NOAA Coral Reef Watch

Seasonal Coral Bleaching Thermal Stress Outlook

(Experimental product, 2x2 degree spatial resolution)

Analysis of October 2010 Coral Bleaching Thermal Stress and Seasonal Guidance Through February 2011

[Note: The Bleaching Outlook discussed below is an experimental product and should be used as an indicator of potential general patterns rather than a precise predictor of thermal stress at any location. Actual conditions may vary due to model uncertainty, subsequent changes in climatic conditions, extreme localized variability, or weather patterns.]

SUMMARY:

The Coral Reef Watch (CRW) satellite coral bleaching product suite shows that sea surface temperatures (SSTs) remain above normal throughout the southern Caribbean. Large areas of the southern and eastern Caribbean Sea continue to experience thermal stress capable of causing coral bleaching, but the stress has ended in the Gulf of Mexico, Bahamas, and northwestern Caribbean, is much reduced in the northern Caribbean, and is lessening along the southern Caribbean (Figure 2). The CRW Coral Bleaching Thermal Stress Outlook (Figure 1) indicates that thermal stress could continue in the southern and eastern Caribbean into November.

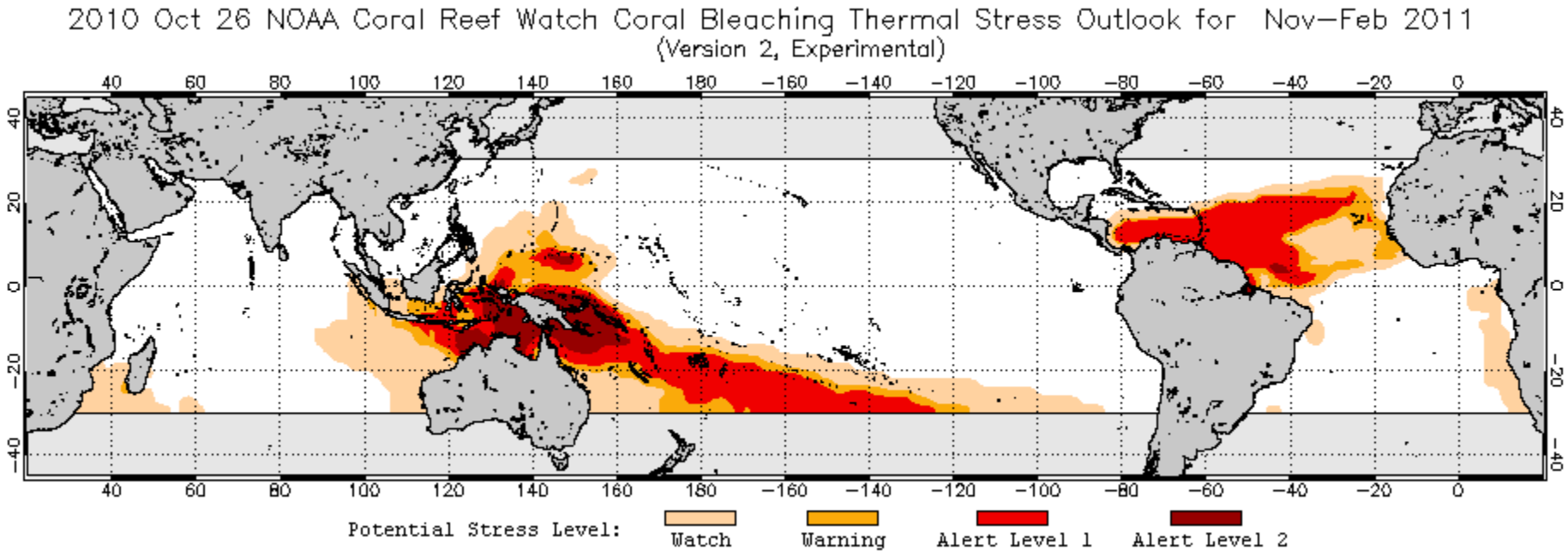

Figure 1. Global Coral Bleaching Thermal Stress Outlook for November 2010-February 2011, issued on October 26, 2010.

According to the CRW satellite monitoring (Figure 2), most of the earlier thermal stress influencing coral reefs in the northwestern Pacific has abated. Some areas around the Coral Triangle and the northern Arabian Sea are in a Bleaching Watch status. The outlook (Figure 1) shows that thermal stress around Palau and the Federated States of Micronesia may intensify slightly during the next 1-2 months, shifting southward to New Guinea, then into eastern Indonesia and northern Australia. There is also a chance for future low-level stress across to New Caledonia and Fiji but it remains unclear how strong this warming will become during the Austral summer.

Most of the Indian Ocean basin is expected to remain free from significant bleaching thermal stress through February 2011 (Figure 1).

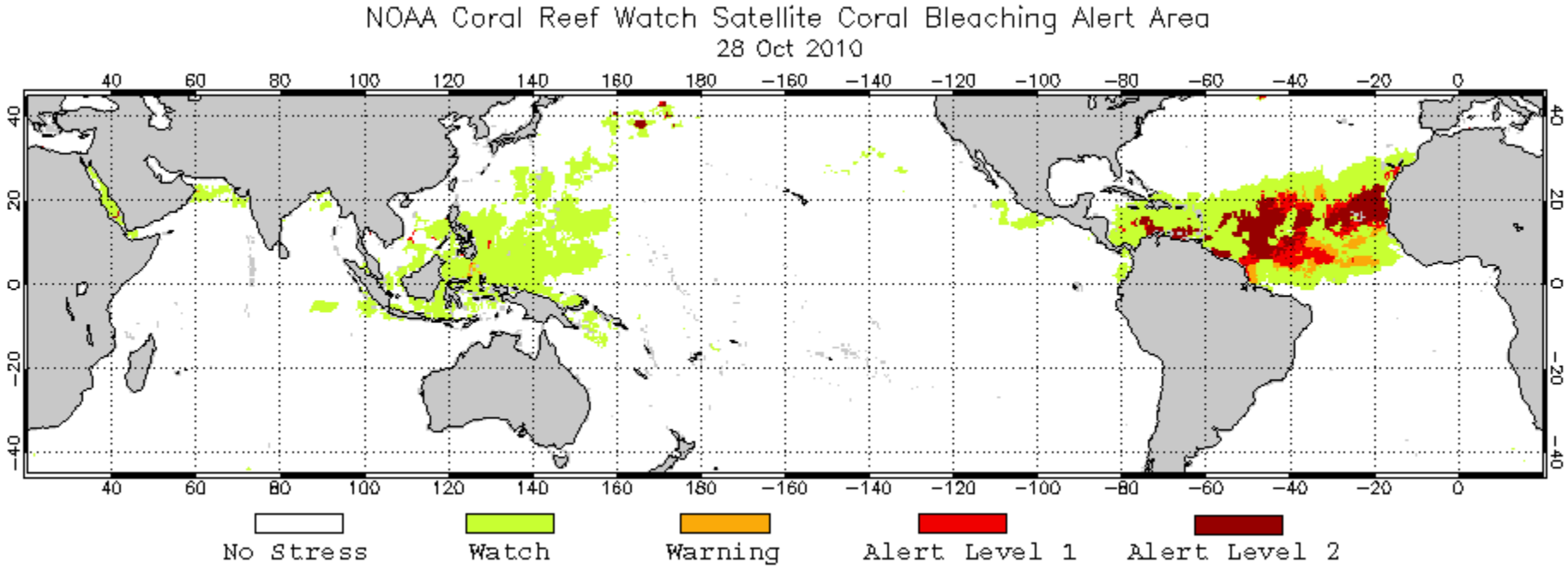

Figure 2. Global Coral Bleaching Thermal Stress Alert Area of October 28, 2010.

Analysis and Outlook for the Caribbean, Gulf of Mexico and Bahamas

Current conditions:

The CRW satellite monitoring shows that thermal stress has continued to develop in the southeastern Caribbean since July (Figure 3), centered somewhat south of the stress observed at the same time period in 2005 (Figure 4), the year of a record mass coral bleaching event. The highest thermal stress currently spans the southern Lesser Antilles, from Barbados to Tobago and westward across the southern Caribbean basin to the north of Venezuela. Many coral reef areas in this region have experienced accumulated bleaching thermal stress exceeding 10 Degree Heating Weeks that usually lead to mass coral bleaching. Observed bleaching throughout this region has ranged from mild to severe; we have received bleaching reports from Panama, Guadeloupe, St. Lucia, Curacao, and Bonaire, and there is concern that bleaching off Venezuela may be worse than 2005. Fortunately, there is now some sign of cooling in this area and around the northern Caribbean.

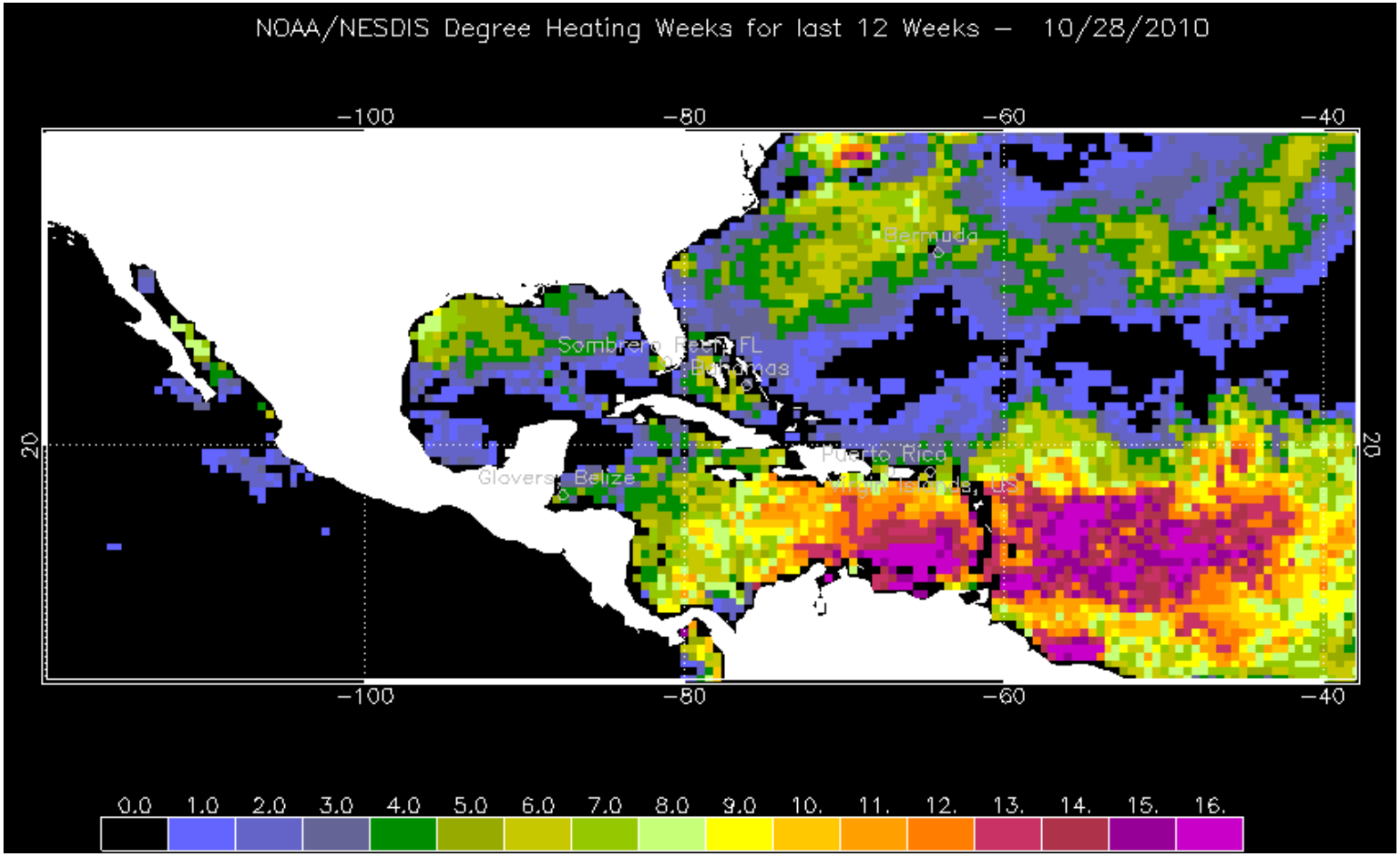

Figure 3. Degree Heating Weeks as of October 28, 2010, in the Caribbean region.

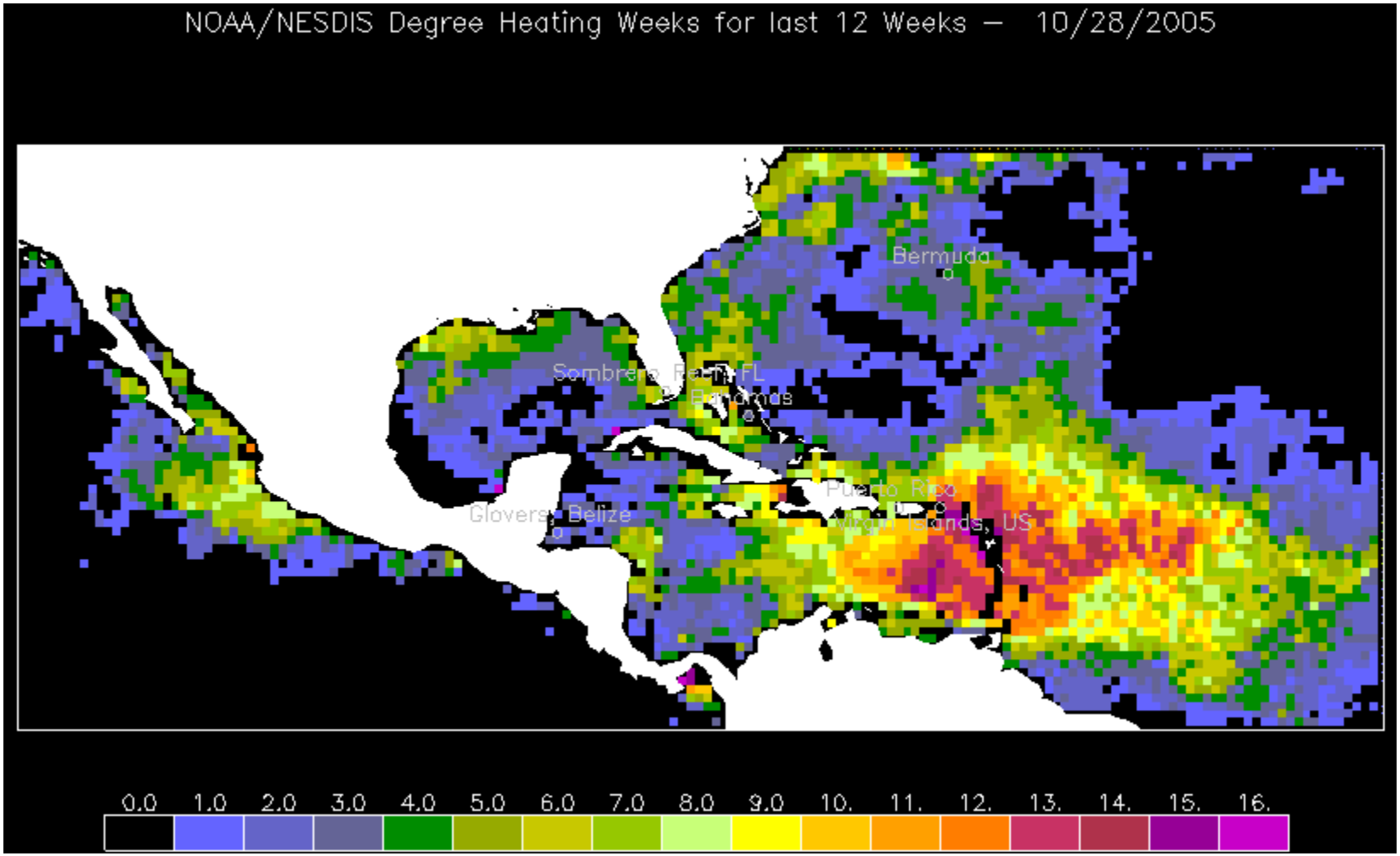

Figure 4. Degree Heating Weeks as of October 28, 2005, in the Caribbean region.

The earlier low-level stress has ended in the Gulf of Mexico, Bahamas, Florida, and the Greater Antilles. Although remaining at relatively high thermal stress levels, SST has started to decrease throughout the Lesser Antilles as well. However, thermal stress still continues to accumulate in the southern Caribbean as seen in the time series graph from Los Roques, Venezuela (Figure 5).

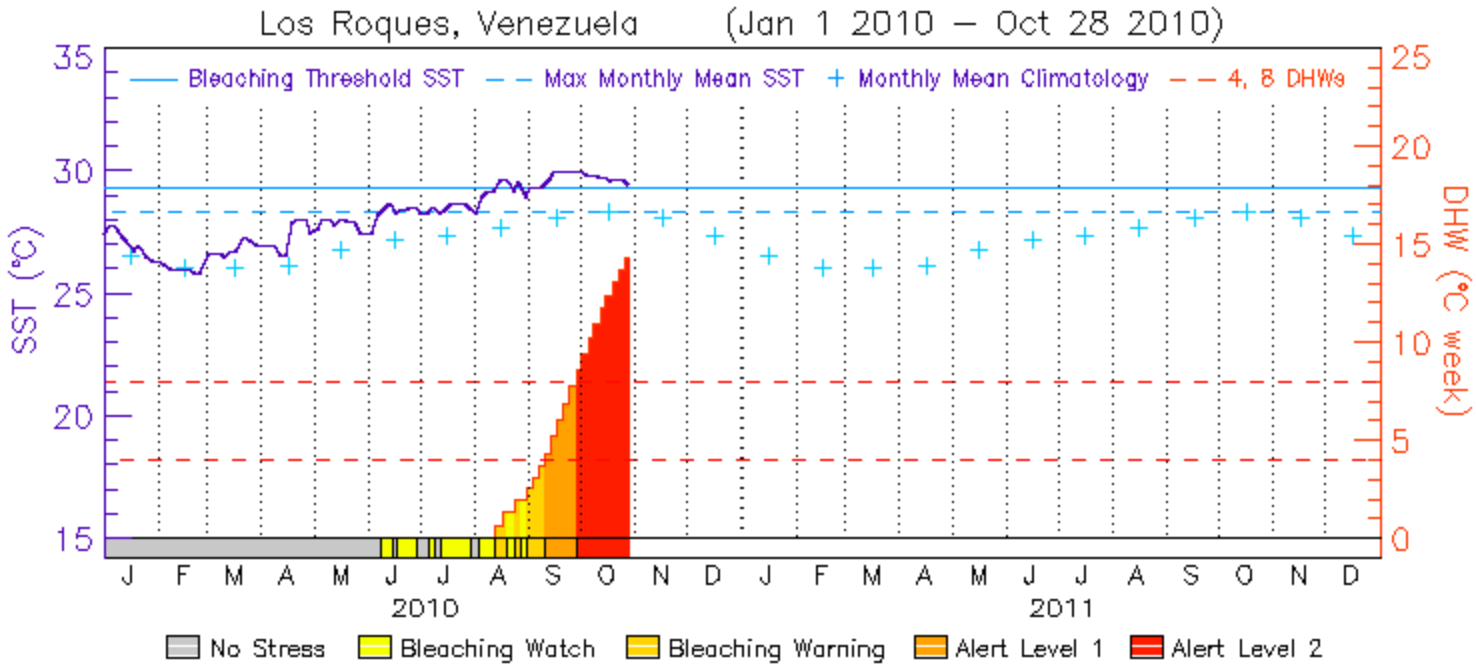

Figure 5. Year-to-date time series of sea surface temperature (blue line) and Degree Heating Weeks (red line) as of October 28, 2010 for the Virtual Station at Los Roques, Venezuela.

Bleaching outlook:

The CRW Coral Bleaching Thermal Stress Outlook shows that we are nearing the end of thermal stress capable of causing significant coral bleaching in the southern Caribbean in 2010 (Figure 6). The region potentially at greatest risk is along the Caribbean coast of South America to the southern Lesser Antilles. Although the seasonal outlook maps (Figure 1 and 6) show reduced potential stress levels for the Caribbean region, weekly outlook maps indicate that the intensity of the thermal stress may persist for several more weeks, before quickly dissipating by mid-November.

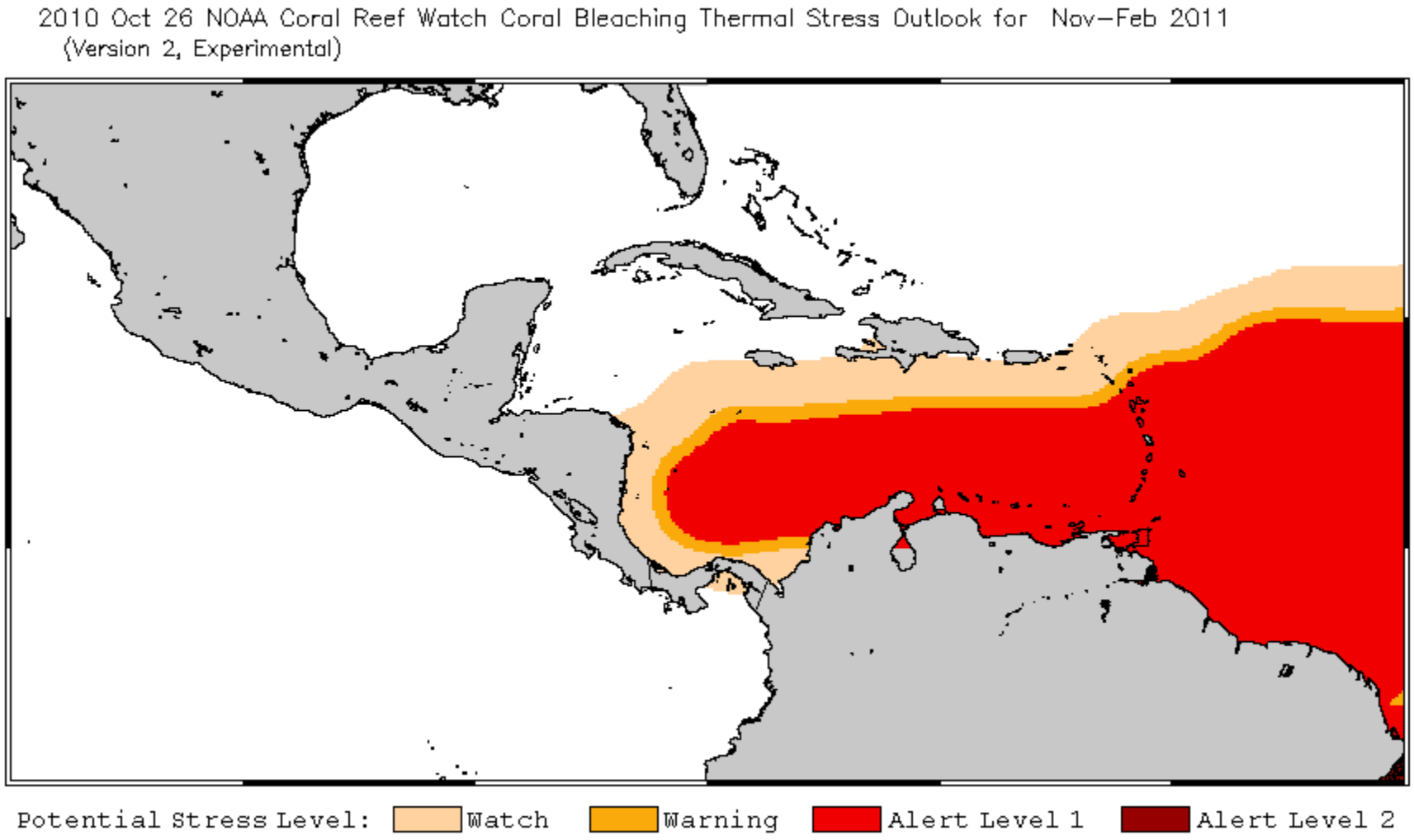

Figure 6. Caribbean Coral Bleaching Thermal Stress Outlook for November 2010-February 2011, issued on October 26, 2010.

Analysis and Outlook for the Western Pacific:

Current conditions:

Temperatures across much of the western tropical Pacific remain above normal. Some thermal stress did accumulate in the Northwestern Hawaiian Islands, but temperatures have since started to decrease. We received a report that the thermal stress did cause some mild bleaching in the northwestern Hawaiian Islands, consistent with the CRW Seasonal Outlook and satellite monitoring, but the stress has now dissipated. There is currently a bleaching watch for a large area from Guam across the Coral Triangle to the northern Arabian Sea (Figure 7).

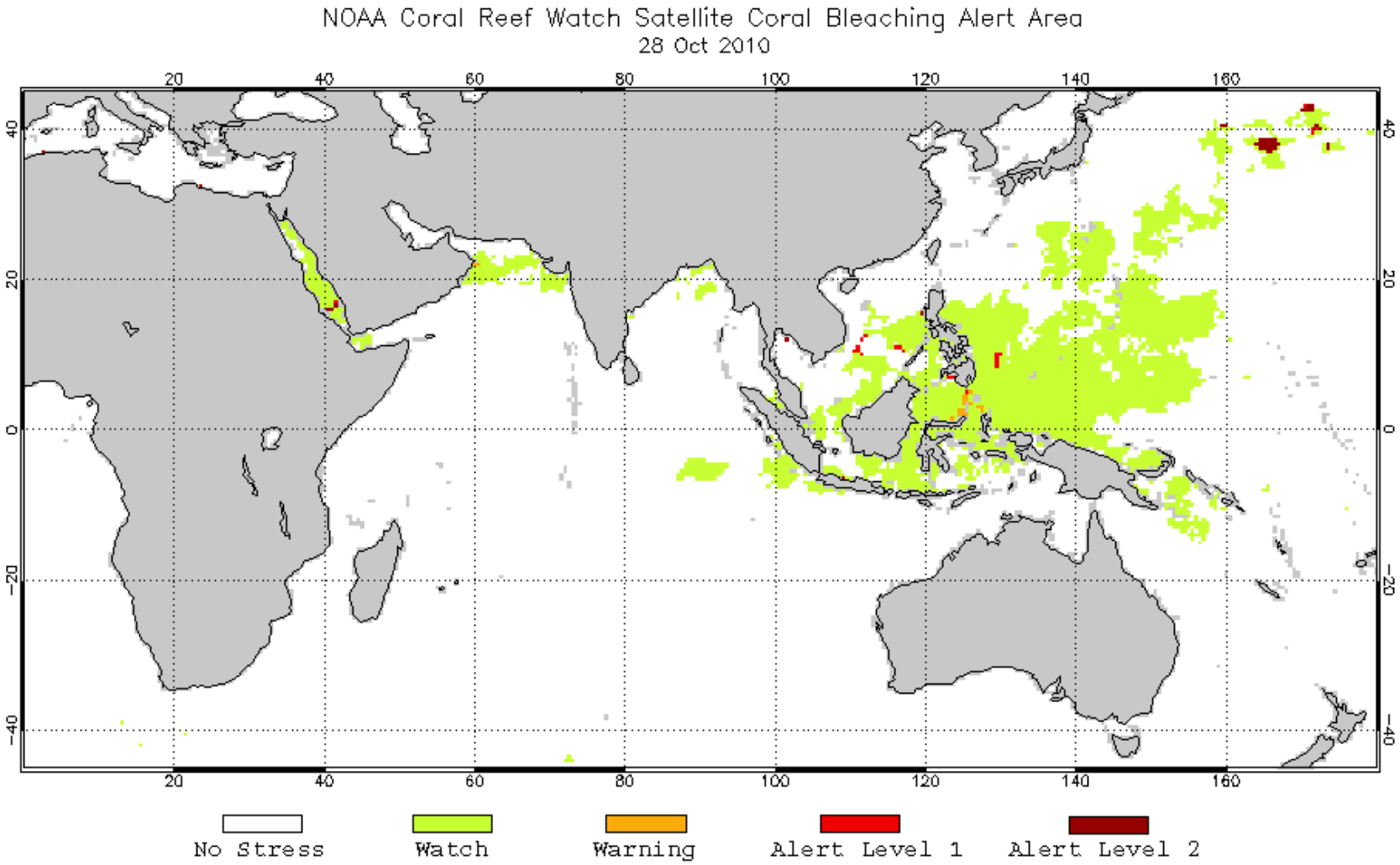

Figure 7. Eastern Hemisphere satellite coral bleaching alert areas of October 28, 2010.

Bleaching outlook:

As the summer comes to an end in the northern hemisphere, our outlook (Figure 8) shows that the potential for thermal stress in the northwestern Pacific has ended. The outlook continues to indicate is a potential for high thermal stress capable of causing bleaching in the region centered to the south of Guam and extended to Palau and New Guinea, including much of the Federated States of Micronesia (FSM). Potential high thermal stress may later build in eastern Indonesia and the north coast of Australia. Looking further ahead, by January and February there is a chance for stress to build through the Great Barrier Reef, and across to New Caledonia and Fiji. However, please note that it remains unclear how strong this warming will become during the Austral summer. For updates on Australia, be sure to check CSIRO's ReefTemp and BOM's POAMA model, in addition to the Coral Reef Watch Seasonal Bleaching Outlook.

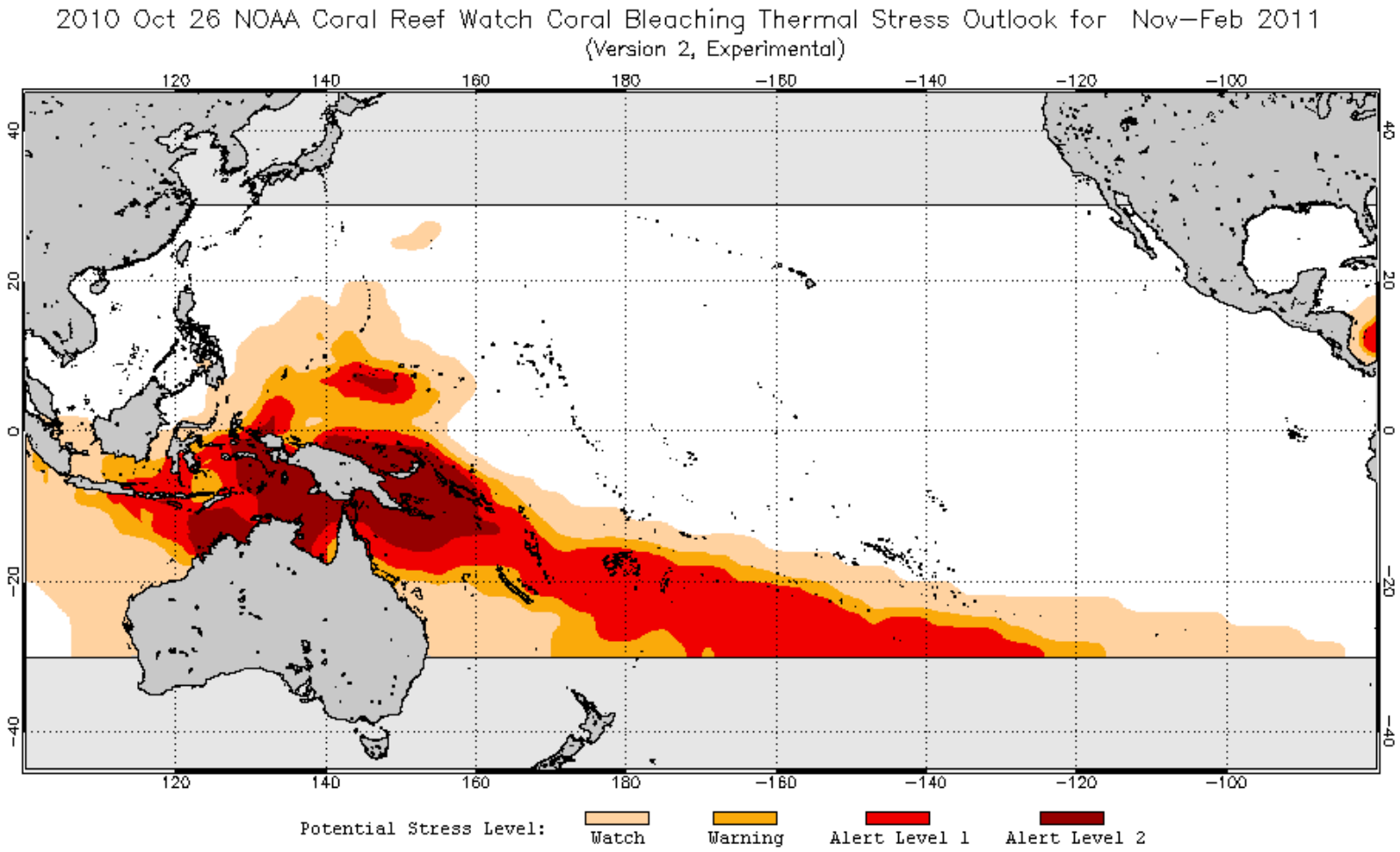

Figure 8. Pacific Ocean Coral Bleaching Thermal Stress Outlook for October 2010- January 2011, issued on October 26, 2010.