



Marine Benthic Communities: Coral Reef Monitoring in Dry Tortugas National Park

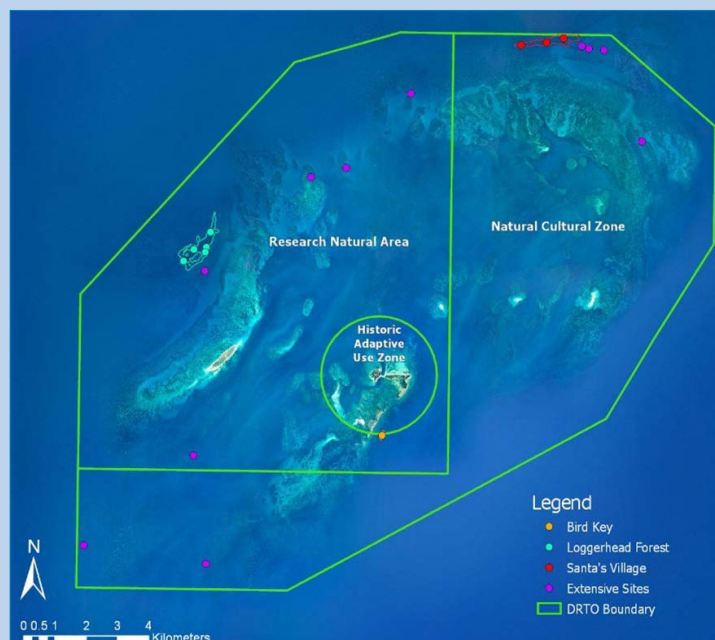
2021

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

Coral reef communities within Dry Tortugas National Park (DRTN), at the western end of the Florida Reef Tract, consist of stony corals, octocorals (e.g., sea fans), sponges, and algae. Reefs support incredible marine biodiversity including a multitude of fish species, as well as lobsters, sea turtles, and other marine life. Reefs in Dry Tortugas National Park play a vital role for humans by supporting fisheries, fishery nursery areas, tourism, biodiversity, and protection of the islands and Fort Jefferson, 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, abrasion of the reef by debris or careless snorkelers and divers, ocean acidification, nutrient enrichment, and contaminants.

Long-term Monitoring: *Bird Key Reef, Loggerhead Forest, Santa's Village and additional sites inside and outside the Research Natural Area (RNA)*

The South Florida/Caribbean Network (SFCN) began coral reef monitoring at Bird Key Reef in 2004 in Dry Tortugas National Park. Bird Key Reef was selected due to management interest to compare with historical work and consists of 20 permanent, randomly-selected 10-meter (32.8-foot) transects which are monitored using underwater video. Thirteen additional four-transect extensive sites were randomly selected in 2008 to compare trends inside and outside the newly established no-take Research Natural Area (RNA).



Above: Three long term index sites are monitored annually and episodically (as needed) by SFCN: Bird Key (19,352 m²); Loggerhead Forest (596,637 m²), and Santa's Village (371,763 m²). Thirteen additional four-transect extensive sites have been monitored inside and outside the RNA since 2008 on a less frequent monitoring schedule (Figure 1 on back).

In 2012, Loggerhead Forest Reef and Santa's Village Reef were selected for additional focused monitoring due to their unusually high coral cover and diversity. Percent cover of living coral by species, macroalgae, turf algae, crustose coralline algae, octocorals, and sponges are calculated. Data on coral disease, bleaching, water temperature, and long-spined sea urchins are also collected.



Above: Highly diverse and complex coral reef terrace habitat in Dry Tortugas National Park.



Status and Trends: Coral cover decreasing ahead of Stony Coral Tissue Loss Disease (SCTLD) presence in the park reefs

Loggerhead Forest and Santa's Village contained the highest percentage of live hard coral cover reported for any Florida reefs (15–30%) in 2012 (Figure 1). However monitoring through 2018 shows a significant negative trend in stony coral cover on these reefs with coral disease outbreaks in 2016 and 2018 causing substantial mortality. White Plague coral disease prevalence ranged from 7–11% of all coral colonies affected per reef during these survey events. Coral cover has been stable or slightly higher since 2018, however a previously undescribed widespread disease, Stony Coral Tissue Loss Disease first reported on Florida reefs off Miami in 2014, was documented on park reefs on May 29, 2021. Water temperature data shows similar patterns throughout the park except in May–June when cold water events appear to affect western and northern sites more than the rest of the park (Figure 2). Daily water temperatures were again exceedingly warm surpassing the coral bleaching threshold in the months June through September (2019 and 2020) and have passed the bleaching temperature limit on all three reefs in five of the last seven summers (Figure 3).

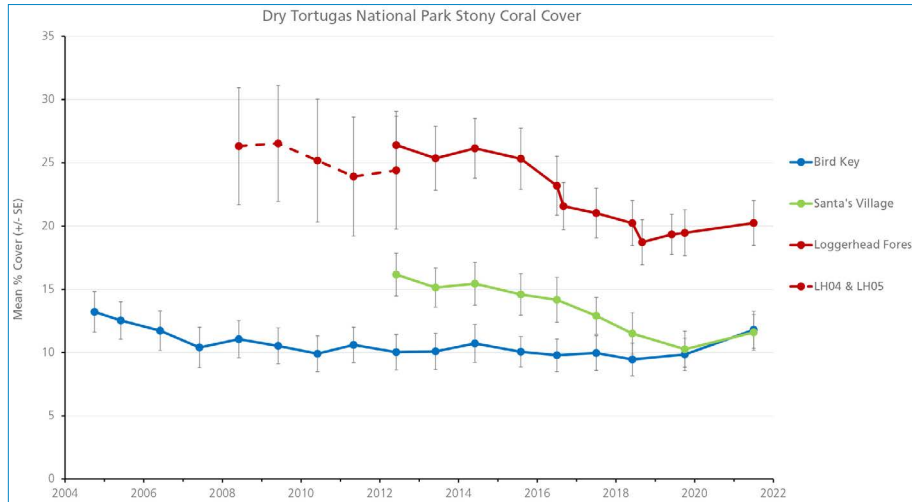


Figure 1. Average live stony coral cover ($\pm$ SE) at all survey sites in Dry Tortugas National Park excluding Santa's village, have a statistically significant negative trend at this time.

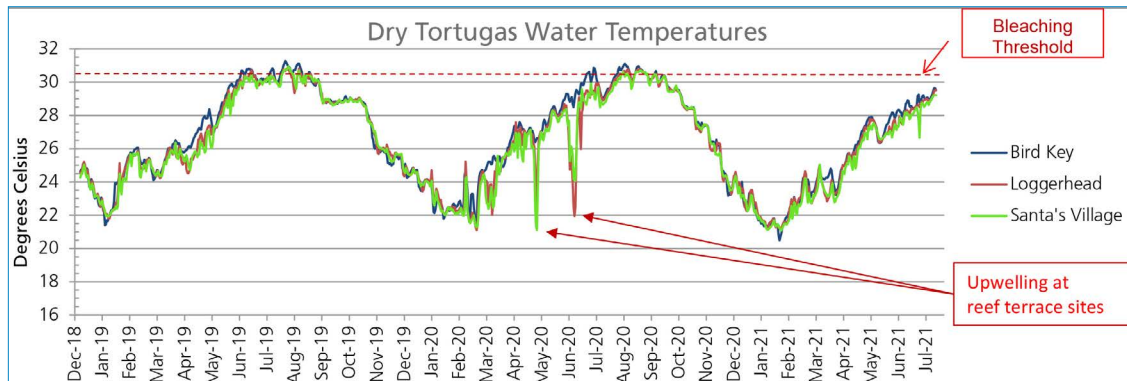


Figure 2. DRT0 water temperature summary graph for 2019–2021. Graph shows water temperature data from Bird Key, Loggerhead and Santa's Village. Cold upwelling at the reef terrace communities can be seen May and June 2020. The bleaching stress threshold of 30.5°C (86.9°F) is shown (top red dashed line).

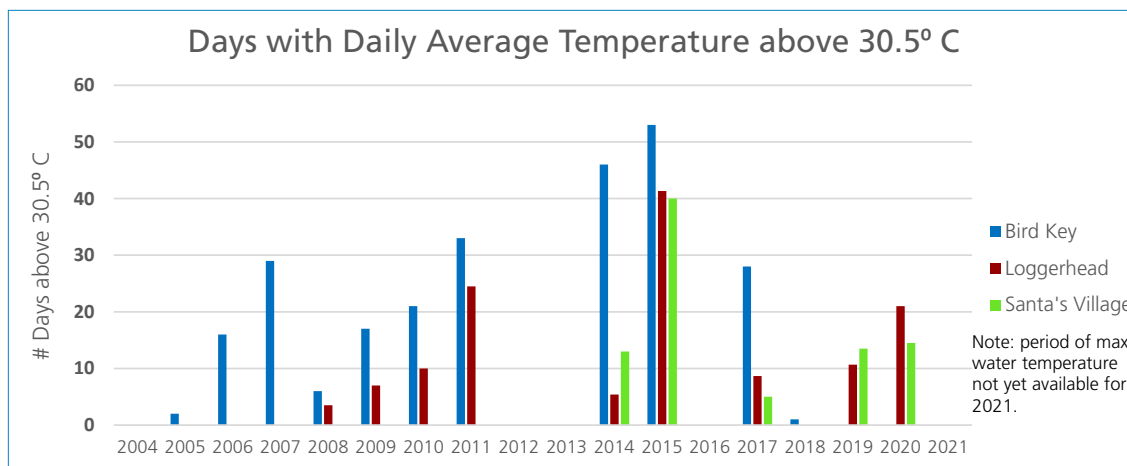


Figure 3. Number of days that the daily average temperature exceeded the coral bleaching stress threshold are quantified. Note the 2021 water temperatures were only collected through July 2021.

