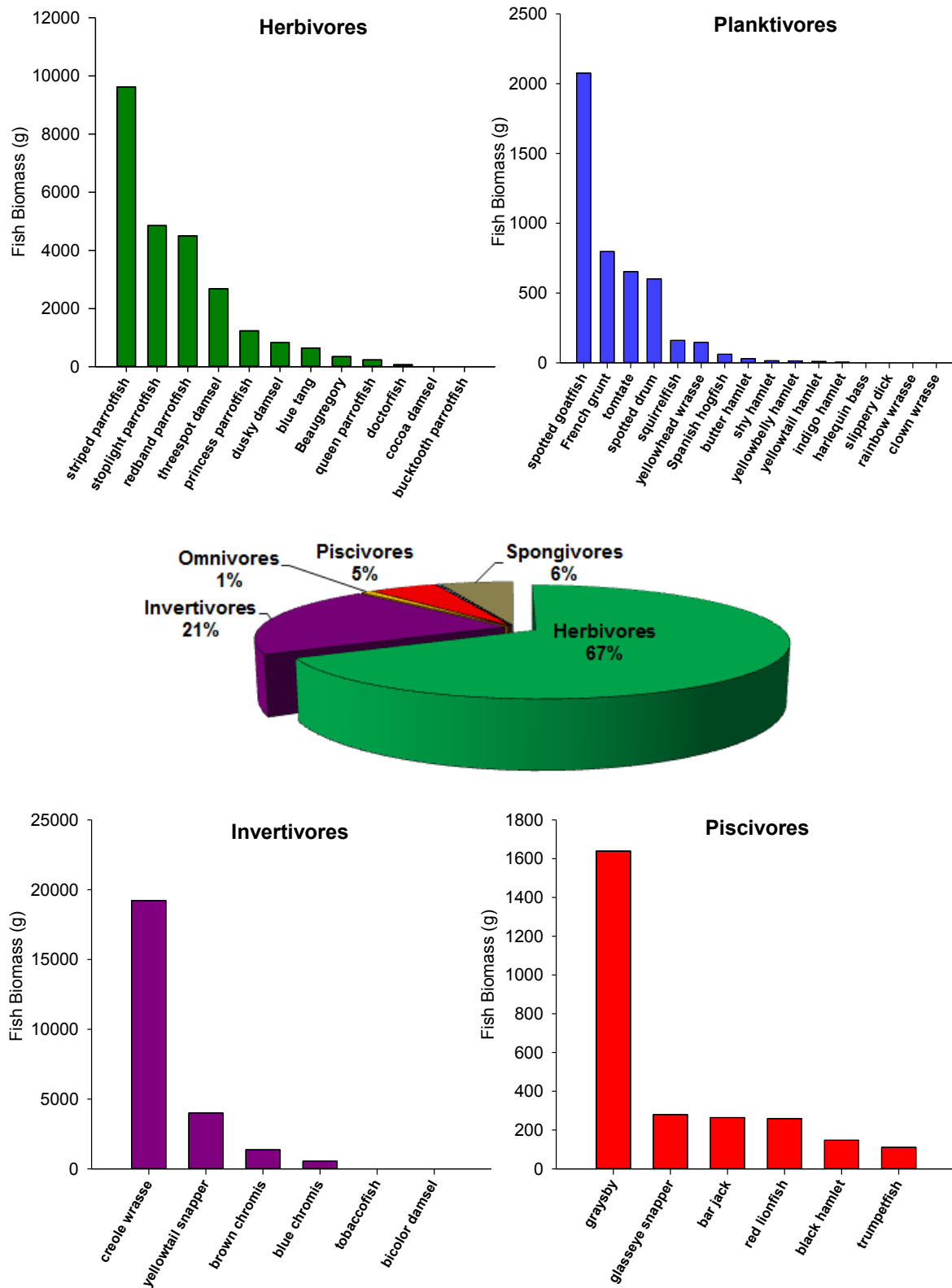


Figure 119. The Black Point fish community by absolute and relative biomass.

BOTANY BAY

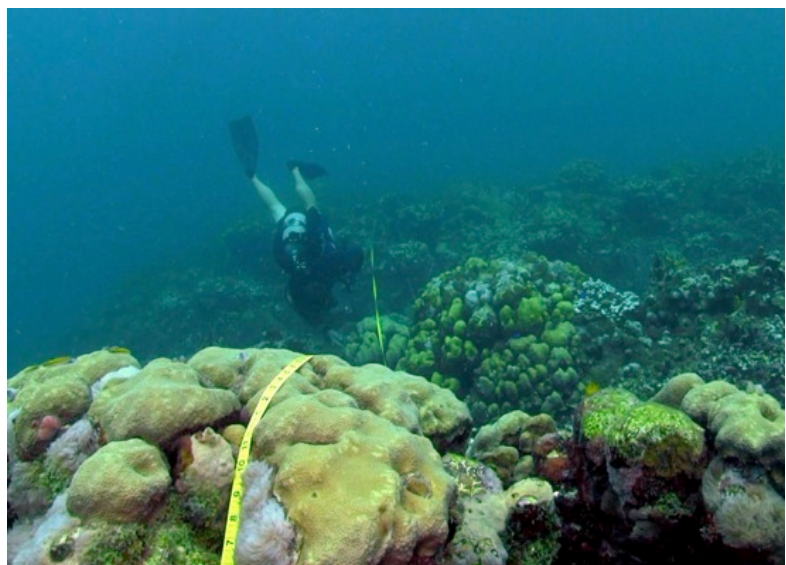
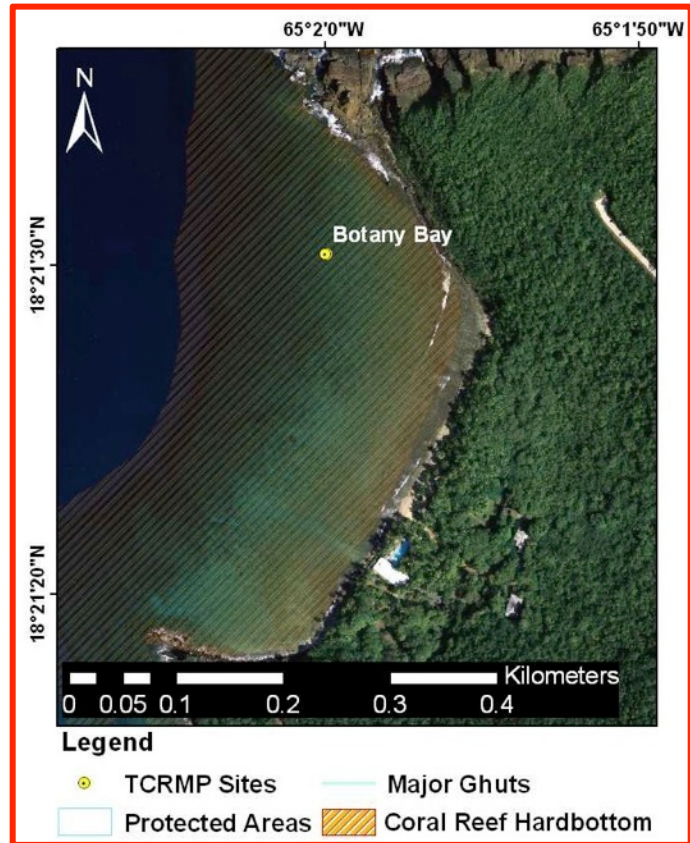
BOTANY BAY

Description. The Botany Bay site is located on the fore slope of a nearshore fringing reef in water depths of 5 – 17 m. The reef crest is a distinct spur-and-groove, with a sharp break in slope leading to an escarpment that terminates in a sand/sediment plain at the reef base. Botany Bay has been monitored since 2002.

Outstanding Feature. Botany Bay supports a diverse and productive reef that is one of the prettiest nearshore reefs in the Virgin Islands.

Threats. Botany Bay is threatened by development of the previously fully vegetated watershed and increased land-based sources of pollution. Cuts in the hillsides for construction of roads for luxury homes has left large areas without vegetation. The area is open to fishing. Increased residential development in the watershed may lead to increased recreational use of the reef, including fishing and collecting. The area is also occasionally impacted by large Atlantic swells, causing breakage of corals.

Figure 120. Botany Bay. (top) Location. (right) A representative photo of the reef.



SITE SUMMARIES

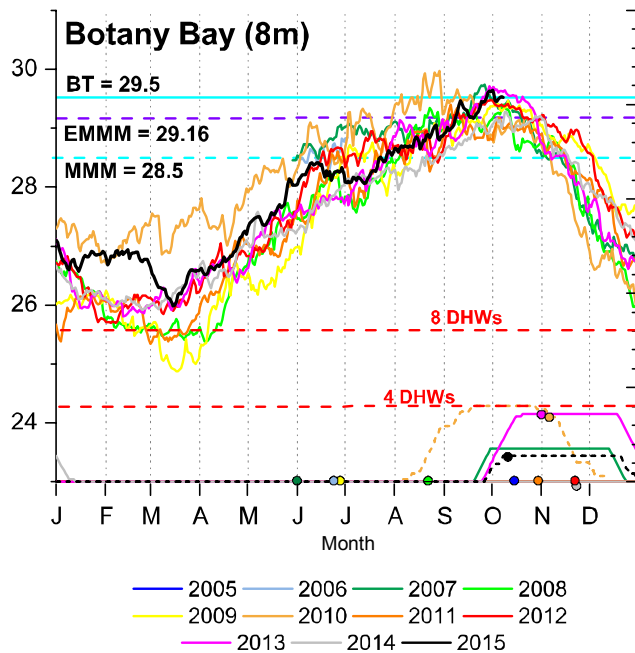


Figure 121. Botany Bay benthic temperature record (11 m depth).

Physical Characteristics. Current. Currents have not been measured directly at Botany Bay.

Unidirectional currents do not tend to be strong. Wave-driven oscillatory currents can impact the reef crest and fore reef. The site is vulnerable to impacts from large Atlantic swells. Many corals were broken and toppled during the 2009 March swell event when offshore swells reached heights to 4 m (Bright et al. 2016). **Temperature.** Botany Bay tends to have slightly cooler temperatures than other nearshore sites, likely owing to its open position facing the Atlantic.

Figure 122. A large colony of pillar coral (*Dendrogyra cylindricus*) dislodge, toppled, and diseased after the 2009 swell event (Botany Bay, June 25, 2009).



Benthic Community. The Botany Bay site coral community is unique for the dominance of branching *Porites porites*. The site lost 38.9% of its coral cover in the 2005 bleaching event and had regained 10.6% by 2011. There is a high abundance of gorgonians on the seaward slope exposed to wave swell. The Botany Bay algal community is co-dominated by epilithic algae and the macroalga *Dictyota* spp., which tend to negatively covary.

Coral Health. Bleaching was extremely severe during 2005, with nearly 100% of corals bleached or pale over 100% of their surface. There was also a high prevalence of bleaching in 2002 at an unknown extent and in 2010 at a low extent. Non-thermal stress years have seen variable bleaching. Coral diseases can be high at Botany Bay, with a preponderance of white and dark spots diseases, and lesions that are likely related to white disease. Old partial mortality shows a pattern that is difficult to explain before 2005. During bleaching and afterwards consistent observers have done partial mortality assessments and this data is valid. There was a large increase in old partial mortality after the 2005 bleaching event, then some subsidence and leveling off after 2008. Recent partial mortality was high through most years of monitoring, largely due to biting by territorial damselfish (*Stegastes planifrons* and *S. adustus*; data not shown).

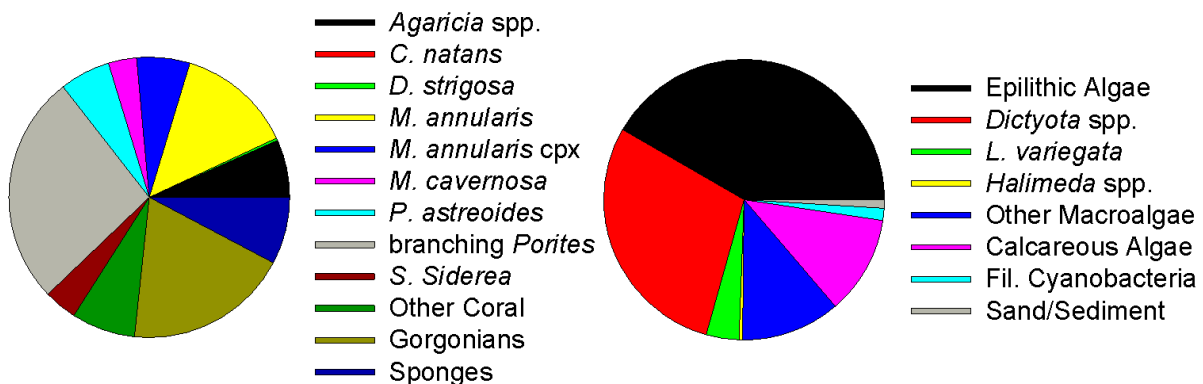


Figure 123. Botany Bay. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.

SITE SUMMARIES

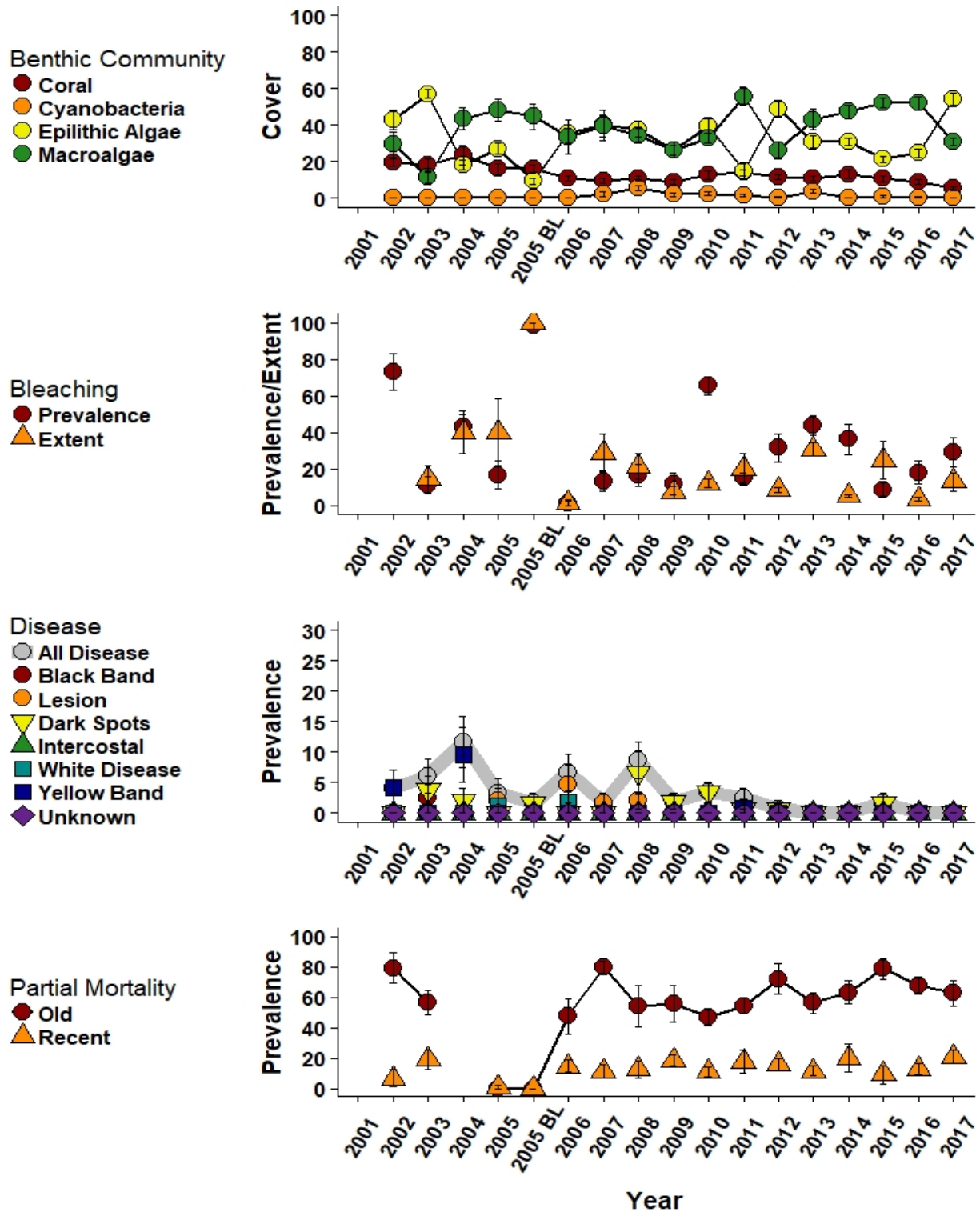


Figure 124. Botany Bay benthic cover and coral health through time (mean $\pm$ SE).

BOTANY BAY

Fish Community. The fish community at Botany Bay is typical of well-developed nearshore reefs around St. Thomas. The site is dominated by herbivores, primarily large stoplight parrotfish. Large habitat diversity at the site supports fish species richness and all trophic groups are well represented. Botany has a highly diverse fish community, similarly to Cane Bay, St. Croix. These sites may each be recruitment sinks owing to their position on the northwest sides of the islands where eddies tend to circulate. Generally, red hind, dog snapper, and yellowtail snapper are recorded in fish transects. In 2014, a rainbow parrotfish was observed. On roving dives, spiny lobsters are nearly always encountered. Grunts and wrasses are especially numerous and diverse at the site. Like most nearshore reefs, large jacks and balistids are nearly absent, and the planktivore community is comprised mainly of blue and brown chromis.

SITE SUMMARIES

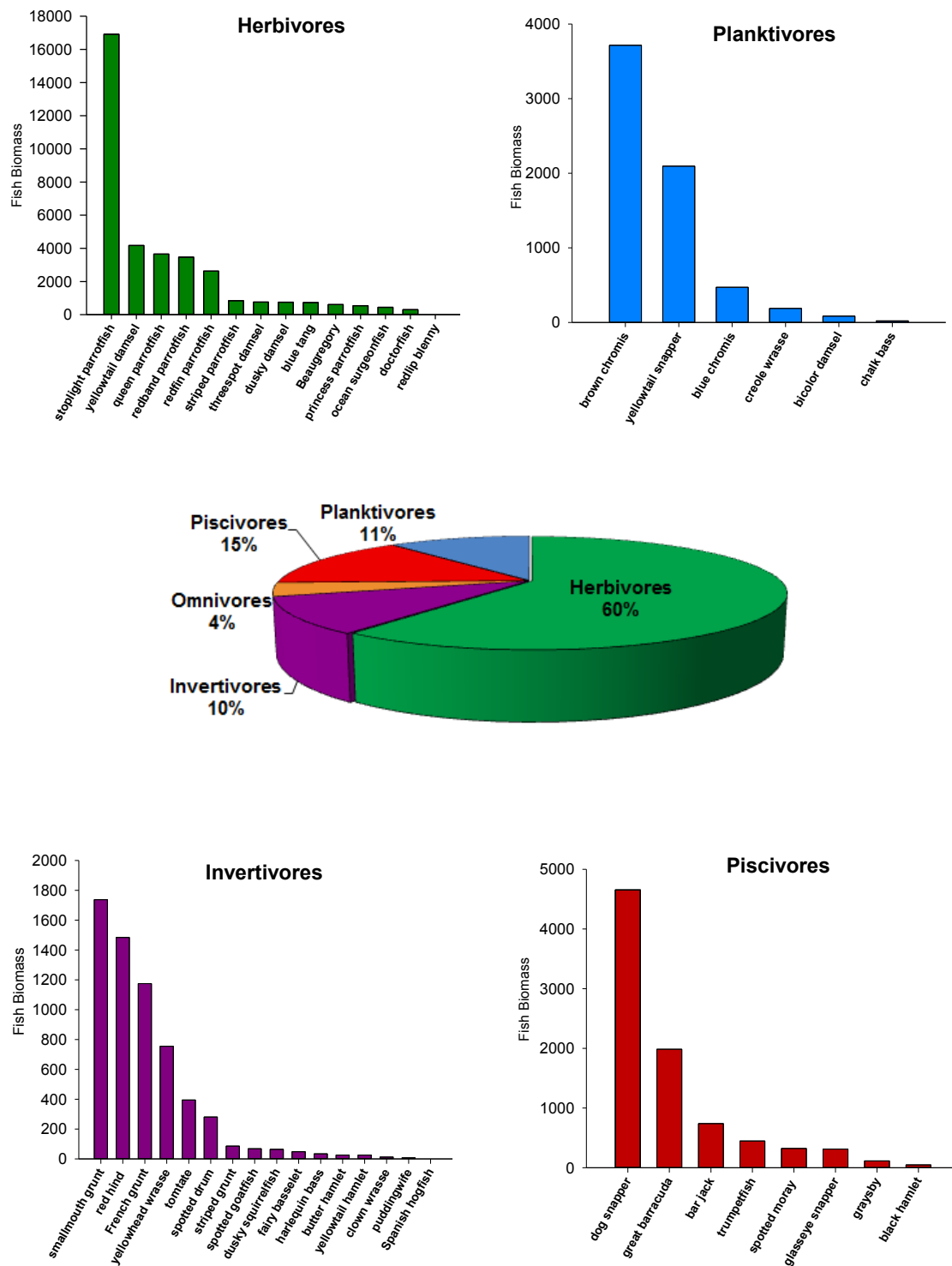


Figure 125. The Botany Bay fish community by absolute and relative biomass.

BREWERS BAY

BREWERS BAY

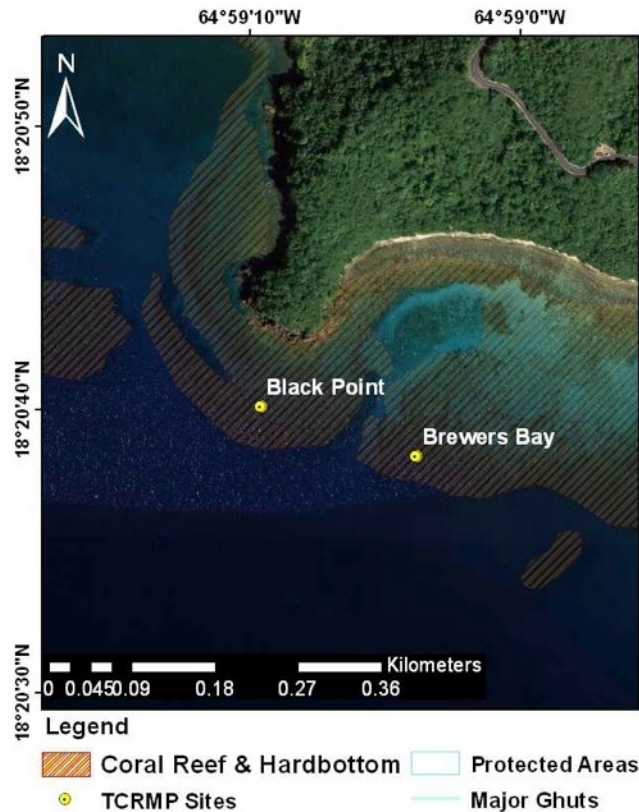
Description. Brewers Bay is a nearshore fringing reef located along the southwest coast of St. Thomas in water depths of 7 – 17 m. Brewers Bay is a very well developed boulder star coral (*Orbicella annularis*) dominated reef. Brewers Bay was initially monitored in 2002/2003, but was abandoned due to its proximity to the Black Point site. It was restarted in 2008 because it was resistant to the 2005 bleaching is one of the best preserved *O. annularis* reefs around St. Thomas.

Outstanding Feature. Brewers Bay is very good example of a nearshore boulder star coral fringing reef and has fared better than other reefs of this type over the 2005 mass coral bleaching event.

Threats. Brewers Bay is subjected to land-based sources of pollution and tends to have turbid water and overgrowth by heterotrophic organisms, such as sponges.

Recreational/artisanal fishers frequently fish Brewers Bay with hand line and spear. The site has a great deal of marine debris, including boat hulls, rope, and metal pieces.

Figure 126. Brewers Bay. (top) Location. (right) A representative photo of the reef.



SITE SUMMARIES

Physical Characteristics.

Current. Brewers Bay currents have not been measured directly, but both unidirectional and oscillatory currents are usually very low in magnitude. See also the Black Point physical data, which was taken within 500 m distance.

Temperature. Brewers Bay temperatures have not been recorded directly, but see the Black Point temperature data from less than 300 m horizontal distance. The site has restricted flow and should develop high warm season temperatures.

BREWERS BAY

Benthic Community. The Brewers Bay site is highly dominated by the boulder coral *Orbicella annularis* and exhibits the highest coral cover of any nearshore site in the TCRMP, with a coral cover of 32% in 2013. Coral cover was not monitored between 2003 and 2008; however there was a 28.4% decline in cover that could largely be attributed to the 2005 coral bleaching event. The algal community at Brewers Bay is dominated by epilithic algae, with lesser amounts of the macroalga *Dictyota* spp..

Coral Health. Corals at the Brewers Bay site were not monitored for health over the 2005 bleaching event. However, corals exhibited some of the highest prevalence of bleaching during the 2010 coral bleaching event, albeit at a low extent. In other years, bleaching prevalence remained high, with a low extent. Yellow band disease outbreaks were severe and affected the *O. annularis* community in 2002 and 2003. Old partial mortality is a prominent and persistent feature of the large *O. annularis* colonies. Recent mortality is very high and largely attributable to the biting of large populations of the territorial three-spot damselfish (*Stegastes planifrons*; data not shown).

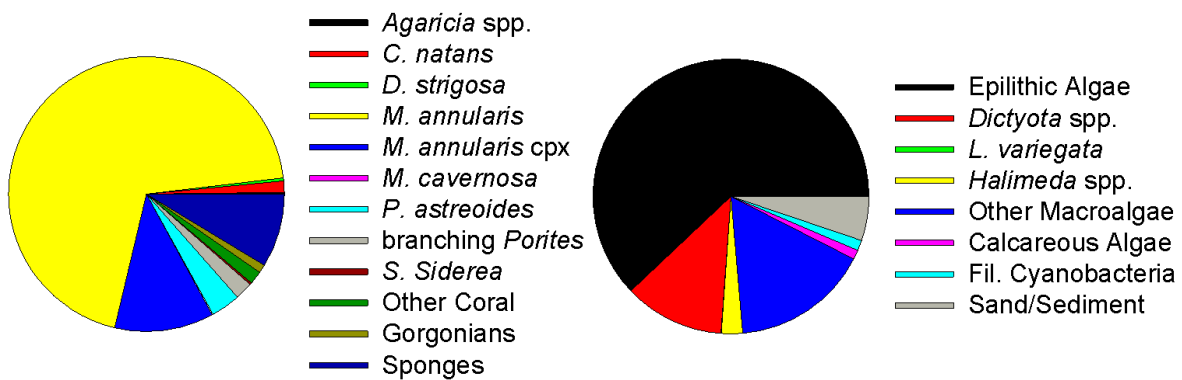


Figure 127. Brewers Bay. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.

SITE SUMMARIES

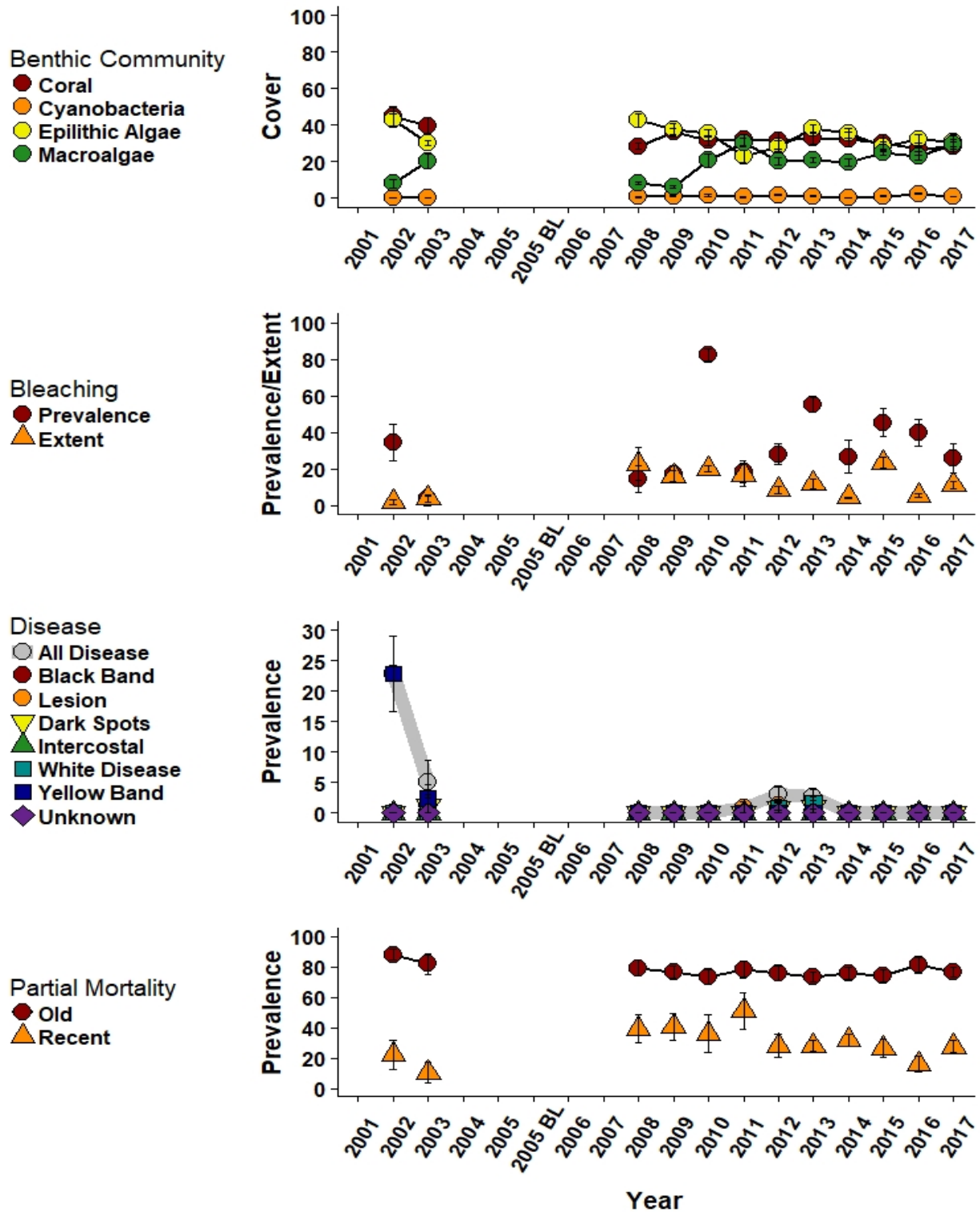


Figure 128. Brewers Bay benthic cover and coral health through time (mean $\pm$ SE)

BREWERS BAY

Fish Community. Brewers Bay is characterized by a high fish abundance dominated by herbivores. The site holds large numbers of parrotfish. Numerically, the herbivores are dominated by juvenile striped parrotfish that swim over the reef in groups of mixed parrotfish and wrasse. Both yellowhead and bluehead wrasse are prolific and school with the juvenile parrotfish. There are also larger stoplights and queen parrotfish grazing the reef. Piscivores are limited in biomass but are fairly diverse and generally include inshore pelagics such as cero mackerel and bar jacks or yellow jacks. Hamlets (*Hypoplectrus*) are very common and diverse, represented by 6 to 7 species in each annual survey. The occasional large snapper (schoolmaster, dog, mutton, and cubera) are sighted on the reef periphery or around large coral heads. The reef is spearfished regularly, so these sighting are becoming more rare. Nassau, black, and yellowfin grouper and the now rare blue and rainbow parrotfish were present in Brewers Bay forty years ago (Rogers 1982); however, only Nassau and yellowfin grouper are rarely seen at the reefs today, whereas the other species are no longer observed.

SITE SUMMARIES

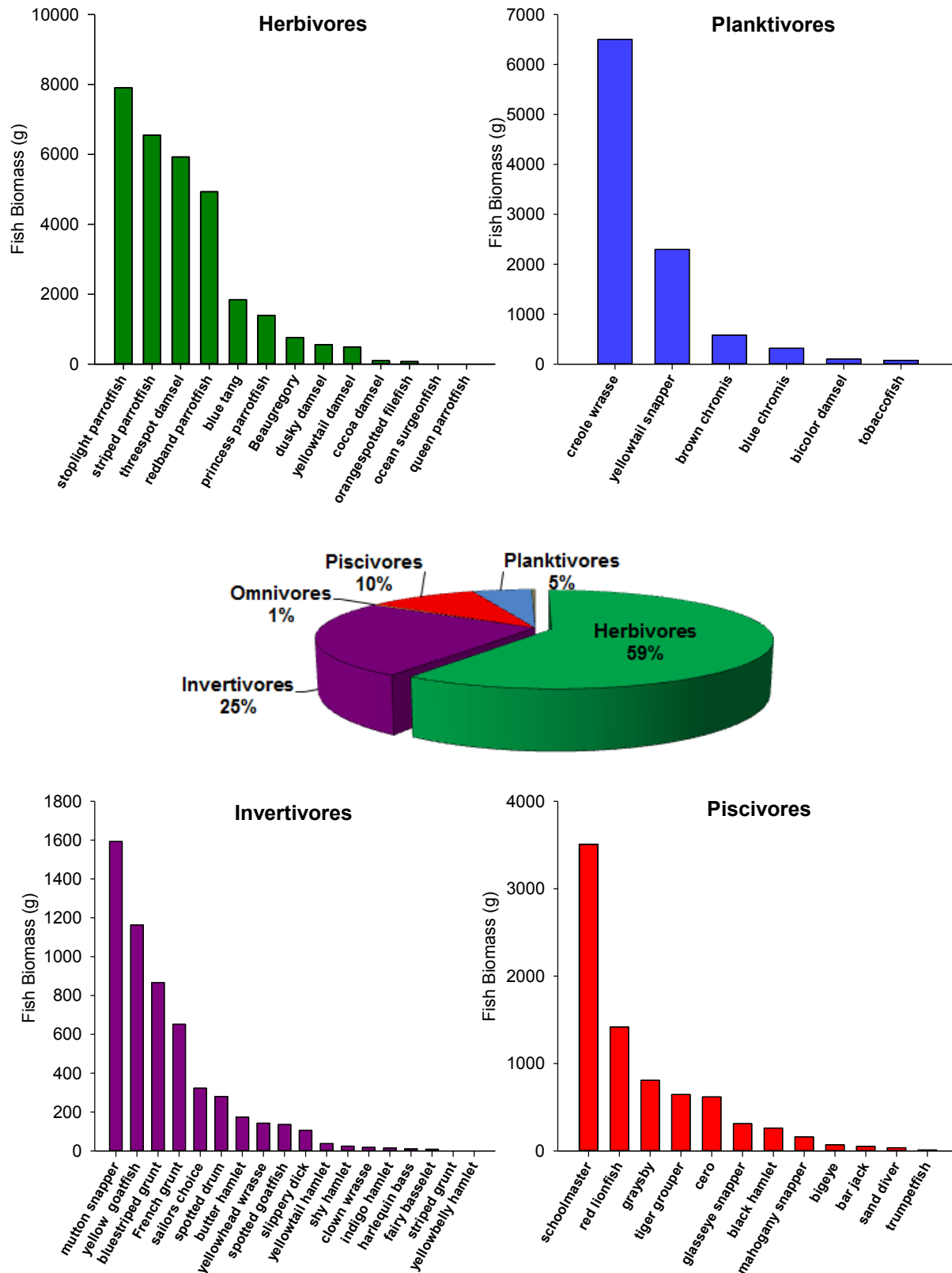


Figure 129. The Brewers Bay fish community by absolute and relative biomass.

BUCK ISLAND, ST. THOMAS

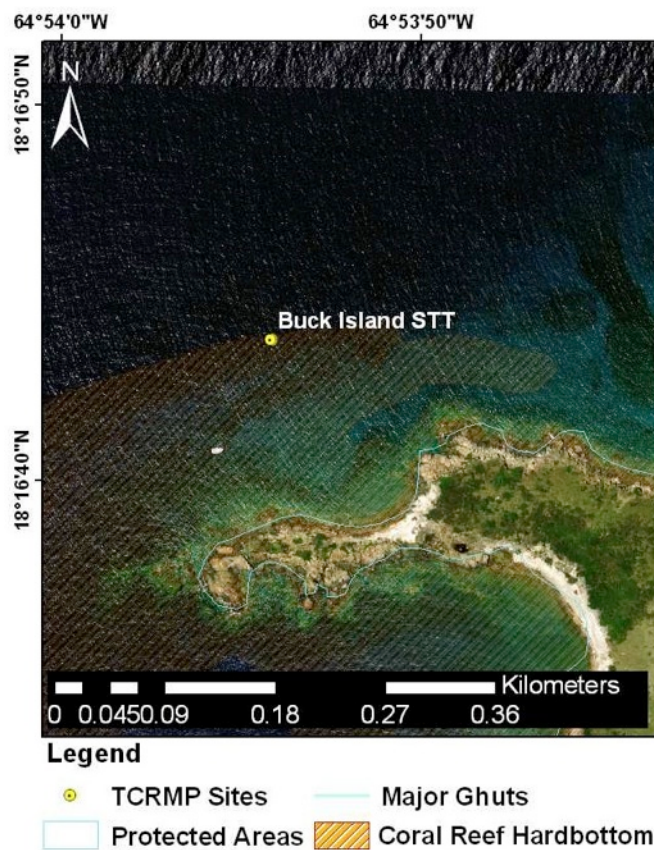
BUCK ISLAND, ST. THOMAS

Description. Buck Island, St. Thomas is a midshelf reef fringing the northwest coast of an uninhabited offshore island in water depths of 7 – 20 m. The reef has a sharp break in slope leading to a steep escarpment that terminates in a sand/sediment plain at the reef base. The monitoring site is located on that slope. Buck Island, St. Thomas has been monitored since 2005, with permanent benthic transects installed in 2007.

Outstanding Feature. Buck Island, St. Thomas is one of the most important tourist sites in the Virgin Islands, with frequent visitation by cruise ship passengers on day boats.

Threats. Buck Island, St. Thomas is very heavily used as a recreational dive site with the potential for cumulative impacts. The water surrounding Buck Island, St. Thomas is open to fishing. Commercial trap fishermen frequently target this site, and trap strings have been laid over the monitoring transects. Federally protected Nassau Grouper (*Epinephelus striatus*) have been observed within traps at the monitoring site. In addition, derelict traps are common around the site.

Figure 130. Buck Island, St. Thomas. (top) Location. (right) A representative photo of the reef.



SITE SUMMARIES

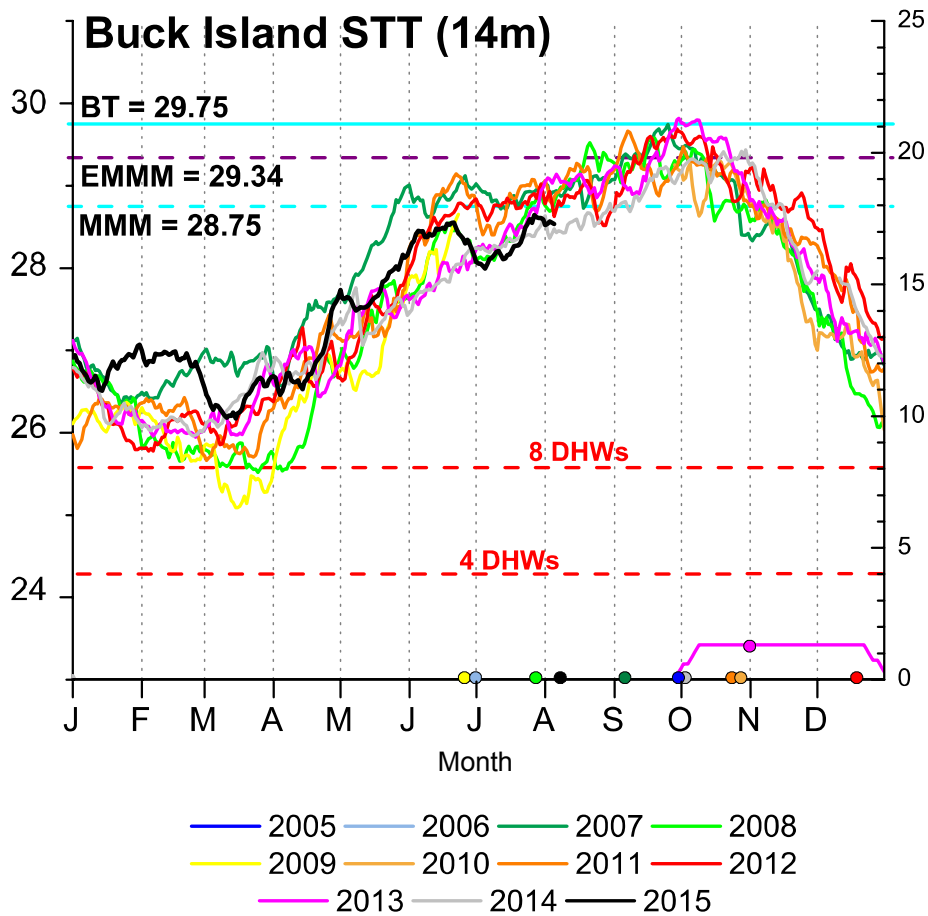


Figure 131. Buck Island, St. Thomas benthic temperature record (12 m depth).

Physical Characteristics.

Current. Buck Island, St. Thomas currents have not been measured directly. Moderately strong unidirectional currents occasionally influence the site; however, in general currents are very weak.

Temperature. Buck Island, St. Thomas may develop high temperatures. Unfortunately, the temperature probe placed during the 2010 coral bleaching event was lost.

BUCK ISLAND, ST. THOMAS

Benthic Community. The Buck Island, St. Thomas site coral community is dominated by the boulder star coral (*Orbicella* spp.), but shows high and even representation of other species. Coral cover declined by 23.4% due to the 2005 coral bleaching event and the site had regained 13.4% of this cover by 2011. Among sessile epibenthic animals a high proportion of the community is composed of sponges. The algal community is co-dominated by epilithic algae and the macroalgae *Dictyota* spp. and *Lobophora variegata*. Filamentous cyanobacteria were also abundant in 2008.

Coral Health. The Buck Island, St. Thomas site was severely bleached in the 2005 coral bleaching event, with over 80% of colonies bleached over 100% of the colony surface. Bleaching was also high during the 2010 bleaching event, but at a low extent on colonies. Low prevalence of low-extent bleaching was common in other years of study. Coral diseases were usually low, in prevalence with the striking exception of 2006, when white diseases and lesions consistent with recent white disease reached extremely high prevalence. Old partial mortality increased rapidly after the 2005 bleaching event and then declined steadily in following years.

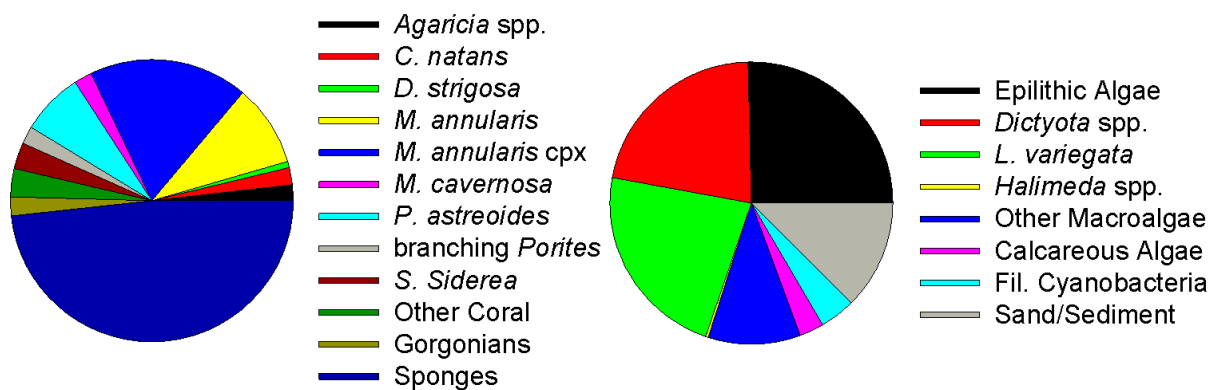


Figure 132. Buck Island, St. Thomas. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.

SITE SUMMARIES

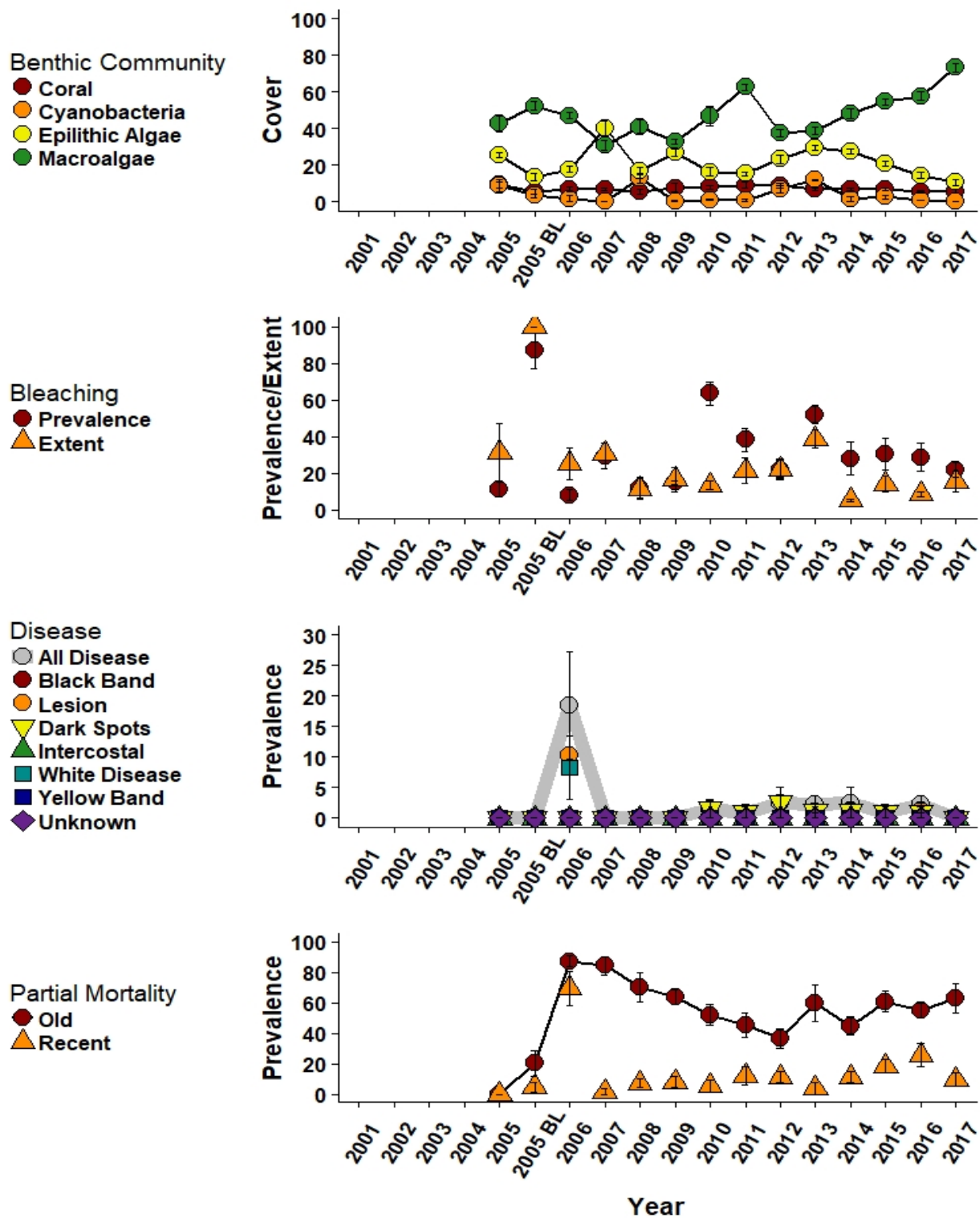


Figure 133. Buck Island, St. Thomas benthic cover and coral health through time (mean $\pm$ SE).

BUCK ISLAND, ST. THOMAS

Fish Community. The fish community at Buck Island, St. Thomas is very diverse and represents the utilization of many habitats and resources. Herbivores, especially parrotfishes, dominate the site. Invertivores, however, are also diverse and very common. Both spotted and yellow goatfish roam the top of the reef and large wrasses, including the Spanish hogfish and puddingwife, are prolific. In addition to goatfish and wrasses, a variety of grunts inhabit the Buck Island Reef, and large schools of both jolthead and saucereye porgies are observed there. Tourists and commercial dive operators are known to feed fish at Buck Island and gregarious yellowtail snapper are large and numerous. Mutton snapper are occasionally observed. Schoolmaster snapper dominate the piscivores community on the site. No large grouper or snapper have been observed in belt transects or roving dives; however, small Caribbean reef sharks are generally sighted. Although a Territorial Park on land, the area is fished with hook and line, traps, and speargun. It is also a very heavily dove SCUBA and snorkel site.

SITE SUMMARIES

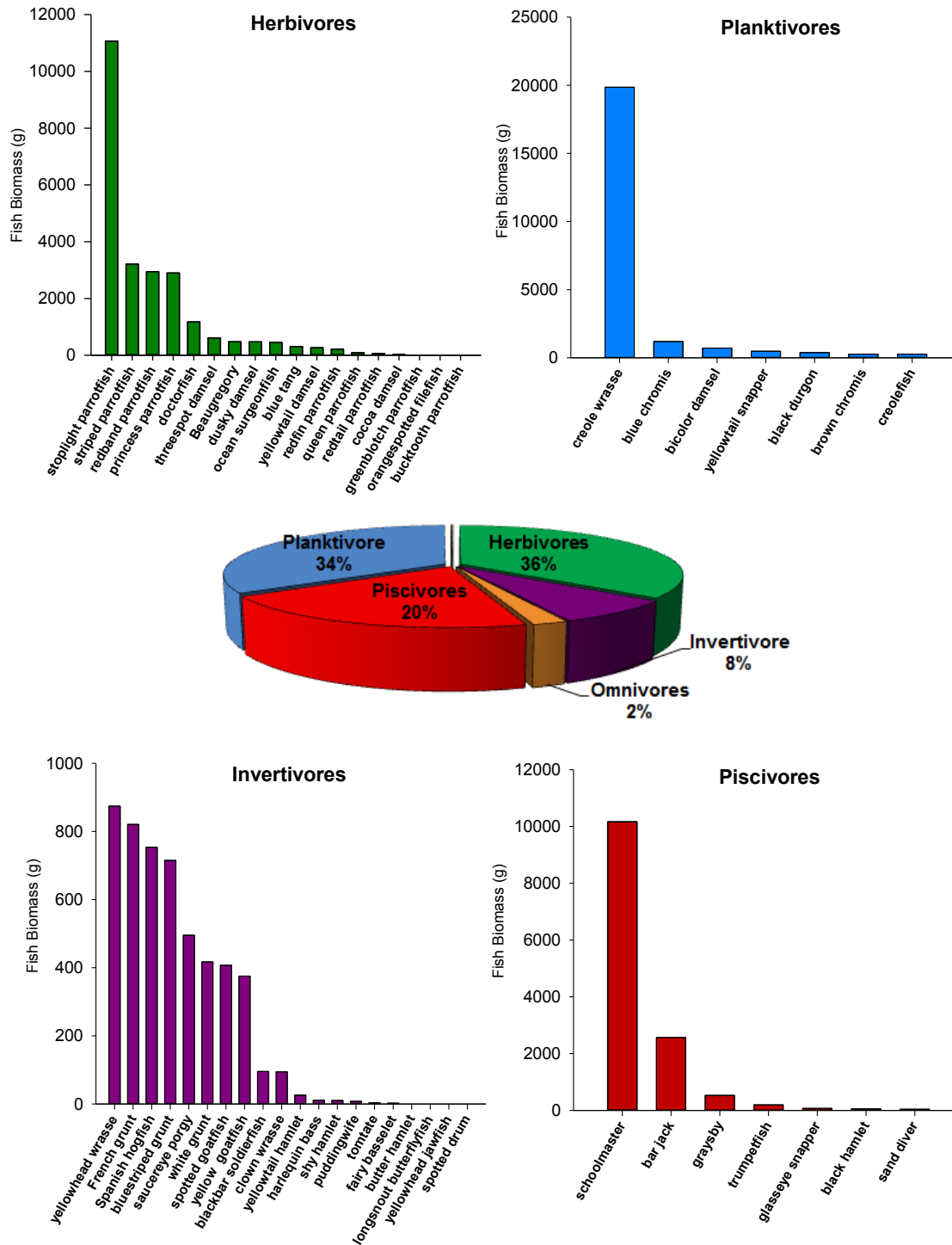


Figure 134. The Buck Island, St. Thomas fish community by absolute and relative biomass.

COCULUS ROCK

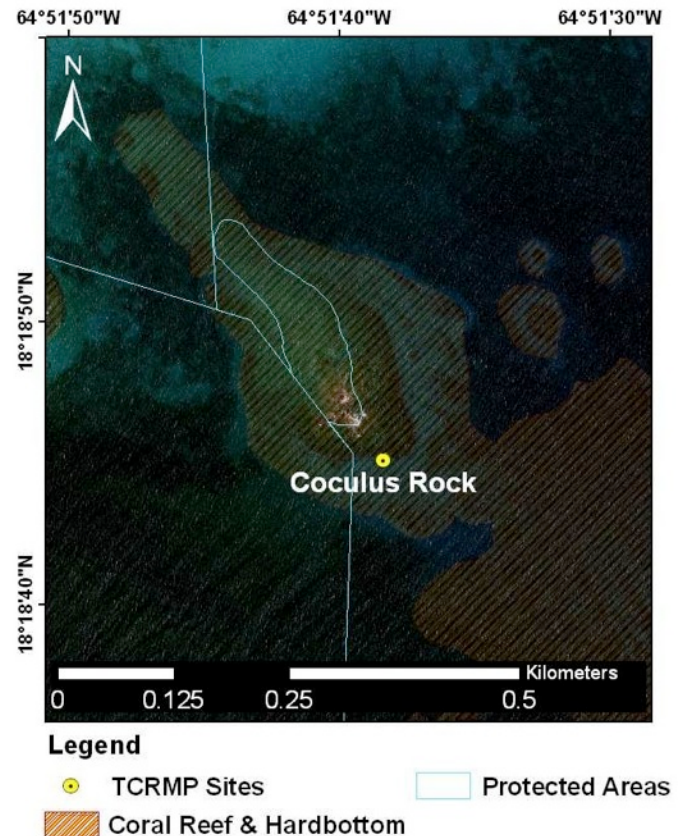
COCULUS ROCK

Description. The Coculus Rock site is a coral community on bedrock and pavement in depths of 4 – 7 m. The reef is formed between emergent rocks and a sand plain at 7m. Coculus Rock has been monitored since 2001, with fish community assessment starting in 2009. A ciguatera fish poisoning study with monthly sampling has been ongoing since 2009.

Outstanding Feature. Coculus Rock is located in the St. Thomas East End Reserve and is closed to taking of reef fishes. The site supports a fish spawning aggregation of redfin parrotfish (*Sparisoma rubripinne*). These 100+ fish engage in daily afternoon mating at southeast reef corner. A ciguatera study with monthly sampling has been ongoing since 2009.

Threats. Coculus Rock is subject to land-based sources of pollution from the Turpentine Gut drainage of the Tutu watershed and the numerous industrial maritime activities in Benner Bay.

Figure 135. Coculus Rock. (top) Location. (right) A representative photo of the reef showing the aggregation of redfin parrotfish.



SITE SUMMARIES

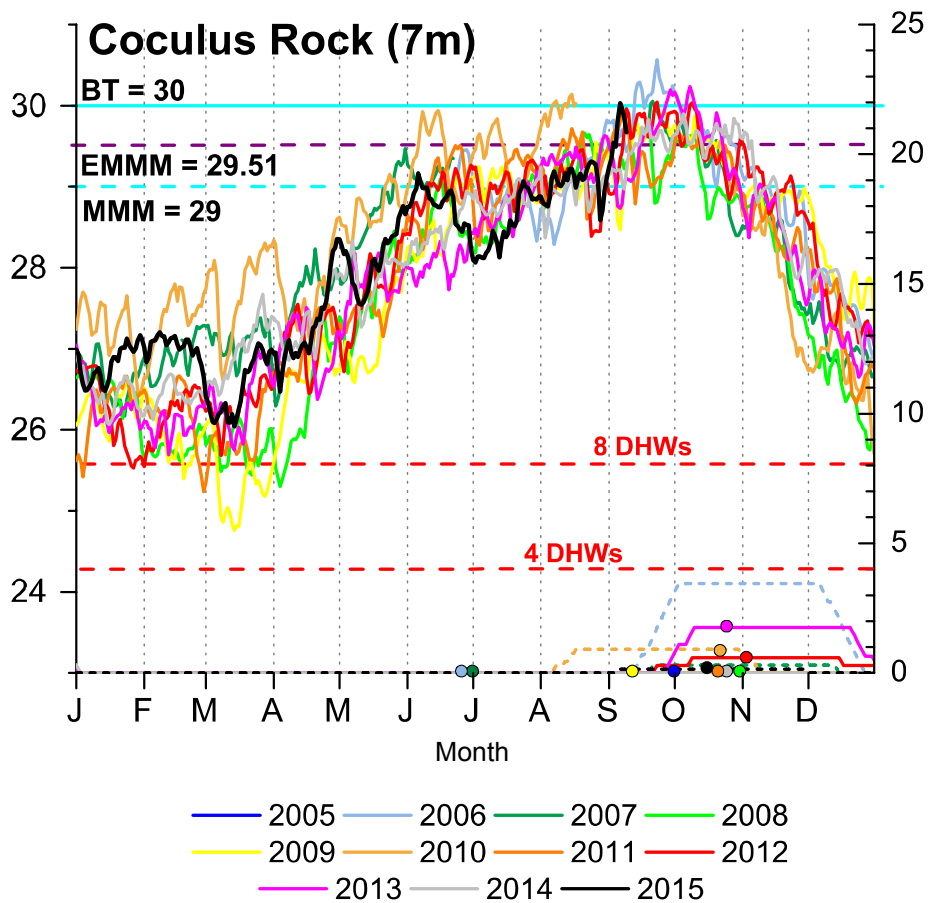


Figure 136. Coculus Rock benthic temperature record (7 m depth).

Physical Characteristics.

Current. Coculus Rock currents have not been measured directly. Only weak unidirectional currents have been experienced. Wave-driven oscillatory currents can be intense from swells coming from the southeast.

Temperature. Coculus Rock can experience very high temperatures during the peak warm season.

COCULUS ROCK

Benthic Community. The Cocus Rock site is a coral community on bedrock and thin carbonate pavement that supports a very diverse coral community with no dominance by any species. The site lost 10.7% of its coral cover in the 2005 bleaching event, but had regained 76.0% of this lost cover by 2011. Sponges are a very prominent component of the sessile epibenthic animal community. The algal community is co-dominated by epilithic algae and the macroalga *Dictyota* spp., which tend to covary.

Coral Health. Corals at Cocus Rock were relatively moderately impacted by the 2005 coral bleaching event in both prevalence and extent on colonies. This may be due to a coral species assemblage composed of small massive species that tend to be less susceptible to bleaching (Smith et al. 2013b). A modest prevalence of low extent bleaching was also evident in the 2010 coral bleaching event. In years without high thermal stress, there tends to be a relatively high prevalence of bleaching relative to other sites, and prior to 2004 this was at high extent over colonies. Coral diseases, represented almost exclusively by dark spots disease, can be quite high in some years. Old partial mortality has been fairly high and consistent over time, with a slight increase after the 2005 and 2010 bleaching events. Recent partial mortality tends to be quite low in prevalence.

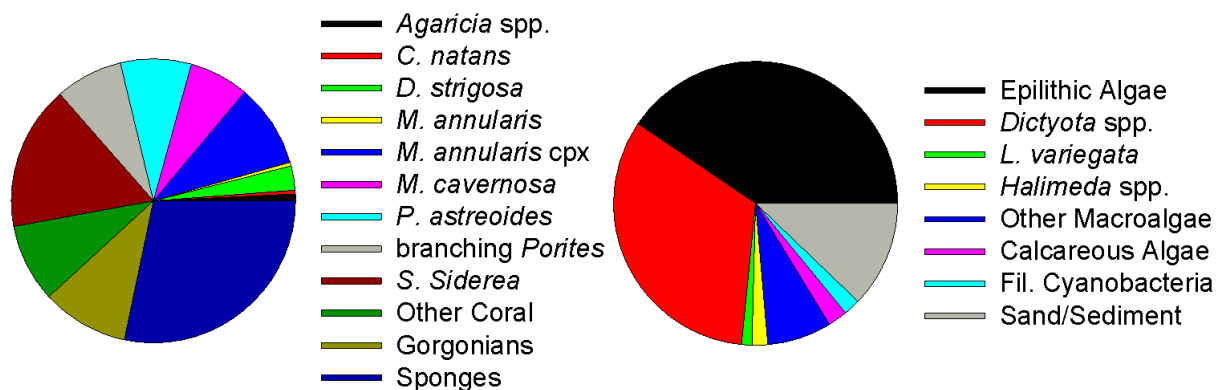


Figure 137. Cocus Rock. (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.

SITE SUMMARIES

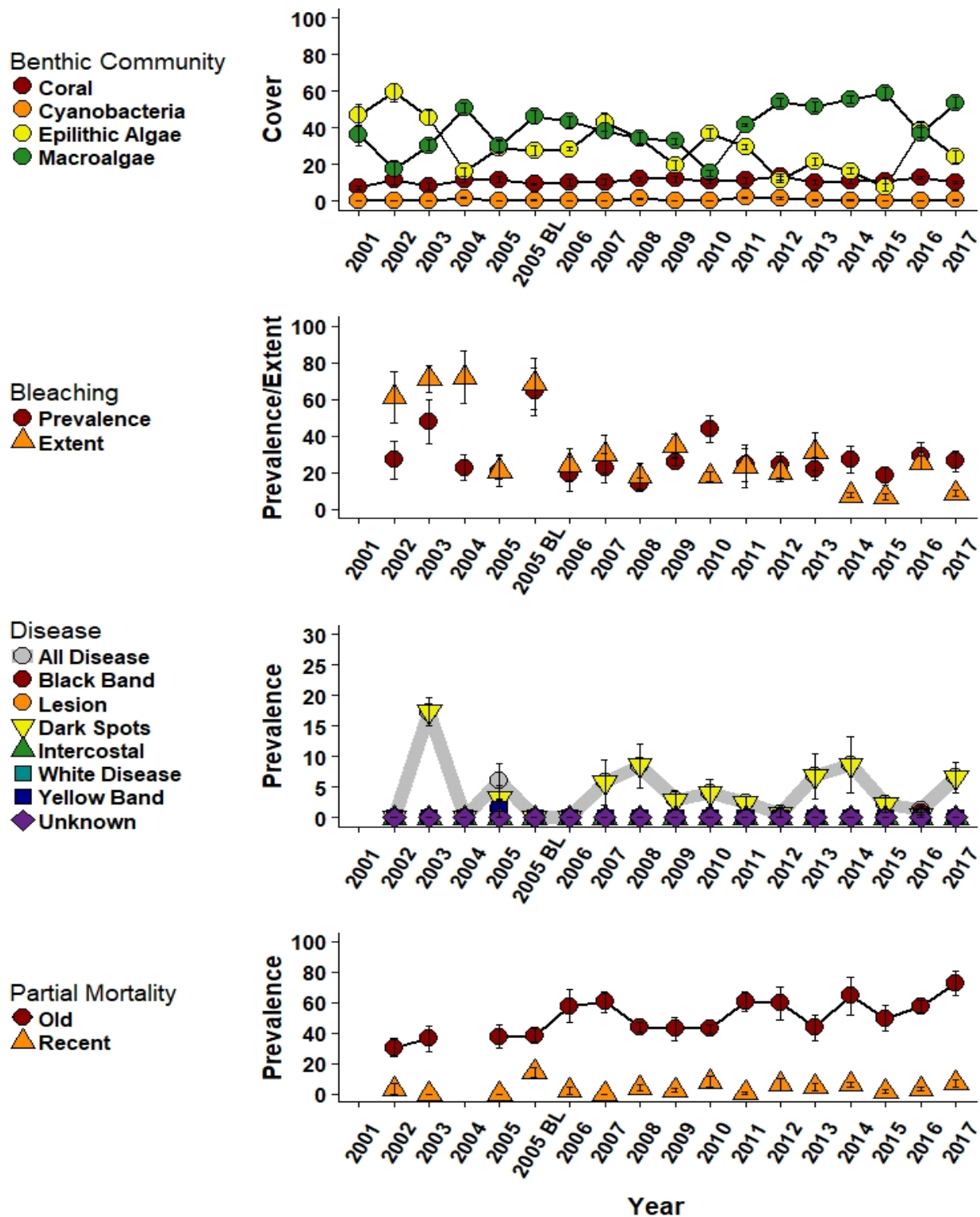


Figure 138. Cocus Rock benthic cover and coral health through time (mean $\pm$ SE). **Fish Community.** The Cocus Rock fish community is interesting in several ways and it represents an inshore promontory that aggregates redfin parrotfish (*Sparisoma rubripinne*)

COCULUS ROCK

to spawn every afternoon. For that reason, redfin highly dominate the site in biomass. The top of the reef, emergent at points, is turbid and rough with breaking waves, but large parrotfish, jacks, snappers, doctorfish, and damselfishes swim in this area. At the bottom of the reef, where coral and rock meet the sand, a small ledge runs along the southeast edge. Red hind and an occasional Nassau grouper have been observed hiding in the ledge here. There are generally a dozen or more juvenile lobster using the ledge as well. Juvenile grunts can be particularly common at Cocus Rock, schooling on large limestone rocks on the western side of the site. Otherwise the fish community inhabiting the steep walled rock and algae covered limestone site is primarily wrasses, small parrotfishes, and acanthurids. Cocus Rock is part of the territorial Saint Thomas East End Reserve (STEER) and fishes are protected from all harvest year-round.

SITE SUMMARIES

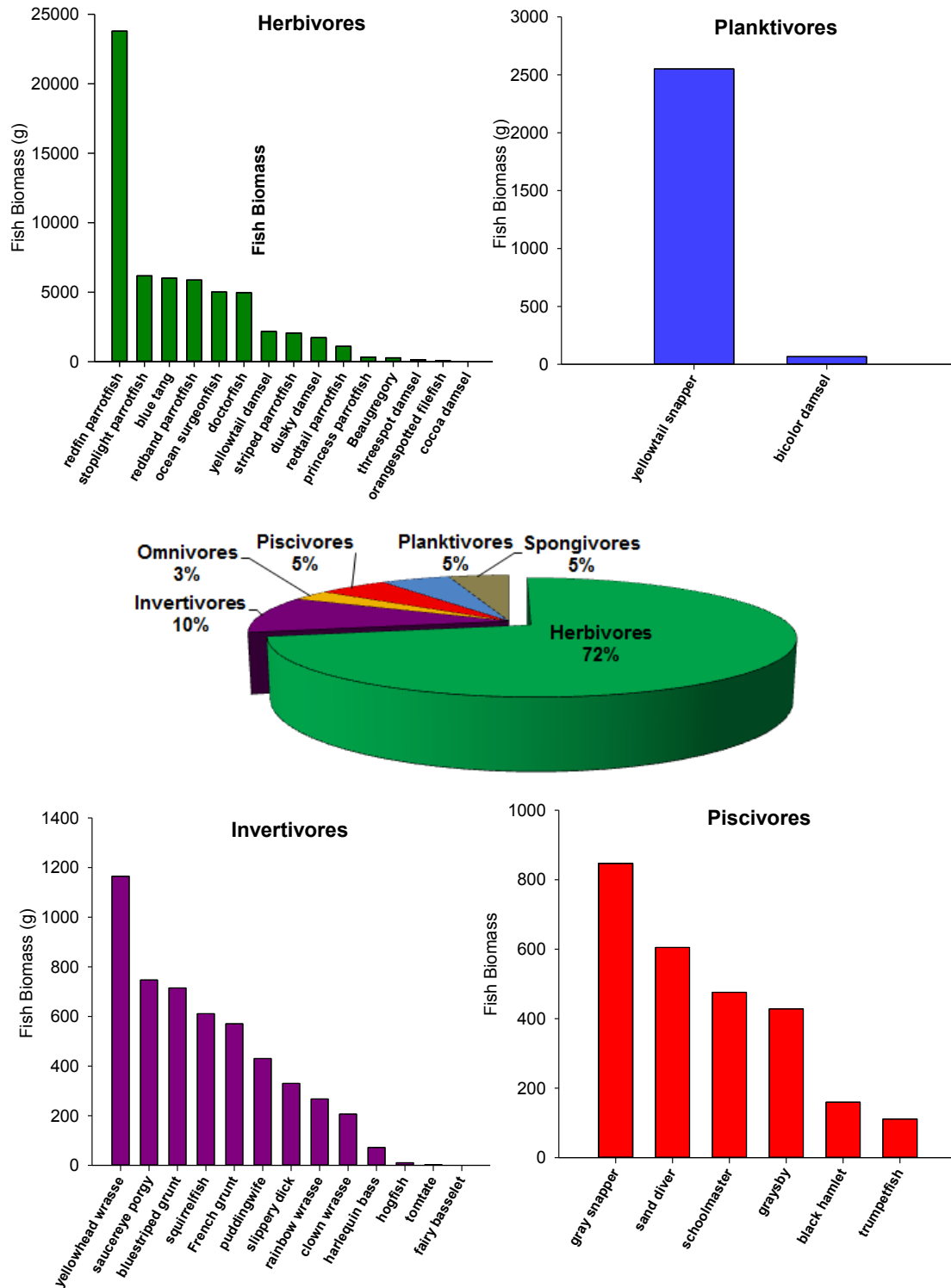


Figure 139. The Coculus Rock fish community by absolute and relative biomass.

COLLEGE SHOAL

COLLEGE SHOAL

Description. College Shoal is part of a mesophotic bank located in the Red Hind Marine Conservation District (est. 1999) in depths of 28 – 33 m. The densely populated coral reef is surrounded by continuous reef structure dominated by star corals (*Orbicella* spp.). College Shoal has been monitored since 2003, with permanent benthic transects installed in 2007.

Outstanding Feature. College Shoal is notable for possessing high water clarity, relatively strong currents, a high density of corals (>30% coral cover), and a great abundance of fishes, including commercially important groupers and snappers. College Shoal is one of the most aesthetically pleasing reefs for diving due to its relatively pristine condition, high coral abundance, and high fish abundance.

Threats. College Shoal has experienced coral white diseases at chronically high levels (> 1% prevalence). This reef also supports a high abundance of the invasive Indo-Pacific Lionfish (*Pterois volitans*).

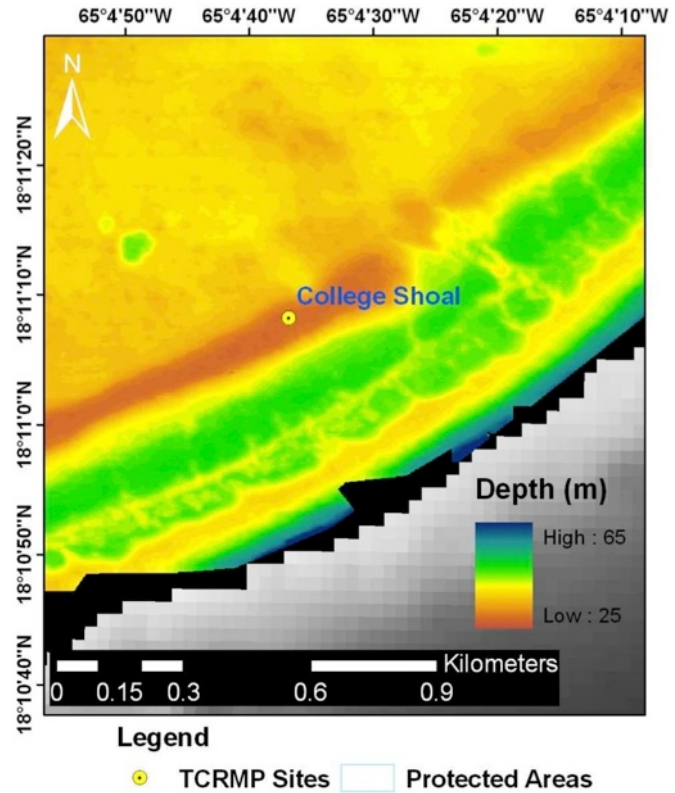


Figure 140. College Shoal. (top) Location. (right) A representative photo of the reef.

SITE SUMMARIES

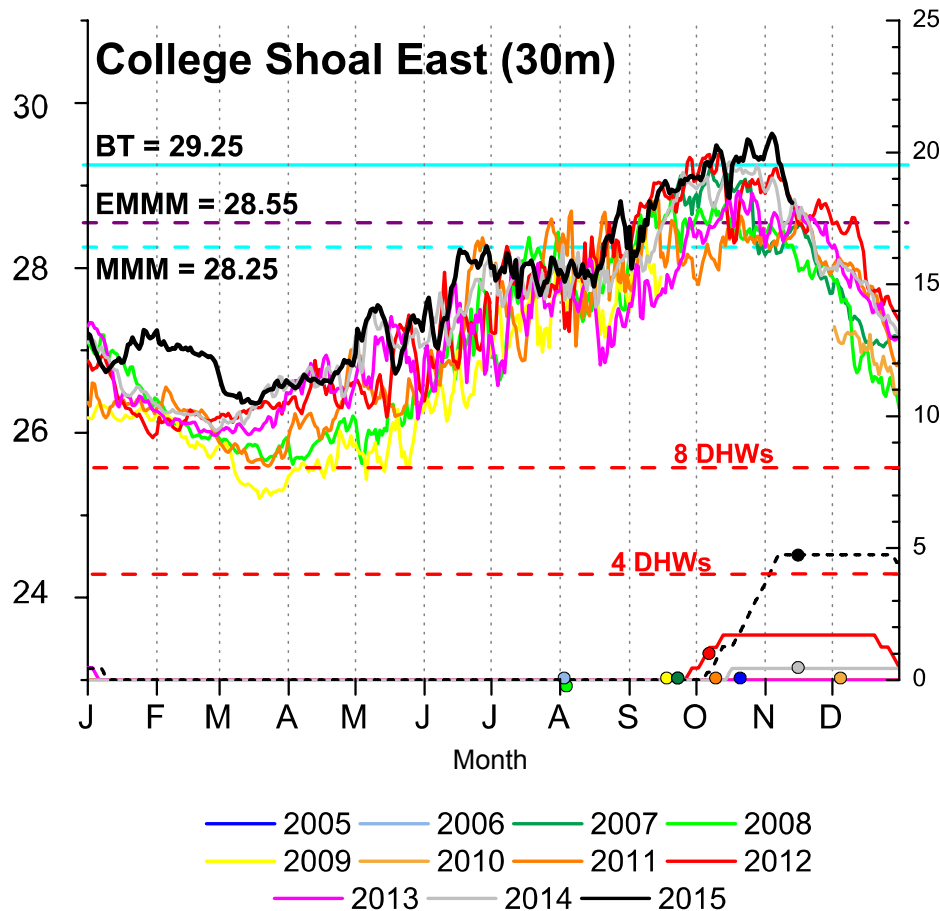


Figure 141. College Shoal benthic temperature record (29 m depth).

Physical Characteristics.

Currents. Although not measured directly, College Shoal has strong unidirectional driven currents that seem to be tidally driven and follow a pattern of increasing strength during spring tides. Current data has been collected and will be presented in a future report.

Temperature. Benthic temperatures are ameliorated in the warm season by the proximity of the thermocline. The presence of the thermocline causes temperatures that are cool and diurnally variable from May to October. Unfortunately, the thermistor re-initialized improperly in 2009 and the 2010 coral bleaching event temperatures were missed at this site.

Benthic Community. College Shoal is among the TCRMP sites with the highest coral cover (38.2% in 2011) and, similar to other bank mesophotic sites south of the St. Thomas, is dominated by the boulder star coral (*Orbicella* spp.). This site lost only 10.1% of its coral cover in the 2005 bleaching event, but had not regained cover since then (-1.3%); however, these estimates have some additional error since transects were not made permanent until 2007. Sponges and gorgonians are in very low relative abundance. The algal community is dominated by the macroalga *Lobophora variegata* and lesser representation by epilithic algae. There is also a relatively high proportion of crustose coralline algae.

Coral Health. College Shoal bleached at a relatively low prevalence during the 2005 mass coral bleaching event, although corals that were bleached tended to lose color over their entire surface. The 2010 coral bleaching event had no apparent effect above background bleaching levels. Bleaching in years without thermal stress tends to be moderate. Diseases were dominated by white disease, which reached very high prevalence after the 2005 bleaching event, with an outbreak that lasted for two years in 2006 and 2007. This disease was again very prevalent in 2011 after the 2010 bleaching event, even without apparent thermal bleaching. Old partial mortality was elevated on corals after the mortality from the 2005 bleaching event, and this level has remained stable through 2011. Recent partial mortality is always relatively high, much of it attributable to fish bites.

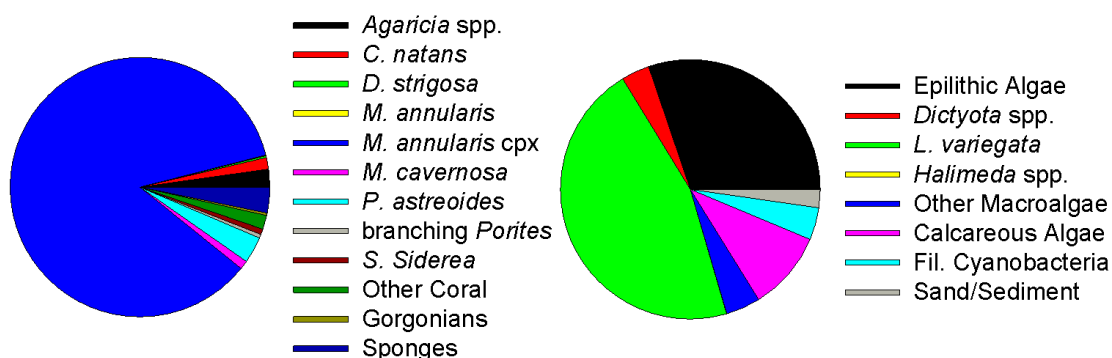


Figure 142. College Shoal (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.

SITE SUMMARIES

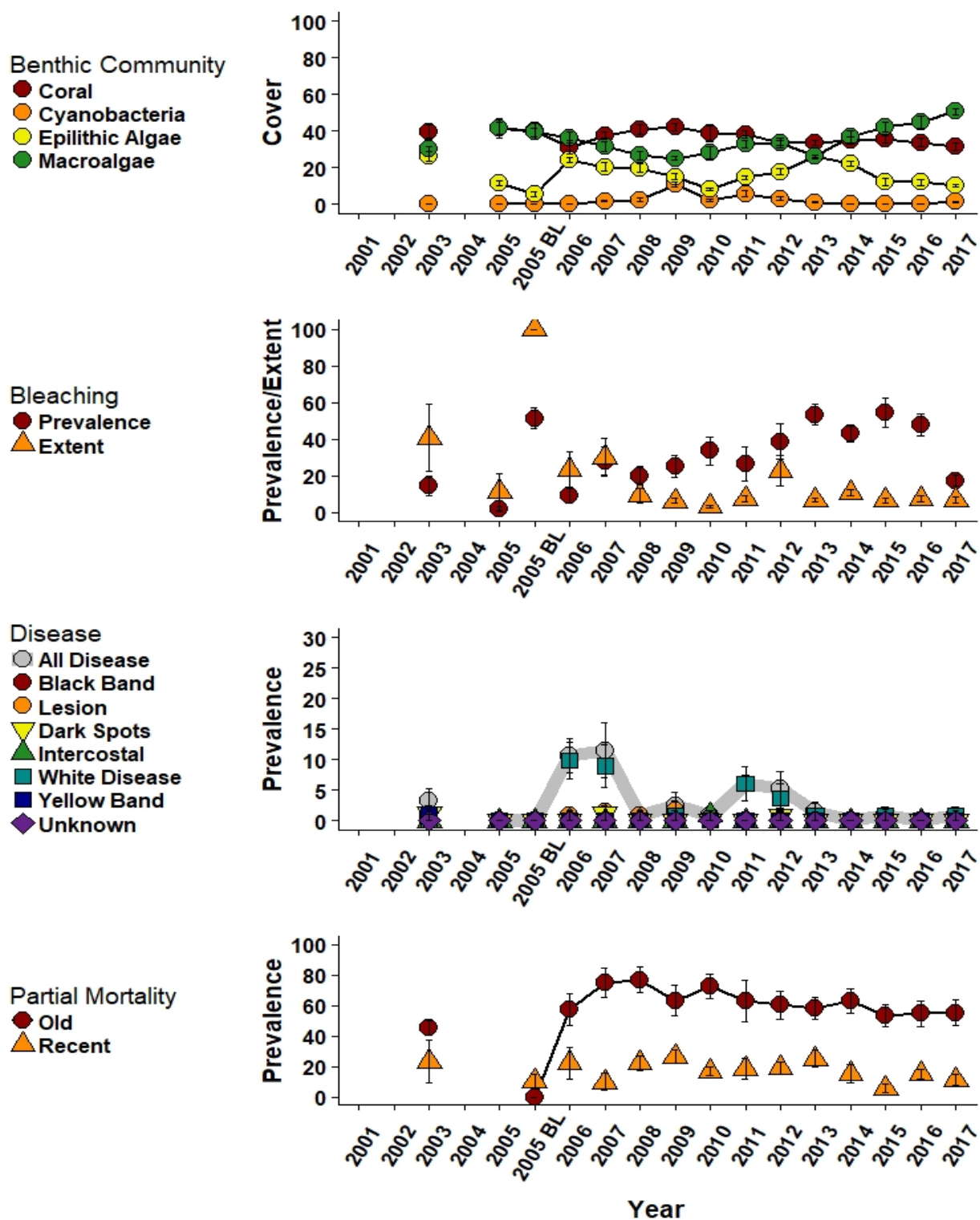


Figure 143. College Shoal benthic cover and coral health through time (mean $\pm$ SE).

Fish Community. College Shoal is characterized by a high fish biomass and high species diversity. Large planktivores are also characteristic of College Shoal, including ocean triggerfish, Atlantic spadefish, black jacks, and yellowtail snapper. Numerically, the site is dominated by creole wrasse; however, large jacks, ocean triggerfish, and black durgelon are very common. College Shoal lies within the Marine Conservation District (MCD) and is protected year round from all fishing. Nassau, yellowfin, and yellowmouth grouper are occasionally observed on the site. Tiger grouper are seen there regularly. The mesophotic, high coral cover reef supports less herbivores than the shallower nearshore and offshore sites; however, more herbivores (ocean surgeonfish) are present than on the significantly deeper Hind Bank FSA and Grammanik Bank FSA sites. Diversity is high in all trophic guilds indicating a high variety of niches available for fishes.

SITE SUMMARIES

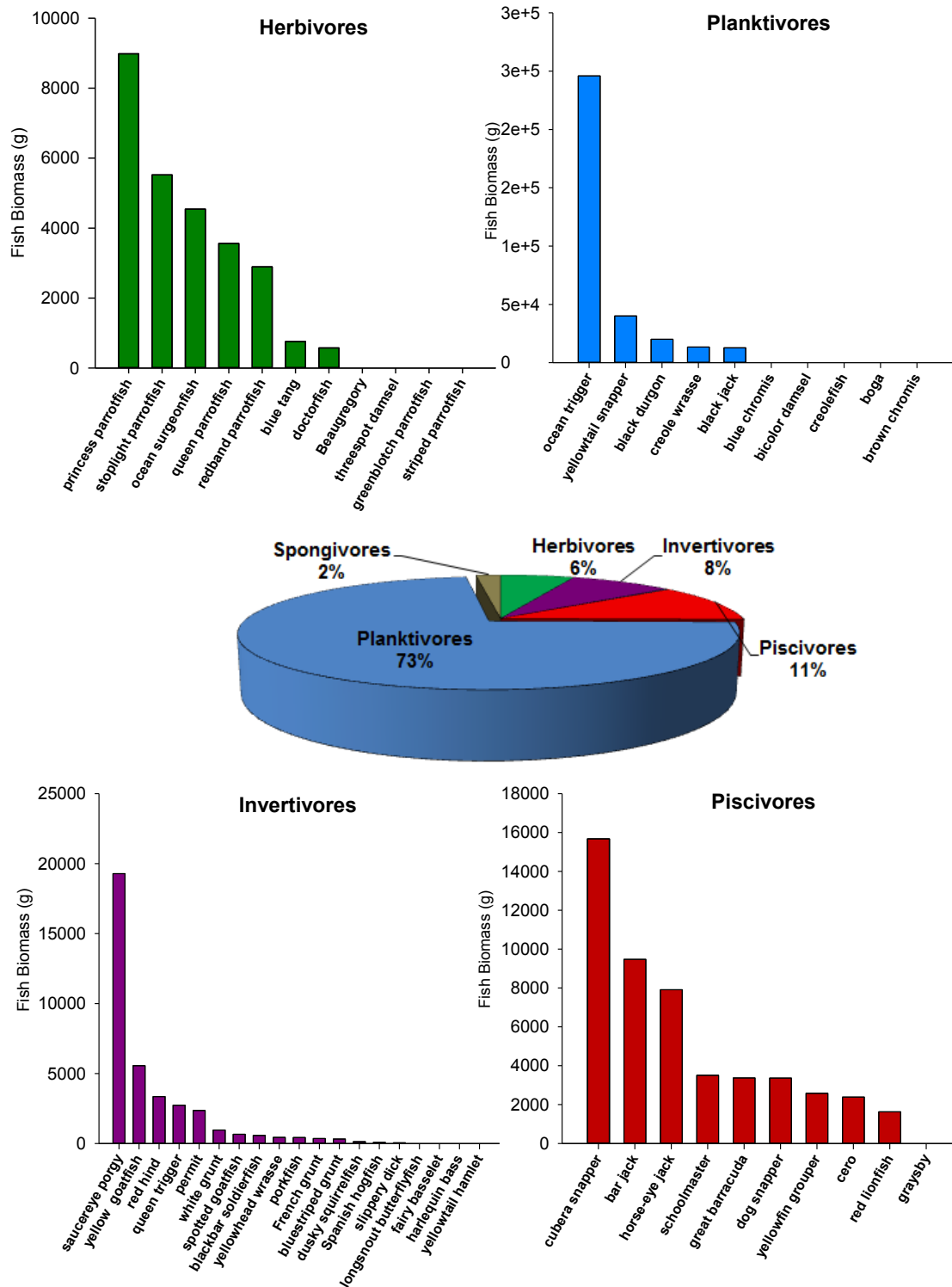


Figure 144. The College Shoal fish community by absolute and relative biomass.