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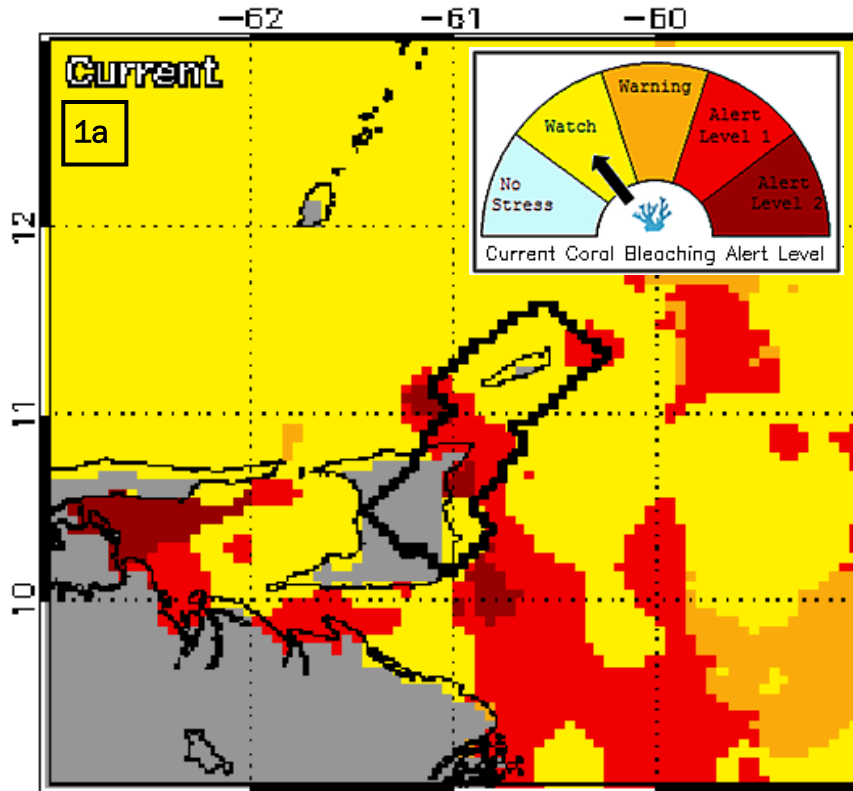
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**CURRENT STATUS:**  
**11 OCT 2017:**

**Reef Referee**  
**BLEACHING WATCH**

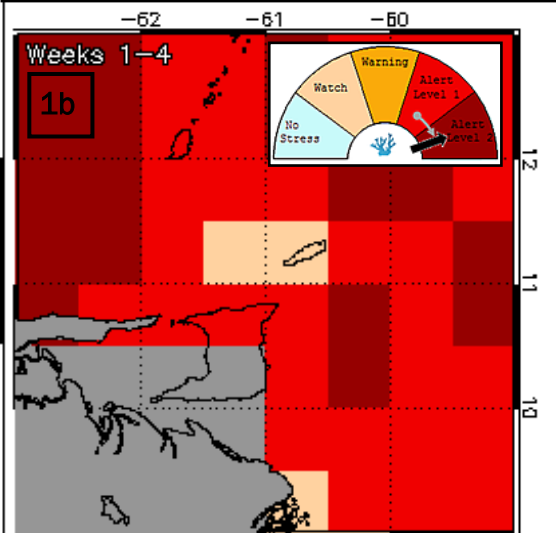


**TRINIDAD & TOBAGO BLEACHING STATUS:** Although it is the peak of Trinidad and Tobago's Coral Bleaching Season, the current status is **Bleaching WATCH** (Fig. 1a). However, it is important to note the patches of higher intensity (**ALERT LEVEL 1** and **ALERT LEVEL 2**) Heat Stress which exists within Trinidad and Tobago region, as indicated by the red and dark red in Figure 1a. The Sea Surface Temperature trend is towards neutrality with areas of heating (up to +1.0°C) and areas of cooling up to -1.0°C).

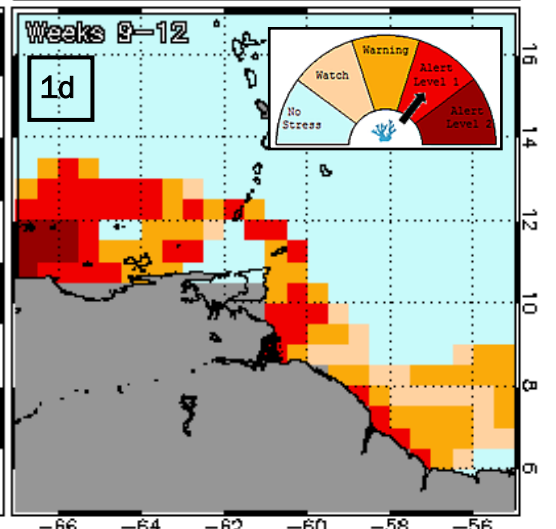
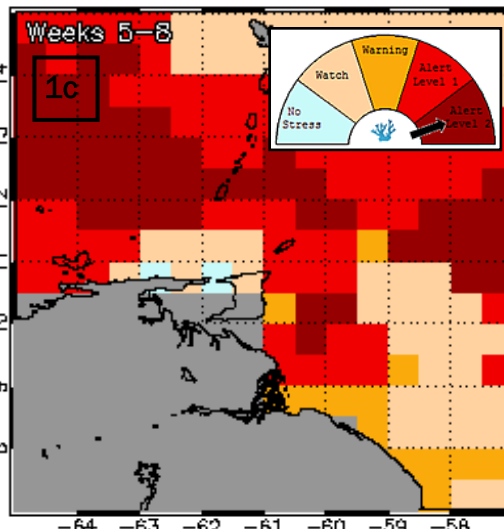


**INDEX SUMMARY**

- Current SSTs: 29.521 °C.
- SST s are above the October Mean SST Climatology.
- SSTs are below the Bleaching Threshold of 29.8
- SSTA: 1.296°C; DHW: 8.7



**TRINIDAD & TOBAGO BLEACHING OUTLOOK:** Heat stress is expected to continue accumulating through October, T&T's hottest month. Thus, the Bleaching Alert Status is expected to increase to the maximum, **Alert Level 2** in October (Fig. 1b), and persist into November (Fig 1c). Temperatures are expected to begin decreasing in late November to early December (Fig 1d) . The Alert Status is expected to begin downgrading at the same time.



**FIG 1: NOAA-CRW BLEACHING ALERT STATUS 9TH OCT 2017: 1A CURRENT STATUS; 1B 1-4WEEK OUTLOOK; 1C 5-8 WEEK OUTLOOK AND 1D 9-12 WEEK OUTLOOK**

## RECAP: LAST ISSUE

- Ocean waters are layered according to temperature and salinity.
- Warmer and less saline overlays colder and more saline.
- The uppermost layer is continually mixed.
- Hurricanes force mixing resulting in more homogeneous temperatures and salinity.
- Stronger and slower moving hurricanes are more effective than weaker and faster storms.
- The storm creates a trail of cooled water along its path called a “cold wake”.

## Several factors negatively impact coral reefs:

1. turbulent water physically damages the coral structure;
2. the increase in turbidity decreases the sunlight available to the algae within the coral polyp;
3. the particles in suspension clog the coral pores;
4. the large amounts of rain water decreases salinity in shallow areas; and the amount of dissolved oxygen in the water decreases the amount of oxygen available for respiration.

The Buccoo Reef (Figures 2 & 3) is a complex reef system comprised of 5 emergent fringing reefs; a shallow sandy lagoon with a patchy distribution of coral communities; an adjacent sheltered lagoon (Bon Accord Lagoon); coastal mangroves and sea grass beds covering an area of 7km<sup>2</sup>. The Bon Accord Lagoon is almost completely enclosed by Sheerbird's

## BUOYS MONITORING AND REEFS

As previously mentioned, ocean temperature and thus coral bleaching can be monitored through remote sensing via satellite. However, ocean temperature (and other parameters) can also be measured directly via in situ buoys. The Government of Trinidad and Tobago has collaborated with the Caribbean Community Climate Change Centre (5Cs), National Oceanic and Atmospheric Administration (NOAA) and the Inter-American Development Bank (IDB) to install 2 Coral Reef Early Warning System (CREWS) buoys in Tobago. The CREWS program is part of NOAA's Coral Reef Watch and Coral Health and Monitoring Program. The CREWS buoys measure, record and transmit key meteorological and water quality measurements. They consist of a basic suite of meteorological sensors (for air temperature, wind speed and direction, barometric pressure and rainfall to name a few. Including the 2 stations in Tobago, there are 7 stations in the (CREWS/CCCC) Caribbean network.

- BUT01 was installed in Buccoo Reef at 11.176°N, 60.834°W on 21<sup>st</sup> November
- ART01 was installed in Angel's Reef at 11.301°N, 60.521°W on 22<sup>nd</sup> November

## BUCCOO REEF

Buccoo Reef, the largest coral reef in Tobago, was designated a marine park in 1973. Additionally, the area was designated an Environmentally Sensitive Area in 2005 and in 2006 it was designated a RAMSAR site under the RAMSAR Convention. The Buccoo Reef Marine Park is located on the leeward southwest coast of Tobago between 11° 08'N and 11°12'N latitude and 60°40'W and 60°51'W longitude. It is managed by the Institute of Marine Affairs (IMA) and the Tobago House of Assembly (THA) and receives an estimated 45,000 visitors annually.



FIG. 2: GOOGLE MAP OF BUCCOO REEF AND POSITION OF BUCCOO Point (*No Man's Land*) and a dense mangrove belt rendering it poorly circulated. The reef fats are generally characterized by narrow seaward reef crests and a more extensive back reef toward the reef lagoon.

The reef flats have wave-resistant species adapted to turbulent waters, such as Elkhorn Coral, while the reef crests are dominated by the Star Coral. In the deeper *Coral Gardens* the coral communities change to large colonies of brain coral, Starlet Coral and Star Coral, with many soft corals that sway in the current.

Despite being a protected area, the combination of climate change with land-based pollution from run-off and physical damage from reef walking and anchors has degraded much of the reef.

The Buccoo Station: **Station 42087** - is owned and maintained

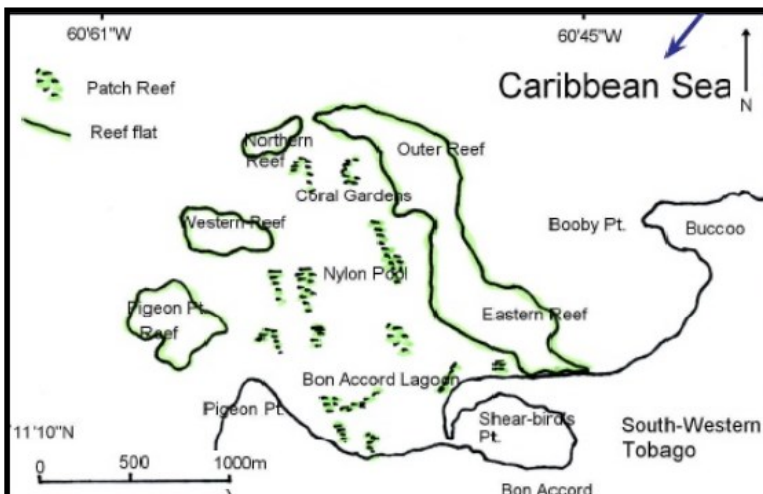


FIG. 3: MAP OF BUCCOO REEF ECOSYSTEM © THE CROPPER FOUNDATION BUCCOO REEF CASE STUDY (ADAPTED FROM LAYDOO ET AL. (1998))

by Integrated Coral Observing Network (ICON) and is moored at **11.185 N 60.848 W** (11°11'6" N 60°50'52" W).

Buccoo has been found to have over 179 marine species, including 42 coral species and 70 fish species.

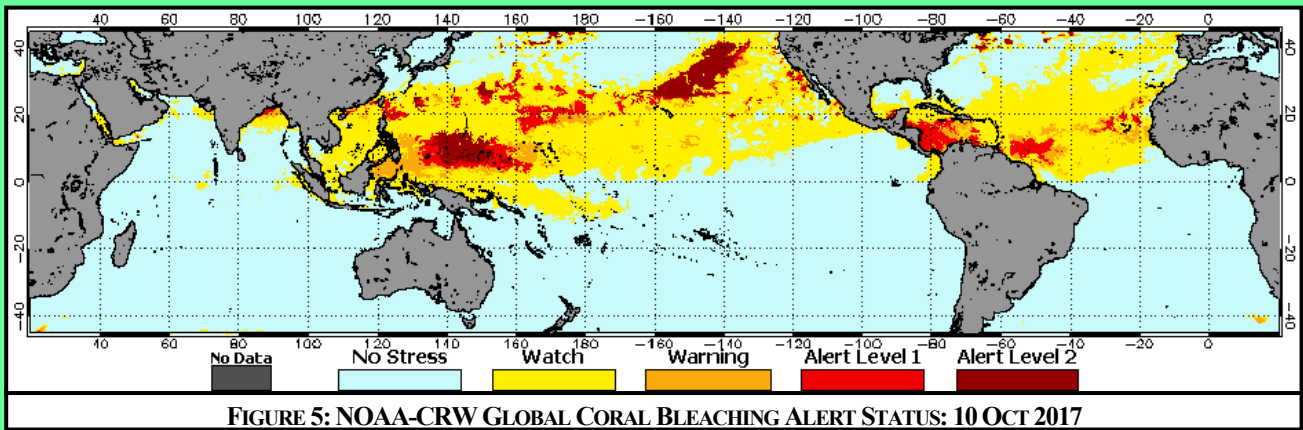
**ANGEL'S REEF** Considerably less has been documented about Angel's Reef (figure 4a & 4b). Angel Reef had the highest recorded mean percentage cover of 41% with



**FIG. 4A: GOOGLE MAP OF ANGEL'S REEF AND POSITION OF ANGEL'S BUOY**



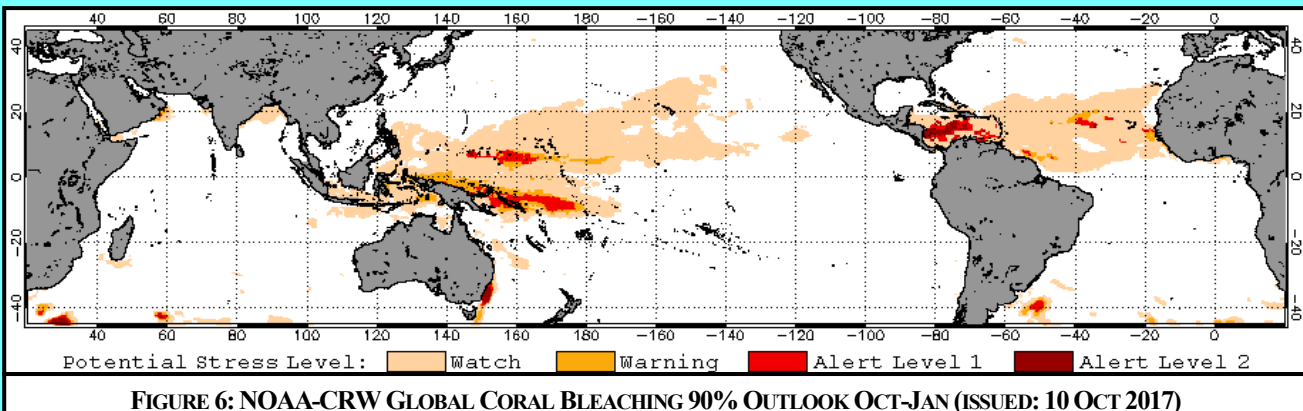
**FIG. 4B: PICTURE OF ANGEL REEF/GOAT ISLAND © THA**



**FIGURE 5: NOAA-CRW GLOBAL CORAL BLEACHING ALERT STATUS: 10 OCT 2017**

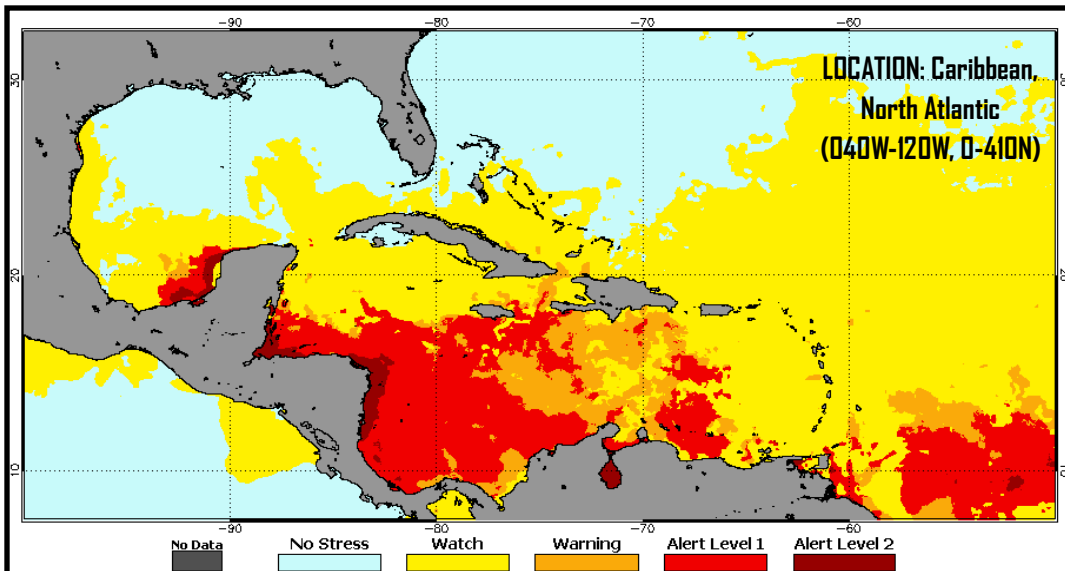
**GLOBAL STATUS:** As seen in Figure 5, heat stress exists primarily north of the Equator. There are several areas of **ALERT LEVEL (1 OR 2)** evident in the Pacific Ocean: 1. the Philippine Sea east of the Philippines 2. the North Pacific Ocean west of Hawaii. By comparison, the Atlantic is under less heat stress with smaller regions of Alert Level 1 Stress positioned east of the Caribbean and near Cape Verde. Additionally, significant heat-stress exists within the Caribbean Sea, particularly near Central America.

The 90% **GLOBAL OUTLOOK** predicts a global decrease in heat stress over the next 3 months. Conditions are expected to reach **BLEACHING ALERT LEVEL Status** in the Caribbean Sea and in the region of Micronesia and Solomon Islands, as seen in Figure 6 below.



**FIGURE 6: NOAA-CRW GLOBAL CORAL BLEACHING 90% OUTLOOK OCT-JAN (ISSUED: 10 OCT 2017)**

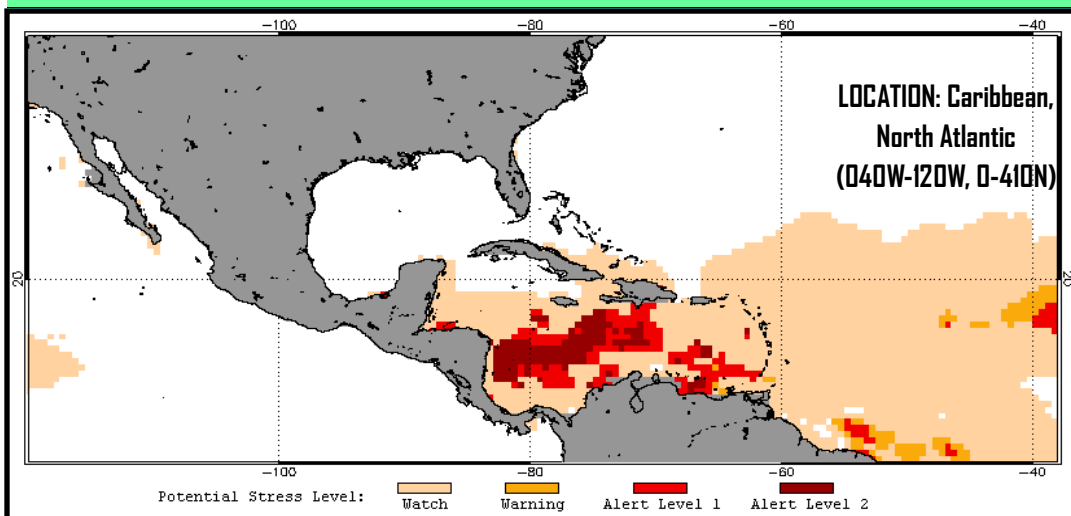




**FIGURE 7: NOAA-CRW CARIBBEAN CORAL BLEACHING ALERT STATUS: 10 OCT 2017**

**REGIONAL STATUS:**

All of the Caribbean Basin is under **CORAL BLEACHING WATCH** (as seen in Figure 7). However, the Central American region of the Caribbean (Belize, Guatemala, Nicaragua, Honduras, Costa Rica and Panama) is displaying Alert Level 1/2 Bleaching Status. Of note is the region of Alert Level 1 Stress positioned east of Trinidad and Tobago, and the rest of the Caribbean, with the potential to increase the current status level.



**FIGURE 8: NOAA-CRW CARIBBEAN BLEACHING ALERT AREA OCT-JAN 2017 90% OUTLOOK 10 OCT 2017**

**REGIONAL OUTLOOK:**

Although heat stress is expected to continue accumulating, with a potential to raise the Caribbean region's threat level to **ALERT LEVEL 1/2**.

The Outlook (Figure 8) shows the heat stress concentrated within the Caribbean Sea while adjacent areas

**ACKNOWLEDGEMENTS:** THE TRINIDAD AND TOBAGO METEOROLOGICAL SERVICE (TTMS) WOULD LIKE TO THANK THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) & THE CARIBBEAN INSTITUTE FOR METEOROLOGY AND HYDROLOGY

**RESOURCES:**

1. IMA, "The formulation of a management plan for the Buccoo Reef Marine Park", volume 2 Socioeconomic aspects, (Institute of Marine Affairs, 1994)
2. NOAA-CRW. (2013, updated weekly). *4 Month Coral Bleaching Heat Stress Outlook*. Retrieved 10 11, 2017, from NOAA Coral Reef Watch: [https://coralreefwatch.noaa.gov/satellite/bleachingoutlook\\_cfsoutlook\\_cfs.php](https://coralreefwatch.noaa.gov/satellite/bleachingoutlook_cfsoutlook_cfs.php)
3. NOAA-CRW. (2013, updated daily). 5-km Satellite Coral Bleaching Heat Stress Alert Area Product. Retrieved 10 11, 2017, from NOAA Coral Reef Watch: [https://coralreefwatch.noaa.gov/satellite/bleaching5km/index\\_5km\\_baa\\_max\\_r07d.php](https://coralreefwatch.noaa.gov/satellite/bleaching5km/index_5km_baa_max_r07d.php)
4. NOAA-CRW. (2013, updated daily). Trinidad and Tobago 5-km Bleaching Heat Stress Gauges. Retrieved 10 11, 2017, from NOAA Coral Reef Watch: [https://coralreefwatch.noaa.gov/vs/gauges/trinidad\\_tobago.php](https://coralreefwatch.noaa.gov/vs/gauges/trinidad_tobago.php)
5. Rawlins, Maurice and Mary Aklins-Koo. 2009. Case Study Guide: for CAPE Geography, Environmental Science and Biology. Port of Spain, Trinidad: the Cropper Foundation (TCF).
6. Richard Laydoo, Kurt Bonair and Gerard Alleng, " Buccoo Reef and Bon Accord Lagoon, Tobago,

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