



**Australian Government**

**Department of the Environment, Water, Heritage and the Arts**

**Marine and Tropical Sciences Research Facility (MTSRF)  
METADATA: Inshore GBR data sets**

**Project 2.5i.4 Tools to support resilience-based management in the face of climate change**

**Project Leader: Dr Scott Wooldridge, Australian Institute of Marine Science.**

## **Summary**

### ***Thermal Regime (GBR)***

#### **1. *Thermal\_regime.shp***

This data set describes the thermal characteristics of the Great Barrier Reef. To achieve this, a standardized principal component analysis (Eastman and Fulk 1993) was undertaken from composite maximum summertime SST images that were derived from monthly SST averages (n.b. the abnormally hot year of 1998 was excluded from the analysis). The zones can be interpreted as the characteristic summertime maximum SST pattern over the Great Barrier Reef for the period 1990-2000.

#### ***Data Reference:***

Wooldridge SA, Done T (2004) Learning to predict large-scale coral bleaching from past events: A Bayesian approach using remotely sensed data, in-situ data, and environmental proxies. *Coral Reefs* 23:96-108

#### **2. *Max\_temp1998.grd***

Following suggestions from Berkelmans et al. (2004) and using 1km<sup>2</sup> SST estimates as derived from advanced very high resolution radiometer (AVHRR) sensors aboard the NOAA16 satellite, this data set provides a proxy heat stress indicator for each 1km<sup>2</sup> pixel based on the highest accumulated SST total for any three-day run of summer SST (1998). This indicator displays the spatial variation of the 3-day heat stress indicator for the survey region. Satellite imagery prepared by Mike Mahoney, AIMS.

#### ***Data Reference:***

R Berkelmans, G De'ath, S Kininmonth, WJ Skirving (2004) A comparison of the 1998 and 2002 coral bleaching events on the Great Barrier Reef: spatial correlation, patterns, and predictions. *Coral Reefs* 23:74-83

### **3. *Max\_temp2002.grd***

Following suggestions from Berkelmans et al. (2004) and using 1km<sup>2</sup> SST estimates as derived from advanced very high resolution radiometer (AVHRR) sensors aboard the NOAA16 satellite, this data set provides a proxy heat stress indicator for each 1km<sup>2</sup> pixel based on the highest accumulated SST total for any three-day run of summer SST (2002). This indicator displays the spatial variation of the 3-day heat stress indicator for the survey region. Satellite imagery prepared by Mike Mahoney, AIMS.

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### ***Water Quality Regime (GBR)***

#### **1. *exceed\_chla\_06.shp***

This data set describes the annual exceedence probability for the chlorophyll a (chl a) concentration being  $>0.6\mu\text{gL}^{-1}$  for all location within the central-northern GBR lagoon. The data set is based on a geographically weighted regression analysis (Wooldridge et al. 2006) that synthesizes in situ chl a measurements with historical flood plume extent data (King et al. 2002).

#### ***Data Reference:***

King B, McAllister F, Done T (2002) Modelling the impact of the Burdekin, Herbert, Tully and Johnstone River plumes on the Central GBR. Technical Report 53, CRC Research Centre

Wooldridge SA, Brodie J, Furnas M (2006) Exposure of inner-shelf reefs to nutrient enriched runoff entering the Great Barrier Reef: Post-European changes and the design of water quality targets. *Marine Pollution Bulletin* 52:1467-1479

### ***Species Richness (inshore GBR)***

#### **1. *swim\_survey.shp***

This data set describes surveys of coral community structure, composition and diversity were carried out at nearshore reefs of the Great Barrier Reef, Australia. 466 sites on 96 reefs between Mackay and Cooktown (latitude 14-21 degrees South) were surveyed between 1994 and 1997. The aim of the study was to characterise nearshore coral communities (to a depth of less than 20m) in this region. Hard corals were identified to species level and rated by relative abundance.

#### ***Data Reference:***

DeVantier, L.M., G. De'ath, T.J. Done and E. Turak. 1998. Ecological assessments of a complex natural system: a case study from the Great Barrier Reef. *Ecological Applications* 9: 480-496.

Devantier LM, De'ath G, Turak E, Done TJ, Fabricius KE (2006). Species richness and community structure of reef-building corals on the nearshore Great Barrier Reef. *Coral Reefs* 25:329-340

## ***Bleaching Impact (GBR)***

### ***1. Aerial\_survey1998.shp***

In response to the bleaching event of 1998 Dr. Ray Berkelmans (Great Barrier Reef Marine Park Authority) flew the entire length of the Great Barrier Reef observing over 600 reefs. This survey of bleaching provided a rapid and extensive assessment of the bleaching impact. The main observation was that the bleaching damage was not uniform but confined mainly to the coastal areas. This pattern would differ from the 2001/02 bleaching event where damage extended to the outer reefs.

#### **Data Reference:**

R Berkelmans, G De'ath, S Kininmonth, WJ Skirving (2004) A comparison of the 1998 and 2002 coral bleaching events on the Great Barrier Reef: spatial correlation, patterns, and predictions. *Coral Reefs* 23:74-83

### ***2. Aerial\_survey2002.shp***

In response to the bleaching event of 2001/02 Dr. Ray Berkelmans (Great Barrier Reef Marine Park Authority) flew the entire length of the Great Barrier Reef observing over 600 reefs. This survey of bleaching provided a rapid and extensive assessment of the bleaching impact. The main observation was that the bleaching damage was not uniform but confined to the coastal areas except in the Townsville region where bleaching extended to the outer reefs. This pattern differs from the 1998 bleaching event where damage was confined to the inner reefs.

#### Data Reference:

R Berkelmans, G De'ath, S Kininmonth, WJ Skirving (2004) A comparison of the 1998 and 2002 coral bleaching events on the Great Barrier Reef: spatial correlation, patterns, and predictions. *Coral Reefs* 23:74-83

### ***3. GBR\_survey1998.shp***

In response to the bleaching event of 1998 the Great Barrier Reef Marine Park Authority (GBRMPA) conducted field surveys to assess the bleaching impact and coral mortality for coral communities at 23 reefs within the central GBR. This data set describes differential mortality observed within different coral species and morphologies.

#### **Data Reference:**

[http://www.gbrmpa.gov.au/\\_\\_data/assets/pdf\\_file/13169/Coral\\_Bleaching\\_Response\\_Plan\\_2006-07\\_Final.pdf](http://www.gbrmpa.gov.au/__data/assets/pdf_file/13169/Coral_Bleaching_Response_Plan_2006-07_Final.pdf)

### ***4. GBR\_survey1998.shp***

In response to the bleaching event of 2001/02 the Great Barrier Reef Marine Park Authority (GBRMPA) conducted field surveys to assess the bleaching impact and coral mortality for coral communities at 15 reefs within the central GBR. This data set describes differential mortality observed within different coral species and morphologies.

#### **Data Reference:**

[http://www.gbrmpa.gov.au/\\_\\_data/assets/pdf\\_file/13169/Coral\\_Bleaching\\_Response\\_Plan\\_2006-07\\_Final.pdf](http://www.gbrmpa.gov.au/__data/assets/pdf_file/13169/Coral_Bleaching_Response_Plan_2006-07_Final.pdf)

## **5. *TNC\_survey.shp***

Following the 2002 bleaching event, a series of three field cruises were undertaken over a total of 30 days between June 25 and August 1. Financed by The Nature Conservancy ([www.tnc.org](http://www.tnc.org)), the surveys assessed the environmental setting, bleaching impact and coral mortality for coral communities from 150 sites at 50 locations on 32 reefs. The survey locations ranged from the southern to the central GBR (~1000 km), and from less than 1 km from the coast to >200 km out into the Coral Sea.

Each site was assigned a habitat class. For the mid and outer shelf reefs, four classes were identified; outer slope, lagoon, back-reef, or channel. For the inner, coastal reefs, a single 'fringing reef' class was used. Assessments involved a 20-30 minute survey, during which a taxonomic inventory was compiled of observed hard and soft corals, and a bleaching impact category noted for each taxon.

Indicators of bleaching and coral mortality were developed from the visual assessment data, and four 'community types' were developed using K-mean clustering (see Done et al. 2003 for details). Types 1, 2 and 3 were offshore (mid- and outer shelf) reefs, whereas Type 4 communities were coastal.

### **Data Reference:**

Done TJ, Turak EI, Wakeford M, Kininmonth S, Wooldridge S, Berkelmans R, van Oppen MJH and Mahoney M (2003) Testing bleaching resistance hypotheses for the 2002 Great Barrier Reef Bleaching Event. Report to TNC. Australian Institute of Marine Science. 95 p.

## ***Species Richness (inshore GBR)***

### **1. *swim\_survey.shp***

This data set describes surveys of coral community structure, composition and diversity were carried out at nearshore reefs of the Great Barrier Reef, Australia. 466 sites on 96 reefs between Mackay and Cooktown (latitude 14-21 degrees South) were surveyed between 1994 and 1997. The aim of the study was to characterise nearshore coral communities (to a depth of less than 20m) in this region. Hard corals were identified to species level and rated by relative abundance.

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