

**FLORIDA KEYS NATIONAL MARINE SANCTUARY
Water Quality Protection Program Steering Committee**

April 18, 2019

Marathon City Chambers

Marathon, FL.

FINAL MINUTES

Steering Committee Members Present

Steve Blackburn, US Environmental Protection Agency, Region IV
Jon Iglehart, Florida Department of Environmental Protection (FDEP) (Co-Chair)
Sarah Fangman, Florida Keys National Marine Sanctuary
Shelly Krueger, Florida Sea Grant/IFAS Extension Monroe County
Barbara Powell, Florida Keys Area of Critical State Concern, Florida Department of Economic Opportunity (FDEO)
Gil McRae, FWC Fish and Wildlife Research Institute
John DeNeale, City of Key Colony Beach
Charlie Causey, Florida Keys Environmental Fund, Inc.
Chris Bergh, Florida Keys Program, The Nature Conservancy
Sandy Walters, Sandra Walters Consultant, Inc. (representing the public)
Commissioner Michelle Coldiron, Monroe County Board of County Commissioners
Joshua Peele, Florida Keys Aqueduct Authority
George Garrett, City of Marathon (sitting in for Mayor John Bartus)
Christopher Kavanagh, National Park Service, Everglades National Park (for Pedro Ramos)

EPA Region IV Guests

Jeaneanne Gettle
Natalie Ellington

I. Meeting to Order, Opening Remarks, Jon Iglehart (FDEP)

Co-Chair Iglehart called the meeting to order and gave opening remarks. FDEP has been moving forward with the environmental priorities of Governor DeSantis. The South Florida Water Management District (SFWMD) has new direction and has a new executive director, Drew Bartlett, who has experience with EPA, FDEP and the TMDL program. The Governor has appointed a new science officer. The environmental crimes unit is moving into DEP from FWC. The Office of Resilience and Coastal Protection has been formed with Kevin Claridge as its director. Mr. Claridge has been in the Keys looking at coral reef issues and is in attendance.

Co-Chair Steve Blackburn gave opening remarks. He is happy to report that funding is 3.2 million for this year. Co-Chair Blackburn thanked Billy Causey, George Neugent and Jennifer Derby for their leadership on the steering committee over the years and welcomed Commissioner Coldiron as a new member. He also introduced Natalie Ellington, the new section chief for Oceans and Estuarine Management Section and Jeaneanne Gettle, Director of Water Protection Division. Ms. Gettle explained that EPA is currently undergoing realignment at the regional level. She added that the EPA that she appreciates the effort that this group has put into working on clean water issues and is very excited about the work being done in the National Marine Sanctuary. She looks forward to meeting and working with everyone, hearing any concerns, and sharing those concerns with EPA in Atlanta. Steve thanked everyone for input in developing the agenda and apologized that not all items could be

addressed at this meeting. He thanked George Garrett, City of Marathon, for providing the facility for the meeting and Nancy Diersing, Florida Keys National Marine Sanctuary, for meeting support.

Steering committee members introduced themselves.

II. Review and Adopt Agenda, Approve minutes from May 22, 2018 meeting

A motion was made by Gil McRae to approve May 22, 2018 minutes. The motion was seconded by Shelly Krueger. Motion was carried without objection. No changes were requested on the agenda.

To view meeting presentations, visit

http://ocean.floridamarine.org/FKNMS_WQPP/WQSccommittee.htm.

III. Wastewater Project Updates

Assistant County Administrator Kevin Wilson gave an update on the status of wastewater in Monroe County. With the exception of Cudjoe Regional, the percentage of EDUs (effluent discharge units) connected to central sewer is 90% or above. Joshua Peele, FKAA, gave an update on Cross Key, also known as Manatee Bay, an island located on the 18 mile stretch north of Key Largo. Mr. Peele explained that the wastewater plant that will serve this small community will process up to 40,000 gallons per day using a low pressure collection system that uses a shallow water injection system. They hope to break ground in October 2019. Peter Rosasco was available to answer questions about Key Largo Wastewater District projects.

IV. Canal Restoration Advisory Workgroup: Canal Mater Plan Updates

FWC Florida Research and Wildlife Institute Director Gil McRae stated that Governor DeSantis announced plans for canal restoration in the Keys. The Department of Economic Opportunity (DEO) has been directed to develop a canal work program, which will become a critical component of the Environmental Protection Plan for the Florida Keys Area of Critical State Concern. The goal is for full restoration of the canals in a 10 year time frame. Barbara Powell, DEO Program Manager for the Florida Keys Area of Critical Concern, explained that this will likely involve 300 poor to fair canals in the Keys.

Monroe County Sustainability Coordinator Rhonda Haag provided an update on the status of canal restoration. The US Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) has provided \$49 million in funding for several canal projects, including the removal of marine debris from 172 canals, which has been completed. This money is funding the cleaning up of four of the six approved Temporary Disposal Management Areas and sediment removal in 10 canals. The county seeking NRCS approval to fund cleanups in 145 canals and sediment removal in 24 canals that were previously rejected.

RESTORE funding for the local pot of money is 1 to 1.2 million. The Nature Conservancy was awarded 578k. The county and Islamorada awards are pending. The application for selected projects for funding from the RESTORE Gulf Consortium pot of money, 19 million, is expected to be completed by October 4, 2019. This federal money, if awarded, is paid out through the State Expenditure Plan.

Governor DeSantis held a press briefing commemorating the local government efforts in wastewater upgrades and recovering from Hurricane Irma. The governor announced support for restoring canals in the Keys through the implementation of a Canal Restoration Work Program.

At this time, canal restoration projects undertaken by Monroe County involve replacing an air curtain in a canal in Big Pine Key that was destroyed in Hurricane Irma. The county is setting up a \$75 per month lot assessment for operations and maintenance for this canal, which was in very poor condition. For Canal #132 on Plantation Key, the county is evaluating the feasibility of using gravity flow injection well to increase circulation. Mr. Corning explained that this will be a gravity fed system that injects canal water into a PVC casing down to sixty feet below the land surface. It has an open hole from 60 feet to 120 feet below. The maximum injection rate of about 700 gallons per minute. They have had a pre-application meeting with FDEP. For Canal #257, a culvert was designed using FDEP water quality funds. An air curtain will also be installed on this canal, which recently underwent dredging.

EPA funds (100k) are supporting work to update the Canal Management Master Plan (CMMP). This involves updating the CMMP database and developing a guidance plan for canal restoration. Once the guidance document is finalized, a draft copy will be provided on the restoration website for comments. This document should be completed by October 2019. A hard copy draft of the outline for this document was provided by Mr. Corning.

For the canal and Reasonable Assurance Document (RAD) water quality monitoring, the county has entered into a contract with University of Miami to study the effects of canals on nearshore water quality. The request for this information on the link between canals and nearshore waters was made by the county commissioners; FDEP is providing 50% match funding for the RAD monitoring.

For five plugged canals, Rhonda secured FDEP funds for cleaning out the marine debris left behind by the hurricane. Residents who live on these canals are asking for improvements in canal water quality, too.

Discussion

Charles Causey brought up the technique of maintaining canal water quality/reducing the weed wrack loading using commercial skimmer boats and would like to see an analysis done on the costs for that method compared to the costs of other ways to restore. He thinks it might be more cost effective than other methods. Rhonda Haag noted that the county's skimmer program didn't cover the area well enough under certain circumstances. Mr. Corning, Wood Group (formerly AMEC) engineer, added that the skimmer boat costs 2,000 per day and would be costly at the level that it is needed. (Note: AMEC Foster Wheeler is now Wood Group.)

V. Reasonable Assurance Update

FDEP Program Administrator Gus Rios gave a presentation on the RAD, which contains a list of management actions designed to address water quality issues. In the 1990s, the Florida Keys waters were declared impaired according to state rule. The primary reason for this impairment was improperly treated wastewater. Stormwater and wastewater actions were implemented to address this impairment. The RAD is updated every five years and now includes canal restoration. The waters of the Keys were assessed for the third time in 2017-2018. The finalized assessments were completed on June 27, 2018 and the RAD was updated in August 2018 as part of this assessment cycle. Items that still need to be completed are mostly related to canal restoration.

Monroe County, FDEP and other stakeholders are partnering to fund a water quality monitoring program in the nearshore waters because there is currently insufficient data to determine if the RAD water quality targets will be attained. The monitoring will take place for 2 years and will include testing for total nitrogen, total phosphorus, chlorophyll-a and field measurements such as dissolved

oxygen (DO). The RAD monitoring will not include canals, but the County is interested in finding out how nearshore waters are being affected by canals and is funding a canal monitoring study to assess impacts on nearshore waters. The University of Miami (Dr. Sullivan Sealy) will conduct the 2-year monitoring program both the RAD (Task 1) and the canal study (Task2) under contract with Monroe County. Data from the RAD monitoring project will be stored in the FDEP Water Information Network (WIN) and will be made available to stakeholders. The 2018 RAD can be found by visiting [http://publicfiles.dep.state.fl.us/DEAR/DEARweb/RAP/FL%20Keys%20RAD%20Update final Aug2018.pdf](http://publicfiles.dep.state.fl.us/DEAR/DEARweb/RAP/FL%20Keys%20RAD%20Update%20final%20Aug2018.pdf).

VI. Environmental Canal Restoration

Dr. Jim Fourqurean, Florida International University, gave a presentation on benthic communities, water quality and canal restoration. FIU scientists studied 25 canals in the Florida Keys and Islamorada. Benthic communities in canals that received treatment were compared with those found in control canals. The study examined the sediments, seagrass tissue chemistry, benthic life and fish inside and adjacent to the mouths of canals. Most of the studied canals have very poor water quality, very poor visibility, thick muck on the bottom and very low or no DO at the bottom. Canal #29, which was backfilled with nice sediment, had plants starting to grow in it until Hurricane Irma removed them. They expect this canal to be recolonized by plants eventually. Canal #266, which is affected by seagrass wrack, had its wrack removed as a treatment, but it still gets plant material entering along the sea floor. Therefore, Dr. Fourqurean doesn't believe that an air curtain will help this canal very much.

In summary, the study detected minor improvements in the biota in some canals with culverts and backfilling, but muck removal didn't seem to work very well. The remediation technologies are helping things like the levels of sulfides in the canals, but scientists haven't seen much biological response at this point. More information, including videos and other visual depictions, are available on seagrass.fiu.edu.

VII. Do Canals in the Florida Keys Contribute to Nearshore Water Quality Degradation Study

Dr. Kathleen Sullivan Sealy, University of Miami, presented background information for the canal/nearshore water quality study being conducted under a contract with Monroe County. She emphasized the importance of good nearshore water quality because it is important to human health/coastal residents and water quality affects the quality of habitats. Study methods include comparing canals and non-canal waters, collecting water quality samples from the mouth of the canal out to 500 meters off shore, measuring water quality after extreme weather events, taking samples on out-going tides and linking trends in water quality with trends in benthic plants and animals in relation to canals and non-canal areas. The 500 meter point represents a point where local water quality is influenced by regional water quality. The study involves sampling quarterly at canal and non-canal sites and will measure benthic plant coverage and species present in order to determine species diversity, which tends to vary between different habitats and is lower in degraded habitats. Non-canal areas are near state parks and preserves.

Discussion/Questions

It was pointed out that previous studies have shown that canal water quality can affect nearshore water quality and benthic communities, but it's hard to generalize across the Keys since the effects are related to the condition of each canal, which tends to vary depending on depth, location, etc. Dr. Sealy explained that the study will compare canal with non-canal environments to determine how the

canals are affecting marine life and will utilize benthic maps and basic information about what degraded habitats look like. The collection of 15 samples per canal/non-canal sites should give data that shows patterns and allows for comparison. From previous studies, they know what the species diversity should be in degraded and non-degraded habitats and will be able to see how it has been altered in different places.

Dr. Fourqurean stated that Florida Keys Carrying Capacity in 1999, which was based on extensive sampling, did not find a relationship between land use and the nearby condition of the benthic community/water quality. The study (<http://serc.fiu.edu/seagrass/NearshoreWeb/NearshoreHome.htm>) found that canals didn't seem to be a factor in that they are not point sources of flowing water like a river would be. The entire coastal zone is being impacted equally with what is going on onshore and it doesn't seem to be concentrated around the canals. The nearshore seagrass sentinel sites that are part of seagrass monitoring are serving the function to track nearshore changes. Dr. Fourqurean added that he thinks there would be a lot of value added to use the sampling points used in 1999 in Carrying Capacity study to have points of comparison.

The TAC provided comments via email on the study; many of which provided to Dr. Sealy for consideration in the final study plan. Regarding whether the steering committee would indicate support for the canal study, it was noted that this project is not a WQPP project and the steering committee has limited authority. Some doubts were expressed regarding the degree of impact from canals on waters beyond 500 meters from shore, but support was also expressed for such information and science that contributes to the overall body of knowledge. In response to a question about the connection between the RAD and the sampling associated with the study, Dr. Sealy pointed out that there is a relationship between the RAD monitoring and this study, but the sampling points don't completely line up. This study, which will show the conditions of benthic habitats within different grids, allows for the examination of conditions adjacent to the canals.

Co-Chair Iglehart asked if there were any objections to this study moving forward. There were none.

Discussion--Technical Advisory Committee (TAC)

A discussion was held regarding the process by which TAC members are appointed/selected. It was suggested that each steering committee member recommend a TAC member and that the management committee identify main topics of interest in order to give direction regarding the TAC selection. It was pointed out that the large size and diffuse nature of the TAC makes it nonfunctional and that a more formal process of TAC member selection might be needed. Travel money might be needed to support TAC participation. Sunshine law issues are also a consideration. If the TAC makes recommendations to the steering committee, then the TAC is under Sunshine law and that means their communication with each other is limited to public meetings.

Note: Currently, a list of TAC members who have agreed to serve is in place. The management committee plans to meet via phone call and can provide feedback for consideration by the steering committee on this topic.

VIII. Public Comments

No public comments were offered.

Chris Bergh stated that TNC received a donation of an island to be used for research by David Wolkowsky. This will be a research center and will be available to agencies, institutions in the future.

IX. Florida Keys Vulnerability Study

Kimberly Koelsch, US Army Corps of Engineers (USACE), gave a presentation on the Florida Keys Coastal Storm Risk Management Feasibility Study. She is the environmental technical lead on this project. Monroe County is the local sponsor and will ultimately share part of the cost for the project recommended by this study. The project will investigate solutions that will reduce damages and risks from coastal storms. Several meetings/workshop were held for scoping purposes in 2018 and the alternatives are now being formulated. By next January 2010, they expect to have a draft report out for comment. They are open to comments at this time as well. When this report is released, they will make adjustments based on public input. An Environmental Impact Statement is being developed in this process. If there are issues that should be analyzed, please provide input.

From input gathered during scoping, they developed descriptions of the problem, opportunities, objectives and constraints. The end result will be combination of structural measures, nonstructural measures and natural and nature-based features. Structural features that were screened out included sea walls, floodwalls, levees and storm surge barriers. Features that remained include beachfill/dunes, canal improvements, shoreline stabilization and breakwaters. All nonstructural measures were carried forward. These include buyouts, elevation, dry/wet flood proofing, emergency planning, warning systems and land use planning. Natural features being considered include beach fill/dunes, mangrove restoration/creation, living shorelines. Reef habitat/creation and drainage improvements/water storage features were not carried forward. Mangrove restoration is being examined in more detail, including identifying areas for restoration. They have been gathering data from agencies, including FDOT. The benefits and costs are evaluated in this study and help to inform the alternatives. An economic analysis will be conducted on the alternatives and the final decision of which alternative or combination of alternatives will be based on an array of decision criteria. A schedule of deadlines was presented along with next steps involved in the process.

Discussion/Questions

Chris Bergh stated that TNC and Florida Atlantic University has conducted a study that makes recommendations for the shorelines in Monroe County. This study, which is in draft at this time, is available as a resource to inform this process.

Sarah Fangman stated that as a resource manager she is pleased to see that natural resource measures are part of the conversation and inquired as to why coral reef restoration was eliminated. Ms. Koelsch responded that there were concerns with the long time frame involved in reef restoration and that they require a model to show the benefits over time, which they didn't have.

Chris Bergh pointed out that study with TNC and the US Geological Survey is underway and will describe the benefits of coral reefs to Florida, Puerto Rico and the Virgin Islands. It will be released this summer and will describe the benefits of coral reefs to shoreline protection.

X. Coral Updates: Disease Response Efforts

Maurizio Martenelli, Florida Sea Grant, gave a presentation on the stony coral tissue loss disease and multi-partner organized response to the stony coral tissue loss disease. This an infectious disease, which began in 2014, is associated with high mortality rates and has now spread past Key West and has spread to various locations in the Caribbean. Mr. Martinelli, a Disease Response Coordinator,

explained that response involves many partners at the state, federal and local levels and various agencies. The response is organized by teams and coordinated by DEP, FWC, NOAA and the National Park Service. The rescue team is charged with rescuing corals ahead of the disease front and involves housing colonies in land-based facilities for future restoration efforts and to preserve genetic diversity. The restoration team is involved in considering what is needed to achieve successful restoration now that the disease has become established. The regulatory team works with regulatory agencies to secure the necessary permits. The data management team shares information to leverage resources. Other teams are in place to address various aspect of disease management. The intervention team treats the corals in the water to keep them alive. They have applied various treatments such as antiseptic treatment and antibiotics and take care to use methods that keep antibiotics out of the water column when applied to corals. Larger scale issues related to environmental conditions are also considered, including wastewater and storm water, nutrient pollution and coastal acidification.

CREMP (Coral Reef Evaluation and Monitoring Program) Update

Rob Ruzicka, FWC FWRI, gave an update on the coral monitoring program and an update on coral disease affecting their study sites. They use a transect method to survey corals in 40 fixed sites in the Florida Keys and off the mainland. They also record information on octocorals, sponges, and macroalgae. A graph showing the long term trends in percent cover for these four taxa (stony corals, octocorals, macroalgae and sponges) shows the impacts from Hurricane Irma. Macroalgae increased after the hurricane, but all other taxa decreased.

Coral disease results from the Upper Keys sites shows significant losses in six species of large corals that contribute to reef framework. The trends for percent cover for these species in the Upper Keys shows marked decreases associated with the disease outbreak, which has moved through the area in the past few years. Generally, percent cover has gone from about 6% to about 3% in areas where the disease has moved through.

Lunch

XI. Endocrine Disruptor Workshop

Bob Glazer, FWC FWRI, gave a presentation summarizing the results from a recent workshop held to discuss endocrine disrupting chemicals (EDCs), including substances such as sunscreens. EDCs are chemicals that disrupt the synthesis of hormones. Sources of EDCs include plastics, pesticides, solvents, etc. They enter the ocean through litter (marine debris), air pollutants, sewage, runoff and industrial wastewater. Effects of EDCs on humans include reproductive cancers, endometriosis, etc. and these chemicals can affect reproduction in wildlife.

In Broward County (John U. Lloyd State Park), the conch population living near the channelized Stranahan River shows abnormalities that affect reproduction. This area is affected by heavy ship traffic, which is thought to contribute to contamination that affects reproductive structures in conch.

Strategic plan development involves thinking about and understanding the problem and using science to develop policy and management approaches. Workshop participants used four themes (science, governance, communications and monitoring) and aligned them with the following model elements: pressures, state, impacts, responses and the driving forces. The plan is in draft form at this time.

Chemicals such as oxybenzone in sunscreen were found in relatively high concentrations in the water at Bahia Honda beach and at Fort Zachary Taylor beach. Oxybenzone can affect coral planula at 62

ppm and marine algae at 10 parts per trillion. Concentrations of this chemical were in the realm of thousands of ppm at the two beaches. Oxybenzone has been studied and its effects have been reported in the literature. Outcomes from the sunscreen workshop involved developing an objective, creating unified messaging, establishing monitoring in the Florida Keys, and finding which organisms are affected. The priorities identified from this workshop, which was funded by EPA, can become future areas of study. The next step will probably involve identifying laboratories that can complete the lab work needed.

Steve Blackburn added that a related study on EDCs has been funded by EPA that involves creating a centralized database.

XII. EPA FY19 South Florida Budget/Special Study Priorities/Biennial Report

Steven Blackburn, EPA, gave an overview of the status of EPA funding for South Florida. This year's budget is 3.2 million, up from 1.4 million in FY18. The program will be able to fund the monitoring programs. He expects to send out a Request for Funding to everyone soon. Of the funding appropriated by Congress, 500k is slated to support water quality and seagrass monitoring in the Caloosahatchee Estuary and Indian River Lagoon and 500k is slated to fund water quality and seagrass monitoring in Florida and Biscayne Bays. Coral monitoring will receive 500k and special studies will receive 400k.

The decision as to have this funding be presented as one RFP or more than one has not been made yet. It can be better to begin with a bigger pool of money and then consider all projects within that context. They can award less than the RFP amount, but not more.

A list of special study recommendations was presented and discussed. They typically select a few priorities to be included in the RFP. Some possible priorities include sponges, canals, EDCs, coral disease, outreach, increased Sargassum seaweed loads, etc.

Gil McRae suggested that three potential areas be considered. The first is related to the factors behind the stony coral tissue loss disease; the second is develop techniques to treat or mitigate the effects of disease and the third is to develop techniques to promote resistance to the disease in affected species and would involve looking at survivors. The first two are ongoing, but the third has not been addressed.

Motion Proposed (passed)

Gil McRae proposed that the special study priority be related to funding the two ongoing efforts (investigate disease factors, develop treatment techniques) and beginning to develop techniques to promote resistance to coral disease.

Note: Since the meeting, the RFP for the upcoming funding cycle has been modified to include 500k in EPA funds for coral reef studies, including disease related studies such as those described above by Gil McRae.

The motion was seconded and carried with no further discussion or public comments.

Motion Proposed (passed)

Chris Bergh stated that he has been hearing reports from fishermen out of Key West about sediment being stirred up by shrimp trawling. He would like to know the repercussions of this since it could contribute to degraded water quality. He made a motion to make this topic another option in the RFP.

This motion was seconded and carried without further discussion. No public comment was offered when the opportunity was presented.

Discussion

It was mentioned that additional priorities may need to be included in the list such as EDCs. Jon Iglehart suggested sending out the priority list to all members and have people make suggestions and additions as needed.

WQPP Biennial Report

Steve Blackburn addressed the WQPP Biennial report, which is being worked on by Shelly Krueger, Nancy Diersing and himself. The idea is to make the report shorter in length, but still remain informative. He expects to have a draft biennial report at the next meeting. This task has fallen to the management committee. Chris Bergh suggested giving the highlights from the past few years and not to review the entire program history.

X11I. Status of FKNMS Regulatory Review/Boater Education Program

FKNMS Superintendent Sarah Fangman gave updates on various sanctuary related topics. FIU currently seeking an Associate Director for FKNMS. This is a leadership position that will include working on water quality and south Florida ecosystem restoration issues. If anyone knows someone who is interested, please let them know about the job opportunity.

In August, FKNMS plans to release the Restoration Blueprint, which is part of the FKNMS regulatory review. This is the culmination of many years of work in this community and is a collection of alternatives that address the threats in the sanctuary. The Sanctuary Advisory Council formed working groups and held public meetings to inform development of the options. These strategies involve possible changes in the sanctuary boundary, regulations and zones. She encourages everyone to participate and help to shape the future. The public comment will be held over at least three months and will involve public meetings in the area.

FKNMS just launched a boater education program last week. This was funded by the WQPP and involved input from the community. This is a free, voluntary online boating course that can be accessed from the sanctuary's home page (<https://floridakeys.noaa.gov/>). The course is designed to help people navigate better in the sanctuary, which is expected to reduce impacts from personal vessels.

WQPP Action Plan

Steve Blackburn asked a question about the Water Quality Protection Program Action Plan. He inquired as to whether the regulatory process would involve changes in this action plan. Superintendent Fangman explained that the sanctuary is developing materials to help people understand the complex issues, including water quality, and that describe the actions being proposed. Sanctuary staff are working very hard to make this process understandable and digestible.

Motion-- Frequency of Meetings (passed)

Shelly Krueger stated that for various reasons, including as stony coral tissue loss disease, algae blooms, etc., having the steering committee meet two times per year doesn't seem to be enough. She made a motion for the steering committee to meet more than two times per year.

Discussion

Historically, the committee has met in January/February and June/July/August. The challenge is finding the dates and meeting rooms. The idea of meeting virtually was brought up, but the technology can sometimes be challenging. It will also be important to know whether this body is allowed to meet virtually and if that kind of meeting still meets all requirements, including those pertaining to the Sunshine Law. Note: The federal law that created the program (and the FKNMS) requires this body to meet twice per year, but does not limit the number of meetings.

The following ideas related to the frequency of meetings were suggested, including meeting two times in person and two times virtually, holding one or two 2-day meetings, meeting three times per year with each meeting focusing on a different aspect of the program, meeting every 5 months over time.

The vote was called and the motion to meet more than two times per year carried without objection. When asked, no public comments were offered.

XIV. Sponge Restoration

Shelly Krueger, Florida Sea Grant, gave an update on the sponge restoration project. She is the outreach lead on this multi-partner sponge restoration program with FWC, TNC, Bonefish, Tarpon Trust, and Florida Keys Environmental Fund. Many thanks to EPA and other funding sources (partners). Sponges are the dominant filter-feeders; they are the functional equivalent of the eastern oyster in Chesapeake Bay. Since 1991, there have been several sponge die-offs. The FWC goal of planting 15,000 sponges. Currently, they have planted 11,000 and expect to meet the 15,000 goal by May. They continue to look for new funding opportunities.

Shelly has begun studying the nitrogen dynamics of sheepswool and loggerhead sponges. This work is based on previous studies on the eastern oyster. The idea is to determine monetary value for the contribution that sponges provide, which will help garner support for future work on sponge restoration in South Florida. Another idea is to place sponges in canals at private docks to function as sponge nurseries. On August 21-22, there will be a Harmful Algal Bloom State of the Science Symposium with the goal of informing the Governor's new task force on this topic.

XV. Impacts from Irma and Analysis of Temperature Rise Across the Sanctuary

Dr. Jim Fourqurean, FIU, gave a presentation about the regional effects of Hurricane Irma on seagrass and rising seawater temperature in the Florida Keys.

The currents and other features associated with Hurricane Irma caused a disturbance of the plants and sediments on the bottom. In general, each hurricane is unique and the damage can be greater in some areas than others. Some seagrass/plant species are more susceptible to damage/uprooting from hurricanes/storms than others. Indirect impacts from storms include water quality issues that arise from decaying seagrass matter concentrated in one place and huge wracks of seagrass material on shorelines.

Just before Hurricane Irma came through the Keys, the seagrass team had completed their summertime sampling, which provided information on the status of soft-bottom communities. FWC scientists also had similar data collected from Florida Bay. These combined data made it possible to ask and answer the question as to how much damage was caused by the storm. They compared June/July data with October/November to determine losses. Even without a storm, losses are expected in this time frame due to changes in natural conditions. Using data from the past and pre- and post- hurricane sites, they calculated changes that could be attributed to the hurricane. In the

Lower Keys backcountry and isolated bays in Northeast Florida Bay, they detected changes that were broad in nature and across the region. Application of a sinusoidal model that fits the changes expected to the data showed that the Lower Keys backcountry experienced losses of seagrass that were greater than normal. They found these seasonal changes at the same locations where they saw changes in density—the Lower Keys backcountry and upper part of Florida Bay. The losses that occurred in the backcountry were direct losses due to the storm itself, but those that occurred in upper Florida Bay occurred after the storm and were indirect losses, specifically from the flushing of tannin water into the basins from the Everglades. Loss of seagrass cover changes the habitat and generally results in shifts in the kinds of species present.

The fact that they didn't detect large changes in sediments/seagrasses at the reef doesn't mean that such changes didn't take place, but it may have not been detected in the monitoring.

Long term data from fixed sites shows that hurricanes can result in burying the seagrass and/or eroding the sediment, leaving nothing for plants to grow in. It can take years for an eroded area to return, if it does. Long term data also shows that factors that affect seagrass communities happen at small scales and that not all sites behave the same, pointing to the value of having enough sample sites to detect changes throughout the system and the importance of the program's tracking of each site over time.

Temperature Monitoring Results

In 2000, they placed temperature sensors at about 40 to 50 seagrass sample sites. Results from an analysis of these data show the change in average temperature from 2002 to 2018. In several areas, the average temperature has gone up 2.2 degrees C. Those sites are raising at .15 degrees C per year, which is ten times the rate of sea level warming in the global ocean. This increase is happening across this system. This has implications for coral, which bleach in conditions above 28 degrees C. Many factors could be affecting temperatures, including things the North Atlantic oscillation.

Discussion/Questions

Bob Glazer commented that scientists are starting to link higher temperatures with reproductive failure in queen conch. He suggested investigating the effects of temperature on organism health/reproduction as a possible water quality special study.

XVI. 24 Years of Water Quality Monitoring in FKNMS

Dr. Henry Briceño, FIU, gave a presentation summarizing water quality results from 24 years of monitoring. A brief review of the highlights related to environmental protection and water quality was presented. The decade of the 1980s, which was marked by algae blooms, seagrass die-offs, coral bleaching and other environmental crises, was followed by the establishment of the Florida Keys National Marine Sanctuary in 1990 and a decade of institutional consolidation, assessment and monitoring. The "white" paper on water quality issues in the Keys, including canals, was produced by EPA in 1999 for the WQPP. Since the water quality monitoring program began in 1995, the number of fixed sites in the program rose to over 300, but now is back down to about 95 fixed sites across the sanctuary. Sample sites outside of the sanctuary on the SW Shelf have been lost. This makes it difficult to know about the larger picture and the factors affecting water quality.

Directional water quality monitoring is needed to know what is coming from upstream and/or from the watershed. From now on, the monitoring in FKNMS will involve measuring currents when sampling. At times in the past, they have been measuring the water mass that happens to be at that station. Long term trends of chlorophyll-a and Dissolved Inorganic Nitrogen (DIN) data show how

the system responds to hurricanes and other events. In this case, increases in chlorophyll and DIN were tied to hurricane activity. Some changes may be tied to major climatic cycles. In the analysis done to determine EPA water quality targets, higher than normal chlorophyll-a values were detected in 2017 and 2018. These two years are out of compliance with the EPA standard established for this parameter.

In 2011, they started monitoring stations that were close to shore and these stations show relatively high TP levels. One shore station in Key Largo has water that is fresher than normal and high in nitrogen and phosphorus and sucralose, which is indicative of human impacts from wastewater/sewer. They are detecting the effects of injected well water from smaller wastewater treatment plants not connected to centralized sewer. This points to the question as to which is having a bigger impact on nearshore waters—this injected water or canals, which have limited exchange with nearshore waters. This might be information could be important to know.

This is a time of new horizons in water quality sampling. New technologies are available, including better sensors. In Biscayne Bay, the FIU team is installing buoys that measure a series of parameters and the direction of water flow. He is utilizing new equipment and methods such as the use of underwater robot systems, gliders and remote sensing. Work is being conducted in partnership with several universities to test new sampling techniques in various studies. Using these new approaches is the future of monitoring and robust data are needed to determine the sources of impacts to water quality. Henry acknowledged the many people who have worked on the project over the years.

Discussion/Questions

Chris Bergh suggested the idea of putting a sensor on the ferry that travels from Ft. Myers to Key West every day since they lost the information gleaned from the stations that were on the SW Shelf. Dr. Briceño is open to this suggestion.

Visit by Lt. Governor Nuñez

Commissioner Coldiron introduced Lt. Governor Jeanette Nuñez. Lt. Governor Nuñez stated that it is an honor to be here. She and Governor DeSantis were in the Keys earlier this week. Today, she met with the health department, community college and FWC. She and the governor thank the committee for their hard work on water quality issues. She and the Governor understand the importance of water quality, canal issues and the effects of Irma. When she was in the House of Representatives, she served on the committee for hurricane preparedness and recovery after Irma. She is a part-time Keys resident and the Keys have a special place in her heart. She is thrilled to continue to work with the committee and understands the importance of what the committee does for the Keys and the state. Lt. Governor Nuñez took a few minutes to have a picture taken with the steering committee and other keys members of the WQPP.

Closing Remarks/Adjourn

Steering committee members offered some closing thoughts. Jon thanked everyone for their collaborative approach to the meeting.