



Marine Benthic Communities: Coral Reef Monitoring in Biscayne National Park

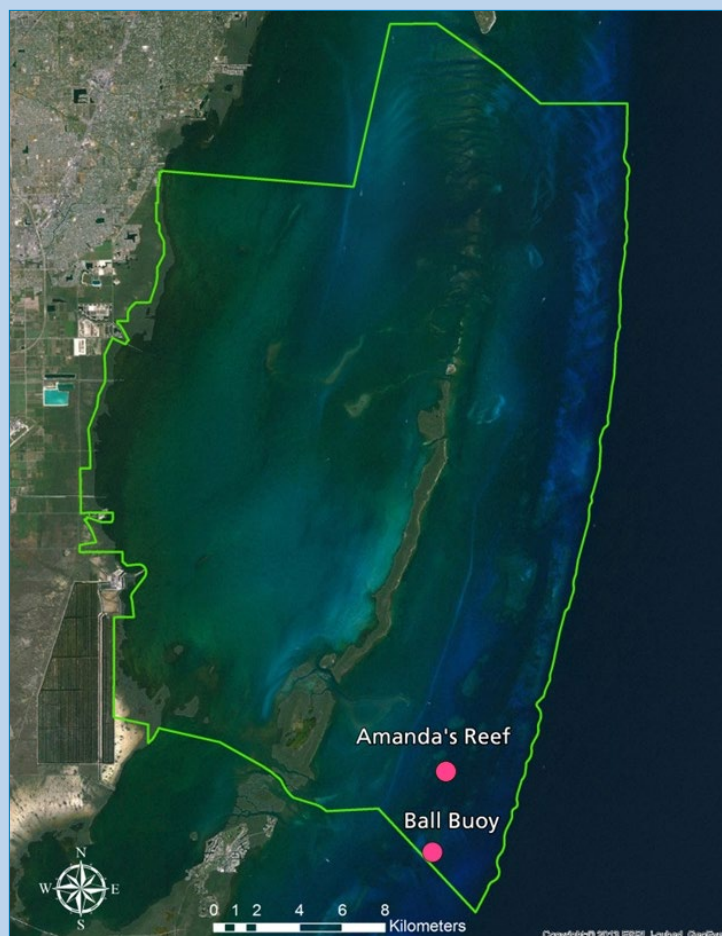
2019

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

Coral reef communities within Biscayne National Park consist of stony corals, octocorals, sponges, algae, and gorgonians (e.g., sea fans). Reefs support incredible marine biodiversity including a multitude of fish species, as well as lobsters, sea turtles, and other creatures. Reefs play a vital role for humans by supporting fisheries, fishery nursery areas, tourism, sand creation for beaches, pharmaceutical bio-prospecting, and shoreline protection to name a few. Monitoring coral reefs was identified as a national priority in President Clinton's Executive Order 13089, establishing the Coral Reef Initiative. These coral reefs are negatively impacted by events such as extreme water temperatures that cause "bleaching," vessel scarring, and major storms, as well as long-term stressors such as coral disease, over-fishing, damaging fishing methods, sediment runoff, nutrient enrichment, contaminants, ocean acidification, and abrasion of the reef by debris or careless snorkelers or divers.

Long-term Monitoring: *Two sites monitored since 2004*

The South Florida/Caribbean Network (SFCN) has annually monitored two coral reef index sites at Biscayne NP since 2004. Ball Buoy Reef and Amanda's Reef were selected due to management interest and to compare with existing historical data. Each site consists of 20 permanent, randomly-selected 10 meter (32.8 feet) transects which are monitored using underwater video. Percent cover of living coral by species, macroalgae, turf algae, crustose coralline algae, octocorals, and sponges are calculated. Data on coral disease, coral bleaching, water temperature, and long-spined sea urchins are also collected. Amanda's Reef is a 20,458 square meter (5.1 acre) shallow patch reef site with an average depth of less than 3 meters (9.8 feet). Common coral species are Mustard Hill Coral (*Porites astreoides*), Finger Coral (*P. porites*), and Massive Starlet Coral (*Siderastrea siderea*). Ball Buoy Reef is 14,136 square meters (3.5 acres) in area and is a reef terrace site ranging up to 12 meters (39.4 feet) deep. Coral species found there consist of Mustard Hill Coral (*Porites astreoides*), Fire Coral (*Millepora alcicornis*) and also include the federally-threatened species, Boulder Star Coral (*Orbicella* sp. complex) and Elkhorn Coral (*Acropora palmata*).



Above: Aerial image of monitoring sites in Biscayne National Park.

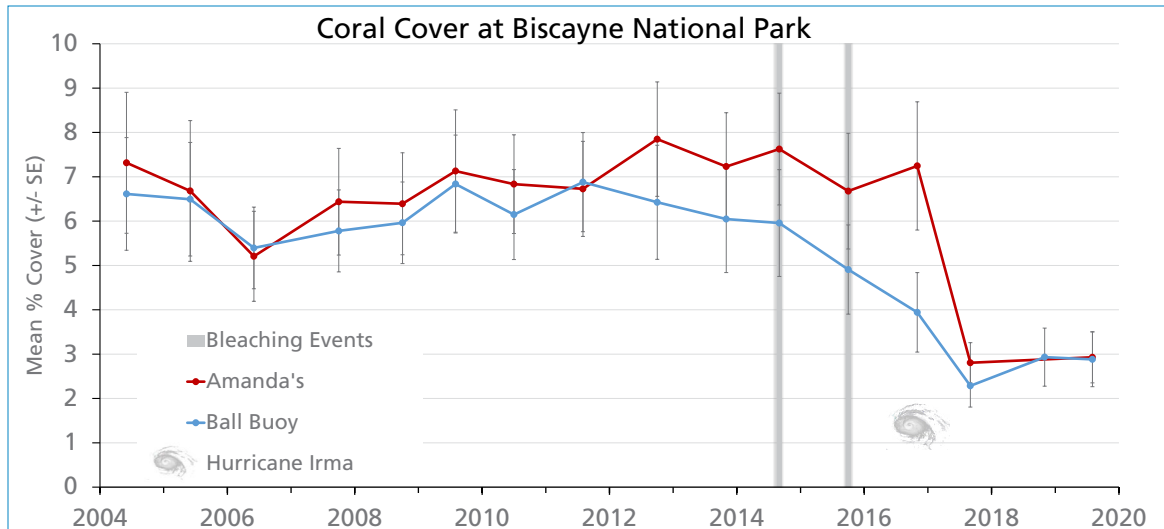


Above: Diseased massive starlet coral (*Siderastrea siderea*) in 2019 at Amanda's Reef in Biscayne National Park.



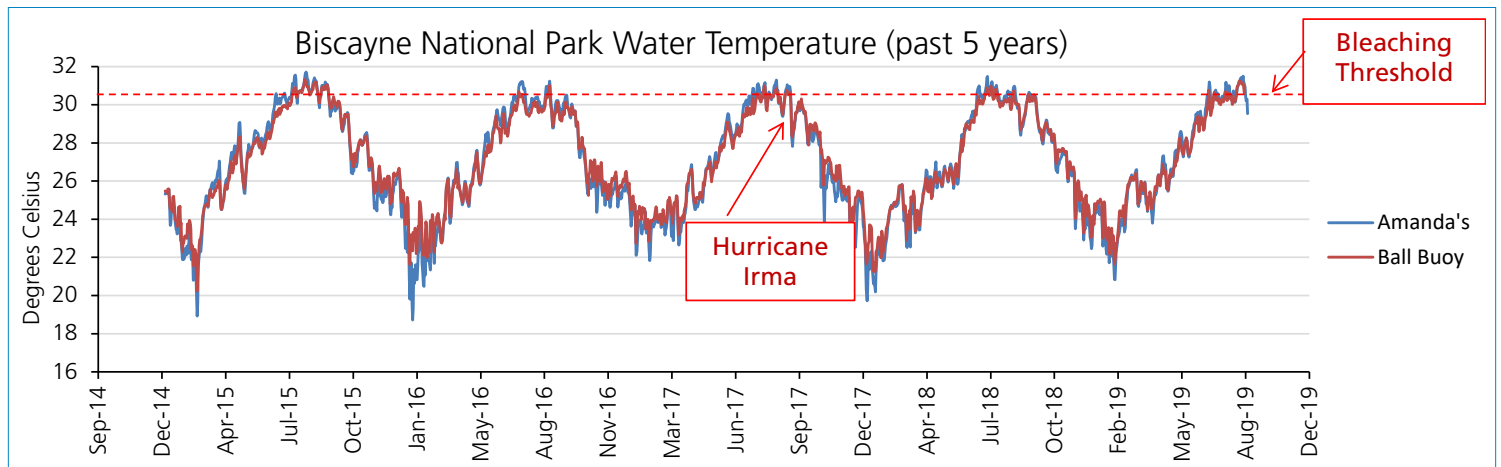
Status and Trends: Disease and Hurricanes combine to cause significant decrease in stony coral cover

In 2019, the SFCN staff conducted annual coral reef community monitoring of index sites at Ball Buoy Reef and Amanda's Reef, which now have 15 years of data. Since 2004, both reefs have suffered an obvious decline in live coral cover, with a 60% loss of coral on Amanda's Reef and 56% decline in coral on Ball Buoy Reef. Conversely, total algal cover has increased to between 70-80% on both reefs, with an increase of 50% of macroalgae alone on Ball Buoy. While hurricanes have slowed coral cover increases, the primary driver of this decline are coral diseases that have ravaged the entire Florida Reef Tract. Coral cover has remained stable at just under 3% since Hurricane Irma in 2017.



Left: Trends in live stony coral cover at Biscayne National Park sites, Amanda's Reef and Ball Buoy Reef. Coral cover is lowest value since monitoring began 15 years ago. Grey bars indicate coral bleaching and disease events of 2014 and 2015. Coral bleaching occurs when coral under stress lose their symbiotic algae and look white or "bleached."

The 2017 coral loss is due to the combined effects of coral diseases and Hurricane Irma.



Biscayne National Park water temperature summary graph (above) showing data from the two coral monitoring sites since late 2014. Severity of recent thermal stress on reefs (below) showing more than one month above the bleaching threshold at Amanda's Reef in five of the past six years. Ball Buoy Reef shows a similar pattern of significant heat stress, with 2013 as the only year since 2006 where the daily average temperature didn't exceed the bleaching threshold.

