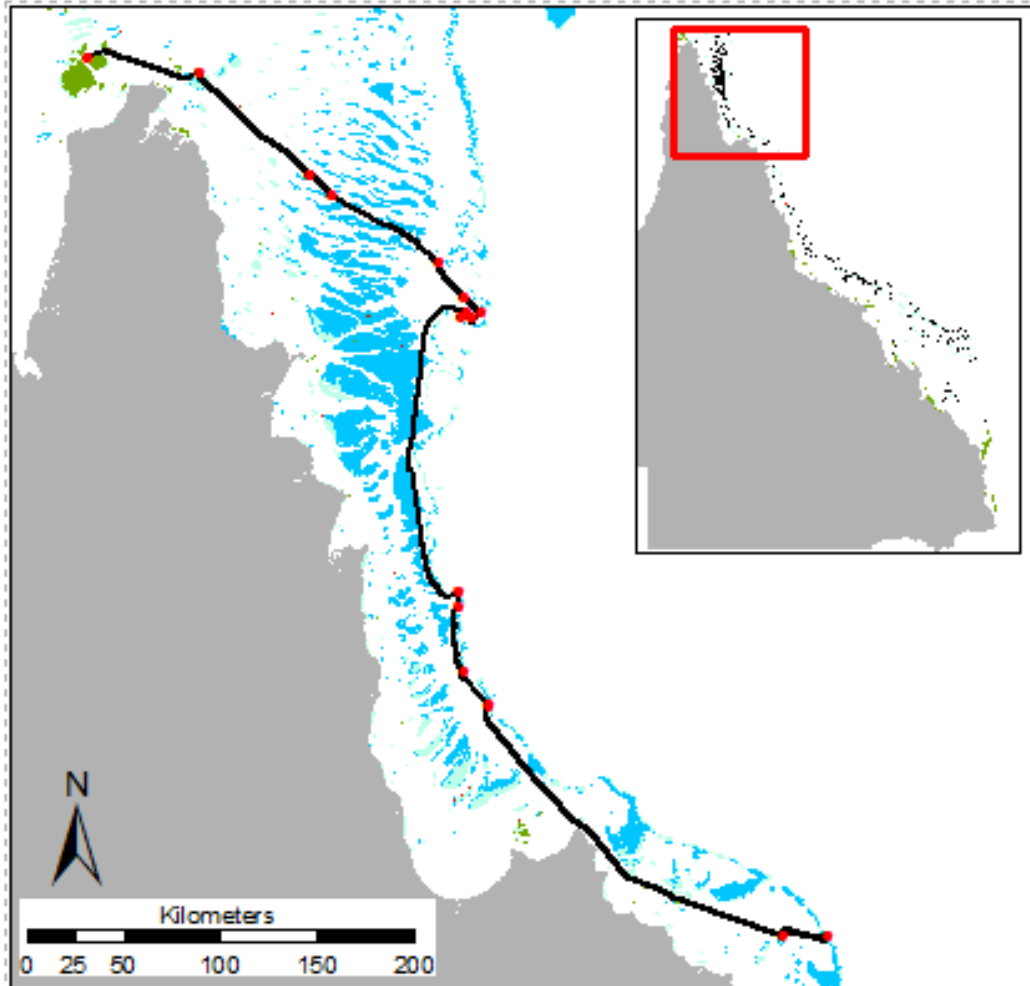


# Citizen Science Based Survey GBR Far North Dive Trip 2016 April 18-26



Chris Roelfsema

Karen Johnson

Douglas Stetner

Trevor Baerenger

Peran Brady

May 2016

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## Short Description

This is a report resulting from observations and data collected by recreational divers, who travelled from Thursday Island to Lizard Island. Due to the Bleaching event that started in March April on the GBR the divers decided to contribute part of their time with conducting citizen science based surveys in the remote areas of the far northern part of the Great Barrier Reef.

During the trip 21 dives were made and one reef flat walk. Every dive the recreational divers spent 10 min of their dive collecting information on the reef health at 5 and 10 m depth reported in this documented and based on:

- Coral Health Chart Survey (Coral Watch)
- Reef Health Impact Survey (RHIS) (Eye on the Reef)
- Coral Bleaching Observational Survey (RHIS-bleaching) (Eye on the Reef)  
Observational reef surveys in regards to Habitat mapping

Considerations when interpreting this report:

- underwater we may covered a total area of 1 km<sup>2</sup> of the GBR, the shallow GBR reef cover at least 25000 km<sup>2</sup>
- Sites were selected by Kalinda skipper David Stewart to please the recreational divers, which they did extremely well.

## Survey Team and Vessel



**Figure 1: Left to right: Chris Roelfsema (CR), Karen Johnson (KJ), Douglas Stetner (DS), Peran Brady (PB) and Trevor Baerenger (TB).**

- Chris Roelfsema (CR): Observational reef surveys for mapping, Coral Watch, RHIS and RHIS-bleaching surveys
- Karen Johnson (KJ) Coral Health Chart Survey (Coral Watch) 5 m depth
- Douglas Stetner (DS) Coral Health Chart Survey (Coral Watch) 10 m depth
- Trevor Baerenger (TB) Buddy Karen
- Peran Brady (PB) Dive support.



**Figure 2: MV Kalinda, with skipper David Stewart**

## 0 SunDay (17 April 2016)

### People:

CR, KL, DS, TB, PB arrive at Thursday Island and board MV Kalinda, Evening

### Weather:

Clear sky, 20-25 kn wind, , Water Temp 30 degree

### Activities:

travel

### Findings

#### Water clarity:

Around Cape York murky,

#### Bleaching

Visible on shallow reefs when flying in to Thursday Island







*Figure 3: Reefs around Thursday island photographed from plane.*

### **Habitat Mapping**

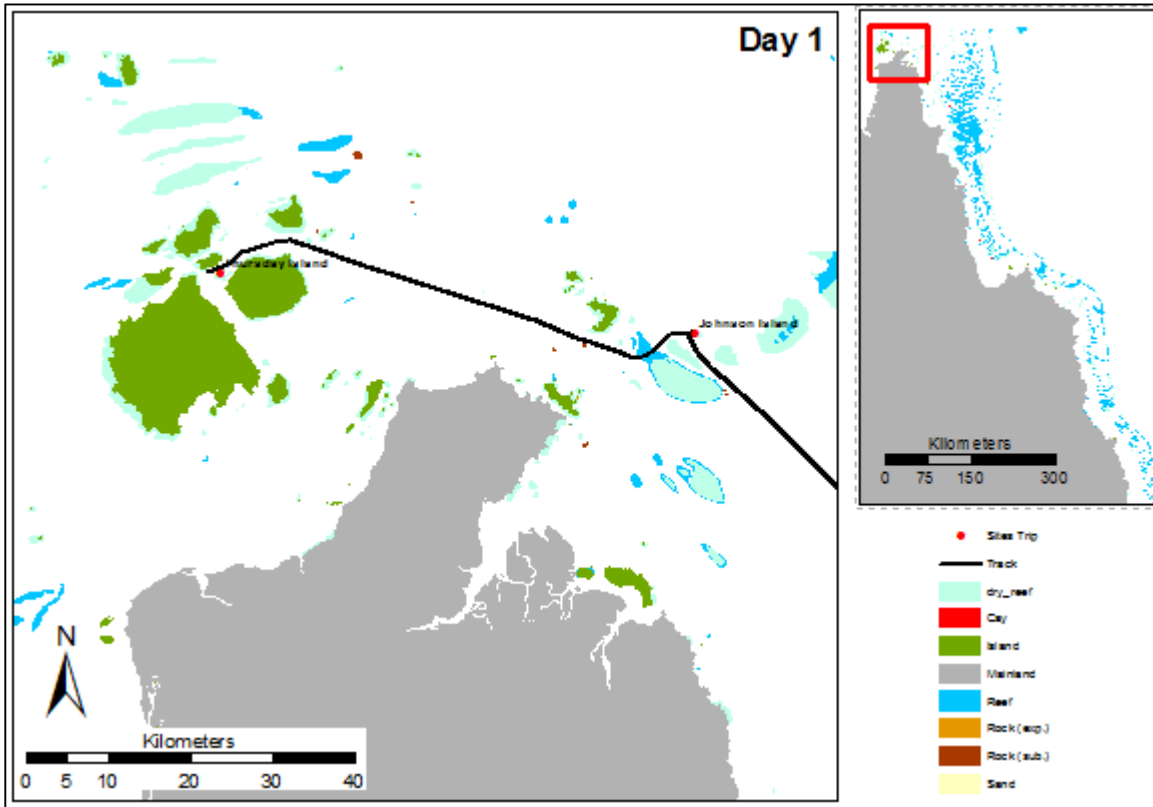
Shallow seagrass areas visible, small reefs from plane

# 1 Monday (18 April 2016)

## Weather:

Clear sky, 20-25 kn wind, , Water Temp 30 degree

## Travel



**Figure 4: Days travel**

Thursday Island to Johnson Island

## Activities:

- Leaving Thursday Island around noon, traveling to Johnson Island
- Reef flat walk on Johnson Island, small coral cay with reef flat
- 2 coral health chart surveys on North East and South West of Island on the Reef Flat



**Figure 5: South East Reef Flat Johnson Island**







*Figure 6: North West Reef Flat Johnson Island*

## **Findings**

### **Water clarity:**

Traveling to Johnson Island water clarity turbid, secchi estimated 5 m

### **Bleaching**

- South West severe bleaching of all soft coral, some massive
- North East Severe bleaching of all soft coral, most massive and branching also bleached

### **Habitat Mapping**

- Reef flat mostly made out of rubble on South West-East side, make it look dark, large areas of green algae not halimeda nor turtle weed
- Reef flat on North West, coral area with sand patches up to reef crest area
- Topography interesting, as height difference of halve meter on the South West-East side, like plateau.

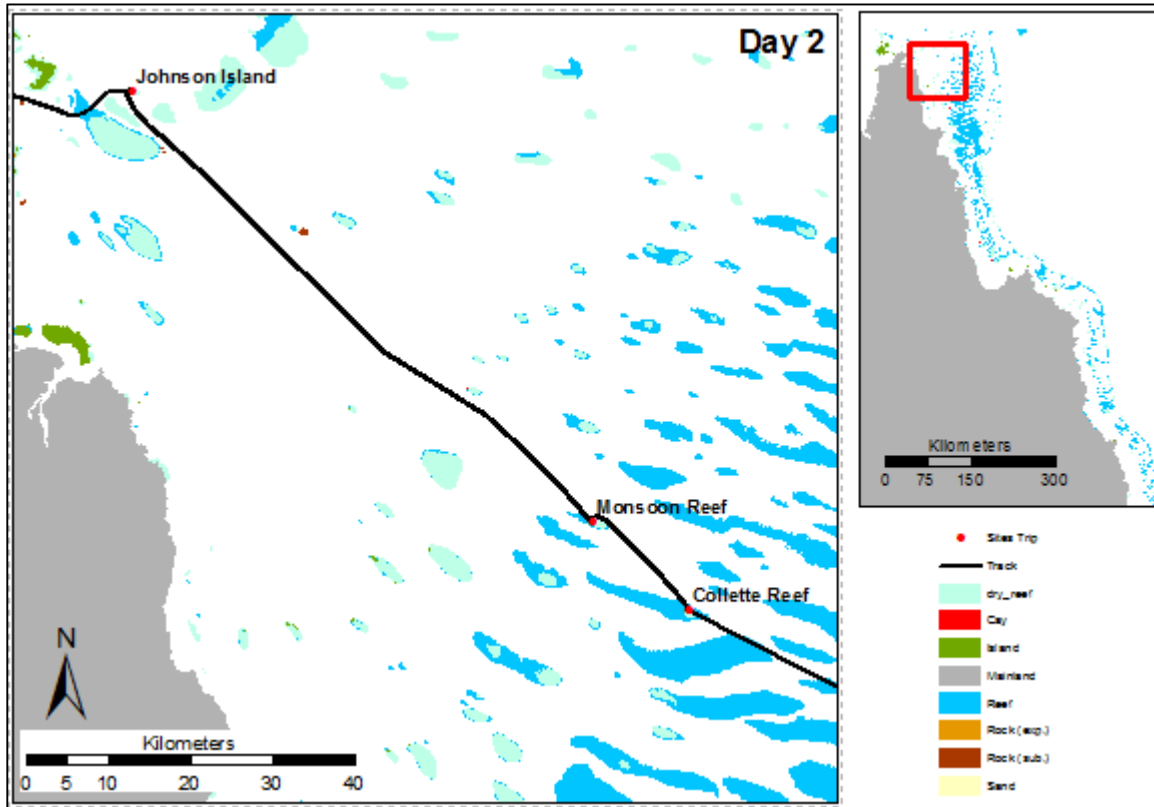


## 2 Tuesday (19 April 2016)

### Weather:

Clear sky, 20-25 kn wind, , Water Temp 30 degree

### Travel



**Figure 7: Days travel**

Johnson Island to Colette reef, via Monsoon reef

### Activities:

- Leaving Johnson Island at night, over night cruise to arrive at Monsson Reef
- Monsoon reef
  - o 1 dive North West site
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)



**Figure 8: Monsoon reef 10 m**

- Colette reef
  - o 1 dive North West site
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)
  - o 1 night dive no surveys



*Figure 9: Collette Reef 8 m*

## Findings

### Water clarity:

Traveling to Monsoon Reef and Colette reef water clarity turbid, secchi estimated 10 m, visibility 10 m underwater

### Bleaching

- at both sites severe bleaching in shallow water of all coral morphs

### Habitat Mapping

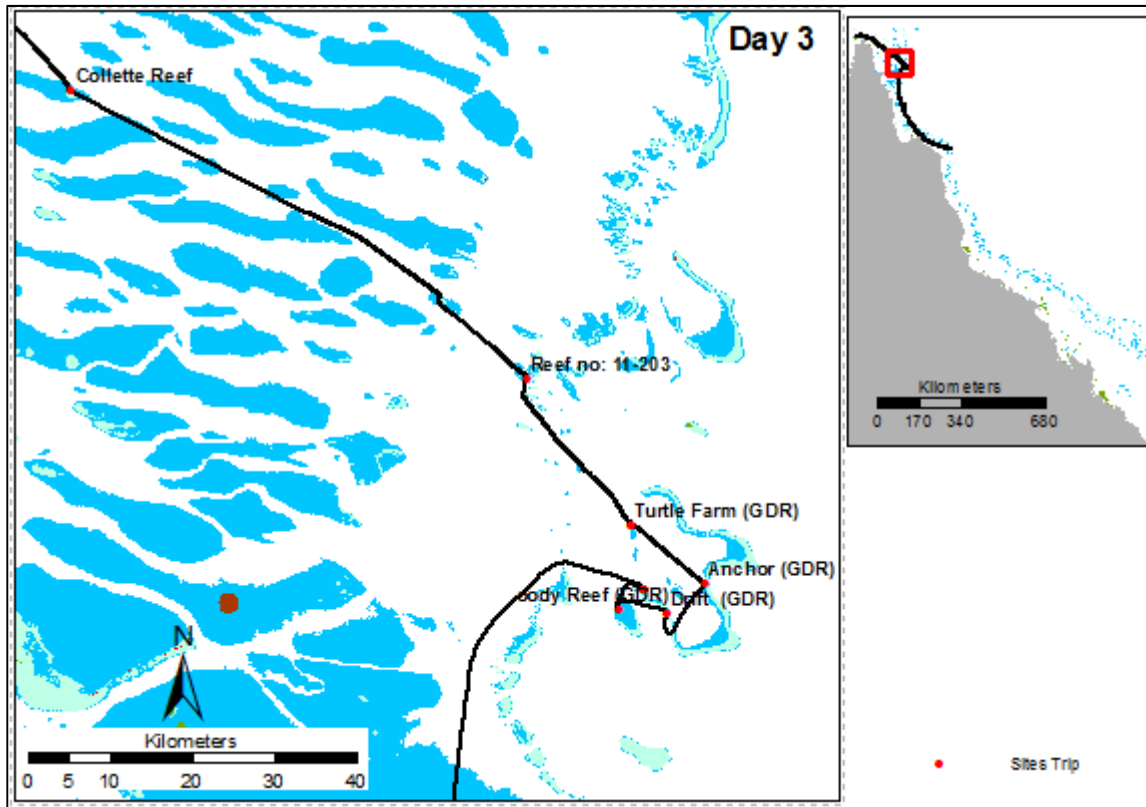
- Monsoon Reef, shallow reef with small cay growing, submerged at high tide
- Colette reef larger cay, with submerged outer reef flat narrow fringe of reef crest

### 3 Wednesday (20 April 2016)

#### Weather:

Clear sky, 20-25 kn wind, , Water Temp 28 degree

#### Travel



**Figure 10: Days travel**

Colette reef to Great detached Reef, Reef 11-203, then to Turtle Farm Reef, followed by Anchor reef

#### Activities:

- Leaving Collette Reef at night, over night cruise to arrive at Reef 11-203
- Great Detached Reef: Reef 11-203
  - o 1 dive North West site
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)





**Figure 11: Great Detached Reef: Reef 11-203**

- Great Detached Reef: Turtle Farm
  - o 1 dive North West site
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)



**Figure 12: Great Detached Reef: Turtle Farm**

- Great Detached Reef: Anchor Reef
  - o 1 dive North West site
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)
  - o 1 night dive no surveys



*Figure 13: Great Detached Reef no 2: Anchor Reef*

## Findings

### Water clarity:

Traveling to Colette reef water to Great Detached Reef very clear at later, secchi estimated 25 m, visibility 25 m underwater

### Bleaching

- at all three sites minor bleaching but mostly in shallow waters.

### Habitat Mapping

- Reef 11-203, shallow reef, large bommies underwater gentle slope on west site and drop off on east site
- Turtle Farm, shallow reef sandy bottom around, gentle to steep slope on East site
- Anchor Reef, reef crest on east site followed by reef flat outer no inner, than lagoonal slope with bommies deep water within reef system
- Great Detached Reef form mainly like barrier reef where Turtle farm and Reef 11-203 are reefs more lagoonal.

## 4 Thursday (21 April 2016)

### Weather:

Clear sky, 15-20 kn wind, cloudy, Water Temp 28 degree

### Travel

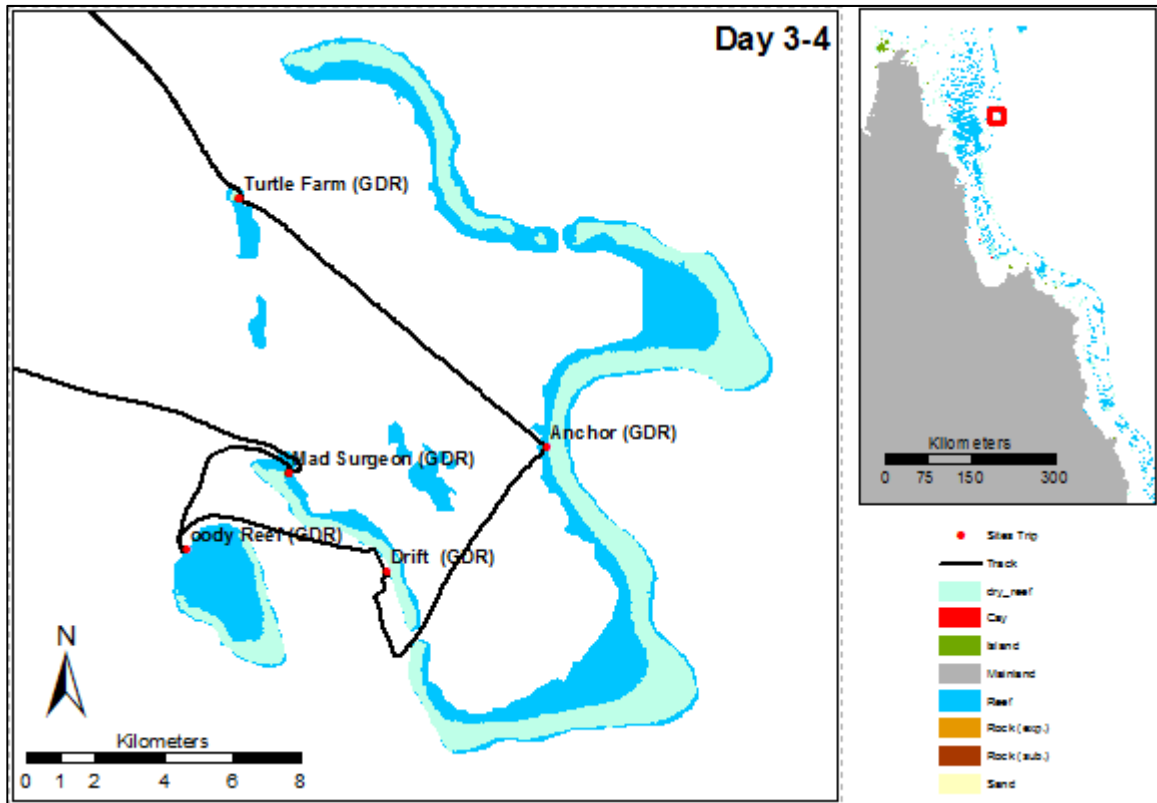


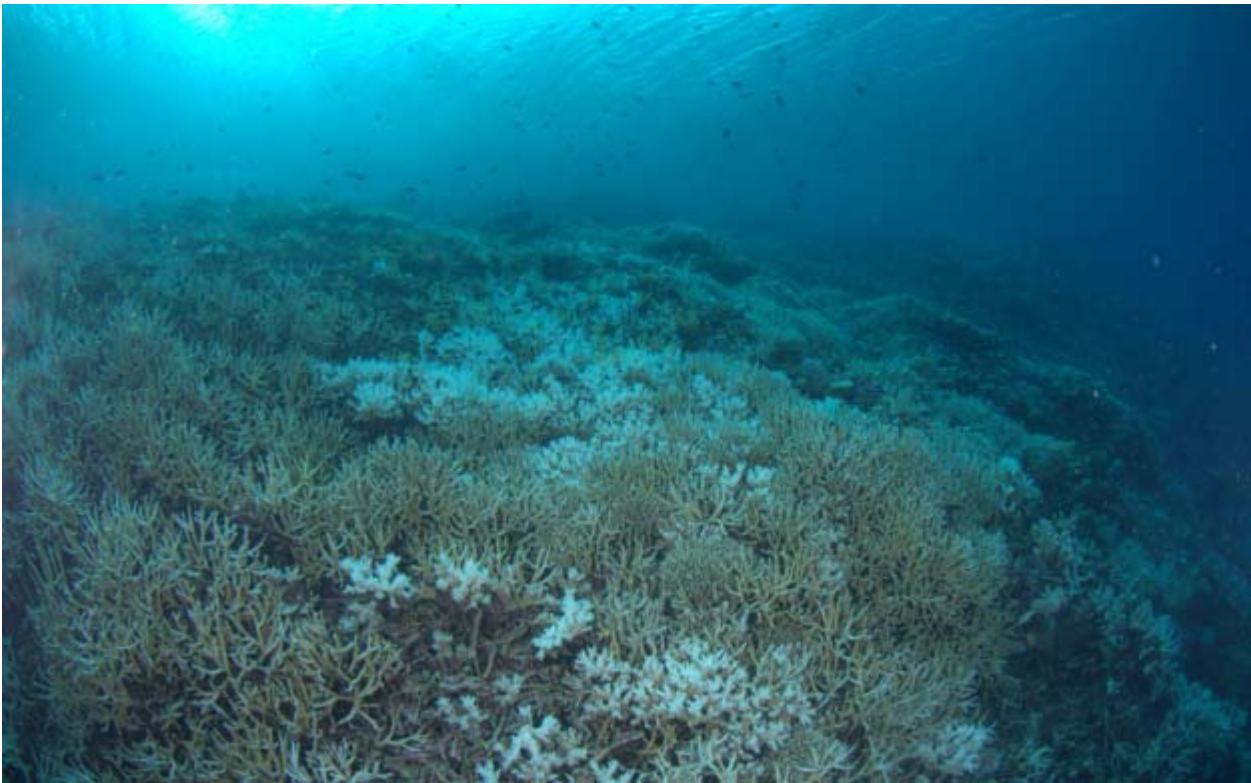
Figure 14: Days travel, Great Detached Reef (GDR)

Great detached Reef, Anchor to Mad Surgeon, via drift dive, wand Wood reef

### Activities:

- Leaving Anchor Reef early morning to cruise to drif dive
- Great Detached Reef no3: Drift Dive reef
  - o 1 dive North West site
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)





**Figure 15: Great Detached Reef no3: Inside / Out side reef**

- Great Detached Reef: Wood Reef
  - o 1 dive North West site
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)





**Figure 16: Great Detached Reef: Wood Reef**

- Great Detached Reef: Mad Surgeon
  - o 1 dive North West site
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)
  - o 1 night dive no surveys

## **Findings**

### **Water clarity:**

Traveling to Anchor reef to Mad Surgeon very clear, secchi estimated 25 m, visibility 25 m underwater, Mad surgeon less clear water 15-20 m

### **Bleaching**

- at all three sites bleaching but mostly in shallow waters, Mad Surgeon Major in shallow, drift dive reef on Wall not much but wall turn in to Acropora bed slope which was severely bleached. stylophora branching mostly bleached at all depth

### **Habitat Mapping**

- Drift Dive reef on outside Great Detached Reef, south west site, steep wall and narrow reef crest and reef flat turning into lagoon.
- Wood Reef shallow reef system, with steep wall on west site, large coral combination in shallow water partly bleached.
- Mad Surgeon, shallow reef mostly reef flat outer characteristics, and gentle slopes with bommies and branching coral.

## 5 FriDay (22 April 2016)

### Weather:

Clear sky, 15-20 kn wind, semi clear some cloudy, Water Temp 28 degree

### Travel

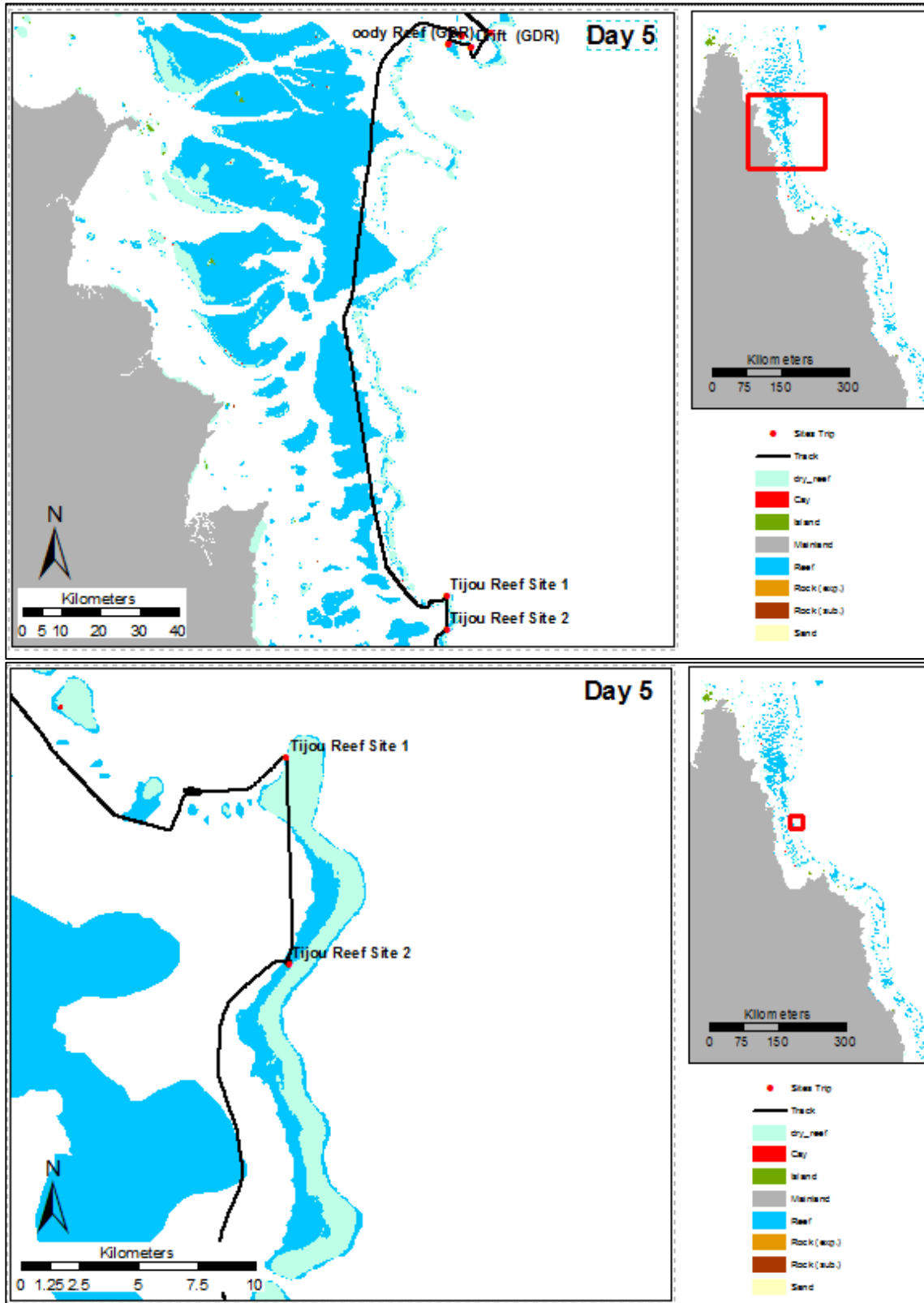


Figure 17: Reef Layout

Great detached Reef, Mad Surgeon, to Tijou reef for the night

**Activities:**

- Leaving early morning at night to arrive 10 am at Tijio reef wall dive
- Tijio reef wall dive inside lagoon west site reef system
  - o 1 dive West site
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)



**Figure 18:** *Tijio reef wall dive*

- Tijio reef lagoon dive
  - o 1 dive West site
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)
  - o 1 night dive no surveys



*Figure 19: Tijio reef lagoon*

## Findings

### Water clarity:

Traveling to Tijio reef very clear, secchi estimated 25 m, visibility 25 m underwater, Mad surgeon less clear water 15-20 m

### Bleaching

- at all sites minor bleaching but mostly in shallow waters, stylophora branching mostly bleached at all depth

### Habitat Mapping

- Wall dive Tijiou at start of reef system on the inside, small lagoon in Tijio reef with from east to west, wall, reef crest, outer reef flat, inner, lagoon, outer and wall on west stie
- Lagoon dive Tijio reef, shallow reef system, east to west, wall, reef crest, outer reef flat, and gentle slope on west site with bommies
- Coral cover low, but fish and inverts some sharks

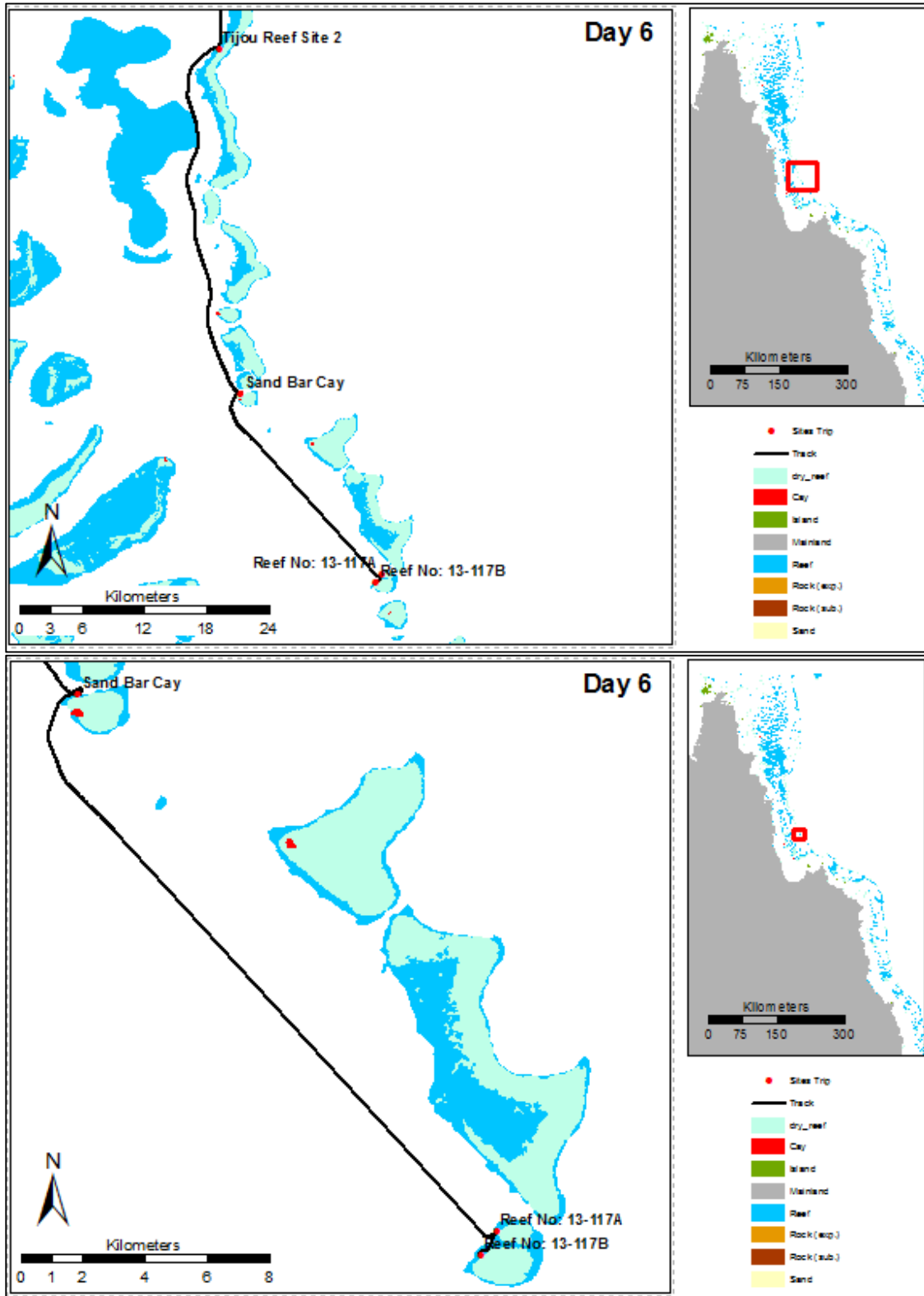


## 6 Saturday (23 April 2016)

### Weather:

Clear sky, 15-20 kn wind, , semi clear some clouds, Water Temp 28 degree

### Travel



**Figure 20: Reef layout**

Tijou reef to Sand bar 7 early morning, moving to reef 13-117

**Activities:**

- Leaving at night to arrive 10 am at Tijio reef wall dive
- Sand bar 7 dive drift dive
  - o 1 dive North West site in channel between green and pink zone
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)



**Figure 21: Sand bar 7**

- Reef 13-117a dive
  - o 1 dive West site of barrier reef next to channel north site channel entrance
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)



**Figure 22: Reef 13-117a**



- Reef 13-117b dive
  - o 1 dive West site of barrier reef next to channel south site channel entrance
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)
- 1 night dive no surveys







*Figure 23: Reef 13-117b*

## Findings

### Water clarity:

Traveling to Tijing reef very clear, secchi estimated 20 m on the way, visibility at sandbar 9 15-20 m, visibility at Reef 13-117 10-15 m

### Bleaching

- at all sites minor bleaching but mostly in shallow waters, stylophora branching mostly bleached at all depth

### Habitat Mapping

- Sand bar 7, platform type reef with coral cay. Good coral cover throughout reef slope into shallows, bottom of channel more rock rubble area. Shallow oval looking reef with sand bar on north west site and navigation marker. Reef top mostly outer reef flat area. dive lots of schooling fish, high diversity, many sharks,
- Reef 13-117a & b, shallow barrier reef system running north to south with an east to west, wall, reef crest, outer reef flat, and gentle slope on west site with bommies. On 13-117a lots of branching coral and gorgonian coral suggesting strong currents. Coral cover medium, lots of fish action, big schools of fish and sharks. On 13-117b less as b but still lots of fish live. Slope more gentle.

## 7 Sunday (24 April 2016)

### Weather:

Clear sky, 20-30 kn wind, , semi clear mostly clouds and rain, Water Temp 28 degree

### Travel

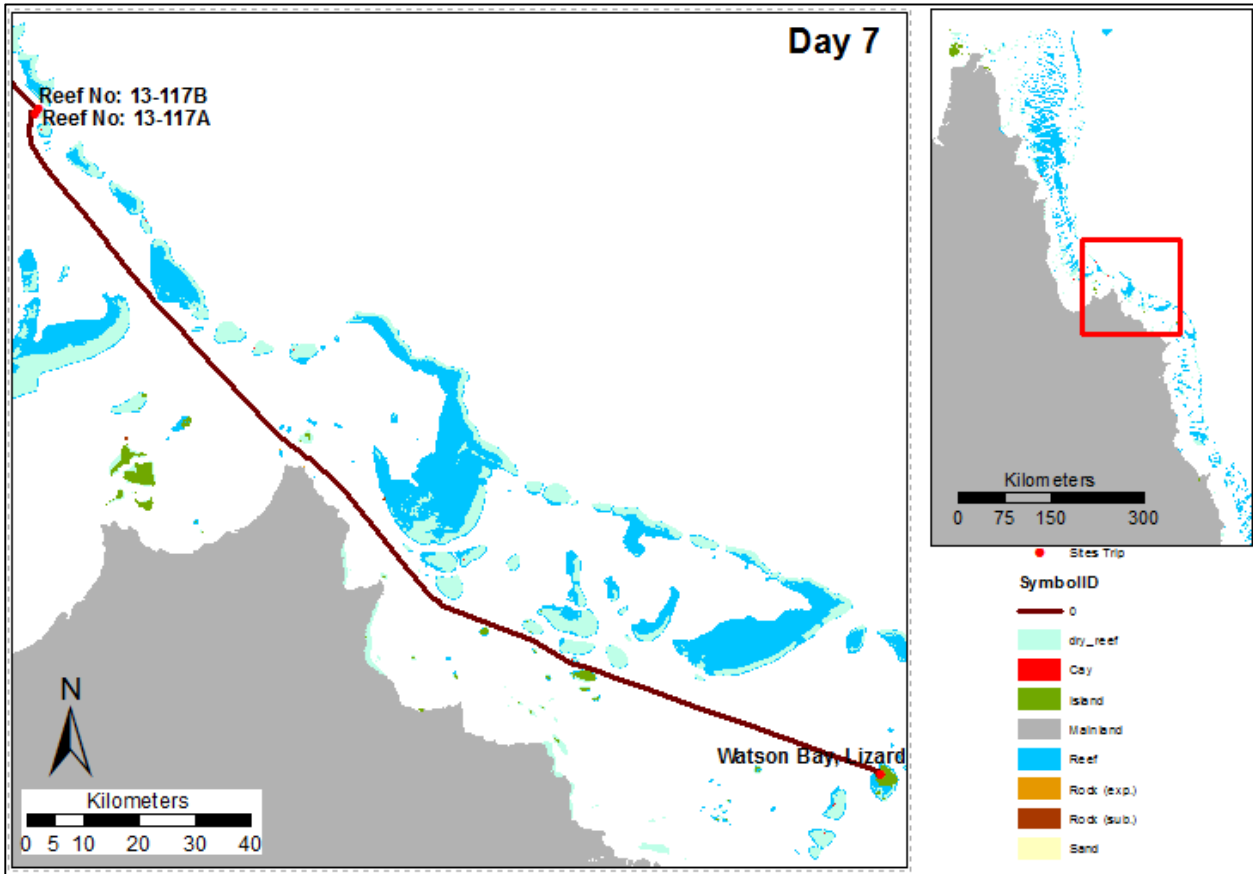


Figure 24: Days travel

### Activities:

- Reef 13-117 leaving 10 pm previous day arriving Lizard 3 pm.
- Watson Bay Lizard
  - o 1 dive shallow area
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)
  - o 1 night dive no surveys



*Figure 25: Watson Bay Lizard Reef*

## **Findings**

### **Water clarity:**

Traveling to Lizard, secchi estimated 5 m on the way, visibility at Watson Bay 5-10 m,

### **Bleaching**

- Major bleaching in shallow waters, especially soft corals, massive coral looked good.

### **Habitat Mapping**

- No comments other than its very big the GBR

## 8 Monday (25 April 2016)

### Weather:

Clear sky, 25-30 kn wind, , mostly clouds and rain, Water Temp 28 degree

### Travel

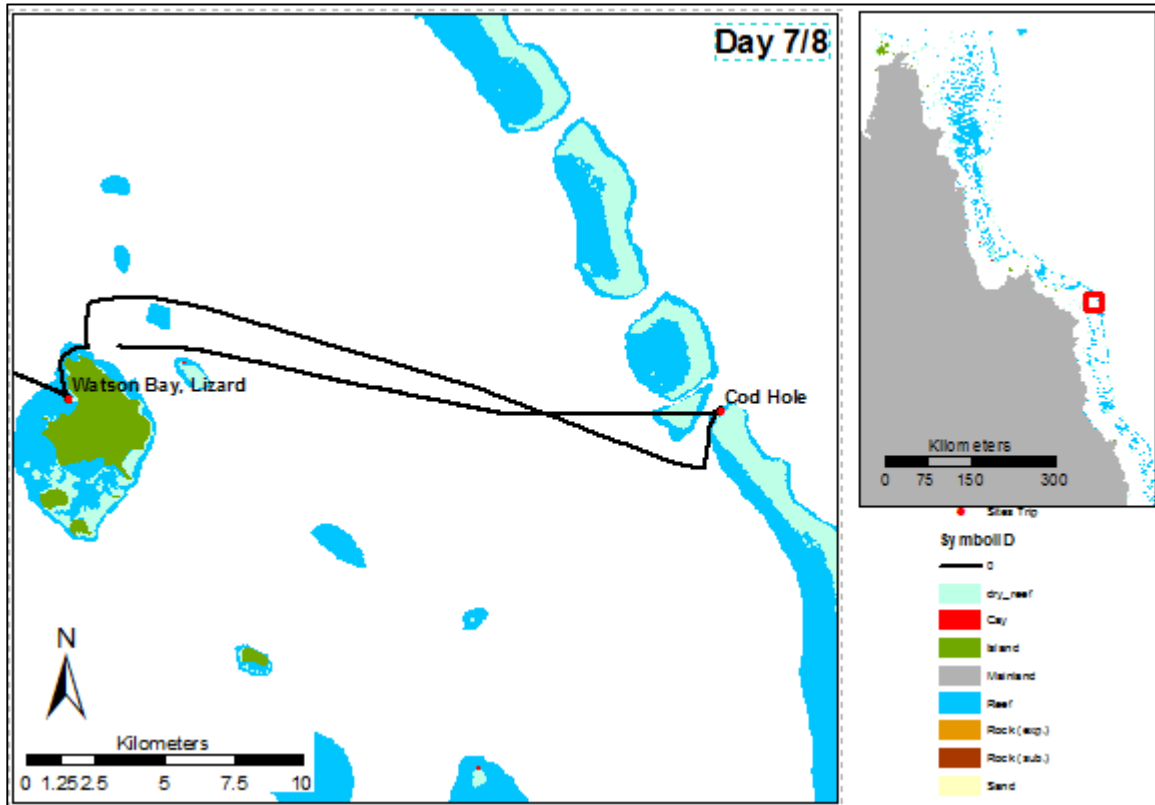


Figure 26: Days travel

### Activities:

- Reef 13-117 leaving 10 pm previous day arriving Lizard 3 pm.
- Cod Hole, Ribbon Reef No:10
  - o 1 dive shallow area
  - o Coral health chart survey 5 m (KJ) and 10 m (DS)
  - o RHIS survey (CR)





*Figure 27: Cod Hole Ribbon Reef No:10*

## **Findings**

### **Water clarity:**

Cod Hole Ribbon no:10. 15-25 m, Rough seas

### **Bleaching**

- Bleaching on corals that are left, bolder corals not white, not many branching coral.

### **Habitat Mapping**

- Ribbon reef no 10, has strong reef crest on east site and wall with smaller crest on the west site. Code hole is lagoonal slope on the north, with rubble and sand, and bommies with little coral on top.

## 9 Coral Watch Data

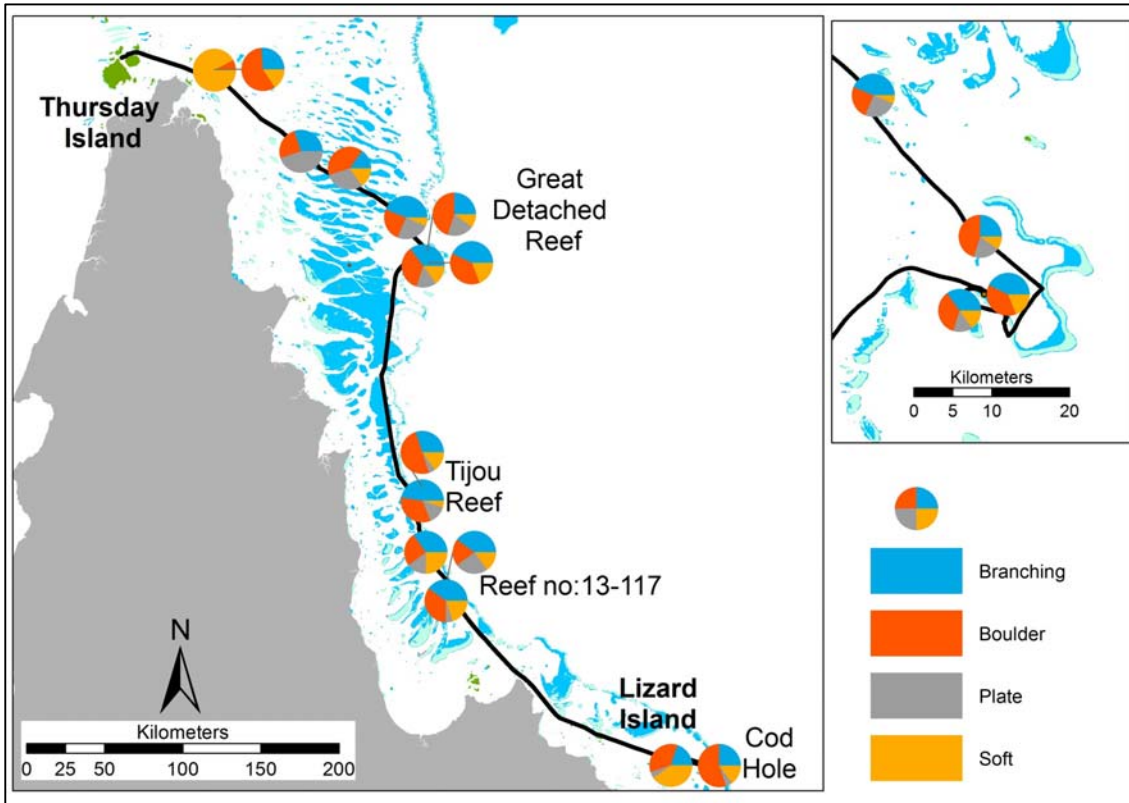


Figure 28: Coral types assessed for coral health chart reading using [www.coralwatch.org](http://www.coralwatch.org) protocols.

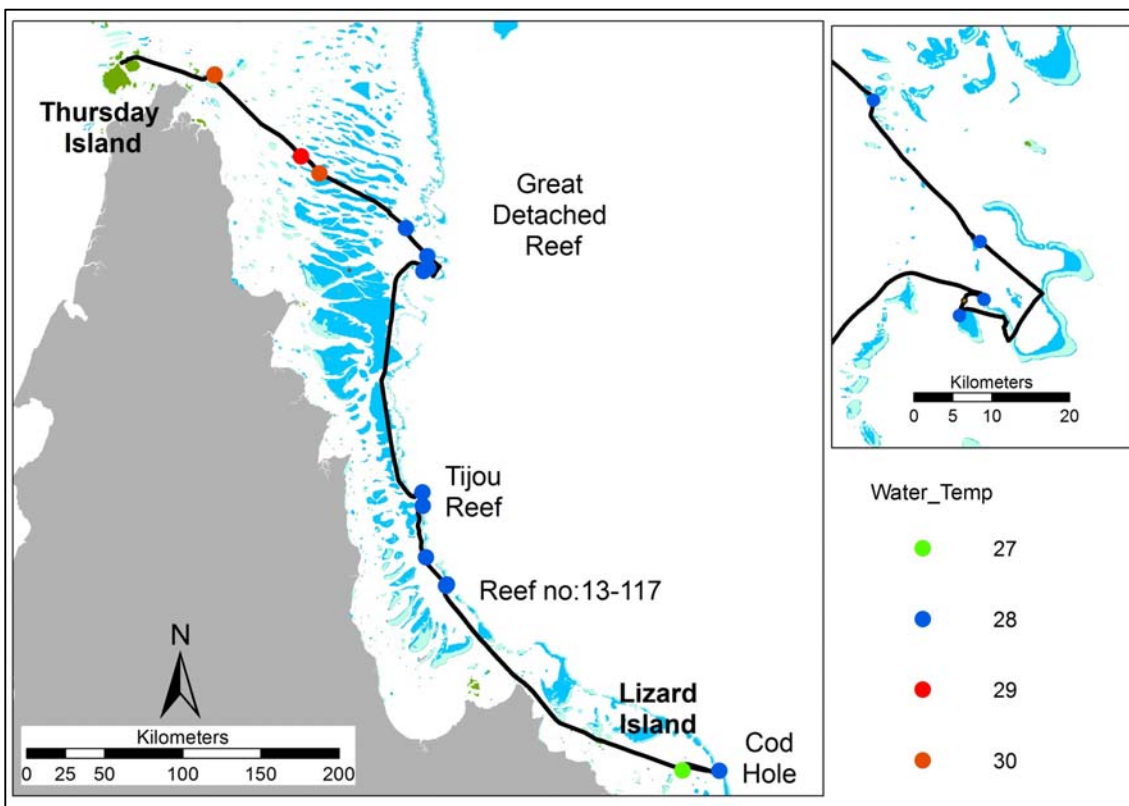


Figure 29: Water temperature at coral health chart reading using [www.coralwatch.org](http://www.coralwatch.org) protocols.

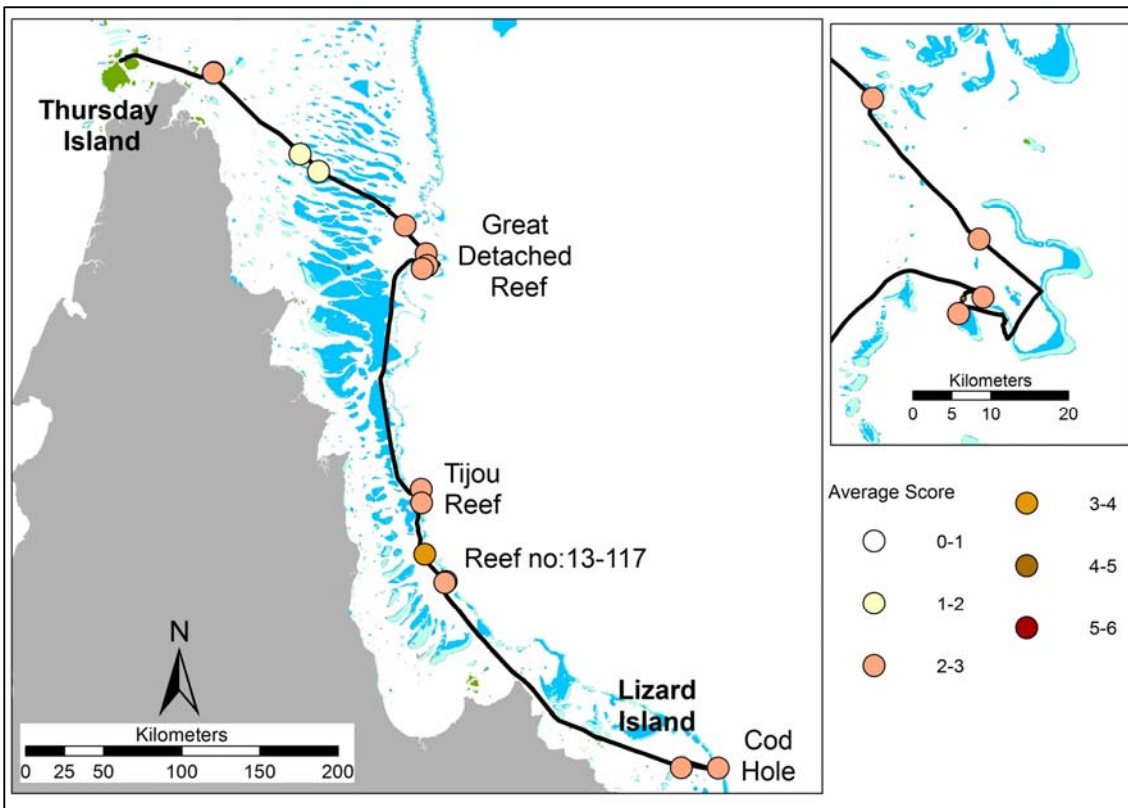


Figure 30: Coral health chart score using [www.coralwatch.org](http://www.coralwatch.org) protocols.

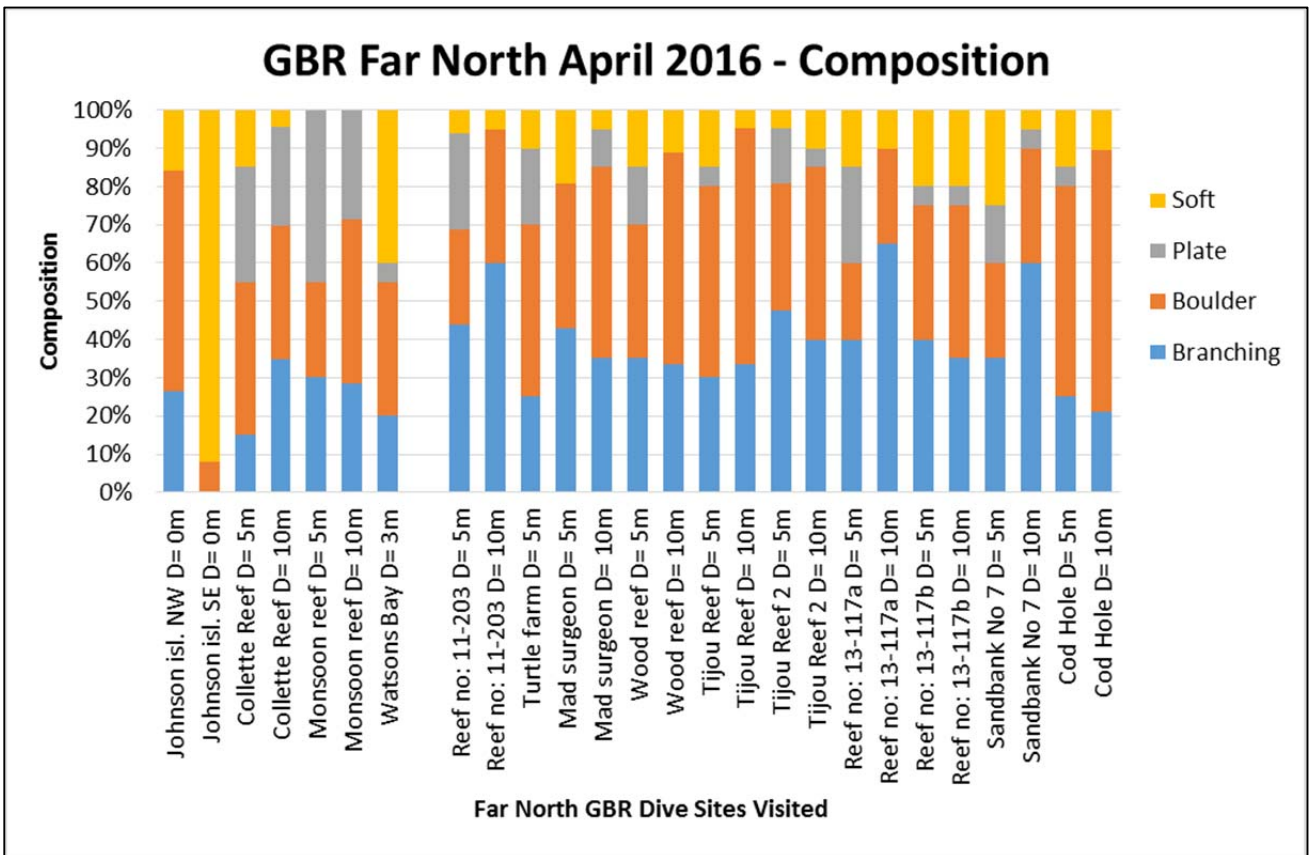


Figure 31: Coral types assessed for coral health chart reading using [www.coralwatch.org](http://www.coralwatch.org) protocols.

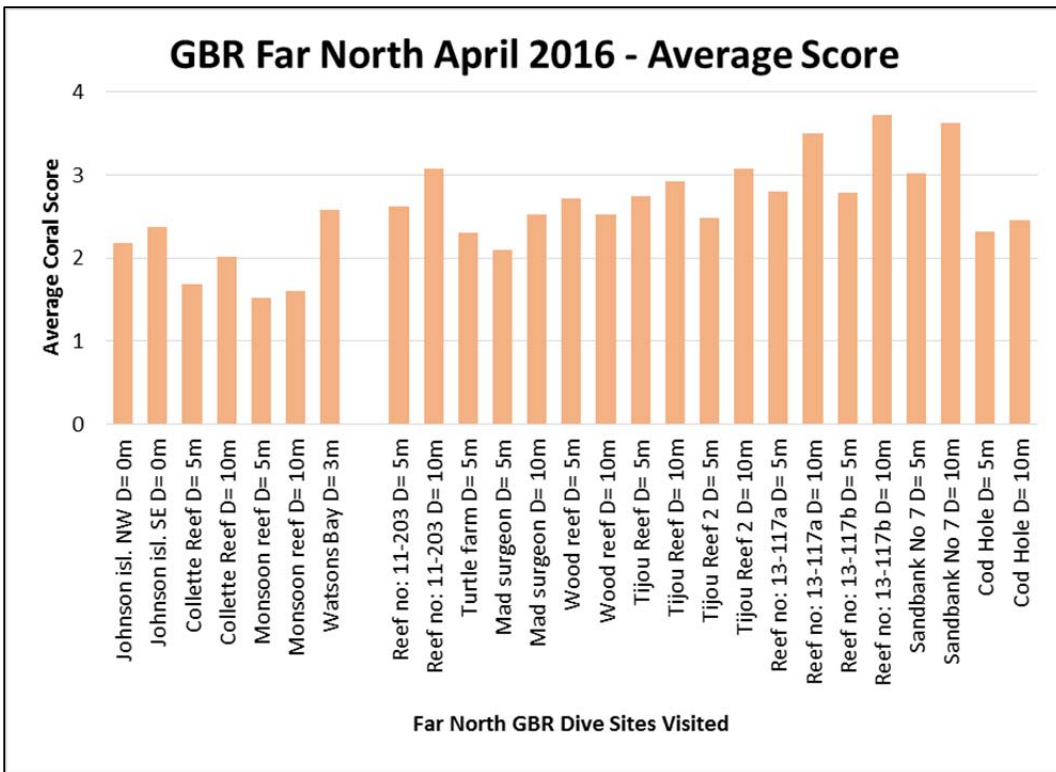


Figure 32: Coral health chart average score using [www.coralwatch.org](http://www.coralwatch.org) protocols.

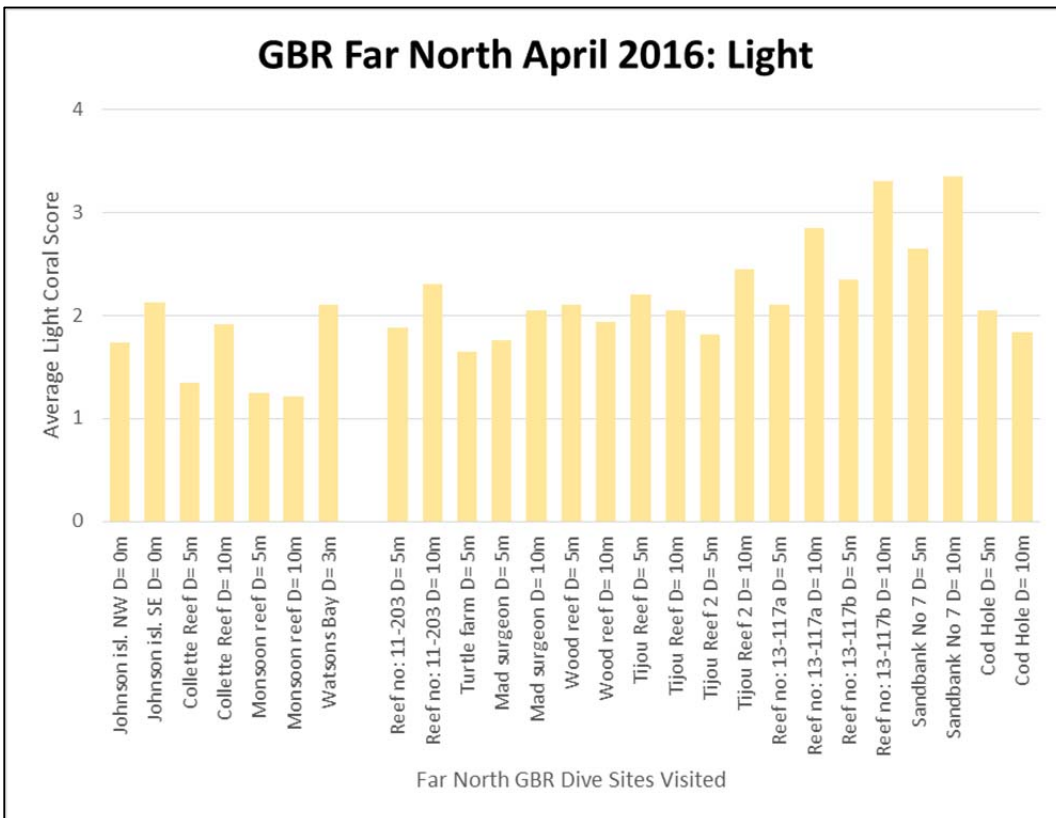


Figure 33: Coral health chart average lightest coral score using [www.coralwatch.org](http://www.coralwatch.org) protocols.



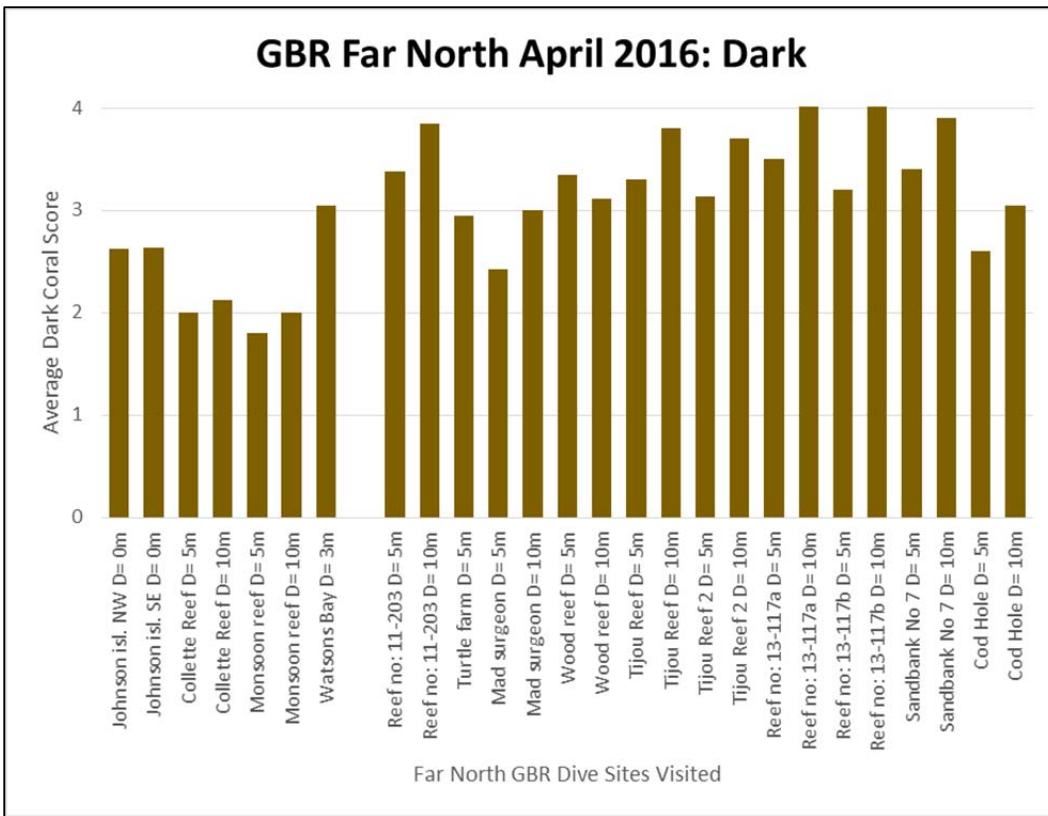
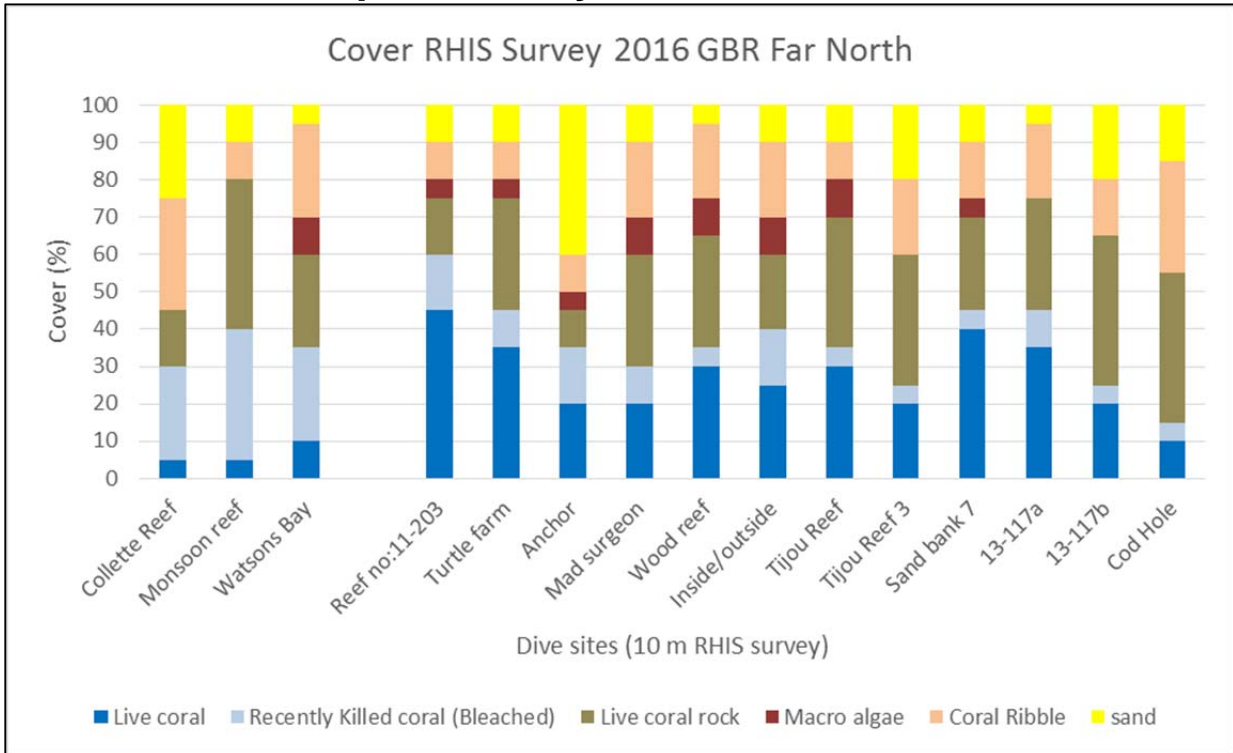
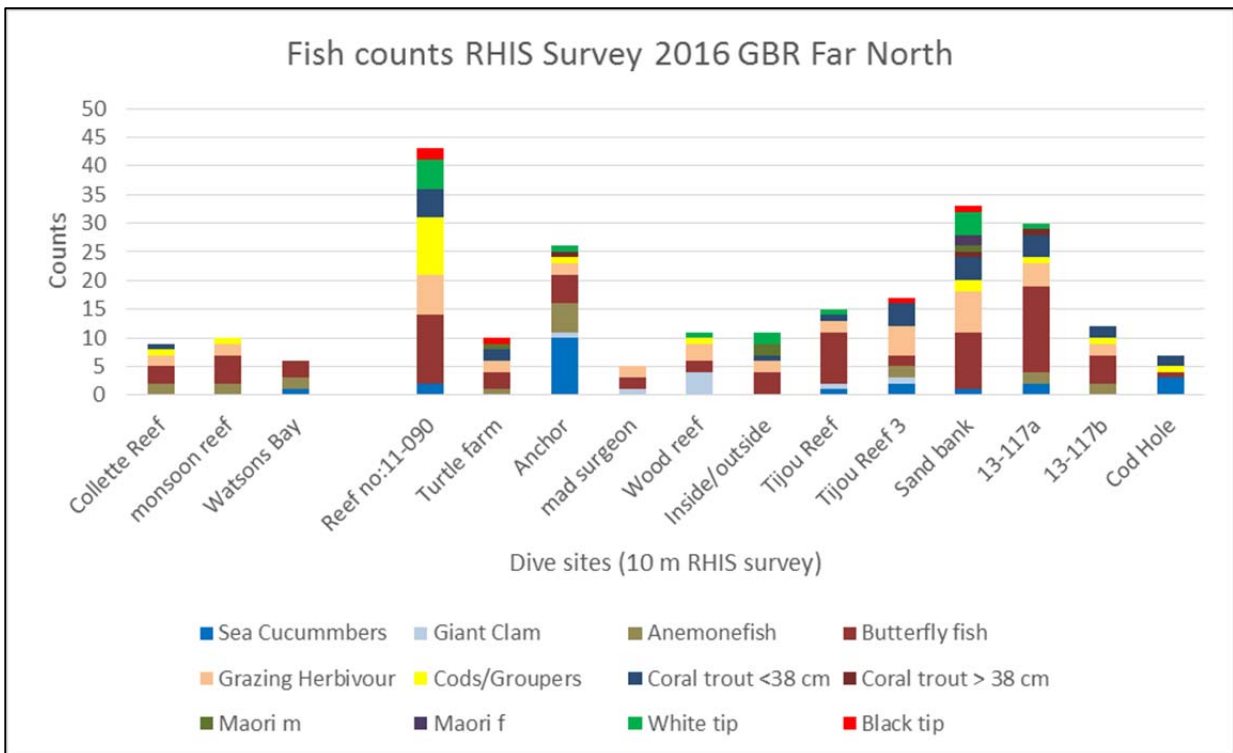


Figure 34: Coral health chart average darkest coral score using [www.coralwatch.org](http://www.coralwatch.org) protocols.

# 10 Reef Health Impact Survey Data



**Figure 35: Reef Health Impact Survey benthic/substrate composition visually estimated following RHIS Eye on the Reef surveys.**

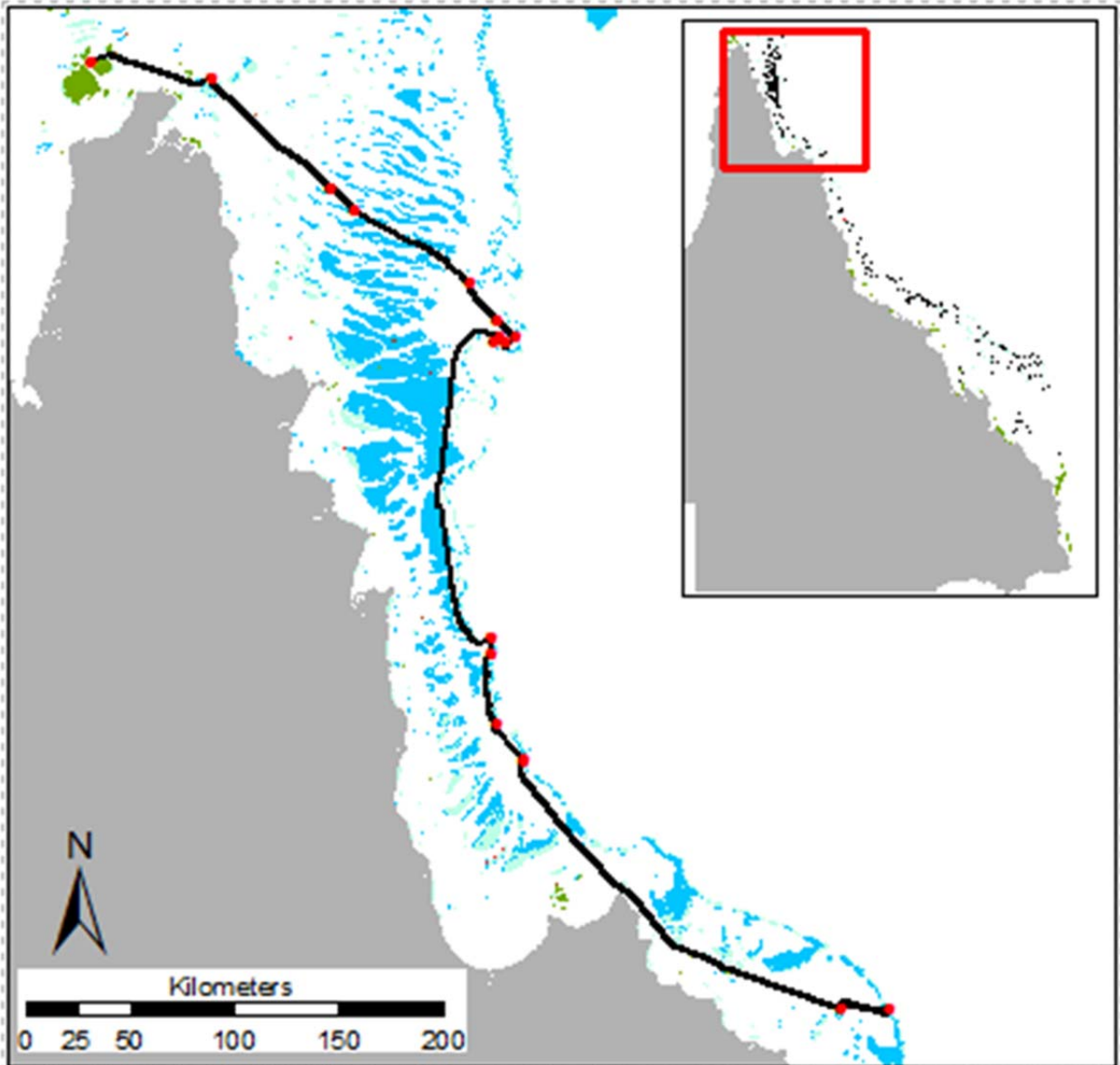


**Figure 36: Reef Health Impact Survey fish composition visually estimated following RHIS Eye on the Reef surveys.**

**Figure 37: Reef Health Impact Survey fish composition visually estimated following RHIS Eye on the Reef surveys.**

		Johnson Island SE	Johnson Island NW	Collette Reef	monsoon reef	Watsons Bay														
								Reef no:11-203	Turtle farm	Anchor	mad surgeon	Wood reef	Inside/outside	Tijou Reef	Tijou Reef 3	Sand bank 7	13-117a	13-117b	Cod Hole	
Reef aspect	north west		x			x				x		x	x	x	x	x	x	x		
	north east			x	x															x
	south west						x	x	x	x	x	x	x	x	x					
	south east	x																		
Habitat	Lagoon																			
	reef flat	x	x																	
	Crest																			
	Slope			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Extent of bleaching	0 < 5 m2, size of a car						x	x	x	x		x	x	x	x	x	x	x	x	x
	5 m < 10 m2, size of a truck	x	x								x									
	10 m < 20 m2, size of a house			x	x	x														
	20 m2+, size of a football field																			
Bleaching severity	bleached only on upper surface						1	1	1	1	1	1	1	1	1	1	1	1	1	1
	pale – light or yellow	1	1	2	2	2	3	3	3		2									
	fluorescing																			
	totally bleached white	2	2	1	1	1	2	2	2	2	3	2	2	2	2	2	2	2	2	2
	recently dead –	3	3	3	3	3					3			3	3	3	3	3	3	3

## 11 Summary of Activities



*Figure 38: Complete track travelled.*

### Collected:

- 27 coral health chart readings at 5 and 10 m depth
- 15 Reef Health Impact Surveys
- 17 Reef Health Impact Surveys Bleaching

### General findings:

- GBR is big and remote
- Outer reefs cooler and clearer waters, higher biodiversity, more coral cover and less coral bleaching observed
- Coral cover higher offshore reefs (40-60%, sometimes shallow 100%) than inshore reefs (30-40%)
- All sites have bleaching, rough estimate for coral present in:
  - offshore sites 10% severe, 20% moderate, 20% minor **50% non**
  - Inshore sites 50% severe, 30% moderate, 10% minor **10% non**
- Biodiversity observed



- Offshore sites:
  - Coral: High cover various forms and species
  - Fish: small, medium and big, schooling and sharks
  - Inverts: diverse and in symbiosis
  - Algae: Little or non
  - Impacts: bleaching, some decease, cyano bacteria harry, and two ghost nets
- Inshore sites
  - Coral: low cover more soft coral, and all forms but same species.
  - Fish: small, medium
  - Inverts: not to diverse
  - Algae: Little or non
  - Impacts: bleaching, decease, siltation, cyano bacteria harry, and two ghost nets

## **Geomorphic Mapping Considerations**

- Reef crest
  - Is not always surrounding reef
  - Barrier reef have no reef crest where low wave energy
- Inner Reef Flat
  - Can go into reef slope, with low wave energy
- Slope
  - Can be wall
  - Wall can have sloping area within it.
- Barrier Reefs
  - Can have walls on both site
- Mapping
  - Use reef crest rule like it is but then select within those areas that are facing gentle slope, and energy low area to define areas on reef without reef crest.
  - Walls steep going from reef crest to no or minor slope, straight into deep water.
- Weather considerations:
  - During trip wind was at all times more than 15 kn average around 20-25 kn
  - Drone surveys would be limited due to this
  - Due to sea state of windward site offshore reefs no dives could be made safely on windward site of offshore reefs