2015 Southeast Florida Coral Disease Outbreak

Coordination Meeting #2
September 29, 2015
2:00 – 4:00pm

Attendees:

- Meghan Balling (FEDP CRCP); Karen Bohnsack (FDEP CRCP); Wes Brooks (Office of Ileana Ros-Lehitnen); Christopher Cavanaugh (?); Janice Duquesnel (FPS); Nicole Fogarty (NSUOC); Dave Gilliam (NSUOC); Lisa Gregg (FWC); Meaghan Johnson (TNC); Pat Landsman (?); Diego Lirman (RSMAS); Joe Lopez (NSUOC); Lauri Maclaughlin (FKNMS); Cliff McCreedy (NPS); Erin McDevitt (FWC); Steven Miller (NSUOC); Margaret Miller (NOAA); Francisco Pagan (FDEP CRCP); Rachel Pawlitz (TNC); Fran Perchick (TNC); Esther Peters (GMU); Bill Precht (Dial Cordy); Laurie Richardson (FIU); Mauricio Rodriguez-Lanetty (FIU); Rebecca Ross (MDC); Melissa Sathe (FDEP CRCP); Mollie Sinnott (FDEP CRCP); Sara Thanner (MDC); Anna Toline (NPS); Joanna Walczak (FDEP FCO); Brian Walker (NSUOC); Lauren Waters (FDEP CRCP); Daron Willison (FDEP CRCP); Cheryl Woodley (NOAA); Ana Zangroniz (FDEP CRCP)

Meeting Summary:

Meeting Purpose

- Purpose of the call is to keep everyone in the loop about what has been going on with the current disease outbreak response efforts, and to include everyone who's interested in planning any necessary next steps.
    - We have been doing some more individualized coordination behind the scenes
    - Today we will talk about any updates on SEFL Bleaching Observations, Response Efforts, Other Disease Work, FRRP Steering Committee and finally action items.
- Everyone who has expressed an interest is invited to participate on these group calls.

Update on Southeast Florida Disease Observations

- Bill Precht –
    - Since last fall, Dial Cordy & Associates has been involved in monitoring for the US Army Corps of Engineers (USACE). Control sites are located both off of the south end of Virginia Key and some 5 miles north of Government Cut (North Miami Beach).
    - While the team was doing surveys, they recorded and reported white plague-like symptoms on some of their tagged corals in the south control site in late October 2014. Then on November 14, 2014, observed that essentially the entire south control site was lit up with white plague disease. It was observed affecting 13 different species of coral. After surveying the control sites, a 60 minute timed swim was conducted at a non-named reef area by the northern tip of Key Biscayne, during which the number of healthy vs diseased corals were counted. Every DSTO and MMEA (98-100%) were affected; a very high disease prevalence was also observed in DLAB and PSTRI. Data was collected and monitoring of disease effects continued at that reef area.
    - Over the next few months the disease was noted moving north at the control sites, and in February 2015 it was observed at the north control sites 5 miles north of Government Cut.

When both the southernmost and northernmost sites were observed affected, they began asking for other observations. There were reports of disease at Rainbow Reef and Emerald Reef from winter 2014, and then reports at the northernmost portions of Biscayne National Park (BNP) from early 2015.

- In 2015 Dial Cordy set up a second tier monitoring effort (not associated with USACE) in which 10 geographically spread sites throughout Miami-Dade County (MDC) were selected. Again, 60 minute timed swim surveys were performed and the same conditions seen at the original sites were observed at all locations between BNP and the northernmost reaches of MDC.
- On September 19th and 20th this year, two of the previous sites were resurveyed, 1 south (Rainbow Reef) and 1 north (Sunny Isles). Timed swims at both sites revealed no living colonies of EFAS, MMEA, DSTO, CNAT, DLAB, and PSTR observed during 2 hours of diving. Active disease at both sites was observed in PCLI, OANN, and MCAV and all other species were bleached.

- Karen Bohnsack noted that these observations could likely be corroborated by other people on the call also involved in bleaching/disease surveys, and requested additional observations of new or worsening disease while diving recently – especially north of the known location in Palm Beach or south in the Keys.
  - Laurie Richardson – This is the worst thing I've heard that has happened to these reefs since I started working here in 1990 – its magnitudes worse.
  - Erin McDevitt – Dove a week or two ago within 6 miles of the Palm Beach Inlet, but didn't see any disease and only a bit of MMEA bleaching. Will be going out again and will report back, but seems like Palm Beach County is doing ok.
  - Lisa Gregg – FWC staff (Rob Ruzicka) have been out doing DRM and CREMP transects in the Keys. They were in the Upper Keys and though they didn't survey specifically for white plague, they saw lots of bleaching but no white plague. Large *Orbicella* were paling or partially beached, but very little signs of disease. Doesn't seem like it's getting into the Keys.
  - Karen Bohnsack – Received a concerning Bleachwatch report that noted bleaching on the majority of MMEA and DSTO on the 60' reefs between Lake Worth Pier and Breakers. Could this possibly be misidentified disease?
  - Erin McDevitt – MMEA typically bleaches every summer and they come back, so at this point it shouldn't be a cause for concern since it's been observed in the past. Unsure about DSTO.
  - Mauricio Rodriguez Lanetty – Reports of white plague on DCYL, which have been monitored over the past 18 months. A report from Cindy Lott from September sampling across the Keys included observations of white plague, with the highest prevalence in the Upper Keys in comparison to the other regions. So far this has only been observed on DCYL; there was no evidence in other coral species. There have also been observations of black band disease on other species. The numbers for this year are not available yet, but will be estimated.
  - Karen Bohnsack – Requests that the group be updated if there is any information that the disease is being observed at higher than background rates.
  - Mauricio Rodriguez Lanetty – We can show prevalence through time and can compare to last year once the numbers are available.
  - Diego Lirman – RSMAS just finished 25 random FRRP surveys just south of Port of Miami channel. Within FRRP transects the presence of disease has been close to 0, although isolated colonies (DSTO) have been observed outside of transects. Currently it doesn't appear that the disease prevalence is higher than any other years; it may have already run its course. At every site living healthy colonies of all the species Bill mentioned were observed, but we need to compare the abundance data.

- Bill Precht – Agrees that in these areas, especially south of Government Cut to northern portions of BNP, the disease had run its course by May 2015, so all of the MMEA and DSTO were already impacted. You wouldn't find active disease because it's already run its course. Maybe we could hear more from Paul Jones (UM-RASMAS) and Sara Thanner (MDC) about this.

- Karen Bohnsack – We're expecting the annual Florida Reef Resilience Program (FRRP) monitoring surveys to wrap up next week and will have a region-wide update in early November from The Nature Conservancy (TNC). Anyone have anything major to add?
  - Diego Lirman – What are people seeing with the branching corals?
  - Margaret Miller – NOAA has been monitoring populations in the Upper Keys and have seen lots of bleaching and disease-like tissue loss. It was present last year but definitely noticeable now. If tissue is bleached adjacent to tissue loss we call it "bleaching tissue loss" versus "disease tissue loss." A fair bit of bleaching and tissue loss has been observed on branching corals in the Upper Keys.
  - Dave Gilliam – In southeast Florida not much bleaching has been seen on ACER, and disease isn't above what is normally observed.
  - Ester – Relating to Margaret's comment, we're still working on getting all of those samples processed from the 2014 bleaching event. Notes that there is a difference between bleaching and disease tissue loss. Corals can lose their tissue when they lose their zooxanthellae.
  - Karen Bohnsack – In reference to a recent email from Mark Eakin, the temperature might start cooling off soon, without further temperature accumulation hopefully we might see some bleaching recovery.

Update on Response Efforts

- **Tissue Sampling**
  - Karen Bohnsack – FDEP CRCP collected 4 samples from two sites in Broward County: MCAV with WPL and BBD; MMEA with WPL, SSID with DSD.
    - Rebecca Ross – MDC took MCAV and DSTR samples at a 3rd reef site on August 6th, but they haven't been shipped yet; hoping to get more samples from an artificial reef site later this week. Seeing a lot of white plague on a lot of species.
    - Lisa Gregg – Speaking for Kate Lunz, the samples from FDEP CRCP are the only ones received so far.
    - Karen Bohnsack – Request FWC to keep the group informed as they receive more samples. It sounds like the goal is to try to sample the full range of species with disease, so please let us know if additional samples are needed.
- **FRRP DRM Surveys/Additional Quick Site Surveys**
  - Karen Bohnsack – Requested feedback from the FRRP DRM survey effort and additional information collected via the 'quick surveys.' FDEP CRCP picked up on disease that otherwise would not have been captured in transect.
    - Lauri McLaughlin – Based on results from surveys up in Biscayne, FKNMS staff have been seeing lots of different types of cyanobacteria, also saw a lot of drift algae in the Lower Keys and Middle Keys. There was an intense outbreak of algae (Ceranium) on a staghorn patch at Horseshoe Reef which killed many of the colonies between August-September in the upper region. I wanted to add on a drift algae or overgrowth category for cyanobacteria and algae (general algal overgrowth (AOG), esp. to include cyanobacteria mats, frondose "hair-like" overgrowth, and gorgonian

impacts). Also added that while doing FRRP surveys, white plague was found on SINT and OFAV, as well as DCYL and PSTR. This was observed in August but subsided in early September. At Conch Reef and Burrfish (nurse shark) Reef, they are still seeing active disease (WPL and black band), and bleaching.

- Karen Bohnsack – Reminder to the group to enter additional data quick survey data in the "Notes" section. Other comments?
  - Laurie Richardson – Another big issue is the sedimentation from the dredging in the Port of Miami since it is killing all the corals. This should be documented. Also, as opposed to diseases, we don't know what's been causing them after 40 years. FDEP staff should be going out and removing the excess sediment.
  - Karen Bohnsack – In the interest in keeping on topic and on schedule, requests to follow up on this issue after the call with FDEP staff.

- **Targeted Sites**
  - Karen Bohnsack – Reminded that during the first coordination call, it was discussed to potentially identify targeted sites to help capture the extent and impact of the disease outbreak. FDEP CRCP contracted Brian Walker with NSUOC to document a subset the large corals he previously identified last year (some of the oldest on the reef) and compare from surveys last year.
  - Brian Walker – The team has been out the past 2 weeks. Last year we identified 195 targets, visited 160, and found that 110 were actually large corals (>2m diameter) and that over 50 of them were alive or had remaining tissue on them. We wanted to go look during this event. We have visited 50 so far and have 10 left plus some extra. Of the 50 we've visited, we found about 30% have had disease, about 30% have been bleached, 26% had some recent mortality, and about 20% had some paling. Some corals were affected by multiple indicators. 51% of the corals had no disease, bleaching or paling. Of the corals we visited: 44 were OFAV, 3 OFRA, 1 OANN, and 2 SSID. SSID was in bad shape; one was bleached and the other had dark spots. We have 10 colonies left to visit and somewhere around 50 more targets to hit to see if there are additional large corals down off Biscayne. Study area is from the tip of Key Biscayne up to Broward on near shore hardbottom reefs. I sent around some representative photos of the diseased corals, and also posted a link to the Sentinel webpage with a few videos.
  - Karen Bohnsack – If you agree, we'll post your photos to share with the group (photo sharing will be discussed later in the agenda).
  - Brian Walker – Sounds great.
  - Bill Precht – Clarified terminology when discussing areas of the reef; the surveys I did were on the inner reef line that sits between outer reef and nearshore hardbottom. This xtends from Key Biscayne north to Broward County and follows the paper Walker published on naming habitat types. We kept our observations in the middle zone.
  - Karen Bohnsack – In addition to surveying these large coral sites, there was discussion about potentially doing additional tissue sampling at those locations, maybe under a new SAL. FDEP is concerned with sampling (and adding an additional stressor) during this time and requests that sampling be delayed until the corals have a chance to recover from the current events. Asks for clarification about the sampling that would be done.
  - Joe Lopez – Tissue samples would be taken to test the hypothesis that there is some microbial component that could be causing some of these diseases or taking advantage of the stress conditions. Agreed to hold off and noted that they don't have that permit yet. Request if people wanted to share samples, that is another possibility. Added that while in the Bahamas two weeks ago (New Providence and Andros Island), bleaching of OFRAN and

OANN was pretty extensive across 7 sites (over 20% of OANN were heavily bleached). Wasn't looking for disease at the time, don't know if its temperature related.
    - Karen Bohnsack – We can continue conversation about sharing samples and sample analysis as a follow up.
    - Joe Lopez – That'd be great.
    - Brian Walker – At the sites we visited we saw a lot of corals that were recently dead with no tissue on them. Wonder if we wait too long the disease will run its course and we will miss the opportunity to get samples. Perhaps if we avoid sampling the biggest most precious corals, but we can at least get some from other corals at those sites while the disease is still active.
    - Karen Bohnsack – The current disease tissue sampling SAL is still active, so we could potentially discuss doing that. If samples are to be housed at NSUOC, we might need a new SAL application.
    - Lisa Gregg – We can add anyone to the existing license, it takes 5 minutes to amend.
- **Additional Sampling Efforts**
    - Karen Bohnsack – In addition to the above efforts, we have initiated a contract with NSUOC to do additional FRRP DRM sites. A few entities were asked to assist with this effort, but NSUOC was the only one that could find the time. We appreciate everyone's efforts to get as much disease info as possible. This contract will be to complete more of the secondary FRRP sites to get more information in Broward. We also included some of the deeper RVC sites so we can capture more deep reef sites (>60ft deep) to see disease impacts there. Staff at Pennekamp have also offered to help do additional DRM surveys, they've been asked to do as many secondary sites and other targeted sites as they can.
    - Vanessa Brinkhuis – SCREMP and CRMP sites were monitored early in the summer, so it might be good to go back and compare if bleaching has gotten worse.
    - Karen Bohnsack – Refers to Meaghan Johnson regarding a push already underway to revisit the CREMP/SECREMP sites.
    - Meaghan Johnson – Yes this is happening. I think SCREMP have already been done and they are finishing up CRMP sites while bleaching is happening.
    - Kerry Maxwell – We've had bleaching but very little disease. A little, looked like baseline level.
- Wes Brooks (for Congresswoman Iliana Ros-Lehtinen) – Is there any way we could get a graphic to visualize the level of disease in different areas along SEFL?
    - Karen Bohnsack –Yes. Following the current FRRP DRM surveys, TNC will put together a report showing severity and locations. We could get that to you early November, does that work?
    - Wes Brooks – Yes.
    - Lauri Richardson – Suggests using Bill Precht's or Mauricio's data to get something sooner.
    - Bill Precht – We wrote a manuscript from our 12 sites that we plan on submitting to a journal within the next 10 days or so. It's not published yet, but I have a graphic I'd be willing to share. Need to confirm with co-authors, but will share it within the next couple days.
    - Lisa Gregg – Part of our original intent with this effort is that we have an app for phones, that's probably what you're looking for. It is under ESRI and doesn't work on a desktop computer which has limited our ability to compile all of the information, but we are trying to get it done (last spoke to ESRI 1 month ago).
    - Wes Brooks – Yes, visuals are helpful.

- Karen Bohnsack – I will defer to Joanna Walczak, but I think in the short term it's possible to provide photos and we also have talking points about bleaching and disease that are geared towards non-scientists; once we have all the region wide surveys in 1 month it will better tell the story from a regional perspective.
- Joanna Walczak – I'm fine with that, we can share info. Brian Walker has also offered to put together a spatial map of the info we have and data sets so far.
- Brian Walker – If you send us all the coordinates we can plot them on a map.
- Joanna Walczak – We could get something preliminary before November.

- Wes Brooks – What is the best way that we can help up here from Washington? What's your biggest restriction on being able to do things – manpower, funding, regulations, permitting?
  - Joanna Walczak – I just had a meeting with head of National Ocean Service; there is no emergency funding mechanism to address issues like this in the coral world. At the national level, we are working on the reauthorization of the Coral Reef Protection Act and including wording to support efforts like this in future. But short term we need a way to funnel money to whomever can get down there to help. To understand prevalence, the budget is really only in the $30-50k range. There are other mechanisms in the fisheries world, such as under the Magnusun-Stevens Act that if you declare emergency it opens up funding to gather information.
  - Laure Richardson – National Science Foundation (NSF) has a fund called RAPID which disperses grants in the $200k range. Mauricio has a grant and is the PI, myself and Diego are also on it. There is a need to do long term studies to understand what's happening at the basic biological level.
  - Joanna Walczak – To clarify the $30-50k estimate is to document the problem. Requirements for NSF RAPID were too stringent in our timeframe.
  - Laure Richardson – NSAID gives out million dollar grants to entities like the NIH. There is a serious threat to corals worldwide.
  - Wes Brooks – I'm an ecologist by training, I want to help in the next few weeks and understand that funding doesn't work that way. A letter sent to the administration at NOAA NOS may help to loosen up some funds.
  - Joanna Walczak – Constraint of government funding is that it doesn't work quickly. There may be other opportunities through foundations such as NFWF that might be able to move money more quickly; we'll need targeted conversations about this. We should follow up together.
  - Wes Brooks – Great, thanks.

Overview of Relevant Disease Work

- Karen Bohnsack – We would like to provide an opportunity for others doing disease work to share with the group, especially as it pertains to the current response effort. Mauricio has been invited to give an overview of his current project and findings.
- Mauricio Rodriguez-Lanetty – We have been working to determine the susceptibility of DCYL to bleaching along the coral reef tract and of ACER in nurseries in Miami-Dade County and the Keys.
  - We established the project in April 2014 and started monitoring populations a few months before we had the bleaching event last year. The project is funded by NSF and aims to correlate susceptibility bleaching and recovery with genotype differences.

        - Monitoring began on a monthly basis after the bleaching event last August 2014, and we observed the disease developing. Last year we started seeing white plague in DCYL seeing 20/100 colonies, with the highest prevalence observed in November 2014. We should be prepared to see greater prevalence again in the coming months, as was observed last year. We particularly saw this on outer reef, although it occurred along whole Florida reef tract.
        - Samples were taken to look at the DNA/genotypes of different corals to better understand if there is a resistant genotype. Disease samples were also taken to better understand if it's bacteria that might be driving this; we were interested in seeing if microbes in the coral were driving disease.
        - Surveys occurred monthly until December 2014, and since it's been every 3 months. We have a good amount of samples for sequencing, and can provide results in the near future. We're growing bacteria associated with white plague type disease and we already have a library of bacteria isolates and are in the process of doing challenge experiments to replicate disease development, and try to identify or isolate the potential causative agent. There are two approaches – sequencing system and genomics and marrying it with this culture-dependent approach.
        - At the moment we have been sampling, and are now in the stage where we can tell more about the disease. We've seen a lot of bleaching and white plague in a few DCYL colonies a few weeks ago. Based on the bleaching we saw we're expecting that there will be an increase in disease in the next 2 months. Want to identify resistance genotypes. In a few months, by November, we might be able to provide information about resilience and genotype. We have some funds to drive the DNA sequencing but funds will run out by the end of this year. A lot of information is to be generated after these analyses but I can tell you that we need to be careful about what is going to happen in October and November because of what we saw last year.
    - Karen Bohnsack – To clarify, you might be able to provide preliminary data by November?
    - Mauricio Rodriguez-Lanetty – Yes. From what we see in October, we'll be able to compare the numbers to last year and try to answer the question of whether there is resistance of certain genotypes, which will be relevant to any type of conservation plan we might put in place, in particular for these endangered coral species. We'll be able to generate data in that regard in November; the genealogy data will take 2 months (to start suggesting genealogy of white plague in DCYL. Data compares this disease development to last year and determines if there is resistance.
    - Dave Gilliam – Following up on DCYL, we've been monitoring 50 colonies in Miami-Dade, Broward and Palm Beach counties over past 3 years. About 50% over the last 3 years have experienced disease but this is the first year we've seen what looks like black band. On average colonies have lost about 30% of live tissue and 10% have experienced complete mortality. Not a good story but adds to Mauricio's information.

Overview of FRRP Steering Committee Meeting Outcomes

- Karen Bohnsack – The FRRP Steering Committee met earlier this month; Meaghan Johnson will give brief recap.
- Meaghan Johnson – The main purpose of the meeting was to discuss the current coral bleaching conditions and disease event, and putting together a press release. Surveys are wrapping up at end of next week so we should have data analysis by the end of October and a report in early November. The disease event data will be included in this quick look report. Much of the data being collected

now is being entered in under the "comments" field, so we will need to determine how we will filter that out and analyze it. We are working on drafting a press release about the disease and bleaching, and will circulate it and work with various agencies to finalize that press release.
    - We will have another Steering Committee meeting in early November to determine if post bleaching surveys are necessary and what that will entail.
- Brian Walker – Spoke with James Byrne last week and I'd be willing to work with you about spatial statistics and spatial analysis when the data comes in.

Review Action Items

- **Communications:**
    - Karen Bohnsack – TNC is working on the disease and bleaching press release. Any idea on a time frame for that?
    - Fran Perchick – We'd like to have a draft to everybody to look at this week.
    - Karen Bohnsack – Update from FDEP CRCP, we had a press inquiry about the bleaching so we have some bleaching talking points approved. The format similar to the Current Conditions reports from BleachWatch, and we will have something similar for the disease. I can share these with everyone. Fran and Rachel, I can get with you to send the most updated version of these talking points.
- **Photos:**
    - Karen Bohnsack – As part of the FRRP surveys we've been asking for landscape photos and recent disease or mortality photos. We will be using an FTP site and will be sending around directions for how to upload files and the photo naming convention to use. This central location will allow everyone to look at other people's photos.
- **Data Analysis**:
    - Karen Bohnsack – We will continue the discussion about what kind of data analysis will be most useful to tell the story here.
- **Next Meeting:**
    - Our next coordination meeting will probably be early November, after the next FRRP steering committee meeting so we can give updates and follow up from that. A meeting invite will be sent in the next few weeks.
- **Other:**
    - Lauri Richardson – There is a paper by Susan Sokolow, 10 years of data of white plague in 1990s – modelling paper. Will send the PDF to the group.
    - Karen Bohnsack – I will send meeting minutes by the end of this week to review along with other follow-up items discussed during the call.

Adjourn Meeting