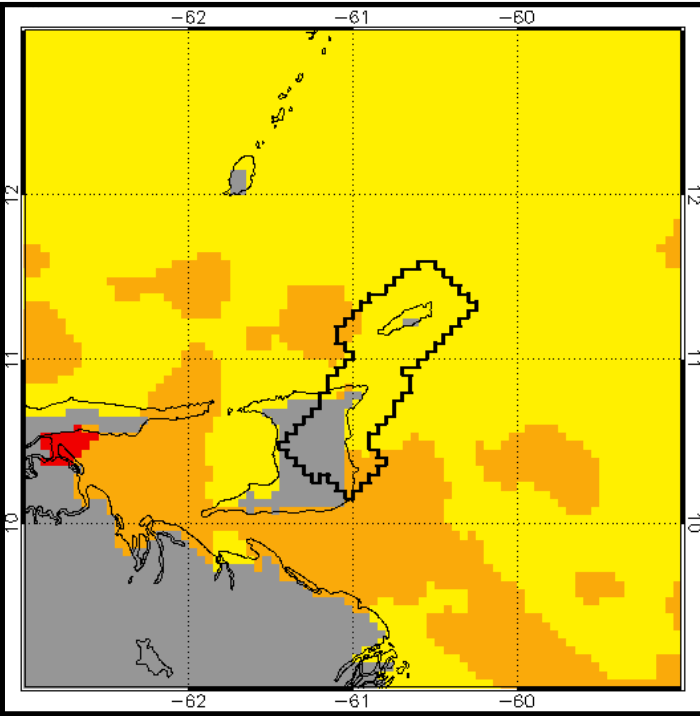


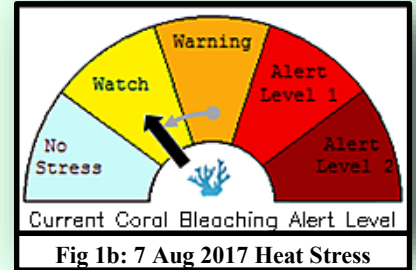
## CURRENT STATUS: 9 Aug 2017: **BLEACHING WATCH**



### TRINIDAD & TOBAGO BLEACHING STATUS:

We are approaching the Peak Season of Trinidad and Tobago's Coral Bleaching Season. Currently, T&T is under **BLEACHING WATCH/WARNING**

(yellow-orange status in Fig. 1a & b) and the Sea Surface Temperature trend is neutral with some adjacent patches of heating (up to +1.0) and cooling up to -1.0°C).



### INDEX SUMMARY

- SST: 29.037 °C ↑
- HS: 0.000
- SSTA: 1.282 ↑
- DHW: 0.000
- SST is above the July Monthly Mean SST Climatology
- SST is below the Bleaching Threshold of 29.8°

FIG 1: NOAA-CRW CURRENT BLEACHING ALERT STATUS 7 AUG 2017)

### BLEACHING OUTLOOK:

#### WEEKS 1-4:

Heat Stress is expected to accumulate in September, increasing the Alert Status to **Bleaching Warning Level** (Figs. 2a & 2b).

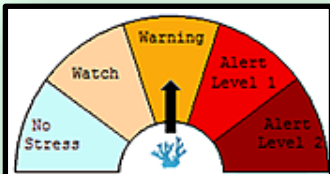


Fig 2a: Outlook September (Weeks 1-4) Heat Stress

**WEEKS 5-8:** October Heat Stress is expected to increase to the **ALERT LEVEL 1**, with an area of **WARNING** Level stress (See Figs. 3a and 3b).

**WEEKS 9-12:** Heat Stress during November is expected to persist at **ALERT LEVEL 1** with a patch of **ALERT LEVEL 2** Stress east of Trinidad & Tobago. (See Figs. 3a & 3c)

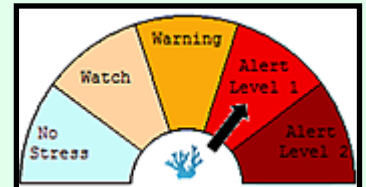
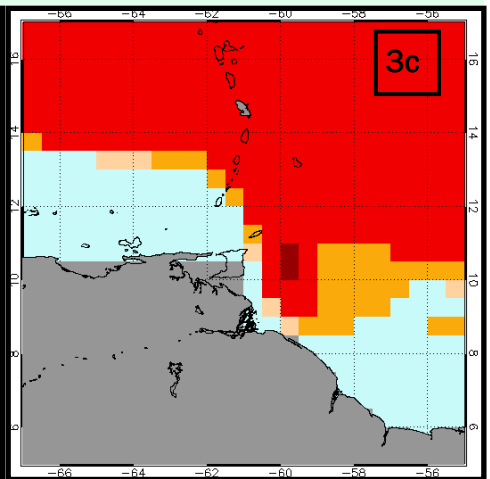
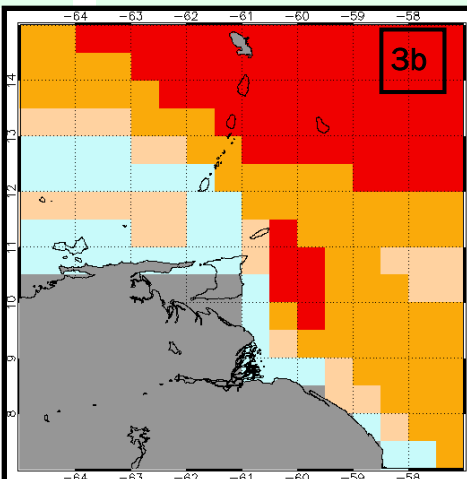
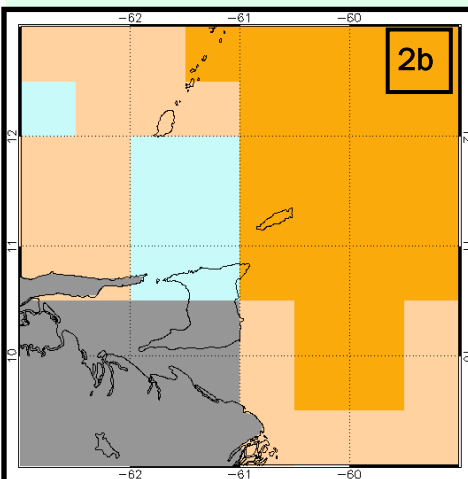


Fig 3a: Outlook October (Weeks 5-8) and November (Weeks 9-12) Heat Stress



NOAA-CRW 1 AUG 2017 OUTLOOK 2b: September (1-4 WEEKS); 3b: October (5-8 WEEKS) & 3c: November (9-12 WEEKS)

**RECAP: LAST ISSUE**

- Corals are marine invertebrate animals
- Corals belong to the Class Anthozoa
- A single coral body is called a polyp
- A collection of corals growing closely together and linked is called a reef
- Corals feed in 2 ways:
  - Capturing food (plankton) via tentacles and
  - Photosynthesis via a symbiotic hosting of specialised algae called zooxanthellae.
- Corals get their colour from the algae they host
- During times of heat stress, the algae produces a biochemical toxin which damages coral tissue
- Coral Bleaching occurs when the polyp releases the algae thus losing colour or becoming “bleached”
- Bleaching also results in a nutritional deficiency since the coral is no longer able to fulfill its nutritional requirements.

**REEF REQUIREMENTS**

Reefs are highly sensitive organisms that occupy a particular niche and require specific conditions with respect to the following parameters: salinity, temperature, depth, turbidity and nutrients:

<b>Salinity:</b>	32—42 ppt	Measurement of dissolved salt content expressed in parts per thousand by weight
<b>Temperature:</b>	20-32 °C	Different species can tolerate different temperatures
<b>Light:</b>	Corals require sunlight for photosynthesis. Stony corals require more light than soft corals.	
<b>Depth</b>	<70 m	Deeper water has less sunlight available for photosynthesis
<b>Turbidity</b>	LOW	Turbidity is a measure of the haziness of a liquid due to particulates. High turbidity means less sunlight.
<b>Nutrients:</b>	Calcium (Ca) 380-450 ppm Stronium (Sr) 8-14 ppm Iodine (I) Magnesium (Mg) 1250-1350 ppm	The process of nutrient cycling between corals, zooxanthellae and other reef organisms facilitates survival in nutrient poor waters. Coral reefs often also depend on other habitats such as seagrass and algae beds and mangrove forests in the surrounding area for supplemental nutrients via nitrogen rich dead plants and animals. Reefs in turn provide protection from storms and produce sediment for the mangroves and seagrass to root in.
<b>Waves</b>	Waves bring nutrients, oxygenate the reef and prevent excess sedimentation, therefore reefs are usually more common on eastern shores.	

**TABLE 1: REEF REQUIREMENTS FOR GROWTH**

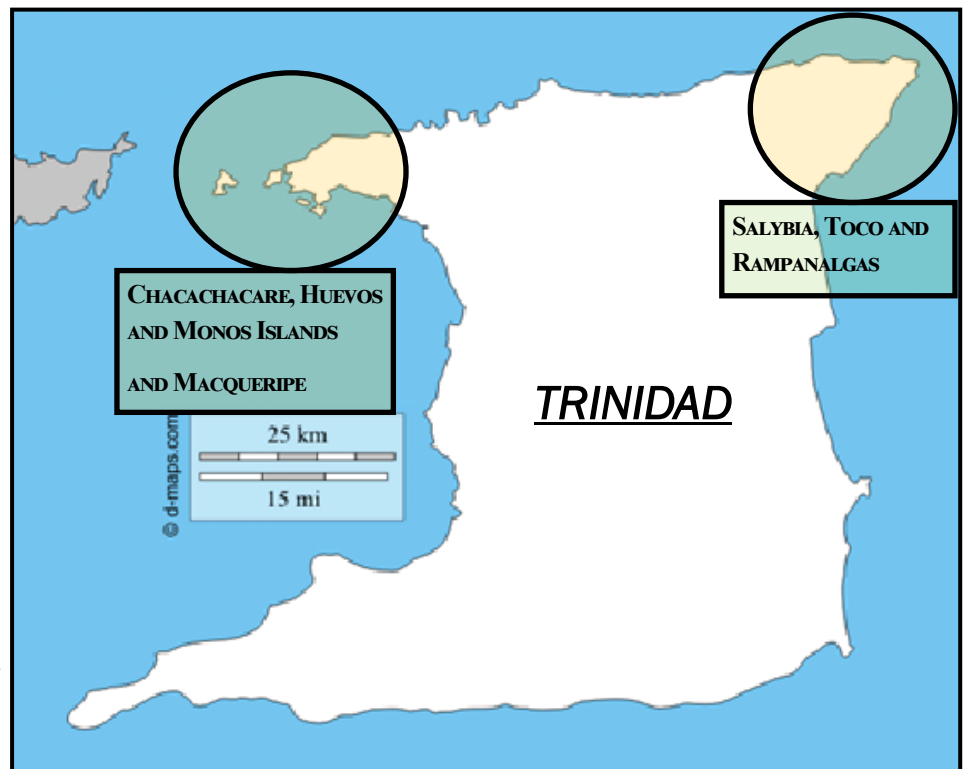


**FIG. 4 TRINIDAD, TOBAGO & THE ORINOCO DELTA**  
©MAPSOFTHEWORLD.COM

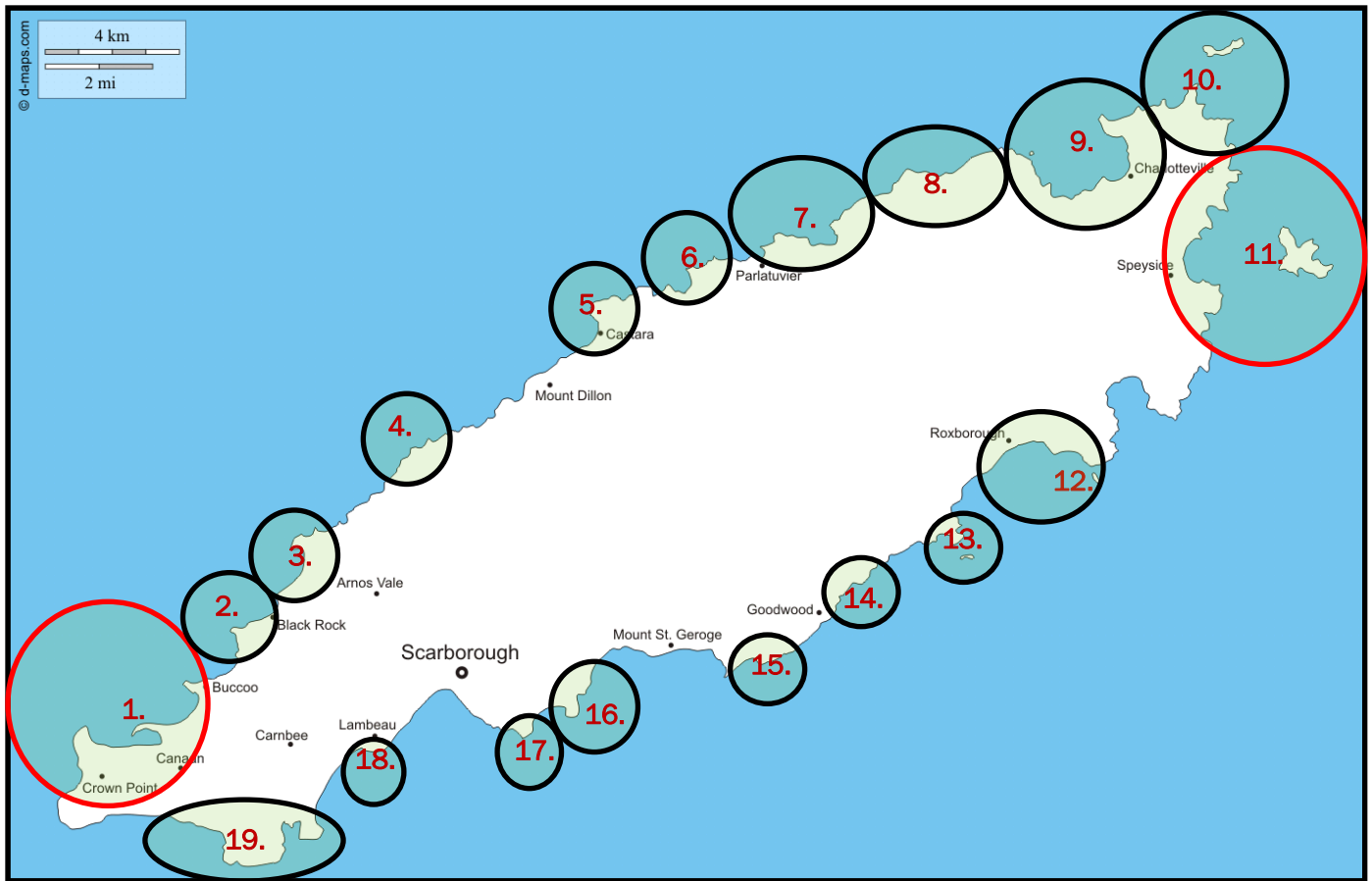
**REEF DISTRIBUTION IN TRINIDAD & TOBAGO**

Trinidad and Tobago’s coastal waters are influenced by the Venezuelan Orinoco River which pumps large amounts of sediment and freshwater into the marine environment, thereby limiting coral growth and distribution. The Orinoco River Delta, as seen in

Figure 4, extends for approximately 400 km from the Gulf of Paria to the Boca Grande along the Atlantic Ocean and achieves peak flow in July. As shown in Figure 5, Trinidad is closer to and thus more susceptible to the influence, with reefs limited to the North-east (Salybia, Toco and Rampanalgas) and to a few patch reefs in the northwest (Chacachacare, Huevos and Monos Islands and Macqueripe). Tobago, which is further from the influence of the Orinoco and thus has more stable conditions (sediment load, nutrients, salinity), has approximately 19 reef areas as indicated in Figure 6 on page 3.



**FIG. 5: REEF DISTRIBUTION IN TRINIDAD (BASE MAP © D-MAPS.COM)**



1	Buccoo Reef	8	Sister's Rocks & Brothers Rocks	13	Richmond Island
2	Mt. Irvine Reef & Rocky Pt.	9	Corovo Pt., Man O' War Bay, Gardner Rock, Booby Island & Pirate's Bay	14	Goldsborough
3	Amnos Vale & Plymouth	10	Iguana Bay, St. Giles Island, Melville Island, Sail Rock & Marble Island	15	Smith's Island, Granby
4	Culloden	11	Angel's Reef, Bateaux Bay, Goat Island & Little Tobago	16	Hillsborough Bay & Minister's Point
5	Castara	12	Carapuse Bay, Queens Bay, Queens Bay & Prince Bay	17	Bacolet Bay
6	Englishman's Bay			18	Little Rockly Bay
7	Parlatuvier & Bloody Bay			19	Canoe Bay, Petit Trou Lagoon & the Cove

FIG 6: REEF DISTRIBUTION IN TOBAGO & TABLE 2: NAMED REEF AREAS IN TOBAGO (BASE MAP © D-MAPS.COM)

**GLOBAL STATUS:** As seen in Figure 7, we are in the Northern hemisphere's Coral Bleaching Season and heat stress exists primarily north of the equator. There are 6 areas of **ALERT LEVEL (1 OR 2)** evident in the Global Bleaching Alert Status Map: 1. The Mediterranean Sea & the Black Sea (north and south of Turkey); 2. The Bay of Bengal near Bangladesh; 3. The Yellow Sea, the East China Sea and the Western Pacific Ocean (China, North Korea, South Korea, Japan & Taiwan); 4. The Pacific Ocean (near Mexico); 5. North Atlantic (east of the United States of America) and 6. The Equatorial Atlantic at the Amazonian River Mouth.

The **GLOBAL OUTLOOK** predicts an increase in heat stress within the Northern hemisphere over the next 3 months. Conditions are expected

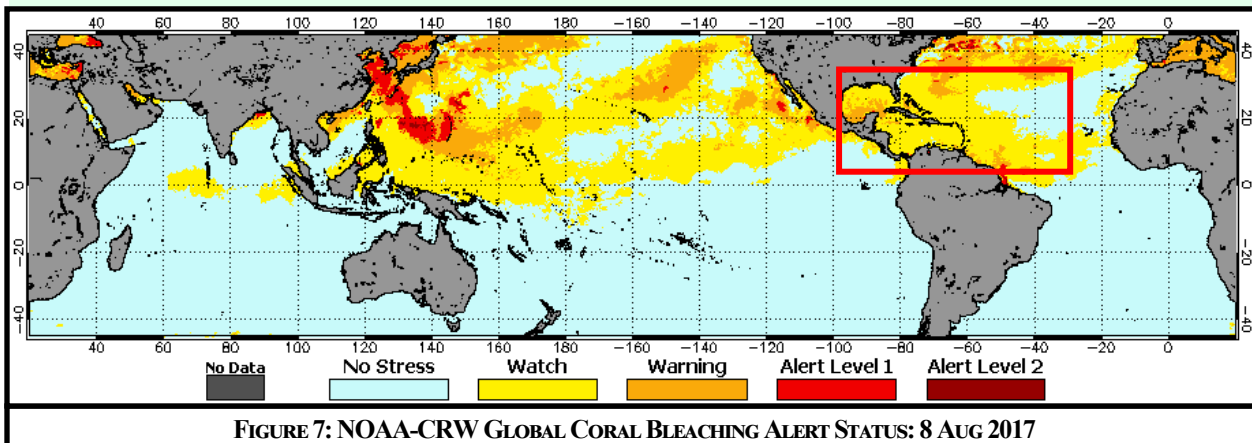


FIGURE 7: NOAA-CRW GLOBAL CORAL BLEACHING ALERT STATUS: 8 AUG 2017

to reach **BLEACHING ALERT LEVEL** Status in the Caribbean Sea and the North Atlantic Ocean, and in the Pacific Ocean, particularly the central region and along Mexico.

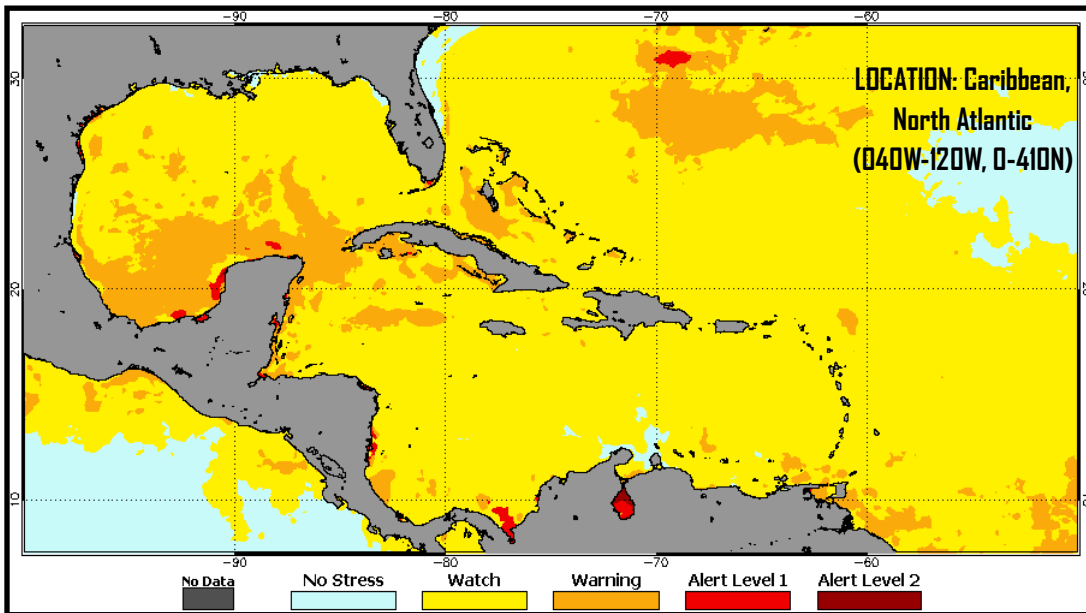


FIGURE 8: NOAA-CRW CARIBBEAN CORAL BLEACHING ALERT STATUS: 7 AUG 2017

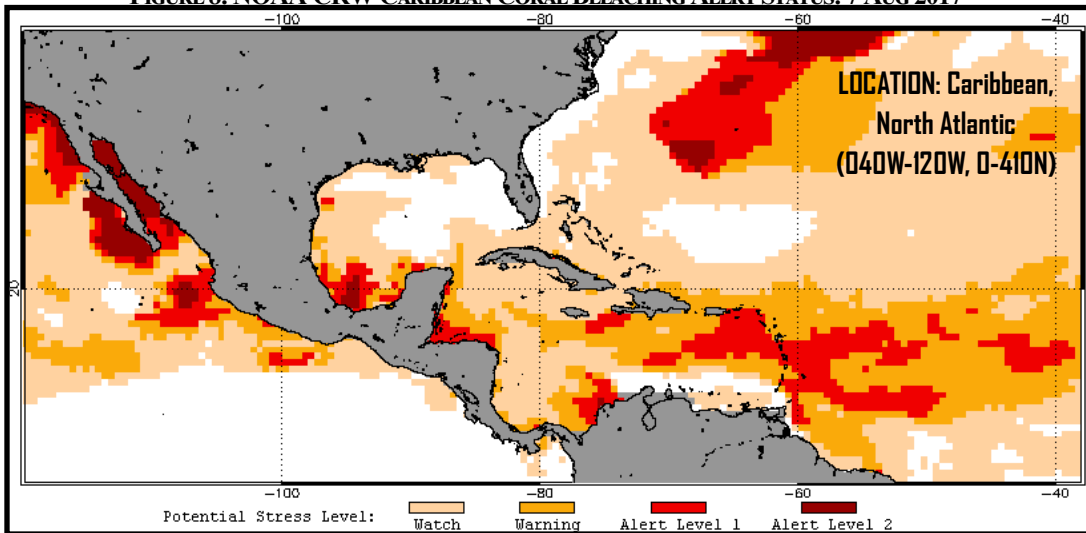


FIGURE 9: NOAA-CRW 90% CARIBBEAN BLEACHING ALERT AREA SEP-NOV 2017 OUTLOOK 8 AUG 2017

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 (CIMH) FOR THEIR CONTINUED SUPPORT AND GUIDANCE TOWARDS THE ADVANCEMENT OF ATMOSPHERIC AND HYDROLOGICAL SCIENCES.

**REGIONAL STATUS:**

All of the Caribbean Basin is under **CORAL BLEACHING WATCH** and, as already discussed, Trinidad and Tobago is under **BLEACHING WARNING/WATCH**. However, areas of higher risk (**BLEACHING ALERT 1/2**) exist in the following areas: The Gulf of Mexico along the Yucatan Peninsula and at the Columbia-Panama Border. (**ALERT LEVEL** Stress also exists in Lake Maracaibo and Northeast of Bermuda.) Large areas of **WARNING LEVEL STRESS** exist within the Gulf of Mexico, surrounding Jamaica and the Bahamas, and around Trinidad and Tobago.

**REGIONAL OUTLOOK:**

Heat stress is expected to continue accumulating, raising the region's threat level from **Watch** to **WARNING**. For some areas, including the majority of the Windward Islands, Belize, Honduras, Haiti and Columbia; the threat will raise to **ALERT LEVEL 1**. Mexico is expected to reach **ALERT LEVEL 2**.

- Next Issue: 2017-Sep
- T&T Bleaching Status & Outlook
- Index Summary
- Recap: Last Issue
- Major Reefs in T&T
- Reef Heat Resistance
- Global Status & Outlook
- Regional Status & Outlook

**RESOURCES:**

1. Alemu I, J. B., & Clement, Y. (2017). Mass Coral Bleaching in 2010 in the Southern Caribbean. *PLoS ONE*. doi:10.1371/journal.pone.0083829
2. Laydoo, R. (1991). *A Guide to the Coral Reefs of Tobago*. Port of Spain: Institute of Marine Affairs and the Asa Wright Nature Centre.
3. Mallela, J., Parkinson, R., & Day, O. (2010). An Assessment of Coral Reefs in Tobago. *Caribbean Journal of Science*, 46(1), 83-87.
4. NOAA-CRW. (2013, updated daily). *5-km Satellite Coral Bleaching Heat Stress Alert Area Product*. Retrieved 08 09, 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)
5. NOAA-CRW. (2013, updated daily). *Trinidad and Tobago 5-km Bleaching Heat Stress Gauges*. Retrieved 08 09, 2017, from NOAA Coral Reef Watch: [https://coralreefwatch.noaa.gov/vs/gauges/trinidad\\_tobago.php](https://coralreefwatch.noaa.gov/vs/gauges/trinidad_tobago.php)
6. Spalding, M. D. (2004). *A Guide to the Coral Reefs of the Caribbean*. Berkley, USA: University of California Press.

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