

# GBR\_Townsville\_Swains Region (TSR)

## Field Trips:

- 1) 19 – 28 May 2019(finished)
- 2) 28 May – 6 June 2019 (in progress)

Projects supported:

GBRMP Mapping Project



School of Earth and Environmental Sciences



Australian Government  
Great Barrier Reef  
Marine Park Authority



Version 1 20 May 2019 Chris Roelfsema

## Thanks Field team helping to save the reef

Great work on the first trip 1, you were all important contributor for safe and successful trip.

Thanks also to Kalinda crew, great job.



### Summary Activities Trip 1:

Steamed approx. 320 nm with MV Kalinda, visited 10 reefs

Reef Name: <b>Summary</b>	Dive	Snorkel
People (initials)	KM, EVK, EK, RB, AO, JP, CR	KM, EVK, EK, RB, AO, JP, CR, IP
#Quadrat Photos	11144	7672
#Photo Transects	32	31
Total Transects length	17377 m	21186 m
#Rugosity photos	90770 (Left+right)	169112(Left+right)
#RHIS	60(snorkelling+diving)	
#CoralWatch	72(snorkelling+diving)	
#COTS counts	0	14
#COTS samples	0	14
#CCA samples	199 (snorkelling+diving)	
Echosounding pings	24326 (snorkelling+diving)	



## **Overview**

### **Goals for trip**

Calibration and validation data need to be collected for habitat mapping project in the GBR\_Townville\_Swains Region (TSR) by visiting approximately 16 selected reefs where at each 8 shallow dives and 3-5 snorkel transects will be conducted.

### **Activity**

At each reef following activities will take place:

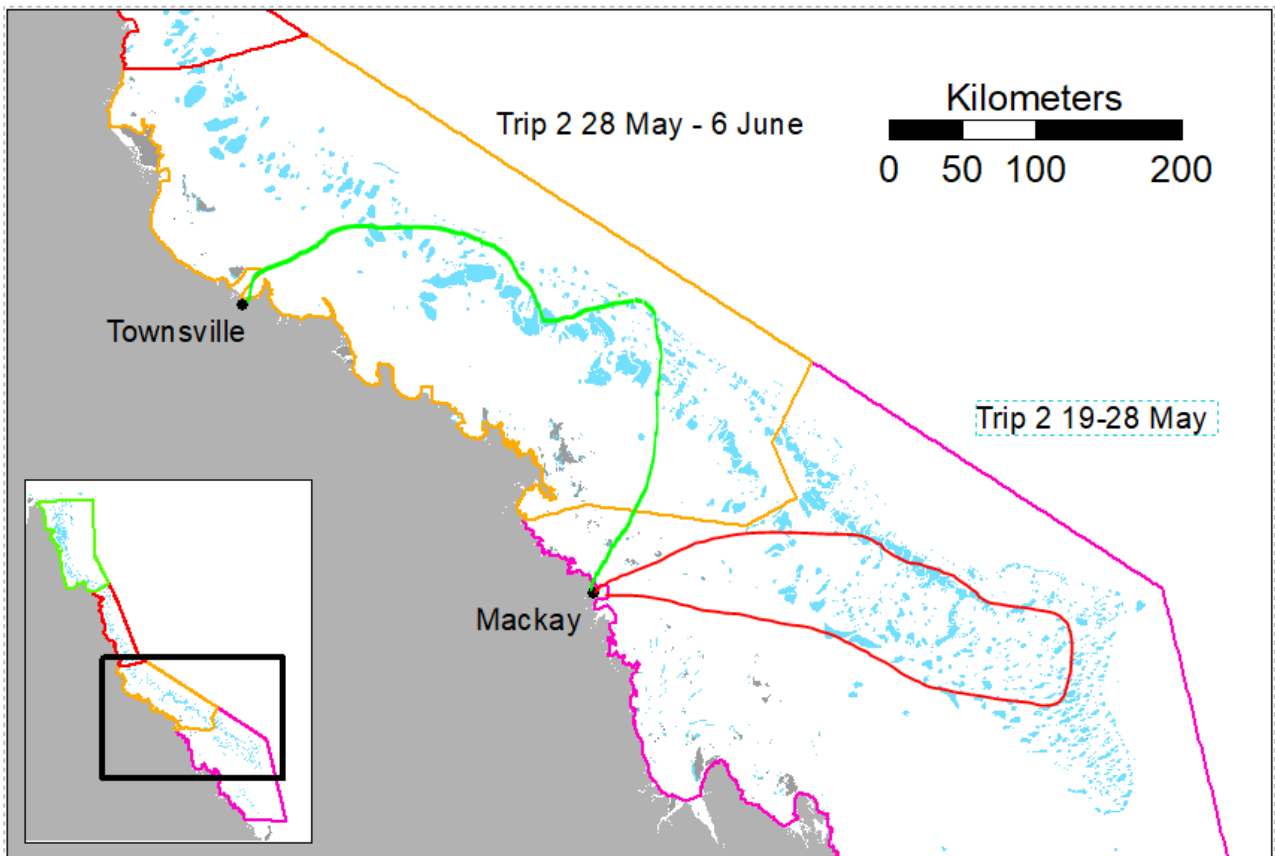
1. Dives along the reef slope at 5 m depth 30 min each equivalent to approximately 500 m, collecting:
  - a. Georeferenced Benthic Photo transects
  - b. Rugosity images with stereo GoPros
  - c. Coralwatch survey
  - d. Reef Health Impact Surveys
  - e. COTS count
  - f. COTS sample
2. Snorkel over reef flat 30 min each equivalent to approximately 500 -1000 m, collecting:
  - a. Georeferenced Benthic Photo transects
  - b. Rugosity images with stereo GoPros
  - c. Coralwatch survey
  - d. Reef Health Impact Surveys
  - e. COTS count
  - f. COTS sample
3. Pretty Reef Picture Drone Survey
4. Bathymetry data for ongoing work

## Study Site and Survey Location

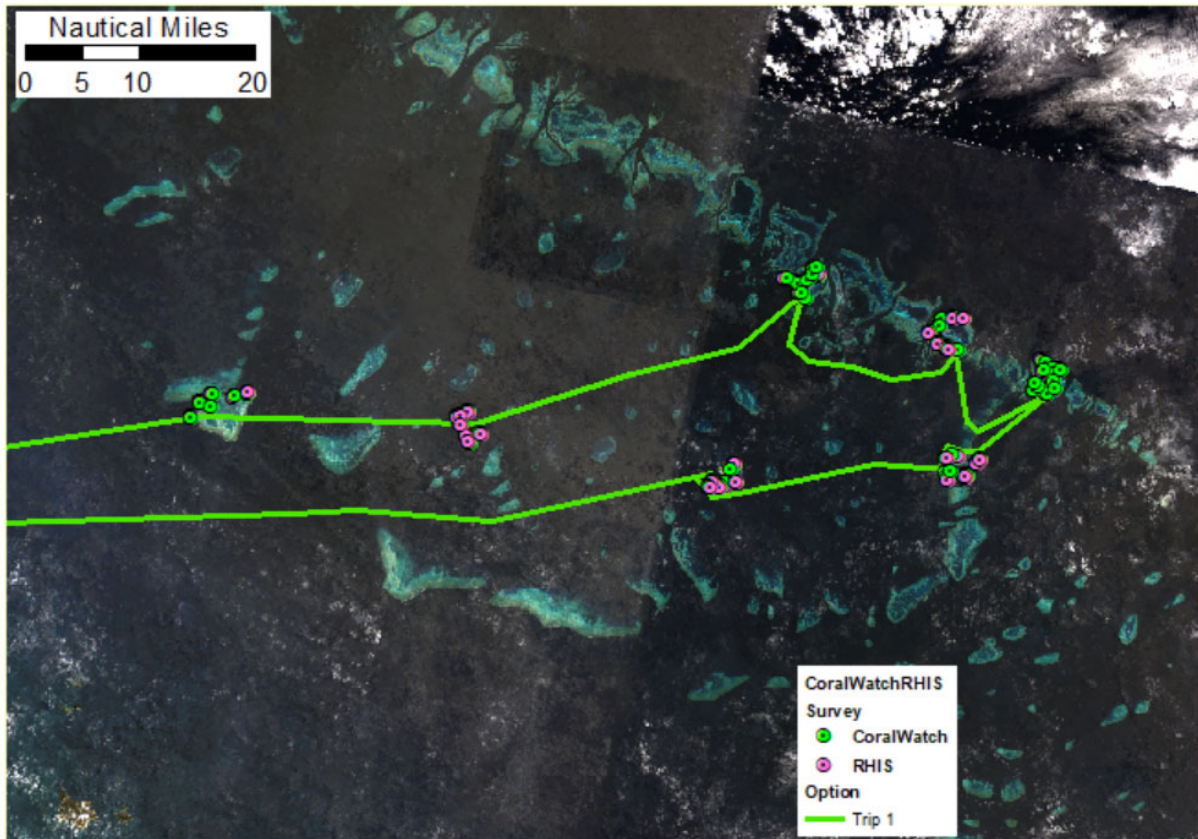
Ideally 16 reefs will be visited (1 per day), 45 potential reefs were selected out of reef present offshore in the section from Cairns to Swains. Exact choice of reefs will take place in the field on day to day basis.

### Site requirements

- High and low wave exposure
- Intermediates are close to the above
- Little impact as possible
- Variety of reef shapes
- Variety of reef aspects
- Variety of coral types.
- Reefs with perimeter larger than 8 km
- Some overlap with AIMS and GBRMPA



# Trip 1 19-28<sup>th</sup> May Mackay-Hardline Reefs



# Boat



**MV Kalinda base station**



**RIB Patrol, size engine ??, length ? and RIB Antaris, size engine ??, length ??**





## Participants

	Code	Name	Start	End	T	Diving	Boat handler	Institute	Role
1	CR	<b>Chris Roelfsema</b>	19/5	6/6	1+2	Sci + inst	Rec	UQ Staff	PI
2	EK	<b>Eva Kovacs</b>	19/5	6/6	1+2	DM	Rec	UQ Staff	CW/RHIS+PT dive
3	EVK	<b>Emma Kennedy</b>	19/5	6/6	1+2	Ins	Coxs	UQ Staff	CW/RHIS+PT dive
4	KM	<b>Kathryn Markey</b>	19/5	6/6	1+2	DM	Coxs	UQ Staff	CW/RHIS+PT dive+ organiser
5	RB	<b>Rodney Borrego</b>	19/5	6/6	1	DM	Rec	UQ Staff	CW/RHIS+PT dive
6	AO	<b>Alexandra Ordonez Alvarez</b>	19/5	28/5	1	n.a.	non	Vol. UQ	CW+PT+ Dive + CCA
7	JP	<b>Josh Passenger</b>	19/5	28/5	1	DM	Rec	Vol. UQ	CW/RHIS+PT dive + Drone
8	IP	<b>Iva Popovic</b>	19/5	28/5	1	OWD	n.a.	UQ.Staff	CW+COTS

	Code	Name	Start	End	T	Diving	Boat handler	Institute	Role
9	MR	<b>Meredith Row</b>	19/5	6/6	2	Res	Rec	UQ Staff	CW/RHIS+PT dive + Drone
10	DS	<b>Douglas Stetner</b>	28/5	6/6	2	Ins	Rec	Vol. UQ	CW/RHIS+PT dive
11	KJ	<b>Karen Johnson</b>	28/5	6/6	2	DM	Rec	Vol. UQ	CW/RHIS+PT dive

BDO = boating and diving officer on duty

## 2019 Trip 1 Swains Habitat Characterisation Team



*Left to right: Eva Kovacs (EK), Kat Markey (KM), Emma Kennedy (EVK), Alexandra Ordonez (AO), Rodney Borrego (RB), Iva Popovic (IP), Josh Passenger (JP), Chris Roelfsema (CR),*

## 1 Sunday (19 May 2019)

### People:

All travel to Mackay

### Weather:

Partly Clear sky, 20-25 kn wind, Water Temp 24 degree

### Activities:

Travel and getting ready

### Findings

- no specifics

### Plan for tomorrow

Get gear ready and cross 5 am Mackay to reef 21-057

## 2 Monday (20 May 2019)

### People:

All

### Weather:

Partly Clear sky, 20-25 kn wind SE, Water Temp 24 degree

High 10:49 am

### Activities:

5 am leave Mackay in direction reef 21-057

Travel and getting ready, arrived Reef 21-057 around 4pm, set up equipment for tomorrow.

### Findings

- no specifics

### Plan for tomorrow

Survey reef 21-057 and cruise to next reef.

## 3 Tuesday (21 May 2019)

### People:

All

### Weather:

Overcast, breezy, 15 knots, gusting 20 knots. Water Temp 25°C.

High 11:30 am, Low 05:18 pm

Wind chop on North West side of reef, Wind chop and swell on South West side.

**Activities:**

8:00 am Dive boat depart

8:30 am Snorkel boat depart

12:00 pm Snorkel boat return

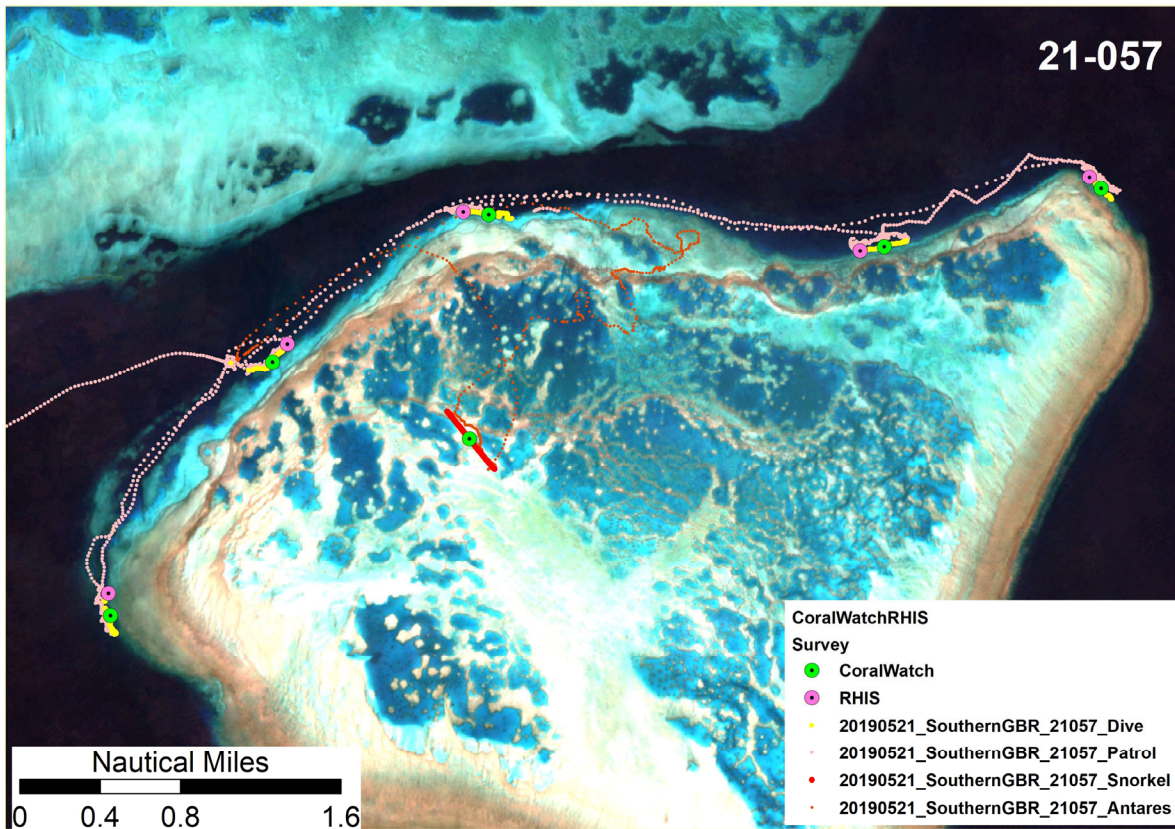
1:00 pm Dive boat return

1:30 pm Kalinda depart to 20-074 site

5:30 pm Kalinda arrived at anchorage

Reef Name: <b>21-057</b>	Dive	Snorkel
People (initials)	CR, JP, KM, AO, IP	EK, EVK, RB
#Quadrat Photos	1464	181
#Photo Transects	5 (D1->D8->D7->D6->D2)	1 (S4)
Total Transects length (m)	2003	453
#Rugosity photos	13566	2192
#RHIS	5	0
#CoralWatch	5	1
#COTS counts	0	0
#COTS samples	0	0
#CCA samples	20 (snorkelling/diving)	0
#Hydrophone recordings	1	0
#Echosounding pings	6157	na

**Map with survey points** (Transect, RHIS and Coral Watch sites and Depth pings).



**Figure 1: Survey sites**

**General photos** (reef, people actions)

**Findings** (in regards to methods, team, reef health or other observations)

Reef 21-057 lagoon was difficult to enter except one hour either side of high.

Ridge system throughout lagoonal area creating a bathtub, which was impossible to enter on low tide.

**Dive transect**

- No access to South East site due to wind and swell
- Time limited to only 5 transects due to starting day and sea condition slow to drive between sites, and very big reef.
- D1, D8 and D7 mixture of sand and walls due to protected site of reef and facing neighbouring reef, narrow 1 km wide channel in between.
- Strong current hence growth of seafans and softcorals.

**Snorkel transect**

- Lagoon filled with coral bommies, halimeda covered reefs, deeper sandy pools
- Little water on top making it hard to access
- Echosounder not connecting

- Snorkel tracking GPS disappeared from dry-back/float, float not completely inflated and possible back not closed properly. As a result GPS coordinates of photos need to be calculated based on interpolation between drop off and pickup point
- RHIS not attempted as not enough substrate, Coral Watch just one survey (6 corals only)

### **Plan for tomorrow**

21-068 and 21 – 074

## 4 Wednesday (22 May 2019)

### People:

All

### Weather:

Partly cloudy, 20-25 kn wind, sun, Water Temp 24 degree

High 12:11 pm, low tide 6:28 am

### Activities:

7:00 am Snorkel and Dive boat depart

12:00 pm Snorkel and dive boat return

0:30 pm Kalinda depart to 20-101 site

5:30 pm Kalinda arrived at anchorage

Reef Name: <b>21-068 and 21-074</b>	Dive	Snorkel
People (initials)	CR, EK,JP,EVK	KM,AO,IP,RB
#Quadrat Photos	1739	741
#Photo Transects	5	4
Total Transects length (m)	2191	2087
#Rugosity photos	13040	3578
#RHIS	5	4
#CoralWatch	5	4
#COTS counts	0	0
#COTS samples	0	0
#CCA samples	33 (snorkelling/diving)	
Echosounding pings	2336	na

**Map with survey points** (Transect, RHIS and Coral Watch sites and Depth pings).

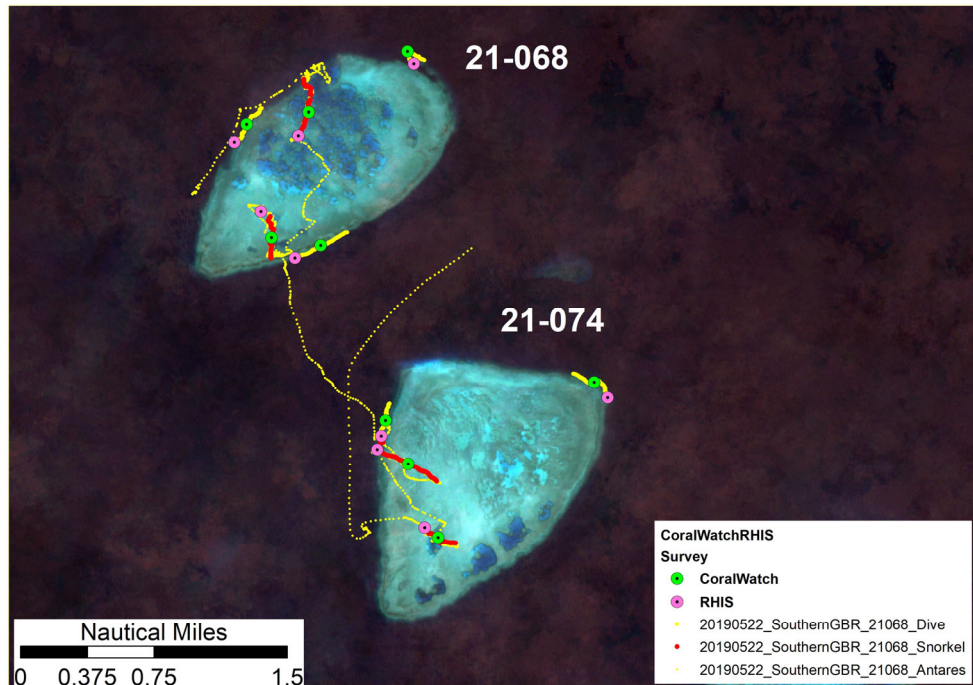


Figure 2: Survey sites

General photos (reef, people actions)



Findings (in regards to methods, team, reef health or other observations)

Dive transects

- All gear worked perfect
- D1 at 21-068 has alternating areas of dense coral (mixed forms and colours) on the slope with rubble



- D2 at 21-068 had large branching rubble area, partly wall but plateauing at location of transect
- D4 at 21-068 high number of mushroom coral, and mixture of other coral, sloping area, with closer to 3 m a small wall.
- D1 at 21-074 high coral cover dominant branching, but also other geomorphs plate and massive, lots of fish, sloping area
- D4 at 21-074 was a field of huge bommies with overhangs and walls, some enormous round mounds and some tall pinnacles.
- 20-074 deeper reef then 20-068, no clear developed reef crest.

#### Snorkel transects

- All gear worked perfect

#### Plan for tomorrow

- Survey 20-085
- Than travel to???

## 5 Thursday (23 May 2019)

#### People:

All



#### Weather:

Clear sky, 10-15 kn wind, Air temp 29 degrees, Water Temp 24 degree  
 RSRC-UQ GBR South Field Trip 1 19 – 28 May 28 May 2019 17

High 12:56 pm, low 7:14 am

**Activities:**

7:00 am Snorkel and Dive boat depart

1:00 pm Snorkel and dive boat return

1:30 pm Kalinda depart to 20-101 site

4:30 pm Kalinda arrived at anchorage

Reef Name: <b>20-385</b>	Dive	Snorkel
People (initials)	EK, KM, RB, AO	CR, EVK, IP, JP
#Quadrat Photos	855	1524
#Photo Transects	5 (D7->D5->D9->D10->D4)	6 (S8->S9->S1->S2->S3->S4)
Total Transects length (m)	2116	3115
#Rugosity photos	1076	7898
#RHIS	4	4
#CoralWatch	5	6
#COTS counts	0	0
#COTS samples	0	0
#CCA samples	43 (snorkelling/diving)	
Echo sounding pings	2462	na

**Map with survey points** (Transect, RHIS and Coral Watch sites and Depth pings).

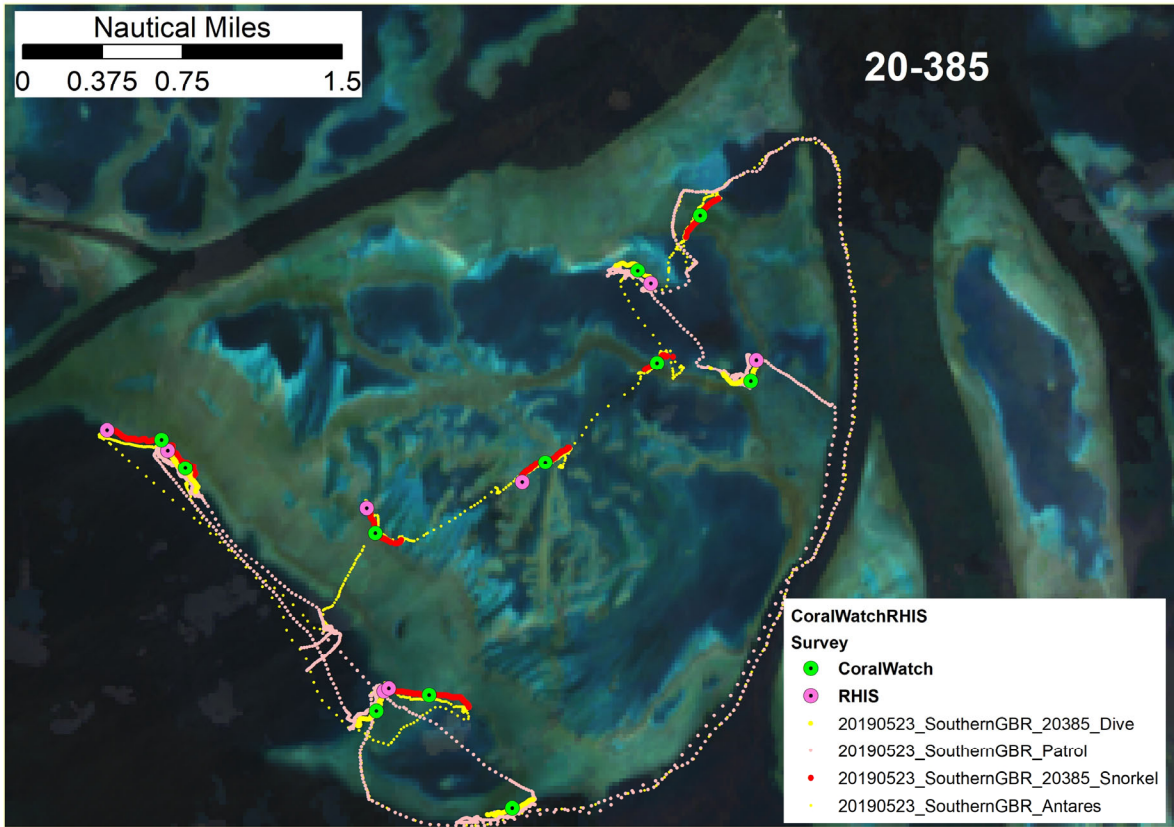
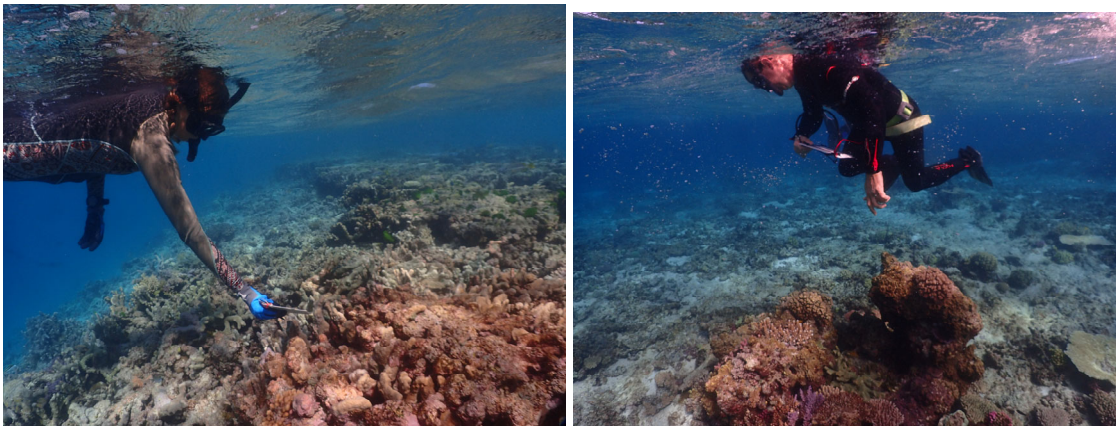


Figure 2: Survey sites

**General photos** (reef, people actions)





## Findings (in regards to methods, team, reef health or other observations)

- Dive Transect
  - o D7 leeward reef slope – scattered rough coral bommies, small fish, rubble and sand
  - o D5 ??
  - o D9 northern side of upper large lagoon – sandy base to depth of ~10m, bommie ridge covered in coral, lots of mushroom coral in 'bloom', active leopard shark.
  - o D10 ??
  - o D4 southern end of eastern channel – large patches of beautiful coral and fish alternating with large patches of rubble/CCA. Gradual slope dropping down to the (not visible) bottom of the channel. Large fish. Maori wrasse. Speedy leopard shark.
- Snorkel Transects
  - o S8 edge of the reef following the reef rim, sheltered site reef rim, classic CCA on the plateau (high amount 80%) and healthy coral before the slope
  - o S9 reef flat, starting with coral algae zone, then hard substrate white with bommies of coral and then more coral before getting in deeper water
  - o S1 reef rim inside lagoon on edges start and end point of transect coral with on north side sandy slope and south side slope with branching coral with rubble, mid reef top hydroid brown and CCA
  - o S2 like S1 but now on the highest point caulerpa and halimeda and CCA
  - o S3 coral plateaus, with slightly sloping rubble areas (past thick branching coral) in deeper sand, large stands of Seriatopora and Acropora thickets in deeper lagoon, plenty of rubble around too
  - o S4 current took us sideways instead of over reef flat – but more thickets of Acropora

## Plan for tomorrow

### 6 Friday (24 May 2019)

#### People:

All

#### Weather:

Clear sky, 15-20 kn wind, Water Temp 24 degree

High 13:49 pm, low 08:06 am

**Activities:**

7:00 am Snorkel and Dive boat depart for Reef 21-101

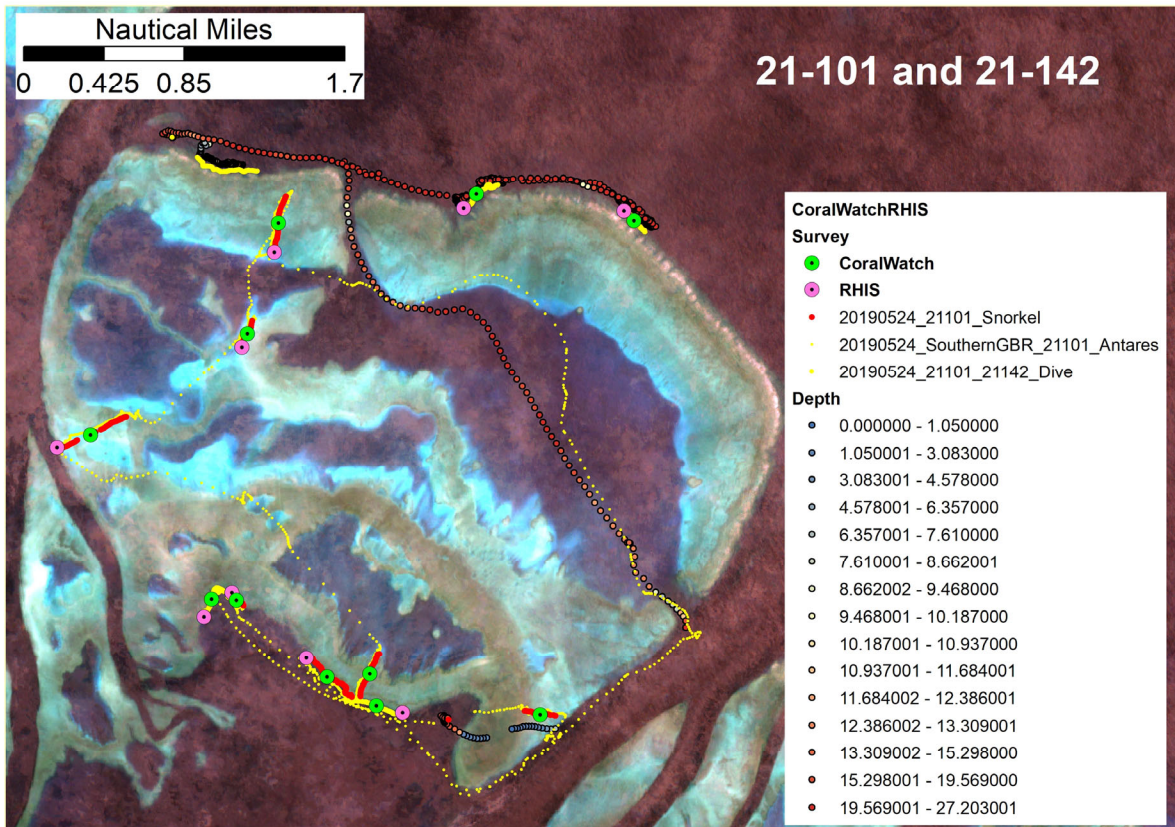
1:00 pm Snorkel and dive boat return – dived to retrieve lost tank and tawny nursesharks

2:30 pm Kalinda depart to 21-147 site (through passage between reefs)

4:00 pm Kalinda arrived at anchorage

Reef Name: <b>21-101 and 21-142</b>	Dive	Snorkel
People (initials)	EVK, CR, JP, KM	IP, AO, EK, RB
#Quadrat Photos	1386	592
#Photo Transects	5 (21-101: D5, D4, D1; 21-142: D1, D2)	7 (S5, S6, S1, S4, S7, S8, S3)
Total Transects length (m)	2302	3153
#Rugosity photos	14440	4840
#RHIS	4	5
#CoralWatch	5	7
#COTS counts	0	0
#COTS samples	0	0
#CCA samples	25 (snorkelling/diving)	
Echosounding pings	1452	na

**Map with survey points** (Transect, RHIS and Coral Watch sites and Depth pings).



**Figure 3: Survey sites**

**General photos** (reef, people actions)



**Findings** (in regards to methods, team, reef health or other observations)

**General**

- Large deep lagoon up to 25 m with narrow openings. Strong currents at openings
- Large shallow lagoon area connected to
- Deep lagoon not always closed, as can have channels leading into it, hence require consideration with the

## Snorkel:

- S5 – parallel to the reef crest on the outer reef flat. Lots of coral and lots of current!
- S6 - parallel to the reef crest on the outer reef flat. Almost like spur and groove – alternating elevated areas of corals, and rubble trenches. Huge Maori wrasse eyeing us off as tasty tid-bits!
- S1 – from northern reef crest to lagoon. Lots of coral close to the reef crest, decreasing in quantity and quality as we were approaching the lagoon. Lots of calerpa on the inner reef flat. Very white sand.
- S7 – deep rubble area with a few coral patches.
- S4 – started on a sandy reef flat, crossed a couple of deep sandy bottom lagoons, to cross the outer reef flat to finish at a beautiful reef crest with stunning corals and deep hidey holes full of fish and coral.
- S3 – started on an elevated low (relative) ridge which consisted of lots of branching corals with a rubble top in the exposed areas. Progressed towards the reef crest where again. Stunning large white, sea snake swimming towards us.
- S8 – very deep sandy/macro algae area to start, changing to a shallower rubble area with small corals.

## Dive

- 21-101-D5(D6-for photo transect) High coral cover large dense thick branching coral with high canopy, foliose coral, high diversity and lots of fish life, sloping protected embayment
- 21-101-D4 rubblely gentle sloping reef with sparse corals – mainly bushy acroporids
- 21-101-D1 Plating coral, strong current towards northern part transect, spurs and groves, gentle slope, pelagic fish, presence of large Maori wrasse. Abort RHIS and CCA survey due to strong current
- 21-142-D1 fast current running westwards along steep outer reef slope - CCA dominated stepped plateau – crest at around 7-9 m and then a drop to about 20 m sandy bottom. Broken profile with spur-and-groove style channels breaking up occasionally into large bommies. Grooves were deep sand filled channels. Top mainly flat hardground CCA dominated with sparse bushy corals (Stylophora dominant) and soft corals.
- 21-142-D2 Plating and bushy coral lower cover with lots of CCA and high turf and slime coral, strong currents

## Plan for tomorrow

### 7 Saturday (25 May 2019)

#### People:

All

#### Weather:

Clear sky, 10-15 kn wind, Water Temp 24 degree

High 14:57; LT 09:08

#### Activities:

7:00 am Dive boat depart for Reef 21-147/148

8:00 am Dive boat depart for Reef 21-147/148

1:00 pm Snorkel boat return

1:30 pm Dive boat return

2:00 pm Kalinda depart to next site 21-160

4:30 pm Kalinda arrived at anchorage

Reef Name: <b>21-147/21-148</b>	Dive	Snorkel
People (initials)	CR, EVK, JP, RB	KM, EK, IP, AO
#Quadrat Photos	2359	1246
#Photo Transects	7 (21-147: D4, D5, D2; 21-148: D3, D1, D9, D10)	7
Total Transects length (m)	3713	3558
#Rugosity photos	17944	7206
#RHIS	7	5
#CoralWatch	7	6
#COTS counts	0	0
#COTS samples	0	0
#CCA samples	25 (snorkelling/diving)	
Echosounding pings	2479	4022

**Map with survey points** (Transect, RHIS and Coral Watch sites and Depth pings).



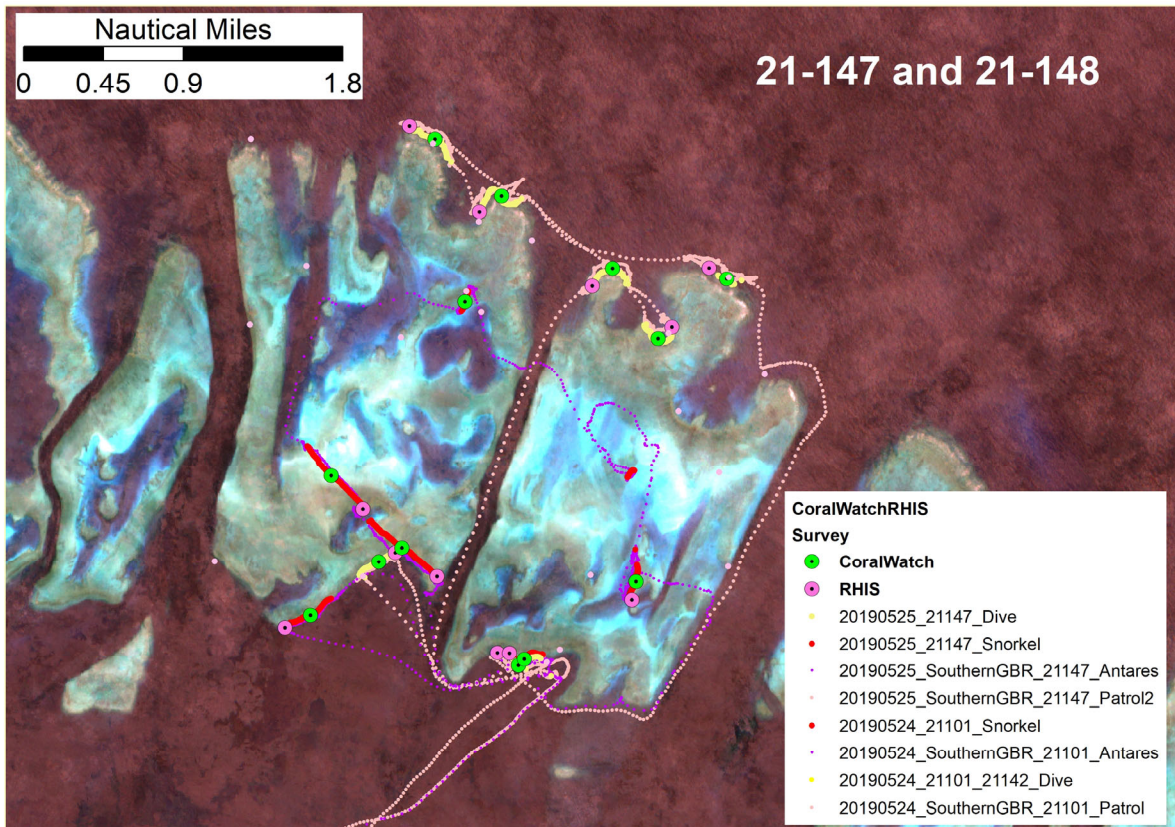


Figure 4: Survey sites

**General photos** (reef, people actions)



**Findings** (in regards to methods, team, reef health or other observations)

**Snorkel:**

Dive

- 21-147 D4 Southern slope mainly rubble, with coral, dense coral growth above 5 m. Rubble consisted out of old branching.
- 21-148 D3 southern slope mainly consolidated rubble with sparse corals, large snappers on a gentle short slope onto mixed sand and rubble (around 8 m) – towards the end of the transect a HUGE house sized Porites coral at least 3 pixels big.

- 21-148 D1 Gentle slope, with spur groves, some coral and cca, mostly plate, bushy.
- 21-147 D5 exposed slope on northerly edge, began as wall with some tabulate Acropora but became a sloping terrace dominated by Porolithon CCA crust – crest flattened and stopped at around 6 m and then gently rolled down at a very flat angle. Amazing number of very small green Porites all 5-7 cm in size covering whole reef
- 21-147 D2 Deep spur groove system coral cover and specifically on spurs dense plate coral
- 21-148 D9 shallow broken slope onto sandy area around 8 m deep looked like a reef in recovery – dominated by Isopora (some dead intact structures being resheathed) growing on dead Isopora framework thick consolidated rubble
- 21-148 D10 Mixture of coral with large rocky formations underwater strong current suggested by type of coral and lining present in sand.

Presence of narrow channels Deep from North to South with strong currents.

Equipment need

### **Plan for tomorrow**

- Survey 21-160/162
- Travel to reef 20+ nm from current location in direction of Mackay.
- Underestimated travel time

## 8 Sunday (26 May 2019)

### People:

All

### Weather:

Clear sky, and rain 10-15 kn wind, Water Temp 24 degree

High 14:57, LT: 09:08

### Activities:

7:00 am Snorkel and Dive boat depart for Reef 21-160, 21-162

12:00 pm Return Snorkel and Dive boat

12:30 pm Kalinda depart to next reef 21-117, 21-119

2:45 pm Antares and snorkel team go to conduct surveys at 21-117/119. Kalinda proceed to anchorage at 21-117

2:30 pm Kalinda arrived at anchorage 21-117

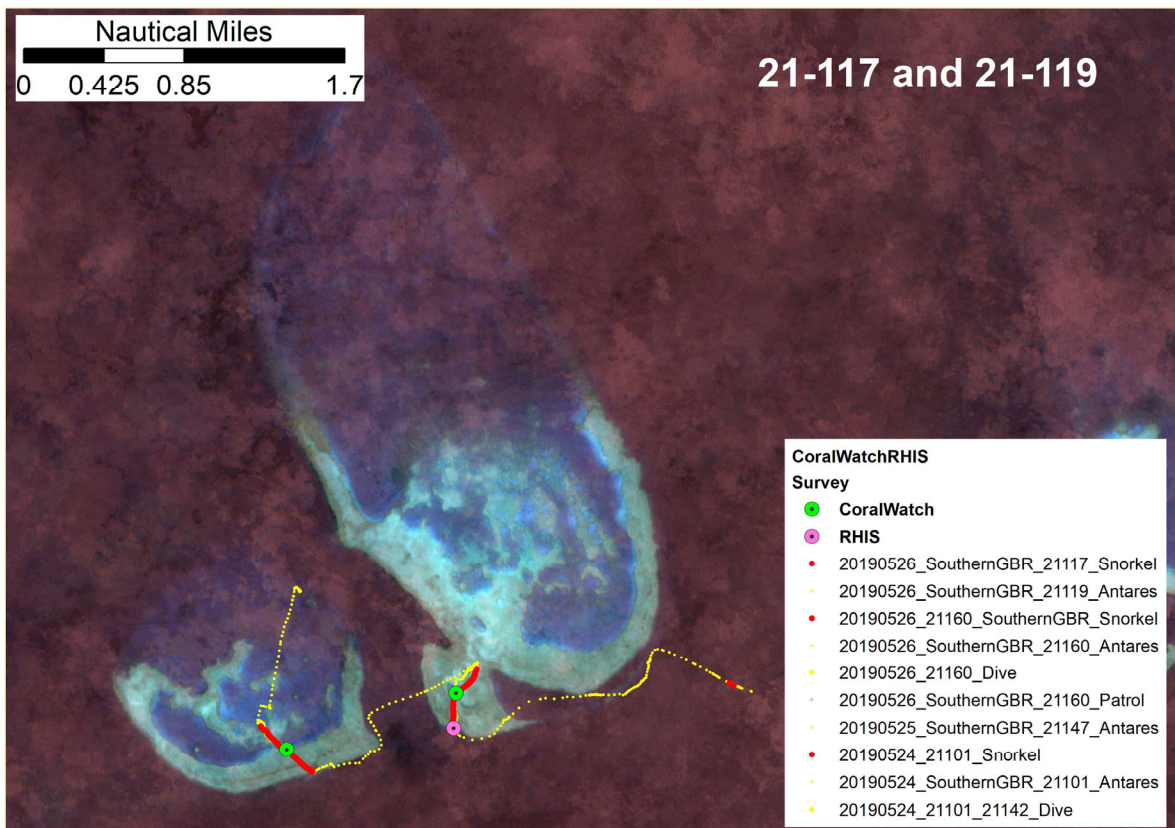
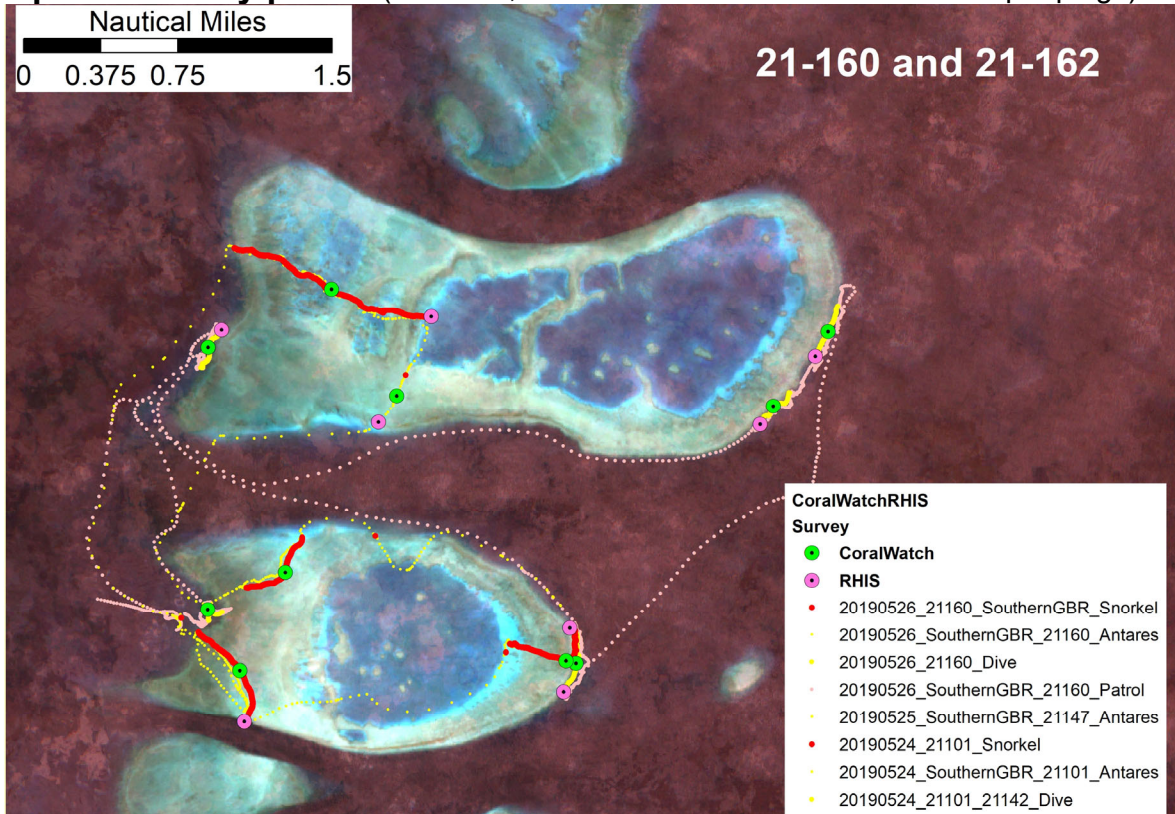
4:20 pm Snorkel team returns.

Reef Name: <b>21-160, 21-162</b>	Dive	Snorkel
People (initials)	EK, KM, AO, RB	EVK, JP, CR, IP
#Quadrat Photos	1016	2477
#Photo Transects	5	7
Total Transects length (m)	2259	4693
#Rugosity photos		
#RHIS	4	4
#CoralWatch	5	5
#COTS counts	0	0
#COTS samples	0	0
#CCA samples	32 (snorkelling/diving)	
Echosounding pings		2152

Reef Name: <b>21-117, 21-119</b>	Dive	Snorkel
People (initials)	n/a	CR, KM
#Quadrat Photos		328
#Photo Transects		2

Total Transects length (m)		1345
#Rugosity photos		
#RHIS		1
#CoralWatch		2
#COTS counts		0
#COTS samples		0
#CCA samples		10
Echosounding pings		

**Map with survey points** (Transect, RHIS and Coral Watch sites and Depth pings).



**Figure 5: Survey sites**

**General photos** (reef, people actions)



## **Findings** (in regards to methods, team, reef health or other observations)

### Dive Transects:

- 21-162 D1 – strong current towards the reef crest (not evident from surface) pushed divers towards crest. Lots of Acropora, gardens of branching coral
- 21-160 D5 – lee reef – large coral bommies, lots of diversity, swarms of huge fish and a chaperone Maori wrasse.
- 21-162 D4 – complex terrain with big coral formations with channels filled with rubble and sand. Lots of cyanobacteria growing on the rubble.
- 21-160 D2 – essentially a wall with outcrops and overhangs, beautiful diversity of coral.
- 21-160 D3 – Sloping reef with areas of rubble with complex terrain, good coral diversity.

### Snorkel Transects:

- 21-162 S4 Going with current W→E, reef flat very shallow starting with dense coral, but varying between cyanobacterial cover/slime algae over pavement. Areas with dense coral in between, and then areas with forams and then going to edge with very healthy coral.
- 21-162 S2 W→E in lagoon sand with bommies, and then going to coral, and coral rubble and large coral heads, going to plate corals on the edge into deep water after crest
- 21-162 S2 (over reef rim), following crest large areas with plate coral in pastel colours
- 21-162 S1 N→ W, sandy area with hallimeda stands covered in slime algae going into reef area with coral and forams regions
- 21-160 S3, Lagoon via flat to slope from E→W, starting with reef bommie, then sand with thick branching coral, then with CCA rubble region like reef rim, going into sandy lagoonal areas with rubble surrounding thick branching coral, then going into shallow areas with coral, finishing on the western site with large coral beds. In shallow areas also cyanobacterial cover/slime algae over pavement and areas with forams.
- 21-117 S2, S→N, coral, into cca rubble reef rim zone but not well defined.
- 21-119 S2, S→NW, rubble zone, reef rim area with dead coral and rock rubble, going into coral area with steep drop offs in to lagoon with in lagoons areas with branching coral in deep water.

## **Plan for tomorrow**

Survey remaining 21-117/119 and steam to Mackay

## 9 Monday (27 May 2019)

### People:

All

### Weather:

Clear sky, 5-10 kn wind, Water Temp 24 degree

High 10:00 am

### Activities:

7:00 am Snorkel and Dive boat depart for Reef 21-117/119

11:00 am Return Snorkel and Dive boat

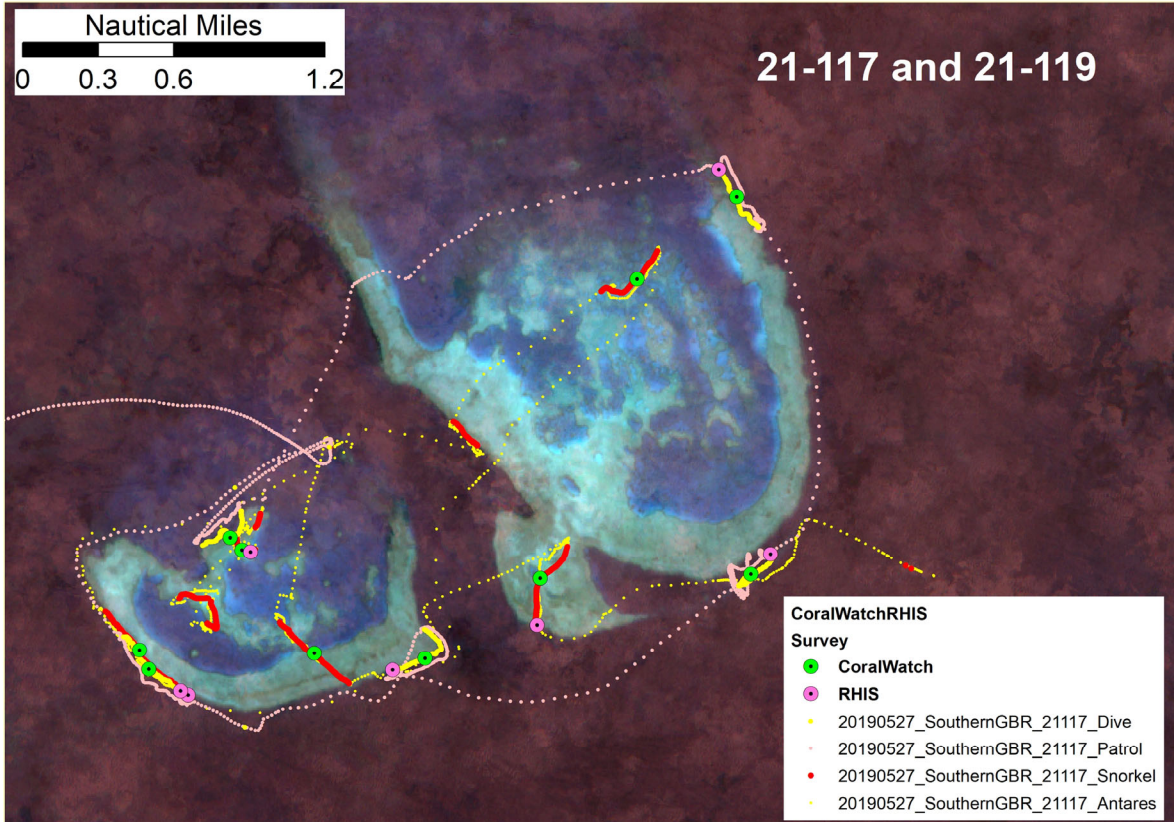
JP stayed on board to further improve photo transect software user interface.

12:30 pm Kalinda depart to Mackay

Reef Name: <b>21-117/119</b>	Dive	Snorkel
People (initials)	CR, EVK, AO, EK	KM, IP, RB
#Quadrat Photos	2321	905
#Photo Transects	5	4
Total Transects length (m)	2793	2755
#Rugosity photos		
#RHIS	4	4
#CoralWatch	4	3
#COTS counts	0	12
#COTS samples		14
#CCA samples	20 (snorkelling/diving)	
Echosounding pings	1253	2491



**Map with survey points** (Transect, RHIS and Coral Watch sites and Depth pings).



**Figure 6: Survey sites**

**General photos** (reef, people actions)



## **Findings** (in regards to methods, team, reef health or other observations)

### General

- Coral
  - o Lots of disease observed
  - o Branching coral in deep water of lagoon
  - o Plate corals on north eastern site
- Other
  - o Snakes and sharks observed
  - o Various Napoleon fish
  - o COTS 14 on transect

### Snorkel transects

### Dive Transects

- 21-119-D2, Current going East, dive W→E, branching, foliose, coral and nine sharks sighted, sloping reef up to 4 m, then wall up to 0 m.
- 21-119-D1
- 21-117-D1 Current going East, dive W→E starting but then change as dive was around a secondary barrier that reached shallowest 5 m, lots of rubble, plate and bushy coral with various deceases sighted.
- 21-117-D3
- 21-119-D3 Lagoonal dive, sloping reef up to 4 m, then wall up to 0 m, branching coral, big bolder corals, lots of fish life

### Site names

- Note site name and time right on start slate photo transect so no confusion with processing.
- Dive logs, coral watch, RHIS slates should check site name with photo transect name.

## **Plan for tomorrow**

Arrive in Mackay

JP, AO, IP, RB depart

DS, KJ and MR arrive

Depart south of GBR

## 10 Tuesday (28 May 2019) Change over Day

### People:

JP, AO, IP, RB depart

DS, KJ and MR arrive

### Weather:

Clear sky, 10-15 kn wind, Water Temp 24 degree

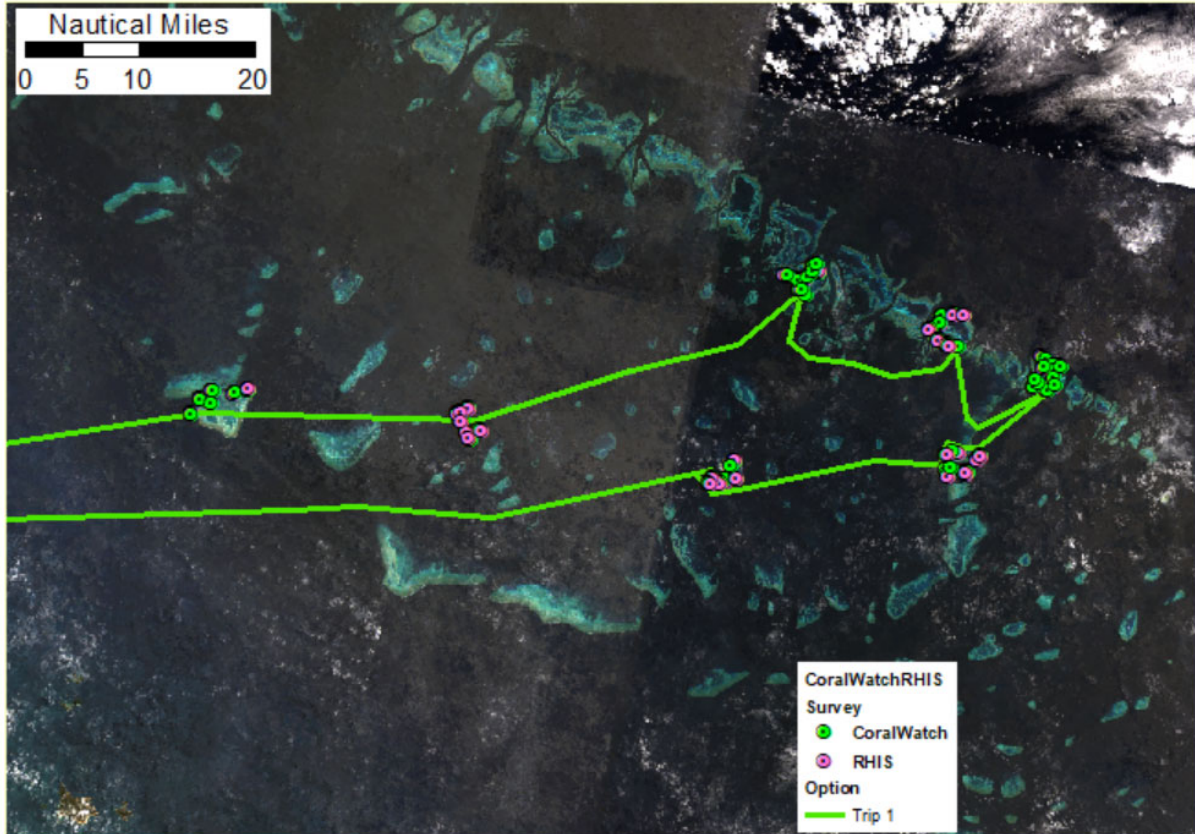
High 8:30 am

### Summary Activities Trip 1:

Steamed approx. 320 nm with MV Kalinda, visited 10 reefs

Reef Name: <b>Summary</b>	Dive	Snorkel
People (initials)	KM, EVK, EK, RB, AO, JP, CR	KM, EVK, EK, RB, AO, JP, CR, IP
#Quadrat Photos	11144	7672
#Photo Transects	32	31
Total Transects length	17377 m	21186 m
#Rugosity photos	90770 (Left+right)	169112(Left+right)
#RHIS	60(snorkelling+diving)	
#CoralWatch	72(snorkelling+diving)	
#COTS counts	0	14
#COTS samples	0	14
#CCA samples	199 (snorkelling+diving)	
Echosounding pings	24326 (snorkelling+diving)	

**Map with survey points** (Transect, RHIS and Coral Watch sites and Depth pings).



*Figure 7: Survey sites over 10 reefs*



