

SITE SUMMARIES

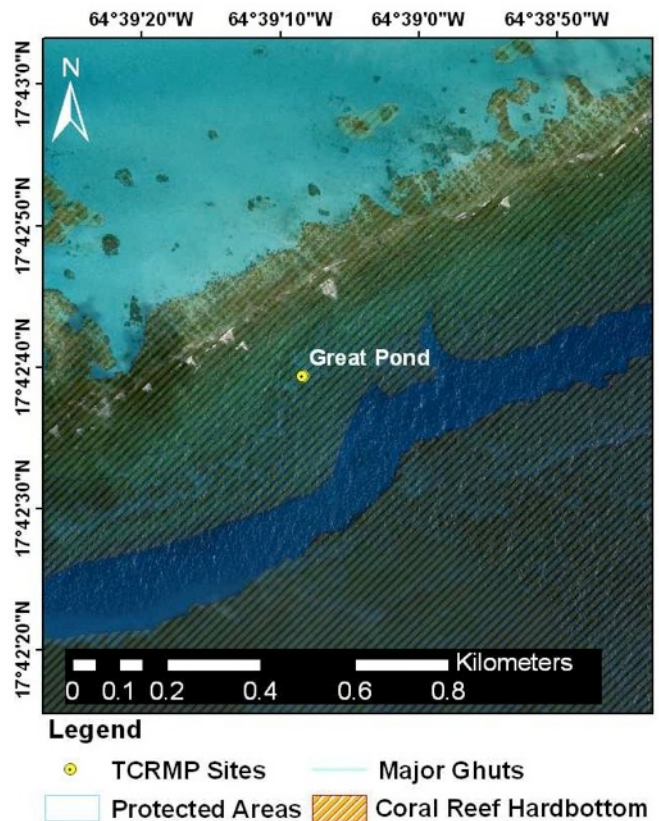
GREAT POND

Description. The Great Pond monitoring site is a wave-washed shallow barrier reef that was formerly an elkhorn coral reef in depths of 5-7 m. The reef is part of the barrier reef front surrounded by patch reefs and sand. Great Pond has been monitored since 2003.

Outstanding Feature. Great Pond hosts the largest population of the black spiny urchin *Diadema antillarum* of any TCRMP monitoring site, likely because of its shallow depth. It also hosts an abundance of large-bodied stoplight (*Sparisoma virde*) and yellowfin parrotfish (*Sparisoma rubripinne*) that likely spawn near the site.

Threats. The Great Pond monitoring site is located in the St. Croix East End Marine Park but outside the no-take fishery zone. If park rules are enforced, this site could see a return of fisheries species by spillover from adjacent protected areas. Because of high turbulence and low watershed development, sediment is not considered a problem; however, large industrial sites operate within 3-10 km westward and could contribute to pollution.

Figure 54. Great Pond. (top) Location. (right) A representative photo of the reef.



GREAT POND

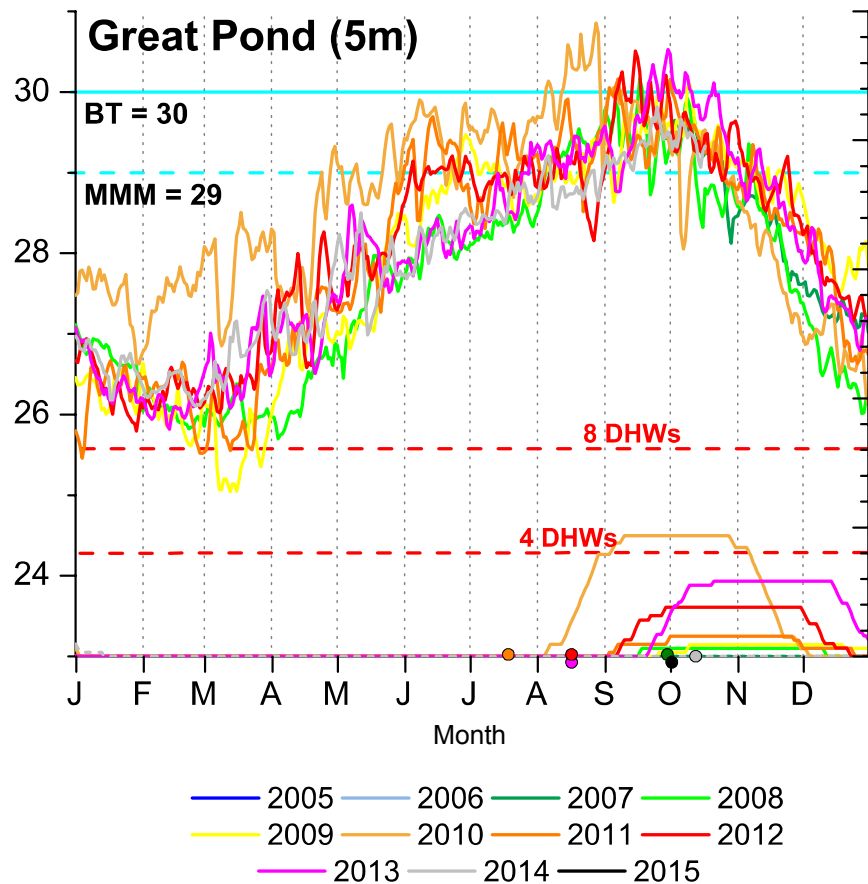


Figure 55. Great Pond benthic temperature (5 m depth).

Physical Characteristics

Current. Great Pond currents have not been measured directly. Wave-generated oscillatory currents dominate and this is the most regularly swell-influenced site in the TCRMP making work conditions difficult on all but the calmest day. Strong unidirectional currents have not been experienced.

Temperature. Great Pond typically experiences very high temperatures in August to October, with temperatures peaking at nearly 31°C in 2010.

SITE SUMMARIES

Benthic Community. The Great Pond site is unusually dominated with the mustard hill coral (*Porites astreoides*) and *Diploria strigosa*. It is also the only site with a relatively high abundance of *Diploria clivosa*. The site lost 55.9% of its coral cover in the 2005 bleaching event, but has regained about half as of 2011. Macroalgal blooms occur occasionally (2007 and 2011), but the site is dominated by epilithic algae.

Coral Health. Great Pond corals were moderately affected during the 2005 coral bleaching event, which may be a reflection of the high composition of resistant coral species and the regular exposure to high temperatures. The site was not monitored during the height of the 2010 coral bleaching event. Patchy, low-level bleaching is common in some years. Diseases have been almost non-existent at the monitoring site. Partial mortality is variable and has not shown consistent trends over years.

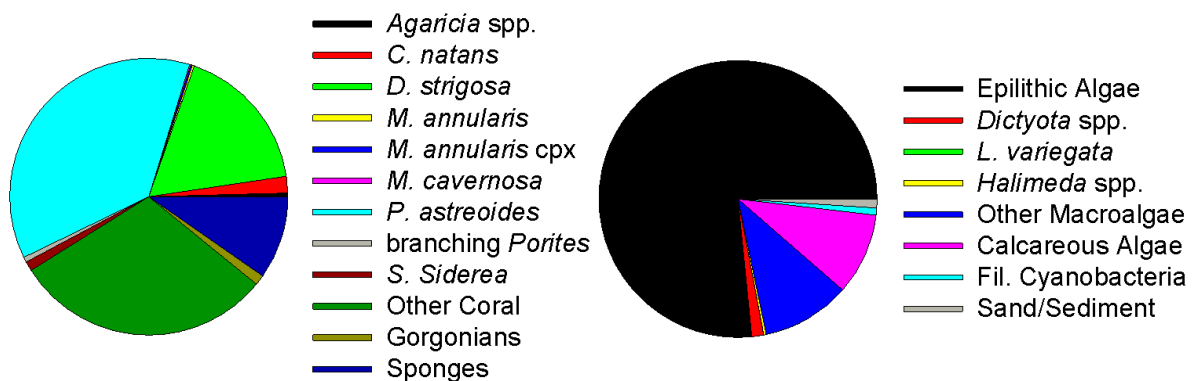


Figure 56. Great Pond (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.

GREAT POND

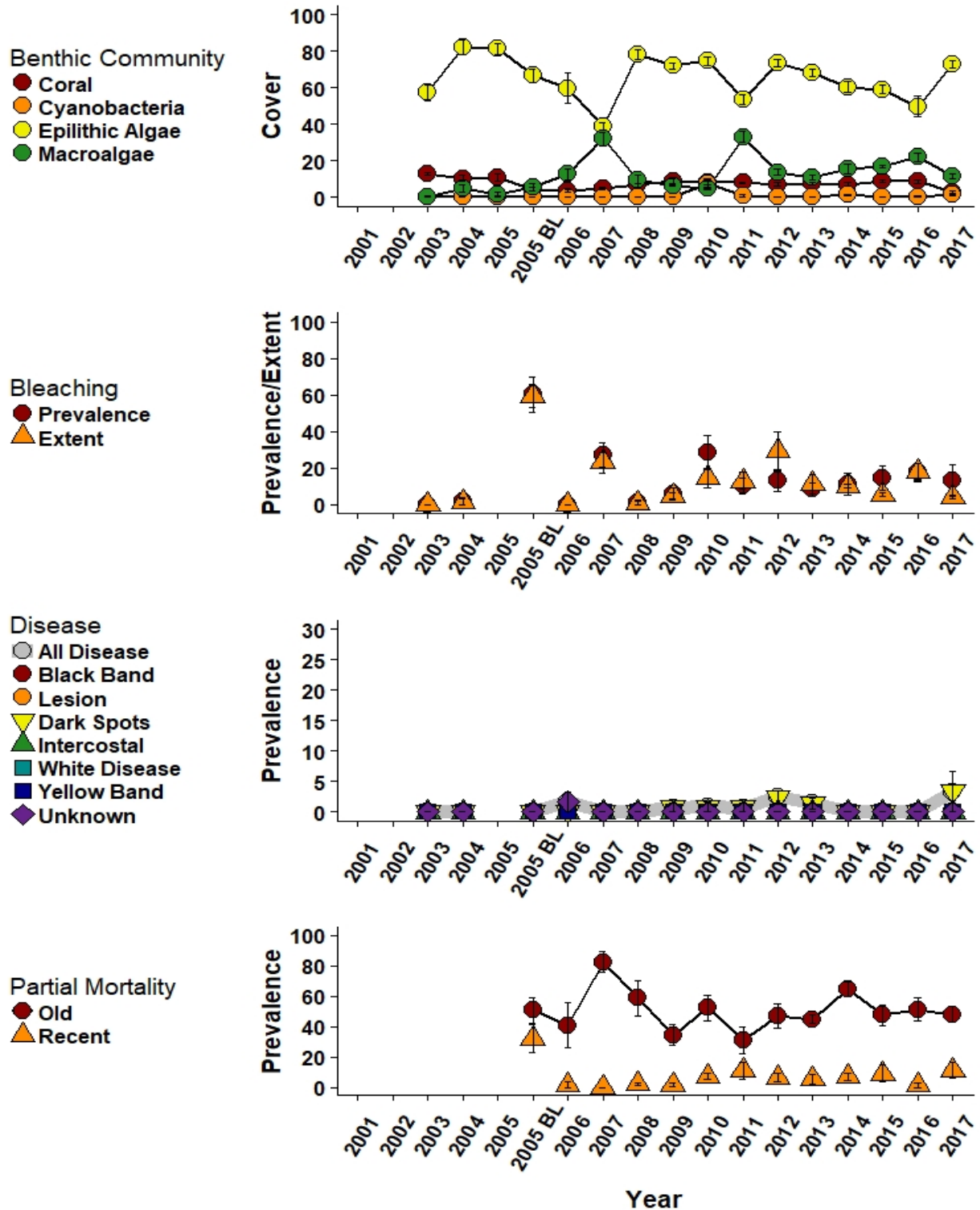


Figure 57. Great Pond benthic cover and coral health through time (mean $\pm$ SE).

SITE SUMMARIES

Fish Community. The Great Pond fish community is dominated by herbivores. The primary herbivores at the site are the yellowtail damselfish and blue tang, which swim in foraging schools feeding on algae covering the relict elkhorn coral. Also present are large queen and stoplight parrotfish, which can also be seen foraging in large groups, and a probably spawning in the late afternoon and evening hours at or near the site. These fish concentrate around the skeletal remains of *Acropora*. Between these areas, fish biomass is low and is primarily made up of yellow goatfish, wrasses, and juvenile parrotfish. Piscivores at Great Pond are limited almost entirely to mahogany snapper and bar jacks. Benthic invertivores are dominated in biomass by yellow goatfish and blackbar soldierfish, however the wrasse diversity is high on the site and includes slippery dick, clown wrasse, yellowhead and bluehead wrasse, rainbow wrasse, puddingwife, and Spanish hogfish.

GREAT POND

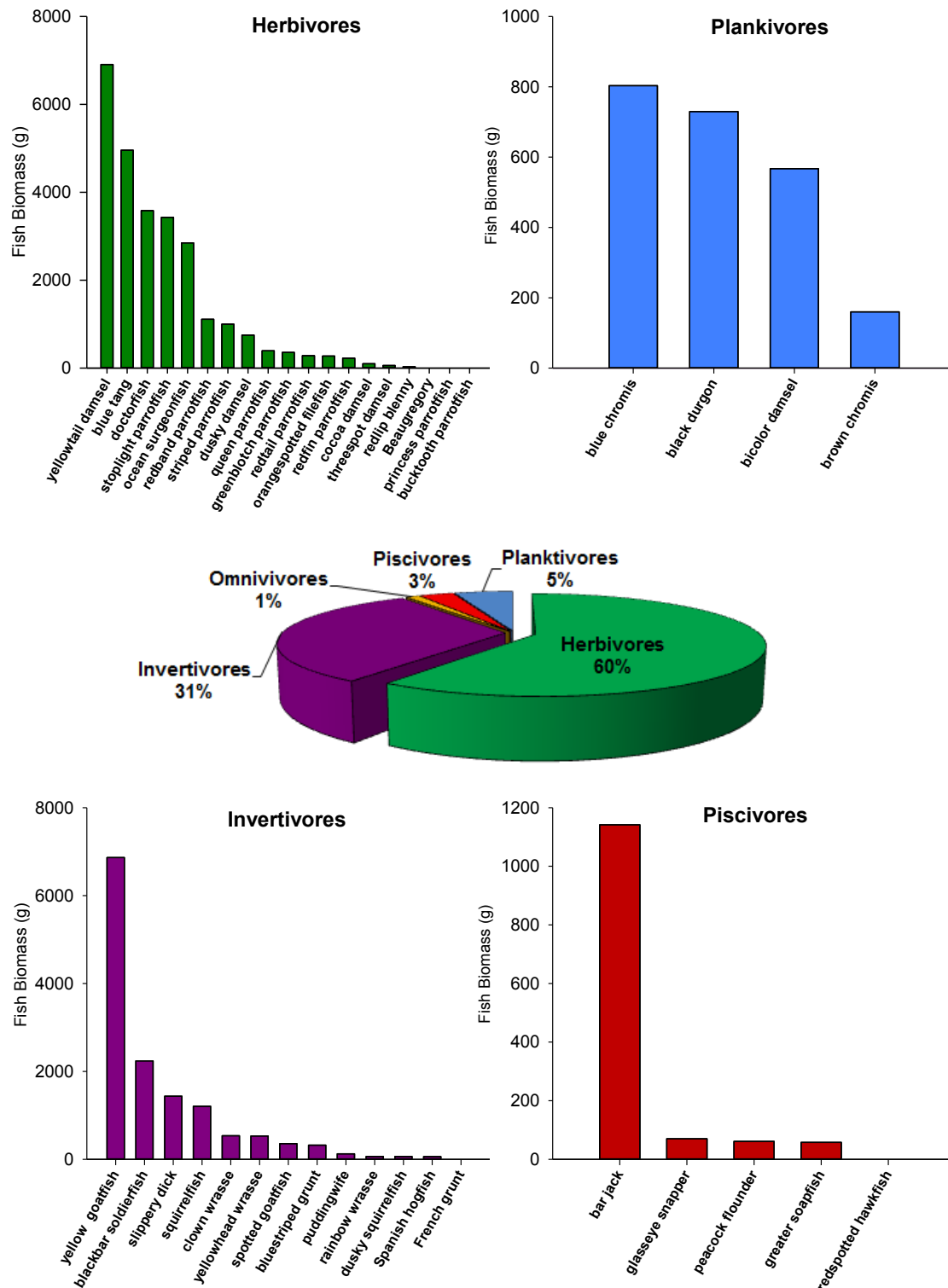


Figure 58. The Great Pond fish community by absolute and relative biomass.

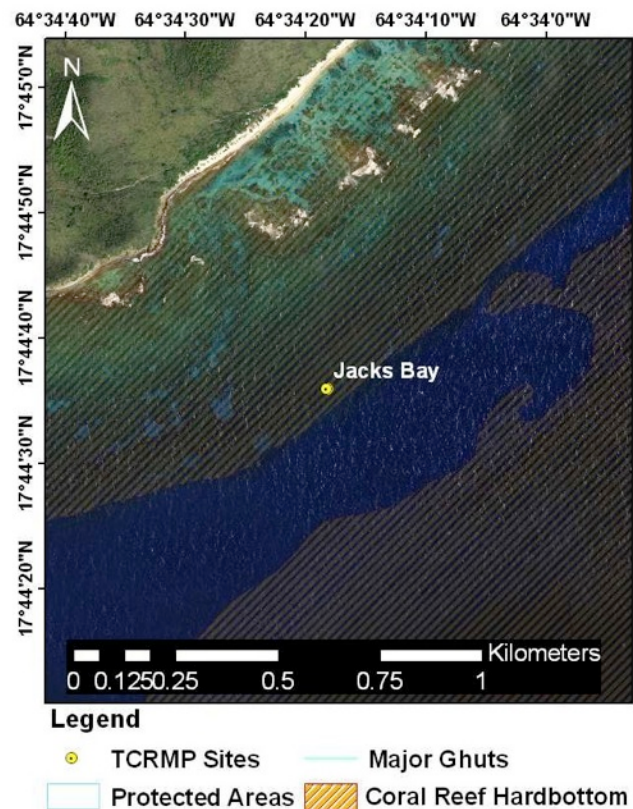
SITE SUMMARIES

JACKS BAY

Description. The Jacks Bay monitoring site (aka Jacks/Isaacs Bay) is part of fringing reef, colonized hardbottom on the southeast point of St. Croix in water depths of 13-16 m. The monitoring site is just inward from the shelf break and seaward reef slope, which terminates in a sand plain at about 20 m depth. Jacks Bay is largely a carbonate hardbottom with scattered hard coral, although there are some large coral heads seaward of the transects. Permanent transects were installed at Jacks Bay in 2001.

Outstanding Feature. Jacks Bay hosts a unique fish community with high abundance of small wrasses and the occasional occurrence of red hind (*Epinephelus guttatus*).

Threats. Jacks Bay is within the St. Croix East End Marine Park but lies just outside the restricted fisheries area and is open to fishing. High turbulence and no watershed development mean there is low threat of land-based sources of pollution at this nearshore site.



JACKS BAY

Figure 59. Jacks Bay. (top) Location. (right) A representative photo of the reef.

SITE SUMMARIES

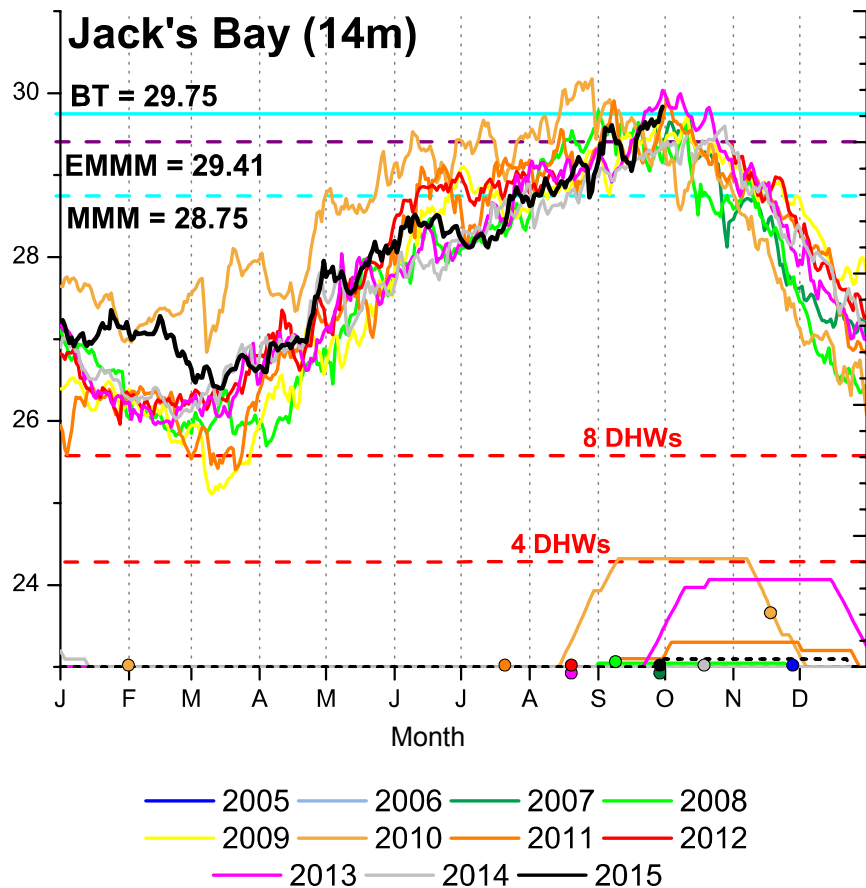


Figure 60. Jacks Bay benthic temperature at 12 m depth

Physical Characteristics

Current. Jacks Bay currents have not been measured directly. There are weak unidirectional currents, but there is a propensity for strong wave-generated oscillatory currents due the open coast southeast exposure.

Temperature. Jacks Bay can experience high temperatures during August to October.

Benthic Community. The Jacks Bay site has low coral cover (<10%) and is the only TCRMP site dominated by the great star coral *Montastraea cavernosa*. Jacks Bay lost 44.7% of its coral cover in the 2005 coral bleaching event, but had regained about 32% of the loss by 2011. Over half of the sessile epibenthic community is composed of gorgonians and sponges and the site might be considered more a colonized hardbottom than true coral reef. The algal community is composed of high proportions each of epilithic algae, macroalgae, and filamentous cyanobacteria. The site also shows a high degree of sand intermixed with filamentous algae, an important deterrent for coral larval settlement (Bellwood and Fulton 2008). This site is often colonized by fleshy upright brown algae, such as *Turbinaria turbinata* and *Sargassum hystrix* (species unconfirmed). Very large beach wrack of these brown algae can often accumulate on the windward beaches behind the site.

Coral Health. The Jacks Bay site was strongly affected during the 2005 bleaching event and was moderately affected during the 2010 bleaching event. Disease prevalence was low and only dark spots disease was present. Recent partial mortality was high during the 2005 bleaching event, likely reflecting the fact that surveys were conducted in November 2005 when mortality had begun. Old partial mortality increased greatly after the 2005 bleaching and then declined to stable levels in 2009-2011.

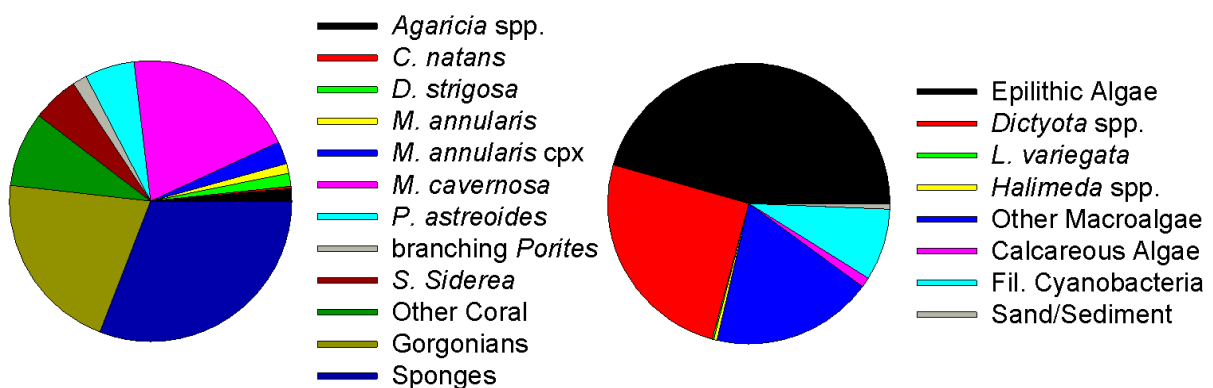


Figure 61. Jacks Bay (left) relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.

SITE SUMMARIES

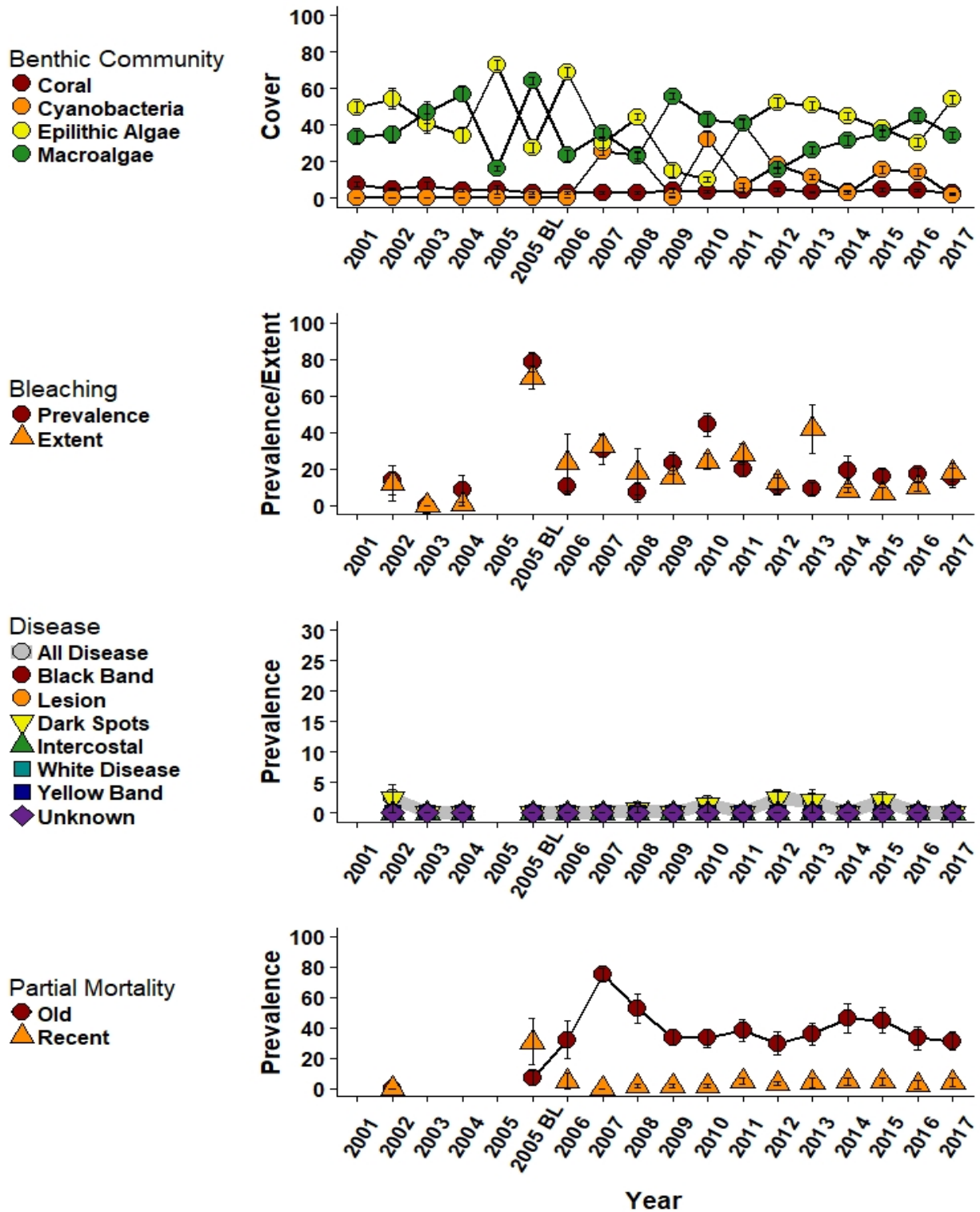


Figure 62. Jacks Bay benthic cover and coral health through time (mean $\pm$ SE).

JACKS BAY

Fish Community. The Jacks Bay fish community is characterized by very low fish biomass and abundance but relatively high diversity. The site is primarily hard bottom, adjacent to more developed coral reef on the seaward edge, over which larger fishes are observed. The hardbottom community is highly dominated numerically by blue chromis, yellowhead wrasse, and bicolor damselfish. Juvenile wrasses and parrotfish swim and hover in mixed schools among the rubble and gorgonians. Slippery dicks, clown wrasse, rainbow wrasse, and blackear wrasse are also fairly common. Angelfishes are common across the hardbottom. Piscivores are always rare and limited to schoolmaster, bar jack, glasseye snapper, and redspotted hawkfish. Medium to larger sized species are very rare, and nearly all of these species are seen at Jacks Bay in the juvenile life history stage.

SITE SUMMARIES

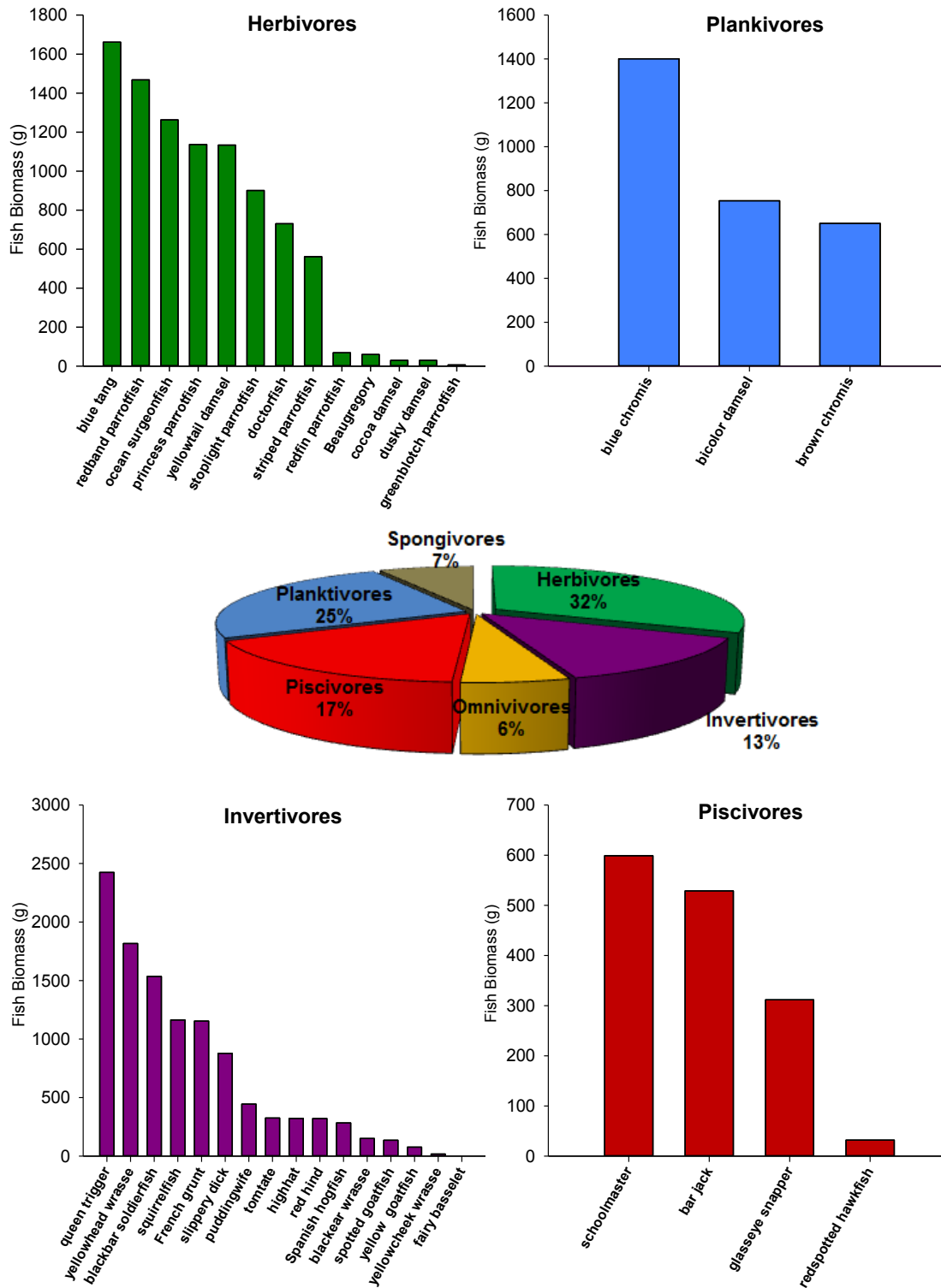


Figure 63. The Jacks Bay fish community by absolute and relative biomass.

SITE SUMMARIES

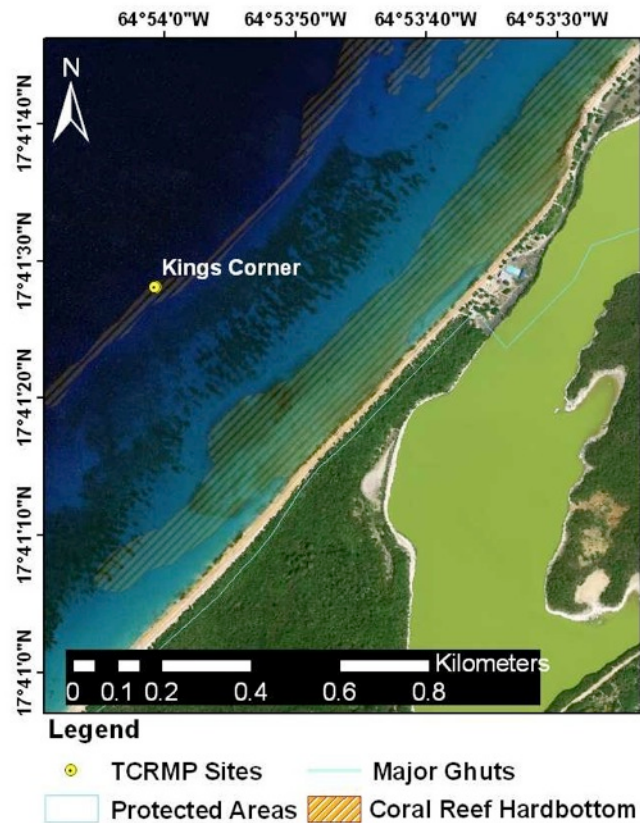
KINGS CORNER

Description. The Kings Corner monitoring site is a part of a patchy reef complex along the steeply sloping west coast of St. Croix in depths of 15-25 m. The reef contains a high diversity of corals and sponges on mounds surrounded by sand. Kings Corner has been monitored since 2006, with permanent transects installed in 2007.

Outstanding Feature. Kings Corner is a commercially important recreational dive site. The site supports a high diversity and density of fishes. It is also a very aesthetically pleasing site with high topographic relief.

Threats. Kings Corner is open to fishing and is easily accessible as part of the calm lee of western St. Croix near Frederiksted. Derelict fishing lines, fish traps, fish weights, and other marine debris are in evidence in and around the site. Large plumes of sediment that wrap around Sandy Point from the south coast of St. Croix also periodically affect the site. Plumes can drop visibility to near zero and lead to high incidence of sediment on coral and spotty bleaching.

Figure 64. Kings Corner. (top) Location. (right) A representative photo of the reef with a school of lane snapper (*Lutjanus synagris*).



KINGS CORNER

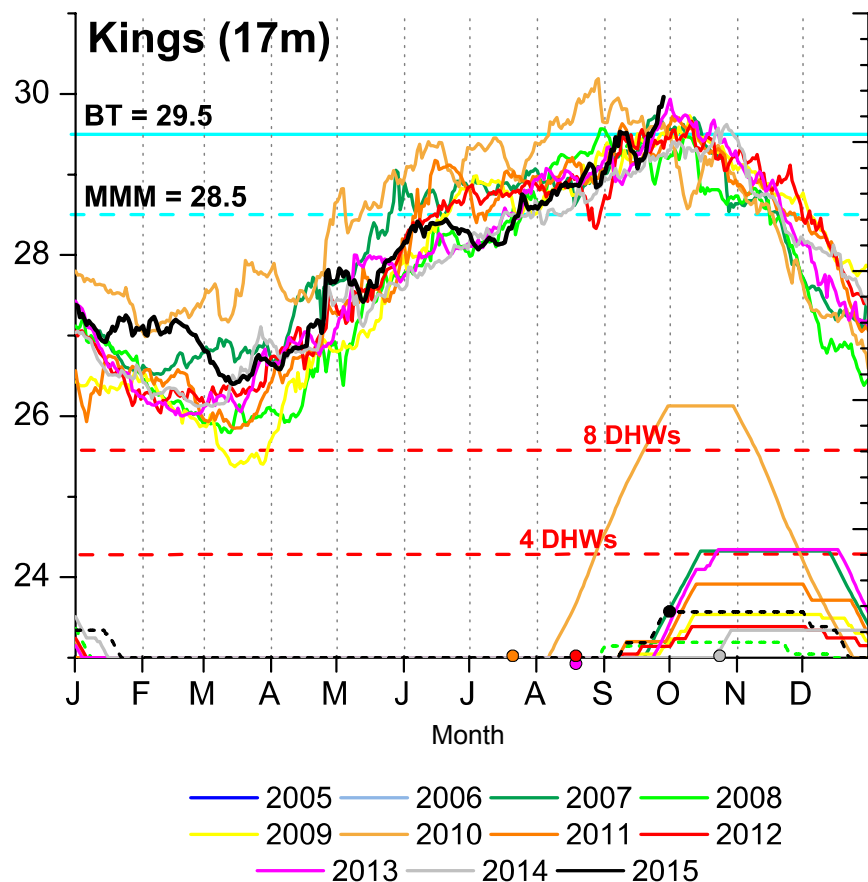


Figure 65. Kings Corner benthic temperature (17 m depth)

Physical Characteristics

Current. Kings Corner currents have not been measured directly. The site is protected from wave action, but can experience strong unidirectional currents at times, particularly at shallower depths.

Temperature. Kings Corner has moderately high temperatures.

SITE SUMMARIES

Benthic Community. The Kings Corner site supports a diverse community of hard corals dominated by *Orbicella* spp. The site also has a very abundant population of sponges. This site was not monitored until after the 2005 bleaching event, so the impacts on coral cover are not known. Epilithic algae dominate the algal community at Kings Corner, with very low abundance of macroalgae and filamentous cyanobacteria. Sand is prominently interspersed among the coral banks.

Coral Health. Non-thermal bleaching with moderate prevalence but low extent on colonies is a common feature at this site, likely as the result of chronic sedimentation. The prevalence of coral diseases has been low with dark spots disease predominating. Old partial mortality has been very high at this site and may be an indication of impacts from the 2005 coral bleaching event. Old partial mortality has increased lately.

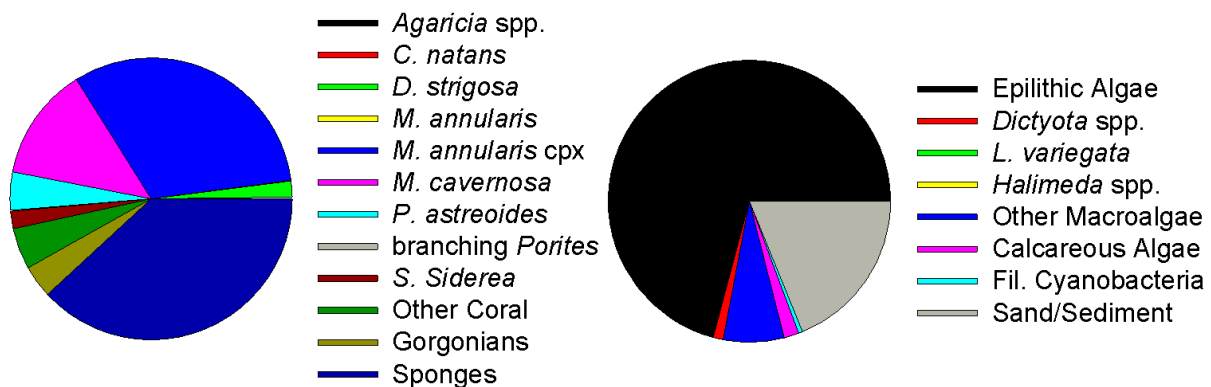


Figure 66. Kings Corner (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.

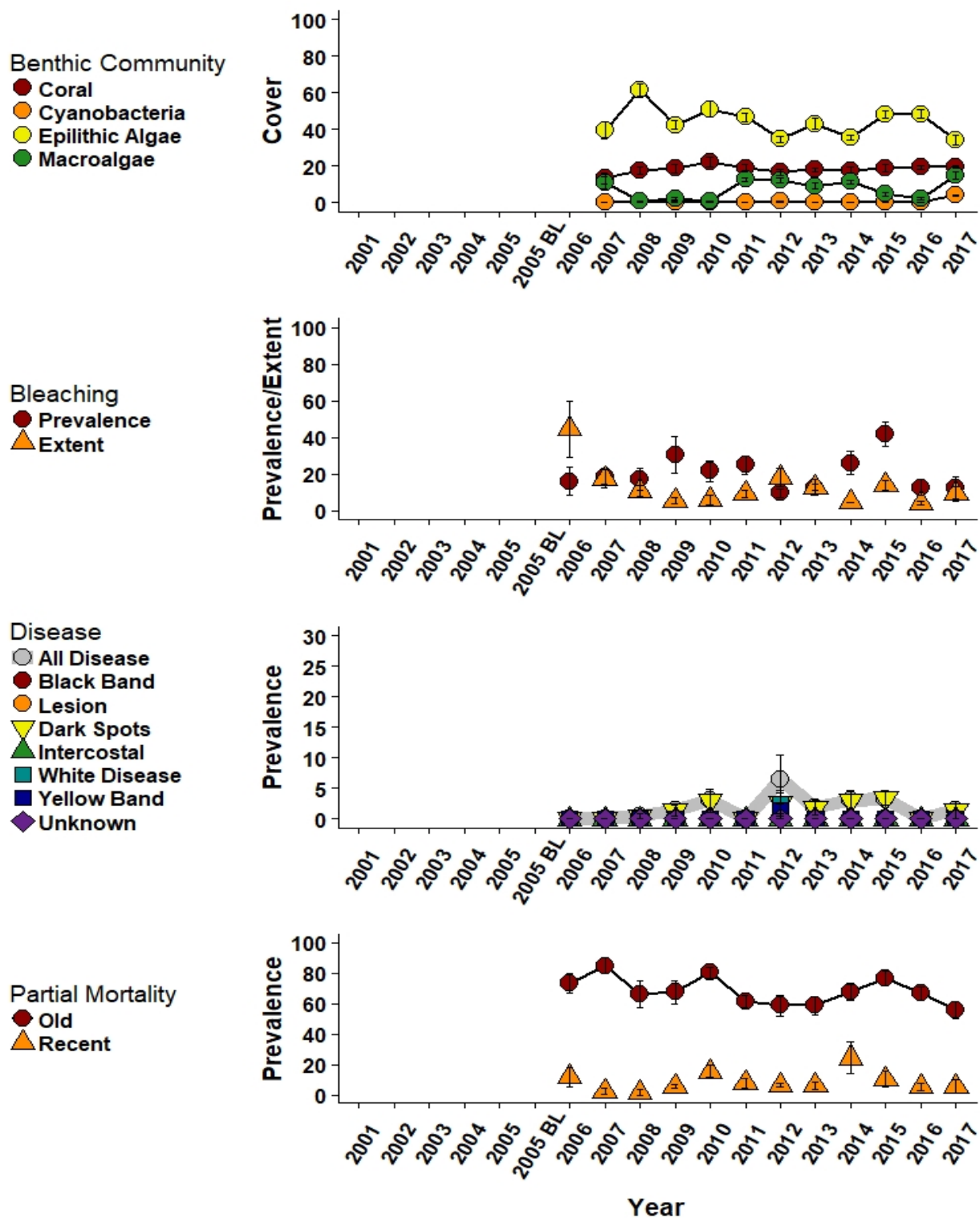


Figure 67. Kings Corner benthic cover and coral health through time (mean $\pm$ SE).

SITE SUMMARIES

Fish Community. Kings Corner represents the most diverse fish community with the highest fish biomass in the St Croix monitoring program, with a huge variety of resources available for foraging and habitat. The site is dominated by invertivores, influenced highly by the large numbers of the nocturnal feeding blackbar soldierfish, a zooplanktivore, and the tomtate, a more opportunistic benthic feeder of invertebrates, zooplankton and benthic algae. Other common planktonic feeders include the black surgeon, creole wrasse, and yellowtail snapper. Common benthic herbivores include the blue tang and ocean surgeonfish as well as most of the parrotfishes (stoplight, princess, redband, redfin, queen, and striped). Grunts are common on the site and mutton snapper occasional. Piscivores as a group can be relatively high in biomass, primarily as a result of the great barracuda, which is generally observed in relatively high numbers at the site. Other common piscivores are represented by bar jacks (pelagic), glasseye snapper and bigeye (nocturnal feeders), and graysby, lionfish, and small snappers (diurnal bottom feeders).

KINGS CORNER

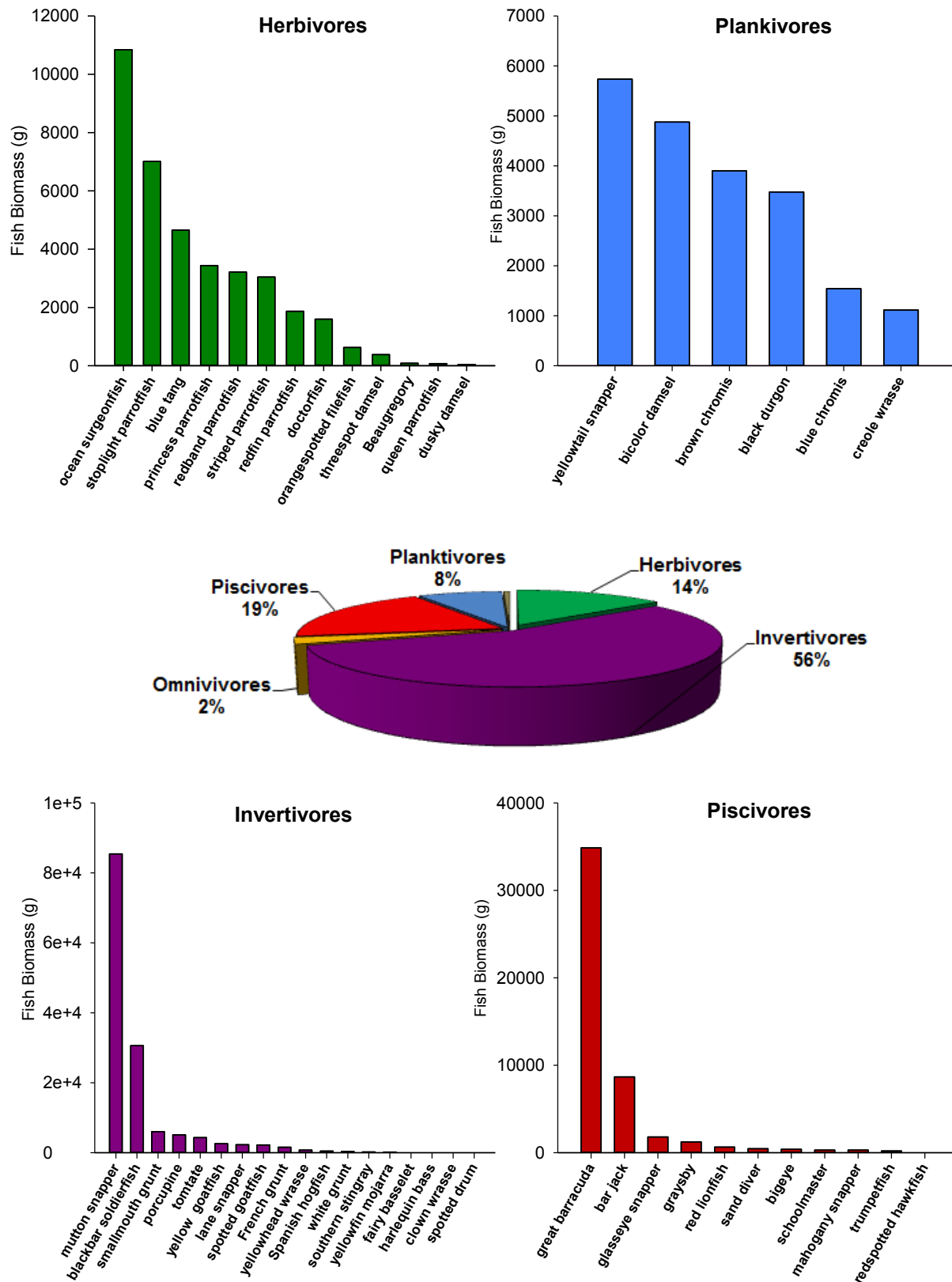


Figure 68. The Kings Corner fish community by absolute and relative biomass.

SITE SUMMARIES

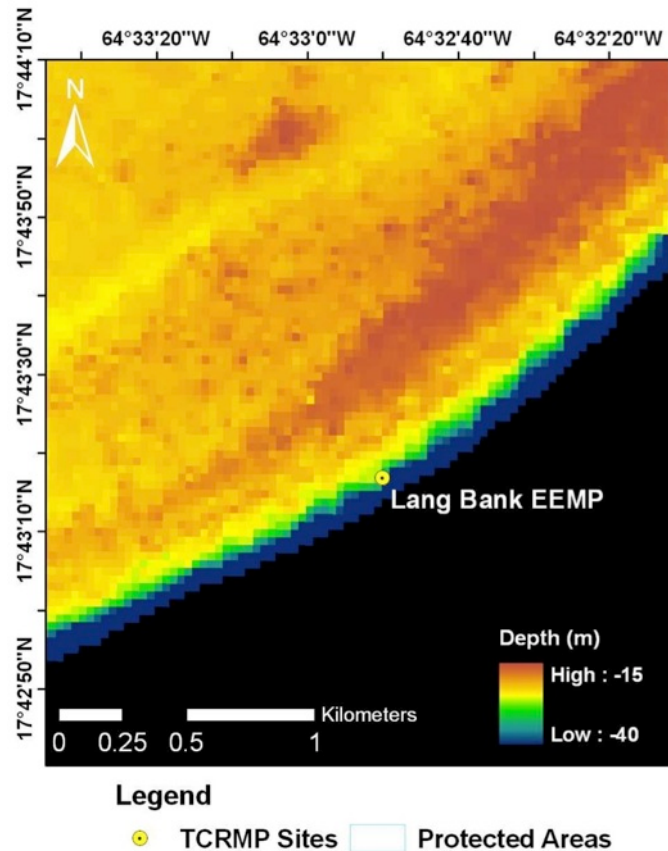
LANG BANK EAST END MARINE PARK

Description. The Lang Bank EEMP site is a shelf edge mesophotic coral reef located at a depth of 27 – 30 m. The monitoring site sits just above a steep shelf break and is composed of rolling coral knolls dominated by boulder star corals (*Orbicella* spp.). This site was established in 2009.

Outstanding Feature. The Lang Bank EEMP site appears to be a well-developed mesophotic boulder star coral reef on St. Croix, which may be relatively rare compared to St. Thomas. Large populations of fishes and spiny lobsters are often encountered

Threats. The Lang Bank EEMP is in the outer park area and is open to fishing year-round. = Its offshore location protects it from land-based sources of pollution.

Figure 69. Lang Bank EEMP. (top) Location. (right) A representative photo of the reef.



LANG BANK EEMP

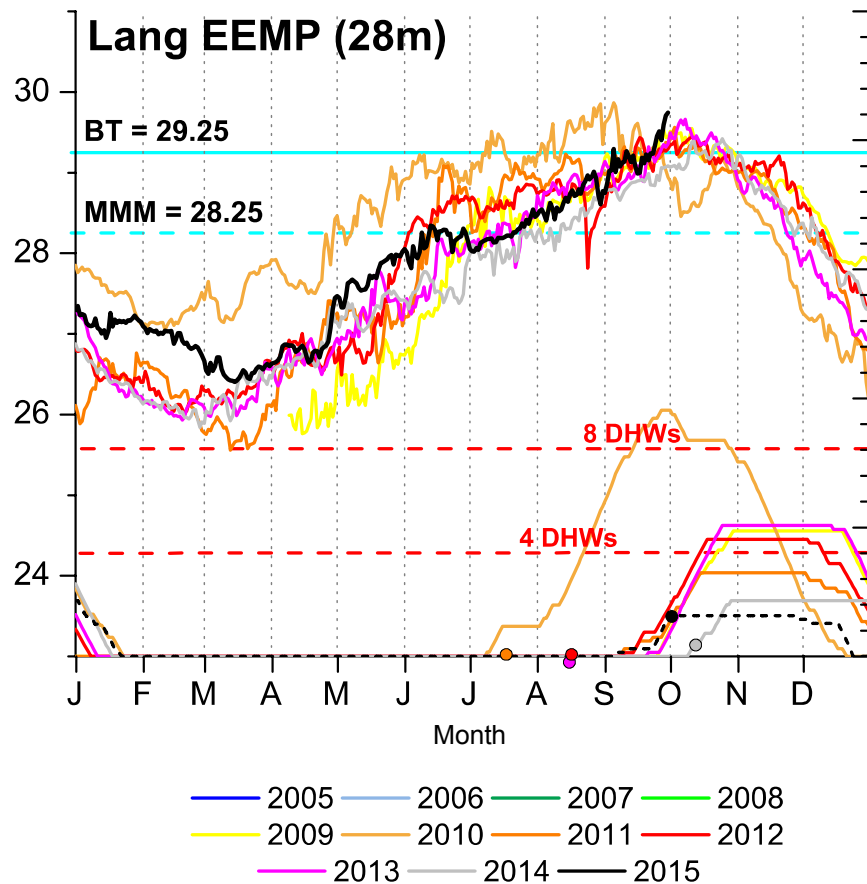


Figure 70. Lang Bank EEMP benthic temperature (28 m depth)

Physical Characteristics

Current. Direct current measurements have not been taken at Lang Bank EEMP. The depth buffers the site from wave-driven oscillatory currents. Only weak unidirectional benthic currents have been experienced at the site during monitoring; however, midwater and surface currents can be moderate to strong ($>10\text{cm s}^{-1}$).

Temperature. Lang Bank EEMP has temperature that is reduced relative to shallow water sites. However, the bleaching threshold has not been established and here is based on a relationship between depth. It is likely to low given the degree heating weeks accumulated since 2009, but empirical observations are lacking.

SITE SUMMARIES

Benthic Community. Lang Bank EEMP supports many coral species but is dominated by *Orbicella* spp.. Sponges are also quite prominent and make up a quarter of the sessile epibenthic animal community. Epilithic algae, *Lobophora variegata*, and filamentous cyanobacteria near equally represent the algal community. The prominence of filamentous cyanobacteria is quite striking and has reached almost 40% of the substrate in some years.

Coral Health. Background, non-thermal bleaching prevalence is quite high at Lang Bank EEMP. White disease showed an outbreak in 2011. Lang Bank EEMP was not initially monitored until well after the 2005 coral bleaching event; however, a high prevalence of old partial mortality suggests that corals were impacted. Many of the large faviids show lesion patterns that are consistent with the large lunate dead areas caused by white diseases following bleaching in 2005.

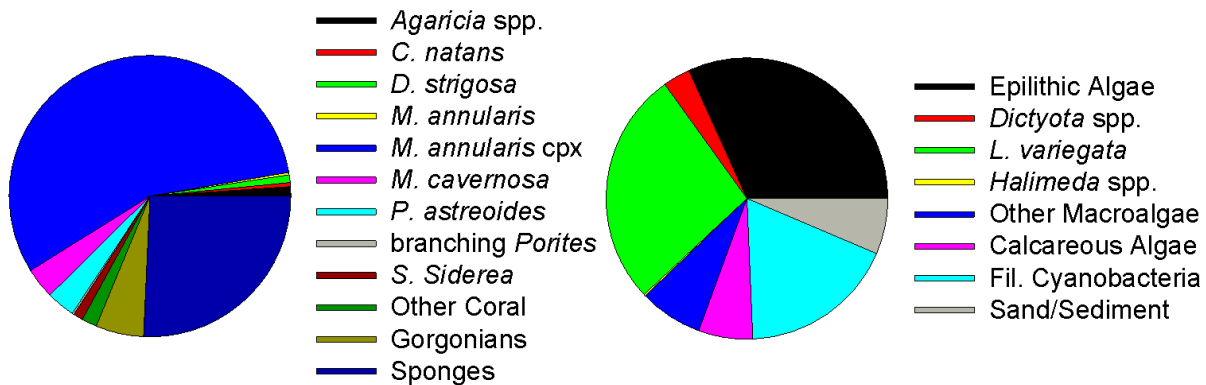


Figure 71. Lang Bank East End Marine Park (left) relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.

LANG BANK EEMP

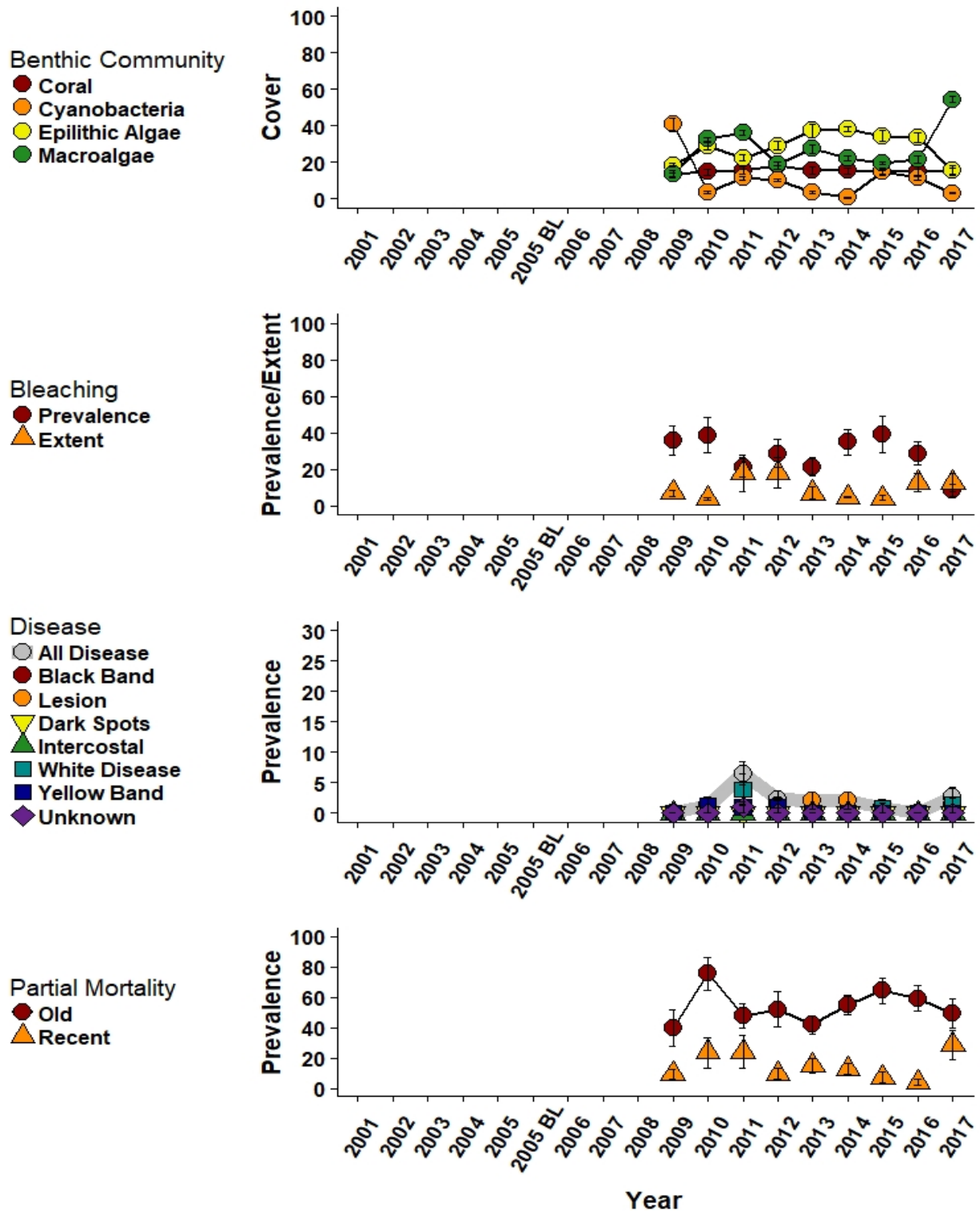


Figure 72. Lang Bank EEMP benthic cover and coral health through time (mean $\pm$ SE).

SITE SUMMARIES

Fish Community. The Lang Bank East End Marine Park site represents a mesophotic reef community that is characterized by a high biomass of planktonic feeders. The high overall biomass of the group was influenced primarily by the black durgelon while numerically creole wrasse are dominant. Queen triggerfish are also common. Benthic herbivores are dominated both numerically and in biomass by the redband parrotfish. Large parrotfish are fairly uncommon, however small parrotfish (striped and princess) as well as the doctorfishes are very abundant. The benthic invertivores at the site are diverse and include nocturnally feeding blackbar soldierfish and squirrelfish, as well as several species of grunt (French, tomtate, white, bluestriped, Caesar, and smallmouth). Piscivores are generally dominated in biomass by barracuda; however, graysby were common numerically. Other piscivores on the site included the horse-eye jack and cero mackerel, indicators of a deep water community.

LANG BANK EEMP

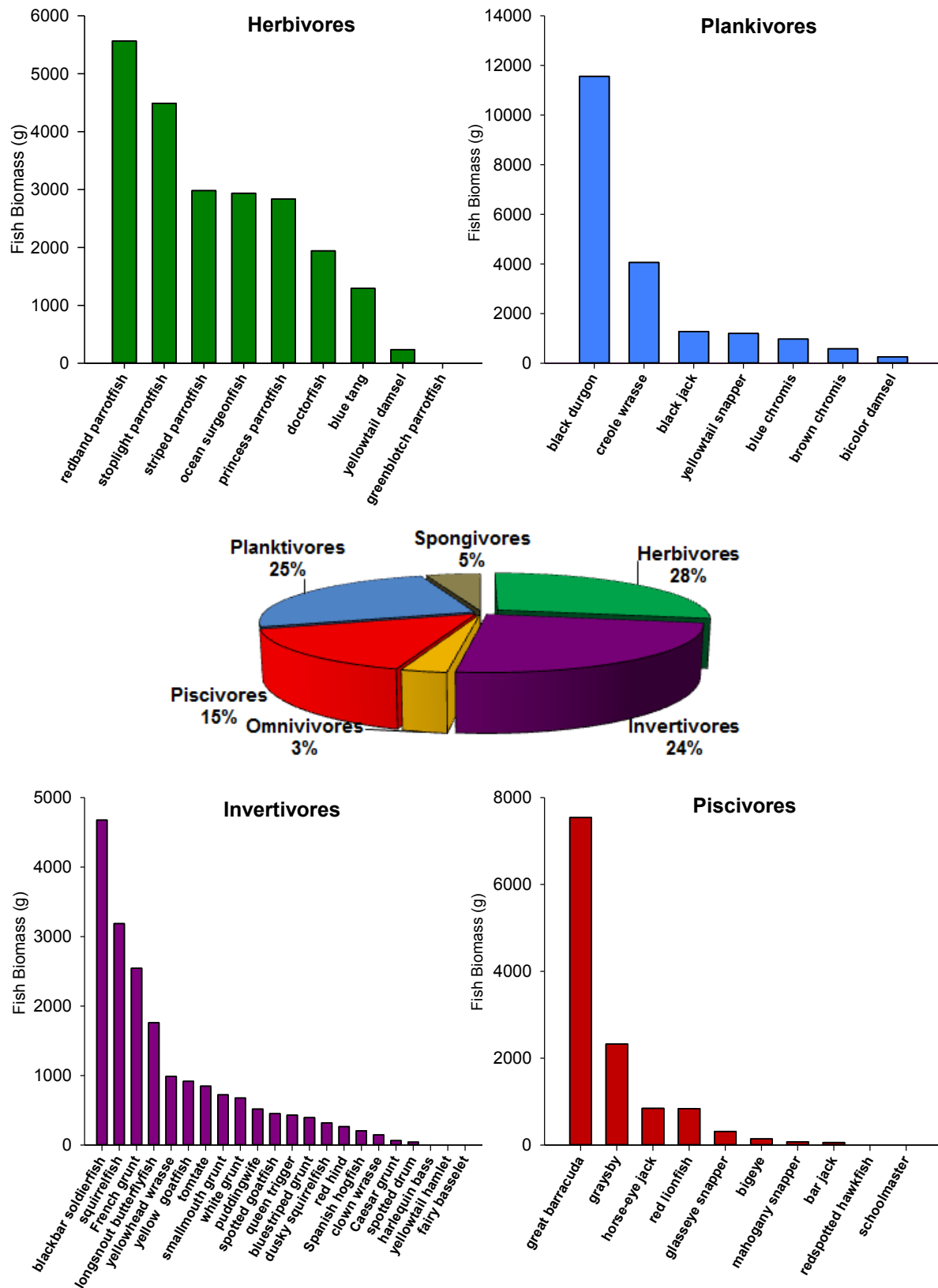


Figure 73. The Lang Bank EEMP fish community by absolute and relative biomass.

SITE SUMMARIES

LANG BANK RED HIND FISH SPAWNING AGGREGATION

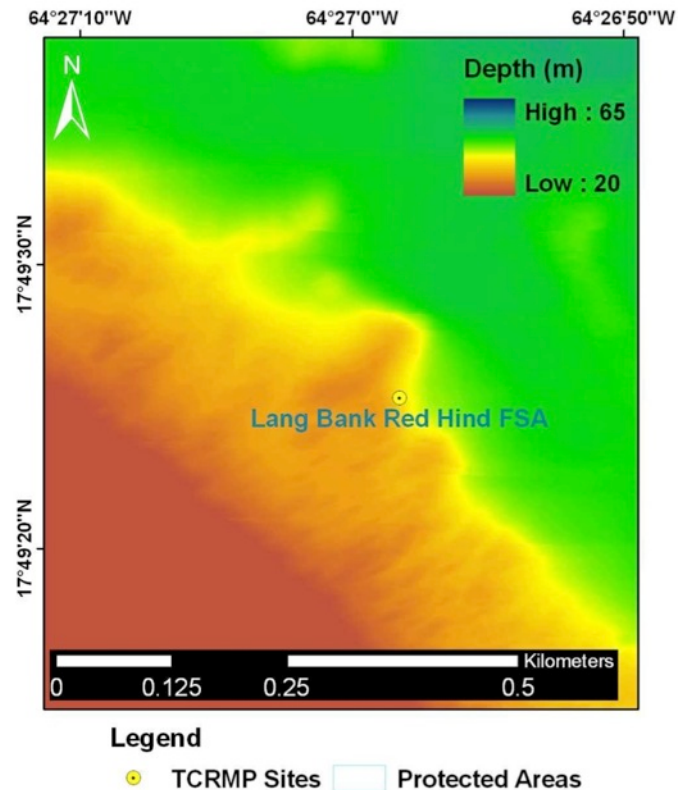
Description. The Lang Bank Red Hind Fish Spawning Aggregation (Lang Hind) monitoring site is a mesophotic reef of antecedent spur and groove structure at a depth of 30 – 35 m. The site is perched on the southeast side of the spur, which is a large finger that rises to 24 m to the west and drops on all other sides to a rhodolith/sand plain at about 50 m. Lang Hind was initially monitored in 2001 at a site on the shallower (24 m) portion of the bank to the west.

Monitoring in 2004-2007 occurred along random transects in a deeper portion of the reef (~33 m depth) and benthic transects were made permanent in this area in 2009

Outstanding Feature. Lang Hind supports an annual fish spawning aggregation of the red hind (*Epinephelus guttatus*). This site also possesses high water clarity.

Threats. The Lang Hind site is removed from land-based stressors. Fishing of the red hind aggregation was common prior to closure of the area to fishing in 1993. However, the aggregation is near the closure boundary.

Figure 74. Lang Bank Red Hind FSA. (top) Location. (right) A representative photo of the reef



LANG BANK RED HIND FSA

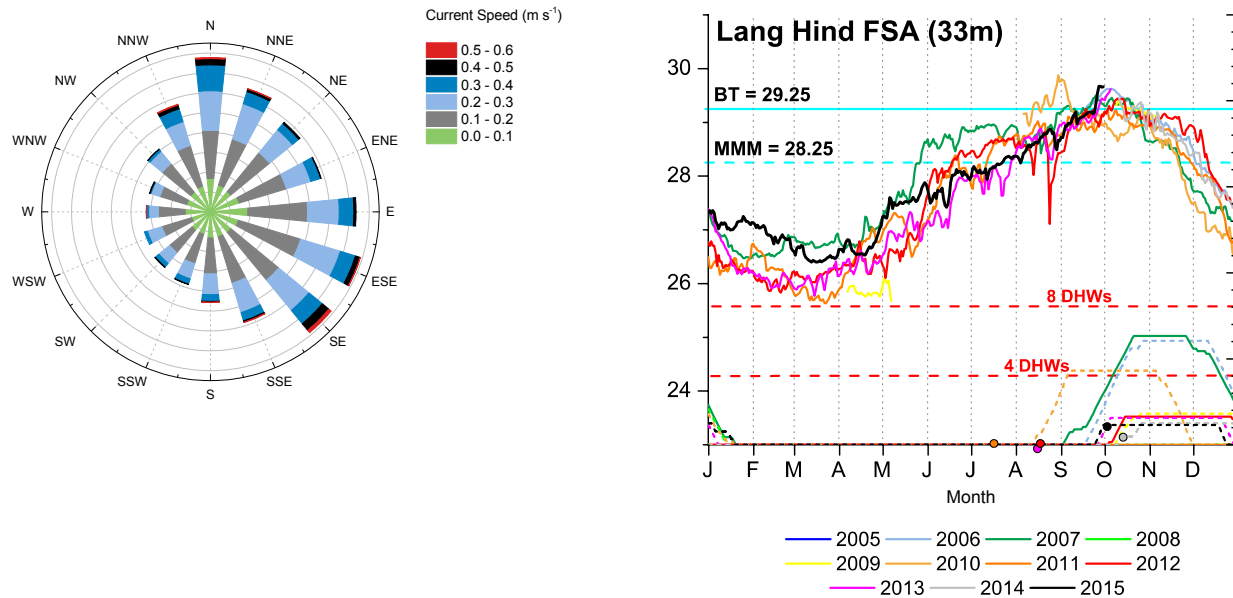


Figure 75. Lang Bank Hind current speed (left) and benthic temperature (right; 33 m depth)

Physical Characteristics

Current. Lang Hind had benthic currents recorded with ADCP every 30 minutes from 11/20/05 to 8/20/06, and 12/11/06 to 3/10/07. Bottom currents most typically alternate between north and southeast and can attain strong speeds periodically exceeding 0.4 m s^{-1} .

Temperature. Lang Hind has temperatures that are reduced due to the depth and proximity of the warm season thermocline. However, temperatures are not as cool or variable as sites on the southern Puerto Rican shelf, indicating that this site may be more susceptible to warming ocean temperatures.

SITE SUMMARIES

Benthic Community. Lang Hind has a diverse sessile epibenthic community dominated by hard corals, predominantly *Orbicella* spp., gorgonians, and sponges. Coral cover actually increased by 110% between the coral bleaching event and re-monitoring in 2006, but this may reflect the fact that transects were laid in random, rather than permanent, locations prior to 2009. The algal community is largely open epilithic algal communities, but also contains large proportions of *Lobophora variegata* and filamentous cyanobacteria. The algal community shows high inter-annual variability.

Coral Health. Lang Hind FSA was heavily affected during the 2005 coral bleaching event, with a very high prevalence of corals that were 100% bleached over the colony surface. Non-thermal bleaching with moderate prevalence and low extent on colonies also occurred in later years. The site was heavily affected with white diseases after the coral bleaching event and has had high disease prevalence in all years of monitoring. Old partial mortality jumped after the 2005 bleaching event and was variable in later years. Recent partial mortality is unusually high at Lang Hind, largely as the result of fish bites and predation by the corallivorous snail *Coralliophila* spp.

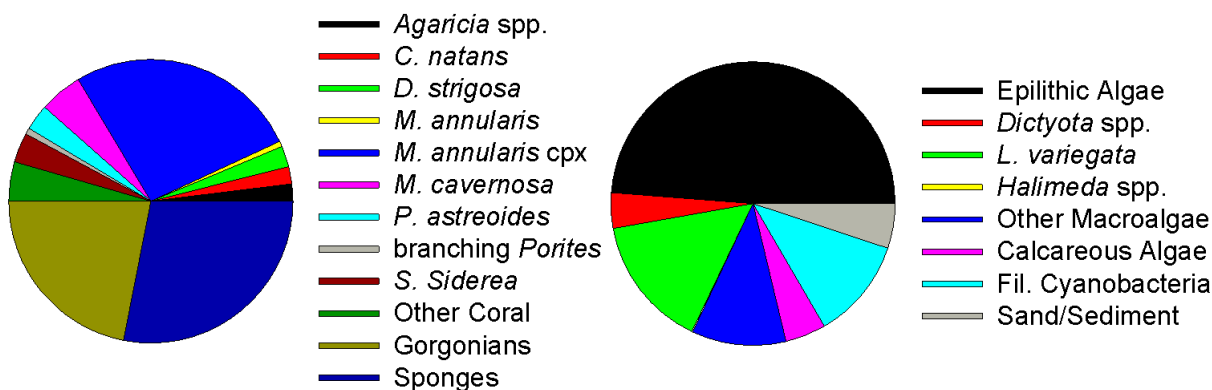


Figure 76. Lang Bank Red Hind FSA (left) Relative composition of the sessile epibenthic animal community. (right) Relative composition of the algal community and unconsolidated sediment.

LANG BANK RED HIND FSA

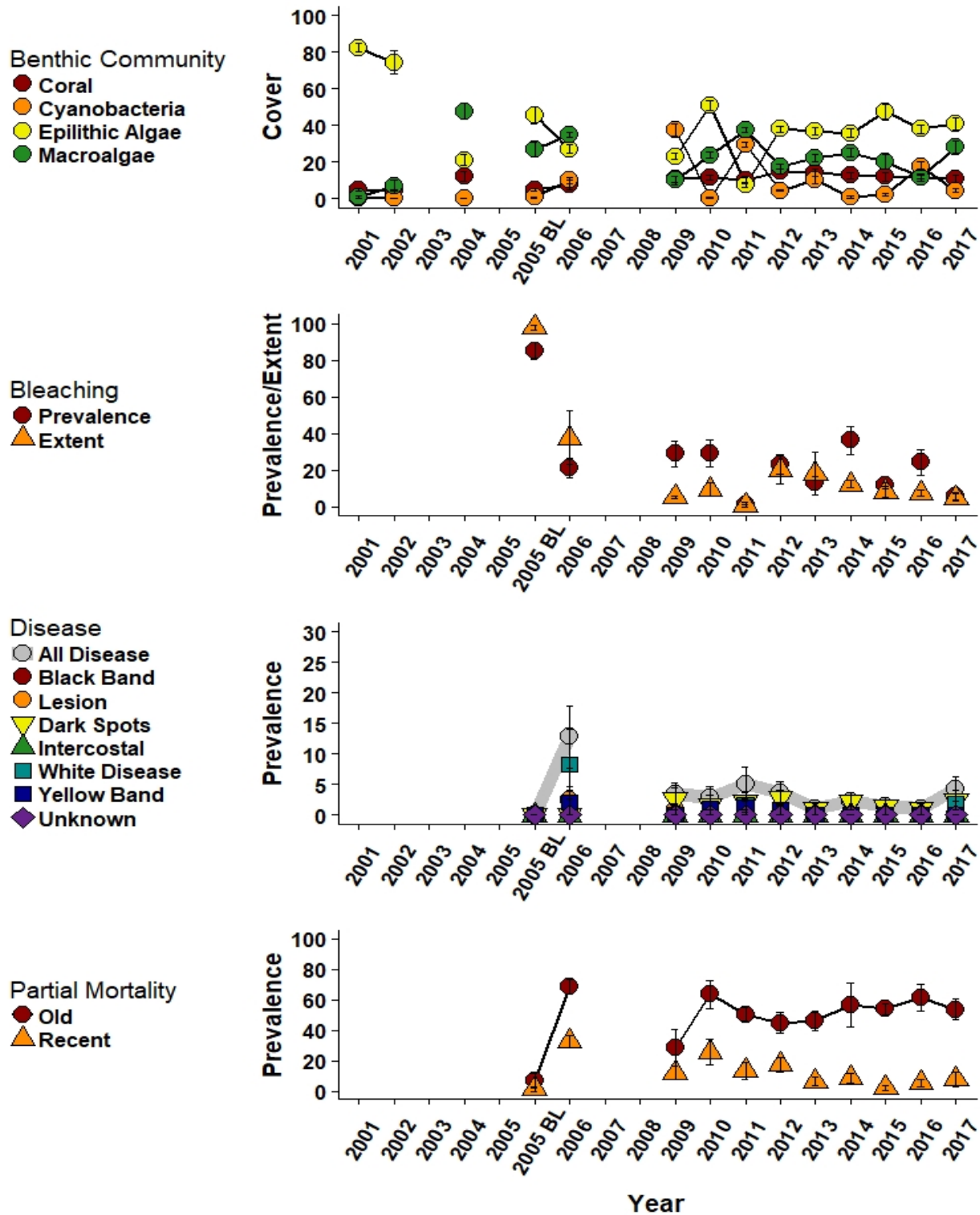


Figure 77. Lang Bank Red Hind FSA benthic cover and coral health through time (mean $\pm$ SE).

SITE SUMMARIES

Fish Community. The fish community at Lang Bank FSA is indicative of a mesophotic reef system. High water column planktonic feeders are abundant and include the black surgeon, creole wrasse, yellowtail snapper, and creolefish. Bicolor damselfish are numerous while herbivorous damselfishes are uncommon. Benthic herbivores are relatively low in diversity, abundance and biomass compared to nearshore sites. Invertivores are diverse and include many planktivores as well as benthic feeders, utilizing the varied resources of the bank. Four species of angelfish were observed on transects reflecting the high sponge cover. Lang Bank FSA supports a red hind spawning site, active during December through February each year, and red hind are occasionally seen on both roving dives and transects. One Nassau grouper was observed on the bank in 2011, a first observation across all St. Croix monitoring sites. There is reportedly a historic Nassau grouper spawning site near the Lang Hind monitoring site, and with the bank now closed to trap fishing there is hope of some re-establishment of the species on St. Croix. Mahogany snapper dominate piscivorous fish on Lang Bank FSA. No other large groupers or snappers are common although occasionally Caribbean reef sharks are observed.

LANG BANK RED HIND FSA

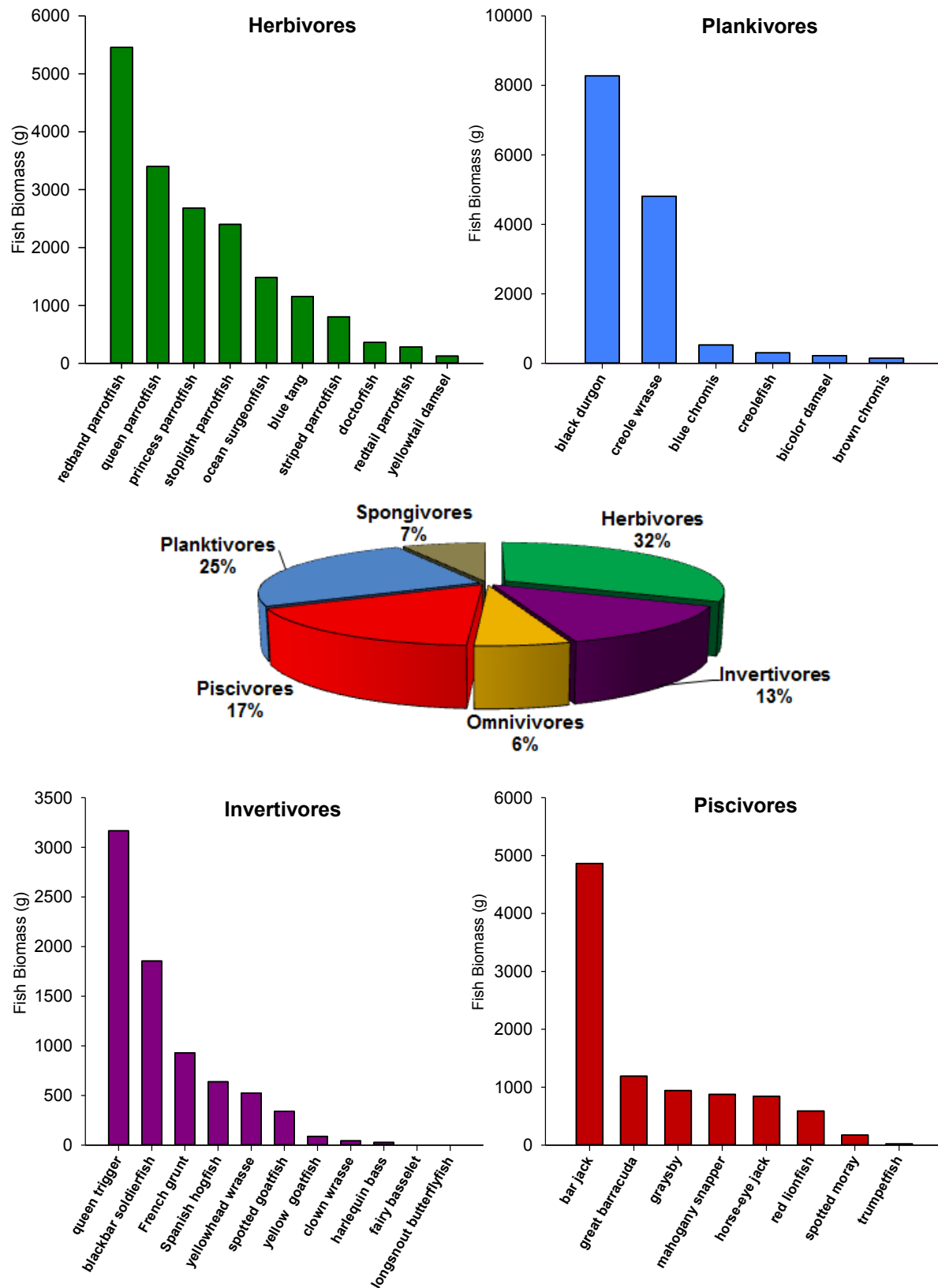


Figure 78. The Lang Bank Red Hind FSA fish community by absolute and relative biomass.