

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

March 4, 2026

DRAFT NOTES

Steering Committee Members Present

Kevin McOmber/Jeananne Gettle/Wade Lehmann/Joel Hansel, US Environmental Protection Agency (EPA), Region 4 (Co-Chair)
Lawrence Glenn, Florida Department of Environmental Protection (DEP) (Co-Chair)
David Burke, Florida Keys National Marine Sanctuary (FKNMS)
Mark Shafer, U.S. Army Corps of Engineers (USACE) - *Online*
Heather Stewart, Florida Keys National Wildlife Refuges Complex (FKNWR)
Yazmin Valdez, Florida Commerce
Austin Sparber, South Florida Water Management District (SFWMD)
Mark Roby, Florida Department of Health in Monroe County (DOH)
Gil McRae, Florida Fish and Wildlife Conservation Commission (FWC)
Philip Schwartz (Designee), Key Largo Wastewater Treatment District (KLWTD)
Emmy Koenig McDowell, Florida Keys Aqueduct Authority (FKAA) - *Online*
Andrea Leal, Florida Keys Mosquito Control District (FKMCD)
Craig Cates, Monroe County Board of County Commissioners
Alison Higgins, City of Key West
George Garrett, City of Marathon
Marisa Carrozzo, FKNMS Sanctuary Advisory Council (SAC) - *Online*
Sandy Walters, Eco Legacy Solutions, LLC
Chris Bergh, Florida Keys Program, The Nature Conservancy (TNC)
Shelly Krueger, Florida Sea Grant/IFAS Extension Monroe County
Patience Cohn, Marine Industries Association of South Florida (MIASF)

Summary of Resolutions

- N/A
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I. Welcome and Opening Remarks

Lawrence Glenn, Division of Ecosystem Assessment and Restoration (DEAR) Director, DEP, called the meeting to order at 9:03 and welcomed everyone. Wade Lehmann, Ocean and Estuarine Section Chief, EPA Region 4, and Mr. Glenn are the meeting co-chairs.

Dr. Lehmann introduced Mr. Kevin McOmber, Regional Administrator for EPA Southeast Region (Region 4), and Ms. Jeananne Gettle, Deputy Regional Administrator. EPA has several partner meetings set up and Mr. Joel Hansel, Advisor to the Water Division Director will co-chair the meeting today. Mr. McOmber recognized the impressive work being done in the Keys; this is his first trip down here, but he has visited elsewhere in south Florida and the Everglades. All of this flows in the direction of the Keys, and it's nice to see the pieces come together.

Mr. Glenn gave the opening remarks on behalf of FDEP, noting that as a community surrounded by water, water quality is important. Today we will discuss the issues and solutions for water quality in FKNMS.

Steering Committee members introduced themselves. Attendees were provided instructions for participating in the meeting and for signing up for public comment. The presentations and materials associated with the meeting will be available at the steering committee page on the Water Quality Protection Program website https://gis.myfwc.com/FKNMS_WQPP/steering.htm.

Agenda and Minutes

Mr. Glenn reviewed the agenda and minutes and requested edits or a vote to approve from the Steering Committee. Sandy Walters made the motion to approve the agenda; Chris Bergh seconded. The agenda was approved with no changes. Dave Burke made the motion to approve the minutes; Chris Bergh seconded. The minutes passed with no objections.

II. Canal Restoration Progress & Local Government Efforts

Rhonda Haag, Chief Resilience Officer, Monroe County and Peter Frezza, Environmental Resources Manager, Village of Islamorada provided updates on canal restoration progress and other local government priorities

Monroe County

Rhonda Haag provided an update on progress and priorities, focusing on resilience and water quality projects.

The following resilience efforts was summarized:

- Natural Resources Adaptation Plan: Completed with a DEP grant; identifies natural resource vulnerabilities and a project list for future grants.
- Harry Harris Resilient Redesign: Will incorporate a resilient shoreline and other features.
- Vulnerability Assessment: Updating the County's assessment to meet the new Resilient Florida program requirements.
- Watershed Management Plan: Updating the plan to maintain the County's Community Rating Score of 3, which provides reduced flood insurance premiums.

The county also has a \$2.5B program underway with the Department of Transportation (DOT) and USACE for U.S. 1 shoreline stabilization and other nonstructural measures (e.g., elevation of up to 4,698 homes and floodproofing of over 1,000 government and commercial facilities). Home elevation is currently on hold pending a federal Cost-Benefit Analysis. This plan has been approved by Congress, but appropriations only cover the design portion of U.S.1 stabilization.

Images from Big Pine Key and Stillwright Point were shown to demonstrate the common road flooding in the Keys. Road resilience is another \$2B plan with 97 different project areas. Twin Lakes is the first project currently under construction, and a number of other roadway projects are currently in design, including Winston Waterways, Big Coppitt, Conch Key, and Flagler Avenue in Key West. These efforts are funded by state and federal grant funding.

- Twin Lakes Road Adaptation (Key Largo): Includes road elevation, a retaining wall, and the installation of a large pump station.
- Big Coppitt Road Elevation: Under design with total potential grant funding of approximately \$84.5 million. The project involves elevating roadways and installing a modern engineered

drainage system (to replace gravity infiltration which does not function with high groundwater). Unknown if funding will be enough to cover construction costs (estimated at \$85 million); residents will vote on paying to fund any shortfall.

- Winston Waterways Road Elevation (Key Largo): Under design with potential grant funding of approximately \$51.5 million. It uses the same road elevation and modern drainage approach as Big Coppitt. Construction costs are pending bids. Road elevation should keep roads from flooding for the next 20-30 years.
- Flagler Avenue Road Adaptation (Key West): A partnership with the City of Key West involving full roadway reconstruction (not elevation) and complete removal/replacement of the outdated, gravity-based stormwater system. Total potential federal and state grant funding is approximately \$76.4 million.

The benefits of these projects include reducing/eliminating standing water on roads, improving long term access to homes, increased value of homes; and improved resilience to future flooding and climate conditions. These are expensive projects with significant grant funding, which may not be available in the future.

Breakwater repairs and living shorelines are also being constructed, including in Rock Harbor and Tavernier to repair damage from Hurricane Irma. Both will include an air curtain to reduce sargassum loading into canals and provide water quality benefits. Living shorelines will be constructed at Long Key Transfer Station and Duck Key. The transfer station is the first living shoreline (1,282 feet) and will include wave attenuation devices and mangrove and seagrass plantings.

Rhonda also summarized the status of the Canal Restoration Program. Benefits of this effort include water quality improvement, reduced seaweed accumulation, improved benthic resources and marine life and reduced dead zones. Many canal homeowners pay for an assessment to keep up with air curtains and other operating costs. In total, there are 96 canals on the restoration list with an estimated cost of \$500M in projects; with current funding at \$5M/year, it would take 100 years to complete restoration.

A number of recently completed and newly awarded projects were summarized. Canal 278 was the first pilot injection well project installed in Big Pine Key. One challenge with injection wells is finding vendors to do the work. New stewardship canal grants will address Canal 82 in Key Largo (organic removal/backfill), Canal 266 Part 2 in BPK (backfill and larger capacity air curtain - needed because a demo project with initial muck removal without backfill did not work), and Canal 255 in BPK (muck removal, backfill, air curtain, and injection well). A recently signed \$12.4 million grant with RESTORE funds will complete 6 canals on Big Pine Key to create a bigger, more cost-effective impact. This is an experiment to restore several canals in one place and determine if additional water quality improvements can be achieved. This effort will start early next year; design is currently underway. Projects include outreach to homeowners to inform communities and receive feedback. In some cases this includes taking votes on assessment payments (\$100/month on average to fund O&M of air curtains).

The County works closely with the cities to support Keys-wide resilience efforts. This includes supporting street elevation planning, vulnerability assessments, watershed management plans.

Residential Neighborhood Improvements Program: This program allows neighborhoods to request improvements (canal restoration, road elevation) by voting to assess themselves to fund the costs (including permitting, design, and any construction differential). For example, if more funding is needed to complete construction in Big Coppitt, the community will be asked to vote on funding the differential. Projects can be expensive and only benefit a certain neighborhood; this is a change in how we do business where beneficiaries pay for the differential versus using taxpayer money.

The county has 14-15 plugged canals, and there has always been an interest among those neighborhoods in unplugging them. This new program is being considered by residents as a possible mechanism to unplug canals (whereby they pay and the county does the work). This is currently not allowable by county code and other regulations, but at least four neighborhoods have reached out so far. This will require further conversation by regulatory agencies. Most water quality in plugged canals is poor, so efforts to restore these canals may have larger potential benefits.

Finally, Rhonda flagged that at a recent KLWTD meeting there was discussion about how the stewardship funds should not be prioritized for canal restoration as a priority. This is still a priority with county, municipalities, and sanctuary. There is some friction among the utilities and water quality activities.

Questions & Answers/Comments/Discussion:

- Chris Bergh: It's nice to see the outcome of many efforts now hitting their stride. All of this requires big money and the effort is the result of sea level rise (SLR) and storms that have occurred in the last century, while preparing for more rapid SLR (another foot estimated by 2050). Is the county thinking about when the Cost Benefit Analysis (CBA) doesn't make sense anymore (e.g., some roads shouldn't be elevated b/c they don't serve many residents)?
 - This is already happening. Without enough funds to cover all road elevations, residents will have to decide whether to cover it or not. If not, grant money will have to be returned. With decreased property taxes and federal funds, we are unlikely to see this level of grant funding in the future. The county and residents will have to work together, decide if we want to pay differential and monthly assessments.
 - FEMA funds are on reserve for the construction portion; they will also do a CBA once the county completes design and permitting. We are anxious to see how this comes out. If their results are negative or the effort doesn't pass their CBA, we don't get funds. This will be a big test.
 - How the big projects turn out (Big Coppitt, Winston Waterways, etc.), will dictate the future of the Keys (e.g., may have part time neighborhoods since they are flooded). Stillwright voted no for funding b/c they didn't want to give up easements (needed 100% participation, so they returned \$41M in grant funding). It's not just about money, it's about the community and how people want to live.
- Andrea Leal: How do you get the community to vote? Does this require a majority or 100%?
 - A vote of 50% + 1 (51%) is needed to move forward. If that doesn't pass, they will try another vote.
- Heather Stewart: Where does muck removed from canals go?
 - It is dewatered and then taken to a dump in Miami Dade. If there is arsenic in the muck it has to go to a Class 1 dump, which is a more expensive disposal.
- Brian Walker: For canal restoration, are the inputs that cause a canal to have poor water quality addressed before flow is restored? Concern that whatever runs into the canal that causes issues will then be released further afield (so the restoration may improve water in the canal but exacerbate issues downstream).
 - This will be addressed in the next presentation.

Village of Islamorada

Peter Frezza provided an update on the Village of Islamorada's Canal Restoration Program. Islamorada has completed 4 of the top 10 ranked canals needing restoration in the last 3-4 years (2 organic removal/backfilling, 2 Shallow Injection Well (SIW) projects). Currently two projects to install culverts under roads in Lower Matecumbe are under construction, and a couple others are in design. Total costs so far are \$4.4 million, with \$9 million planned for additional ongoing projects, primarily funded by the DEP Stewardship Act.

Canal 114, Plantation Key, had two SIW/infiltration wells installed as a relatively low-impact and low-cost technology. This is still relatively new, but some early data is available. Monitoring shows a well flow of 4,000 gpm (compared to nearly zero flow before), turning the water over in the canal every 5 days and resulting in a 25% increase in dissolved oxygen (DO) compared to test sites. The wells are effective for water quality (WQ) improvement and function as vertical culvert pipes. Monitoring for DO is done bimonthly in 63 canals and nutrient monitoring and benthic monitoring is conducted semi-annually in 5 canals (those with active restoration projects)

Canal 116, North Plantation Key, was successfully backfilled. The project, completed from October 2023 to January 2024, reduced the canal depth from 12 feet to 6–7 feet. This canal had been monitored by FIU since 2015 and had good baseline data. Pre-construction (Sept 2023), benthic surveys showed <5% cover of submerged aquatic vegetation (SAV). Eight months post-construction (Sept 2024), SAV cover increased to 25-50% (Average BB Score 3), with initial recruitment of shoal grass. By Sept 2025 (1 year and 9 months post-construction), SAV cover was sustained at ~50% (Average BB Score 3.4) and notably survived a heavy sargassum load from the previous summer. The data supports the success of backfilling by addressing the critical issue of canal depth. This success means less poor WQ is discharging into the nearshore halo zone.

Culvert Project (Lower Matecumbe): This project is installing 5 sets of pipes to connect 6 dead-end canals and introduce tidal exchange. One pipe is being installed using directional horizontal drilling (micro tunneling) under US 1—the first use of this technique in the Keys for a WQ reason. Other culverts are trenched through the road and configured as dual side-by-side box culverts. These are large pipes that allow good flow and are accessible by a manhole for maintenance. Overall these are low-impact to canals with 2 headwalls on each side. Data is being collected and anecdotal evidence shows instant results in improved flow, WQ, and marine life.

Questions & Answers/Comments/Discussion:

- Chris Bergh: Great progress. I've tracked canal SIW injection progress and it's good to see this progress. When this water is put down into the groundwater, it is displacing anything we don't want. If the water is coming up, are we monitoring for this?
 - We are not monitoring for this, but it is a good question. This is ocean water moving into ocean water, and the groundwater there is also ocean water. While the water will displace saltwater below 60 feet, it will displace it with saltwater. We feel that won't result in negative impacts.
 - Chris flagged that this may be true unless the groundwater is dirt; this would be good to verify.
- Heather Stewart: Is anyone monitoring the amount of runoff into canals from residential properties? Also, is there any monitoring of the water quality impact before and after mangrove trimming, specifically since filtering organisms like sponges and oysters on the roots are removed when roots are cut to address clogged canals?
 - There is runoff from residential homes, but it's better now. Both N and P are monitored, and they rarely see elevated levels in these canals anymore, including high chlorophyll-a (chl-a) levels or phytoplankton blooms. Historic wastewater effects from decades of septic tanks have been minimized over the years. The Village has an ordinance to control fertilizers, and we don't think runoff contributes to poor WQ; the sargassum outweighs other nutrient inputs.
 - Regarding mangrove trimming: They do benthic monitoring in the canals, but have not seen mortality to mangrove roots from this effort (beyond possible construction impacts, not day-to-day). They don't do much mangrove trimming with these projects, only some with culvert work, which involves a minimal footprint at the mouth of the culverts

- Chris Bergh: Regarding the original causes for poor WQ - all of these canals are now in AWT/sewer. There is legacy septic pollution in groundwater but nearly 100% compliance on AWT.
 - Yes.

City of Marathon

Update deferred to the afternoon, Agenda Item XII. Steering Committee Member Updates.

III. Project Report: Canal Restoration

Greg Corning, Assistant Vice President, WSP provided an overview of the outcomes of EPA-funded projects to update water quality summaries, evaluate the effectiveness of gravity injection well technology for canal restoration, and potential reclassification and reranking of impaired canals to include the use of new, stand-alone, combination of or partial restoration technology implementation. The EPA grant received in 2024 outlined six specific tasks:

Task 1: Canal Water Quality Monitoring

Two semi-annual WQ monitoring events were completed in March 2025 and November 2025 for residential canals. DEP dictates sampling locations at the center of the canal, including 1 foot from the top and bottom with the average used for DO concentration. There are some challenges with this as it drives some inconsistencies; there's also a desire to incorporate benthic information to better understand what technology to implement and where.

Results:

- March 2025: Mean Dissolved Oxygen was 67.5% (target is 42% per DEP criteria).
- November 2025: Mean DO was 49% across the 270 canals monitored.

Evaluation: FDEP 62-303 requires a minimum number of samples to characterize if DO meets criteria. With 10 samples, if 3 do not meet the 42% target, the canal is not meeting the DO criteria. A z-score analysis was used to compare canals with over three samples to the FDEP 62-303 criteria, as most canals lack the required 10 samples. As a result of more data, the number of canals meeting the "poor" category increased from 14 (in 2017) to 55 (now). With more data, canals will be ranked as poor or good (thus indicating yes or no for restoration).

Task 2: Canal Technology Cost Reduction and Effectiveness Evaluation

The Canal Restoration List contains 96 projects estimated at \$538 million. At the current funding of \$5 million per year, completing the restoration list would take 100 years. This effort is thus looking at how to apply the technology we have now to drive down costs while increasing DO concentrations. Looking at the distribution of projects between 2021 and 2025, we now have more tools available. Technology selection strategy is also adapted to the size of the canals to minimize costs. The goal is to reduce per-project costs to a feasible level, such as an average of \$1.5 million per project (a 65% decrease from the 2021 average of \$4.5 million). For example, for very large canals, SIWs and a partial backfill can result in effective restoration while driving down project costs.

Technology Considerations/Lessons Learned (O&M and Easements):

- Culverts: Ranked as the top choice if it will work. This is a maintenance-free operation with good results, only requiring easements.

- Injection Wells (SIWs) & Air Curtains/Seaweed Barriers: Both require easements, long-term use of property, and O&M. Air curtains also require storm hardening for compressors and wind vanes for control.
- Muck Removal/Capping/Backfill: This involves high costs for equipment, temporary easements for staging, dewatering, and disposal.

Task 3: Geographical Grouping of Canal Restoration Projects

The goal of this was to maximize DO improvements and effectiveness towards protecting nearshore waters by grouping canals. This used the UM study from a few years ago to identify canals within close proximity to each other and the associated water quality in adjacent canals to determine a prioritization. An “impact grouping” score was added based on the proximity (within 200 meters) and associated WQ of adjacent canals. This information was added as part of the ranking data to support prioritization of adjacent canals to improve water quality.

- Score 0 (Good): Canal groups that did not have at least two fair or poor canals. (80.9% of grouped canals).
- Score 2: Canal groups with 2 fair canals.
- Score 3: Canal groups with a fair and poor canal, or two poor canals.
- Score 5 (Poor): Canal groups with more than two fair and poor canals. (10.3% of grouped canals).

Some projects were reranked based on 2025 vs. 2021 information; this will inform future restoration priorities based on funding available.

Task 4: Pre and Post Injection Well Water Quality Monitoring

The SIW design uses a gravity differential to push canal water into the subsurface. The design includes a 120’ open bore hole that is 2’ in diameter with 60’ casing that attaches to a concrete vault and includes a grate to prevent trash infiltration. The technology is based on the gravity differential. As the canal water goes up, more is pushed down, and the pipe is placed as low as possible to maximize the differential and thus infiltration.

A study was initiated due to this being new technology and concerns that infiltrated canal water could migrate into sensitive nearshore resources. This monitoring was important to ensure the technology is effective and not causing adverse impacts to surrounding areas. To determine the transport and fate of the canal water, a multi-well was installed near the SIW on Big Pine Key (Canal #278) to monitor WQ and geochemical data at seven depths (located between 55’ to 115’ at 10’ increments). Water transport calculations showed that the vertical travel downward to 30’ is approximately 0.2 days. The horizontal pathway is 10 miles south offshore over 324 days (nearly a year before the ultimate discharge to the ocean). Overall, the estimated annual infiltration rate is 0.2% of the transport domain's pore volume. Results indicate the infusion of canal water with the seepage discharge into the open ocean at 120 feet below sea level will not be significant nor detrimental and occur approximately 10 miles offshore.

Task 5: Mitigation Credit Ledger

The purpose of this task is to assess how we evaluate the impacts of projects, as there is a lack of State-approved mitigation banks in the Keys. Many projects implemented in the Florida Keys have improved the water quality and benthic resources and could be utilized within a mitigation bank program. Work is underway to create a mitigation credit ledger using successful WQ and benthic resource improvements from restoration efforts to offset future unavoidable impacts.

Task 6: Canal Restoration – Public Outreach

A public outreach video is in progress, and virtual public meetings are scheduled for the week of March 16th to share information and best management practices with communities. The video is available here: [Florida Keys Canal Restoration Project](#).

Ongoing efforts include continued WQ monitoring under a new EPA Grant (#05D37325) and evaluating the reconvening of the Canal Subcommittee to support continued restoration.

Questions & Answers/Comments/Discussion:

- Lawrence: Before and after monitoring is good to have for these projects What is used for backfill and the dredge cap?
 - This is a layer of clean sand material about one foot deep. It is used after ensuring that all organics are removed, then this is added as a layer on top.
- Sandy: We haven't been able to track where groundwater is going, which was a significant issue with central wastewater. What data is the groundwater migration conclusion based on?
 - This is specific to the canal water going into the Injection Well. The multi-well system was installed adjacent to the Injection Well to monitor how the water migrates through the groundwater there. The discharge is saltwater into saltwater, not freshwater, which is the case with wastewater. This means the system is not pushing groundwater out of the way. The wells are 120 feet deep, and the freshwater lens in Big Pine Key is 30 feet deep.
- Chris Bergh: The freshwater lens varies, and the canal and well location may impact it; you can see freshwater coming into some canals. Regarding Sandy's point, the net groundwater flow is North to South, but it is dynamic depending on tides and seasons. Chris added that Greg has been with this program for a long time and has "helped write the book," confirming this has been a great partnership.

Break

IV. Beach Water Quality Monitoring

Florida Healthy Beaches Program

Dr. Mark Roby, Director of Nursing, FDOH, provided an overview of the Florida Healthy Beaches Program and beach water quality monitoring in Monroe County. Dr. Carla Fry, the current Health Officer, will be transitioning to Hillsborough County, so this position in Monroe is in flux.

Dr. Roby navigated through the FDOH Healthy Beaches website as a visual aid during his presentation. The Healthy Beaches Program began in 1988 with five monitored beaches in Florida and expanded by August 2000 to include 30 beaches across Florida's 30 coastal counties. The program tests for enterococci, which is used as an indicator bacteria that can appear in elevated levels due to sources like animal waste, garbage, or rainfall runoff. Monroe County monitors 17 beaches every two weeks, having recently increased the number from 10 beaches. The last recorded results were in the "good" category. Joel explained that Enterococci is preferred in marine waters over E. coli because it is more stable in saltwater, making it a better indicator for disease-associated fecal matter.

The program supports tourism, and wants to ensure recreation, and public health. DOH does not close a beach but posts advisories based on water quality results:

- Good (<35 enterococci per 100 milliliters of marine water) means it is safe to swim.
- Moderate (35 to 104) advises swimming with caution, especially for individuals who are immunocompromised or have open wounds.
- Poor (>104) means the public should not swim.

Anne's beach was noted as a new addition to the monitored locations in Monroe County. If a spike in Enterococci is detected in a new area, DOH works with partners to identify the source or the cause of the increased levels. Sometimes this is due to heavy rainfall. Advisories and results are emailed to community partners and posted on the [Florida Health website](https://www.floridahealth.gov/). The pathway to find this information from the primary Florida Health website <https://www.floridahealth.gov/> is as follows. Under Environmental Public Health select Water Quality → Aquatic Toxins → Beach Water Quality.

The Beaches website includes links for health implications, and information about the program's history. Dr. Roby also cautioned about other water issues, noting that warm saltwater is a medium for vibrio to grow, which can cause infection from standing water. Five deaths were reported from vibrio last year, which can also be contracted from raw shellfish. The website also has tabs for algal blooms, seafood safety, sargassum, etc.

EPA Beach Water Quality Monitoring Program

Joel Hansel, Region 4 BEACH Program Coordinator, EPA provided additional perspectives from the EPA Beach Water Quality Monitoring Program.

The EPA National Beach Program began in 2000 with a modification to the Clean Water Act (CWA). During that first year, \$50k was provided to all eligible states and Tribes to start a monitoring program; some had no beach monitoring prior to this. Now, the National Beach Program provides between \$9M and \$10M annually to eligible States, Tribes, and local governments for monitoring and notification. Florida receives \$450K-\$500K, which is among the top allocations alongside California. Local governments are also included because some states don't run the program. As of the 2024 season, 4,364 beaches are under the BEACH Act program, with 3,406 actively monitored nationwide. This program offers an ongoing monitoring dataset for water quality (WQ) and a historical record to detect if deterioration is occurring. The program allows monitoring for E. Coli and Enterococci, as well as notification to the public. The grant funds cannot be used for investigation, cleanup, restoration, or fixing infrastructure like pipes. Although the program is authorized to \$30M, it receives \$10M in appropriations. Attempts to reauthorize the program since 2000 to increase funding to \$60M and include these actions have failed.

States, Tribes and local governments report data for the previous year by December 31st, so it takes a full calendar year before updated data are available. In 2024, 37% of all monitored beaches had at least one advisory, but 82% of those advisories lasted less than 8 days. The 8-day period is often noted because most states monitor once per week. Overall, beaches were open and safe to swim 94% of the time during the swim season. An advisory existed somewhere <6% of the time. When states report data, they are asked to guess the cause of poor water quality: 45% of cases are listed as unknown, 21% are guessed to be stormwater issues (e.g., heavy rain), 11% are TBD, and 8% are attributed to wildlife. Other causes like Combined Sewer Overflows (CSOs), leaking septic systems, or line breaks are less common.

Joel discussed a few unique State and Tribal items, including qPCR and predictive modeling. Qualitative Polymerase Chain Reaction (qPCR) is a genetic methodology that tests for viable bacteria (E. coli and Enterococcus). It offers a rapid analysis time of about two hours, which is exciting as currently one will only find out tomorrow if they should have been in the water today. The rate-limiting step remains sample collection. Because labs are often located centrally (e.g., Marathon and Key West in the Keys), the quick result may still be too late for same-day notification. This is very expensive for limited benefits, and is currently used in targeted studies in places like Rhode Island, New York City, Michigan, and California. Predictive modeling attempts to provide a real-time percentage chance of exceedance for bacteria levels based on current conditions. Models are used in Great Lakes states (e.g., Minnesota, Wisconsin, Michigan, Illinois, Ohio) where factors like wind-driven currents are simpler. Currently, no marine state

is using predictive modeling because, in Florida, complex factors like tide, wind, and longshore currents make simple modeling impossible.

Questions & Answers/Comments/Discussion

- Chris Bergh: There is a nexus between rainfall and water pollution in the Keys (e.g., not swimming after it rains). Predictive models can tease out storm-driven pollution in certain places. Is this a consideration for models here?
 - Yes, this is a consideration. The shellfish program, for example, uses rain and river stage gauges to shut down a bed if a certain amount of rain falls in 24 hours. There is enough consistent data to support this relationship. However, rainfall at the beach is not always the problem; inland rain can show up at the beach from miles away. In places like South Carolina, a combination of inland rainfall and longshore current can determine if a beach will be under an advisory 18 hours later. A site must be known well enough to place weather stations and flow gauges to understand the relationship between rain elsewhere and water quality at the beach.
 - Brian Walker added that tomorrow he will present a model that has the potential to do this. It is focused on water quality at reef sites in southeast Florida and ties that to inland rainfall and canal flows. That model is currently being expanded to the Keys and may be able to predict conditions and provide recommendations about advisories accordingly.
- Yazmin Valdez: The program has two objectives. Once bad water quality is identified, are there other programs working to address the source? Also, how is wildlife an important source of pollution?
 - Once bad water quality is identified at a beach, the EPA Beach Program itself cannot take action. However, the State of Florida or DOH can coordinate with environmental regulatory agencies at the state or county level to use other mechanisms, such as enforcement for National Pollutant Discharge Elimination System (NPDES) discharge or non-point source grants, to clean up those inputs. DOH in Monroe County will coordinate with DEP on an investigation to move from "unknown" to a determined cause. No Monroe County beaches have been closed in Dr. Roby's tenure, but that would be done in coordination with the County via an ordinance. The last closure he's aware of was in Miami Dade County after a major line break in Biscayne Bay; recreational areas were closed by a state health order.
 - Wildlife pollution, which accounts for 8% of known factors, often refers to Canadian geese, according to reports from Great Lakes partners who experience enormous migrations. It's unknown if wildlife sources are as pathogenic as human sources. The program just counts and treats all Enterococcus numbers the same, regardless of whether the source is human or wildlife. Other studies could be conducted to update threshold amounts (e.g., if it's determined that wildlife sources are half as risky as human sources, the threshold amount could be increased). However, these studies are expensive.
- Chris Bergh: The Water Quality Communications Subcommittee has discussed beach advisories. Can DOH announcements be modified to include a precautionary message, even when the source of contamination is unknown (e.g., you may not want to swim; remember not to let pet waste get into waterways; report sewage leaks, etc.)?
 - Dr. Roby agreed that this type of messaging would be easy for DOH to do locally, but it would need to be approved by the Communications section in Tallahassee. It was also suggested that DOH could potentially include a QR code or a plug for the Water Quality Protection Program (WQPP) in these announcements.

V. Innovative Nature-based Media Filtration Technology for Meeting Nutrient Removal Targets

Vincent Seibold, Director of Operations, Sustainable Water Infrastructure Group (SWIG), LLC introduced an innovative nutrient removal technology designed to restore and protect nutrient-impaired waters from nitrogen and phosphorus pollution.

SWIG is a water technology company working in Florida since 2017. SWIG's systems provide passive, chemical-free water treatment that mimics natural filtration through the use of engineered media and wetland plants. These systems are scalable, cost-efficient, and designed for longevity, with lifespans ranging from 10 to 25 years. The system is deployable for point and non-point sources, is passive, easy to operate, and uses no chemicals. The system has documented and verified removal of TP, TN, Color, E. Coli, TSS (95%), Metals (80%), PAHs, Toxic Anions, and PFAS. The media is manufactured in Mt. Dora, and a research facility is located near Doctor's Lake in Orange Park, FL. A number of projects are occurring around the state, and SWIG is working with SFWMD and Miami Dade County on projects in south Florida.

Phosphorus Elimination System (PES): This is aluminum-based, using dried alum residuals to create maximum surface area for P adsorption. It uses patented media with an exceptionally high capacity to adsorb and irreversibly bind P. The system uses a flow cycle of filling with water for one hour and draining over a three-hour period. During the draining cycle, chemical bonds increase, creating more bonding sites for the next dose of water. The media's estimated lifetime is 10–20 years, depending on loading. Spent media can be recycled for agricultural applications and compost.

Mechanism for Nitrogen (N) Removal (PES + N): To achieve denitrification, an anoxic zone is added beneath the P-removal layer. This is a two-layer system: the first is aerobic for nitrification (converting organic N/ammonia to nitrate), and the second is anoxic for denitrification (converting nitrate to harmless nitrogen gas). The technology achieves greater than 50% Total N (TN) removal. Total N removal is dependent on the bioavailability of N, with better results observed in stormwater sources than in wastewater sources.

The system is classified as a Nature-Based Solution because it mimics natural filtration using engineered media and wetland plants, enhancing nutrient transformation through saturated and unsaturated flow cycling. Plant roots help maintain media porosity to increase contact time, but the media's function is separate from plant nutrient uptake. The operation is passive, made from recycled, non-toxic materials, and does not include chemicals.

The system is more efficient than treatment wetlands, requiring only 5% of the footprint to treat the same volume of water (and thus is good in areas with land constraints). It is not constantly saturated, allowing it to function as a green space and habitat while treating water.

Doctor's Lake Case Study: An advanced water treatment (AWT) wastewater polishing project at Doctor's Lake has been in service for over five years. This project pumps partially treated water into the PES, with treated water returned to the wastewater system, where it is chlorinated before distribution for consumption or to the St. Johns River. In this project, a 1.1-acre system treated approximately 1.4 mgd and removed 7,500 lbs. of Total P. Removal rates remain high - over 80% removal after 5 years. In one example, P concentrations were reduced from 0.58 mg/L post-AWT to 0.11 mg/L. Vegetation is harvested annually, composted and applied to land. Often volunteer growth outcompetes planting with vegetation repopulated after a few months.

Black Creek Case Study (PES + Color): This system was used to recharge the Upper Floridan Aquifer with up to 10 MGD and provided a secondary benefit of restoring historic lake water levels. Stormwater was harvested from the natural organic dark waters of Black Creek, a 17-mile route with the 12 acre treatment system to the south. After running through the system, color removal from the water was 84–

86% pre-dry out and 93–94% post-dry out. The system performs better after periods of rest, as chemical bonds are translocating and the media is regenerating, which increases transmissivity. The system achieves a high Ultraviolet Transmittance (UVT) of 84%. High UVT (minimum of 70-75%) is essential for the UV disinfection process, which makes this an ideal pretreatment for Aquifer Storage and Recovery (ASR) injection wells and drinking water systems.

SWIG is working toward smaller-scale, modular systems that would be more appropriate for the Keys. These can be applied as stormwater systems where gravity pushes water through underground stormwater vaults with the media for pretreatment. Other system types include rain gardens, bioswales, residential stormwater treatment systems, and floating systems. These filter water through a media bed suspended above the water line, are 95% more efficient than treatment wetlands, and can be solar-powered and self-sufficient. Three modules are being deployed in Lakeland at Lake Morton. This area has lots of geese and swans and is operating under a Reasonable Assurance Document. The modules will have QR codes to allow for interaction with the public.

A demonstration project is currently being planned at the City Marina in Marathon to assess the ability to improve water quality in dead-end canals. The system is tolerant of saltwater and petroleum. It will be vegetated, requires maintenance only once per year, and uses a small, quiet pool pump. Intake and discharge will be from different locations. This will also include a QR code for public engagement. The Media is delivered by dump truck or bags.

The media has been validated by a 3rd party, with lab tests and known quantities in and out measured. This was tested as part of an EPA study, which was awarded for commercialization of PFAS removal. Toxic anion removal rates were great, and positively charged metals were effectively adsorbed. Outflows for cadmium, lead, mercury, and thallium were all below detection limits, with removals ranging from 99.1% to 99.9%. Removal of longer-chain PFAS was virtually complete. Short-chain PFAS removal is less effective; a second pass through new media or a redundant system may be necessary for substantial removal, especially in areas of high Total P load (P competes for binding sites, and increases PFAS discharge)..

The technology has received a NPDES permit (Black Creek project) and can be used for UIC disposal, integrated with treatment wetlands (parallel or in series), or utilized as pretreatment for drinking water systems.

Questions & Answers/Comments/Discussion:

- Lawrence Glen: Was with South Florida Water Management District (SFWMD) and noted the small footprint is a huge advantage for municipalities. He asked if the acre plot was lined, and if all plots are lined based on the spring shed.
 - Lining is location-specific. In Miami-Dade County they are working on a canal project using small pockets for containers, potentially next to pump stations or pocket parks used for stormwater to further treat stormwater before discharge to improve overall water quality..
- Sandy Walters: As someone working with SWIG, affirmed that Vincent Seibold's 17 years of regulatory experience with DEP, local governments, and St. Johns River WMD confirms the technology is proven. The Marathon study is critical for proving the concept for saltwater use in a real-world environment (it has already been done in the lab). The phosphorus removal capability is a "game-changer": AWT does not remove nutrients enough to prevent shifts in the benthic habitats. The "polishing" can alleviate this; this is a real opportunity to have another tool in the toolbox. Planting on the surface is a valuable component, as the root systems penetrate the media to keep the soil open for continuous water charging. The Lakeland project received one of DEP's

innovative technology grants. SWIG is also pursuing an EPA South Florida (SFL) grant with the city.

- Audience Question: What is the end objective for the City of Marathon project (e.g., chlorophyll-a biomass in the water column)?
 - The Keys are listed as impaired by FLDEP for P and Nitrogen (N). The end goal is to demonstrate that the technology works in a saltwater environment so it can be scaled up to improve water quality in the Keys. The system is tolerant of saltwater and petroleum.
- Chris Bergh: Confirmed that the system uses seawater to treat seawater without affecting salinity?
 - Yes, the technology won't affect salinity.
- Sandy Walters: Note that DEP has concluded the technology may be an exception for permitting and meets NPDES requirements, potentially making it easier to permit if there is no impact to mangrove and seagrass during installation. This also offers a potential solution for plugged canals that currently cannot be opened because they must meet high Outstanding Florida Waters (OFW) standards.
- Chris Bergh: Can the technology help polish Advanced Water Treatment (AWT) water to remove PFAS, especially since Shallow Injection Wells (SIWs) are suspect and require upgrades?
 - Preliminary conversations are underway with the Florida Keys Aqueduct Authority for a potential project, using stewardship funds, to model and reduce PFAS levels in AWT water. Phase 2 will involve running wastewater concentrations through columns to model how long the media will last, and to determine the necessary size and cost-effectiveness for reducing PFAS.

Lunch

VI. Florida's Coral Reef Unified Water Quality Monitoring Database: Data Aggregation and Analysis

Dr. David Kochan, Associate Research Scientist, FWC, provided an overview of a DEP-funded project to develop a unified water quality monitoring database for Florida's Coral Reef and associated ecosystems.

This effort is a collaboration between USF, FWRI, and NOAA (initially), and is crucial because WQ changes, including excess sedimentation and nutrient enrichment, impact benthic organisms. Billions of dollars have gone towards the Comprehensive Everglades Restoration Plan (CERP), and that water flows downstream to the reef and associated ecosystems. The database will help evaluate the effects on water quality at a large scale. Extensive WQ data is collected across Florida, but not all of those monitoring efforts measure the same thing; there is unequal coverage and parameters are collected differently. The goal with this project is to have a singular database to compare water quality across the region.

Project Goals and Objectives

Years 1-4:

- Create a unified water quality monitoring dataset. Focused on nutrients (Nitrogen, Phosphorus) and water clarity. The team considered 93 programs but narrowed it down to 8 actively sampling programs that met criteria, including sampling at least 4 of 29 parameters (e.g., Total Nitrogen, Total Phosphorus, Chlorophyll-a, Turbidity, and Silicates) and having at least five years of consistent, annual data.
- Trend analysis suggests that data are broadly interoperable, but there is so much variability in water quality monitoring (day, tide, collection times), that there's not much overlap in space and time. The analysis identified hotspots, noting a negative trend (getting worse with more chlorophyll-a) in Biscayne Bay.

- An interactive data visualization tool (Shiny app by USF) is available, allowing users to view time series data for specific sites and filter data. Web maps and data can be downloaded via QR codes.
- Spatial correlation analysis (semivariograms) was used to identify monitoring gaps and determine how far apart samples can be and still reflect similar trends (in other words, this helps determine if we are sampling too much or not enough). Buffer distances vary by analyte; for example TP overlaps with a 1.7km buffer, but orthophosphates show similarities within 3.5km. There is no buffer for N due to strong inshore to offshore gradients. Overall, we are not sampling enough; filling these gaps would require some effort and thought. Gaps were found in the northern end of the Kristin Jacobs Coral Ecosystem Conservation Area and Florida Keys, Marquesas, and Dry Tortugas (which would provide valuable information about Everglades water reaching the reefs).
- Remote sensing (MODIS satellite imagery) was explored to determine if this could fill monitoring gaps. Trends in Chlorophyll-a and turbidity were compared. While trends are similar, the scale of satellite imagery is different from in situ measurements. This is another tool but not as directly comparable as hoped.

Years 4-6:

- The project updated inventories to help Florida's Coral Reef Coordination Team (FCRCT) detect change from Everglades restoration efforts. This included an inventory of 59 programs monitoring abiotic factors (pH, DO, salinity, temperature), which are easier and faster to sample and are useful for filling gaps, tracking water movement across Florida Bay and identifying hot spots to more strategically measure nutrients or other parameters. This also included an inventory of 33 biological/ecological monitoring programs (e.g., coral, fish, seagrass, HABs, etc.).

Overall, collecting water quality data is important but significant effort is required to make it compatible and useful; this is essential to assess impacts of major restoration projects and better inform management efforts. All web maps have been added to an ArcGIS Online Hub, and the data is being integrated with SEACAR for automatic quarterly updates. Future goals include integrating WQ data into a Coral Reef Decision Support System and updating the 2021 map of Contaminants of Emerging Concern. The project team welcomes feedback to improve the functionality of the inventories and tools.

Questions & Answers/Comments/Discussion:

- Shelly Krueger: Do you have any ideas about a future WQM program based on these analyses?
 - Yes. We are prepared to help the FCRCT at the next stage of their efforts to streamline existing WQPP programs and identify strategic new monitoring stations, particularly in areas where water moves through gaps in the Keys (like bridges and roads). Once we know what's being monitored and where, then we can improve the monitoring approach.
 - This has also been discussed with the WQ team - what are we missing and where? If we had unlimited money where would we focus? The WQPP has a lot of monitoring and presents an opportunity to streamline and improve the utility of these programs.
- Sandy Walters: From previous meetings where we received updates from the PIs on the monitoring programs, a gap identified was the difference between night and day (e.g., O2 levels vary by significantly between night and day).
 - DEP is collecting continuous data at certain locations (data is collected every 15 minutes so will include night time measurement). This will be incorporated into the database, but more data is needed for a time series/trend analysis.
- Lawrence: This effort is valuable because it distills the data from 88 programs down to what is actually usable for answering questions. If you showed this to a legislator, they'd wonder why we're doing all this monitoring. It's important to highlight that this is disparate monitoring focused on a set of questions; now we're seeing how we can use this data to answer new questions. Suggest including the Islamorada canal monitoring data in this effort too.

VII. Florida Seafloor Mapping Initiative (FSMI)

Jeff Lovin, Florida Geospatial Program Director, Woolpert, provided an overview of the Florida Seafloor Mapping Initiative (FSMI), a \$100 million statewide bathymetric data collection effort managed by DEP, and Woolpert's work in Region 3 (the Florida Keys). Woolpert is a global architectural engineering and geospatial firm that specializes in remote sensing, surveying, and Lidar technologies. Woolpert has 5 offices in Florida, 40 offices across the US, and 3000 employees across 5 continents. They have a number of geospatial capabilities, remote sensing, aerial imagery, and GIS. They were a pioneer in Lidar, including topobathymetric lidar collected by aircraft. The company operates 22 aircraft, 60 drones, and has a fleet of vessels that do sonar mapping.

FSMI is a \$100M federally-funded initiative and the largest hydrographic survey effort to date, designed to map the seafloor using two primary methods: Topobathymetric Lidar collected via aircraft and multibeam sonar collected by ships down to 200 meters in depth. The data will be processed and made public in a portal.

This effort aims to produce high-resolution seafloor data that previously did not exist for coastal Florida at this resolution. Applications include: helping understand coastal vulnerability; completing hurricane impact studies; locating natural and archaeological resources; improving storm inundation modeling with better data further out from shore; assessing the health of fishery populations; and evaluating the performance of restoration projects. The projected return on investment is 5:1, because it avoids a duplication of effort and provides benefits for navigation and recreation.

Woolpert was one of three firms selected for this initiative, and they were awarded Region 3, which covers South Florida and the Florida Keys and was ideal for this work due to its water clarity. The project area was 20,000 square kilometers, the largest among the project teams, with an additional 7,000 square kilometers of "optional areas" planned for topobathymetric Lidar collection.

The project started in late October 2023 (toward the end of storm season). Two Lidar technologies were used: near-infrared Lidar for shore and land-based features and a green laser (532 nm spectrum) for underwater visibility. A total of 4 aircraft were mobilized at a time, flying at 480 meters across 50km flight lines spaced 300m apart. The swath of each flight line is 350m which provides a 20% overlap between lines. They were able to achieve near-record depth clarity of up to 50 meters below the ocean floor in clear conditions. The data took almost a year to collect from the air, and encountered challenges such as weather (hurricanes), environmental conditions like persistent turbidity, mechanical issues with aircraft and high-tech sensors, sargassum, and processing petabytes of data on a tight schedule. Turbidity prevented data collection in some areas, which will be filled using sonar. The contract required at least two attempts to collect data and they usually tried three times. The seamless dataset, including the optional areas out to the Dry Tortugas, was delivered as of September 30, 2025.

The data revealed unprecedented resolutions of features, including spur and groove coral formations up to 6 meters tall near Looe Key; coral reef features east of Elliot Key, some up to 5 meters tall; underwater channels north of Big Pine Key, including deep, natural channels; numerous shipwrecks, including the Bentwood Wreck southeast of Key Largo and the intentionally sunk Vandenburg (the second largest artificial reef in the world); shifting sands and turbidity in the Quicksands area between Key West and the Dry Tortugas (including many partially submerged wrecks); and mysterious "blue holes" that were too deep to map entirely from the air. Even kite surfers were picked up with the Lidar. The data processing workflow included AI and human data checks, with product outputs in Esri ArcGIS, FME, and other formats.

Vessel-based sonar data collection uses sound to collect bathymetric data. This is a narrower swath, takes longer, and is more expensive, but requires less water clarity than aerial Lidar. Woolpert mobilized 6 vessels to collect sonar data across the awarded areas of the Panhandle, Big Bend, and Jacksonville. Pre- and post-storm data from Hurricane Helene was also collected in Crystal River.

The next phase of this project involves edge matching data for the entire state effort. The final product and data, including metadata with collection timestamps, will be distributed to the community for use in research. These data are significant to the Blue Economy and support habitat mapping, change analysis, site preservation, and navigation.

Questions & Answers/Comments/Discussion:

- Lawrence Glenn: This seamless map of the state is very valuable for hydrodynamic modelers to help understand transport
- Sandy: Local Principal Investigators (PIs) monitoring benthic conditions in the Keys may find this data a significant addition to their highly site-specific information. It also raises interesting questions about what some features are. The seamless dataset will be available for everyone to use in research, which is powerful.
- Brian Walker: Noted the challenge of having data collected over a year, given that landscapes change during that time. The data will be seamless but collected in varying timeframes. Are timestamps included with the data?
 - Metadata will include the time stamps to discern when the data for specific areas or flight lines were collected

Break

VIII. Communications Subcommittee

Julie Cheon, Communications Director, NOAA FKNMS and Shelly Krueger, University of Florida/IFAS Extension Monroe County shared an update on efforts and progress of the Communications Subcommittee.

The subcommittee includes representatives from: Monroe County, Environmental Protection Agency, Florida Sea Grant, Florida Fish and Wildlife Conservation Commission, FKNMS NOAA, Lower Keys Guides Association, Eco Legacy Solutions, The Nature Conservancy, Florida Department of Health, Florida Department of Environmental Protection and the Tourist Development Council.

The objectives of the Communications Subcommittee are to disseminate information about water quality efforts, including WQPP meetings, funding opportunities, and successes via the Report to Congress (RTC); educate the community about WQ issues, clarifying the roles and responsibilities of various organizations; advise the WQPP on communications needs; and support public awareness and engagement with WQPP via website updates and meeting notices.

Achievements include the new WQPP website, which is live and hosted by FWC. The group is also actively working on a Communications Plan for the Congressional Report, and Julie highlighted some of the sections included in the plan. Those include key messages, WQPP background, major components of the report, red flags, target audiences, spokespeople, supporting materials and FAQs.

Julie shared the existing FAQs identified by the subcommittees, and requested input on other potential questions or ideas for inclusion in the anticipated communications effort surrounding the RTC. The current plan includes prepared answers for questions such as how water quality is defined and measured, the WQPP's authority, water quality improvements from wastewater upgrades, the timeline of the last

report, and how the public can connect with the WQPP. She also presented some discussion questions seeking volunteers to serve as spokespeople for the WQPP and whether any members of the Steering Committee want to review the key points.

Finally, the Communications Subcommittee was established for a 2-year period, with a potential sunset date in July 2026. Guidance will be requested at the next Steering Committee meeting regarding whether to sunset, keep, and/or modify the objectives of this group.

Questions & Answers/Comments/Discussion:

- Chris Bergh: We started on RTC years ago; with the new administration there may be questions about what has been accomplished related to water quality. Be prepared for this question.

IX. WQPP Report to Congress

Beth Smith, South Florida Program Coordinator, EPA and Karen Bohnsack, Associate Director, NOAA FKNMS provided an update of the status of the current WQPP Congressional Report (RTC) and led discussion on the next report cycle.

The current report is anticipated to be available by the next Steering Committee meeting, estimated for July 2026. The document is currently under review by a federal working group. After this it will go to the Office of Management and Budget (OMB) for comment and review, which is expected to take several weeks. There are still plans to format the document before it is shared, with the hope this will be completed before July.

At the December Steering Committee meeting, a Gantt chart was presented that articulated a proposed process and timelines for staying on schedule with the next report. This may have been a bit ambitious, especially considering the timelines to achieve agency approvals. We are learning as we go and the goal is to achieve 2-year reporting cycles. The timeline for the last report was roughly 2014-2024, so the next report should cover calendar years 2025 and 2026, although the timeline will remain fluid.

Acknowledging the challenge in thinking ahead to a future report when the current one hasn't been finalized, Karen shared the sections included in the current report, and flagged some highlights, including where the bulk of new content would be incorporated in future reports. The Florida Keys National Marine Sanctuary and Protection Act mandates that these reports include updates on accomplishments, programmatic modifications, and recommendations for future implementation of the program. Accomplishments are grouped into corrective actions, long term monitoring, special studies, and outreach and education efforts.

The discussion focused on identifying topics and content for the next report cycle. Karen Bohnsack stressed that the report is a reflection of the collective accomplishments and requires engagement from the Steering Committee. A series of discussion questions were presented to the group. These included:

- Do you agree with a standing opportunity to discuss new RTC content additions/POCs during each meeting?
- What topics should be consistent across reports? Consider the bigger, long-term projects such as wastewater upgrades, canal restoration, monitoring, etc.
- What new topics are relevant to include in this report (since January 2025)? For example, should we share the full list of what is funded by the EPA South Florida program during this reporting period, or solely highlight a couple of key projects and why they are important? With only a 2-year reporting period, this will be easier to tackle than the 10+ years in the last report. DEP has also been funding relevant projects on an annual basis.
- Who is the point of contact for the new additions?

Karen shared a few examples of new content that may be reported in the next cycle, including the Communications Subcommittee and website updates; Curry Hammock tidal connection project, research and lessons learned associated with the 2023 marine heatwave; and the new effort to disseminate research outcomes with the one-day symposium happening tomorrow. If reinstituted, we can also report on the Canal Restoration Subcommittee. If there's something else that should be included and you can provide a point of contact, please let us know.

Questions & Answers/Comments/Discussion:

- Chris Bergh: The Steering Committee and Communications Subcommittee have discussed institutionalizing the report; is that the plan moving forward?
 - It's been a long time since this last report was done, a lot has changed, especially with how this gets reviewed and shared with Congress. Lots of lessons learned, so hopefully next time we will have a quicker turnaround.
- The Steering Committee was overall favorable to having regular updates on the RTC to keep on track (Q1). Chris Bergh suggested bringing a straw proposal to help the Committee get started.
- Gil McRae: There's a lot of effort on coral restoration. It's not directly tied to improving water quality, but without good water quality, these large-scale restoration efforts wouldn't be successful. We have enough to report on now and this could be worth including as a regular update in the long term.
- Chris Bergh: Recommend connecting coral restoration to the monitoring EPA funds for coral reefs, water quality, and seagrass to enhance the narrative. He also suggested reporting on funding—specifically what was funded, how much, and highlighting a few key projects to show the results and what taxpayer dollars are accomplishing.
- Patience Cohn: Similarly, suggest we mention the community's involvement. EPA provides the money for these efforts but there's also buy-in from the community.
- George Garrett: Emphasized the importance of including spatial data advancements, like the entire coastline of bathymetric data now available, and the need to develop modeling to show how regional factors (e.g., Gulf of Mexico, East Coast currents) impact the Keys..
- Sandy Walters: Urged the group to start looking at the water quality issues on the ecosystem level (corals, seagrass, mangroves). This is all connected; they're not separate habitats. All our education materials, including the book developed previously (Tropical Connections), clearly demonstrates that, but we don't normally focus on it. Think about unintended positive consequences of the work we're doing.
- Lawrence Glenn: Having worked on multiple reports to Congress in the past, emphasized that Congress responds best to a succinct report with agreed-upon metrics: dollars spent, effort put forth, what was achieved and why, and what was required to complete the work. He cautioned that research for its own sake is not well received; the focus should be on saying: "These are the metrics and highlights that we, as a committee, find important to justify continuing to move forward."
- Karen Bohnsack: Acknowledged the ideas from the Committee, highlighting the concept of developing an agreed-upon set of metrics. The Steering Committee was encouraged to think about what specific metrics to include in the RTC, and how to report them consistently.

X. Canal Restoration Subcommittee Discussion

George Garrett, City of Marathon, initiated discussion on a proposal to reconvene the Canal Restoration Subcommittee to help expedite canal restoration progress.

The previous committee, which included DEP, FWC, and Monroe County, among others, focused on completing the Canal Management Master Plan and internal coordination on canal projects. We've

shifted from a 2D to a 3D view of canal profiles and restoration options for canals in different configurations and levels of impairment. Now, there is an interest in reinvigorating this committee to support new and emerging canal restoration needs.

Rhonda Haag added rationale and goals for this subcommittee, referring to several points raised during the canal discussions earlier in the day. In particular, she noted that the canal restoration list remains extensive and is currently estimated to take 100 years to complete at the present pace and funding level (\$5 million/year). Improving cost efficiency is part of the reason for wanting to explore other technologies and combined restoration approaches (for example, looking at partial backfills or culverts to improve water quality for lower cost than full-scale backfills). This subcommittee could also help obtain feedback from experts to modify and implement plans, as well as coordinate on vendors, community assessments, and invite community participation.

Questions & Answers/Comments/Discussion:

- Gil McRae: Acknowledged the good work that came out of this subcommittee in the past. The group helped establish metrics for canal restoration (e.g., miles of canals, categorized the severity of impairment and restoration expenses). Suggest revisiting these metrics for the RTC. The technology has evolved and it's possible that resident perspectives have too; we may be able to do things we couldn't previously. Community engagement is a great aspect as well.
- Yazmin Valdez: Permitting issues/timelines are also a problem and present another opportunity to coordinate within this subcommittee. Participation by the pertinent agencies will be key to expedite these permits. This is key as there is a risk of losing funding if permits are delayed.
- George Garrett: Confirmed that permitting coordination was another purpose for the original and agreed that the permitting agencies should participate to streamline that process. The total cost for canal restoration could easily be \$1 billion (equivalent to wastewater and stormwater costs). Coordination is needed on how funding sources—including FKWQIP, RESTORE, and Stewardship funds—can be best utilized, and what is practical to implement. Unlike Deep Injection Wells (DIW), canal restoration does not permanently remove the water. This reinforces the need to look holistically beyond restoration technology to fix the persistent water quality problems, such as community fertilizing.
- Dave Burke: Agreed the concept is valuable, noting that FKNMS permitting is difficult (3 people processing 1,000 permits per year) and prioritizing is hard. The sanctuary is sensitive to funding deadlines and does not want funds to be lost. Suggested improving communication with permitting agencies (FKNMS, USACE, DEP, SFWMD) sooner than later, coordinating with stakeholders on sequencing considerations for different projects, and exploring how to consolidate similar projects (e.g., geographic consolidation). FKNMS is also exploring batch permitting. FKNMS does not have the bandwidth to run this effort and added that a lead will need to be identified.
- Nick Parr: Added that DEP also does not have bandwidth to lead this effort with current staff, but they may be able to loop in the regulatory side of DEP.
- Rhonda Haag: Also added that she is not able to lead this; there is a need to figure this out before the Steering Committee commits to this effort.
- Yazmin Valdez: Offered that DOC can help organize the committee and participate in agency communications to expedite projects.
- Gil: Since this committee already existed and has just been inactive, there's no need to vote on reinstating it. However, request the Management Committee to provide a recommendation for the next phase of the Canal Restoration Subcommittee including membership, objectives, and outputs.
 - Karen Bohnsack confirmed that the Management Committee will follow up with a recommended scope of work for the Canal Restoration Subcommittee.

XI. Public Comment

None

XII. Round Robin Steering Committee Member Updates

The following members offered updates:

Heather Stewart, Florida Keys National Wildlife Refuges Complex (FKNWR): The Refuge is trying to get more involved in water quality efforts and expects to have more updates to share soon.

Gil McRae, Florida Fish and Wildlife Conservation Commission (FWC): No updates, looking forward to the next day's meeting.

Yazmin Valdez, Florida Commerce: Thanked the presenters and will bring the information back to the Department of Commerce.

Patience Cohn, Marine Industries Association of South Florida (MIASF): The FAU Blue Economy/innovation effort is worth paying attention to to see what findings they have.

Lawrence Glenn, Florida Department of Environmental Protection (DEP): Thanked everyone for the welcome and expressed appreciation for the candor in the group, noting the need to discuss hard issues to find solutions.

George Garrett, City of Marathon: Provided an update on the City of Marathon's water quality issues, focusing on the Deep Injection Well (DIW) project. The city has five wastewater (WW) plants, all currently using Shallow Injection Wells (SIWs) that are 120 feet deep. There are 12 wells feeding these five plants. The city was involved in a lawsuit regarding the DIW, which they recognize should be settled. The DIW project, prompted by concerns related to PFAS and pharmaceuticals, will connect the plants and convert one to a DIW that extends 3,500 feet into the boulder zone. Advanced Water Treatment (AWT) still contains certain substances that will now be injected into the DIW. The DIW project is an estimated \$65 million. This will involve several phases of directional drilling, including under Vaca Cut, which is currently in the permitting stage. Engineering for the DIW is nearly complete, but it is still in the permitting phase. The Deepwell needs to be completed by 2028. Future plans include phasing out individual WW plants and converting them into holding tanks to drive sewage to the area 6 plant (Coco Plum), which will then be rebuilt to handle all flow. This process is expected to take 10 years to complete. The city was in discussion with the Florida Keys Aqueduct Authority (FKAA) about providing effluent for potable reuse, but FKAA is currently not pursuing this. Marathon may consider creating reverse flow to bring effluent to their Reverse Osmosis (RO) Plant on Crawl Key in the future. George volunteered to help with the canal restoration group, noting he would be stepping away from DIW responsibilities soon.

David Burke, Florida Keys National Marine Sanctuary (FKNMS): Reported recent leadership visits, including with EPA Regional Administrator Kevin McOmber and from NOAA Administrator Dr. Neil Jacobs, who is an advocate for the Keys and its activities. Thanked the City of Marathon for hosting the meeting. Upcoming events include a Sanctuary Advisory Council (SAC) meeting next week and the annual Coral Restoration Practitioner workshop the week after. A major challenge for FKNMS is how data informs regulatory decisions, how advanced technology is being deployed to address problems, and how work is connected to tangible benefits, economic benefits, and efficient funding use.

Sandy Walters, Eco Legacy Solutions, LLC: Discussions are beginning with FKAA and SWIG regarding the AWT plant on Layton. A creative concept involves treating AWT water via a SWIG facility

on vacant county land next door and then using it for dust control at the landfill across the road (the landfill currently uses FKAA water pumped from Florida City). This represents a potential water reuse opportunity in the Keys and a need to think outside the box to use new technology to contribute to WQ and other local needs.

Alison Higgins, City of Key West: Stantec is now on board for the Water Quality Monitoring (WQM) program, with the task of getting Key West harbor monitoring back on schedule. The costs will go to the commission next month. The city is working on an EPA application for beach monitoring, hoping to find ways to improve conditions. They are pursuing innovative technology, including bioassays for various sources of bacteria (humans, dogs, cats, chickens) to determine the cause of contamination, as steps may change depending on the source. No bioassay exists for iguanas since that is a South Florida problem. A project funded through a FEMA Hazard Mitigation Grant Program from Hurricane Irma funds will sunset at the end of the calendar year, which is unfortunate. Currently, all sewage goes into one pipe on the side of the Fleming Key bridge, and this is an effort to improve that system via a pipe under the seabed. Permitting for this project is nearly 99% complete, but they cannot get a directional bore done in the next 6-7 months. They are considering options to challenge.

Meeting Wrap-Up and Adjourn

Lawrence Glenn thanked everyone for participating in the meeting and reviewed accomplishments and next steps.

The meeting adjourned at 3:55 pm.