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

July 23, 2021

DRAFT MINUTES

Steering Committee Members Present
Jon Iglehart, Florida Department of Environmental Protection (DEP) (Co-Chair)
Wade Lehmann, US Environmental Protection Agency (EPA), Region 4 (Chair)
Sarah Fangman, Florida Keys National Marine Sanctuary (FKNMS)
Christopher Kavanagh, National Park Service
Greg Boling, Florida Keys National Wildlife Refuges Complex
Justin Stiell, Department of Economic Opportunity
Gil McRae, Florida Fish and Wildlife Conservation Commission
Sue Heim, Key Largo Wastewater Treatment District
Tim Maloney, Key Largo Wastewater Treatment District
Kerry Shelby, Florida Keys Aqueduct Authority
Julie Cheon, Florida Keys Aqueduct Authority
Craig Cates, Monroe County
George Garrett, City of Marathon
Patrick Rice, FKNMS Sanctuary Advisory Council
Chris Bergh, Florida Keys Program, The Nature Conservancy
Sandy Walters, 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): Wade Lehmann made the motion to approve the agenda; Craig Cates seconded. The agenda was approved with no changes.
- Motion 2 (passed): Shelly Krueger made the motion to approve the September 2020 meeting minutes; Craig Cates seconded. The minutes passed with no objections.
- Motion 3 (passed): Chris Bergh made a motion to approve the updated Bylaws, but also direct the Management Committee to examine the sanctuary advisory council's recruitment process and suggest a similar process for the WQPP. Craig Cates seconded the motion. The motion passed with no objections.
- Motion 4 (passed): Sandy Walters made a motion to add Patience Cohn to the WQPP Steering Committee. Sarah Fangman seconded the motion. The motion passed with no objections.
- Motion 5 (passed): Shelly Krueger made a motion for the WQPP Steering Committee to call on the TAC to review the water quality monitoring program and provide recommendations back to the Committee. During discussion, the motion was amended to additionally task the Management Committee with developing a list of questions that would guide how the existing monitoring programs are evaluated by the TAC. The Management Committee was also called upon to provide recommendations for avoiding conflict of interest in such an evaluation by the TAC. Any management questions should be reviewed by the Steering Committee before going to the TAC. Sandy Walters seconded the motion. The motion passed with no objections.

I. Introduction and Opening Remarks

Jon Iglehart, South District Director, DEP, called the meeting to order and welcomed everyone. Wade Lehmann, Ocean and Estuarine Section Chief, EPA Region 4, and Mr. Iglehart are the meeting co-chairs. Mr. Iglehart thanked the members of the WQPP Management Committee for putting together the agenda and members of the public who are in attendance. Public comment will be held in the afternoon.

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. Iglehart gave the opening remarks on behalf of FDEP. FDEP has a new acting secretary, Shawn Hamilton. He previously worked with the Northwest District and also as the state environmental justice liaison to the EPA, so is aware of submerged lands issues and the Florida Keys. This year's budget included money for water quality which is mostly earmarked for specific projects. Expect that funding will be allocated to DEP in the coming weeks, which will determine what might be available for additional water quality projects in the Keys.

Mr. Lehmann gave the opening remarks on behalf of EPA. He and Jeaneanne Gettle, EPA Region 4 Water Division Director, wanted to thank everyone for their involvement in improving Keys' water quality by participating in the committee. EPA recently created a new senior science advisor position within the Water Division, filled by Becky Allenbach. This role will include tracking all water quality issues and programs across south Florida, from Lake Okeechobee to Keys. Mr. Lehmann will continue to serve on the WQPP on behalf of EPA leadership. EPA is also in the final stages of hiring a new South Florida position who will engage in issues locally. This person will replace Cecilia Harper, who was located in Jacksonville and recently retired. EPA's South Florida Request for Applicants will close next week, and we are hoping to get a lot of good projects to choose from. The intent is to make money available by early 2022, which was faster than this past year.

Agenda and Minutes
Mr. Iglehart reviewed the agenda and minutes and requested edits or a vote to approve from the Steering Committee. Mr. Lehman made a motion to approve the agenda; Commissioner Craig Cates seconded the motion. The agenda was approved with no changes. Shelly Krueger made a motion to approve the February 10th Steering Committee meeting minutes; Commissioner Cates seconded the motion. The minutes passed with no objections.

II. WQPP Steering Committee Bylaws

Gus Rios reviewed the proposed changes present in the draft updated Bylaws document and the process for approval. The updated Bylaws and the original 1996 version are both available online, and a redline version was sent via email. Once the Bylaws are approved, they will be circulated to all WQPP Steering Committee members for signatures. The following summarizes the draft updates to the Bylaws:

Background:

- Updated language to be more consistent with Florida Keys National Marine Sanctuary and Protection Act (FKNMSPA; the legislation that created the WQPP).
- References the Technical Advisory Committee (TAC) and Management Committee as the main supporting bodies to the Steering Committee.
- Removed obsolete text.

Membership:

- Updated the membership list to include new agencies and local governments have been added or evolved since 1996.
- Clarified the process for routine changes in representation to the Steering Committee. Existing members can designate a representative to attend a meeting and that does not require a ⅔ affirmative vote (as is needed for new membership).
- Added a provision to reconfirm bylaws and membership every 3 years.

Meetings:

- Specified a minimum 2 meetings and recognized opportunities for remote participation.

Quorum and Voting:

- Minor additions to clarify these sections to be consistent with current practice.

Subcommittees:

- Updated process for selecting Subcommittee members.
- Added information about the TAC and Management Committee, consistent with FKNMSA and current practices.

Comments/Discussion:

During the discussion, the following points were made:

- Public comment was provided on these Bylaws. Those comments are posted online and included suggestions to specify who is eligible to serve as a citizen representative on the Steering Committee, TAC or Management Committee, and allow public requests to be considered by the Co-Chairs in developing agendas. This also raised concern about potentially allowing subcommittee meetings to not seek public input.
- Mr. Iglehart noted that in the past the Chairs have included agenda items suggested by the public on topics that are important to the Keys with no issue; that likely doesn't need to be specified in the Bylaws.
- The Committee agreed that if the amended Bylaws are approved today, they can still be revisited at any time to make additional updates.
- The Bylaws are still unclear about how we would nominate or identify a new citizen member. Chris Bergh, TNC, noted that the Sanctuary Advisory Council (SAC) has a formal process for notifying the public, a formal application, etc. The WQPP could consider following or modifying this approach.

Motion (passed)

Chris Bergh made a motion to approve the updated Bylaws, but also direct the Management Committee to examine the sanctuary advisory council's recruitment process and suggest a similar process for the WQPP. Commissioner Cates seconded the motion. Co-Chair Iglehart called the question. The motion passed with no objections.

III. WQPP Steering Committee Membership

Jon Iglehart recognized Patience Cohn with the Marine Industries Association of South Florida (MIASF) as a candidate for a new non-agency seat on the Steering Committee. Patience Cohn introduced herself as a liaison for the MIASF, which contributes an economic impact of $12.5B and 149,000 jobs in the State. Ms. Chon has worked for the Association for 17 years, and formerly worked as yacht crew and as a marina operations manager. She grew up in Nantucket Island, which as similar issues to those in the Keys, including water quality, tourism, resilience, etc. The MIASF is committed to protecting the environment so people will continue to want to boat in the Keys.

Comments/Discussion

- Mr. Iglehart noted he has worked with MIASF for a long time and is happy to have them participate on the Steering Committee.
- Wade Lehman also noted that the member seat for the Florida Keys Aqueduct Authority (FKAA) recently changed. Kerry Shelby introduced himself as the new Executive Director of FKAA. He has worked for FKAA for many years, including serving as the Deputy Executive Director for 17 years. He was around since the first efforts began to upgrade wastewater in the Keys and has worked with many people on the WQPP over the years. Since this is a change in membership for an existing seat, no Steering Committee vote is required. The membership list will be updated accordingly.
- Adding a seat to the Steering Committee requires a 2/3 vote of approval from the Steering Committee members.

Motion (passed)
Sandy Walters made a motion to add Patience Cohn to the WQPP Steering Committee. Sarah Fangman seconded the motion. Co-Chair Iglehart called the question. The motion passed with no objections.

IV. Identifying Priorities for Endocrine Disrupting Compounds (EDCs) in South Florida's Marine Environment

Bob Glazer, FWC, reviewed the outcomes of an EPA-funded project to identify research priorities to help reduce or mitigate the impacts of EDCs. The overall goal of the project was to identify and prioritize the activities necessary to reduce the impacts of EDCs on organisms, populations, communities, and ecosystems. This was intended to serve policy and management needs, and help identify what can be implemented to reduce EDCs, rather than identifying concentration and distribution of those compounds. The project included a 2-step approach, first to conduct a gap analysis to determine what's been done and what is still missing, and secondly a prioritization exercise to determine the highest priorities. The research priorities were identified based on literature reviews and stakeholder input (i.e., managers/decision makers, field scientists, citizen, etc.) and were subdivided in five different areas of focus: 1) science, 2) monitoring, 3) economics, 4) governance, and 5) communication. This effort went beyond just looking at the science, but also looked at existing legislation to address EDCs, etc.

The project findings included a number of objectives for achieving goals within the 5 themes. These goals and the top priority identified for each included:

- Science: Reduce the impacts of EDCs on organisms and ecological communities in the south Florida marine environment (8 objectives)
    - Top priority: Identify best practices for reducing EDCS entering the marine environment. This was the highest priority in this theme and across all the themes.
- Science: Identify needed scientific information to better understand effects and needed actions related to EDCs in south Florida (9 objectives)
    - Top priority: Identify how EDCs alter marine ecosystem functions
- Monitoring: Ensure sufficient knowledge and capacity to effectively monitor the south Florida marine environment to identify significant changes to the environment, identify when strategies should be implemented (trigger points), or evaluate the effectiveness of management efforts (16 objectives).
    - Top priority: Determine which habitat, species, and ecological communities are most vulnerable to EDC exposure and determine what needs to be monitored to achieve their protection (e.g., water, sediments, tissue, larval development)
- Governance: Create or strengthen policies, and/or legislation that contribute to the reduction of endocrine disrupting chemicals ad their effects (10 objectives).

    - Top priority: Develop methodology to identify candidate products/industries to be regulated.
- Communications: Develop effective communications tools and approaches to communicate information to stakeholder groups related to science and policies in order to provide effective framework for addressing EDCs in south Florida (15 objectives).
    - Top priority: Provide public with examples of how they can reduce EDC sources.
- Economic Impact: Reduce the impact of EDCs on economies and social condition of communities associated with the south Florida marine environment (3 objectives).
    - Top priority: Identify and quantify economic impacts from EDCs to multiple sectors.

Other sections of the final report include information on the current state of knowledge, emerging contaminants, mitigation technologies, policies and regulations currently in place to address EDCs, and EDCs and climate change. Overall, to meet the goal of reducing or mitigating EDC impacts, it is necessary to identify ways to implement these priorities across various sectors.

Questions & Answers

- Sarah Fangman inquired whether the capacity exists to begin to implement some of these recommendations, now that the work has been done to identify and prioritize them.
    - This will take agency-wide action to determine where effort can be shifted to tackle the EDC priorities. High-level leadership is needed to advocate for mediating these threats, which includes effectively communicating this to ensure necessary governance structures are in place. Fishery Management Councils are a good example of the structure necessary to strategically make these types of changes.
- If we have capacity to make progress on some of these recommendations now, even if they are not the top priority, should we begin to chip away at those recognizing that we have work to do to get the structure in place to achieve those top priorities?
    - EPA felt they could more easily address what was identified as the top priority than other objectives identified in the study. Some priorities also only lead to other questions. Some of these are possible to do now, even if they were not rated as the highest priority.
- Chris Bergh acknowledged EPA and the WQPP for prioritizing this work for funding and noted that in wastewater management, there is a growing interest in wastewater reuse. Will wastewater reuse reduce the level of EDCs that get into the environment?
    - This is discussed somewhat in the project report. Tertiary wastewater treatment doesn't remove all EDC, but some other advanced technologies like ozone and carbon do, although they are very expensive. Technology to reduce EDCs exists, but it's a question of how much of an impact they'll make and how much we want to pay as a society to reduce them.
- Henry Briceno noted a recent publication from FIU to understand the occurrence and distribution of emerging pollutants in sensitive ecosystems, including the Keys. Reference: Science of The Total Environment, Understanding the occurrence and distribution of emerging pollutants and endocrine disruptors in sensitive coastal South Florida Ecosystems, Volume 757, 25 February 2021, 143720.
- Wade Lehmann added that the National Academy of Sciences is also reviewing scientific information on ingredients used in sunscreens and their fate and effects in aquatic environments. More information is available on the National Academies website.

V. Water Quality Data Compilation, Analysis and Decision Support

Christopher Kelble, NOAA, provided an overview of the initial outcomes of a DEP-funded project to compile and compare information from water quality monitoring programs across Florida's Coral Reef.

The project goals were to compile water quality data for Florida's reef ecosystem, construct a matrix to compare sampling program parameters and methods, analyze datasets to identify hotspots and patterns of change over time, and incorporate data from remote sensing programs to fill gaps.

Over 80 WQM programs were identified across south Florida, of which 4 met the criteria for inclusion in this initial effort (over 10 years of data, good geographic distribution, and included most of the parameters of interest). The comparison matrix is a good resource on the various monitoring programs and includes points of contact and websites, spatial and temporal coverage, instruments used, analysis methods, etc. Long term data sets were merged to conduct the hot-spot analysis. Trends were analyzed for each parameter in each monitoring program. Seasonality was accounted for to determine the rate of change, and significance of that rate of change over time. A similar analysis was done with remote sensing data. During the next phase of this project, trends will be looked at across monitoring programs.

Results of these analyses depend greatly on the period of record, as conditions when data collection began can affect the rate of change. For example, the Southeast Environmental Research Center (SERC) data starts in 1988, which corresponds with the first big seagrass die off in Florida Bay. Because starting turbidity was high, those data now show a decrease in turbidity between 1988 and 2021 in Florida Bay. The other primary dataset of interest to the Keys is the Walton Smith data, which began in 1998 and is comprised of onshore to offshore water quality transects. All data needs to be further analyzed, but other trends initially identified in these datasets include:

- Total Nitrogen: Decreases along the southwest coast, increases along the coastal Keys and offshore.
- Nitrates and Nitrites: Increases in runoff from the Florida peninsula and the Keys.
- Total Phosphorous: Mostly decreasing trends.
- Chlorophyll a: This can be used as an indicator for eutrophication in oligotrophic (nutrient poor) systems. These values have remained stable in the Keys overall, with some increases in the nearshore areas of the western Florida shelf.

Timeseries from a few stations show that satellite data match well with in-situ data, and thus can be used to fill gaps and provide a more complete picture of water quality in the area (especially at offshore sites and for parameters that satellite picks up well).

Conclusions: The 4 monitoring programs analyzed in this project can all be used to determine long-term trends in key water quality parameters. Trends do not indicate red flags at first glance, but these are preliminary results at regional scale. Different time ranges may cause different results, so additional input would be needed on a standardized time range or issue-specific time ranges to further investigate patterns in water quality. Remote sensing can help to fill data gaps.

Next Steps: Compare between programs to determine where they overlap in space and time. Conduct the hotspot analysis on a consistent time range to answer management questions. Incorporate more monitoring programs into the analysis (DEP/CRCP). Conduct a more detailed gap analysis, which may include spatial gaps in coverage and parameters. Compare water quality and benthic trends, and make recommendations to improve the utility and consistency between monitoring programs.

A series of issues and proposed solutions were identified to improve the utility of water quality monitoring data from different programs. These include: agreeing to common database naming conventions or create a code to automatically rename datasets to a common framework; using unique station names with a reference key and accessible metadata; providing coordinates as the average or define a fixed coordinate for each station; defining time periods for trend analysis based on management questions; and requiring quarterly sampling at a minimum, with more frequent sampling preferred.

Questions & Answers

- Christopher Kavanagh (NPS) inquired about the frequency of the Walton-Smith transects, and specifically those along the coast near the Caloosahatchee outflow. Also, what turbidity trends were observed in Florida Bay? Overall the results looked positive, but after Hurricane Irma (September 2017) there were problems with turbidity in Florida Bay, both coming down form the Gulf of Mexico and some generated in situ.
    - The Walton Smith transects are taken every other month/six times per year. The Caloosahatchee transects are a little offshore and sampling there has been intermittent. Monitoring was consistent from 1998-2007, then budget cuts affect the program until 2018.
    - The decreasing turbidity trends seen in Florida Bay used every data point, not just the start point vs. endpoint. There is a need to take a closer look at these data and specific stations to see what is going on.
    - The National Parks Service has long term monitoring in this region, which is continuous and covers some of the period in question. These data can be incorporated to help fill in the analysis.
- Henry Briceno noted concern with the use of different time frames to conduct these analyses.
    - Agreed. We need to work on having these sampling regimes use more consistent time frames and make the data more consistent for analysis.
- Jim Fourqurean noted that it's not entirely accurate that the first sign of eutrophication is chlorophyll-a. The benthic habitat could completely change before you measure anything in the water column
    - Agreed. A future goal is to merge these data with benthic data to better illuminate the trends.

Break

VI. FKNMS Water Quality Monitoring Program: Current Status and Envisioning Future Opportunities

Dr. Henry Briceño, FIU, presented an update on water quality status and trends in FKNMS, based on the data from the water quality monitoring program that has been in place with the same methods and protocols for 26 years. The objective of this program, when established, was to provide information on status and trends in water quality for decision makers, and to potentially inform remedial actions to improve water quality. Overall, water quality in FKNMS is complex and includes pollutant loading from the Keys, the Florida peninsula, and far away areas such as the Mississippi and Gulf of Mexico. General water circulation changes seasonally in the Keys, and they've been able to classify all waters in south Florida based on biogeochemical differences. Trends observed over the past 26 years include:

- Slight increase (<0.5 degree Celsius) in surface water temperature in the middle Keys, upper Keys and Marquesas, with slightly cooler water in the lower Keys and Florida Bay. Bottom water temperature also increased up to 1°C, which is a threat to coral reefs.
- Small <1 psu increase in salinity on the Bayside of the lower and middle Keys, likely from the influence of Florida Bay on FKNMS waters.
- Increased dissolved oxygen in surface and bottoms waters sanctuary-wide, a good change.
- Decline in water clarity based on the light attenuation coefficient (Kd; higher values = less light in the water column = less water clarity). Most increases are in areas influenced by land-based inputs from the Keys. This is a worrisome trend.
- Increases in Total Phosphorous (TP) associated with the shoreline/land. This is the primary pollutant responsible for many algal blooms in the water column and the benthos. The Florida Bay contribution to TP is important and increasing over time. This links to increases in surface

chlorophyll-a (CHLA) across the Keys from Key West to Biscayne Bay (although declines were observed in the Marquesas).
- An odd trend is that there has been a continuous sanctuary-wide decrease in Total Organic Carbon (TOC) since the early 1990s. This could be an indication of lower productivity.
- Total Nitrogen (TN) is also declining.

Additional monitoring stations to assess water quality within 500m of shore (the "halo" zone), were added in 2011. These include one bayside and one oceanside station in each of the following locations: Key Largo, Islamorada, Marathon, Big Pine Key, and Key West, and are intended to provide more information about pollution contributions from the Keys vs. regional trends as the program was originally designed. Generally, we need more than 10 years of data to assess trends. Significant increases were seen at all the halo stations, in some cases across all parameters: CHLA, TN, TON, TP, and turbidity.

At reef stations, EPA developed water quality targets based on a 10-year baseline (1995-2005). The number of stations in compliance with these targets has fluctuated through time across a number of parameters (CHLA, Kd, DIN, TP).

Dr. Briceño introduced 3 critical questions for the monitoring program, and provided some initial insight on those:

1. Are we measuring/sampling where we should be?
    - Yes, but based on the initial goals of the project. New questions linked to the sources of pollutants would require a reassessment and inclusion of more stations, especially within the "halo" zone, or around critical areas like the Port of Key West.
    - New technology, such as remote sensing data, can be used to increase sampling stations. For example, the Data Flow system can be used to gather surface water data from a vessel moving up to 35 kts. This may be a good tool in shallow nearshore waters where remote sensing doesn't work. The University of South Florida also uses virtual buoys to obtain time series for different parameters at specific stations.
2. Are we measuring/analyzing what we should be?
    - All traditional monitoring "species," which are the basis for decision-making, are covered. We should also investigate new compounds such as emergent pollutants that may affect the ecosystem, sucralose and microbial communities. Sucralose can be used as an indicator of human impacts to identify pollution hotspots. Higher sucralose was measured by the Walton Smith after Hurricane Irma compared to background levels.
3. Are we measuring as frequently as we should be?
    - No. Quarterly sampling cannot go beyond seasonally-driven variability. Many processes occur at shorter frequency. Instrument buoys that can collect and transmit data in near real-time should be incorporated into monitoring programs.

Questions & Answers
No time for questions and answers.

VII. FKNMS Seagrass Monitoring Program: Indications of Water Quality Trends

Dr. Jim Fourqurean, FIU, presented an update on long term seagrass monitoring data in FKNMS and the relationship between those trends and water quality.

The FKNMS seagrass monitoring program has been ongoing since 1995, and includes monitoring the benthos at 40 of the water quality monitoring stations (including 30 stations since 1995, plus the 10 halo sites). The goals of this program are to look at water quality patterns on a regional scale based on distribution and status of benthic communities within FKNMS. In addition to in-water rapid assessments

of species composition and abundance they also collect water quality data and seagrass tissue samples to investigate elemental and stable isotope composition.

The species composition and aerial extent of seagrasses can be used as an indicator of FKNMS health. Eutrophication (excess nutrients) results in a change of seagrass community composition from seagrasses to macroalgae and finally microalgae. Seagrass chemistry seems to mirror the water clarity observations (from earlier presentation). Seagrasses integrate water quality constantly so are a good measure of it. $\delta^{13}C$ (an indicator of light availability) is a leading indicator that points towards future events, as opposed to seagrass area, which is a lagging indicator which confirms the pattern in progress. Data show that N:P ratios were initially below 30:1 (indicating nitrogen-limited conditions), but have been increasing over time, indicating that these areas are becoming more light-limited and less nitrogen limited. This is reflected in losses of the slower growing *Thalassia testudinum* (turtle grass) throughout FKNMS.

The seagrass monitoring component of the WQPP is measuring proven leading indicators of the impact of water quality on seagrass status. Most sites show long term changes in at least one leading indicator that are consistent with declining water quality. These changes are occurring in the absence of any violations of FDEP water-body specific numeric nutrient criteria. The waters of the sanctuary are warming 5-7 times faster than the global ocean over the last 20 years. Sea surface temperature is a leading indicator of *Thalassia* density and high temperatures are linked to seagrass loss.

Looking forward, it is important to maintain permanent site monitoring as the value of time series data increases with the length of that time series. An effort should also be made to resample the synoptic mapping of seagrass distributions done in the early days of the seagrass monitoring program. Data from the seagrass monitoring program can be found at https://seagrass.fiu.edu/data.htm

Questions & Answers

- Commissioner Cates expressed an interest in identifying why sea temperatures in the Keys are increasing more than the global average.
- Chris Kelble asked about the cause of the disparity between this temperature data and the data from the water quality monitoring program?
    - The cause of this is uncertain and would require a deeper examination of the other datasets. It may have to do with the frequency at which these data are collected (hourly since around the year 2000, versus quarterly. With more data collection, the water quality monitoring program data may reach the same conclusion.

VIII. Steering Committee Discussion: Next Steps for Reinventing the FKNMS Water Quality Monitoring Program

Jon Iglehart initiated a discussion with the Steering Committee on if and how FKNMS water quality monitoring efforts may be reevaluated and possibly redesigned.

Comments/Discussion

In the discussion, members of the steering committee made the following points about opportunities to improve upon water quality monitoring programs in the sanctuary:

- Gil McRae (FWC): These long-term spatial datasets are truly valuable. From a larger perspective, we need to shore up the connection to management in terms of the entire landscape of water quality stressors that impact the keys. We need to prioritize the stressors that are most critical to address, recognizing that we do not have the resources to address these all at once. Last year a subteam of the WQPP created a strawman document that lays out the landscape of water quality concerns; the Steering Committee now needs to square that document with the water quality monitoring program. The monitoring programs need to be set up to answer key questions and

address key uncertainties we still have about water quality stressors in the Keys. This also needs to be communicated in a way that the community can understand.

- Chris Bergh (TNC): Agreed that the longevity of these programs leads to their power. However, they were designed with a specific purpose, largely to keep tabs on regional scale changes versus identifying the reason those changes are occurring. We need to identify what actionable changes FKNMS or the other regulatory agencies can make based on the data we have. If this isn't enough to provide that information, we then need to identify what additional data would get us there and what resources are needed to collect that data. New technologies such as the Data Flow tool will be important to fill gaps, especially for questions around specific places such as Key West harbor and other trouble spots.
- Sandy Walters (SWC, Inc.): Agrees with the idea of prioritizing primary stressors. There has been a focus on addressing nutrients, with an emphasis on wastewater. However, how long will it take to flush legacy nutrients out of the geology/groundwater? Stormwater also contributes a lot of nutrients, however there is a disincentive for implementing stormwater improvements along roadways. Since changing the footprint of the road require new stormwater treatment, most projects seek to avoid that by only milling and resurfacing the existing roads. This is happening on Card Sound right now, and no stormwater treatment is being incorporated. Stormwater is a funding topic, but no one has submitted projects.
    - On the question of how long it will take to wash out historic loading from the system, Jim Fourqurean explained that phosphorous pollution is permanent and cumulative, unlike other nutrients that can be "washed out" of the system. This is one reason why existing water quality rules are ineffective.
- Jim Fourqurean (FIU): Water quality regulations in Florida, specifically estuarine numeric nutrient criteria, are not protective of the resources. The rules are written in such a way that it is almost impossible to have a water quality violation, yet the balance of flora and fauna is changing. For a waterbody to have a violation, the entire water body must exceed the 3-year geometric mean, however those zones are so large you can effectively pollute without causing a water quality violation in that zone.
    - Jon Iglehart (DEP) inquired if the data we have now is enough to justify a change in the regulations, or if we'd need to refocus monitoring efforts to further support this point.
    - We can probably do both. Setting protective values is going to take a lot of work, but it's possible to prove the current protections are not working with data we have today. The benthic system will change before chlorophyll-a shows up in the water column, but the chlorophyll-a is a water quality criterion.
- Jon Iglehart noted that there is increased funding available for resiliency and inquired if this could be tied to seagrass?
    - Yes, we can tie these together theoretically, but it's harder to do experimentally.
    - Chris Bergh added that with to mangroves and coral reefs, communities that are healthier and have more 3D complexity are better at wave attenuation. This is true of seagrasses too, although they need to be at a certain depth to affect wave size. The question is how much, where, and to what extent this is occurring
    - Sandy Walters: Seagrasses are dying all over Florida, which is a concern for manatees starving to death. We have more data than anyone. What we're doing here can be extrapolated to elsewhere in Florida. Seagrasses are also beneficial for carbon sequestration.
- Wade Lehmann (EPA) added that DEP and EPA have been looking at the literature to identify if there are additional water quality criteria that could be set to be more protective of corals.
- Henry Briceño (FIU) suggested that the TAC could perhaps discuss these issues and generate conclusions to deliver to decision-makers (e.g., use water quality monitoring data to set nutrient concentrations/recommend changes to criteria for water quality violations).

- Chris Bergh recommended that a structured decision-making process would be beneficial to lead us to these target outcomes. Otherwise the WQPP ends up with so much technical information and potential paths forward that we don't make progress or end up focusing on the wrong issues.
    - Sandy Walters agreed we need to focus on specific recommendations, and reiterated that we have nonpoint sources of pollution such as stormwater where funding mechanisms do not encourage water quality improvements. The state implements standards given by EPA; with the different levels of entities involved, the WQPP is beneficial as it allows collaboration on these types of issues. She supports a conference geared toward looking at the data and then developing specific recommendations. We have a lot of data, but the challenge is how we integrate that into management changes and policy decisions.
- Shelly Krueger (FL Sea Grant) noted the variety of different water quality questions (freshwater releases from the Caloosahatchee, regional connectivity, regulatory questions about the Florida Keys reasonable assurance document, injection wells, canals, cruise ships, etc.). Each deserves a different sampling regime. The TAC could be asked to think about these issues individually, as well as holistically.
- Andy Bruckner (FKNMS) inquired whether this extensive water quality data can help us understand how likely a site is to recover (e.g., from a boat grounding injury). FKNMS has a lot of managed areas, and we're in the process of proposing modifications to those. We are also investing in restoration through Mission: Iconic Reefs and other projects, and some have questioned the point of doing this without addressing the underlying water quality issues. It would be beneficial to look at data specific to these areas and identify sites with higher resilience that are more likely to recover.
- Jon Iglehart recognized the importance of having longer, face-to-face discussion on these issues, and indicated his support for a longer, more robust meeting at the next opportunity to look into potential recommendations.

Motion (passed)
Shelly Krueger made a motion for the WQPP Steering Committee to call on the TAC to review the water quality monitoring program and provide recommendations back to the Committee. During the discussion, the following points were made:

- Gil McRae: Supports the TAC looking at the existing monitoring programs and providing feedback, but suggested a modification that this should go to the Management Committee as an additional step. The TAC should provide feedback on technical merit and their ability to address questions on water quality stressors identified by the Management Committee.
- Jim Fourqurean highlighted that conflict of interest should be considered, as some of the TAC members are also the PIs on these water quality monitoring projects.
- Henry Briceño agreed; an external entity should evaluate these programs, not ourselves.
- Chris Bergh: We need to be more explicit in what the task is. The first task should be getting feedback from managers and the public about what we are rethinking in terms of the water quality monitoring programs. Chris Kelble's recommendations may be a good starting point.
- Gil McRae suggested tasking the Management Committee with developing a list of questions that related back to the water quality priorities already identified last year. Those questions should then guide how the existing monitoring programs are evaluated. The Management Committee may also be able to provide guidance on a process to avoid any conflict of interest.
- Jon Iglehart noted that each Steering Committee member can have a participant on the Management Committee. The Management Committee should come up with questions over the next few months, and the Steering Committee should be able to weigh in before these questions go back to the TAC.

Sandy Walters seconded the motion. Co-Chair Iglehart called the question. The motion passed with no objections.

IX. Public Comment

Edward Russo, President Reef Florida Keys Environmental Coalition/Reef Relief Board Member
Our members and followers are far in excess of over ten-thousand people, and I cannot overstate how important your work is. It is very essential to the living conditions and quality of life for the people and our environment in the Florida Keys. And I can personally tell you how impressed I am with the quality of everyone's work. However, the issue I'm bringing up has been brought up many times in terms of other members talking about how we can participate in a more site-specific approach to address point and nonpoint source pollution throughout the Keys. The negative impacts of these pollutant sources, be they from cruise ships, chemical discharges from boat yards, landfills, illegal discharges from liveaboards, and surface water runoff is very important. It doesn't seem to be addressed yet but it seems that's the direction you're going. I wanted to encourage everybody to continue the work, and if you need strong public support, it's there. So please continue the good work and the more we can get site specific locations we can establish accountability and when you have accountability you can have enforcement. Thank you everybody, good work.

Mimi Stafford, Sanctuary Advisory Council/Reef Relief Board Member
I was very impressed and quite amazed with all the presentations. It was wonderful to see the advancement in understanding of all the different elements that are going into decline of the environment. I would encourage you to consider having a longer and in person meeting whenever you are able to do it. It would be a really good move to help the general public understand what goes on behind the scenes because at so many meetings the discussion behind water quality is so open ended and people really need to understand what is happening, what are the studies that are going on, and what they can contribute in their daily lives because that's the only way we're really going to make a difference is to get the general public involved. A meeting where the general public can attend and it is advertised so that people really know about it, kind of make it a big splash, would be really helpful in distributing this information to the broader group.

X. Steering Committee Member Updates

Chris Bergh, The Nature Conservancy (and Sanctuary Advisory Council Member)
About six months ago the SAC and WQPP-Steering Committee called for a working group to be set up under the auspices of the SAC to focus on sources of pollution originating from outside FKNMS. This has been set up as the Florida Keys and South Florida Ecosystem Connectivity Team, with Jerry Lorenz (Audubon of Florida) and Cara Capp (NPCA) as the chair and vice chair, respectively. We also have members from the SAC and WQPP, and public, as well as agency advisors. The group's first meeting in March was mainly organizational to figure out what topics to focus on. In May the group had an Everglades Restoration 101 and more recently got an update on the Lake Okeechobee System Operating Manual (LOSOM) from Audubon of Florida and the Army Corps. The Corps recently announced the selection of Alternative CC, which will attempt to send more freshwater south and is generally supported by the working group.

Commissioner Craig Cates, Monroe County Commission
Commissioner Cates invited Michael Roberts to update the committee on a new program called MPOOP to assist marinas is establishing pump out services. The goal is to assist the many marine facilities in the Keys with upgrading pump out facilities and reduce vessel wastewater discharges. Currently, only about 30% of the 200+ marinas in the Keys have on site pumpout facilities. The Clean Vessel Act program operated by DEP helps provide funding, and MPOOP will help marina owners navigate that process. For more information about the program, visit: https://www.monroecounty-fl.gov/1250/Marina-Pump-Out-Program-MPOOP. Additionally, Monroe County is working on amending the Land Development Code. Proposed revisions include changes to stormwater management to strengthen water quality and quantity

discharge criteria. These are intended to reflect statewide initiatives to reduce TP and TN by up to 95% compared to pretreatment standards.

Patrick Rice, College of the Florida Keys (Sanctuary Advisory Council Liaison to WQPP Steering Committee)
There has been a lot of discussion about the impact cruise ships have on water quality in Key West, considering the potential for their return to Key West in the near future. His group initiated basic water quality monitoring efforts in this vicinity in fall 2020 which has continued into the spring and now summer of 2021. Recently, with help from NPS and FKNMS, they've been able to acquire some data sondes to help increase monitoring capabilities with in-situ data collection of conductivity, temperature, depth and turbidity. Sondes will be deployed at the mouth of the Key West shipping channel, one in Key West Harbor, one at Eastern Dry Rocks, and one at Western Dry Rocks. They have also taken field samples of turbidity, dissolved oxygen, pH, ammonia, salinity, etc. The water currently seems to be characterized as "good" with high dissolved oxygen, low turbidity, and zero hydrogen sulfide. FIU is helping with lab analyses for total nitrogen, total phosphorous, etc. They were also able to procure funding to add dissolved oxygen sensors to the data sondes.

Gil McRae, FWC
Still have an army of organizations responding to Stony Coral Tissue Loss Disease (SCTLD) on the reef, and now there is a need to pivot to one of the largest restoration efforts ever undertaken. Efforts to intervene and treat the disease continue, with a focus now on Dry Tortugas National Park, where SCTLD has now been detected. The focus of those efforts has been to treat the large framework building corals. Thousands of corals have also been rescued from the reef, which will become the source of propagates for restoration. Pilot restoration studies with SCTLD-susceptible species is currently underway and will inform how we proceed with restoration in the future. This represents a paradigm shift for coral reefs and is likely to be a focal area for decades to come. Another important update to mention is that Western Dry Rocks (a hardbottom area off Key West) is now the location of a seasonal fishing closure by Florida Fish and Wildlife Conservation Commission. This was also proposed as a priority area for protection by FKNMS in the Restoration Blueprint, and is a good example of agency coordination to get protection in place.

Shelly Kruger, Florida Sea Grant (and Sanctuary Advisory Council Member)
In June, the SAC unanimously approved a "Resolution of the Florida Keys National Marine Sanctuary Advisory Council Urging the U.S. Army Corps of Engineers and South Florida Water Management District to Prioritize in Their Updates to the Lake Okeechobee Systems Operating Manual (LOSOM) the Freshwater Flows to the Southern End of the Everglades System Critical for Maintaining the Health of Everglades National Park, Florida Bay, and the Florida Keys National Marine Sanctuary."

Sarah Fangman, FKNMS
FKNMS was selected to host a paid internship through the Hispanic Association of College and Universities. This internship will be for 20 hours per week to support the WQPP by specifically working on the draft update to the WQPP Report to Congress, in coordination with staff and other WQPP members as needed. With time and interest, will also be engaged in other projects and tools that help raise public awareness about the WQPP.

Meeting Wrap-Up and Adjourn
Jon Iglehart thanked everyone for participating in the meeting and reviewed accomplishments and next steps. There is hope for an in-person meeting next time, but this will depend on evolving pandemic-related travel restrictions.