

## Florida Reef Tract Coral Disease Outbreak

### Coordination Meeting #9

July 27, 2017

1:00 PM – 3:00 PM

### Meeting Summary

**Attendees:** Meaghan Johnson, Tracy Ziegler, Derek Manzello, Christopher Sinigalliano, Jack Stamates, Lauri Maclaughlin, George Sedberry, Jennifer Moore, Dana Williams, Billy Causey, Valerie Paul, Meghan Balling, Kristi Kerrigan, Kelly Montenero, Aubree Zenone, Karen Bohnsack, Joanna Walczak, Vladimir Kosmynin, Jeff Beal, Yasu Kiryu, Jan Landsberg, Kate Lunz, Erin McDevitt, Kathy Fitzpatrick, Rebecca Ross, Sara Thanner, Dave Gilliam, Brian Walker, Josh Voss, Karen Neely, Esther Peters, C.J. Reynolds, Pamela Fletcher, Dan Clark, Stephanie Clark, Ed Tichenor, Jennifer Stein, Caitlin Lusic, Angela Smith, Marisa Magrino.

### **Welcome, Roll Call, Meeting Purpose**

- Karen Bohnsack welcomed attendees to the call and reviewed the agenda and attachments sent prior to the meeting.
- The agenda includes sharing new or noteworthy disease observations, updates on ongoing response efforts (including new funding opportunities, coordination with the USGS National Wildlife Health Center, a recap of the Coral Disease Workshop, and information from the Florida Reef Resilience Program), working group updates (NSF Rapid Project, coral tissue sample analysis, and disease interventions), and a discussion on the future direction of the coral disease coordination calls.
- Attachments include: Meeting agenda, recent disease photos, summary of disease surveys on St. Lucie Reef (Martin County), and a PDF with updated preliminary histological analyses.

### **Update on Florida Reef Tract Disease Observations**

- Southeast Florida –
  - o Coral Reef Conservation Program – *Kristi Kerrigan (DEP CRCP)*
    - SEAFAN and BleachWatch are still receiving disease reports, especially from shallow reef sites in Broward County. New reports also include an observation of cactus coral with white plague-like disease, and disease affecting wild and outplanted *Acropora cervicornis* (ACER) colonies at Diego Lirman’s outplant site in Miami Beach. Approximately 10% of outplants were lost within a week. No disease was observed at their Key Biscayne outplant site.
    - DEP staff recently completed their quarterly ESA species monitoring and found a colony of *Dendrogyra cylindrus* (DCYL) with only ~10% tissue loss and a minimal disease margin. This colony is located off of Deerfield ledge at a depth of approximately 18’. It is believed that this same colony had active white disease and less tissue cover (~50%) in September 2016. A repeat survey is planned for September 2017 to document the status of this colony.
  - o St. Lucie Reef – *Jeff Beal (FWC)/Josh Voss (FAU HBOI)*

- St. Lucie Reef is Florida’s northernmost coral reef, is relatively isolated (located roughly 10 miles from significant reef structure), and has survived numerous freshwater releases over the years. Despite hopes that this reef would be protected from this disease event, this location has now been impacted by disease. The Fish and Wildlife Research Institute (FWRI) sampled this reef in April as a disease-free reference site, and by June 1<sup>st</sup> disease was observed here by the Southeast Florida Coral Reef Evaluation and Monitoring Project (SECREMP) team.
    - FWC and FAU HBOI completed surveys of this site on June 30<sup>th</sup>: The species affected by disease were *Montastraea cavernosa* (MCAV), *Pseudodiploria clivosa* (PCLI), and *Solenastreaa bournoni* (SBOU). Some of these corals have been monitored and sampled routinely for the past 8 years; additionally, two of eight colonies that were transplanted to this reef in July 2015 from Breakers Reef (West Palm Beach) are now diseased.
  - Questions/Comments:
    - Joanna Walczak (DEP) requested additional information on the sampling conducted at St. Lucie reef prior to the disease event.
      - Jeff explained that they have been collecting tissue samples on the reef for approximately 8 years, always revisiting the same colonies of MCAV and PCLI. They did mucus/bacterial community structure work in the past, and are currently doing gene expression and zooxanthellae work. They have also begun doing genotyping work here and at sites further south.
    - Karen Bohnsack inquired about any analysis that is planned for biopsies that were taken from the diseased colonies on St. Lucie Reef.
      - Josh Voss clarified that the biopsies were taken to compare differences in gene expression among the infected versus pre-infected colonies (from previous samples taken) as well differences between the newly affected versus apparently healthy colonies on the reef. They hope to identify funding to complete these analyses and have submitted a proposal to EPA with that intent.
      - For the corals that they have genotyped, they will have a better understanding of which genotypes were resilient versus which were susceptible to this disease at St. Lucie, Jupiter, and Breakers Reefs. They will also investigate whether the disease causes changes in coral zooxanthellae or microbiology.
      - The samples they obtained are not preserved for histology; they are in TRIzol for protein or nucleic acids.
    - Esther Peters (GMU) expressed a concern that there are no histology samples, and asked if the gene expression work will be on coral tissue only, or will also include zooxanthellae.
      - Josh clarified that their gene expression protocol incorporates all mRNA from eukaryotes, so it includes both the coral and zooxanthellae. Those gene patterns can be mapped back to known genes for both.

- In the future, they are willing to collect histology samples, but may need to amend their existing permit to do so.
- Biscayne National Park – *Karen Bohnsack (DEP) on behalf of Vanessa McDonough*
  - BNP staff did not have significant new information to add; they are still seeing active disease on many species and lots of mortality most likely from last summer and fall.
- Florida Keys – Florida Keys National Marine Sanctuary – *Karen Bohnsack (DEP) on behalf of Cory Walter (MML)/FKNMS Staff*
  - During the Coral Reef Evaluation and Monitoring Project (CREMP) surveys over the past two weeks, various stages of the disease outbreak were observed across the different sites; observations indicate that the disease appears to have continued to progress south and west.
  - Anecdotally, disease seems to have progressed further at the offshore reefs than at the patch reefs; new reports indicate that disease is now extremely active at patch reefs in the Upper Keys. The CREMP team confirmed active disease at Alligator reef and Hens and Chickens patch reef. Meanwhile observations indicate that disease at offshore reefs in the upper Keys has already passed through, with the exception of continued *Siderastrea siderea* (SSID) disease.
  - Cheeca Rocks has also been observed to have early signs of disease; prevalence is low with *Colpophyllia natans* (CNAT) being the primary species impacted, although *Orbicella faveolata* (OFAV) may also have the beginnings of lesions. Photo mosaics have been captured at this site over the past few years, including in May 2017, so there is good pre-disease data to determine the impact of the event. DEP and NOAA are exploring the possibility of getting additional mosaic photos at this site in the near term.
  - Tennessee Reef, which was reported as disease-free during the June disease call, has also been newly observed with disease. This reef is located off of Long Key, near where previous studies have shown that current patterns change so that the primary flow of water is from Florida Bay as opposed to south through Hawk’s Channel. Despite hope that this would prevent the continued spread of disease south along the Florida Reef Tract, disease at Tennessee Reef indicates that the disease might continue to spread into the Middle Keys.
    - Other disease observations from this vicinity include *Pseudodiploria clivosa* (PCLI) with tissue loss disease at a patch reef <1 mile NW of Tennessee Reef, as well as disease at a near shore patch reef (FWC outplant site) several miles SW of Tennessee Reef near Grassy Key.
  - Tissue loss on SSIDs has been reported around the Keys, including in the lower Keys and Key West.
  - Questions/Comments:
    - Lauri Maclaughlin (NOAA) clarified that the species affected at Tennessee Reef include *Meandrina meandrites* (MMEA) and *Dichocoenia stokesii* (DSTO). Disease is still active as far north in FKNMS as Turtle Rocks, and down to Alligator Reef.
    - Karen Bohnsack reminded attendees that DSTO and MMEA were some of the most susceptible species when the disease first emerged around Key Biscayne.
    - Esther Peters noted that MMEA was not previously sampled. If there are active lesions on that species, paired histology and molecular samples should be taken.

This is an important species to sample because they have largely disappeared from other sites. With the very high impacts to this species, it is important to investigate whether the mechanism causing it is the same as that which is affecting other species.

- Karen Bohnsack noted that this suggestion would be considered as new sampling plans evolve over the next month or two.
- Dry Tortugas – *Meaghan Johnson (NPS)*
  - CREMP surveys were completed in June with no significant disease observations. This is consistent with observations at the National Park Service’s restoration sites, where only background levels of disease were observed.
  - However, monitoring at the South Florida/Caribbean Network fixed sites completed two weeks ago did discover high levels of yellow band disease at Loggerhead Forest (reported to be affected by WPL last summer). Primary species impacted included *Orbicella* spp. Like last year, they hope to complete follow-up surveys at this site.
- Questions/Comments:
  - Lauri Maclaughlin noted a disease outbreak affecting *Orbicella annularis* (OANN) at Turtle Rocks near the CREMP site and inquired whether others have observed this same condition. The lesions look like yellow band (but appear white instead of yellow); tissue is still present, but the calyx structure appears denuded. The lesions were located along the lower edge of OANN lobes. Lauri will try to get pictures for reference.

#### **Update on Current Response Efforts**

- New funding opportunities – *Joanna Walczak (DEP)*
  - DEP received funding from the Florida Legislature specifically for disease response capacity in this next Fiscal Year. The hope is to fund new projects that will generate enough data and results to justify additional funding in the future.
  - DEP is working to identify priority projects on which to spend this money. These will focus on data collection efforts, including a more concentrated survey to quantify exactly where the disease boundary is in the Keys. There is a hope that some of our partners can provide in-kind support for this initial survey effort. Repetitive surveys will likely need to be conducted throughout the year to track any changes to the disease boundary.
  - Once the boundary is identified, a second goal will be to establish fixed monitoring sites where additional data can be collected, and colonies will be fate-tracked to observe changes caused by the disease over time. Cheeca Rocks is an example of site that has a lot of historic monitoring data; we are working to get very detailed information about how the disease progresses through this reef site. The same is true of St. Lucie Reef where Jeff Beal and Josh Voss have done a lot of work previously and have a lot of data from prior to the disease event to serve as a baseline. It is important to look for these types of opportunities to build off of previous projects.
  - DEP is also pursuing one of the two EPA awards for disease response. This would be multi-year funding that will hopefully extend money to support additional disease response capacity for another couple of years.
- Coordination with USGS National Wildlife Health Center – *Karen Bohnsack (DEP) on behalf of Katie Richgels (USGS)*

- The NWHC has been trying to obtain additional staff support to dedicate to the disease outbreak investigation, specifically statistical modeling work. Their proposal to hire a new internal position was not funded, but they are still exploring other ways to get someone on board, including reaching out to university collaborators who might have a student who wants to work on this project and initiating conversations with other colleagues who might be able to dedicate some time to this.
- The NWHC has also included information about this outbreak in the quarterly Wildlife Disease Association Newsletter, which will hopefully generate additional interest and support. This will be published in October.
- Coral Disease Workshop Update – *Karen Bohnsack (DEP)*
  - DEP recently hosted a Coral Disease Workshop with Dr. Greta Aeby (University of Hawaii) and her former student, Dr. Blake Ushijima (Oregon State University) to which all participants on this coral disease coordination list were invited. In total, 74 people attend in-person, and the webinar was full. It is estimated that approximately 125 participants attended total.
  - Karen Bohnsack provided a quick update for those who were not able to attend:
    - Drivers of coral disease range from the abundance of the coral host, the emergence of new pathogens, increased abundance or virulence of existing pathogens, and injury and stress from a variety of global and local sources.
    - Potential management actions to combat disease include continuing research to understand disease ecology, promoting reef resilience by reducing local stressors, and more targeted management actions such as developing response plans, promoting citizen science, and direct treatment applications.
    - It is important to understand the ecology of coral diseases when conducting a disease investigation. This is key to figuring out a potential cause and how to best respond to manage that disease. For example, some diseases are seasonal while others are not and some are host-specific while others are generalists. Virulence (harmfulness of a disease) also varies; some may cause direct colony mortality while less virulent diseases may decrease reproductive ability and/or growth rate. There are many different etiologies of coral disease, such as bacteria, fungus, parasites, etc., and susceptibility to any given disease may vary among coral genera.
    - Attendees also received a lesson in lesion identification, including specific nomenclature that should be used to more consistently describe coral disease observed in the field:
      - 1) Describe the type of lesion (tissue loss, color change, abnormal growth)
      - 2) Determine if that could be caused by disease or other biological factors (such as competition, abrasion, etc.). In particular, when white is observed on a colony, these lesions should be differentiated between bleaching, predation, and disease.
      - 3) If disease is suspected, the rate of tissue loss (chronic, sub-acute, or acute) and the type of lesion (focal, multifocal, etc.) should be described.

- An important take home message was that tissue loss diseases cannot be diagnosed in the field. When disease is suspected it is important to follow field documentation with histological examination. Photos of field observations are also critical.
      - Dr. Blake Ushijima presented information about coral microbes and noted that not all coral disease lesions are caused by the same pathogens. While some bacteria cause disease (are pathogenic) and are a threat to corals, others are important for their health.
    - For those who were unable to attend the webinar, the presentations were recorded and Dr. Aeby and Dr. Ushijima have offered to share PDF versions of their PowerPoints. These will be made available to all interested parties in the coming weeks.
    - Special thanks to Dr. Aeby and Dr. Ushijima for their time and expertise, and to NSU and Broward County for providing venue and boat support for the event.
  - Florida Reef Resilience Program Updates – *Jenni Stein (TNC)*
    - Disturbance Response Monitoring (DRM):
      - The Keys DRM training was held at Mote Marine Lab on July 17<sup>th</sup>. Dr. Greta Aeby attended and gave a short presentation on coral disease nomenclature and how to identify lesions. Given this new information, a few revisions have been made to the DRM protocol and data sheet. To be consistent with previous DRM data collection efforts, surveyors are being asked to continue to use the previous disease acronyms at least in the short term. Definitions have been added to help clarify what each type of disease means, and if an unknown disease is observed surveys should include descriptive terminology in the notes. A decision tree for lesion identification (as presented by Dr. Aeby) will also be shared with all surveyors.
      - The FRRP website ([www.FRRP.org](http://www.FRRP.org)) will include a new feature that allows surveyors to upload pictures.
      - The next DRM training is August 4<sup>th</sup> at NSU in Dania Beach. Dr. Aeby will be presenting again and participating in a team leader field QA/QC dive.
      - DRM season is August 14<sup>th</sup> - October 13<sup>th</sup>. Preliminary bleaching observations have already been reported; the Florida Reef Tract is currently under a bleaching watch.
    - Disease Boundary Survey Effort:
      - TNC and partners have been working to revise the disease boundary identification protocol. This will hopefully be ready to implement in the near future. The area where surveys will take place has shifted south with the latest disease observations.
      - Joanna Walczak thanked TNC for working to pull that protocol together.
  - Questions/Comments:
    - Esther Peters expressed her enthusiasm for the many programs and opportunities for people to be trained to in disease and bleaching recognition. This is important to understand what is happening on the Florida Reef Tract.

### **Working Group Updates**

- NSF RAPID Project – *Val Paul (Smithsonian Marine Station)/Greta Aeby (U. of Hawaii)*

- One laboratory-based disease transmission study has been completed, in which both nursery MCAV and OFAV were exposed via contact and non-contact to a diseased MCAV colony (collected from Ft. Lauderdale). The experiment maintained controlled conditions with filtered seawater (0.2 micron) changed every day.
- Data are still being analyzed, but initially they have seen rapid disease transmission from MCAV to OFAV. Transmission via contact is faster, but they have also observed waterborne transmission. MCAV was a bit more resistant, but after 12 days approximately half of the specimens were also observed with disease. This is showing for the first time that this disease is transmissible, with likely some waterborne component. Still, the conditions in the lab are very different from those in the field, where there are many more potential vectors for transmission. Val Paul referenced a recent paper published in PeerJ by Steve Vollmer that showed that zooplankton can be implicated in transmitting coral diseases (<https://peerj.com/articles/3502/>).
- Thanks to help from Broward County, they have also tagged ~22 MCAV colonies in the field. The colonies were recently photographed (3 weeks after they were originally tagged), and although these new data have not yet been fully analyzed, their general impression is that there is variability in disease progression; disease on some colonies has slowed down, while it continues to move rapidly through others. These corals will continue to be tracked over the next few months.
- A second lab-based transmission experiment will be initiated soon between MCAV and *Porites astreoides* (PAST) which has been reportedly more resistant to disease impacts.
- Dr. Blake Ushijima has been working on bacterial isolations, and they are treating some aquarium specimens with antibiotics (not for the purpose of field application, but to try to understand if this disease is bacterial). If antibiotics slow or stop the disease, that may be an indication that it is a bacterial infection.
- Questions/Comments:
  - Karen Bohnsack noted that it was interesting that they've observed MCAV to be more resistant to transmission in the lab. Reports from southeast Florida indicate that MCAV was initially not one of the main species impacted by the disease outbreak. After a delay, they became heavily impacted in a second outbreak wave that also impacted SSID.
- Sample Analysis – *Jan Landsberg (FWC)/Esther Peters (GMU)*
  - Jan Landsberg provided an update on initial findings from histological analyses of MCAV samples that were collected in November 2016. This may help inform the experimental work that Val Paul, Greta Aeby and others are working on.
  - Slide 2: For perspective, they have provided some photos of what an apparently healthy MCAV colony (#134) would look like, both in the field...
  - Slide 3: ...And histologically. This image shows a longitudinal cut (top to bottom from the surface to the skeleton). This shows a healthy, normal community of algae and fungi in the skeleton (which dominates the middle to bottom of the photo), and the surface tissue looks healthy and intact.
  - Slide 4: Magnified photo of the normal position of the endolithic community in the skeleton (where there appears to be a gap between the algae and the facing tissue of the skeleton). This may be relevant when you compare against the disease specimens.

- Slide 5: Close-up of normal-appearing surface epidermal layer, gastrodermis with healthy-looking zooxanthellae, and mesoglea. These are the features that will be compared to affected corals with tissue-loss lesions.
- Slide 6: Field photo of a diseased MCAV (#101).
- Slide 7: Close-up field photos of the diseased MCAV. It is important to get good photographic documentation in the field to later verify observations. In these photos, the lesion development in the polyps is visible, which is helpful for matching field observations with histology.
- Slide 8: Another photograph of the diseased MCAV sample, showing the progression from apparently healthy tissue on the left to where the lesion was observed in the collected sample (right side of the photo). Disruption in the surface of the tissue as well as internal damage are visible where the lesion was located.
- Slide 9: Photos of different areas within the affected coral. They show similar types of lesions in different sections of the coral. Interestingly, deeper lesions are observed more often than surface lesions. Photos show examples where the surface (epidermal/gastodermal layer) is intact, but deeper there are whitish areas where there is tissue necrosis and loss of zooxanthellae. There appears to be a pattern here, as similar conditions have been visible in 4 or 5 samples.
- Slide 10: Comparison of diseased (left) vs. healthy tissue (right). The loss of zooxanthellae and necrosis/whiting of the tissue is visible in the diseased sample. The bottom image shows a different stain to look for other features within the diseased sample (Thionin stain is used to identify potential DNA, organisms, or other cellular features inside the lesions).
- Slide 11: Close-up of “dots” that may or may not be coccoid bacteria in the diseased tissue sample. However, it’s too early to confirm whether these are bacteria; it might just be the breakdown of tissue or other cellular features. This needs to be confirmed through other diagnostic methods; parallel slides will be sent to Esther Peters (GMU) for fluorescent in-situ hybridization (FISH) which can target bacteria. These are the types of features they look for in lesions to see if there are any signs of potential pathogens.
- Slide 12: Another disease example (MCAV #109). These next slides show that histologically they are seeing similar patterns in MCAVs across the different stages of lesions (e.g., subacute versus chronic lesions with more algae growth overtime).
- Slide 13: Close-up. Regarding endolithic algae in the skeleton, when you have bleaching or a loss of zooxanthellae, there is more light penetration into the tissue, so there is often a response by the endolithic community upwards. They are normally adapted to low light levels, but they can respond and start growing up. This is what appears to be happening in this slide (lower arrows show algal mass closely abutting the tissue, then there are lesions located above that which may or may not be connected with the algae interface with the skeleton and the deeper tissue). Algal growth oftentimes comes from the surface (e.g., algal bands observed in the field) and below.
- Slide 14: Similar image of damage to the surface tissue with zooxanthellae loss and tissue necrosis. It also appears that some kind of lysis might be going on, but this is still a subjective observation.
- Slide 15: Another diseased MCAV example (#104). Halofolliculina (black dots in the photo) are seen overtime in skeletal areas (in the lab and are obvious in the field as



- well). These ciliates seem to be coming in secondarily as they are not exactly on the interface between the diseased and healthy tissue, but on older diseased, skeletal areas.
- Slide 16: Similar extensive lesions, including sub-surface and surface lesions.
  - Slide 17: Close-up.
  - Slide 18: Another observation in this specimen was that below the surface in the gastrodermis, the zooxanthellae are swollen (hypertrophic) with a lot of refractile bodies in them (these are probably crystals/uric acids which have been documented in zooxanthellae). This may tell us about their physiological status and health. This may be relevant, but it is unknown if this has to do with ongoing bleaching, zooxanthellae stress or even water quality. It will be important to follow-up with electron microscopy to better understand what these may be.
  - Slide 19: Shows how these crystals look in different stains. The bottom left is the GMS stain that is usually used for fungal identification, which seems to show the crystalline masses well. This was especially striking in this specimen, which was field-identified to have white plague-like disease. They will be systematically getting together different criteria of what they are observing histologically, and matching that up with other ongoing diagnostics.
  - Slide 20: Higher magnification. Some pathology/damage to the zooxanthellae can be seen.
  - Slide 21: Another MCAV example (#105) – Field photos of lesions.
  - Slide 22: Similar lesions observed histologically.
  - Slide 23: Similar observations. It's important to get multiple samples and compare what is visible in the field vs. what is being seen histologically.
  - Slide 24: No obvious organisms were observed in the Thionin stain, but more tests are needed to help align what is being seen in the lesions as far as potential organisms.
  - Slide 25: Summary:
    - Histopathological appearance of bleaching band/border and some “white plague-like” disease lesions (as identified in the field) potentially suggests same disease process. These may be different stages of the disease.
    - In initial observations, early lesions can be seen in the deeper calicodermal/gastrodermal layer in the absence of surface lesions.
    - Various stages of bleaching, zooxanthellae necrosis/vacuolation are present in gastrodermal lesions.
    - Endolithic algae appear to be responding in some lesioned/bleached areas of reduced zooxanthellae presence; “blooming” upwards towards the surface. Potential involvement in disease etiology?
  - Questions/Comments:
    - Regarding the Halofolliculina, Vladimir Kosmynin (DEP), noted that these seem to appear after the disease is present. Is this because they have a white exposed skeleton, or because they come as the aftermath of the disease?
      - Jan Landsberg clarified that these seem to appear afterwards as a secondary based on their distribution (not immediately on the active disease interface). It is unknown if they have a primary role; there is a need to determine if other affected coral species also have these ciliates, and where they are.

- Karen Bohnsack inquired as to whether the subsurface lesions may be evidence that corals are potentially affected by disease even when they appear healthy during field surveys.
        - Jan Landsberg stipulated that while this may be the case, we cannot say this for sure at this time. It is important to carefully align where these lesions are observed in relation to the healthy-appearing tissue. Getting diseased samples and apparently healthy samples from the same colony (as well as healthy control reference samples) may help to determine if that is the case. More sections need to be looked at.
        - Esther Peters clarified that there are still a lot of slides that need to be reviewed, but it does appear that the zooxanthellae are being affected and they are not yet sure why.
- Coral Disease Field Interventions – *Dana Williams (NOAA)*
  - Karen Bohnsack noted that Dana Williams had to leave the call unexpectedly due to an emergency. Updates from this group will be postponed to a later call.
  - Val Paul mentioned that Dana and others are going to start pursuing permitting to apply the epoxy chlorine methodology, which has already been successfully deployed in Hawaii for black band disease. There may still be some regulatory roadblocks, but they are looking into it.

#### **Disease Coordination Calls – Look Ahead**

- The original intent of the calls was to bring interested parties to the table to share the current status of the disease outbreak and ensure that everyone had the best available information, highlight the response efforts being led by the individual partners, provide a venue for discussion, and provide an opportunity for coordination to streamline response efforts, avoid duplication, and identify gaps. To an extent, this has been successful, however some partners have indicated that these calls are not effective.
- Karen Bohnsack requested input from participants about the future direction of the coral disease coordination calls, including whether they should be terminated or could be adjusted to be more effective.
- Questions/Comments:
  - Lauri Maclaughlin suggested that these calls could be a good forum for additional training on disease nomenclature, especially between now and mid-August when FRRP season begins.
    - Karen Bohnsack noted that it is unlikely that there will be time in the next two weeks to set this up, but all of the trainings from Greta about disease nomenclature and field identification will be available online (including webinar recordings and PDFs of the PowerPoint slides).
    - Jennifer Stein reminded participants that Greta will be giving another brief training again at NSU in early August. They are also working to add a new FRRP training module that will incorporate this additional disease information.
  - Valerie Paul mentioned that these calls have been informative and useful in helping figure out who is doing what, encouraging communication, and building collaboration among the various entities. It has also helped share information (such as the initial histology findings) that would be difficult for most people to decipher independently.

Still, understanding that organizing these calls is time-consuming, perhaps they could be held less frequently (e.g., quarterly or tri-annually).

- Jan Landsberg concurred with these thoughts.
  - Esther Peters also agreed. It's important to improve our coordination to know what's going on, but a lower frequency would still work (e.g., every 2 months).
  - Karen Bohnsack noted that if the group requests that these calls continue, given new priorities and time constraints they would probably occur no more frequently than three to four times per year.
- Lauri Maclaughlin observed that the calls are invaluable from a manager's perspective, and agreed that calls held quarterly or even less frequently are sufficient. However, if there is any big news that is important to share we should consider a "special edition" call that is more timely.
    - Karen Bohnsack agreed that this was a reasonable request.
  - Billy Causey (NOAA) agreed that the calls have been very useful for increasing collaboration between scientists, observers, and managers. With everyone's challenging, busy schedules, the calls provide a good synopsis of the current disease outbreak and response status in a condensed format. Calls should continue, but can be scaled down to reduce the administrative burden of organizing them.
  - Karen Bohnsack summarized the input and consensus thus far: We will continue to host these coordination calls, but hold them at less frequent intervals. Additional calls can be scheduled as necessary if there are issues that require additional input from the group or big news that needs to be shared. The next call will be planned in the late October to early November timeframe.
  - Dan Clark (Cry of the Water) questioned whether now is the most appropriate time to be scaling back these calls (we are entering the warmest time of the year when disease is usually much more rampant), and suggested waiting a few months before implementing this suggestion.
    - Karen Bohnsack agreed with this assessment, but noted that while we are looking to reduce the frequency of the coordination calls, the work we are doing will continue in the meantime. All participants are encouraged to continue participating in the local citizen science programs (C-OCEAN, SEAFAN, BleachWatch) which are instrumental in keeping scientists and managers updated on current reef conditions. BleachWatch reports will continue to be distributed ~monthly from those programs, which summarize the current conditions on the reef. Additionally, with the additional Legislative funding the push to initiate new response projects is a priority; this may be hindered by continuing to allocate staff time to planning and coordinating calls at the same frequency as has been done in the past.
  - Joanna Walczak (DEP) thanked everyone for their input; such positive feedback helps us ensure that we're allocating our time productively and wisely. Joanna also reiterated that we will continue to work behind-the-scenes to get new projects initiated, and will still plan to summarize all this information via regular (although less frequent) calls.
  - Referring to Dan Clark's point, Karen Bohnsack reminded attendees to please continue to keep her informed of any relevant updates, so that we can compile that information

and are prepared to share all updates during the next call. Karen also reminded everyone that they are welcome to reach out between calls if they need information.

### **Other Reef Issues**

- Brian Walker announced that they received an award from the NOAA CRCP Domestic Grant. They will be revisiting all the large corals (>2m in diameter) in the southeast Florida region, most of which are OFAV. It is currently unknown how these have fared with the ongoing coral disease outbreak since they were last surveyed in 2015, but as we've heard, disease transmission can occur to this species. Those colonies with active disease will be identified and potentially included in tissue collection efforts. Brian requested an opportunity to collaborate with others on the call to get these samples analyzed.
  - o Lauri Maclaughlin inquired as to whether these large corals could potentially be good candidates for applying in-situ intervention techniques (e.g., firebreak, chlorine, epoxy, etc.).
  - o Brian Walker noted that is not a decision they can make, but expressed a willingness to assist with any such efforts. Additional conversations will need to be had by DEP and other agency representatives before any interventions are applied. Their goal in the meantime is to first understand the status of these corals, then help with management strategies. Brian clarified that this project is only focused on the large corals located north of Key Biscayne.

### **Wrap-Up and Adjourn**

- Karen Bohnsack reminded attendees that Florida is hosting the next U.S. Coral Reef Task Force (USCRTF) Meeting the week of August 7-11 at the Ft. Lauderdale Marriot Harbor Beach Hotel. This is a week of workshops and meetings that concludes with a business meeting on August 11<sup>th</sup>, which will include a coral disease presentation. Dr. Greta Aeby will provide a coral disease overview, Rob Ruzicka (FWC) will discuss the status of the outbreak, and Karen deliver a high-level summary of the various response efforts undertaken by our partners, including highlighting challenges and providing recommendations for moving forward.
- Next call date: TBD (likely early November).
- Follow-up:
  - o Karen will send:
    - Notes from this call.
    - Links to the coral disease workshop recordings and PowerPoint PDFs once they are available online.
    - A link to the Wildlife Disease Association Newsletter (October).