USING CORALWATCH DATA TO IDENTIFY BLEACHING EVENTS – DATA VALIDATION

CoralWatch was established 2002, with the first data collection being available from 2003. The primary tool for measuring coral bleaching is The Coral Health Chart. This chart was developed based on the colour changes exhibited by corals during controlled bleaching laboratory experiments (Siebeck et al 2006).

We aimed to quantify the validity of the Coral Health Chart by examining how well it identified well-established coral bleaching events worldwide.

Identifying well-described bleaching events

Bleaching events that occurred during the period 2003-2012 were identified using searches of the scientific literature and other media. Bleaching events were selected for validation analysis if they fulfilled the following criteria:

1. Bleaching event was described by more than one information source, including at least one peer-reviewed source.
2. Existing information permitted identifying start dates and duration of the bleaching event.
3. CoralWatch data was available in the same region for the period of the bleaching event, and for the equivalent months in the calendar year prior to the bleaching event.

Based on these criteria, the following bleaching events were selected for analysis: Caribbean 2005; Heron Island, The Great Barrier Reef 2006; Gulf of Thailand 2010; West Thailand 2010; and Persian Gulf 2010

Validation analysis

Quantifying accuracy of single surveys using ROC (receiver operating characteristics) curve analysis

ROC curves provide a way to quantify the accuracy of tests, where the outcome is either present or absent (such as a bleaching event). In particular, this analysis looks at different data cut-offs to identify bleaching events, and indicates the percentage of surveys that correctly identify a bleaching event (*sensitivity*) and what percentage of surveys correctly classified as non-bleaching events (*specificity*).

Using individual CoralWatch surveys as the units of analysis, we looked at whether the data indicated there was a bleaching event, and compared this to whether there actually was a bleaching event in the time and area that the survey was conducted.

Our findings indicate that, using the most optimal cut-off, a single CoralWatch survey that meets the 'potential bleaching threshold' has a 72% chance of indicating that a bleaching event is taking place. A single CoralWatch survey that indicates 'no bleaching risk detected' has 77% chance of representing a reef that is not experiencing a bleaching event.

How to interpret these findings and the CoralWatch *'potential bleaching risk'* data?

A single CoralWatch survey, in the absence of any other information, cannot tell us whether a bleaching event is occurring with complete accuracy.

If a single survey does meet the 'potential bleaching threshold' – this means that there is a higher than average chance that a bleaching event is occurring. If there are multiple surveys from the same area or region that indicate bleaching risk, this indicates that there is much higher chance of bleaching occurring in this area.

If CoralWatch surveys indicate potential bleaching risk, this provides the opportunity for you, or reef managers in the area, to visit the site and monitor more thoroughly for potential bleaching and other impacts.