

FLORIDA KEYS NATIONAL MARINE SANCTUARY
Water Quality Protection Program Steering Committee
May 22, 2018
(Monroe County Government Center
2798 Overseas Highway in Marathon)

DRAFT 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
Billy D. Causey, NOAA Office of National Marine Sanctuaries
Shelly Krueger, Florida Sea Grant/IFAS Extension Monroe County
Barbara Powell, Florida Keys Area of Critical State Concern, FDEO
Christopher Kavanagh, National Park Service, Everglades National Park
Audrey Siu, SWC, Inc., Environmental consultant/citizen representative
Joshua Peele, Florida Keys Aqueduct Authority
Gil McRae, FWC Fish and Wildlife Research Institute
John DeNeale, City of Key Colony Beach
Charlie Causey, Florida Keys Environmental Fund, Inc.

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

Co-Chair Iglehart called the meeting to order and provided opening remarks on behalf of Secretary Noah Valenstein, who sends his regrets that he could not attend. The secretary has a very strong interest in coral reefs and is placing a focus on coastal areas/coastal resilience/sea level increases. Coastal resiliency is one of the six DEP priorities. Toward this end, the legislature has passed appropriations toward strengthening the coast to respond to increases in sea level. The secretary also wants to focus on a “one DEP” approach, which involves changing how the agency brands itself and entails having the different entities in DEP work closely together. This approach will enable the 4,000 DEP employees to help each other more effectively, including having the coastal office work more closely with the regulatory branch.

Co-Chair Derby stated that funding for the WQPP will remain level with last year’s funding at \$1,692,000. This means EPA will be able to fully fund the monitoring programs—coral, seagrass and water quality and anticipates having special studies funding (300k). RFPs for special studies just went out last week. The grant deadline for submitting proposals is June 25. The FY19 President’s budget has no money for South Florida budget (WQPP). Budget meetings are underway and they hope that Congress will restore the funding. EPA appreciates the efforts that have taken place to protect the budget.

The WQPP canal subcommittee will be meeting tomorrow from 9am to noon at the City Chambers in Marathon. They will discuss the master plan, monitoring results and canal restoration. Mote Marine Lab is sponsoring a special study workshop that will focus on endocrine disruptors (2pm, same place). Presentations will be provided and discussion will be led by scientists at MOTE toxicity study results on lobster, coral, mitigating impacts, nearshore waters, citizen science, stormwater modeling. They will be taking feedback from the community.

Co-Chair Iglehart thanked the meeting organizers and Monroe County for use of the facility.

II. Review and Adopt Agenda, Approve minutes from December 6, 2017 meeting

No changes were requested. A motion was made by Gil McRae to approve the December 6 minutes. Motion was carried without objection.

To view meeting presentations and minutes from previous meetings, visit http://ocean.floridamarine.org/FKNMS_WQPP/WQSCcommittee.htm.

III. Wastewater Project Updates

FKAA Engineer Joshua Peele gave an update on the wastewater systems managed by the Aqueduct. These include the following discrete central systems: Key Haven, Big Coppitt, Bay Point, Cudjoe, Layton/Long Key and Duck Key. In 2019, the Key Haven System will be decommissioned and sewage will be sent to the AWT Big Coppitt plant. The Boca Chica plant, which serves the Naval Air Station, will also be sending sewage to the Big Coppitt plant. The Bay Point system, which is Best Available Treatment, has a 97% hookup at this time. Cudjoe Regional is the largest system (AWT). At this time, about 57% of the total 9,000 EDUs have been connected. This system is being expanded to accommodate additional EDUs. This plant has a deep injection well; the shallow injection wells are used for backup. They are exploring the possibility of taking sewage from Bay Point. Duck Key's AWT facility serves Hawk's Cay. Its collection system, which has two shallow injection wells, handles Duck and Conch Keys. Layton (Long Key) has a new small BAT system and has two shallow injection wells. As of May 2018, 69% of all potential EDUs in the region are connected to central sewer.

Key Colony Beach Mayor John DeNeale explained that they have had an advanced water membrane system for years. It started to not meet nitrogen standards, so they have added a new system to take care of that, which will be completed in about four months.

IV. Post-Irma Debris Removal Efforts

Monroe County Sustainability Coordinator Rhonda Haag gave update on Hurricane Irma canal debris removal and canal restoration. Canal debris was the greatest on Big Pine Key, but canals on Little Torch Key, Marathon, Islamorada, Tavernier and Key Largo were also heavily impacted.

FDEP and Monroe County executed an MOU in February to pay for debris removal in canals in private and public waterways. A separate 2 million dollar MOU was developed for Marathon and Islamorada. FDEP fronted the money; all three entities will reimburse FDEP and then seek reimbursement from FEMA. FDEP contracted with Tetra Tech and DRC for debris removal.

The county made a request to have FEMA cover removal of debris based on deepest draft vessels in the county, but FEMA rejected it. FEMA will cover only removal to about 6 feet for navigation purposes. DRC was originally contracted to go further down than 6 feet until they found out that FEMA would not cover it. The NOAA aerial photographs were used to make the debris volume estimates and then create an estimate of total cost of removal from all canals in the Keys, which was \$52.6 million. Impacts vary keys-wide, but the highest impacted canals are in the Big Pine Key area. The cleanup has not reached the Key Largo area at this time. Removal began in February 2018 on Big Pine Key. DRC contractor halted work on April 18. Prior to that, they had removed about 3,000 cubic yards of debris. The program is on temporary hold at this time while the state determines its options.

With regards to FEMA, it is not clear as to what they will reimburse to the county. In general, federal funding has been slow to arrive. Elected officials have been helping Monroe County, along with county officials. The county may have to self-fund the removal of debris that is left on the bottom and is not covered by FEMA. The county sought funding from the Natural Resources Conservation Services (NRCS), which also helped fund removal after Hurricane Georges. The total number of eligible canals for NRCS funding is 103 (out of 513). NRCS will provide \$34.5 million to clean up these canals; \$10 million in local match is required. The county will ask NRCS to approve the use of funds for dredging canals that have filled in with sediment from the storm. Dredging is not a pre-approved activity. The RFPs for debris clearing and monitoring services were issued in May and work is expected to begin in July.

V. Canal Restoration Update

Ms. Haag explained that approximately 149 canals do not meet state water quality standards; 103 canals in unincorporated Monroe County, 25 in Islamorada, 21 in Marathon. The demonstration canals have used a variety of techniques—backfilling, air curtains, culverts, organic removal, etc. The only project taking place now is the backfilling of a canal in Key Largo, which was funded by FY16/17 FDEP stewardship allocations (\$1.5 million).

FDEP is providing 50% match for Reasonable Assurance Document (RAD) monitoring. University of Miami was selected as the vendor for unincorporated Monroe County. The county's share is estimated to be \$496,000 for two years for RAD and canal monitoring. They are working with Julie Espy, FDEP, on this monitoring. Future reimbursement due to hurricane damage is much easier when a documented canal maintenance program is in place.

In response to a question about how canal demonstration projects were affected by the hurricane, Ms. Haag stated that canals that had been backfilled did not have impacts. Air curtains and other equipment were destroyed by the hurricane. Whether air curtains, which are expensive to maintain, will be replaced is not known yet. Instead, the county may opt to use a skimming boat to go up and down the canals. This is a much less expensive option.

Funding sources include:

RESTORE Gulf Consortium Pot 3 - \$19 Million

FY17/18 State Stewardship Act –\$3.9 Million to County – varies annually

RESTORE Local Pot 1 - \$478,000

DEP Annual funding - \$100,000

Monroe County funding –amount to be determined

Homeowners – amount to be determined

VI. Canal Restoration Advisory Subcommittee Report

FDEP Program Administrator Gus Rios gave a presentation on the activities of the canal restoration advisory subcommittee. Canal restoration was identified as a priority action in the Water Quality Plan, W-10. The committee was formed to carry out this function. At this time, the Canal Management Master Plan (CMMP), which provides the feasible framework and includes feasible strategies to improve water quality, was completed. The CMMP calls for the implementation of demonstration projects, which has now been completed. FIU has been conducting the monitoring for the canal demonstration projects. It is time to assess what has been learned and to determine how to move forward. Canal debris removal is an important priority. Determining whether the subcommittee has the expertise to review future engineering and scientific proposals is also important.

Subcommittee members include the following:

- Federal: EPA, NOAA
- State: DEP, FWC
- County: Monroe County
- Cities: All 5 represented

Other: Florida Keys Environmental Fund

The work group for the WQPP steering committee is the management committee. The management committee held a meeting to discuss canal restoration.

They recommended the following:

- Review FIU canal monitoring results for the demonstration projects
- Assess the effectiveness of tested technologies and address monitoring data gaps/future needs
- Review Subcommittee membership and resources
- Update the Canal Management Master Plan
 - Water Quality Monitoring Database & Best Available Technologies for Restoration
 - Program Priorities/Seek public input
 - Impacts from IRMA debris when planning new projects
 - Update Project Selection Criteria
 - Identify Responsible Entities for Canal Restoration
 - Identify funding sources for updating CMMP and restoration activities

Discussion/Questions

- Gil McRae commented that the subcommittee was set up to evaluate the techniques used in the demonstration projects and is now moving more toward implementation. A new group experts may be needed to oversee this new phase.
- Billy Causey pointed out that a combination of managers and engineers/scientists on the subcommittee has made for a good approach because the managers can weigh in on what is being discussed/proposed.
- Gil McRae added that the assessment on the demonstration projects has not been completed. The subcommittee should probably remain intact until this task is complete. The final water quality report from FIU is needed.
- Gus Rios added that additional long-term canal monitoring will be taking place in conjunction with the RAD.
- Jon Iglehart pointed out that it might be helpful for the steering committee to redirect the focus of the canal restoration advisory subcommittee.
- Gil McRae indicated that the subcommittee seems to be the right group to evaluate water quality demonstration techniques, but is not the right group to evaluate implementation of large scale projects. It is uncertain as to the role of the WQPP in this effort. Wouldn't canal restoration be similar to wastewater implementation, which was carried out by other entities?
- Gus Rios stated that one thing that needs to be determined is who carries out these different projects. With the wastewater issue, a consulting firm was hired to develop the plan. This was done with public input and oversight of WQPP. The plan provided the standards that needed to be met, etc. For the canal restoration, a good master plan that includes operations, data, criteria, etc. may be needed. This plan could then be used by the county/municipalities for implementation.
- Gil McRae noted that the decision as to how to implement canal restoration should probably be done outside of the subcommittee. Canals are somewhat different from wastewater because the issue for a canal can be very local and homeowner groups may be involved in

funding, etc. The update of the master plan should provide guidelines and anticipate that different types of groups may be take the lead in canal restoration.

- Jon Iglehart explained that the term plan causes concern because a plan lays out future roadmaps for projects, including prioritization of those projects. The original idea for the canal subcommittee was to evaluate the demonstration projects/monitoring techniques/data and leave it at that. Communities would be allowed to determine how they want to move forward with the actual restoration.
- John DeNeale added that the WQPP can help provide information and support to local entities regarding permitting issues and other things to help them move forward. Key Colony Beach has benefited from the expertise of the engineers and scientists involved in the canal restoration process.
- Gus Rios stated that the permitting pre-application program is in place to help the different entities with permitting and has helped people contend with endangered species issues, etc.

VII. Public Comments

Stuart Shaffer, Sugarloaf Key resident, urged the subcommittee to look at the criteria set up in 2013 CMMP and update them based on what has been learned from the demonstration projects, etc.

Break

VIII. Water Quality Canal Demonstration and Monitoring Results (Dr. Henry Briceno, FIU)

Dr. Briceño, FIU, presented the findings from the canal demonstration monitoring. The root of the canal problem is the design of canal geometry, which was driven by fill requirements to increase land area for new housing. In the deeper parts of canals (below the entrance depth of the canal), water becomes stagnant, which is one of the major issues. Organic matter and other debris accumulates in these deeper levels.

Each canal was treated with a different methodology and different sampling approaches to some degree (since it is not for regulatory purposes). Data collected includes information collected pre-remediation, post-remediation and from nearby control canals. These data can be used in the future for RAD, etc. The proposed methodologies for the demonstration canals were the following: culverts, organic removal, backfilling and air curtains. These methods were selected because they were thought to reduce the organic loading to canals/increase circulation/reduce bottom hypoxia, etc. The three methods used to measure changes/improvements included chemical analysis of water samples, profile of water column and diel measurements. Evaluation included comparing before and after measurements of nutrient concentrations, profile data, YSI diel sampling and average/median value of other variables, including percent Dissolved Oxygen (DO) saturation.

The study has shown that nutrients do not respond very rapidly to whatever intervention is used. It takes a while for the nutrients to change. A comparison of the nutrient data in the canals with the different treatment showed mixed results in many cases. Profiles of the water column showed that at a certain depth (around 4 meters), the variables (salinity, pH, % DO saturation, and Light (PAR)) changed markedly (in a negative way). Salinity went up; DO and light went down; and the pH became more acidic. There is not much living down in the bottom of deep canals where it is so dark. The situation can be improved with backfilling. This is needed because the upper portion of the water column moves, but the bottom water does not. Things that improve circulation can help process the organic matter.

Profiles were presented for the demonstration canals, not all of which showed improvements after treatment (see summary below). Diel measurements were taken over a period days. In terms of diel measurements, the backfill canal showed marked differences before and after remediation and as compared with its control. The backfilling allowed for great improvements on the canal bottom.

The **profile assessment** yielded the following:

#29 Backfilling = OK
#137 Air Curtain + Aerators = OK
#148 Air Curtain = NO
#266 Organic Removal + Air Curtain = NO
#277 Culvert = OK
#287 Weed barrier = NO
#290 Organic Removal + Air Curtain = NO
#470 Culvert = ?
#472 Culvert = OK

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Some methods require more time for a response to occur. Organic matter reentering the canal can reduce the effects of restoration. (This took place with organic removal and air curtain treatment in #266, which showed improvement at first, but then took on more organic matter that flowed into the canal bottom from outside of the canal).

In summary, remediation projects may be well designed and fully implemented, but expected changes may not show conclusive results. The remediated canals can be revisited in the future to see what changes have taken place over time. For the most part, all of the methods that reduce/prevent nutrient inputs will work, but not all at the same rate and degree. Keeping the seaweed from entering the canal is a good thing; backfilling brings good results and brings them more quickly. Air curtains can be important in certain situations. Since answers are needed right away, what has been learned so far can be used to make decisions. Backfilling and culverts are two good methods. Culverts can work in shallow canals.

Discussion/Questions

Backfilling depth discussion:

- In response to a question as to how much improvement in the variables would be expected if the canal was shallowed up to about a meter less than where the profile decline exists (at about 16 feet), Dr. Briceño stated that he would expect definite improvement if the canal were filled to something like 12 feet, for example, which is less than the full more ideal level. He thinks partial fill would take care of the problem to a large extent. Although, improvement may not be as much as if the canal were filled to a higher level. The profiles can help guide how much backfilling at levels that aren't as high but still have the benefits of improved water quality. Of course, there is some uncertainty with this approach, especially because other factors may be at play in water quality, including inputs into the canals. In addition, acceptable D.O. values at the bottom will not be achieved until at least some backfilling is done.
- Charlie Causey pointed out that one of the main treatments for the poor canals has to involve backfilling first before applying any other methods. Of the 103 canals, how many are greater than 14 feet? These are the ones to begin backfilling. Some of the deeper canals might have to be left off the restoration list (at this time) because

backfilling is so expensive. The focus should be on the shallower canals and skimming seems to be a good idea.

- Billy Causey explained that the limiting factor at every canal entrance is the depth and backfilling should be done as much as can be afforded to get to the depth at the entrance of the canal (which is usually limestone rock). Each canal can be somewhat different; the profiles can guide this; flushing rates can be estimated.

Canal Debris question:

- Charlie Causey asked, “How will debris in canals where it won’t be removed (at least not right away) affect water quality in the restoration process?” Dr. Briceño thinks a cost-benefit analysis could be helpful. Budget is a consideration. Overall, it is difficult to predict.

Canal special projects question:

- Jon Iglehart asked, “What task could be used by a committee to ascertain which canals would best benefit from the special projects discussed today?” Dr. Briceño indicated that the canals with the organic removal should be improved, but aren’t showing improvements. The canals with the air curtain play a role, but don’t solve the depth problem and the problem of organics in the bottom. Should these organics be capped/isolated in some way? Organics can come back in after removal and fine grained organic material is more reactive in the water column.
- Greg Corning commented that it seems as if the remediation projects are similar to the Little Venice Study, which was done prior to the initiation of wastewater improvements. Organic removal and air curtains might show some positive effects in the future, so they shouldn’t be ruled out at this point.

Continued Monitoring Funding

- Gus Rios suggested using the canal monitoring money to continue to monitor the remediated canals to track them over time. Rhonda Haag indicated that the plan is to choose new sites for monitoring purposes, so these canals will not be covered. Gus explained that the RAD money is looking at the impacts to the halo zone. FDEP indicated they needed more data from canals, which will be monitored by the county (through a contract). The original 500 foot halo zone was set up by modelers as part of the RAD. At the 500 foot mark, no impacts from land should be detectable.
- Rhonda Haag explained that the canal monitoring was at the request of the county commissioners, who wanted to evaluate the relationship between canals and nearshore waters. She suggested using the \$100k from FDEP for continued monitoring on the remediation projects.
- Gil McRae pointed out that using nutrients as an indicator in canals is not going to prove to be too useful because of the complicated factors. However, preventing canals from developing their own water quality to begin with is something that would help. This can be done by backfilling and/or culverts. The determinants are to minimize anoxic conditions and maximizing light penetration. Some canals with thick muck are the hardest to deal with it. If that is mitigated with a culvert, the muck will affect the ambient water quality when it gets out. It might be worth testing culverts and then looking at the ambient water quality since that is of concern. This is not to minimize skimming, and air curtains.
- Jon Iglehart asked whether it would be a good idea have the Technical Advisory Committee (TAC) to determine what a good sampling protocol should be for looking at the nearshore waters and within the canal systems, if this is needed.

- Gus Rios noted that the TAC is not really cohesive group right now and membership needs to be examined. A request was made by the steering committee to have people serves as experts for peer review purposes. Jon Iglehart indicated that the canal subcommittee is probably not the appropriate group for this task.
- Gil McRae supports strategic monitoring in relation to actions that have been taken. Monitoring nutrient concentrations within canals is probably not the best use of money; it should be tied to a restoration activity and then success can be evaluated. One size fits all monitoring doesn't fit this situation because canals vary so much. The monitoring that needs to be done strategically is pretty basic.

Canal Restoration Advisory Subcommittee Direction

- Gus Rios noted that the subcommittee could use input/direction on updating the CMMP from the steering committee. The plan needs updating because lessons learned and new information has become available. The subcommittee would like to go forward and requires funding to update this plan.
- Gil McRae sought clarification on the term master plan. Is this more of a guidance document with information and best management practices or is it a plan that prioritizes certain canals for work before others? Gus responded that the current plan is both. It contains criteria for selection and methodologies. Some members of the public have pointed out that the selection criteria could be improved. This involves guidance on selecting future projects.
- Jon Iglehart asked about the possibility of future demonstration projects as it relates to the role of the committee. Funding has come from special study projects morphed into demonstration projects. There is no funding set aside for more projects at this time.
- Gil McRae noted that updating the document, whether or not there are more demonstration projects, makes sense because of the new information, etc. The plan focuses on the technical aspects of prioritization, but in the real world there are lot of other factors at play. He is fine with technical aspects and feasibility being discussed, etc. but the plan should probably not be prescriptive to the level of what canal goes before another. Gus explained that the demonstration projects were evaluated in the plan, which also contains criteria for prioritization of projects.
- Charlie Causey asked whether the plan should be tied into funding considerations because funding plays such an important role. Funding should be discussed and citizen participation in the process is needed in some form or another.
- Jennifer Derby agreed that funding is an important consideration. The priority list could be developed using a contribution from the homeowner that front the canal as a criteria that gives more weight to that project. On the water quality side, there were about 125 canals that were rated poor in the first CMMP. Based on rough calculations, Jennifer estimated the cost of backfilling the worst canals would be about \$15,500 per canal land owner. It is a bit puzzling to her as to why the land owners that get the most benefit from the canal restoration would not contribute to the cost of restoration, especially when there are concerns about water quality beyond the canals.
- Charlie Causey suggested that the canals be prioritized using the new criteria and then approach the homeowners to see what contribution they would be willing to make to complete the project. That might help determine how much funding will be available and for what projects. Prioritization would be focused on water quality. Gus pointed out that the county has conducted surveys, etc. It is not the same as a sewer district at this time. So far, it has been RESTORE funds and a formula is not in place for determining

financial contributions. Is this a decision that should be done at the county/municipal level?

- Billy Causey stated that the canal issue stems from poor design and is part of the greater restoration effort in the state (Everglades restoration). Perhaps seeking funding from other sources is something to consider.
- Charlie Causey agrees that other funding sources should be considered and that the land owners should probably contribute.

Motion (passed)

Jon Iglehart made a motion that the FDEP Special Study funding be used to update the CMMP. Gil McRae seconded that motion. Motion carried with no objections.

IX. Seagrass/Benthic Habitat Monitoring and Canal Results

Seagrass Monitoring

Sara Wilson, FIU, gave an update on benthic habitat monitoring taking place across the sanctuary. This long-term project has defined the spatial extent and species composition of seagrass beds in the FKNMS and defined a baseline to assess change over time. They have also defined the spatial and temporal pattern of seagrass community dynamics and confirmed the role of nitrogen and phosphorus in controlling seagrass bed structure and productivity.

Long term trends at stations in FKNMS are consistent with increases in nutrient availability, which expresses itself by shifting from a *Thalassia* dominated community to a *Syringodium* dominated one. The Species Composition Index (SCI) shows the relative importance of *Thalassia*, which prefers oligotrophic waters. In recent times, SCI, hence the species composition, has remained relatively stable. The Elemental Indicator (EI) indicates that seagrasses in FKNMS became more nutrient limited from 2011 through 2014, then became less nutrient limited from 2014 to 2017.

This monitoring project has produced 25 scientific publications over the years. Three manuscripts are in preparation for publication at this time. Publications are available on the new website, which also has new functionality and content information and tools.

Irma Impact on Seagrass

Sara Wilson describe impacts to seagrass communities from Hurricane Irma based on field assessments. Notable erosion was observed at 6 of 40 sampling sites. Notable canopy thinning was observed at 2 of the 40 sites and notable sediment deposition occurred at 9 of the 40 sites. Erosion is the worst impact because the rhizomes are removed. Areas that experience thinning are expected to rebound.

A quantitative analysis of changes in seagrass density related to storm impacts show that the greatest change (decrease) occurred between summer 2017 and fall 2017 in the Lower Keys where the eye of the storm passed. The seasonal analysis showed that seagrass density in FKNMS was significantly lower than predicted fall 2017 density based on 20 years of monitoring. After Hurricane Georges, they had three sites that were most severely impacted, but have had different recovery trajectories over time. One site lost seagrass and has not recovered. Another site recovered after 10 years, but lost its seagrass in Hurricane Irma. The last site showed recovery in 2- 3 years and still shows recovery at this time. Google Earth imagery is also being used to track seagrass changes over time.

Canal mouth monitoring involves analyzing samples of seagrass collected at various distances from canal mouth for nutrients.

Benthic Habitat Monitoring in Canals

For the benthic habitat monitoring in the 19 canals (7 treatments), Sara Wilson explained that a benthic community assessment is conducted along with sediment (muck) measurements. The last sampling event was after Hurricane Irma. Canals were filled with debris and in some cases, it wasn't safe to put divers in the water. In some oceanside canals, they observed large deposits of sediments. These deposits will change the circulation and other things about that canal.

Fall sampling was pushed back because of the storm. Data are currently being analyzed and will be available in June in a report. Benthic monitoring data were collected to measure changes before and after remediation in control and the remediated canals.

The following results were described for the various treatment pairs of canals—one treated and one control for each method or combination of methods.

- Backfilling led to significant changes improvements in water chemistry in the treated canal. No major differences in benthic communities outside of the canal mouths were detected.
- The weed curtain treatment did not produce a reduction in dry bulk density. The treated canal showed an increase in organic carbon in the sediments (muck). This unexpected result may be due to greater loading of organic matter from wrack deposits. No major differences were observed in benthic communities inside versus outside of canal mouths. These data do not show improvements due to the weed curtain.
- The dredge treatment did not produce major benthic community differences between treatment and control canals. But, significant differences in dry bulk density, muck depth and sediment organic carbon were detected in the treated canal. Data indicate less muck and significant impacts from the dredge weed barrier treatment in the treated canal.
- The culvert treatment data did not demonstrate a lasting impact from culvert installation. There were some changes after culvert installation, but they did not last. Some differences in sediment dry bulk, muck depth, etc. were observed but don't appear to be related to culvert installation.
- The dredging treatment applied in Big Pine Key showed marked improvements in dry bulk density, muck depth and sediment organic Carbon. Seagrasses adjacent to the treated canal may have be experiencing greater light availability, but more data are needed to confirm this observation. For more information, visit <http://seagrass.fiu.edu/canals.htm>.

X. Future Visioning Exercise for WQPP: Develop process for identifying WQPP progress and updating priorities

Sarah Fangman explained that some ideas discussed at the last management committee meeting are being presented today for the steering committee's consideration. During the sanctuary's management (and zoning review) planning process, concerns were expressed about water quality from members of the community. It may be time to evaluate priorities for the group, which has accomplished so much over the years. The concept proposed is to undertake a facilitated process to assess the work of the WQPP progress to date, to examine what priorities may be updated, if any, and identify member contributions to meet those priorities.

This process would involve in utilizing an external facilitator, using existing documents to inform the process, and compiling and synthesizing relevant information/program outcomes. A timeline with

action steps was proposed (May 2018 through spring 2019), along with things to consider in the process. The management committee would undertake this task with a facilitator; results would be presented to the steering committee for consideration.

Discussion/Comments

- John Hunt explained that what is expected from this process is that the management committee would get some clear priorities on which to focus in the next few years. This will help in planning special studies accordingly and management actions are focused on water quality. It is not a strategic plan and is fairly operational. This will help inform making decisions about money and projects. In the past, the focus was on wastewater treatment. This could be done by the management committee, but they feel that is not appropriate. This program hasn't taken the time recently to refocus.
- Billy Causey pointed out that some great science has been done and it is time to get that science out in front of the public where it can be interpreted clearly. It's time not only for hindcasting, but for forecasting.
- Gil McRae is on board with the concept. It's not just about considering what the WQPP can do given its charge, it's about maximizing the benefit in view of what all of the other related programs can contribute. That is a valuable perspective and he is supportive of updating.
- Billy Causey pointed out that roadmaps exist that can be used for this process: the Water Quality Protection Program and the sanctuary's Water Quality Action Plan, which was developed as a roadmap with public input and should be re-examined to see what has been and has not been accomplished.
- Jennifer Derby has some concerns about a long, facilitated, complicated review process, especially in light of the budget concerns these days. The President's budget has this program zeroed out again this year. Given that, she sees updating the report to Congress as being a very important priority. The second most important priority is the coral disease outbreak. It wasn't too long ago that EPA/WQPP went through a formal process to identify priorities.
- Sarah Fangman agreed and explained that the two reasons just mentioned (budget and coral disease), speak to the why this approach is needed. It will help focus the money on what is most needed. Decisions and the decision-making process need to be reexamined in view of the new disease threat. It should be done smartly and quickly.
- Jon Iglehart sees an issue with expense and timing. He thinks the timing is not quite right; perhaps starting the process in the spring and shifting the time line later will work better. This will allow for the biennial report to be developed and produced.
- Jennifer Derby would like to see how the report can be developed with input from other people. Steve Blackburn explained that a great deal of info is available to feed into the report, which is needed and will reflect successes such as wastewater, hurricane related efforts, etc. and canal updates. For the future, the priorities should be identified and be more detailed.
- Sarah Fangman suggested that perhaps members of the management committee (Beth, John) and flesh out how this process could be undertaken. This could be the first step and results could be presented at the next meeting.
- Jon Iglehart mentioned the priorities were revisited through the process that Steve conducted a few years ago. Better participation from members is needed to make the priorities more meaningful.
- Billy Causey stated that most people in the community care about is Florida Bay and some people don't think we are paying much attention to Florida Bay. He would like to see whatever is published have information on what is being done with regards to Everglades restoration and Florida Bay. People on this steering committee (and their agencies) are involved in Everglades restoration.

- Jon Iglehart noted that other places have water quality action plans and suggested developing such a plan with goals, etc. that could be updated on the regular (5 year) basis. Instead of the product being a one-time thing, it would be a living document.
- Beth Dieveney explained that the management committee didn't really decide the details of the product outcome, but focused more on the need for this process and how it might be undertaken. If this is something that the steering committee wants to pursue in some way, she thinks the next steps would be to have the management committee flush out more details.
- Shelly Krueger would like to see the accomplishments, especially wastewater treatment, captured in the report. Shelly volunteered to work on this process.
- Jennifer Derby recognized the hard work Gus and Steve put into the last report to Congress. Her hope would be that the work be distributed amongst many people. This report usually contains the near future priorities. Steve Blackburn explained that the priorities were determined through a process held a few years ago and could be revisited. The results of this priority inventory can be summarized and contains input from the public, TAC, management committee and steering committees. Jon Iglehart stated that corals are right on top in terms of priorities.

With agreement from the committee, Co-Chair Iglehart directed the management committee to complete the following tasks and provide feedback at the next steering committee meeting:

1. Look at what the end product will be (and the processes that would get to that endpoint).
2. Develop a biennial report draft by the last week in September; contributions from others are needed. This report will need to include near-future priorities determined, which can be discussed at the next meeting and then added to the draft.
3. Compile the resources needed to carry out the above tasks.

Next WQPP meeting is expected to be held in September/October.

XI. Coral Disease Planning and Response Efforts (Karen Bohnsack, FDEP)

Karen Bohnsack, FDEP Florida Coastal Office, gave an update on the coral disease outbreak and response efforts and next steps for moving forward. This disease outbreak is one of the most widespread outbreaks on record and is continuing to spread to the north and south. This disease is causing high rates of mortality in short periods of time for multiple species. Certain species are more susceptible than others and have a prevalence of 60 to 100%. Many partners/agencies are involved responding to the disease.

Thanks to the Florida Legislature, Governor Scott, the Florida Coastal Office Southeast Region received funding (\$1 million) for FY17 and FY18 for studying water quality and coral disease. FDEP received funding from EPA to hire a disease specialist and develop a coral disease response plan. Partners have also received funding from other sources to address the disease. Priority response activities include coral disease surveys and fixed site monitoring, strategic sampling and laboratory analysis, and intervention and field trials.

FWC Florida Wildlife Research Institute (FWRI) has been tracking all corals in 4 sentinel sites off of Marathon to document how the disease progresses over time. By mid-April, all sentinel sites had corals with disease. Lab analysis is underway using tissue samples to identify the potential pathogen. Experiments have shown that the pathogen is contagious and can be transmitted both through the water and by touch from species to species. In recent times, the focus of intervention efforts have been developing ways/methods to slow to stop the disease. At Looe Key, where disease was largely contained to the western side, the idea of strategically removing diseased corals was discussed, but

the disease was too widespread, so this option was not considered feasible. At this time, laboratory studies are continuing, along with small scale field trials and larger scale field applications. FDEP leadership is supportive of these efforts and is helping obtain resources.

This is an infectious agent and identifying the pathogen is very important. Equally important is continuing to investigate and address the underlying environmental conditions associated with the disease. Again, recognition goes to the many partners and to this body for years of work protecting water quality of the sanctuary.

XII. Coral Disease Intervention (Karen Neely, NSU)

Dr. Karen Neely, NOVA Southeastern University, gave a presentation on the intervention work in responding to the disease outbreak. Her work was originally centered on *Dendrogyra cylindrus*, pillar coral, which was listed under the ESA in 2014. In 2013, they started baseline studies describing pillar coral distribution and disease occurrence. At that time, there were 750 colonies with 150 genotypes. Since 2014, 76% of the colonies have been lost and 60% of the genotypes. This species is facing regional extinction.

Gene banking is taking place to preserve the genetic material, for potential restoration in the future. Banking is occurring in offshore nurseries and in laboratories of partners. Some wild genotypes have not been collected at this time because taking a sample from healthy colonies might make them more susceptible to the disease. These colonies are being monitored closely. Most colonies in nurseries are doing well so they may contribute to future restoration efforts.

Cheryl Woodley at NOAA's Coral Disease Center has been dosing diseased corals with certain antibiotics and has had success under laboratory conditions. In the field where direct application is used, it is necessary to use a substance deliver the antibiotic or treatment to the coral. This could be clay, dental paste, etc. that will control the release of the antibiotic.

A series of laboratory experiments and treatment techniques were conducted on four species (*Dendrogyra cylindricus*, *Psuedodiploria strigosa*, *Dichocoenia stokesii*, *Copophyllia natans*) to help determine what treatment approaches would be most effective. These included creating trenches, barriers, using epoxy, direct application of antibiotics and/or chlorine. Direct application of antibiotics was effective on pillar coral and other species. To make this approach feasible, a way to make this technique work in the field is needed. Scientists are working to develop a better application product to deliver the antibiotic.

In summary, no good method for field treatment has been identified. The right material for a barrier is needed, along with a way to break tissue connections (trench) and some effective treatment (antibiotics/antiseptics).

Discussion

- In response to a question about the causative agent being bacterial, Dr. Neely stated that coral disease is often more complex than one bacteria and the fact that antibiotics work to treat this disease doesn't rule out that other factors might be underlying causes.
- In response to a question about divers potentially transmitting disease through contact with diseased coral, Dr. Neely explained that they are very cautious and always bleach/disinfect their equipment. As for recreational divers, it is more difficult and there is a lot of movement around throughout the reefs.

Coral Disease Workshop Announcement

Superintendent Fangman announced that NOAA and the State of Florida are working together to host a workshop in the next month or two to bring together scientists and agency folks to grapple with the questions associated with responding to the disease. The outcome of the workshop will be a response plan with a multipronged approach and will result in a suite of responses to the different levels of disease infection. The plan, which will be adapted as new information becomes available, will also include a citizen's component and communication approach.

XIII. Coral Reef Evaluation and Monitoring Program

Rob Ruzicka, FWC FWRI, gave an update on CREMP. The coral surveys conducted in 2017 showed increases in prevalence in many cases. In other cases, corals were already gone and so disease prevalence was low. Some major corals, *Montastrea cavernosa* and others showed great losses in recent years, which is reflected in the coral abundance survey data. Coral cover at three reefs in the upper Keys was presented: Molasses Shallow, Grecian Rocks and Carysfort Deep. Molasses and Grecian showed losses after 1998 bleaching events and then showed some recovery from 2001 to 2014 or so. Declines were observed at all three sites from about 2015 through 2018.

Coral resistance is important and why some reefs may or may not succumb is not well understood. Coral Reef Conservation Program (CRCP) has funded coral recruitment program in the past few years to capture what happen after a disturbance event. Juvenile surveys are also conducted. Coral recruitment tiles that have been placed in the environment are being analyzed to see what kinds of corals are settling on them. These are true recruits, not produced through asexual reproduction. Tiles were placed out during 2014 and 2015, which were very warm years. (Keys data were analyzed separately to show what was taking place in the Keys only). Coral recruitment was less than 500 in 2015, but increases occurred in 2016 and again in 2017. Most of the recruits were *Siderastrea siderea*, which was surprising since that coral is being affected by the disease outbreak. It is not known whether these recruits are local or originate elsewhere. About 20% of the tiles were lost during the hurricane, so the estimate for 2017 might even be a little low.

Discussion—Coral Disease

- In response to a question about the disease outbreak, Dr. Andy Bruckner explained that this particular disease outbreak is unprecedented in that it has spread so quickly and continued on for so long. Most often, a disease will affect an area and then subside after some time.
- In response to a question about Lake Okeechobee discharges and how they might be implicated in the disease, Karen Bohnsack explained that the disease originated in waters off of Miami and moved both north and south from there. Dr. John Baldwin, Florida Atlantic University, FAU, has been studying the impacts of the discharges and will be submitting a report on that topic to FDEP in June 2018. This report will be available to everyone via the website. Dr. Erinn Muller, MOTE Marine Lab, is currently conducting a spatial epidemiology analysis using all available datasets, including water quality monitoring. The purpose of this effort is to tease out some factors associated with the outbreak.

Introduction of FKNMS Research Coordinator

Sarah Fangman introduced Dr. Andy Bruckner, the sanctuary's new research coordinator, who started last week. Dr. Bruckner, who worked for NOAA several years ago in Coral Reef Conservation Program, stated that it is great to be working for NOAA again. Until recently, he was focused corals/ecology in the Indian and Pacific Oceans.

XIV. Florida Keys Water Watch (Krueger)

Shelly Krueger, UF/IFAS Extension Monroe County, Florida Sea Grant, gave an update on Florida Keys Water Watch (FKWW). FKWW uses trained volunteers to conduct water sampling and focuses on reducing nonpoint source pollution. Individuals, schools and homeowners associations serve as volunteers. In 2016, EPA approved their quality assurance plan and in 2017, they initiated working with FDEP Quality Assurance staff to obtain the equipment needed to make the data more useful and eligible for entry into the EPA Water Information Network (WIN) database, where it can be used by resource managers and the public. A Train-the-Trainer program was created and has been implemented at the Florida Keys Community College and elsewhere. Eight Sea Grant agents were trained as trainers, which allowed the program to become statewide. University of Florida, with funding from the Gulf of Mexico Alliance (GOMA), will be creating a UF website. This new website will replace the Georgia Adopt a Stream website, which has been used for data collected through the program so far. In the future, they plan to establish an advisory council, work side-by-side with FDEP and Water Watch volunteers to verify data methods and to seek state-wide funding.

In summary, since 2015, FKWW has held 61 workshops with 458 participants. Seventy-two volunteers and teachers have adopted a FKWW site in the Keys and contributed to an estimated value of \$19,926 of work to the state of Florida (885 volunteer hours). Eight Sea Grant agents and three Florida Keys Community College professors have completed the Train-the-Trainer course. FKWW has also reached 746 members of the public through invited seminars, club meetings, etc. A Qualtrics survey is conducted annually with positive results in terms of reducing nonpoint pollution behavior changes and knowledge gained.

Note: The RAD Monitoring Update (Rios, Haag, Espy) was discussed earlier in the meeting.

XV. Public Comments

No public comments were offered at this time.

XVI. Closing Remarks/Adjourn

Co-Chair Iglehart stated that more time is needed to discuss water quality related matters. He suggested that the next meeting be held over two days, with one day devoted to the future priorities discussion and the other devoted to coral reefs, seagrass and water quality monitoring results.