

## Grecian Rocks Disease Outbreak 7/16/2016

Prepared by Vanessa Brinkhuis and Lindsay Huebner, FWC

During the annual Coral Reef Evaluation and Monitoring Program (CREMP) survey effort at Grecian Rocks on 7/16/2016, we observed what appeared to be multiple diseases on at least nine species of scleractinian coral. Species affected include *Colpophyllia natans* (CNAT), *Pseudodiploria strigosa* (DSTR), *Diploria labyrinthiformis* (DLAB), *Meandrina meandrites* (MMEA), *Dichocoenia stokesii* (DSTO), *Siderastrea siderea* (SSID), *Montastraea cavernosa* (MCAV), *Orbicella annularis* (OANN), and *Eusmilia fastigiata* (EFAS). The diseases observed include what appear to be White Plague, the unknown white disease “White Blotch”, and other indistinguishable white diseases.

During a two-person, 15 minute random swim, all observed DSTO and MMEA were affected, and most colonies were 100% recently dead (Figures 22 and 23). We found only one DSTO with live tissue (Figure 14); it appeared to be affected by White Plague. We observed only one OANN colony affected by disease; ~30% of the colony’s tissue was symptomatic, and this tissue abutted a recently dead MMEA colony (Figure 25). Two large CNAT colonies near mooring ball #12 (between CREMP stations 3 & 4) are affected: one is 99% dead (Figure 15) and the larger colony has numerous white circular lesions (Figures 1 and 2). A picture from 2012 of this colony healthy is included (Figure 1). Other CNAT colonies had >90% recent mortality with only small circular or irregular patches of tissue remaining (Figures 16-18).

Patterns of lesions and tissue mortality, as well as speed of progression, varied between disease, species, and within species between colonies. For the unknown “White Blotch” disease, circular lesions appeared to spread outward, and disease progression appeared to occur faster on CNAT and DLAB than on other affected species. Other lesions appeared to start at the peripheral edges of the colony near the sediment/substratum boundary and move over the colony (typical of White Plague), leaving random patches of tissue. The unknown disease “White Blotch” that has been reported farther north near Carysfort Reef also was observed at Grecian Rocks on SSID colonies. There was a range of lesion types on SSID colonies, including white circular lesions and dark purple ringed lesions with white exposed skeleton in the center (Figures 8-11).

In this document, figures are organized by suspected disease type and then by affected species. Brief disease lesion descriptions are provided in the figure captions. The CREMP team plans on collecting tissue samples from SSID, CNAT, DLAB and MCAV colonies affected with the unknown “White Blotch” disease at Grecian Rocks later this week. We will also conduct prevalence surveys, and take photographs and video of the reef.

**I. Unknown White Blotch Disease** – *Colpophyllia natans*, *Diploria labyrinthiformis* and *Montastraea cavernosa*



Vanessa Brinkhuis, FWC



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Figure 1. Top: large *Colpophyllia natans* colony #1 at Grecian Rocks mooring ball #12 photographed in 2012; Bottom: *Colpophyllia natans* colony #1 photographed with active unknown "White Blotch" disease lesions 7/16/2016.

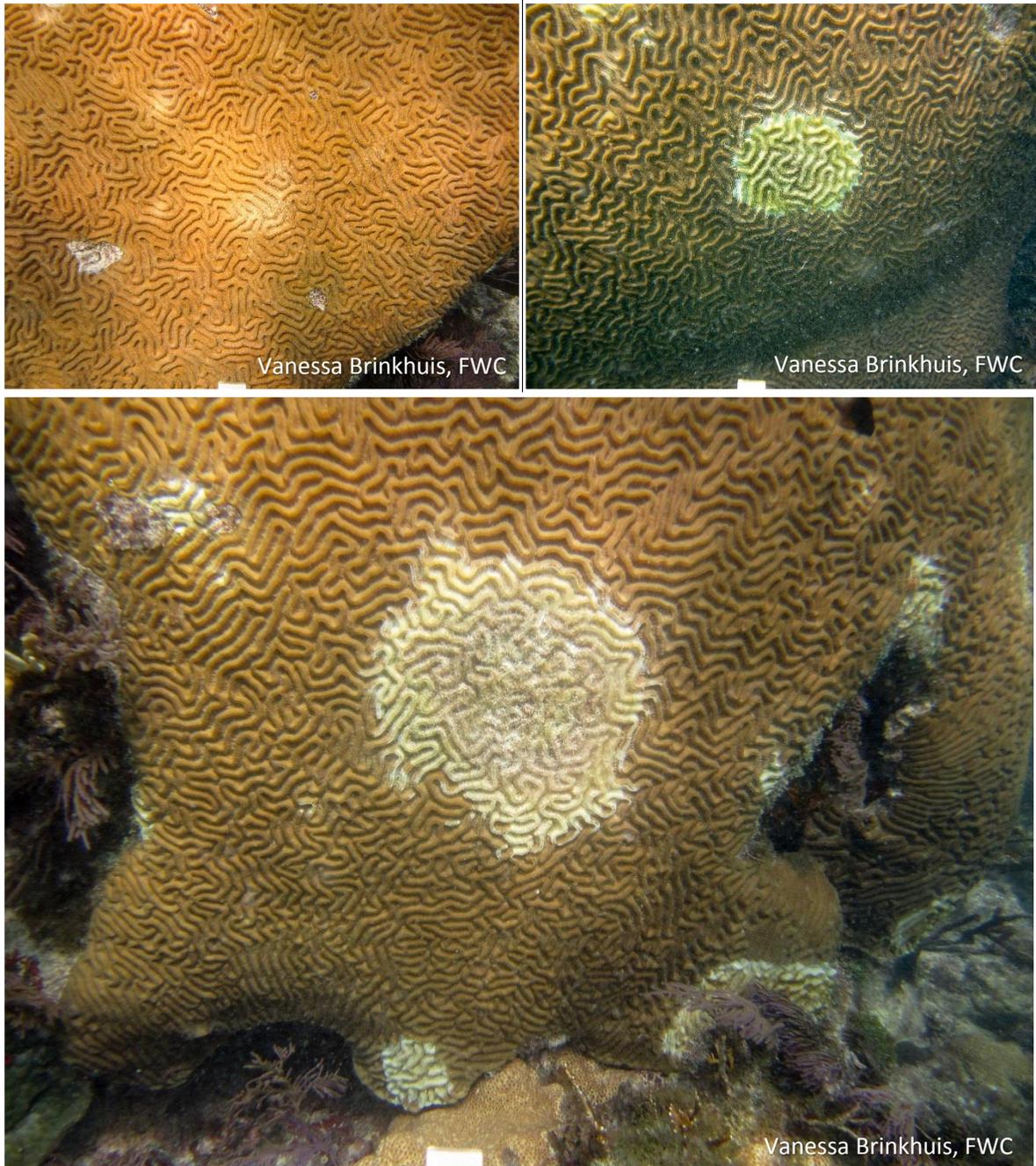


Figure 2. Unknown “White Blotch” disease lesions on *Colpophyllia natans* colony #1. Top left: multifocal areas of paling tissue some with small areas of exposed skeleton at the center of the lesion; Top right: central multifocal lesion with bare exposed skeleton with turf algae at center; Bottom: central and peripheral lesions present.



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Figure 3. *Colpophyllia natans* colony #2 with unknown “White Blotch” disease, exhibiting several multifocal central and peripheral white lesions with bare exposed skeleton with turf algae.



Figure 4. Top: large *Diploria labyrinthiformis* colony #1 at Grecian Rocks mooring ball #12 photographed in 2015; Bottom: *Diploria labyrinthiformis* colony #1 with active unknown “White Blotch” disease lesions photographed on 7/16/2016.

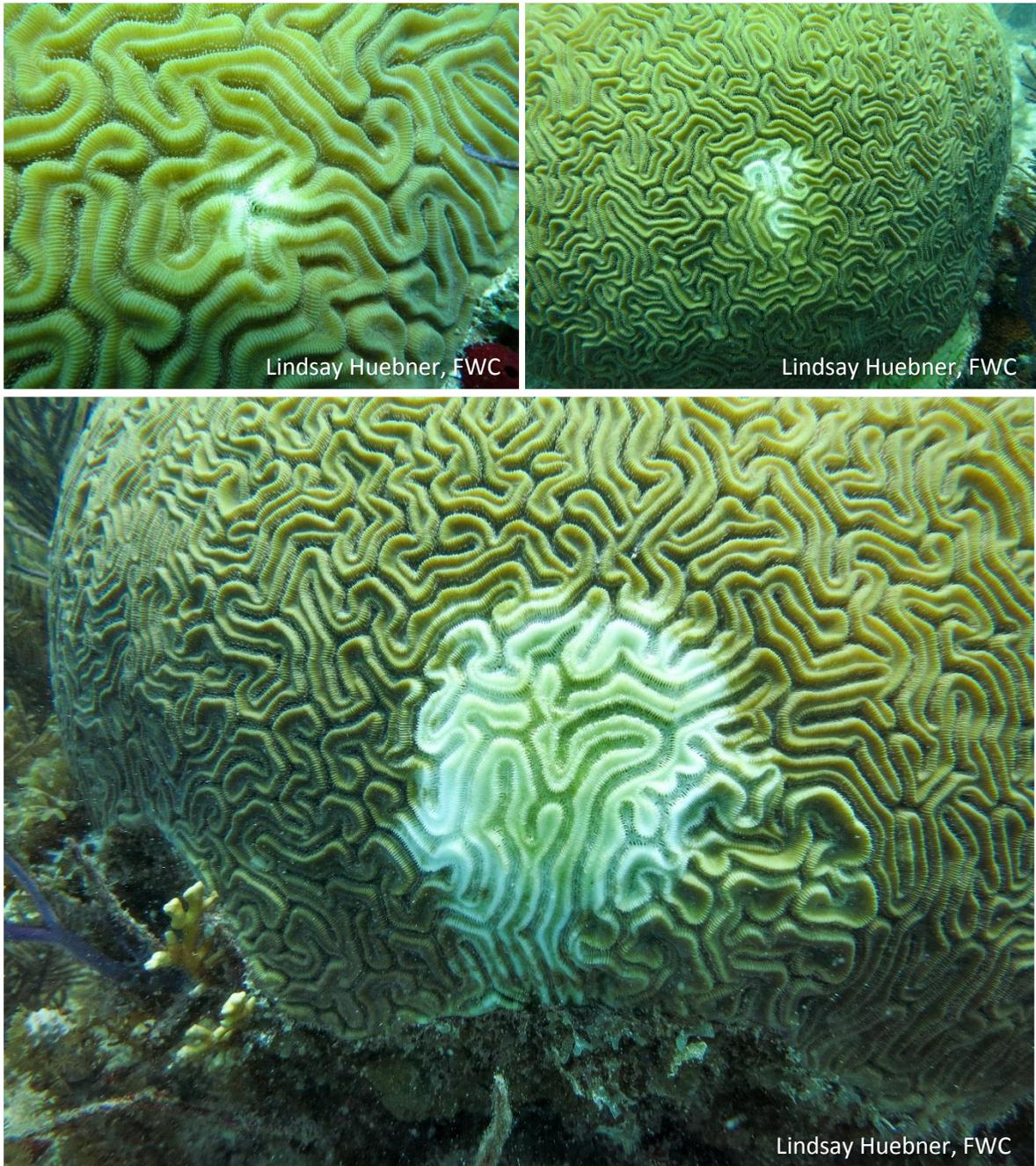


Figure 5. Unknown “White Blotch” disease lesions on *Diploria labyrinthiformis* colony #1. Top left and right: multifocal white lesions with bare skeleton at the center; Bottom: central multifocal lesion near colony edge with bare exposed skeleton with turf algae at center.



Figure 6. Unknown “White Blotch” disease lesions on *Montastraea cavernosa* colony #1. Top: multifocal central and peripheral white lesions with bare skeleton with turf algae; Bottom: central white multifocal lesions with bare exposed skeleton.



Figure 7. Unknown “White Blotch” disease lesions on *Montastraea cavernosa* colony #2. Multifocal central lesion with white bare skeleton at center.

## II. Unknown White Blotch Disease – *Siderastrea siderea*

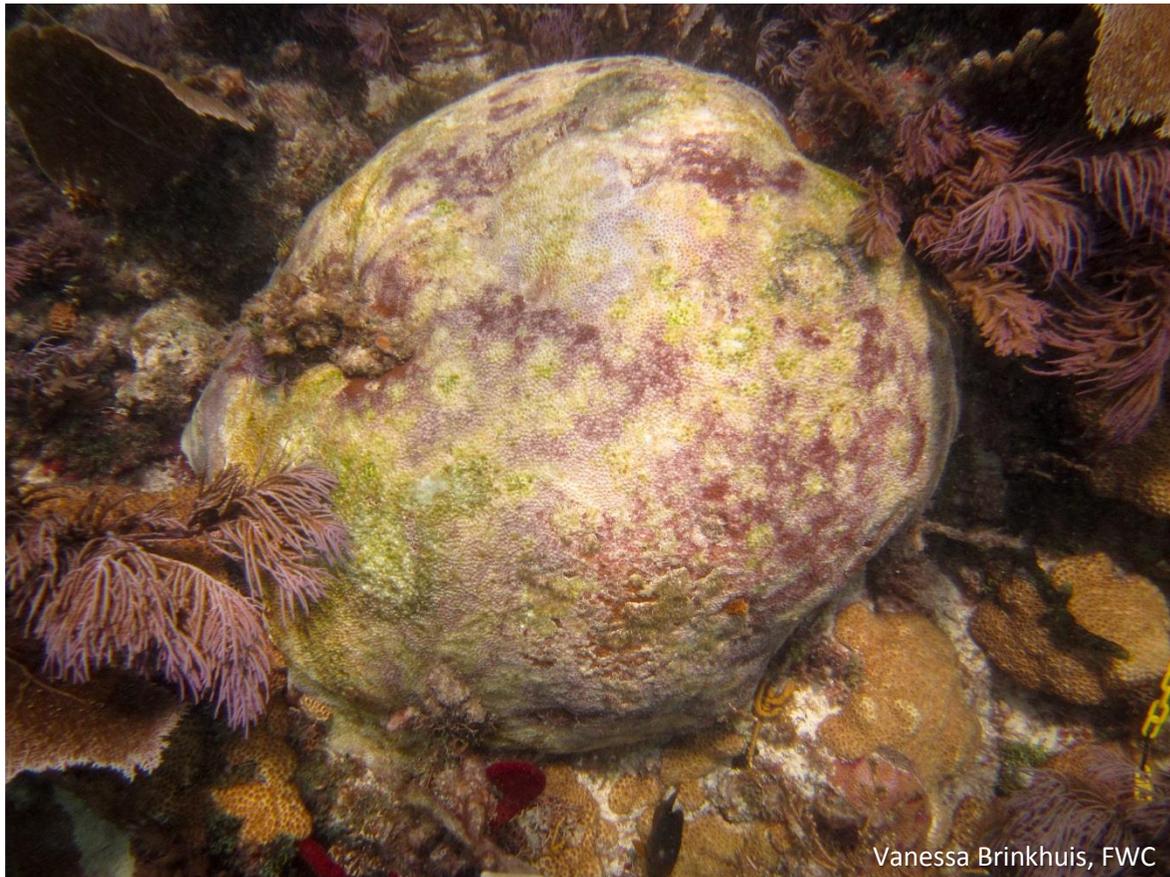


Figure 8. Large *Siderastrea siderea* colony #1 with late-stage unknown "White Blotch" disease. Multifocal to coalescing lesions of exposed bare skeleton that are white, purplish (pigmented skeleton) and/or yellowish (algae).



Figure 9. *Siderastrea siderea* colony #2 with unknown “White Blotch” disease. Multifocal to coalescing lesions of exposed bare skeleton that are white, purplish (pigmented skeleton) and/or yellowish (algae).



Figure 10. *Siderastrea siderea* colony #3 with unknown “White Blotch” disease. Multifocal to coalescing white-purplish lesions with exposed bare skeleton at the center of lesion.



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Figure 11. *Siderastrea siderea* colonies #4, #5 and #6 with unknown “White Blotch” disease. Multifocal to coalescing lesions of exposed bare skeleton that are white and/or yellowish (algae).

**III. White Plague** – *Pseudodiploria strigosa*, *Montastraea cavernosa* and *Dichocoenia stokesii*



Figure 12. White Plague on *Pseudodiploria strigosa* colony #1. Peripheral lesions with white margins of bare skeleton with turf algae.



Figure 13. White Plague on *Montastraea cavernosa* colony #3. Peripheral lesions with white margins of bare skeleton with turf algae.



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Figure 14. White Plague on *Dichocoenia stokesii* colony #1. Peripheral lesions with white margins of bare skeleton with turf algae.

**IV. Unknown White Disease** — *Colpophyllia natans*, *Diploria labyrinthiformis*, *Pseudodiploria strigosa*, *Meandrina meandrites*, *Dichocoenia stokesii*, *Montastraea cavernosa* and *Eusmilia fastigiata*; possible unknown “White Blotch” disease, White Plague or other unknown white disease.



Figure 15. Top: Large *Colpophyllia natans* colony #3 at Grecian Rocks mooring ball #12 with 99% mortality. Bottom: bare exposed white skeleton.

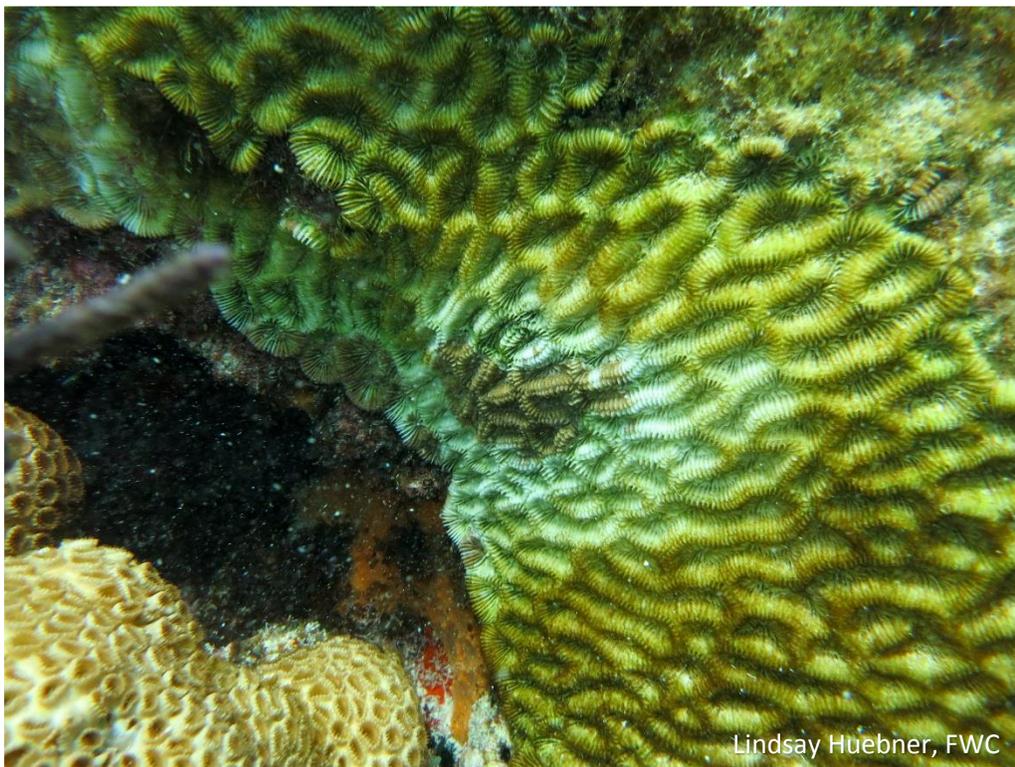
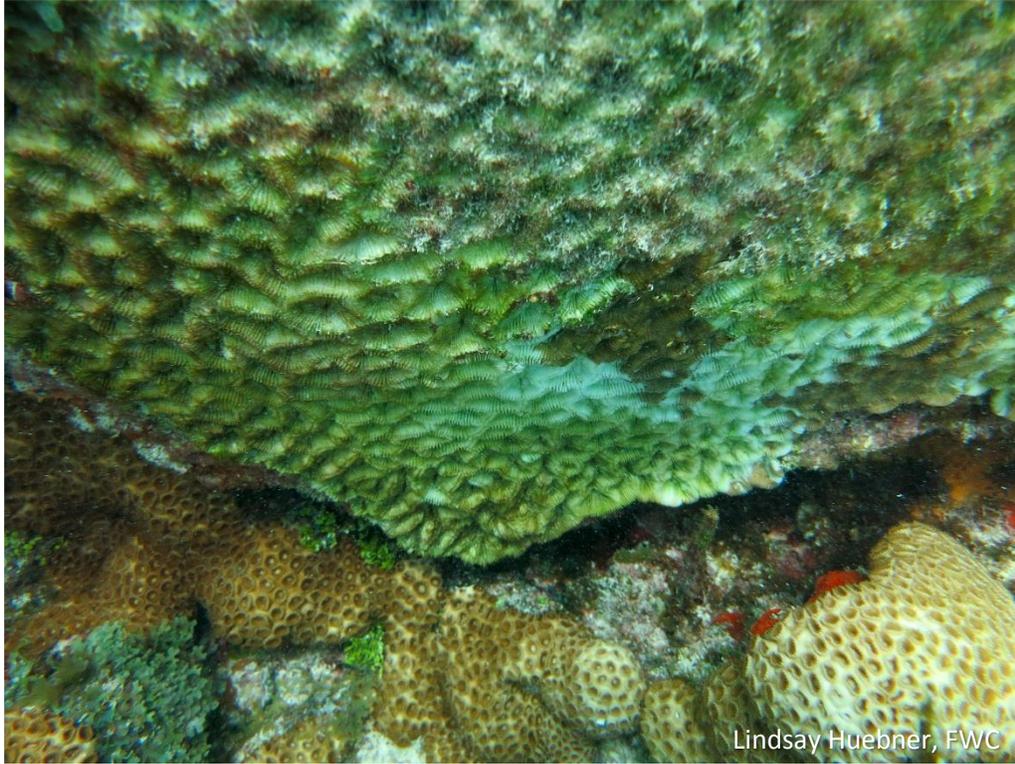


Figure 16. The remaining tissue isolates on *Colpophyllia natans* colony #3 with 99% mortality.



Figure 17. *Colpophyllia natans* colony #4 with 90% recent mortality. Multifocal coalescing white lesions and patches of remaining tissue isolates with undulating margins.



Lindsay Huebner, FWC



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Figure 18. *Colpophyllia natans* colony #5 with undulating lesion margins.



Figure 19. *Pseudodiploria strigosa* colony #2 with 100% recent mortality.



Figure 20. The remaining tissue isolates on *Diploria labyrinthiformis* colony #2 with 95% mortality.



Lindsay Huebner, FWC

Figure 21. *Diploria labyrinthiformis* colony #3 with 100% recent mortality.



Figure 22. *Meandrina meandrites* colonies with 100% recent mortality.



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Figure 23. *Dichocoenia stokesii* colonies with 100% recent mortality.



Figure 24. *Eusmilia fastigiata* with unknown white disease (possible White Plague).



Figure 25a. *Orbicella annularis* colony #1 with unknown white disease(s). Lesion types similar to both White Plague and “White Blotch” diseases. Top: whole colony; Bottom: white multifocal central and peripheral lesions with exposed bare skeleton with turf algae.



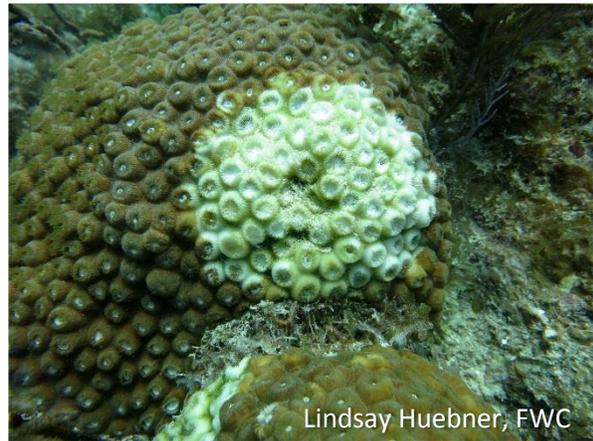
Figure 25b. *Orbicella annularis* colony #1 with unknown white disease(s). White multifocal to coalescing central and peripheral lesions with exposed bare skeleton with turf algae. The OANN colony margins abutting a 100% recently dead MMEA colony displayed disease lesions.



Lindsay Huebner, FWC



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Figure 26a. *Montastraea cavernosa* colony #4 with unknown white disease(s). Lesion types similar to both White Plague and “White Blotch” diseases. Top: whole colony; Bottom: white multifocal central lesions with exposed bare skeleton with turf algae.



Figure 26b. *Montastraea cavernosa* colony #4 with unknown white disease(s). White peripheral lesions with undulating margins and exposed bare skeleton with turf algae.



Figure 27a. *Montastraea cavernosa* colony #5 with unknown white disease. Lesions appear unlike other disease lesions observed at the site. Multifocal central and peripheral lesions are characterized by undulating margins of white bleached polyps followed by exposed bare skeleton with greenish turf algae.



Lindsay Huebner, FWC



Lindsay Huebner, FWC

Figure 27b. *Montastraea cavernosa* colony #5 with unknown white disease.