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

November 15, 2021

DRAFT MINUTES

Steering Committee Members Present
Wade Lehmann, US Environmental Protection Agency (EPA), Region 4 (Chair)
Jon Iglehart, Florida Department of Environmental Protection (DEP) (Co-Chair)
Sarah Fangman, Florida Keys National Marine Sanctuary (FKNMS)
Christopher Kavanagh, National Park Service
Christian Eggleston, Florida Keys National Wildlife Refuges Complex
Barbara Powell, Department of Economic Opportunity
Gil McRae, Florida Fish and Wildlife Conservation Commission
Sue Heim, Key Largo Wastewater Treatment District
Julie Cheon, Florida Keys Aquaduct Authority
Craig Cates, Monroe County Board of County Commissioners
Teri Johnston, City of Key West
George Garrett, City of Marathon
David Webb, Village of Islamorada
Patrick Rice, FKNMS Sanctuary Advisory Council
Charlie Causey, Florida Keys Environmental Fund
Chris Bergh, Florida Keys Program, The Nature Conservancy
Natalie Bryce, Sandra Walters Consultant, Inc.
Shelly Krueger, Florida Sea Grant/IFAS Extension Monroe County
Patience Cohn, Marine Industries Association of South Florida

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Summary of Resolutions

- Motion 1 (passed): Jon Iglehart made the motion to approve the agenda; Sarah Fangman seconded. The agenda was approved with no changes.
- Motion 2 (passed): Jon Iglehart made the motion to approve the July 2021 meeting minutes; Sarah Fangman seconded. The minutes passed with no objections.
- Motion 3 (passed): George Garrett made a motion to approve the updated WQPP Bylaws, as presented, to clarify the process for selecting new knowledgeable citizens to serve on the WQPP. Commissioner Craig Cates seconded the motion. The motion passed with no objections.
- Motion 4 (passed): Chris Bergh made a motion to move the water quality monitoring program evaluation process forward as written. George Garret seconded the motion. The motion passed with no objections.
- Motion 5 (passed): Shelly Krueger made a motion to add Allison Higgins to the Management Committee. Commissioner Cates seconded the motion. The motion passed with no objections.

I. Introduction and Opening Remarks

Wade Lehmann, Ocean and Estuarine Section Chief, EPA Region 4 called the meeting to order and welcomed everyone. Jon Iglehart, South District Director, DEP, and Mr. Lehmann are the meeting co-chairs.

Steering committee members in attendance were recognized.

Karen Bohnsack introduced the virtual meeting format and instructions for attendee participation. The presentations and materials associated with the meeting will be available at the steering committee page on the Water Quality Protection Program website http://ocean.floridamarine.org/FKNMS_WQPP/.

Mr. Lehmann gave the opening remarks on behalf of EPA. Becky Allenbach has started with EPA as a new senior advisor to the division director, and will be coordinating on all south Florida activities, including Everglades restoration and the Keys. Veronica Fasselt has also started with EPA and will be relocating to South Florida to focus primarily on wetlands issues. She will most likely sit in on WQPP meetings as well, and will be a good resource for water quality issues in the Bay and originating from the land. The federal government is currently operating on a continuing resolution and when a budget is approved EPA will begin working on the request for applicants (RFA) for this year's grant funds. The new administration is focusing on environmental justice, an area where the EPA has some tools, but the Florida Keys is a novel place. When bringing up projects and issues, WQPP members are encouraged to consider how those activities relate back to environmental justice. Coastal and climate resilience are another big topic of interest within EPA, which will be reflected in the upcoming RFA.

Mr. Iglehart gave the opening remarks on behalf of DEP. This is Gus Rios's last meeting, and DEP will be working on how to keep their involvement in the WQPP strong with staff turnover. The Florida Legislative session is coming up and there will continue to be a focus on water quality issues.

Agenda and Minutes
Mr. Lehmann reviewed the agenda and minutes and requested edits or a vote to approve from the Steering Committee. Mr. Iglehart made a motion to approve the agenda; Sanctuary Superintendent Sarah Fangman seconded the motion. The agenda was approved with no changes. Mr. Iglehart made a motion to approve the July 23rd Steering Committee meeting minutes; Ms. Fangman seconded the motion. The minutes passed with no objections.

Retirement Recognition for Gus Rios for 35 Years of Service to DEP.
Mr. Iglehart recognized Gus Rios for many years of service to DEP. Gus was widely recognized by the Steering Committee for not only his time, but his dedication and commitment to the goals and objectives of the Water Quality Protection Program.

II. WQPP Steering Committee Bylaws

Gus Rios, DEP, reminded the Steering Committee that during the last meeting, a proposed amendment of the original (1996) WQPP Bylaws was presented and approved. However, the Committee identified that it was still not clear how to nominate and select new citizen members, so a resolution was passed requesting the Management Committee to suggest a process for selecting new 'knowledgeable citizen' representatives to serve on the WQPP Steering Committee. The Management Committee has proposed a short paragraph and that new language is shown in a redline version of the updated Bylaws, which is available on the WQPP webpage. A sample application form was also developed to help the Committee envision in more detail the type of information that would be asked of applicants and submitted to the

Steering Committee along with a resume. Mr. Rios reviewed the proposed changes present in the draft updated Bylaws document. Another issue that remains unresolved is the question of whether the Steering Committee should put a cap on the number of citizen members.

Questions & Answers/Discussion:

- Wade Lehmann reiterated the question about a potential cap on citizen seats and requested feedback.
    - Jon Iglehart noted two incidents with the National Estuary Program where the citizens on the committee became driven by a single issue, which was disruptive. There may be a benefit in limiting the number of seats to avoid this situation. The Bylaws require a minimum of three knowledgeable citizens, and the Committee currently has six.
- Sue Heim (FKAA) inquired about the timeline for submitting applications and the procedure for removing citizen members from the committee. Additionally, would it be worth having 3-year term limits for the citizen seats? The agency members have a level of turnover since their seats are appointed and subject to replacement by new staff.
    - There is a procedure in the Bylaws for asking members to resign, specifically if there are attendance issues that are affecting the Steering Committee's ability to reach a quorum. The timeline for submitting applications is deliberately vague at this point since there is no immediate plan for a citizen seat recruitment; a timeframe will be included on the application form and provide sufficient notice.
    - It was noted that term limits would add an administrative burden and staff capacity is already limited. Others disagreed with term limits, or stipulated they would have to be quite long given the steep learning curve associated with water quality issues.

Motion (passed)

George Garrett (City of Marathon) made a motion to approve the updated WQPP Bylaws, as presented, to clarify the process for selecting new knowledgeable citizens to serve on the WQPP. Commissioner Craig Cates (Monroe County) seconded the motion. Co-Chair Lehmann called the question. The motion passed with no objections.

- As requested by the Steering Committee, the final version of the Bylaws and any future revisions will include a date.

III. Florida Keys Reasonable Assurance Document: Nearshore Water Quality Monitoring Update

Ken Weaver, DEP, provided an overview of the Florida Keys Reasonable Assurance Document, including its origins, the latest nearshore water quality monitoring results, and next steps for assessing compliance with water quality standards. Nearshore waters of the Florida Keys were listed as impaired in 1998. At that time, Florida did not have Numeric Nutrient Criteria (NNC), so other information had to be assessed to list the waters as impaired. In 2008, the State of Florida adopted a Florida Keys Reasonable Assurance Plan (FKRAD) as an alternative to a Total Maximum Daily Load (TMDL) to focus on improving nearshore water quality. Reasonable Assurance Plans are updated approximately every two years, and in 2011 the FKRAD reported that 68 of 126 restoration projects had been completed. At that time dissolved oxygen was also identified as an impairment. By the 2018 FKRAD update, 42 additional projects were completed, however it was determined that monitoring data was insufficient to assess the nearshore waters. Planning is underway for a final FKRAD to be released in 2022.

The goal of the FKRAD is to implement sufficient nutrient control mechanisms for the nearshore waters to achieve water quality targets. The targets were developed for model 'quads' based on an insignificant increase above natural conditions within 500 meters from shore (the area known as the Halo Zone). includes nutrient targets which were developed via a dilution model. The Keys are divided into a total of 20 model Quads (split with 10 north and 10 south of the island chain), each with a specified natural and

"insignificant increase" target condition. Target conditions are defined as 10 µg/L increase above the natural Total Nitrogen (TN) concentration, and 2 µg/L increase above the natural Total Phosphorous (TP) concentration within each Quad. Between 2018 and 2021, additional monitoring was conducted by the University of Miami Coastal Ecology Lab at 65 nearshore stations (500m from shore) to assess the attainment of FKRAD targets. Results indicate that average TP measurements were less than (e.g., in compliance with) the targets across all quads, whereas the TN measurements show 5 quads that are not yet meeting the targets at Boca Chica north, Saddlebunch north and south, Layton south, and Ocean Reef north.

With only two years of data it is not possible to analyze for trends, nor is that amount of data sufficient to move the Keys out Category 4b (impaired waters) status and into Category 2b (waterbodies with a completed Reasonable Assurance Plan that are attaining standards). Continued monitoring in the halo zone is recommended, at least in the quads that are not attaining the standard. All "in progress" projects in the FKRAD should be completed and targets should be met for at least 3 years to close the FKRAD. DEP is currently working on the 2022 FKRAD update and will reach out to stakeholders for project status updates. The updated FKRAD will summarize project completion status, provide information on attainment of TN and TP targets, and provide recommendations for additional projects, if any, that may be necessary to meet water quality standards.

Questions & Answers/Discussion

- Wade Lehmann requested clarification on what additional data is needed (more stations, more sampling events per year, more years of sampling, etc.)?
    - More than two years of data are necessary to demonstrate that the Keys are fully attaining the targets at the 500m halo zone boundary. Other water quality monitoring programs are not collecting data that far inshore.
- Charlie Causey (Florida Keys Environmental Fund) noted that the trendline in Total Nitrogen appears to be increasing over the two years, and questioned if there has been any investigation into how those increases affect the habitat and species at 500m offshore? It is important to assess the impacts to the biota, as that is ultimately what we are trying to protect.
    - DEP only looked at the nutrient concentrations in the environment, not the specific habitat impacts. It is known generally that higher nutrients lead to eutrophication, and that greater biomass in the water column limits light. Would need to consult and collaborate with biologists for habitat-specific impacts. Looking at individual data points across time vs. annual averages may be helpful to tease out any differences over time.
    - Mr. Weaver cautioned that with only 2 years of data, we cannot interpret these results as a trend.
- At this point, there has not been an investigation or a hypothesis about what is happening in the areas that did not meet targets. This could be related to slower conversion from septic to sewer, or a lag time between project implementation and water quality improvements. It would be beneficial to compare these results to the project status in those areas.
- Mr. Weaver confirmed that water quality was only assessed at the 500m mark, not within the entire quad. An oddity related to nutrients in the Keys is that the FKRAD applies to the whole quad, but we assess compliance at 500m. Beyond 500m, numeric nutrient criteria (NNC) apply. The current FIU monitoring scheme is useful for comparisons against the NNC beyond 500m. As we move forward and the Keys hopefully attain the FKRAD targets, the Steering Committee may want to work with DEP to develop new criteria for those waters in the Halo Zone so we have targets that apply and that we can continue to evaluate against.
- Rhonda Haag (Monroe County) inquired about what would be needed to collect more data; would funding from the cities and county be necessary?

    - More funding will be needed, but monitoring could also be scaled back. DEP would prefer to continue working with local stakeholders and would be willing to set up a similar cooperative agreement.
- Adding new projects to the FKRAD would be a stakeholder-driven process. Such additions would likely only occur if additional reductions in nutrient inputs were deemed necessary to meet the targets, based on the monitoring data. In that situation, the stakeholders would be involved in identifying additional projects and expected timelines for completing those.
- Regarding the influence of land-based sources of pollution on water quality in the Keys, John Hunt (FWC) inquired about whether 500m from shore is in fact the appropriate 'end point' or distance for measuring those influences. Conducting measurements along a transect from the shoreline to 500m at a subset of sites may provide a better sense as to the shape of the curve and the impact that the Keys themselves have on nearshore waters.
    - The current curve that identifies 500m as the threshold is a model/hypothetical curve. It would be interesting to set up transects to compare the modeled output to reality, although it may vary from location to location based on water circulation and flow patterns. This type of monitoring could be considered in the next round of EPA funding, and could be helpful for future conversations about revising criteria and targets.
- It was noted that over the 26 years of FIU sampling, they have detected a decreasing trend in TN.
- Additional input provided in writing following the meeting due to audio issues:
    - Henry Briceño (FIU) noted that DEP is dismissing 13 years of data that FIU has collected at 10 stations within the halo zone, following a mandate from the WQPP Steering Committee. That data is NELAC certified and DEP has approved FIU's field and Lab methods and SOPs. EPA is currently funding a joint FIU-FWC-WIN project to format and upload the data to the WIN database. FIU have been supplying FWC with both old and new data for them to upload to WIN. How can EPA-FIU data be obviated, when DEP used that very same data from our EPA-funded regional monitoring network (not in WIN yet) to derive the current nutrient criteria for South Florida estuaries and coastal areas? Furthermore, DEP followed the classification framework of water quality types developed by FIU (Briceño et al., 2013) using the same dataset to calculate those criteria (Fla. Admin. Code, 62-302.532).

Break

IV. Project Update: Do Canals in the Florida Keys Contribute to Nearshore Water Degradation?

Kathleen Sealey, University of Miami, provided an overview of the status and outcomes of a project to measure the effects of canals on nearshore water quality. The project was conducted over 2 years with measurements taken quarterly at 13 sites (4 "non-canal" state park sites and 9 canal sites). At each site, an imaginary grid was set up with three zones within in which random and fixed points were sampled: within 100m of the shoreline (Zone A), 100-300m from shore (Zone B) and 300-500m from shore (Zone C). Measurements included water quality, as well as benthic transect and quadrat surveys to document submerged aquatic vegetation, epifauna, and benthic communities. The project attempted to characterize sites as having good or bad water quality by comparing nearshore water quality to the FKRAD standards and characterizing them statistically. Poor water quality is characterized by highly variable temperature and salinity, pH < 8.0, low dissolved oxygen, a stratified water column, variable nutrients and chlorophyll-a, and evidence of chronic eutrophication. Each sample site was given a 'water quality' score, which is available on a water quality dashboard. Scores above 60 generally indicate that there is good water quality in that area most of the time. Poor water quality sites saw a loss of species richness in benthic communities from Zone A to Zone C; similar changes were not observed at better water quality sites.

A breakpoint analysis was conducted to determine the average distance from shore at which the influence from the shoreline is diminished to background level. The breakpoint is depicted at the height of the curve. While water mass indicators such as temperature and salinity had almost straight lines (e.g., no breakpoint), the curved lines for nutrients indicate a plume from shore. Breakpoints were different for canal and non-canal sites, but were well within the 500m distance used in the FKRAD. Most shoreline impacts were found to be diluted by 500m. While it is clear that nutrients are coming from the shoreline to nearshore waters, the source of that pollution is unknown, and in some cases not clearly linked to a canal. As such, remediation of some sites would be more successful, whereas others are more challenging or may not immediately translate to improved water quality nearshore. Overall, the diversity of natural communities and benthic species were found to be impacted by canal water quality. For more information, please see the attached executive summary from the Florida Keys Residential Canal Water Quality Project (Sealey, 2021).

Questions & Answers/Discussion

- Regarding single canal remediation, do areas with multiple canal inputs contribute to greater offshore plumes?
    - This is unknown. There are locations such as Rock Harbor and Geiger Key where there is a dredged channel in front of seawalls in addition to canals, which may exacerbate the problem.
- It was clarified that this project did not attempt to look holistically across multiple Keys, but at the gridded area adjacent to the canal and non-canal sites. Similarly, any influence from the Everglades is not captured in this study, as it only encompassed the shoreline to 500m.
- This study addresses the question of how we define and measure water quality assessment units nearshore (e.g., WBIDs). To understand how our management efforts (e.g., canal remediation, etc.) affect water quality, we need to rethink where we do our monitoring. This study has made a compelling case for a distance that is closer to shore than 500m. This should be something the WQPP investigates further: where should we measure to detect if our remediation activities have a local or regional effect on water quality.
    - Ms. Sealey noted that we could consider more nearshore water quality monitoring to help answer this question, and that could potentially be done in a more cost-effective way. Since we already have a large data set, it may be possible to draw similar conclusions about good vs. bad water quality areas based on simple measurements of temperature, salinity, pH and dissolved oxygen. The costly part of these water quality monitoring efforts are the nutrients and chlorophyll.
- Additional input provided in writing following the meeting due to audio issues:
    - Henry Briceño (FIU) questioned the attempt to extract trend data from a two-year database, despite the number of samples collected on a quarterly basis. A sustained monitoring program taking into consideration spatial and temporal scales is necessary to obtain statistically robust results. I hope that DEP does not use only the UM dataset to derive nutrient criteria for the Halo Zone. Restricting Halo Zone data to sites in front of urban canals would result in elevated concentrations in nutrient criteria, non-protective of our coastal habitats and the community.

V. Steering Committee Discussion: Next Steps for Initiating a FKNMS Water Quality Monitoring Program Evaluation

Karen Bohnsack, FKNMS, provided an overview on the proposed guiding management questions and draft framework for evaluating the FKNMS water quality monitoring programs that was developed by the Management Committee. Ms. Bohnsack reminded the Steering Committee that this is follow-up from a resolution passed in July, during which the Steering Committee tasked the Technical Advisory Committee with conducting a review of the water quality monitoring programs, but for the Management

Committee to first draft management questions to guide the evaluation and recommend strategies to avoid conflict of interest in conducting the review. This effort is consistent with the updated priorities adopted by the WQPP in 2020, of which there were six related to data collection, analysis and reporting. Specifically, recommendation 19-3 was to set up a critical monitoring workshop to evaluate the existing water quality monitoring program and recommend changes to answer priority questions to better inform management needs. The draft management questions are based on directives included in Section 8 of the Florida Keys National Marine Sanctuary and Protection Act, which established the WQPP.

Questions & Answers/Discussion

- Chris Bergh (TNC) noted an inclination to focus on the second question, related to the effectiveness of management efforts. To do this, it will be important to define the management actions that have been taken. There is a lot of data from various monitoring efforts around FKNMS, but it's not always clear how to use that information. Measuring the effectiveness of our efforts is key.
- Gil McRae (FWC) reminded the Steering Committee that the creation of the priorities was a first step, and that generally speaks to the sources of pollution in the Keys. The second step is to evaluate if we've been looking at the right things with our monitoring programs. The draft management questions are consistent with the original intent of the WQPP. Ultimately, the Steering Committee should be able to highlight and speak to specific water quality issues and potential management actions that are the highest priority. Historically, we've had water quality standards and management efforts that may not be protective enough in the Keys environment. Mr. McRae agreed this is a logical approach and that additional expertise will be needed.
- Gus Rios suggested that the FKRAD is a good resource on the types of management actions that have been taken. This was recently updated in 2018 (Florida Keys Reasonable Assurance Document). There are other places where this information exists, such as the Monroe County master plans for wastewater, stormwater and canal restoration (Monroe County Sanitary Wastewater Master Plan, Stormwater Master Plan, and Canal Restoration Program). As a reminder, 10-15 years ago a panel of experts was convened in a workshop for a similar type of program evaluation; the results of that are available in a final document (Battelle, 2007). This may be a useful model to follow.
- The Steering Committee engaged in discussion about potential funding sources to support a review and/or the design and facilitation of a workshop. Doing this correctly will be a large undertaking and probably require multiple days of review and input from experts. It would be ideal to have outside facilitation support and/or to consult entities that have done similar types of evaluations. The original independent audit by Battelle in 2007 was contracted by EPA. EPA was unsure if this new effort would qualify for special studies funding, but will look into. Karen Bohnsack noted she'd investigate other potential funding sources as well. DEP also has $100k they contribute towards specials studies, but this needs to be spent before July 1.
- Sue Heim (FKAA) questioned whether the Steering Committee should establish a timeline and deadline for this work to be completed. Following discussion, the Committee agreed that the Management Committee should recommend how long this will need to take; it is unlikely to occur sooner than a year or two, especially with capacity limitations and pandemic restrictions.

Motion (passed)

Chris Bergh (TNC) made a motion to move the water quality monitoring program evaluation process forward as written. George Garret (City of Marathon) seconded the motion. The motion passed with no objections.

Lunch

VI. Project Update: Quantifying the Impact of Shallow Wastewater Injection in the Florida Keys

Miquela Ingalls, Penn State University, presented an update on the status of a special study to investigate the impact of shallow injection wells on surface waters of FKNMS. The study is taking place at Marathon's Area 3 wastewater treatment facility, and aims to: (1) characterize wastewater plume geometry, composition and migration; (2) quantify the impact of shallow injection on the nitrogen and phosphorus content of groundwater in the Halo Zone; and (3) evaluate if findings are generalizable to other sites with different geologies to inform regulatory decision-making. Measurements of nutrients and ion concentrations at different levels were used to describe where the treated wastewater plume from a shallow injection well disperses. Wastewater appears to buoy to the surface within tens of meters of the injection well. A resistivity survey demonstrated that the treated wastewater plumes mostly gather under the surface and above the saline groundwater. Preliminary findings indicate that shallowly injected wastewater is staying on the surface, as evidenced by depressed salinities and elevated nutrients. Hope to show through a future part of this study that blended effluent and seawater can increase residence time in limestone by reducing the density contrast between the plume and saline groundwater, thus allowing for longer denitrification and phosphorus adsorption through biological and abiological processes. Future testing will also include dye injections at the point source to track arrival time in the halo zone.

Questions & Answers/Discussion

- In response to a question, Ms. Ingalls confirmed that mixing saltwater with the effluent is an experiment to increase the density and slow down the time it takes for the plume to reach the surface, thus allowing more time for microbial denitrification and phosphorus adsorption. If successful, this could be a tool reduce surface water impacts.
- Ms. Ingalls also clarified that they have not yet documented whether the treated wastewater is reaching surface waters within the Halo Zone or canals. They have documented that it reaches the shallow subsurface within the Key Largo limestone. The tracer study will help inform a connection to surface waters.
- While this study is entirely based at the area 3 wastewater treatment facility in Marathon, the reactive transport modeling component of the project is intended to inform whether this information can be used elsewhere in the Keys.

VII. Florida Keys and South Florida Ecosystem Connectivity Team Update

Kelly Cox, Audubon Florida, presented an update on the Florida Keys and South Florida Ecosystem Connectivity Team, a joint working group of the WQPP and Sanctuary Advisory Council (SAC) to improve engagement in regional issues of concern to water quality in the Florida Keys. Recognizing that Florida Keys water quality is influenced by external factors, the objectives of this team are to inform and engage community members in south Florida ecosystem restoration, and to ensure sanctuary interests are represented in decision making by facilitating dialogue and collaboration. The team is chaired by Jerry Lorenz, SAC member from Audubon Florida, and co-chaired by Cara Capp with the National Parks Conservation Association (NPCA), and includes a number of other stakeholders from the community, as well as agency advisors. The Connectivity Team first convened in March, and has since recommended two resolutions to the SAC that were subsequently passed. These included: (1) a request to USACE and SFWMD that the Lake Okeechobee System Operating Manual (LOSOM) prioritize flows to the southern

end of the system, and (2) a request to the Miami-Dade County Board of County Commissioners to oppose expansion of the Miami-Dade urban development boundary into an area being considered for an Everglades restoration project that will benefit the southern coastal system. The team meets bi-monthly on the 3rd Tuesday; meetings are open to the public. For more information visit: https://floridakeys.noaa.gov/review/workgroups.html.

Questions & Answers/Discussion
None.

VIII. Florida Keys Coral Reef Status Update

Coral Reef Evaluation and Monitoring Program (CREMP)
Rob Ruzicka, FWC, provided an update on the latest status and trends of Florida's Coral Reef. CREMP recently completed it's 26th field season, and in that time has documented a 50% reduction in coral cover. Stony Coral Tissue Loss Disease (SCTLD) is now entering its 7th year, and officially reached the Dry Tortugas in May 2021. Early assessments indicated an 80-90% reduction in abundance or live coral tissue for several species at long term monitoring sites. Quantifying the impact of SCTLD is difficult. While we traditionally use coral cover as a metric, that does not capture how large corals are or how many there are. FWC recently used the CREMP and a similar data set from the Florida Reef Resilience Disturbance Response Monitoring Program to quantify the number of corals killed by SCTLD. This analysis focused on 7 coral species (MCAV, OFAV, MMEA, DSTO, CNAT, DLAB, PSTR) across 4 subregions (southeast Florida, upper Keys, middle Keys and lower Keys) and their relevant habitat types. Estimates could not yet be calculated for a 5th subregion, the Dry Tortugas, because SCTLD is still in the epidemic phase. By calculating pre and post-SCTLD populations, this study provided the first quantitative assessment of corals lost across the broader reef tract. The results of this analysis show ~10 million colonies of CNAT lost (most conservative estimate = 6 million), and over 29 million colonies of MCAV lost (most conservative estimate = 21 million. While it is difficult to comprehend the scale of the number of corals lost, these projections are still likely an underestimation due to the exclusion of some subregions and habitats (like West Palm or the Marquesas) because of inadequate sampling or mapping. This information is important for setting restoration targets and highlighting the significant investment that is going to be required for developing both ex- and in-situ coral propagation infrastructure. Moving forward, CREMP is looking at intervention assessment at the Dry Tortugas and Acropora outplanting at Looe Key and Sombrero Reef.

Stony Coral Tissue Loss Disease
Maurizio Martinelli, Florida Sea Grant, provided an update on the latest SCTLD progression and response efforts. SCTLD is not just a Florida problem, it has spread throughout the wider Caribbean and is affecting ~20 jurisdictions. There is a large group of response partners. New research shows that both bacteria and viruses may have roles in SCTLD, and co-infections are a problem. Algal symbionts may be key to the infection as some species appear to be more resistant than others. Transmission is likely driven by human activity at a large scale, while currents may be more responsible for the spread from reef-to-reef within a system. Sedimentation is a coral stressor and may be transporting SCTLD pathogens. The response team is also investigating nutrients, land-based sources of pollution and temperature, and environmental drivers may differ in different areas of Florida's Coral Reef. In southeast Florida, for instance, rain events leading to increased runoff and proximity to septic systems may drive an increase in disease incidence. Elevated temperature, on the other hand, has shown to result in a decline in SCTLD, possibly due to its effect on algal symbionts. In addition to research, a large coral rescue effort continues. Groundbreaking work in genetics show a high diversity thus far among rescued corals. Collections now are targeting the endemic zone in southeast Florida. The Restoration Team is working to determine what, where and when to begin restoration. FWC is in the process of conducting a large replicated restoration trial in which 6000 corals were outplanted and are currently being monitored at sites across Florida's

Coral Reef. Colony-scale interventions continue, with a focus on the Dry Tortugas. With NFWF emergency funding, divers worked to treat 6,038 coral colonies during a multi-day intervention cruise.

Questions & Answers/Discussion
None.

IX. Public Comment

Joseph Boyer, Entelekic Environmental
I sent a letter to Karen for your reference in the future. I applaud the Steering Committee for proceeding with outside evaluation. I think it's important for participants in the evaluation and new Steering Committee members to be briefed on the history of the water quality management program as well as significant milestones achieved over the past 25 years. Some of these issues are still noted in the current framework. When I collected samples and wrote the initial report for Fred McManus, we were able to answer some of the main questions about sources of pollution after three years. Most were external, especially in the Marquesas and Dry Tortugas, and the backcountry was affected by internal nutrient loading. This was published in a 2001book by Porter and Porter, which would be a good reference. The data, as you know, informed the Florida Keys Regional Assurance Document and was instrumental in developing the state of Florida numeric nutrient water quality criteria. Originally the water quality criteria proposed essentially the same thing as the rest of the state coastal waters and we made a really good case that south Florida was different. And that's why we have very different criteria. It's good to hear someone mention the Battelle Report, that was a big effort by Fred McManus to shake the tree and bring in some money and do an evaluation of the whole program. They have a full list of recommendations which also are reflective of, I think, of some of your framework things right now. A lot of the evidence concerning the Gulf of Mexico connectivity to South Florida was informed by a symposium organized by Brian Keller et al in 2004. That was published in 2008 as "Connectivity, Science, People, Policy in the Florida Keys." At the end of this he asked a couple questions: Was this colloquium successful in connecting the dots between science and policy in the Florida Keys? Do we understand the complex coral reef ecosystem in the Florida Keys well enough to take additional management actions? If not, have we identified information gaps that need to be filled to help inform sanctuary managers, or will we do little more than carefully document a coral reef ecosystem on the slippery slope to slime? I encourage the Steering committee to provide the evaluation committee with some historical context within which to couch their discussions before making recommendations for any future course corrections.

- See the attached written comments submitted to the Steering Committee: Joseph N. Boyer, Ph.D. re: FKNMS Water Quality Monitoring Program Evaluation

Will Benson, Committee for Safer Cleaner Ships
I'm here today representing the Committee for Safer Cleaner Ships, the Lower Keys Guides Association, and all of the flats guides of the Florida Keys of which I am the member representing them on the Sanctuary Advisory Council. I just want to say thank you to all for taking time out today to come and listen to stuff that's affecting us. Nothing's more important than water quality. It's really hard to hear this stuff. I know because I see it every day. We're out here and I just want to say thank you to all of you guys for serving and for being there listening and for all of the scientists and the staff that put these amazing meetings together. They're really professional and they're really well done and you know they need to be. We have really important stuff going on down here in the Keys and we need to focus our attention and be absolutely great at doing this if we're going to prevent this slippery slope from declining any further. But I'm here today to turn your attention to a public comment that Safer Cleaner Ships, of which I'm a part of, submitted yesterday. And that addresses a water quality violation in Key West Harbor and a continuing water quality violation of existing law, I might add, in Key West Harbor. We noticed when there was an emergency docking of the Royal Caribbean cruise ship that came in recently, massive plumes of silt and subsequent turbidity that was kicked up after that docking event. And we've done some analysis and some investigation and found that there was monitoring issues that are not being upheld and there's a

historical abuse of those turbidity issues within Key West Harbor. I would like to have all of you guys reflect on that public comment that goes into a lot more detail than I'm capable of doing in three minutes here today. I also would like to offer to this group if they would like for our group to come and present, we would be very happy to do so at the next meeting or any subsequent meeting. It's important to remember that the sanctuary, as it goes through with its regulatory review, is really interested in gathering as much public feedback and community feedback to address issues. A lot of this water quality is going to hopefully be a part of that regulatory update. And I think this particular issue of cruise ships and cruise ship generated turbidity in Key West Harbor has received and extraordinary amount of attention in the last two years as we conducted a campaign and later looked at the Monroe County Commission, the City Commission, and indeed the Sanctuary Advisory Council all supporting the will of the voters in Key West as they expressed to limit the size and capacity of cruise ships. So, we would ask for the sanctuary to read over this, have a look at the argument that we provided, and to consider this in their approach on the regulatory update. And that's all that I have, thank you very much for your time and I'll turn it over to the next speaker, thank you.

- See the attached written comments submitted to the Steering Committee: Arlo Haskell re: Cruise Ship Propeller Dredging and Turbidity.

X. Steering Committee Member Updates

Alison Higgins, City of Key West

The City of Key West is undergoing a strategic planning effort, and would like to supplement their environmental protection section with more involvement in water quality. To help inform this, they would like to form a short-term small group to provide guidance on what a local government can and should be doing to make a difference for local water quality. Other local governments are welcome to attend. Anyone from the WQPP who are interested in helping with this effort, please email Alison at: ahiggins@cityofkeywest-fl.gov.

Gil McRae, FWC

Corals are the forefront of FWC's activities. FWC is working to set up coral propagation infrastructure with multiple agencies as part of a larger coral restoration strategy. On the fisheries side, FWC is developing a multi-year monitoring program that will be tied to the seasonal closure area at Western Dry Rocks. Fisheries closures are controversial management actions, but FWC was successful in getting this one passed and believes it will have a significant impact on rebuilding and sustaining important fisheries. FWC also continues to work on sponge restoration in Florida Bay. Sponges are critical components of the ecosystem and help with water quality, and they have made significant progress on both the scientific and operational sides of sponge restoration. Please contact Gil for more information.

Chris Bergh, The Nature Conservancy

The Florida Reef Resilience Program recently released a new document: The Resilience Action Plan for Florida's Coral Reef. This document looks across Florida's Coral Reef instead of singular jurisdictions, and identifies what needs to be done relative to coral reef threats. Recommendations in the document are divided into three sections, based on the audience: What can reef managers do, what can policy makers doe and what can reef stakeholders do? Water quality is woven throughout the document., and the Steering Committee should take some time to review it.

Teri Johnston, City of Key West

The City of Key West would like to request a representative to sit on the WQPP Management Committee.

Motion (passed)

Shelly Krueger (Florida Sea Grant) made a motion to add Alison Higgins to the Management Committee. Commissioner Cates (Monroe County) seconded the motion. Co-Chair Iglehart noted that generally any

Steering Committee member is welcome to have a representative on the Management Committee; this is helpful since the Management Committee serves as the staff to the Steering Committee. Wade Lehman called the question. The motion passed with no objections.

Meeting Wrap-Up and Adjourn
Wade Lehmann thanked everyone for participating in the meeting and reviewed accomplishments and next steps.

Additional Documents for Distribution
The following were referenced and provided for circulation to the Steering Committee before, during, or immediately following the meeting.

1. Briceño H. O., Boyer J. N., Castro J., Harlem P. (2013). Biogeochemical classification of South Florida's estuarine and coastal waters. Marine Pollution Bulletin. 75, 187–204. 10.1016/j.marpolbul.2013.07.034, PMID: - DOI
2. Fla. Admin. Code, 62-302.532, Estuary-Specific Numeric Interpretations of the Narrative Nutrient Criterion.
3. Sealey, K. S., Patus, J., and Thanopoulou, Z. (2021). Florida Keys Residential Canal Water Quality Project: Executive Summary. Department of Biology, University of Miami, Coral Gables, Florida
4. Management Actions to Address Sources of Pollution in the Keys:
    a. Florida DEP (2018). Florida Keys Reasonable Assurance Document. https://floridadep.gov/dear/alternative-restoration-plans/content/florida-keys-reasonable-assurance-plan
    b. Monroe County Sanitary Wastewater Master Plan. https://www.monroecounty-fl.gov/124/Wastewater
    c. Monroe County Stormwater Master Plan. https://www.monroecounty-fl.gov/151/Stormwater-Master-Plan
    d. Monroe County Canal Restoration Program. https://www.monroecounty-fl.gov/598/Canal-Restoration
5. Battelle (2007). Evaluation of the Water Quality Protection Program and Science Program for the Florida Keys National Marine Sanctuary: Final Report. EPA Contract No. 68-C-03-041.
6. Written Public Comments:
    a. Joseph N. Boyer, Ph.D. re: FKNMS Water Quality Monitoring Program Evaluation.
    b. Arlo Haskell re: Cruise Ship Propeller Dredging and Turbidity.