



Monitoring, Citizen Engagement, Dive Shop Collaboration and Treatment Trials in the Turks and Caicos Islands.

Alice Zimmermann



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2 In-person training sessions ID, diagnosis, monitoring, treatment

4 online Zoom training sessions (50 participants total)

4 section YouTube training videos created from Zoom sessions

70 + Volunteers trained in basic coral ID of the 15 most common/susceptible species, Diagnostic Differentiation and monitoring protocol.

200+ Surveys over 30+ dive sites This does not include surveys done by SFS in South Caicos but does include surveys done by trained volunteers on the Turks Bank.

750+ Hours of in water volunteer time surveys, treatment site set ups, treatment, monitoring

750 + Tanks filled by dive shops Without this, our work would not be possible. At \$10 a tank (retail), this is a significant donation.

Survey data being entered into AGRRA online tool This will make extrapolation of specific data points easier for comparison with other places.



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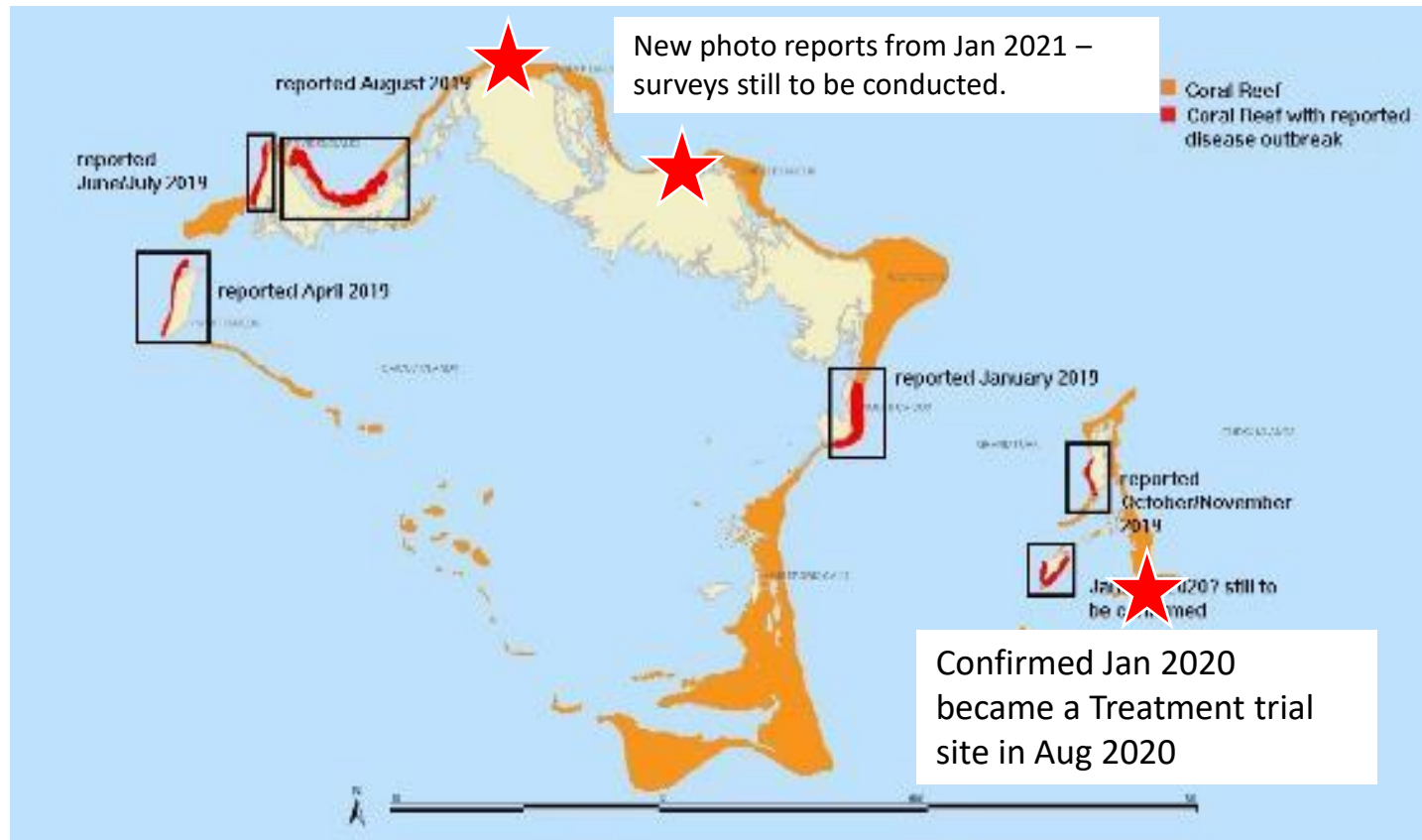
Lessons learned about monitoring SCTLD

- When we had no SCTLD
- When we suspected SCTLD
- Once we confirmed SCTLD was in the territory
- When treatment trials got underway
- Coral tagging plans going forward

- Engaging volunteers in SCTLD monitoring
- Engaging dive sector in SCTLD monitoring
- Photography for SCTLD monitoring



In the Beginning....



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NO SCTL D? – Get landscape shots with scale bar. Invaluable comparative images.

I wish we had taken pre-SCTL D reef-scape photos in TCI.

DECR Officer Richard 'Pepp a' of DECR doing fish counts during our East Caicos expedition



Pre SCTL D monitoring in TCI:

- **SFS** – Coral Point Count surveys – most detailed pre-SCTL D estimates of relative species abundance in some representative sites
- **DECR** – AGRRA surveys in 2019 just before SCTL D – first ones since 1999 – Coral monitoring program reinstated before COVID – Not possible since, plans to resume.

Visual comparisons help connect stakeholders and legislators



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Suspected SCTLD?

- Take photos, lots of photos!
- Submit to your local Gov agency, Environmental NGO or AGRRA.
- Use existing resources to engage local stakeholders, especially Dive and Watersports operators. Encourage decontamination and moving from 'clean' to 'dirty'



MPAConnect guide to detect **Stony Coral Tissue Loss Disease** on Caribbean coral reefs


A partnership between: **GCH** and **CORAL REEF**

Be Alert!


A new coral disease is causing high mortality of stony corals. Cause is unknown but it is water-borne and may spread via direct contact.

Take care not to confuse with other coral diseases, bleaching or fish bites.

Correct field diagnosis depends on multiple factors.




Bare skeleton with no tissue




Sloughing away of tissue

Total loss of affected tissue


Highly susceptible species



Eusmilia fastigiata




Dendrogyra cylindrus




Dichocoenia stokesii


Typical order of infection




Meandrina meandrites




Pseudodiploria clivosa



Diploria labyrinthiformis




Colpophylia natans




Pseudodiploria strigosa


High prevalence and mortality



Orbicella species



Montastrea cavernosa



Siderastrea siderea

Rapid spread
Within one week to two months

High prevalence and mortality
Among susceptible species

- ~2-3% Normal background disease prevalence
- 66-100% Species-specific Stony Coral Tissue Loss Disease prevalence

On coral colonies
Multiple lesions

Rapid mortality

On dive sites
Rapid spread among corals

What can managers do?

- 1 Monitor highly susceptible species via roving diver surveys
- 2 Monitor sentinel sites weekly – old, large, healthy, spawning colonies
- 3 Monitor suspected cases every three days to weekly, take photos, note date and location
- 4 Inform your agency about new threat, seek contingency support, investigate supplies for treatment
- 5 Inform relevant stakeholders, encourage reporting
- 6 Prevent spread – wash dive gear in lots of fresh water and sun dry, disinfect survey tools, dive on clean sites before infected sites
- 7 Promote ballast water management, exchange ballast offshore and not on coral reefs
- 8 Seek training in protocols for treatment of priority corals

February 2019
Coral photography: K. Neely, Nova Southeastern University; Graphic Design: ©2019 Deviste Design

Contact MPAConnect for advice and training mpaconnect@gcfl.org
For more information, see <https://floridakeys.noaa.gov/coral-disease/>
and <https://www.gcfl.org/emerging-issues-florida-coral-disease-outbreak/>

Confirmed SCTL D? – Survey, survey, survey.

- Repetitive surveys.
- Try to find disease ‘frontline’
- Are species infection rates and order the same as elsewhere?

Sample Size Matters – challenges of non-spatially defined surveys.

Surveys **have been** time-based, but with relatively dense coral cover here, we’ve been able to survey the **200 minimum** that Judy’s requested for the new surveys for the AGRRA website.

We’ve been able to do this with teams of 3 volunteers or repetitive dives with one surveyor on same site.

Larger samples = better data



Treatment trials and monitoring for efficacy

Early 2020 – TCRF given Research Permit to conduct efficacy testing of Amoxicillin in Base2B on 3 dive sites. DECR to do comparative testing of Chlorine based treatment.

Covid-19 hits – Only one transect on one site treated so far but 3 more test sites on Turks Bank approved by DECR.

272 Corals tagged across 6 sites by late autumn 2020.

200 of the corals are treated

80-90% efficacy rate over 157 colonies. All sites analysed except Site 3 Pinnacles where 43 colonies are still waiting for final efficacy calculation



Maps, Transects and Monitoring

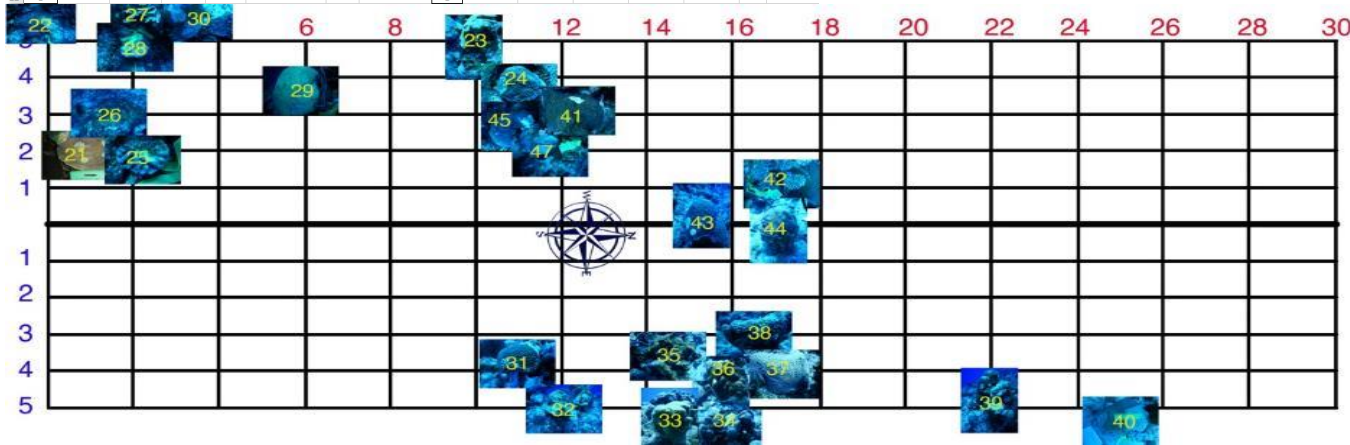
Transect	Distance along transect (m)	Dist perpendicular to transect (m)	direction from transect	tag #	species	TIC	Notes	Transect	Distance along transect (m)	Dist perpendicular to transect (m)	direction from transect	tag #	species	TIC	Notes
1	-2.4	5.4	W	46?	DLAB	T		1	25.6	10.1	E	40	DLAB	C	
6	-1	5.37	W	22	MNEP	T		1	21.9	4.54	E	39	DANN	C	
7	-1	3.7	W	21	DLAB	C		1	17.4	2.9	E	38	MCAV	C	
8	0	2.5	W	26	AGAP	C		1	17	4.15	E	37	DLAB	T	
9	0.35	2.9	W	27	DFAV	T		1	16.65	4.3	E	36	DFAV	C	
10	0.9	1.9	W	25	MNYCT?	C		1	15.85	6.1	E	34	DANN	T	
11	1.8	4.8	W	28	DFAV	C		1	15.7	5.8	E	33	DSTD	T	
12	2.61	6.24	W	30	AGAP	C		1	15.4	4	E	35	AGAP	T	
13	5.9	3.71	W	29	DLAB	T		1	11.8	5.15	E	32	DFAV	C	
14	10.37	4.81	W	23	DFAV	C		1	11.1	3.7	E	31	MCAV	T	
15	10.9	3.95	W	24	MCAV	T		1							
16	11.3	3.35	W	45	AGAP	T		1							
17	11.3	2.45	W	47	DANN	C		1							
18	11.8	2.75	W	41	MCAV	T		1							
19	15.5	s	W	43	MCAV	C		1							
20	17.3	1	W	42	MCAVSSID	C		1							
21	17	0	W	44	DFAV	T		1							
22	1							1							

‘Fishbone’ map to help relocate colonies during revisits.

Terraslate – a great tool – I’ve reused the same data sheets repeatedly over 1.5yrs

5m belt helps make colonies easier to find again.

Visual representation created to show ‘clusters’ of infected corals along transect.



Treatments going forward...

Expansion permit approved

Plan to treat large, priority, reproductive colonies

1000 custom tags to engage divers

Proposals to help test alternative treatments underway

Working with partners across the region to share knowledge, experiences and data.



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Getting a Team together – Volunteer recruitment



**Turks & Caicos Islands Reef Tract
Stony Coral Tissue Loss Disease
Observer Training**

Alizee Zimmermann
Turks & Caicos Reef Fund
March 2020

Adapted from FL SeaGrant
SCTLD Observer Training.
With help from Judith Lang
and AGRRA

**TURKS & CAICOS
REEF FUND**



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Engaging stakeholders – DIVE SHOPS



Contacted all shops – 6-10 out of approx. 20 engaged

Those who actively help – Promote them on Social Media, thank them publicly

Dive tanks and open spots on a boat have been instrumental to our work!



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Last Minute charter on the Turks & Caicos Aggressor

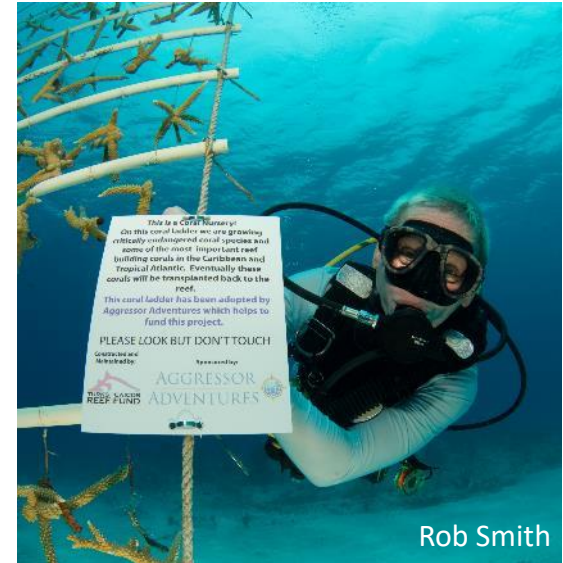
Dive shops and liveboards are still not running per normal due to Covid-19 –

Reach out about potential trips or highly discounted rates for surveying – often companies want their boats to run and this could be a win/win.

Are they interested in sponsorship?

TCRF are working on creating a marketable itinerary for Aggressor guests.

1-3 x per year we will send a ‘group leader’ on a dive charter and do daily class sessions, in-water sessions and create a fun, dynamic, educational and engaging charter that repeat guests love!



Rob Smith



Rob Smith



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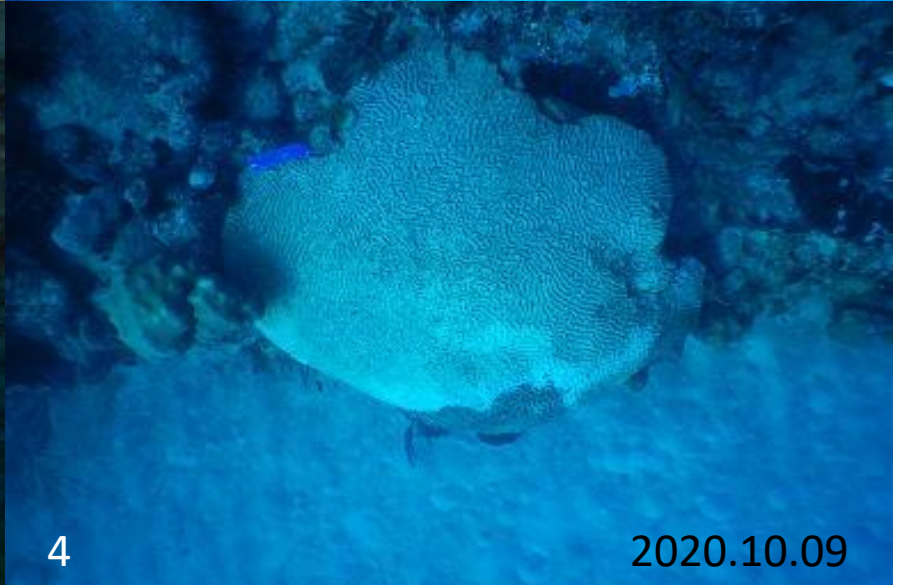
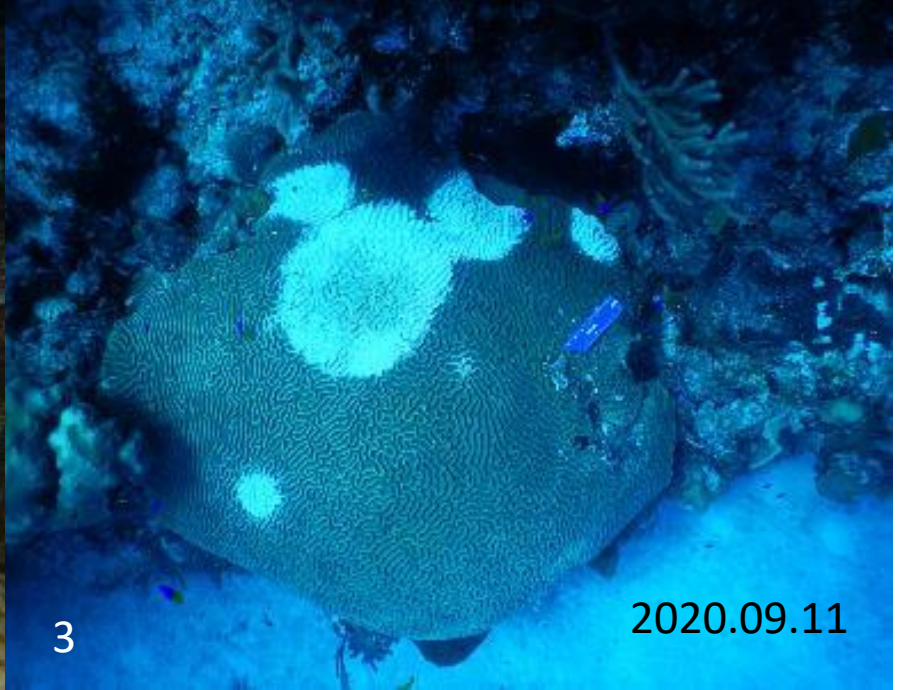


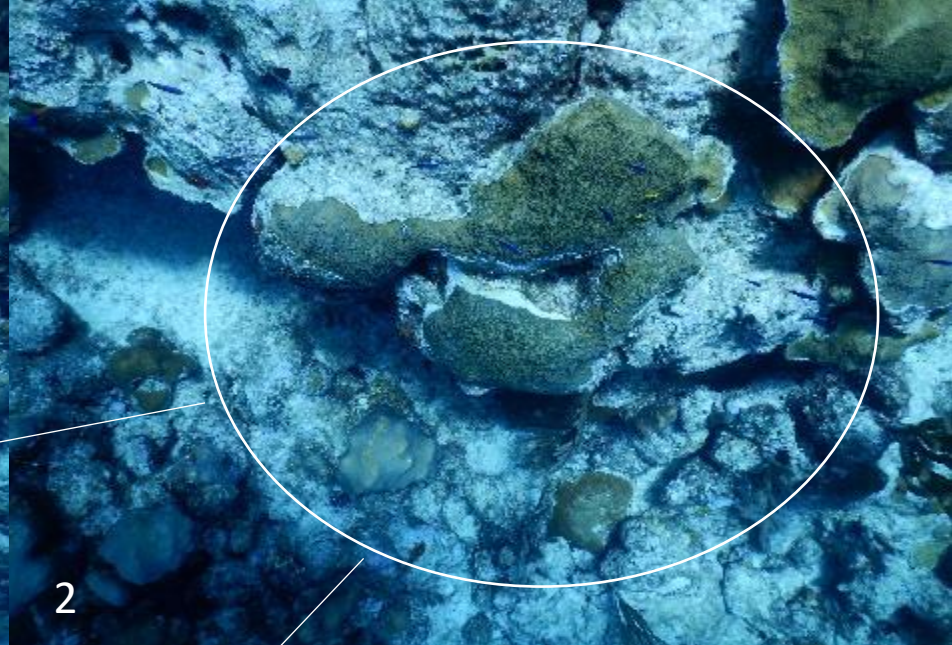
Photography based on Survey Objectives:

Are you surveying for general reef-wide infection? – Landscape photos with a scale bar

- Landscape photos help corroborate surveys
- Show reef-wide impact
- Show speed of spread – especially during initial outbreak/ many bright white lesions







1. Tag in this photo can be used as scale. A scale bar or ruler would be better. In the field, use what you can.
2. Get closer
3. Get closer and use 'flash' and 'macro' modes

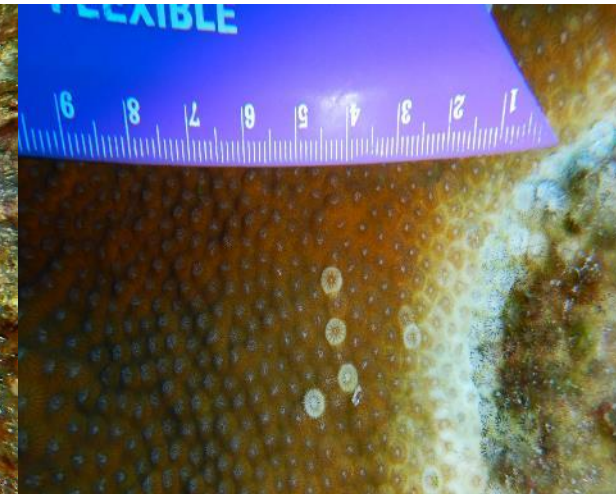
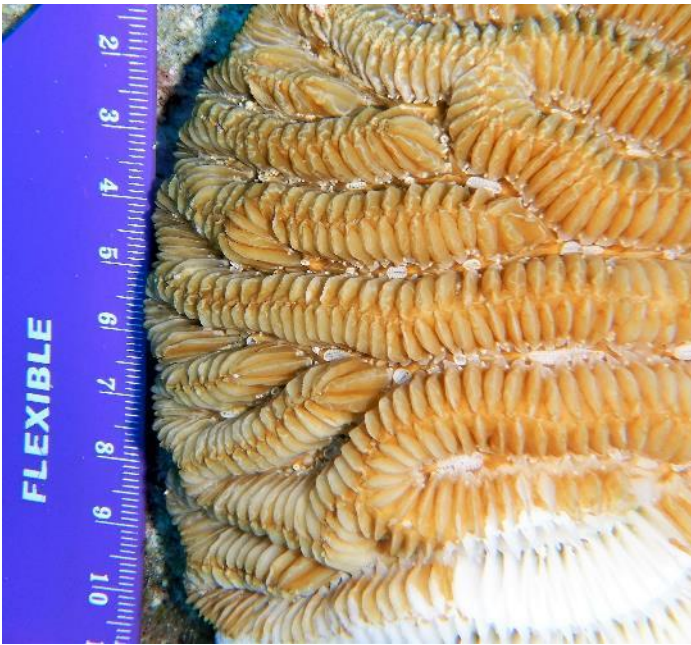
Get Progressively Closer!



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Take photographs (with scale when possible) of things that just don't seem right, or that you've not seen before...



Starting top left going right:

- Open mouth response MMEA
- Polyp remnants on MCAV killed by SCTLD
- Single polyp lesions on OFAV

KEEP THE HOPE ALIVE – PHOTOS OF RECRUITS AND HEALTHY SUSCEPTIBLES



Be careful of exposure and flash in wide angle shots

Take photos from the same angle and add 6penny nails to demarcate treatment (if possible)



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2020.08.09

Katharine Hart



2021.01.09

Katharine Hart

Large MCAV in Grand Turk

Side-by-side monitoring photos
help engage community and legislators

SUCCESS!



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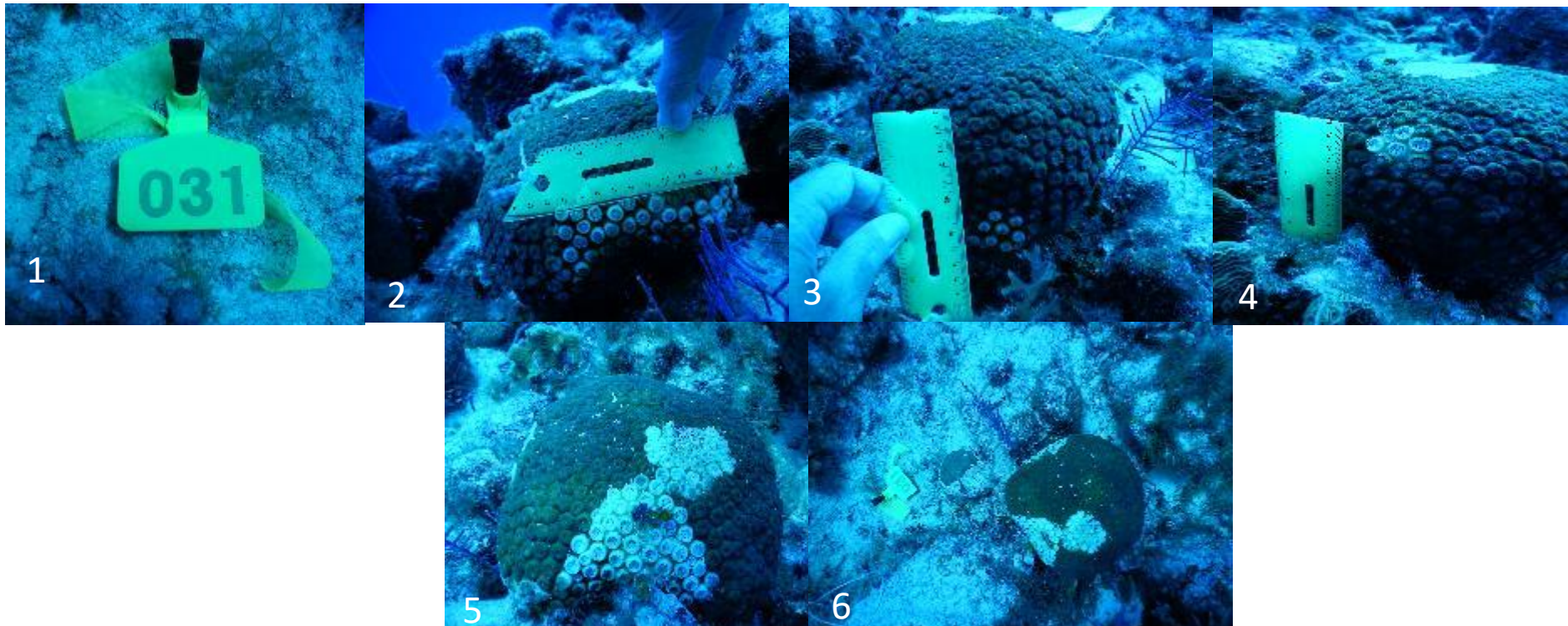


Photographing Tagged Colonies


Minimum of 6 photos per colony.

1- Tag 2-5 – Starting at tag take photos on all 4 'sides' 6 – Photo from above

Digital is free – the more the better.



The Visual Power of Photo Montages



TURKS & CAICOS REEF FUND

DIPLORIA LABYRINTHIFORMIS

GROOVED BRAIN CORAL

Colony tag #29 - Treatment colony - 6 month update




fig.1
Lesion on S edge of colony. Treated on 2020.03.07




fig.3
2020.05.11 - After 7+ weeks treatment line has algae but disease progression has stopped




fig.5
2020.08.28 - 6.5 months later this colony is still showing no signs of disease progression or reinfection




fig.2
Lesion on N edge of colony. Treated on 2020.03.07




fig.4
2020.05.11 - Disease has been halted




fig.6
2020.08.28 - 6.5 months later this colony is still showing no signs of disease progression or reinfection



fig.1
2020.03.06 - This colony has several active lesions




fig.2
Close up of SCTLD lesion on Montastrea Cavernosa. Live tissue can be seen sloughing off



fig.3
2020.03.20 - Lesions have grown and coalesced in places

MONTASTREA CAVERNOSA

GREAT STAR CORAL

Colony tag #43 - Control colony



TURKS & CAICOS REEF FUND

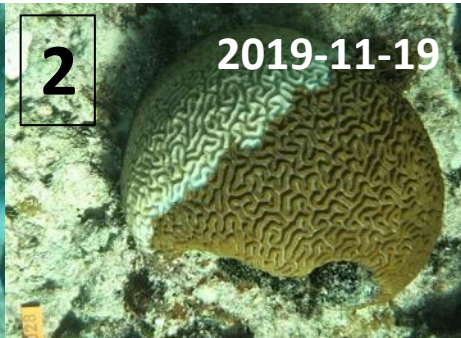


1

2020-03-04



2020-05-18



2

2019-11-19



2019-11-27



2020-01-16

all dead

#2,3 = controls



4

2019-10-10

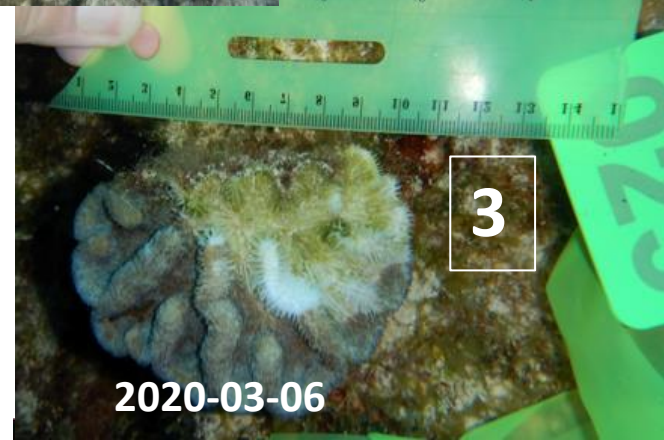


2019-11-20



all dead

2020-04-



3

2020-03-06



2020-03-20

all dead

#1,4 = Amoxicillin treatment

DLAB 'Grooved Brain
Coral' leggings
Designed by local
company T SEA I



Alizee Zimmermann
Executive Director
Turks & Caicos Reef Fund
alizee@tcreef.org



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