

Stony Coral Tissue Loss Disease

Strike Team Training

Part I: Susceptible Coral Species Identification



CORE Strike Teams- Tier System

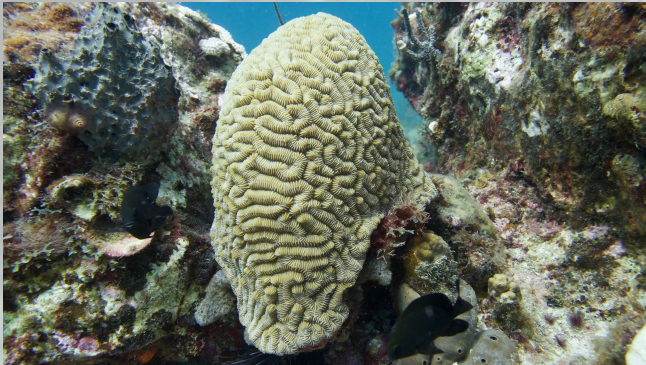
- **Tier III- Strike Team Volunteer**
 - Has completed classroom and in-water training sessions
 - Can conduct roving diver surveys; can safely be a support diver for Intervention diver
 - Can NOT perform interventions
- **Tier II- Intervention Diver**
 - Has completed classroom and in-water training sessions; has completed adequate number of intervention dives as support diver
 - Determined at the discretion of the field lead prior to a dive day
 - Can perform interventions under supervision of field leader only
- **Tier I- Strike Team Field Leader**
 - Can lead, guide, and organize intervention dive days (under direction of Strike Team Coordinator and Coral Disease Response Coordinator)
 - One Strike Team Field Leader must be present for all intervention dive days
 - Specifically identified and approved by Strike Team Coordinator and Coral Disease Response Coordinator

The Highly Susceptible Species

<u>Common Name</u>	<u>Scientific Name</u>	<u>Species Code</u>
Maze Coral	<i>Meandrina meandrites</i>	MMEA
Elliptical Star Coral	<i>Dichocoenia stokesii</i>	DSTO
Pillar Coral	<i>Dendrogyra cylindrus</i>	DCYL
Smooth Flower Coral	<i>Eusmilia fastigiata</i>	EFAS
Boulder Brain Coral	<i>Colpophyllia natans</i>	CNAT
Grooved Brain Coral	<i>Diploria labyrinthiformis</i>	DLAB
Symmetrical Brain Coral	<i>Pseudodiploria strigosa</i>	PSTR
Knobby Brain Coral	<i>Pseudodiploria clivosa</i>	PCLI

Meandrina meandrites - MMEA

Maze Coral



Tan to yellow-brown hemispherical shaped heads or flattened plates. Mazes of ridges have a zipper-like appearance.

Dichocoenia stokesii -DSTO

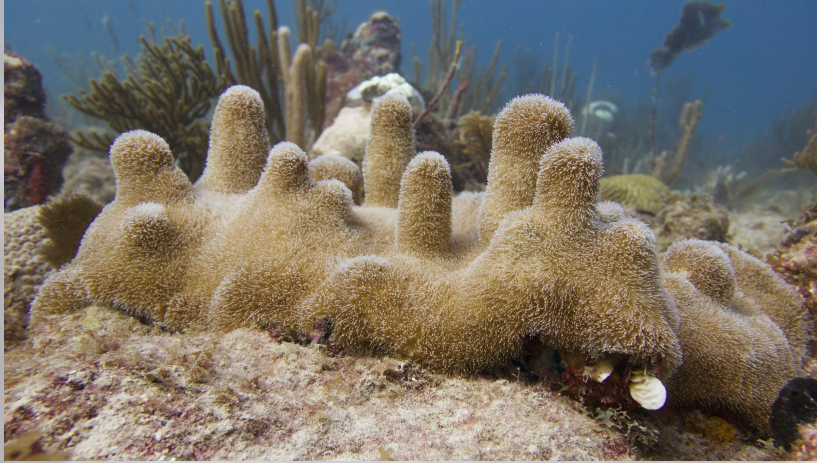
Elliptical Star Coral



Yellow-brown or cream colored domed heads with protruding round, oval, or "y" shaped corallites.

Dendrogyra cylindrus - DCYL

Pillar Coral



Tan to brown pillar like columns. Polyps are extended during the daytime giving a hairy appearance.

Eusmilia fastigiata - EFAS

Smooth Flower Coral



Hemispherical mound with yellow-brown widely spaced round or oval tubular projections.

Colpophyllia natans - CNAT

Boulder Brain Coral



Large rounded domes or plates. Ridges are typically brown with wide valleys being green, tan, or whitish.

Diploria labyrinthiformis - DLAB

Grooved Brain Coral



Tan to yellow-brown hemispherical heads. Double ridges and sometimes deep valleys.

Pseudodiploria strigosa - PSTR

Symmetrical Brain Coral



Hemispherical domes or plates. Evenly rounded ridges and connected long narrow valleys. Has distinct light line at the top of its ridges

Pseudodiploria clivosa - PCLI

Knobby Brain Coral



Yellow- brown or bluish-gray hemispherical domes or encrusting with irregular knobs. Typically only found in very shallow water (~15ft or less)

The Intermediately Susceptible Species

<u>Common Name</u>	<u>Scientific Name</u>	<u>Species Code</u>
Great Star Coral	<i>Montastrea cavernosa</i>	MCAV
Mountainous Star Coral	<i>Orbicella faveolata</i>	OFAV
Lobed Star Coral	<i>Orbicella annularis</i>	OANN
Boulder Star Coral	<i>Orbicella franksi</i>	OFAV
Smooth Star Coral	<i>Solenastrea bournoni</i>	SBOU
Blushing Star Coral	<i>Stephanocoenia intersepta</i>	SINT
Massive Starlet Coral*	<i>Siderastrea siderea*</i>	SSID*

Montastrea cavernosa - MCAV

Great Star Coral



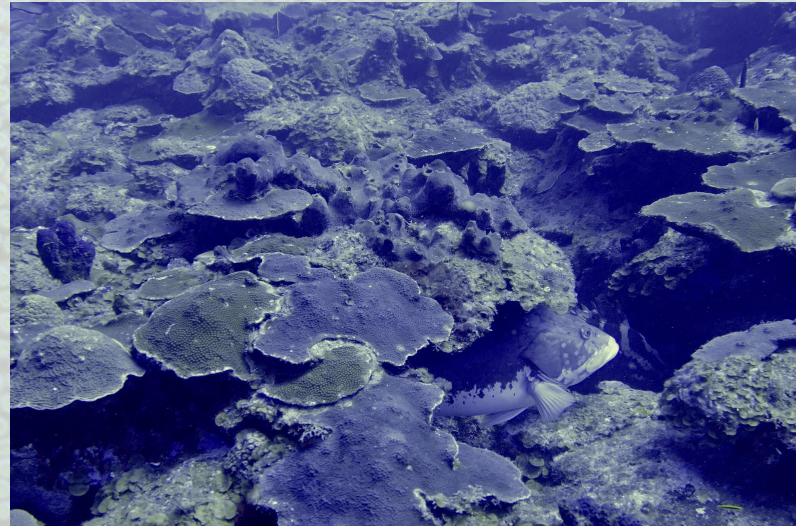
Green, brown, gray, or fluoresce red orange massive fleshy mounds and domes. Large, except corallites. Polyps usually retracted during the day, but can sometimes be seen extended. Sometimes have bright green polyps

Orbicella Faveolata- OFAV

Mountainous Star Coral

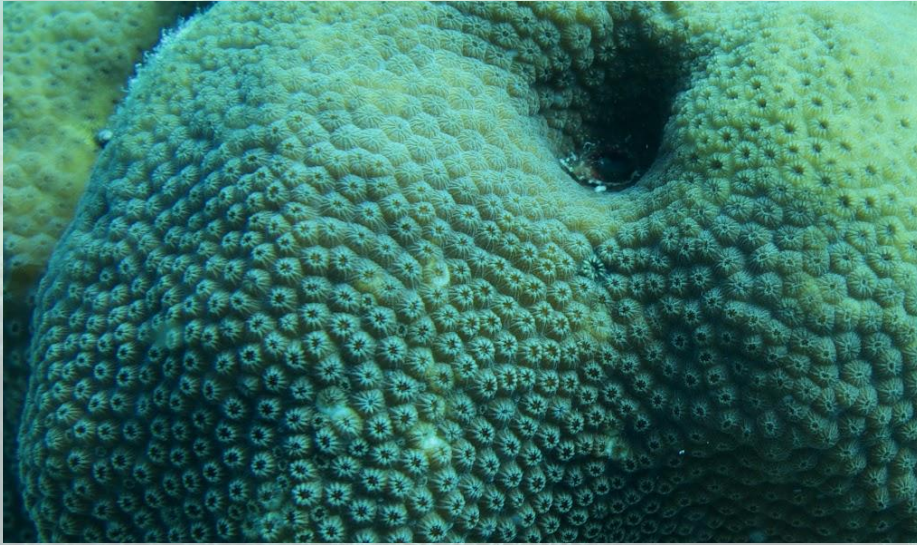


Large mounding or plating colony, red-brown, brown, green, yellow in color. Small excerpt polyps. Has bumps along regular ridges



Orbicella annularis- OANN

Lobed Star Coral

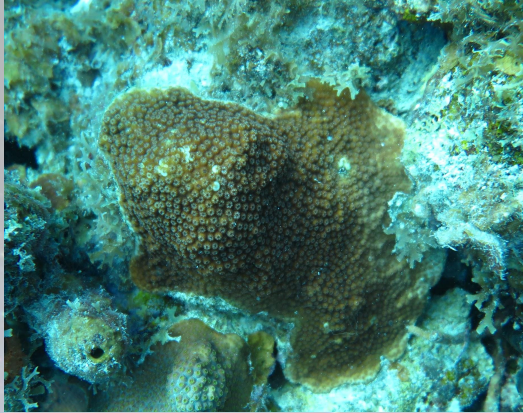


Larged semi-hemisphere colonies made of separate pillars or "lobes". Yellow to brown in color, with very small excerpt polyps.

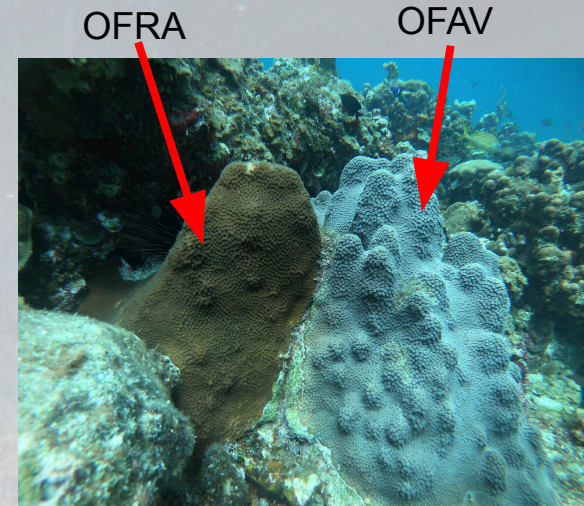


Orbicella Franksi- OFRA

Boulder Star Coral



Large mounding or plating colony with small irregular bumps, red-brown, brown, green, yellow in color. Small excerpt polyps. Typically found in deeper water

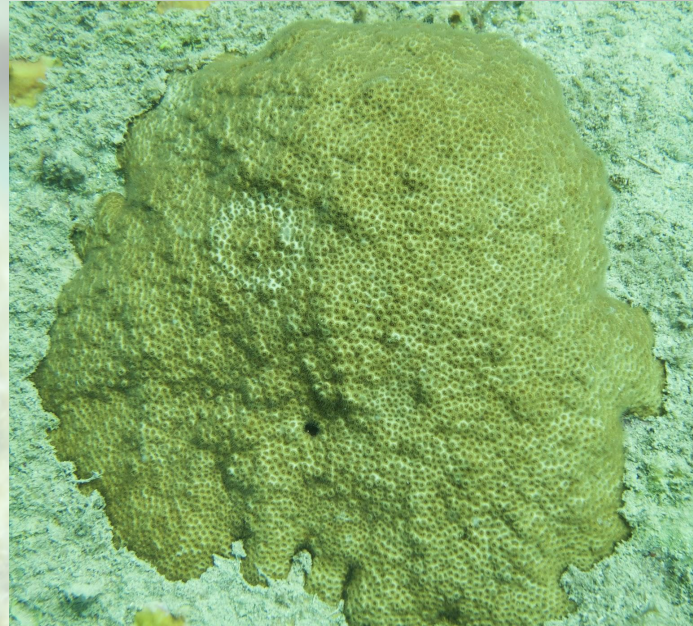


Differences from OFAV:

- Polyps more spaced out
- Irregular bumps
- Tends to grow in deeper water

Solenastrea bournoni

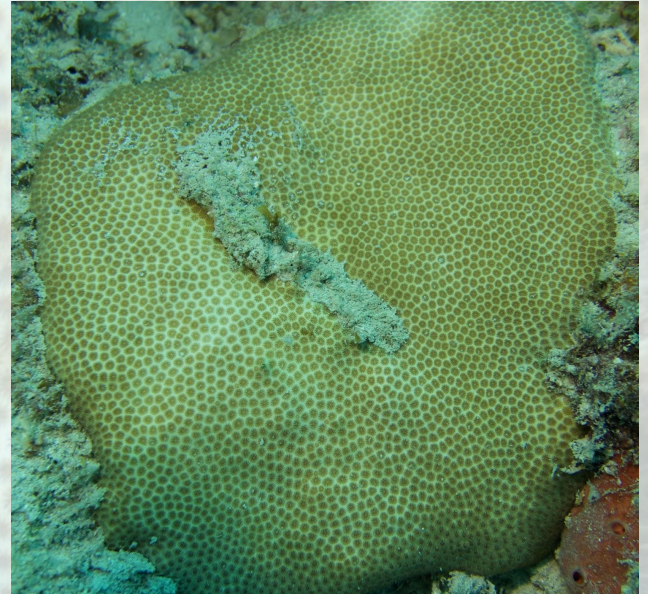
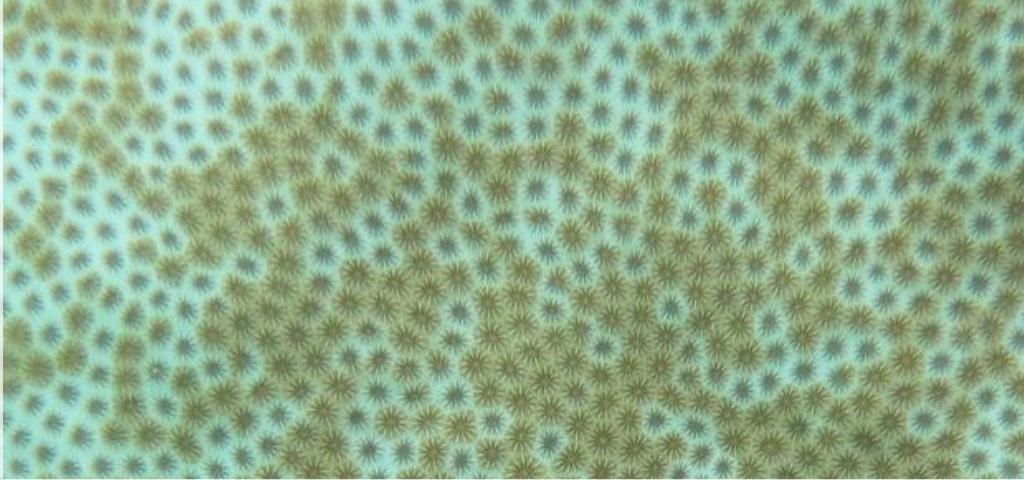
Smooth star coral



Mounding colony, yellow/brown in color, can sometimes appear quite pale. Bumpy surface with dark, except polyps

Stephanocoenia Intersepta- SINT

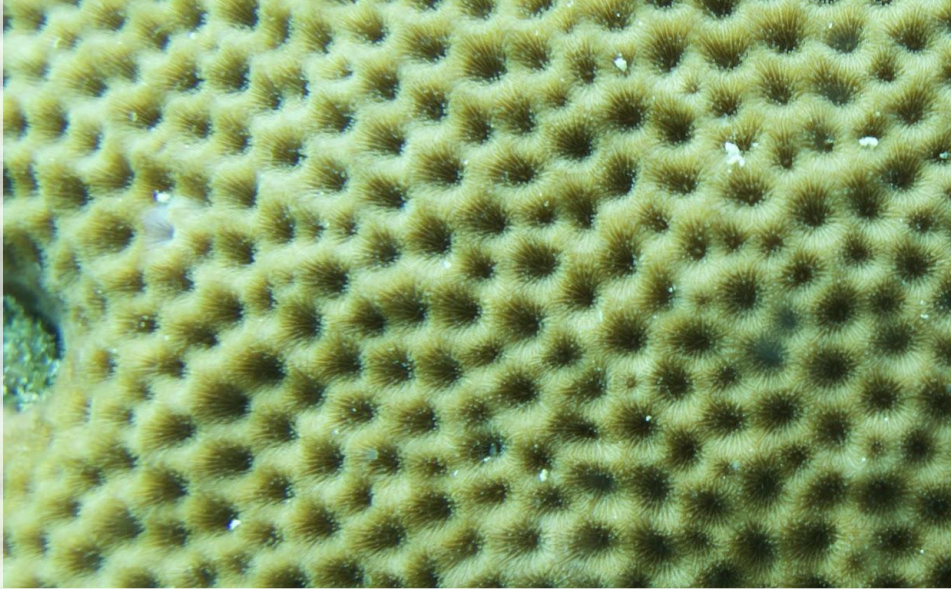
Blushing Star Coral



Small mounds or partially encrusting pale or reddish with dark insert polyps. Pigmentation of the colony is often concentrated into the polyps, leaving bare white skeleton.

Siderastrea siderea- SSID

Massive Star Coral



Small mounds red in color with dark inset polyps. Extremely common. Can appear blue or purple when bleached. Exhibits signs of stress as Dark Spot Disease (DSD)



Additional Corals to Identify

Common Name

Scientific Name

Species Code

Lettuce/Sheet Coral

Agaricia spp.

AGGSP

Cactus Coral

Mycetophyllia spp.

MYCET

Mustard Hill Coral

Porites astreoides

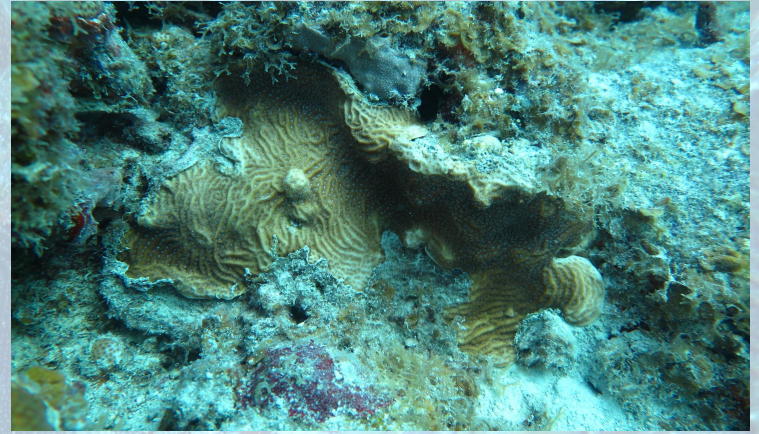
PAST

Agaricia spp.

Lettuce/Leaf Coral

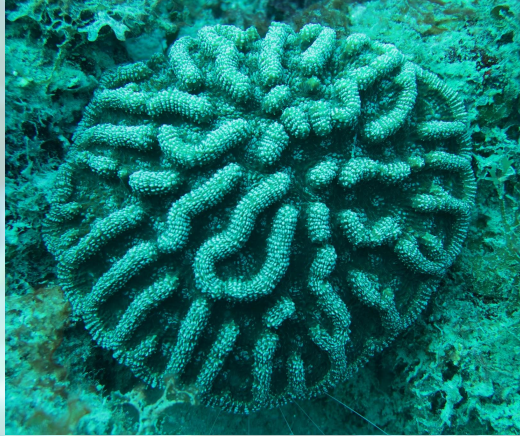


Thin plates or in encrusting colonies with very little height, thin ridges provide texture. Enormous depth range (3-300+ft), can be found in shallow water underneath ledges or in the open.



Mycetophyllia spp.

Cactus Coral



Mounding or thick plating colonies with thick raised bumps and ridges. Overall darker in color but can have bright fluorescent colors as well

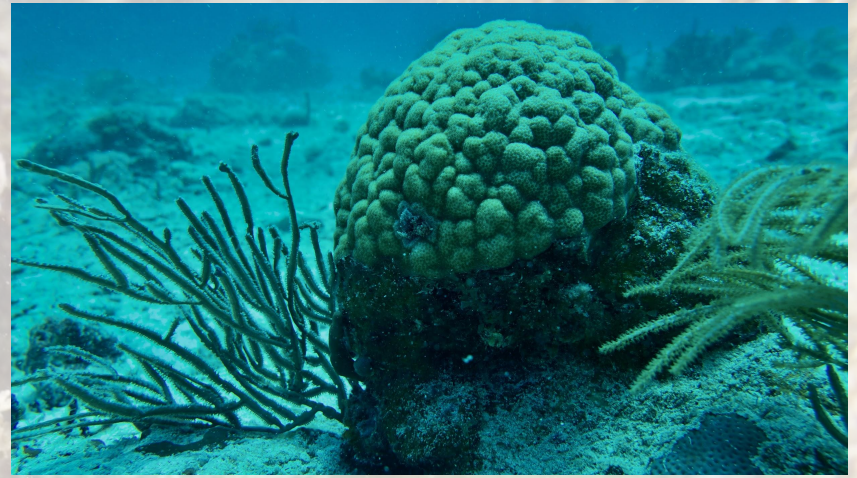


Colonies can be fairly rare, usually only a few on a given reef.



Porites astreoides

Mustard Hill Coral



Extremely common, weedy coral species, found as bumpy mounds or plates. Yellow-brown to green in color. Very small corallites.

Stony Coral Tissue Loss Disease

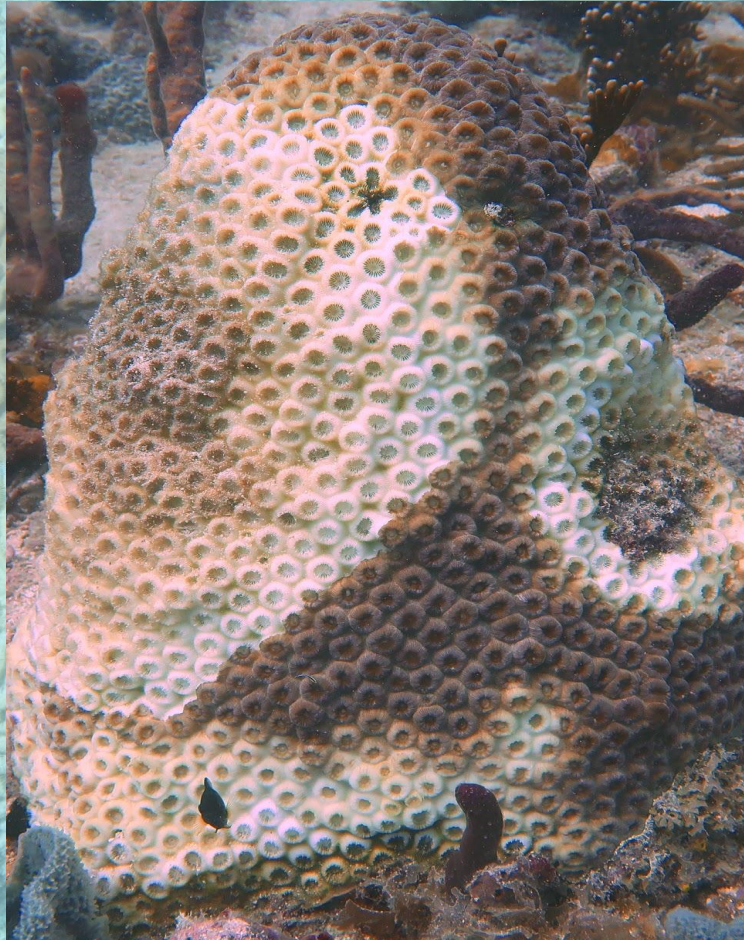
Strike Team Training
Part II: Disease Identification



SCTLD Identifiers



Rapid tissue loss



Multiple lesions



Not on a growth edge

Other Coral Health Notes (Not SCTLD)

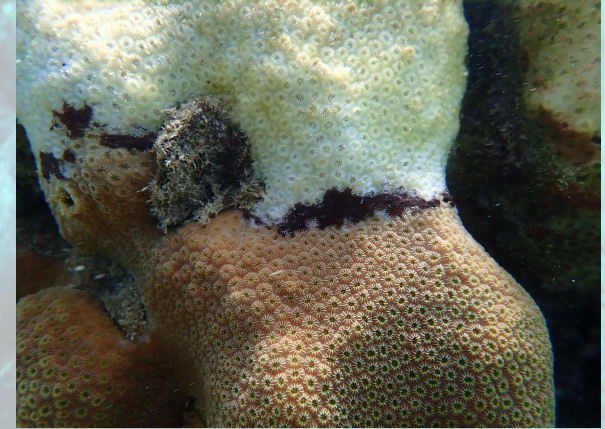
Predation



White Plague



Black Band Disease



Coral Bleaching



White Plague

General Traits:

- Slower
- One lesion from growth edge
- Follows bleaching events
- Largely affects OFAV, OFRA, and OANN



Photo from Dr. Marilyn Brandt at UVI

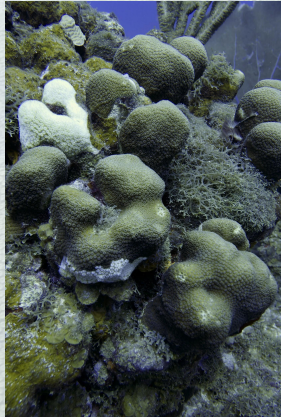


Photo from Dr. Marilyn Brandt at UVI

Black Band Disease

General Traits:

- Distinct “black band” on disease margin of bacteria
- Slow moving
- Consistently present in low levels on the reef, but can have outbreaks



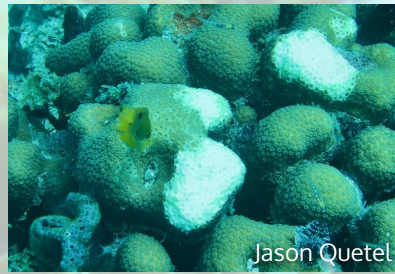
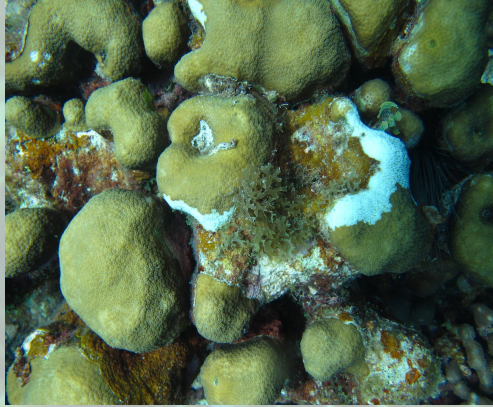
Coral Bleaching



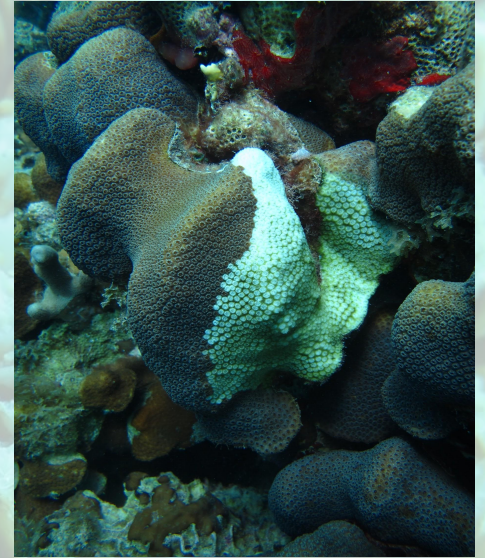
Caused by thermal stress, coral tissue is still present, but appears stark white



Coral Predation



Jason Quetel



Jason Quetel



Jason Quetel

Stony Coral Tissue Loss Disease



Strike Team Training

Part III: Roving Diver Survey Methodology



Roving Diver Methodology

Goals of the Roving Diver:

- Explore and characterize the reef
 - Document the status of the reef
 - Identify if coral disease is present/absent
-
- ~20-40min Explorative dive (with photos)
 - Recording types of coral
 - Recording any impairments

DATE:		Site Name:			Surveyor:				
Start Time		Survey #		Depth	Notes (site health, spots on SSID?):				
End Time		Visibility		Temp (F)					
Distance b/w divers		Reef Type							
Take photo of data sheet at start and end of survey. Take overview photo of entire reef at end of survey.									
Highly Susceptible Species				Impaired Corals					
Species	0	1-9	10-25	>25	#	Species	Obsv.	Notes	Picture?
MMEA					1				<input type="checkbox"/>
DCYL					2				<input type="checkbox"/>
DSTO					3				<input type="checkbox"/>
EFAS					4				<input type="checkbox"/>
CNAT					5				<input type="checkbox"/>
DLAB					6				<input type="checkbox"/>
PSTR					7				<input type="checkbox"/>
PCLI					8				<input type="checkbox"/>
Observance Codes					9				<input type="checkbox"/>
BL	bleaching				10				<input type="checkbox"/>
PAL	paling				11				<input type="checkbox"/>
DIS	misc. disease				12				<input type="checkbox"/>
PRED	predation				13				<input type="checkbox"/>
REC	recent mortality				14				<input type="checkbox"/>
Species Codes					15				<input type="checkbox"/>
DLAB	<i>Diploria labyrinthiformis</i>				16				<input type="checkbox"/>
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DCYL	<i>Dendrogyra cylindrus</i>				18				<input type="checkbox"/>
EFAS	<i>Eusmilia fastigiata</i>				19				<input type="checkbox"/>
PCLI	<i>Pseudodiploria clivosa</i>				20				<input type="checkbox"/>
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OFRA	<i>Orbicella franski</i>				26				<input type="checkbox"/>
OANN	<i>Orbicella annularis</i>				27				<input type="checkbox"/>
SSID	<i>Siderastrea siderea</i>				28				<input type="checkbox"/>
SBOU	<i>Solenastrea bournoni</i>				29				<input type="checkbox"/>
SINT	<i>Stephanocoenia intersepta</i>				30				<input type="checkbox"/>

Roving Diver Methodology

Start of dive information:

- Date
- Site "name"
- Surveyor- diver and diver buddy
- Start time
- Max depth (note range of depth if needed)
- Temperature (if possible)
- Reef type (patch, shelf, slope, etc.)
- Misc notes
 - Note here if DPVs are used

Take a photo of the datasheet with this information to separate dives in photos

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End Time		Visibility		Temp (F)					
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Roving Diver Methodology

Highly susceptible species:

- Tally presence/absence of highly susceptible species
 - None
 - Single
 - Few (2-9)
 - Many (10-25)
 - Abundant (25+)
- Take photos of healthy individuals- within reason
 - Focus on individuals that would be easily relocated on future surveys
- Count ALL individuals- healthy or diseased, in this count

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Roving Diver Methodology

Health impaired corals

- Corals with any health impairments (even if unsure of impairment)
- Record species, observed impairment, and any notes (multiple lesions, previously photographed colony, etc.)
- Photograph the colony
- Tally presence/absence of diseased colonies like highly susceptible species (None, One, Few, Many, Abundant)
- Focus on documenting health impairments across as many species as possible. At a severe location, it won't be possible to document every colony

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Roving Diver Methodology

Reference codes to assist the diver- NOT COMPREHENSIVE

- Possible observations of health impairment (bleaching, disease, paling, recent mortality)
- Coral species codes

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SINT	<i>Stephanocoenia intersepta</i>				30				<input type="checkbox"/>

Roving Diver Methodology

- Max survey time: ~40 minutes
- Note end time
- Approximate visibility
- Depth range (if different than planned)

Take a photo of the complete datasheet

DATE:		Site Name:			Surveyor:				
Start Time		Survey #		Depth	Notes (site health, spots on SSID?):				
End Time		Visibility		Temp (F)					
Distance b/w divers				Reef Type					
Take photo of data sheet at start and end of survey. Take overview photo of entire reef at end of survey.									
Highly Susceptible Species				Impaired Corals					
Species	0	1-9	10-25	>25	#	Species	Obsv.	Notes	Picture?
MMEA					1				<input type="checkbox"/>
DCYL					2				<input type="checkbox"/>
DSTO					3				<input type="checkbox"/>
EFAS					4				<input type="checkbox"/>
CNAT					5				<input type="checkbox"/>
DLAB					6				<input type="checkbox"/>
PSTR					7				<input type="checkbox"/>
PCLI					8				<input type="checkbox"/>
Observance Codes					9				<input type="checkbox"/>
BL	bleaching				10				<input type="checkbox"/>
PAL	paling				11				<input type="checkbox"/>
DIS	misc. disease				12				<input type="checkbox"/>
PRED	predation				13				<input type="checkbox"/>
REC	recent mortality				14				<input type="checkbox"/>
Species Codes					15				<input type="checkbox"/>
DLAB	<i>Diploria labyrinthiformis</i>				16				<input type="checkbox"/>
DSTO	<i>Dichocoenia stokesi</i>				17				<input type="checkbox"/>
DCYL	<i>Dendrogyra cylindrus</i>				18				<input type="checkbox"/>
EFAS	<i>Eusmilia fastigiata</i>				19				<input type="checkbox"/>
PCLI	<i>Pseudodiploria clivosa</i>				20				<input type="checkbox"/>
PSTR	<i>Pseudodiploria strigosa</i>				21				<input type="checkbox"/>
CNAT	<i>Colpophyllia natans</i>				22				<input type="checkbox"/>
MMEA	<i>Meandrina meandrites</i>				23				<input type="checkbox"/>
MCAV	<i>Montastraea cavernosa</i>				24				<input type="checkbox"/>
OFAV	<i>Orbicella faveolata</i>				25				<input type="checkbox"/>
OFRA	<i>Orbicella franski</i>				26				<input type="checkbox"/>
OANN	<i>Orbicella annularis</i>				27				<input type="checkbox"/>
SSID	<i>Siderastrea siderea</i>				28				<input type="checkbox"/>
SBOU	<i>Solenastrea bournoni</i>				29				<input type="checkbox"/>
SINT	<i>Stephanocoenia intersepta</i>				30				<input type="checkbox"/>

Stony Coral Tissue Loss Disease

Strike Team Training

Part IV: Disease Treatment Part 1- Amoxicillin



Pre-dive Preparation

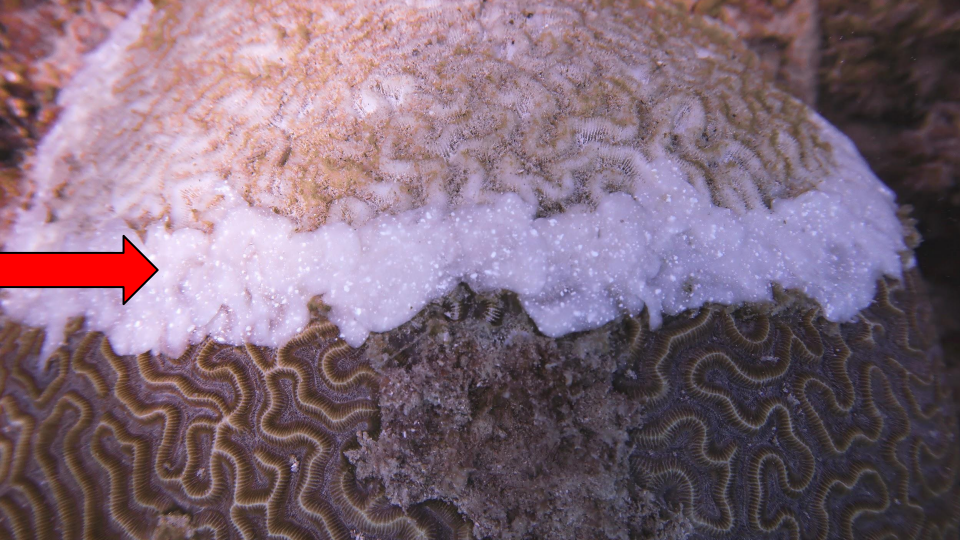
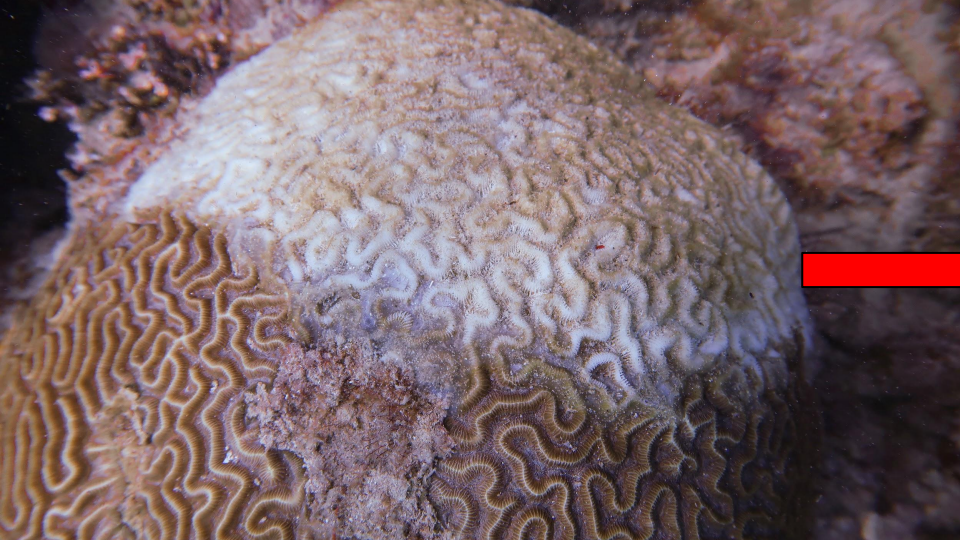


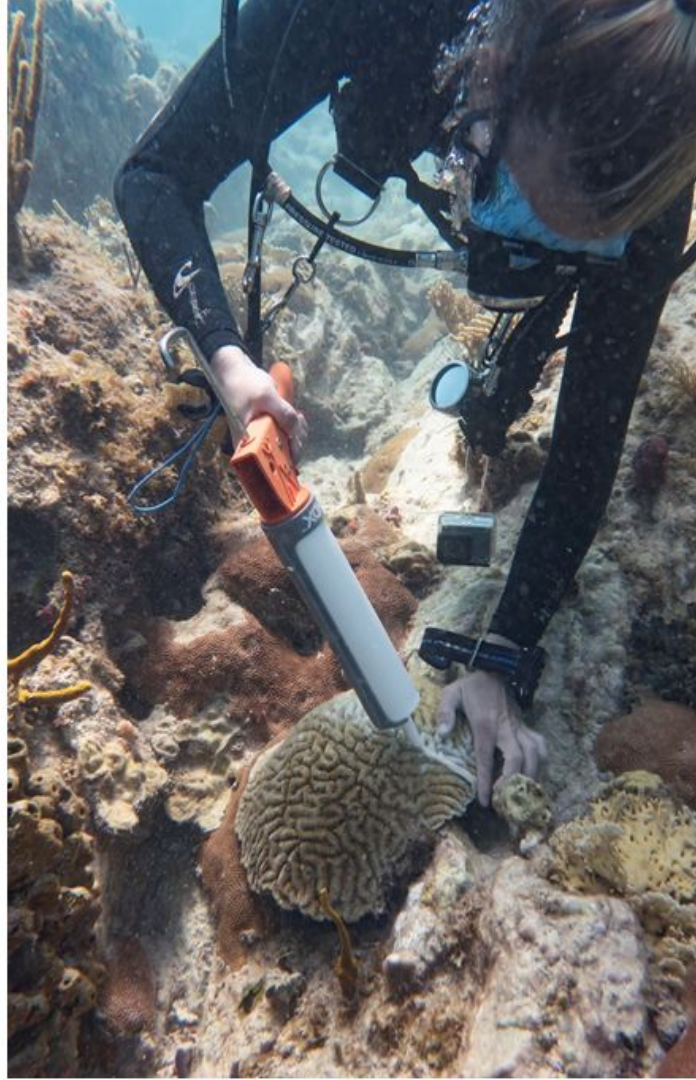
1. Weigh out amoxicillin to be used as a 1:8 weight ratio with Base2b
 - a. For 1 jar of Base2b (400g), this is 50g of amoxicillin
2. Within 18 hours of intended use, mix Base2b with amoxicillin
 - a. Can be done in the jar with small spatula or spoon, or in a medium sized mixing bowl
 - b. Best done with Base2b at room temperature
3. Load syringes/caulking gun tubes with mixture
 - a. Best done with Base2b cold (not frozen)
4. Keep mixture out of direct sunlight/high heat during transportation

Diving Protocol

A diver in full gear is shown underwater, holding a camera. The diver is wearing a mask, snorkel, and a tank with 'US' visible on it. The background shows a coral reef and blue water.

1. Identify SCTL D-infected colony
 - a. Do not treat colonies with greater than ~80% mortality
2. Photograph the colony
 - a. If colony is to be fate-tracked, nail a numbered tag immediately adjacent to the colony before photographing
3. Apply the treatment along the disease margin, ~1cm width
 - a. Take care that any smaller lesions are treated as well
 - b. Use modeling clay sparingly to keep the treatment attached to the colony
4. Photograph the colony with treatment







Stony Coral Tissue Loss Disease



Strike Team Training

Part V: Disease Treatment Part 2- Culling/Amputation



Culling Methodology

Culling is the removal of infected coral colonies from the reef, this should be avoided if possible.

- Only remove colonies <30cm max diameter
- Only remove colonies if they cannot be amputated
- Photograph colonies prior to culling



Culling Methodology

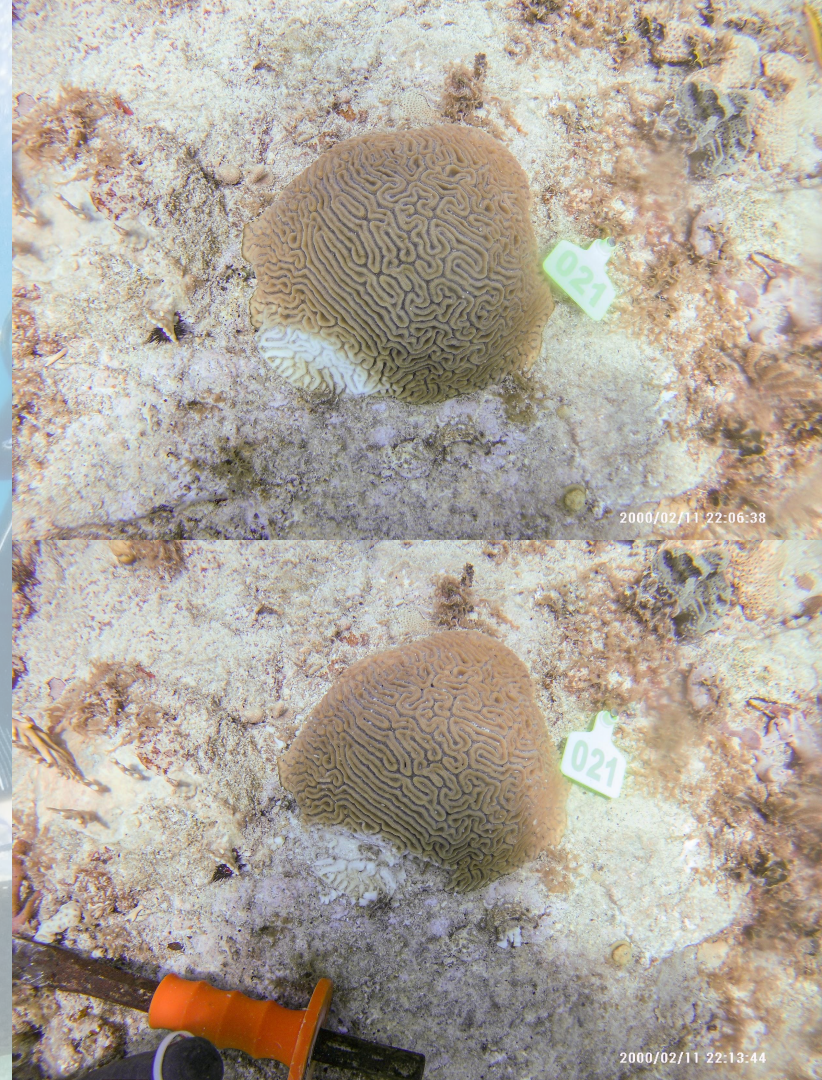
1. Photograph the colony
2. Use a chisel or flathead screwdriver to hammer underneath/around the base of the colony to dislodge it
3. Immediately place the entire colony into a sealable plastic bag
 - a. It is important to do this quickly to minimize mucus spread in the water column
4. Use a mesh bag to transport removed colonies, and use lift bags for safe transport and ascent.



Amputation Methodology

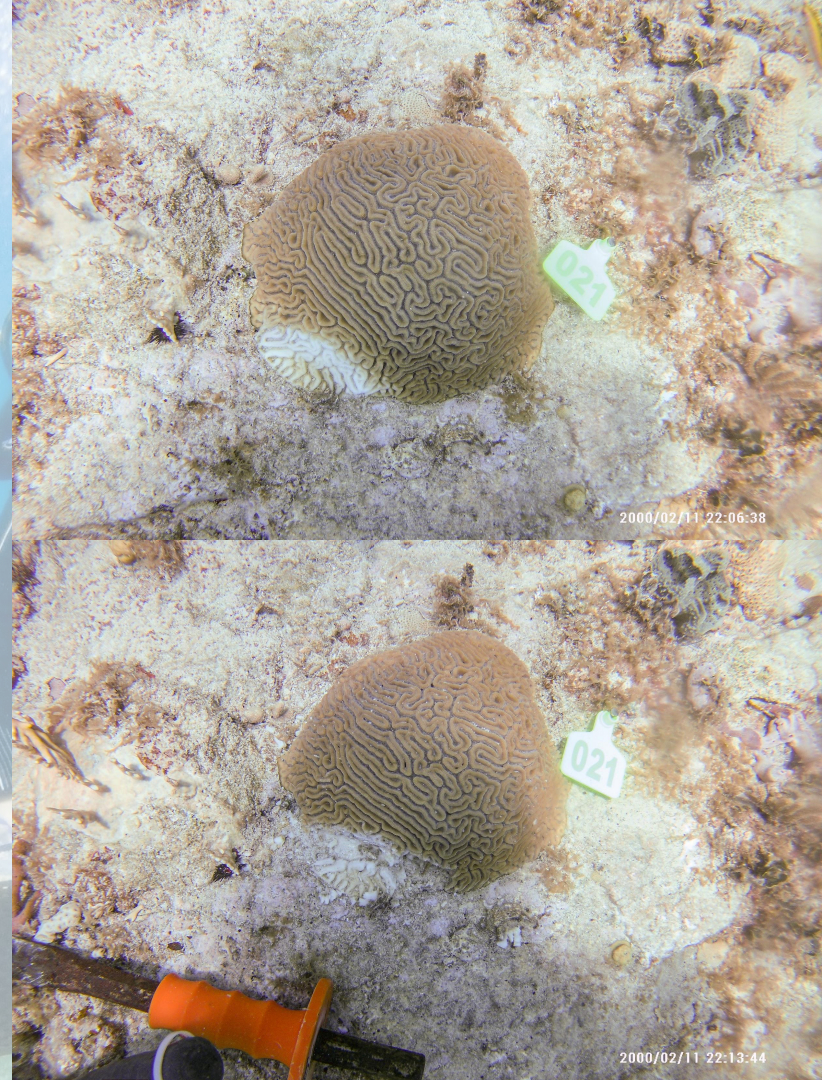
Amputation is the removal of the now dead coral skeleton and any tissue along the diseased margin

- Only on colonies >30cm in max diameter
- Can only be done when disease is on a growth margin



Amputation Methodology

1. Identify and photograph an infected colony
 - a. If fate tracking, install a tag adjacent to the colony before photographing
2. Use a hammer and chisel or long flathead screwdriver to remove recently dead skeleton
 - a. May be more time effective to use an angle grinder
3. Place amputated fragment(s) immediately into a large resealable bag
4. Treat the amputation edge and any lesions that could not be amputated with antibiotic paste
5. Photograph the colony, now treated
6. Use a mesh bag to transport removed fragments, and use lift bags for safe transport and ascent.



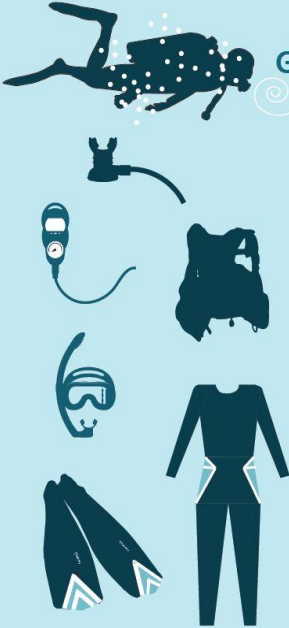
Stony Coral Tissue Loss Disease

Strike Team Training
Part VI: Data Reporting



End of Dive Day Data Management



1. Disinfect all equipment and dive gear
2. Rinse, dry, and photograph/scan any datasheets
3. Upload photos to a common location
4. Dive leader contacts strike team leader and disease coordinator with full report:
 - a. Include access to photos
 - b. Provide summary of corals treated by species
 - c. Provide scans/photos of datasheets
 - d. Highlight any concerns



Guidelines for Disinfection of Dive Gear

- 1**  **Soak all of your gear for 10 min in a 1% household bleach solution**
USE IMMEDIATELY AFTER MIXING

BLEACH (cups)	WATER (gallons)
~1.0	5
~1.5	10
~2.5	15

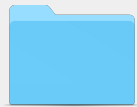
Don't forget your BC internal bladders!
- 2**  **Rinse all of your gear in fresh water**
(e.g., in a 5 gallon bucket)
Properly dispose of disinfectant solutions by rinsing waste into sink or shower. Remember, chlorine will break down in the sun!
- 3**  **Allow gear to air dry thoroughly**

Keep Our Islands Clean!

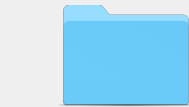
Full disinfection protocol at:
<https://www.vicoraldisease.org/s/Diver-Decon-Guidelines-USVI-8-8-19.pdf>

Photo Organization

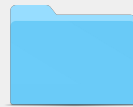
Photos will be organized on the Coral Disease Advisory Committee photo repository following a specific folder pathway:



Island



Site Name



Date



Diver name and affiliation

"STT"



"Hull Bay"



"2020_04_23"

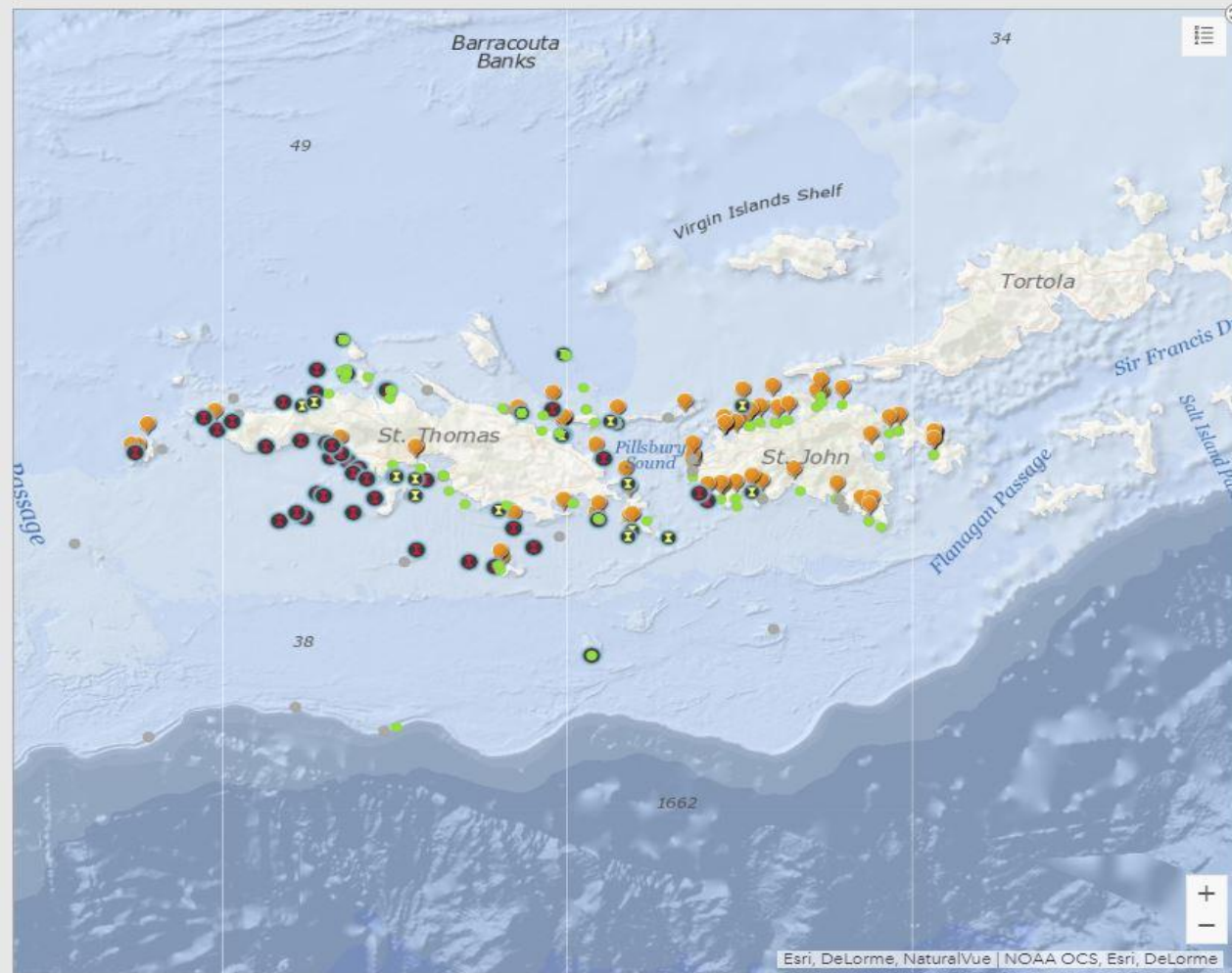


"JET_Joe Townsend_CDAC"

Photos may be used for research and community outreach purposes with credit to the diver when necessary

Photos should be kept elsewhere by the strike team lead in a similar format

The Hunt for Coral Disease Dashboard



Surveys Completed

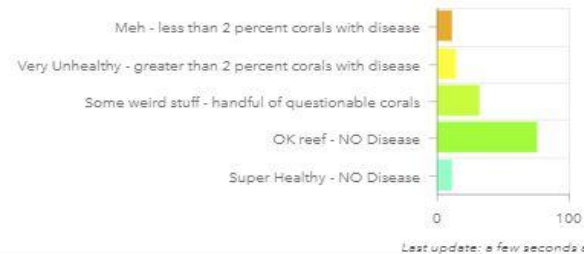
315

Last update: a few seconds ago

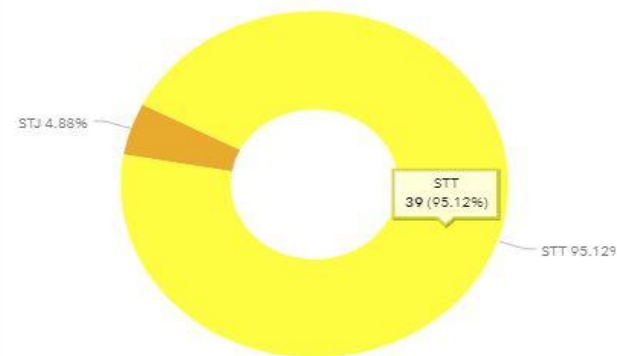
Sites with Intervention Treatments

13

Last update: a few seconds ago



Severe Site Distribution by Island



Submitting "Researcher Reports"

- If a formal roving diver survey couldn't be conducted, a dive should still be noted
- Trained divers who can identify coral species and coral disease can submit "Researcher Reports" to the Hunt for Coral Disease survey sheet
- Enter the survey sheet as best as possible and put in the notes section "RESEARCHER REPORT" with any observations
- Include photos and descriptions as much as possible

<https://survey123.arcgis.com/share/9838819b5e1748448297255f6fd1a183>

The Hunt for Coral Disease

Help us map coral disease!

Fill out one form per dive site and include photos and descriptions of any white spots on coral or areas that look like they are unhealthy. Each submission can have up to three photos, if you have more you can submit another survey or provide a link to a shared folder in the notes!

Para instrucciones en español, haz clic [aquí](#).

Closest Island

STT

STX

STJ

PR

Other

Dive Date

Name(s)*

Put down the names of any divers or snorkelers with you at this site!

Your Email*

We may use this in the future to let you know about Reef Resilience events!

Point of Contact for Questions/Concerns



Joe Townsend

Coral Disease Response
Coordinator for the USVI

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(704) 340-2168



Jason Quetel

Chief of Field Operations,
CORE

fieldops@corevi.org
(340) 643-5654



???

Strike Team Lead for St.
John

TBA