

Status of Bleaching Heat Stress on the Great Barrier Reef, Australia – 2020

Update: March 4, 2020

By: Dr. William Skirving (NOAA Coral Reef Watch Senior Scientist)

All indications at this stage suggest that the vast majority of coral reefs along the Great Barrier Reef (GBR) in Australia have some bleaching. Bleaching reports that NOAA Coral Reef Watch (CRW) has received align well with our [daily global 5km satellite coral bleaching Degree Heating Week \(DHW\) product](#). These confirm we are in the early stages of a widespread bleaching event, but one that is relatively mild as compared with the [intense events of 2016 and 2017](#).

Ex-Tropical Cyclone (TC) Esther is currently not providing much cloud protection to the GBR, although the southern GBR and Capricorn Bunker group are probably under cloud (Figure 1).

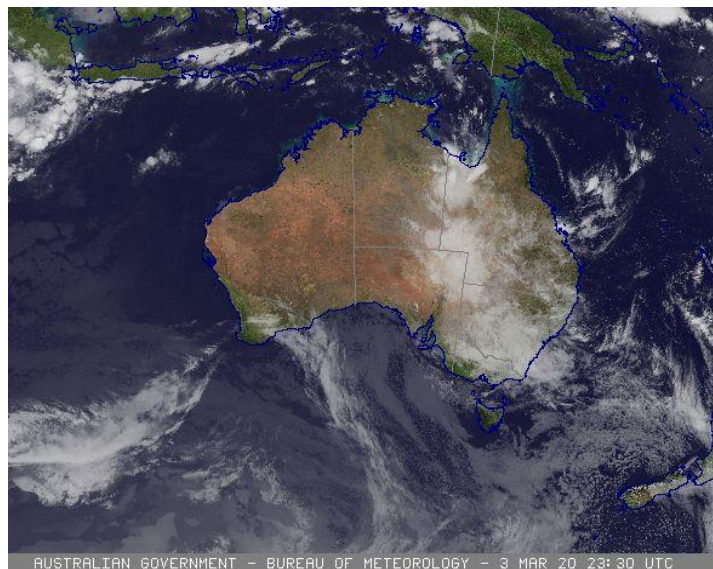


Figure 1. [Himawari-8 visible image](#) taken at 9:30am local time on March 4, 2020. Image courtesy of the Australian Bureau of Meteorology (BoM).

Figure 2 suggests that cloud cover should become more extensive over the southern regions of the GBR, but this respite is likely to be short lived. The troughs left behind after the passage of ex-TC Esther may provide sufficient atmospheric instability to help the formation of cloud over the southern regions of the reef.

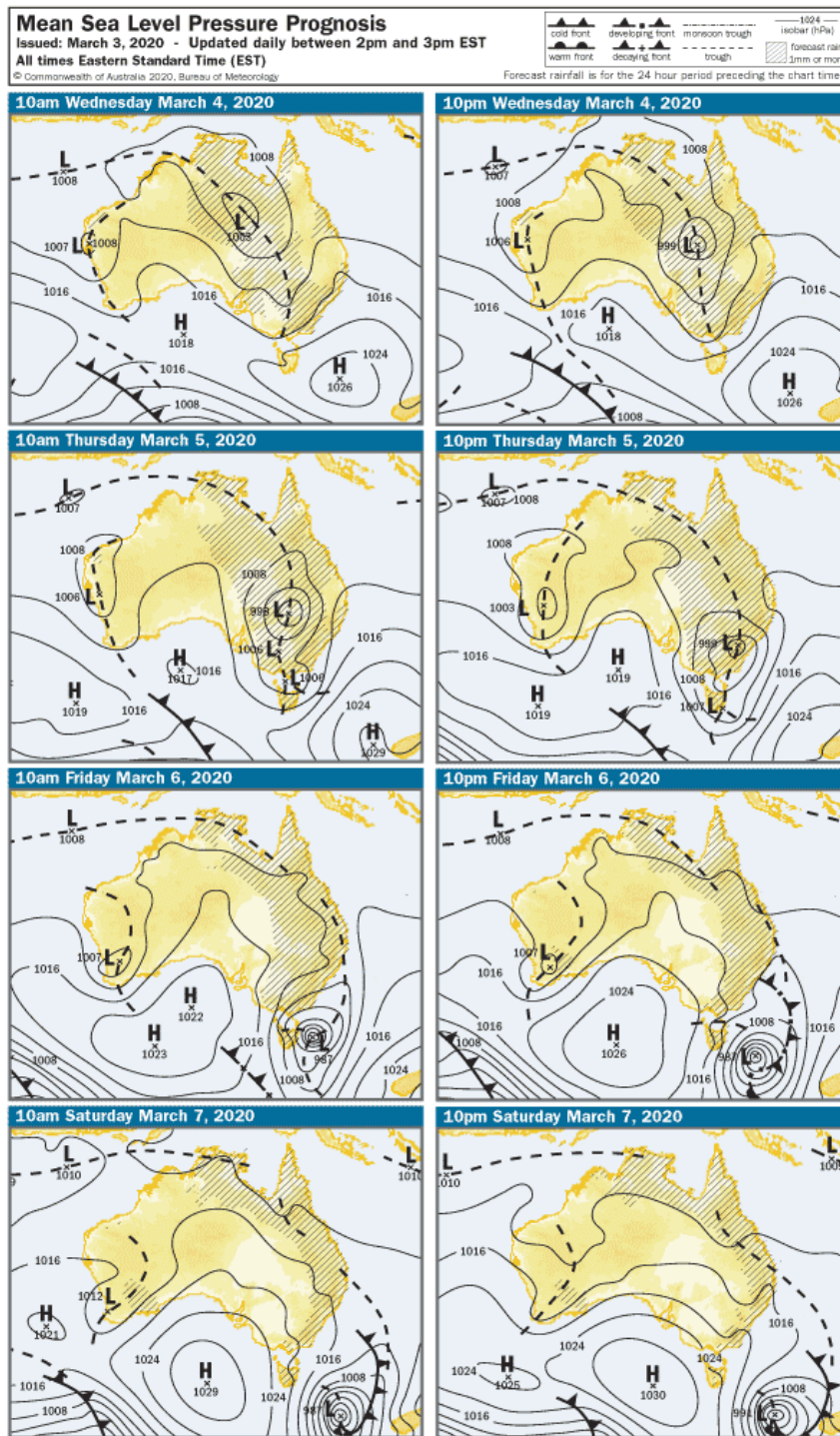


Figure 2. [Surface pressure charts](#) (courtesy of the Australian BoM) covering forecasts from March 4-7, 2020.

NOAA CRW's modeled [Four-Month Coral Bleaching Outlook](#) (Figure 3) predicts fewer clouds over the next few weeks, potentially bringing a stable atmosphere as a result of the high pressure systems in the Great Australian Bight.

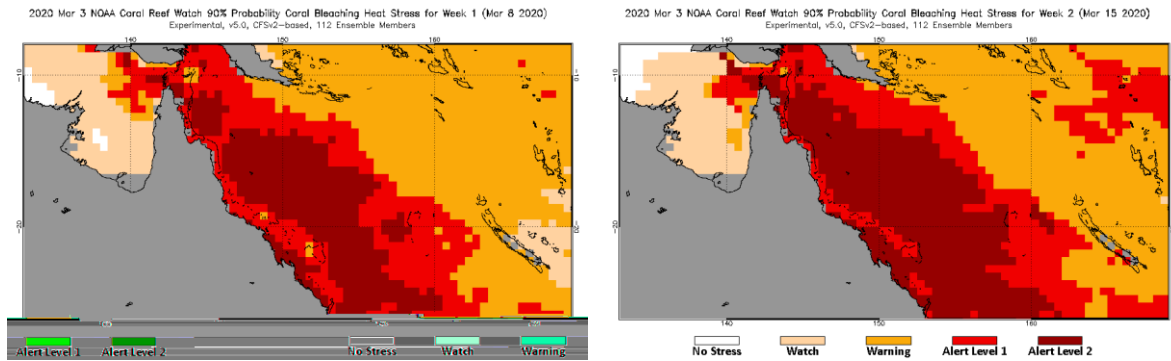


Figure 3. NOAA Coral Reef Watch’s [Four Month Coral Bleaching Outlook](#), issued March 3, 2020, for the weeks beginning March 8 (left) and March 15, 2020 (right). The maps indicate high heat stress (Bleaching Alert Level 1 [bright red; associated with significant coral bleaching] and Level 2 [brown/dark red; associated with severe, widespread bleaching and significant mortality]) are predicted along the GBR by 90% of the model’s ensemble members.

Note that the forecast sea surface temperatures (SSTs), upon which the modeled Outlook (Figure 3) is based, are derived in the absence of a knowledge of tides – which mix warmer waters with cooler waters at depth, manifesting as cooler surface waters. Figure 4 is a graph of the tidal range at Townsville, Australia. It can be used as a proxy for relative tidal mixing strength along the GBR. Note that by next week, tidal mixing will begin to be much stronger than it has been over the past week. This mechanism will help significant sections of the GBR resist heat stress from the significant amounts of solar radiation that are predicted over the next few weeks.

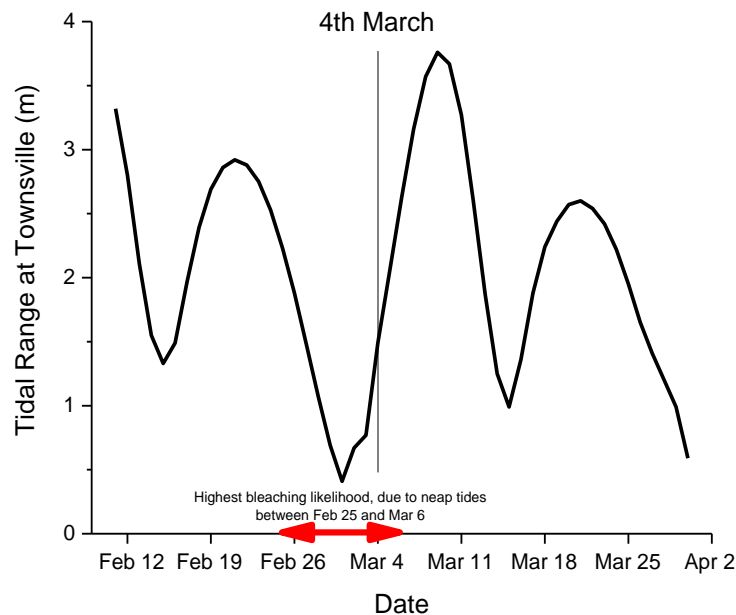


Figure 4. Plot of Townsville, Australia tidal range for February 11 to March 30, 2020.

NOAA CRW’s latest [daily global 5km Coral Bleaching HotSpot](#) for the GBR (Figure 5) show that only some parts of the reef are currently accumulating heat stress. It is expected that this will change over the next few days.

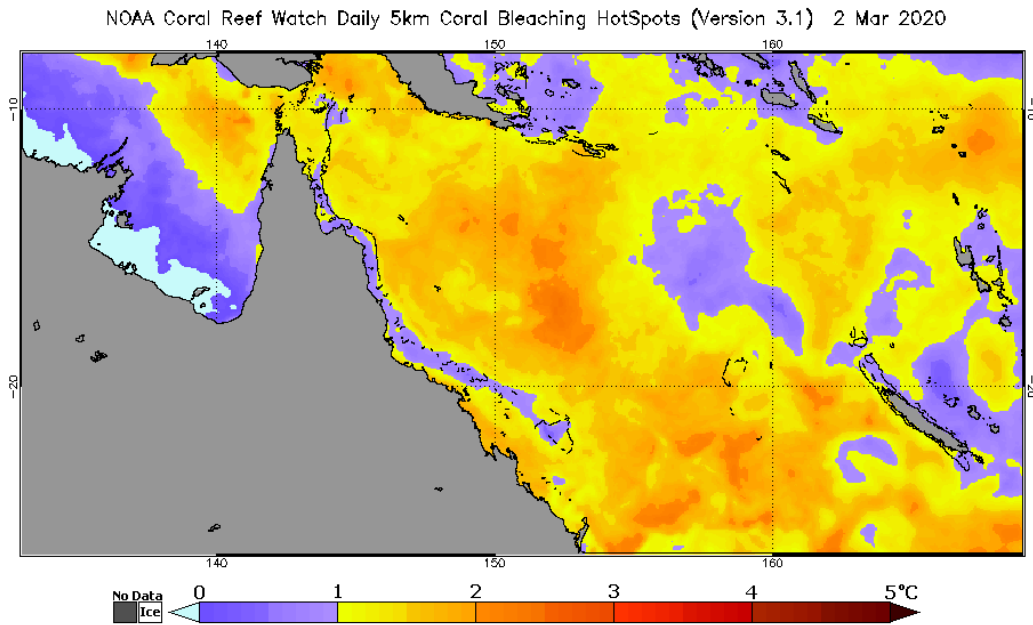


Figure 5. CRW's [daily global 5km Coral Bleaching HotSpot](#) product for the GBR. Heat stress capable of causing bleaching is indicated by the yellow and orange coloring in the image.

CRW's [daily global 5km coral bleaching DHW](#) for the GBR (Figure 6) indicates that most of the reef tract should have evidence of some bleaching, with only a few reefs having no bleaching. (These include outer reefs in the far northern GBR, inshore reefs north of Cairns, and some reefs in the northern part of Swains Island.) The most alarming aspect of this DHW image is that it shows the effect of returning heat stress accumulation in the far northern GBR.

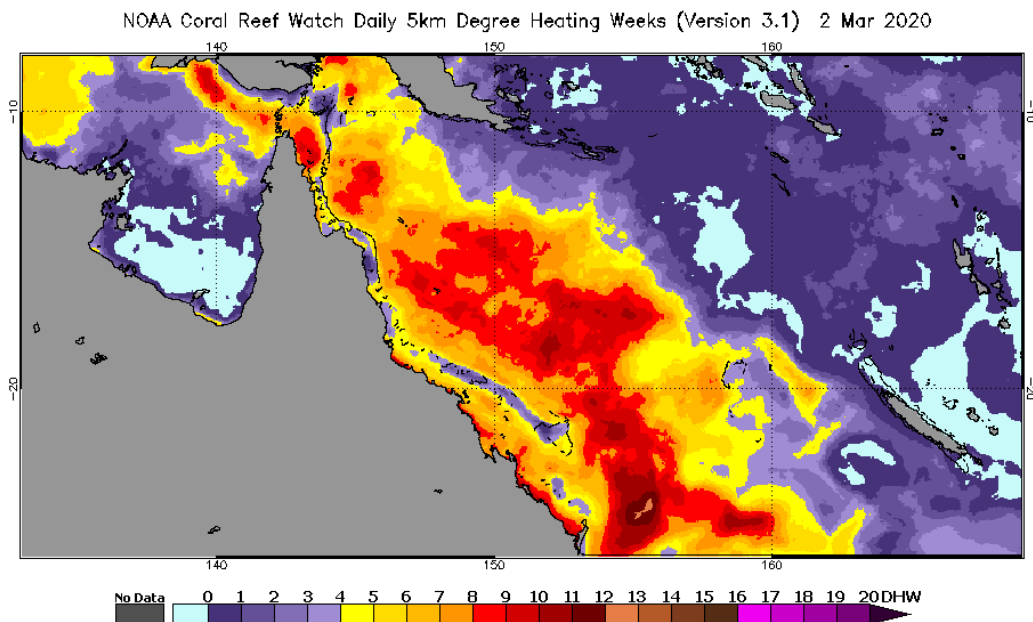


Figure 6. CRW's [daily global 5km satellite coral bleaching DHW](#) product for the GBR.

NOAA CRW's modeled [Four-Month Coral Bleaching Outlook](#) (Figure 7) indicates the probability of significant coral bleaching for the weeks starting on March 8 and 15. Predictions are in keeping with previous forecasts of this same time period, and if anything, have increased the probability of bleaching for the entire GBR. If these forecasts prove to be accurate,

persistent upwelling and tidal mixing will be needed to help some reefs avoid significant bleaching, and to ensure that bleaching along the rest of the GBR remains mild.

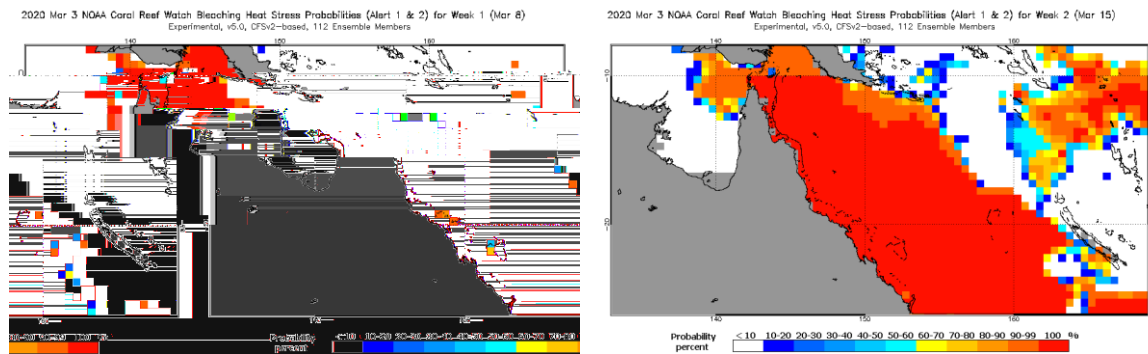


Figure 7. CRW's current [Four-Month Coral Bleaching Outlook](#), for the GBR region, displaying the probability, for the week beginning March 8 (left) and March 15, 2020 (right) that the bleaching heat stress level will reach or exceed Bleaching Alert Levels 1 (associated with significant bleaching) and 2 (associated with severe, widespread bleaching and significant mortality).