

**FLORIDA KEYS NATIONAL MARINE SANCTUARY**  
**Water Quality Protection Program Steering Committee**  
**December 6, 2017**  
**BOCC Marathon, FL**  
**FINAL MINUTES**

**Steering Committee Members Present**

Jennifer Derby, US Environmental Protection Agency, Region IV  
Jon Iglehart, Florida Department of Environmental Protection (FDEP) (Co-Chair)  
Sarah Fangman, Florida Keys National Marine Sanctuary  
Chris Bergh, The Nature Conservancy  
Sandy Walters, SWC, Inc., Environmental consultant/citizen representative  
John Hunt (for Gil McRae), FWC Fish and Wildlife Research Institute  
Andrea Leal, Florida Keys Mosquito Control  
John DeNeal, City of Key Colony Beach  
Clint Barras, Florida Keys NMS Sanctuary Advisory Council  
Shelly Krueger, Florida Sea Grant/IFAS Extension Monroe County  
Charles Causey, Florida Keys Environmental Fund, Inc.  
George Neugent, Monroe County Board of County Commissioners  
George Garrett, City of Marathon

On the Phone:

Billy Causey, Office of National Marine Sanctuary Senior Policy Advisor

**Management Committee Members Present**

Steve Blackburn, EPA

**I. Call Meeting to Order (Co-Chair, Jennifer Derby)**  
**Opening Remarks**

Co-Chair Derby called the meeting to order. EPA has new leadership at Region 4. Trey Glenn was appointed as the new Regional Administrator for the region and Mary Walker is the new director of EPA's Water Protection Division.

Co-Chair Derby expressed her gratefulness to Gus Rios and to members of the steering and management committees for keeping her and Steve Blackburn informed immediately post-Irma and as the recovery has been underway. EPA was asked by the State and FEMA to deploy people from two groups from Region 4. The EPA Emergency Response team was assigned an emergency FEMA mission to assist with recovery of vessels – mostly in the Middle Keys. EPA has been working with contractors on vessel removal in the residential canals, whereas the Coast Guard has been working on vessels in open water. EPA has also been working with contractors on data management for vessel operations and will be transferring this task to a Coast Guard contract in the very near future. As of last week, approximately 1430 vessels had been removed. The EPA Emergency Response Team from Atlanta has also been working on hazardous waste disposal such as propane tanks, boat batteries, gas cylinders, etc. EPA's Region 4 Landfill Specialty Team was assigned by FDEP to

assist in another FEMA mission—handling non-hazardous wastes. This entails overseeing solid waste staging areas and disaster debris management sites.

The Office of Management and Budget (OMB) asked all federal agencies to submit proposed spending needs related to the hurricane recovery (for all three major hurricanes). Her office had less than 24 hours in which to respond, but did submit proposals related to the Florida Keys. This proposal is now under consideration by OMB. Congress is now in charge of deciding the next overall hurricane funding.

Prior to the hurricane, she and Steve's section of EPA worked on obtaining emergency funding to help fund work on the Southeast Florida/Florida Keys coral disease outbreak. This funding was in addition to the special study funding FDEP received through the WQPP. Joanna Walczak, who is present today, is the lead for FDEP on this project.

At the last meeting, Co-Chair Derby reported that the President's budget had zeroed out the South Florida Geographic Initiative funding along with other geographic programs. However, funding for all geographic programs, including the Florida Keys/South Florida Initiative, was included at the FY17 level in the Senate's Interior and Environmental Appropriations Bill. Steve will provide more details regarding the budget in his presentation.

#### **Motion (passed)**

A motion was made by Andrea Leal to accept the agenda. The motion was seconded by John Hunt and passed with no objections. A motion was made by John Hunt to approve the minutes; the motion was seconded by Charles Causey. The minutes were approved with no corrections.

#### **II. EPA Budget Summary**

Steve Blackburn provided a presentation on budget related matters.

In FY17, four special studies were funded:

- Benthic Monitoring for Florida Keys Canal Water Quality Remediation Projects, Islamorada, \$49,450 (FIU)
- Online Boater Education Course for FKNMS, Eppley Institute /Indiana University, \$109,394 (NPCA, FKNMS/NOAA)
- Investigation of a "White Blotch" Coral Disease Geographic Barrier in the Florida Keys, FWC/FWRI, \$91,230 (Mote)
- Freshwater Discharge and Disease Impacts on Coral Reefs: Implications for SFL Reefs, Florida Atlantic University, \$69,926 (FWC, FDEP, Martin County, NOAA).

Two EPA Wetland Program Development grants were also awarded:

- Development of a Coral Disease Prevention and Response Program for the Florida Reef Tract, FDEP, \$400,000
- Determining Ecology of Florida Coral Disease, U of F, \$255,913

The Wetland Program Development grants may be available for funding in the future. Steve has more information if anyone is interested in pursuing these funds.

The Senate included \$1.7 million in its FY18 budget. If this funding becomes available, special study money may be available again next year. Steve emphasized the importance of the website as a tool for communicating about the program for funding purposes. Any proposals that have been submitted can be provided to committee members for review.

John Hunt noted that in the future, if possible, it would be helpful to know in advance about the special study funding. This would allow more time for discussion and for selecting the key topics that would be eligible for funding. Co-Chair Derby noted that this kind of planning could go forward if there is interest, even though they are not certain about the funding levels at this time.

Chris Bergh stated that the Sanctuary Advisory Council is meeting next week. He suggests making an announcement at the SAC about the boating education course. There may be interest from the members in becoming involved in this project. Additionally, Chris noted that an EPA scientist had an intern that might take on the review of endocrine disruptor literature. Co-Chair Derby will check on the intern's capacity. Steve stated there were several submittals on endocrine disruptors for special studies, but they were not funded. The top priorities can be identified in the special study RFP.

Erin Muller, Mote Marine Laboratory, commented that she and Dr. Pierce are wrapping up last year's funded project for EPA in which they looked at permethrin and oxybenzone concentrations and impacts on corals. This report will be available in the near future.

## **II. Update on Wastewater Projects in Monroe County**

Ken Nelson, Florida Keys Aqueduct Authority, provided an update on the wastewater system. Kevin Wilson, who could not attend today, provided the county's numbers to Ken. The focus for Monroe County is on the Cudjoe Regional system; the rest of the system is in excess of 90% complete. For the Cudjoe system, 4500 out of 6500 residences are permitted at this time. With respect to the hurricane, the wastewater system as a whole responded very well. They had no reportable spills because of the storm. They did have some issues, including salinity issues, but things are stable now. The biggest challenge was with the grinder systems. FKAA responded as they promised. Every day they sent staff to pump out the grinder systems as promised. The grinders were not operational because they lost power. At this time, only a few stations at residences that have not gotten their electricity back still need to be pumped.

Chris Bergh expressed that in the future under similar circumstances, more pump-out trucks and equipment should be available to address the grinder pumps when electricity is not available. Mr. Nelson pointed out that not having water to flush the toilets was also an issue.

Co-Chair Iglehart asked about the pumps used in the grinder systems. Some pumps needed to be replaced because they had a faulty electrical connection and/or motors were exposed to saltwater. Mr. Nelson stated that everything that needed to be replaced has been done, except for a few units.

George Garrett reported that they have been using Mayfield Stewardship money to make upgrades to the City of Marathon's wastewater treatment system to improve its functionality and efficiency. Most of the vacuum pumps used in the system are located near a source electrical power and are above base flood. This made getting the system online after the storm more feasible. Marathon did lose

chlorination tanks and other equipment. The grinder pumps they have on Grassy Key are not in an entirely closed system. Those pumps affected by high water are being replaced.

Mayor John DeNeal stated that they had an older gravity fed system. Water came across the whole island and yet they were able to get the system running within days. Fuel was an issue. The plant is undergoing a 7 million dollar upgrade that should be done in July.

### **III. Debris Removal Update**

Rhonda Haag introduced Trey Fuzzell, DRC, to describe actions being taken to remove marine debris. A marine and vessel debris removal MOU is being drawn with FDEP, FWC, and unincorporated Monroe County. Cities will have their own similar agreements. At this time, the county is working on a prioritization list. FDEP plans to seek reimbursement for this effort from FEMA. An emergency funding request (\$5 million) for marine and vessel removal within the Florida Keys has been made to EPA\*. FEMA will only reimburse for removal and disposal of debris for navigation. The means these funds can be used only to remove debris two feet below low-tide draft of the largest vessel, which means that they will be removing debris from possibly up to 15 feet deep. At this time, DRC is very close to signing the MOU so that marine debris removal can begin in canals. Since the storm, vessel removal in canals has been taking place by EPA. Homeowners are welcome to call Rhonda to make sure that the debris in their canals is on the list.

Ms. Haag reviewed the damage done to previously restored canals. Several canals lost air curtains that need to be replaced. Costs will be in the neighborhood of just over 100,000 for each curtain. Canal 75 backfilling is expected to begin soon. Canal 83, which has some storm debris, was backfilled in July. The heaviest hit are on Big Pine Key where homes were lost. FEMA will be covering these costs, but the newer structure has to be more resilient. This can be a challenge because homeowners do not want to view the structures in the air. Even before the storm, homeowners were resistant about adding structures.

Mr. Trey Glenn provided an overview of the plans for removal of debris from canals. They have secured private property on Big Pine for the immediate storage and sorting of recovered materials. Two county sites have been made available: Cudjoe and Rowell's Marina. DRC will be using Best Management Practices during the removal process. Side scan sonar will be used to detect debris beneath the surface. It is difficult to determine exactly how long the entire process will take for a variety of reasons, including the kind of waste, storage needs and other factors. Monitoring and quality assurance on the work done by DRC will be conducted by Tetra Tech, a company on contract with DEP.

George Garrett reported that the City of Marathon is also working on debris removal in canals and will be entering a MOU with DEP to accomplish this task.

\*Note: This funding request will be decided through the Congressional budget process.

### **IV. Canal Restoration Advisory Subcommittee: Update on Canal Demonstration Projects; Post-Irma Status; New Priority List for Canals; Project Financing (Stewardship Act)**

Mr. Greg Corning, AMEC, and Ms. Rhonda Haag, Sustainability Program Coordinator, gave a joint presentation on canal demonstration projects after the storm, priorities and financing.

Ms. Haag reviewed the main topics contained in the presentation: Irma damage to demonstration canals; revised canal water quality summaries, Stewardship funding, and monitoring program specifics for RAD and future canal projects. Three demonstration canals in unincorporated Monroe were heavily damaged (Lower Keys).

Ms. Corning is a consultant on canal restoration to unincorporated Monroe County, Islamorada and City of Marathon. He reviewed the damage done to canals in Islamorada. Damage to restoration equipment in Islamorada was relatively minimal, partially because some equipment was removed prior to the storm.

Mr. Corning stated that in 2016, the county received a grant (\$110,582.30) for AMEC to revise the water quality summaries for canals in Monroe County. This grant covered the collection grab samples from poorly and fairly rated canals, additional collection of diel measurements from 10 canals and the collection of sediment cores from 15 canals. These actions constituted the third phase in sampling as part of the Canal Management Master Plan (CMMP). Phase I (2012) of the CMMP involved identifying objectives related to water quality, eutrophication, dissolved oxygen and related issues in canals with the goal of improving water quality and habitat quality.

Phase II involved examining the water quality in all canals in the Keys. At this time (Phase II), the DEP dissolved oxygen DO indicator was 4.0 mg/L at any point in time. AMEC also looked at biological indicators at that time. By 2016, the DO criteria changed to percent saturation and the method of collecting that sample was very specific—taken at the center of canal and along a vertical profile. Measurements were averaged along the profile to arrive at the DO value. In 2016, 302 canals were sampled using this method. Mr. Corning stated that this method skewed the results since it masked the bad (low DO) portion of the canal.

Assessments using the percent saturation grab sample method indicated that 23 canals out of 302 failed the DEP DO criteria. This was a reduction from the 131 poor canals identified in the 2013 assessment. In terms of the diel measurements taken on a selection of 10 canals as part of Phase III, six out of 10 exhibited a daily average DO saturation below the current DO criteria. Nine of these samples had passed the DO criteria associated with the grab sample method. This illustrates the difference in results obtained from the grab sample to the diel measurement sampling methods. They sought input from DEP on this discrepancy between the 2013 canal list and the 2017 list with only 23 canals on it. DEP pointed out that the 2017 list was based on only one sample (averaged) for each canal and that was not enough information. DEP recommended that the county move forward with the program using the combined 2013 and 2017 water quality data. Biological indicators should also be incorporated into the analysis. DEP has 44 existing monitoring stations (for the Reasonable Assurance Document RAD) located inside canals. This information can also be used for ranking purposes.

Mr. Corning presented a table showing a summary of revised water quality summaries for poor and fair canals located throughout the county, including incorporated areas. Canals that had only limited data (one sampling event) were noted as limited. Ms. Haag explained that this summary is based on the grab and diel sample data. In the future, other factors such as biological indicators, etc. will be used, too. They are seeking funding to incorporate all factors to create a new ranking list.

The sediment core sampling provided a better understanding of the organic sediment from the 2012 survey. The technical memo was sent to EPA for review. All sediment samples exceeded the soil cleanup target levels for arsenic, which indicates that beneficial reuse of this material is not feasible.

Ms. Haag provided the selection of canals using Stewardship Funding from FY-16-17. The \$1.5 million awarded to unincorporated Monroe County will be used for augmented aeration in four canals and backfilling in one canal. Islamorada has not determined how to spend its \$875k. The City of Marathon is using \$100k provided by DEP through the WQPP to install a culvert in canal 257.

Ms. Haag noted that at the next canal subcommittee meeting, to be held the following day, a discussion will take place about using augmented aeration, which involves introducing bacteria into canals. Concerns were expressed by members of the canal subcommittee about these methods. Ms. Haag has asked the vendors proposing augmented aeration to be present at the canal meeting to provide further information on these techniques. John Hunt clarified that the members of the canal subcommittee requested expert independent evaluations of these methodologies in order to better assess them. Results provided by companies alone are not adequate.

Gus Rios explained that they invited the TAC to the canal subcommittee meeting, although the TAC may not have all of the expertise needed to evaluate such methods. DEP has submitted some information provided by AMEC to its central lab Tallahassee to obtain input from them. Rhonda explained that these methods are being evaluated because they are less expensive. If they are not acceptable, they will not be used. John Hunt explained that this action represents a major change in canal restoration and requires the right experts to provide input. This topic should be given the attention needed and the steering committee should be informed about this idea. Co-Chair Iglehart explained that the canal subcommittee exists to vet this kind of issue. John Hunt noted that this evaluation process may not be complete by the end of the upcoming canal subcommittee meeting, but may require more attention and consideration.

Ms. Haag provided information on the potential selection methods they plan to use when moving forward with canal restoration, including using the revised water quality summaries. Selection criteria were presented and included ease of permitting, costs, ease of implementation, etc. Sometimes it is hard to get the homeowners to agree; some projects are very expensive, making them more difficult to do. They are not ready to move forward on the new ranking yet. The county suggests that the municipalities use the same criteria that is adopted by the county.

For Stewardship Funding in FY17-18, the county received \$3.9 million; Islamorada received \$2.3 million and the City of Marathon received \$2.3 million. Ms. Haag will be presenting recommendations on how these funds should be spent at the canal subcommittee meeting tomorrow. She explained that all canals under consideration for restoration for Stewardship funds are ranked poor. In Key Largo, canals 82 and 84, have been identified and will require \$4 million dollars. Doing these canals together will allow for some savings. They believe that the restoration of canals 82, 83 and 84 (83 was already done) will benefit nearshore waters.

Ms. Haag described the specifics for water quality monitoring in demonstration canals. The report from the three-year monitoring program was delayed from September 2017 to early 2018. There

may or may not be enough post-remediation data to reach conclusions on all projects at this time. The BOCC is very interested in these results before they fund any more projects.

Ms. Haag explained that in terms of the RAD, FDEP is working with stakeholders on RFP for sampling of the 23 WBIDs in the RAD. This involves 60 stations throughout the Keys. A 50% match on funding is required by DEP for this sampling effort. DEP has requested that the county obtain this match from the stakeholders; the county will reach out to municipalities for the cost of the monitoring in their municipality. This work, which will take two years, is expected to begin in 2018. FDEP has developed a scope of work for the RAD sampling and asked the county to issue the RFP and manage the contract. This work will include a comparison of canal vs. nearshore results that will be paid for by Monroe County.

Co-Chair Iglehart commented about the FDEP funds that go each year toward WQPP projects. This money is usually applied to non-monitoring projects. Because of the needs associated with the storm this year, FDEP funds might be available for monitoring. Ms. Haag agreed that being able to spend funds that way would be very helpful.

Charles Causey pointed out that the results of the WBID (Water Body Identification Unit) monitoring or other canal restoration projects should provide valuable useful information needed to guide and justify the spending of large amounts of public funds. The monitoring should show what methods are effective in order to help determine whether projects are cost effective. He would like to know how the nearshore water quality is being affected by canals. Steve Blackburn reminded everyone that the WBID water quality monitoring approach was designed to measure the effectiveness of the RAD and wastewater improvements.

## **V. Canal Demonstration Projects Water Quality Monitoring Results**

Dr. Henry Briceño gave a presentation on the results of the canal demonstration monitoring. The goal of this project is to provide unbiased information on the status and trends of water quality parameters in canals that have been remediated through restoration techniques. Dr. Briceño explained the model that depicts how restoration techniques such as reducing weed wrack loading, removing organic sediments, installing culverts, and backfilling canals can lead to changes in the environment that are measurable and represent improvements in water quality conditions.

The details and logistics related to canal restoration significantly affected the monitoring schedule of this project, which took place over four years. The longer time taken to apply the restoration technique to canals caused a delay in monitoring designed to measure the effects from that restoration. From previous experience, they have learned that a lag time exists between remediation actions and the resulting improvements, especially with respect to certain parameters (nutrients).

So far, the project has accomplished the following: conducted continuous (24 hour to 72 hour diel) recording of physical-chemical data (over 60,000 readings total); vertical profiles of water column properties (~ 5900 readings total); and water quality sampling and analysis (over 220 samples and 2,074 analytical determinations).

Sexton Cove canal 29 in Key Largo received backfilling, which changed the conditions drastically for that canal and resulted in a great improvement in DO. This canal went from 35 feet deep to about

7-8 feet. This remediation was completed in 2015. Compared to the neighboring control canal, the remediated canal showed higher DO levels. That improvement took place almost immediately after restoration. Nutrients were also reduced and water quality was greatly improved in the remediated canal.

Canal 137 in Treasure Harbor on Plantation Key was remediated in November 2014 using a weed barrier and aerators. No significant improvement was shown in this canal with respect to the control. This canal is really more like a basin and has a great deal of organic matter that needs to be processed before real improvements are expected. For the diel profiles, the remediated canal did show some improvement in surface waters with respect to the control. The improvement in DO in bottom waters was greater than in surface waters. As expected, changes in nutrient levels were slower to occur in relation to the completion of remediation.

Canal 266 in Doctor's Arm on Big Pine Key was remediated in 2016 by removing organic sediments and installing a sand cap. No significant improvement in DO for canal 266 was observed with respect to the control canal. Dr. Briceño explained that this is a very complex canal system. The water just does not look good and smells. It probably will take a while for it to show improvements. The system may not have stabilized yet. The remediated canal does show higher DO levels in bottom waters. This canal exhibits mixed results, which is not unexpected.

Canal 472 on Geiger Key was remediated using a culvert. The culvert was installed and then closed for a while before being opened again. Measurements were taken before the first opening of the culvert, after the culvert was closed and then when it was opened again. High values of DO were obtained for the remediated canal and in some cases for the control canal. Culvert installation took place in Canal 277 in Tropical Bay, Big Pine Key. Some changes in DO were observed since completion in 2015, but no significant changes were detected in nutrients.

Canal 287 on Big Pine Key received an air curtain, removal of organic sediments and sand capping for remediation. Some improvement was observed, but high values were also observed before remediation. Removal of organic sediments took place in canal 290 on Big Pine Key. Improvements in DO were observed in the remediated canal. Monitoring of this project was possible because they used equipment and resources from other sampling methods (also supported by EPA).

In general, the different methodologies showed some improvements, but the degree varied. In some canals, improvements are expedited by certain actions such as backfilling a canal or improving its circulation (via a culvert). These actions result in changing the residence time of the water in those places, which allowed for better oxygenation and getting some of the pollutants out of the canal. That is why they are having better results with those methods. He has not seen the same level of improvements with bubblers, although they may help oxidize some hydrogen sulfide. In order to drastically change the water quality in most canals, more than bubblers are needed.

Dr. Briceño understands that more immediate results might be desired by the county, but nature takes its time and nutrients tend to be processed slowly. For remediated canals, he would not recommend sampling too frequently—no more than every six months. Enough data are needed to evaluate whether the canal is in compliance. He recommends improving outreach and deploying instruments



that collect real-time data. There is a strong relationship between pH and DO; pH meters might be useful in assessing canals and could be used readily by students or residents.

### **Discussion/Questions**

Mr. Corning asked if for the final report Dr. Briceño could break down the results based on the technologies and show a summary of the results related to DO. Dr. Briceño explained that even using the entire data set when the data are segregated, the conclusions are weaker because they are based on fewer data points. He has examined the data using that approach and it seems as if a secondary technology is needed to make a difference. There are so many factors at play that the signal can be obscure. Mr. Corning indicated that the information that is available could be used to make an initial assessment at this time. Mr. Gus Rios echoed the idea of segregating the data for informational purposes while recognizing that it may have some limitations. Mr. Rios also noted that this presentation will not be repeated at tomorrow's canal subcommittee meeting. Both the steering committee and canal subcommittee are awaiting the final report, which was somewhat delayed because of the hurricane. Earlier delays were related to the time frames associated with completion of the projects themselves. Mr. Corning emphasized the need to distinguish between DO results obtained for surface waters and those obtained for bottom waters. In many cases, surface waters were high in DO, but bottom waters were not. The vertical profile method averages these values and therefore does not show the low DO shown in the bottom waters.

### **Additional Sampling/Analysis**

Dr. Briceño added that after Hurricane Irma his crew was unable to access the canals, but have now resumed sampling using more crews. He worked with a crew from NOAA to obtain samples after the hurricane. NOAA sent samples collected from the southwest shelf area that were analyzed by FIU for sucralose (Splenda sweetener), nutrients and other parameters. For sucralose, high concentrations were noted out of Miami. A gradient was noticed from the Keys to offshore to the coral reef (diminishing offshore). Interpretation of these data also indicated that some Splenda was coming from the Tampa Bay area. Tampa has a serious problem with raw sewage and that is reaching down to the Keys. He has never seen such high values of Splenda as he saw in Tampa Bay.

Note: The samples obtained from NOAA were not taken within the halo zone of the Keys (vessel was too large to sample in shallow water).

## **VI. Public Comments**

No public comments were offered at this time.

## **Lunch**

## **VII. Coral Disease Outbreak: Overview of the Post-Irma Assessment and Triage/coral rescue**

Mr. Rob Ruzicka, FWC Fish and Wildlife Research Institute (FWRI), gave an update on the coral disease outbreak and triage and rescue efforts following Hurricane Irma. Mr. Ruzicka oversees CREMP—the Coral Reef Monitoring and Evaluation Program funded by EPA through the WQPP. He explained that many other research scientists are working on aspects of this disease and that this presentation will not cover all known information.

## **Overview of the Post-Irma Assessment**

The first warning signs of disease were observed in 2014. Because the disease may have resembled bleaching, it may have initially been underreported. When colonies were fate tracked, it became apparent that they experienced rapid disease progression, i.e. rapid rate of tissue loss. The white lesions would rapidly move across the colony. The aggressive nature of this disease is quite different from previous diseases, which have tended to be chronic and slow moving. The disease was first noted in corals located near Government Cut in Miami. It then progressed to the south and north along the reef line. By 2017, disease had spread throughout the Upper Keys and north to Martin County where it decimated corals. As of this past summer, the disease had appeared as far south as Tennessee Reef. At this time, it does not appear to have moved south of Long Key/Tennessee Reef. A natural hydrodynamic barrier might exist at the break south of Long Key. CREMP is monitoring sites to the south of the break to see if the disease spreads across the hydrodynamic “break”. The hurricane that just came through may have affected disease transmission. This disease is spread through the water and through direct contact.

Certain corals appear to be more susceptible to infection than others are. Disease prevalence in the CREMP sampling has doubled since this disease has appeared. Changes in abundance of the coral *Meandrina meandrites* shows that this species has experienced almost 100% mortality. *Montastrea cavernosa* abundance has fallen by about 50%, but some colonies may be actively experiencing the disease, so the ultimate outcome is not known yet. Using CREMP data from before and after the disease occurrence at Grecian Rocks in the Upper Keys, scientists calculated whole colony mortality rates, which ranged up to 100%.

A variety of partners has collaborated to address this disease. FDEP has been a leader in the response. They are working on finding out what the pathogen is and how to stop it from continuing to spread and/or from resulting in total mortality in individual colonies.

Mr. Ruzicka indicated there is some hope that the disease will not cross the hydrologic barrier into the Lower Keys. Billy Causey commented (via phone) that a great deal of data have been collected on currents within the middle and lower Keys regions and this information may be useful. Water exchange takes place between the Gulf and ocean side with the net flow being into the ocean side.

### **Question**

Captain Bill Wickers asked whether sewer was being used in the land areas near the disease outbreak (in Miami-Dade County, near Port of Miami). It was noted that sewer outfalls are present there. Captain Wickers expressed his concern that this method was still being used; Key West has been on deepwell injection for years. In the vicinity of where the disease was first observed a major harbor deepening project was underway. Whether the sewer or dredging played a role in the disease is not fully known, but multiple factors may be at play. This is one of the many reasons why long-term monitoring is important.

### **Post-Irma Triage/Coral Rescue**

Mr. Ruzicka presented an overview of the rapid response to assess the damage done to the reef by the hurricane and to conduct triage and rescue on damaged corals. This multi-agency/organization project was spearheaded by the NOAA Coral Reef Conservation Program using a National Fish and Wildlife Foundation grant. The project entailed mining the datasets from the region, including Southeast Florida, to identify high priority sites to assess. Scientists, including those from FKNMS, collected information while aboard an extended research cruise. They visited just over 100 sites to conduct swim

surveys to record corals in need of rescue and other assessments, etc. Sites were classified into three tiers depending on the degree of need for triage/rescue. Tier 1 were of the highest priority for revisiting for triage purposes. Divers were dispatched as soon as possible to the tier 1 sites.

In general, scientists observed different kinds of damage. Corals and gorgonians were buried, broken, and overturned. A sticky sediment material covered and buried many corals. Large *Xestospongia* (barrel sponges) were destroyed and toppled. Lobster traps and mangrove limbs covered corals in some locations. Information is available in a quicklook report. In terms of long-term trends in reef organisms, he expects that the hurricane may have destroyed some macroalgal growth as well as corals at the reef. Such trends are expected to be detected in the CREMP survey.

In response to a question about the degree of damage and need for triage, Rob explained that while hurricanes can actually be beneficial to healthy normal reefs, the decision was made to go forward and conduct restoration because the reef is impaired and not in a normal healthy state. This disease is of much more concern than hurricane damage.

### **VIII. Seagrass/Post-storm Data from the Sanctuary and Florida Bay**

Ms. Sara Wilson, FIU, presented an update on the status of seagrass post-Irma in FKNMS and Florida Bay (on behalf of Dr. Jim Fourqurean). FIU has been conducting long-term seagrass monitoring in FKNMS with the goal of describing distribution of and trends in benthic communities and the status of seagrass. As part of the sampling, scientists visit 40 fixed stations two times per year. At each site, the following parameters are assessed: distribution, nutrient availability and water column physiochemical data. Six additional fixed sites are located in Florida Bay. New nearshore sites in FKNMS were added in 2012. Major project accomplishments involve developing an eutrophication model, defining the role of nitrogen and phosphorus, describing the spatial extent of benthic communities, identifying long-term trends and defining the effects of changing water quality on seagrass communities.

The program has developed two indices that can be used to describe the status of seagrass. The Species Composition Index (SCI) indicates that species composition has remained relatively stable through time. Trends in the Elemental Index (EI) indicates that water quality in general is declining in FKNMS, although the EI showed that water quality had been improving from 2011 to 2014.

In June 2017, FIU completed the summer sampling effort. Since the hurricane passed through in September, they have not been able to get back out to all of their sites due to weather, staffing, etc. At the Florida Bay sites, they noted no detectable change in seagrass cover or other parameters. Of the 31 sites in FKNMS that have been sampled since the storm, three had heavy burial, eight had heavy erosion or (mechanical) thinning and 20 showed no major changes. Many of the sites that have not been resampled were near where the storm passed and are expected to show heavy impacts.

Since they have long-term data, the effects from Irma can be compared with those from other storms such as Georges in 1998. The two sites heavily eroded by Hurricane Georges were also heavily impacted by Irma, although one site appears to have been eroded during Georges and buried during Irma.

Post-Irma they have had reports of massive mats of seagrass washing up on shorelines. This loss of grass would be expected with a heavy erosion event. Sites that experience heavy erosion or heavy

burial may take a long time (over 5 years) to recover. Thinly eroded sites are expected to recover quickly based on information derived before and after Hurricane Georges. Similar to Hurricane George, many factors likely played a role in the degree of damage from the storm, including the distance from the eye of the storm, water depth and protection offered by the reef tract or Keys.

### **IX. Sponge Restoration, Hurricane Irma, Algal Bloom Impacts**

Mr. Bill Sharp, FWC Fish and Wildlife Research Institute, provided an update on the sponge restoration project underway. The primary purpose of this multi-faceted project is to test whether sponge nurseries are an efficient method for large-scale sponge restoration in Florida Bay. Four sponge propagation nurseries have been established. The project has an outreach component and volunteers are involved in the nursery effort. Sandfly nursery experienced about 20% mortality after being hit by a persistent algal bloom that flowed through the area.

Only Burnt Point and Sandfly Key nurseries were significantly affected by the storm. The Burnt Point nursery suffered heavy sponge losses, which probably occurred because the bay bottom went dry for a period of time. The Sandfly Key nursery, which was closest to the eye of the storm, suffered about 40% mortality. This nursery is in about 4 to 5 feet of water. The blocks and the sponges were scattered around the bay bottom. Scientists righted and recovered blocks with nursery-grown sponges.

Since they first started cultivating sponges in 2015, cultivated sponges have grown to a point where they can be used as tissue donors for new sponges. This means that harvesting from hardbottom sponges is no longer needed. Scientists recently returned to the Rachel Key and Stirrup Key nurseries and found that they were covered by an algal bloom, mostly likely a cyanobacterial bloom. They expect mortality from this bloom event.

### **Question/Discussion**

In response to a question about estimating costs for sponge restoration on a large scale, the project will likely still provide cost estimates for the labor, time, etc. for the project in spite of delays caused by the algal blooms and the hurricane. However, large-scale restoration may not take place in the time frame originally envisioned for this project. Additionally, the loss of sponges during restoration can be incorporated into the overall approach, especially if the result of improving water quality by sponge restoration is achieved.

Note: Shelly Krueger announced that the sponge restoration project team is planning a sponge restoration media day to be held this coming spring.

### **X. Public Comments**

No public comments were offered.

### **XI Closing Remarks**

#### **Discussion/Water Quality**

Mayor DeNeal stated that his constituents are very interested in hearing from experts about when the local water quality is expected to recover from the storm. Chris Bergh pointed out that the hurricane stirred up the water and since the storm there have been many more stormy/windy days that have

prevented things from settling down and returning to normal. Some people have speculated that land runoff has contributed to murky waters. John Hunt added that there are a substantial cyanobacterial in central Florida Bay. Water currents can move the bay bloom into areas on the oceanside. The windy conditions that keep occurring are keeping the fine sediments suspended in the water column. At this time, a canal in Marathon is experiencing a fish kill that is probably related to Irma; FWC FWRI is responding to the event. Recovery time is difficult to predict, but recovery is expected.

Billy Causey reiterated the importance of the work done by the WQPP. Climate change the environmental changes that it brings are very difficult to address, which is why the WQPP work to address water quality, habitat destruction and other impacts is so important. The funding and work that EPA, FWC, DEP and others do as part of the program is commendable and should continue. John Hunt pointed out that the many accomplishments of the WQPP—including working toward central sewers for the Keys. Monroe County has now taken on canal restoration even with the setbacks brought on by Irma. The information on these technologies will help guide canal restoration. The WQPP has been involved in Everglades restoration and now is working on sponge restoration. This geographic based program of EPA and the sanctuary is in the heart of what is needed. People on the steering committee should be proud of the accomplishments over the years.

### **Next Meeting**

Co-Chair Iglehart identified as late April/early May for the next meeting time. Steve Blackburn will send out possible dates to select from.

John Hunt noted that his agency is under new leadership as are other agencies and suggested that at the next meeting bringing agency leadership into the meeting to inform them of the accomplishments and goals of the WQPP. Jon Iglehart added that the management committee should be engaged in reaching out to new members.

### **Meeting Adjourned.**