

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

July 24, 2025

DRAFT MINUTES

Steering Committee Members Present

Katie Butler/Wade Lehmann, US Environmental Protection Agency (EPA), Region 4 (Chair)
David Whiting/Lawrence Glenn, Florida Department of Environmental Protection (DEP) (Co-Chair)
David Burke, National Oceanic and Atmospheric Administration (NOAA)
Heather Stewart, US Fish and Wildlife Service
Yazmin Valdez, Florida Commerce
Julio Tejeda, South Florida Water Management District
Carla Fry, Florida Department of Health in Monroe County
Gil McRae/Tom Matthews, Florida Fish and Wildlife Conservation Commission
Sue Heim, Key Largo Wastewater Treatment District
Emmy Koenig McDowell/David Hackworth, Florida Keys Aqueduct Authority
Andrea Leal, Florida Keys Mosquito Control District
Craig Cates, Monroe County Board of County Commissioners
George Garrett, City of Marathon
Marisa Carrozzo, FKNMS Sanctuary Advisory Council (for Kelly Cox)
Sandy Walters, Eco Legacy Solutions, LLC
Caitlin Lustic, The Nature Conservancy (for Chris Bergh)
Shelly Krueger, Florida Sea Grant/IFAS Extension Monroe County
Patience Cohn, Marine Industries Association of South Florida

Summary of Resolutions

- **Motion 1 (passed)**: Shelly Krueger made the motion to approve the agenda; Craig Cates seconded the motion. The agenda was approved with no changes.
- **Motion 2 (passed)**: Dave Burke made the motion to approve the meeting minutes from March 12, 2025; Sue Heim seconded the motion. The minutes were approved with no changes.
- **Motion 3 (passed)**: Heather Stewart made the motion to approve Shelly Krueger as the WQPP representative to the Sanctuary Advisory Council Adaptive Management Working Group; Marisa Carrozzo seconded. The motion passed with no changes.
- **Motion 4 (passed)**: George Garret made a motion to approve the SOW as written. Sue Heim seconded the motion. The motion passed with no objections.
- **Motion 5 (passed)**: Wade made a motion to give the Communications Subcommittee autonomy to update the existing website to be more easily navigable and to send those non-novel edits to FWC. Novel updates should be approved by the Steering Committee, but can be communicated via email vs. waiting for a Steering Committee meeting to discuss and approve. George Garrett seconded the motion. The motion passed with no objections.
- **Motion 6 (passed)**: George Garreett made a motion to proceed with the Report to Congress as outlined. Shelly Krueger seconded the motion. The motion passed with no objections.

I. Introduction and Opening Remarks

Wade Lehmann, Ocean and Estuarine Section Chief, EPA Region 4, called the meeting to order at 9:01 am and welcomed everyone. David Whiting, Division of Ecosystem Assessment and Restoration (DEAR) Deputy Director, FDEP, and Dr. Lehmann are the meeting co-chairs.

Steering Committee members in attendance introduced themselves, and additional attendees with the WQPP Management Committee, Technical Advisory Committee, and Communications Subcommittee were recognized. Attendees were provided instructions for participating in the virtual meeting. 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.

Katie Butler gave the opening remarks on behalf of EPA. Under the new administration, as of July 2025 EPA has 5 pillars of focus to achieve the agency's goals. This replaces the prior EPA strategic plan. The pillars are:

- Clean Air, Land and Water for Every American
- Restoring American Energy Dominance
- Permitting Reform, Cooperative Federalism, and Cross-Agency Partnership
- Making the United States the Artificial Intelligence Capital of the World
- Protecting and Bringing Back American Auto Jobs

Pillars 1 and 3 are the two that EPA focuses the most on in their work, and these are also the most relevant to the WQPP. The South Florida Program grants selected this year are in the process of being funded; there were some financial delays but funds should be distributed by the end of the year. EPA is also in the process of finalizing the 2026 South Florida Program Notice of Funding Opportunity (NOFO). That is working through the approval process; the WQPP will be notified when that is available. Recommendations from the WQPP have been integrated into the NOFO; that notice has been trimmed a bit from previous years but hasn't really changed in scope. The next WQPP meeting will focus on research and findings from prior grants over the past few years. This will include a one-day symposium to learn more about EPA funded projects, and a Steering Committee meeting. The South Florida Program funded a number of organizations this year, and those projects covered a lot of research topics including coral reefs, seagrass, sponge restoration, ecological resilience, watershed monitoring and modeling, etc.

Mr. Whiting gave the opening remarks on behalf of FDEP. As Deputy Division Director of DEP's Division of Ecological Assessment and Restoration (DEAR), Mr. Whiting joined the Steering Committee when Kim Shugar left DEP earlier this year. Lawrence Glenn has assumed the role of DEAR Director and will take over as the DEP representative on the Steering Committee following this meeting. DEP has an Environmental Regulation Commission meeting on September 25th to brief members on the triennial review of water quality standards.

Agenda and Minutes

Dr. Lehmann reviewed the agenda and minutes and requested edits or a vote to approve from the Steering Committee. Shelly Krueger made the motion to approve the agenda; Craig Cates seconded. The agenda was approved with no changes. Dave Burke made the motion to approve the minutes; Sue Heim seconded. The minutes passed with no objections.

WQPP Representative on Sanctuary Advisory Council Working Group

Dr. Lehmann reminded the Steering Committee that during the last meeting a discussion was had regarding selecting a WQPP representative to participate on a new FKNMS Sanctuary Advisory Council Adaptive Management Working Group. At that time, two members had provisionally volunteered, and the Steering Committee agreed that this could be discussed offline to determine who would be the best fit.

During this meeting, Shelly Kruger was announced as the recommended WQPP representative, and Dr. Lehmann requested discussion or a vote to approve from the Steering Committee. The other WQPP candidate, Chris Bergh, was selected for another seat on the working group, so will also be participating in that effort, although Shelly Krueger would be the official WQPP representative. Heather Stewart made the motion to approve Shelly Krueger as the WQPP representative to the Sanctuary Advisory Council Adaptive Management Working Group; Marisa Carrozzo seconded. The motion passed with no changes.

II. Per- and Polyfluoroalkyl Substances (PFAS) in Florida's Water

Dr. John Bowden, University of Florida, provided an overview of outcomes from a comprehensive mapping effort of PFAS across Florida.

Dr. Bowden's lab at the University of Florida's (UF) focuses on monitoring the life cycle of legacy and emerging chemicals like PFAS, from their initial use in products to their eventual integration into the environment. UF is a collaborative lab with many partners at local, state, and federal agencies. A main goal at UF is education and training, and developing the next generation of environmental chemists. Community engagement is also a significant focus; UF aims to educate the public about scientific research and involve citizens in collecting samples, both of which are important for promoting behavioral change and encouraging responsible governance. Dr. Bowden acknowledged all contributors to this work.

PFAS have been in existence since the 1930s, and were famously used in the Manhattan Project for the development of the atomic bomb in the 1940s. Since then, their use in industrial and commercial products grew exponentially. Over time, concerns about their safety led to some PFAS being phased out. Awareness has significantly increased in the last decade, prompting discussions about government regulation. While PFOA and PFOS are the two most common PFAS, there are over 15,000 species, indicating that current understanding and regulation of PFAS only scratches the surface.

PFAS chemicals are known as "forever chemicals" due to their remarkable durability. They possess a duality of chemical properties - they are both hydrophobic and hydrophilic - which make them advantageous in industrial and consumer applications. The fluorocarbon bonds are among the strongest in chemistry, making these compounds highly durable and hard to break down. This also makes them difficult to manage once released into the environment. They bioaccumulate, are mobile, and are resistant to degradation. Thousands of products contain PFAS, including floss, nonstick coatings, cosmetics, stain resistant products, band-aids, toilet paper, and watch bands. Two of the largest sources of PFAS release are aqueous film-forming foams (AFFF) and effluent from wastewater treatment plants (WWTPs).

The PFAS cycle illustrates a number of sources in close proximity to water. These include manufacturing sites that directly and indirectly contribute effluent, atmospheric deposition from airborne emissions, and landfills with PFAS-containing waste. AFFF from airports and military bases are significant contributors, and most WWTPs do not adequately remove PFAS. All of these sources ultimately lead to contaminated waterways and potential exposure through drinking water.

UF's research encompasses environmental monitoring and engineering (investigating what happens to PFAS after disposal and how they are managed), release pathways such as road dust and emissions, indoor exposure, composting strategies for different PFAS profiles, and seafood contamination. While these are broad topics, today's presentation focuses specifically on PFAS in water.

Humans are primarily exposed to PFAS through food and water. Exposure through indoor dust and air is less understood. Exposure also occurs through personal care products. Interestingly, while water concentrations of PFAS are often measured in parts per trillion (ppt), concentrations in AC filters can be

in parts per billion (ppb), meaning that PFAS are an order of magnitude higher in dust. PFAS bind to proteins and bioaccumulate in the blood (unlike other contaminants that accumulate in fat). They are also highly mobile in the body and have been detected in breast milk. These compounds have been linked to a number of adverse health conditions. As legacy PFAS are phased out, there is still limited knowledge about the safety and impacts of their replacements.

EPA initiatives concerning PFAS regulation did not begin until 2009. The first proposed maximum contaminant levels (MCLs) were enacted last year, although it is unclear how the current administration's priorities may impact these regulations. There is a long way to go to ensure the safety of water and air environments from PFAS contamination.

Analytical workflows for PFAS. The traditional workflow involves targeted methods, which are “hypothesis testing” and seek a known list of PFAS compounds in samples. Conversely, non-targeted methods aim to identify unknown PFAS. Of the 15,000+ PFAS, only a few hundred have established analytical standards. This highlights the importance of identifying unknown PFAS compounds so that they can be incorporated into targeted analytical methods. Volatile and ultra-short-chain PFAS are often not readily studied or covered by current analytical methods despite their high concentrations. Total Fluorine (TF) analysis is a new PFAS measurement strategy and is critical to improve understanding of PFAS concentrations. Targeted methods allow for quantitative analysis, with detection limits down to parts per trillion (equivalent to a drop of water in an Olympic-size swimming pool). These methods provide a chemical fingerprint, allowing for selective analysis. This is akin to looking at the puzzle pieces that are unique to each chemical, then searching for that information in a sample. The challenge is that when a sample contains numerous PFAS chemicals, the targeted method only examines a fraction (50-100 PFAS), which represents a small percentage of the total PFAS present. This means the full PFAS landscape is not captured. UF is collaborating with Notre Dame to develop a Total Fluorine method, which compares TF concentrations to targeted PFAS concentrations. Targeted methods often only capture 5% or less of the total fluorine in samples. This difference defines the upper boundary of fluorine-containing compounds in a sample. When zero PFAS are detected by targeted methods, TF analysis can reveal the presence of other fluorine-containing compounds that are not being monitored. Non-targeted methods can then be employed to identify these unknowns. Utilizing AI and known fragments of fluorinated chemicals assists in building compounds and understanding how they would be measured, which helps in PFAS identification.

Monitoring the PFAS cycle. Dr. Bowden's lab is interested in understanding PFAS ecotoxicity and how these chemicals move around once they are in the environment. This includes examining higher-order apex predators, movement through plants and air, and lower trophic organisms. A [web-based interactive map](#) shows PFAS contamination across waterways in the United States. While some testing has been done in Florida, there is limited data given the vastness of the state's water bodies. A project initiated in 2020 aimed to map PFAS presence in Florida waters and identify hotspots for further testing. The project also sought to educate people about PFAS and establish a crowdsourced sampling network. Sampling kits and YouTube video protocols were provided, and over 2,300 sites were sampled by >130 undergraduate students and >75 citizen scientists and organizations. Dr. Bowden presented a ["Total PFAS" map](#), which sums the concentrations of all individual PFAS at each site, where red indicates areas of higher PFAS concentrations. In total, 92 PFAS were monitored and 33 unique PFAS were detected, with the highest site in Fort Lauderdale exceeding 3,000 ppt. The mean concentration was 29 ppt. This location and concentration data allows for the creation of heat maps illustrating total PFAS levels and highlighting areas of concern. Individual PFAS concentrations, such as PFOA, can also be mapped. Again, any sites denoted by middle orange or redder colors are areas where chemical concentrations are above MCL of 4 ppt for PFOA.

The research also investigated sources and causes of PFAS contamination in Florida surface water. Airports and military bases were obvious contributing sources, but they do not fully explain high levels across the state. Wastewater programs were identified as another potential source. Florida Department of Environmental Protection (DEP) spill data was analyzed from 2017-2022 (when the study concluded); during this time there were over 7,000 spills totalling 1.4 billion gallons of material, which included raw sewage, treated/untreated wastewater, gasoline, biosolids, etc. By the time the paper was published in 2024, nearly 11,000 spill locations had been mapped. A comparison between areas with the highest PFAS concentrations and spill locations showed significant similarities, suggesting spills as a potential source of PFAS in waterways. The amount spilled was also examined. For example, Pinellas/Hillsborough County in Tampa saw 6 million gallons of raw sewage dumped during this period, which may allow for a lot of PFAS to enter the environment. Some of these spills were infrastructure-related spills, such as from hurricanes, rather than accidental. Analyzing the amount of spills by category and concentration can help understand the potential amount, in grams, of PFOA and PFOS released. Despite improving technology, most WWTPs are not effective at removing PFAS.

Data Dissemination: Data are maintained on the project's website and are publicly accessible: [Statewide surveillance and mapping of PFAS in Florida surface water](#). Users can click on a county, zoom in on sampled water locations, and view individual PFAS concentrations in the samples. Redder circles indicate higher concentrations of PFAS. In Monroe County, while many samples are green (low concentration), some red circles appear near Naval Air Station (NAS) Key West. Although there are not many red samples in Monroe County, concentrations are high where they exist.

New techniques are being developed to source PFAS. While much focus is on legacy PFAS, most products have some legacy PFAS, so that's not a useful metric for sourcing. New PFAS compounds are proving more useful for source identification. Statistical approaches, such as clustering, are used to identify different PFAS profiles and correlate them with unique characteristics of specific areas to pinpoint potential sources. Research also examines the impact of PFAS from hurricanes and other large weather events (runoff and destruction), and modeling can be used to identify optimal sampling locations based on environmental conditions.

Dr. Bowden's lab also published a paper investigating PFAS in Florida springs, which are crucial for drinking water. The study found low concentrations of PFAS in Florida springs, with only a few sites exceeding MCLs. Continued monitoring is essential to protect these springs as areas become more developed. Each spring had unique PFAS profiles. Dr. Bowden is also interested in looking at foam in fresh and saltwater. PFAS are surfactants. High levels of foam may indicate more than just organic matter and debris. Foam serves as a highly effective bioaccumulation matrix for PFAS, with concentrations typically 30-1,000 times higher than in adjacent surface water. Direct contact with foam should be avoided.

UF also crowdsourced information on PFAS in Florida drinking water. This involved sampling over 450 taps across the state with the help of citizen scientists. Monroe County was identified as an area of high concern. These were single-point-in-time tests; for high concentrations, continued testing is recommended to track improvements. Testing in areas with historically low PFAS levels is also suggested.

Future endeavors include a big project with Tampa serving as a model site. Dr. Bowden is looking to identify other model sites as well. Over 400 samples have been collected for targeted, Total Fluorine, and non-targeted analysis. Heat maps will be developed to provide a better understanding of the PFAS landscape in this environment. They also have a study looking at fish muscle tissue. Over 3,500 samples have been collected across Florida; if anyone wants to contribute to this data, please reach out. Through this effort, they aim to identify which fish species are most impacted by PFAS, so that we can start to generate fish consumption advisories. There are also sampling kits available where a simple blood

measurement will provide a PFAS body burden. UF is incorporating this for environmental applications, but there is also a human application for this method. There is currently no human PFAS data in Florida. Sediment cores can also be collected for retrospective PFAS analysis. Researchers are doing this in Mississippi and Tampa. Little pieces of the core are removed for PFAS analysis, which can provide information on when PFAS originated in the area and how that has changed over time. Additional work is ongoing to investigate PFAS exposure in wildlife, including manatees, sharks (including maternal transfer of PFAS to offspring), seagrass, sandollars (to track PFAS in sediment), and golden tilefish (to track deep sea PFAS).

Dr. Bowden is always looking for funding assistance and partnerships. Collaborations with state/local agencies have resulted in valuable research projects.

Questions & Answers/Comments/Discussion:

- Questions on this presentation were deferred until after the next agenda item.

III. FKAA – Plans to Address PFAS in Drinking Water

David Hackworth, PE, Director of Engineering for FKAA, provided an update on efforts underway by FKAA to address PFAS in the Biscayne Aquifer.

Mr. Hackworth presented a timeline of regulatory changes concerning PFAS in drinking water. PFAS first appeared on FKAA's radar in 2016 when there was a combined health advisory limit of 70 parts per trillion (ppt) for PFOA and PFOS. By 2022, interim health advisory limits were set for PFOA, PFOS, GenX, and PFBS, but those levels were below detection limits. In 2023, the EPA proposed new levels (4 ng/L [ppt] which were at the detection limit) in the National Primary Drinking Water Regulations (NPDWR), and the final rule was issued in 2024. The original deadline for compliance was 2029, but a two-year extension was granted, setting the new deadline for April 2031.

FKAA's PFAS Journey:

- August 2019-July 2021: FKAA conducted a two-year pilot study to investigate the removal of PFAS using granular activated carbon (GAC).
- July 2022-February 2023: A Request for Qualifications was issued for a consultant to help address PFAS in water.
- April 2023-October 2023: A PFAS Treatment Feasibility Study was completed.
- July 16, 2024 - Present: Following the final rule issuance, FKAA began the full design of new facilities for PFAS treatment. The compliance deadline has been extended to April 2031.

Overview of FKAA's water system: The primary PFAS source is located in the Florida City plant, which draws from the Biscayne Aquifer. This plant currently uses lime softening to treat the water. FKAA has a limit of 18 million gallons per day (MGD) that can be extracted from the Biscayne Aquifer. To supplement this, FKAA also operates a 6 MGD brackish water Reverse Osmosis (RO) plant drawing from the Floridan Aquifer. Current daily demand is 22 MGD. In May 2025, FKAA dedicated a new 4 MGD seawater RO plant on Stock Island, which continuously supplies the lower Keys. FKAA is also working on a new 4 MGD seawater RO plant in Crawl Key, Marathon.

The GAC Pilot Study involved a column design with a 12-inch diameter, 3-foot length, and 18-gallon volume, which represented what flows would be at full scale. It operated with an Empty Bed Contact Time (EBCT) of 20 minutes (water was in contact with the carbon for 20 minutes) at a flow rate of 0.88 gallons per minute (gpm). The pilot study operated from August 2019 to July 2021. The study aimed to understand the longevity and cost-effectiveness of granular activated carbon for PFAS removal (for example, if carbon only lasted 3 months, it would cost 4x higher than if carbon lasted a year). This study

found that the carbon lasted over a year in terms of efficacy for removing longer-chain PFAS molecules, which are readily absorbed by carbon. Mr. Hackworth compared this to a home Britta water filter - while you might want to change the filter every 3 months for taste, the filter will work for another 9 months for the purpose of PFAS removal. While the initial health advisory limit for PFOS was 70 ppt, and FKAA was below this, the new regulations lowered the numbers to 4 ppt, highlighting the need for advanced treatment.

FKAA draws from multiple wells, and thus investigated whether certain wells could be turned off to avoid PFAS contamination. However, testing revealed that all wells in the Biscayne Aquifer had PFAS present, making this an unviable strategy. Currently, three commercially available technologies for PFAS removal were evaluated:

- Granular Activated Carbon (GAC): Requires good pre-filtration, and involves GAC changeout and disposal.
- Ion Exchange (IX): Functions like a water softener, but the resin cannot be regenerated and must be disposed of when spent.
- Reverse Osmosis (RO): Treats emerging contaminants and softens water, but results in concentrate disposal (requiring a new deep injection well) and water loss.

FKAA evaluated four different alternatives to meet two competing goals: (1) Provide the same quality of water to customers that the current lime softening treatment scheme provides and (2) Meet the proposed PFAS maximum contaminant levels.

The treatment alternatives considered were:

- Alt. 1: GAC (PFAS) + Rehab Existing Lime Softening (LS) System: This alternative looked at adding GAC as a pre-treatment to the existing lime softening process. GAC would be added before lime softening to avoid extra wear on the carbon; this worked with clean well water.
- Alt. 2: Anion Ion Exchange (AIX) (PFAS) + Rehab Existing LS System: This alternative was similar to GAC, but used ion exchange for PFAS removal.
- Alt. 3: Nanofiltration (NF) + Side-stream PFAS treatment by AIX: This option uses an RO membrane treatment which also provides softening. Without PFAS, some water would be passed around the membrane and blended with the membrane treated water for optimal hardness (treatment of the full stream through the membrane results in water that is too soft for customers). However, blending with untreated bypass water would reintroduce PFAS, so a side-stream PFAS treatment for the bypass water would be needed.
- Alt. 4: Cation Ion Exchange (CIX) (softening) + AIX (PFAS): This involves two separate processes using different ions/resins to remove hardness and PFAS.

Capital costs for these alternatives were compared, including costs for just the softening benefit, then costs with PFAS removal added. Alternatives 1 and 2 were estimated around \$20 million for just the lime softening. Alternative 3, a membrane plant for softening, was estimated at \$60 million. Alternative 4, using ion exchange for softening, was estimated at \$28 million. Once PFAS capital costs were added, Alternative 3 had the highest capital costs but provided the benefit of both softening and PFAS removal.

Annual Operating & Maintenance (O&M) costs were also considered. The RO system (Alt. 3) had the lowest operating costs. This is primarily due to the significant cost and uncertainty associated with disposing of large quantities of spent granular activated carbon and ion exchange material. Historically, lime sludge was often free to dispose of (farmers would take it), but now disposal can cost millions per year. The concern is that costs for disposing of contaminated material in landfills will likely increase over time due to potential regulations like CERCLA (Superfund), which could designate PFAS as hazardous, leading to increased disposal costs and retroactive liability.

The 20-year Net Present Value (NPV) comparison showed that Alternative 3 (RO + AIX) had the lowest net present value cost. Waste from the RO system can be disposed of in a deep injection well, which is already used to get rid of brine from the RO system in Florida City.

A schematic illustrated the current and future plant configurations. The existing lime softening tanks and sludge processing system will be replaced by a new NF facility. The new treatment process becomes much simpler with RO. A disadvantage of RO is the loss of approximately 15% of the water as brine, which would need to be offset by additional seawater desalination. The cost of augmenting this water loss was factored into the analysis.

Questions & Answers/Comments/Discussion:

- Gil McRae: Asked about the lipophilic and lipophobic nature of PFAS and their accumulation in different matrices. Can you talk more about accumulation of these compounds/
 - Dr. Bowden: We don't know a lot about how PFAS move in complex marine environments, however we do know that long-chain PFAS (PFCAs) are the most bioaccumulative, and any apex predators will incorporate these bioaccumulated levels. Eating fish is a significant source of PFAS. Long-chain PFAS bind to particulates in waterways and end up being present in higher levels at the bottom, so benthic organisms will generally have high concentrations of long chain PFAS. Shorter-chain PFAS are more mobile and more likely to be found in the water column. Invertebrates have shown high levels of short-chain PFAS. These can also be detected at the surface, and both long and short chain PFAS are in foam, which may be due to recent releases. The movement of PFAS in marine environments is still being studied. Most freshwater systems are shallow, so PFAS in the sediment can be redistributed in the water column by boats and storms. We also don't understand how functional groups of PFAS implicate their movement, but they are found in most matrices tested. It's rare not to find PFAS; for example they've been detected in the Galapagos. A study is also looking into PFAS release from water to the atmosphere via sea spray aerosol. This is a complex system still being researched.
- Shelly Krueger: Inquired about PFAS concentrations in wastewater effluent compared to aquifer water. Are PFAS more concentrated in wastewater effluent?
 - Dr. Bowden: More research is needed on the relationship between WWTP releases and environmental concentrations. They are testing effluent releases from WWTPs in Tampa, and are also interested in road waste and runoff. While WWTPs are improving PFAS removal, dilution is not a solution as PFAS do not easily break down. Current research has focused on effluent within WWTPs, not tracking through release.
- Emmy McDowell: Related to road runoff, are there any data or sampling effort focused on neighborhoods or homes where sod has been replaced with artificial turf? Is there any connection between turf and PFAS?
 - Dr. Bowden: Referenced a paper on road dust and PFAS levels (which he can share). Car washes and other industries with runoff also contain PFAS. He would be surprised if artificial turf did not have a lot of PFAS. PFAS-free doesn't necessarily mean there are no PFAS, we just aren't monitoring for those species. This usually means PFOA free. His team has looked at soils and drinking water for individual properties, but they try to keep those locations anonymous. Where they can, data on samples and tracing to potential sources is shared and available on the website.
- George Garrett: Asked about sources of PFAS, specifically from Wastewater Treatment Plants (WWTPs), noting that Marathon had conducted water quality monitoring in wells around their Area 3 plant and did not find pharmaceuticals. He wondered if those might go out in the sludge they have to decant, and if the same thing might happen to PFAS as well. The City of Marathon

offered the Marathon wells and plant for further investigation. He mentioned that effluent is currently going down a Shallow Injection Well (SIW) but will soon be routed to a Deep Injection Well (DIW).

- Dr. Bowden responded that he hasn't looked too closely at WWTPs; they are complicated due to variations in their designs, operations, and testing methods. He confirmed that PFAS are known to be present in high concentrations in biosolids and sludge. He also explained that replacement PFAS (precursors) are found in high concentrations in sludge and biosolids. These are known as precursors because these can break down into legacy PFAS over time, which are subject to regulations. He noted that where samples are taken within the treatment train can influence the types and amounts of PFAS detected, so it's hard to make a categorical claim other than that PFAS are present in wastewater, and we need to remove the whole suite that we know are present and harmful to the environment (not just the two that are regulated).

IV. Monroe County Artificial Reefs Program

Dr. Hanna Koch, Director of the Monroe County Artificial Reefs (AR) Program, provided an overview of the program, including current progress and future efforts. The program is funded by a state grant from the Florida Fish and Wildlife Conservation Commission (FWC) for \$15 million through 2030. FWC and Monroe County aim to partner to develop a program to plan, construct, monitor, and maintain artificial reefs/habitat support structures (HSS) in Monroe County, providing ecosystem and economic benefits to Florida, its resources, wildlife, and public welfare.

The program's objectives include:

- Provide offshore recreational fishing and diving opportunities.
- Reduce pressure on natural reef and hard bottom sites.
- Reduce user conflicts by offering additional recreational fishing and diving sites in state and federal waters of the Gulf of Mexico.
- Establish a framework for the design, placement, monitoring, and maintenance of HSS. The design should:
 - Address habitat deficits related to fish and invertebrate life histories.
 - Promote 3D complexity, biodiversity, and diverse fish assemblages.
 - Provide ecological support and improve ecosystem function.

The long-term goal is to create networks of sites extending from nearshore to offshore on both the Gulf and Atlantic sides of the Florida Keys to support fish movement. The program has two main project categories: the Gulfside Network (outside FKNMS) and the Habitat Support Structures Pilot Program (inside FKNMS).

Gulfside Network: This network will consist of up to 10 sites, 2-5 miles apart and 5-15 miles offshore in state and federal waters, primarily in the sand plain where there is currently no structure or hardbottom. Each site will feature multiple patch reefs in 40-60 feet of water. These sites were identified with angler/local stakeholder input in 2023. This network will provide both ecological and social services. It will provide complex, diverse, high quality fish habitat and serve as waypoints for migrating organisms. Once the main network is established, unpublished notes of low-relief habitat will also be developed to support early life stages and juveniles. This network will also create new fishing and diving opportunities and help disperse activity.

Sites will utilize a variety of material types, structures, and sizes to promote biodiversity and create more complex habitat and spaces. The first project involved deploying 45 concrete power poles at the Gulfside 10 Mile Reef, which is 16 nautical miles from Key West. These were deployed as three patch reefs in

stacked perpendicular layers to create a variety of ledges, and different sized spaces. Post-deployment surveys within three days showed cobia and small schools. After five months, there was abundant life and large egg masses indicating invertebrate reproduction. The program plans to add low-relief structures to the Gulfside 10 Mile site, pending new federal permits (5 are pending, 5 state permits have already been issued). A long-term monitoring plan is being developed to encompass all projects implemented in the first five years.

Habitat Support Structures (HSS) Pilot Program: This program is a different initiative in partnership with FWC, FKNMS, and other entities. The goal is to design, deploy, and evaluate HSS for improving conditions and resources within FKNMS. The maintenance of quality and diverse habitats is crucial for supporting biodiversity, which forms the basis of healthy, productive, and resilient ecosystems. Structural complexity, a key component of habitat, supports greater species richness and abundance by providing more microhabitats and niches.

The program acknowledges that habitat loss and degradation, driven by factors like ocean warming, coastal development, water quality issues, direct human impacts, and storms, have led to a reduction in the abundance and diversity of marine organisms in the Florida Keys. Thus the first step in this program's approach is to characterize habitats and their structural deficits related to fish and invertebrate life histories. This includes identifying areas with a lack of specific habitat or degraded habitat; 5 habitat deficit areas were identified in the lower Keys. Next, the program will design and test a variety of HSS treatments that functionally mimic and/or enhance historical structural components. Treatments will vary by material type, structure style, size, scale (benthic footprint), and include restoration components (hybrid reefs). Finally, the program will evaluate net ecological and ecosystem outcomes based on a comprehensive monitoring plan executed by a team of local experts and scientists.

The first pilot project will be located within bayside shallow nearshore hardbottom habitats of the Keys, an extensive habitat type characterized by shallow waters over limestone substrate with a thin sand veneer. In this habitat, structural complexity is provided by low-relief organisms such as sponges, soft corals, macroalgae, and solution holes. This habitat is important as 80% of reef fish are juveniles here before maturing and migrating. Significant loss has been observed in these habitats, with present-day fish species richness at only 30-40% of what it was in the 1990s, partly due to widespread loss of sponges and soft corals. The study area includes nearshore areas in the middle Keys. The project will test four treatments (basic physical structure, complex structure, physical and biological structure, biological structure), including outplanting with up to six local sponge species.

Monitoring and Evaluation Plan: Information will be collected annually. Pre-deployment surveys will gather baseline data, and post-deployment surveys will focus on: structure physical persistence and stability, and material performance; fish community metrics (species diversity, abundance, size class, behavior); benthic invertebrate metrics (individuals settled on or living under structures); fouling and algal communities; restoration (e.g., sponge attachment, survival, growth); solution hole and sedimentation data (where applicable; assess if structures change hydrodynamic flow, potentially making filled-in solution holes available again); and basic water quality.

Other ideas for artificial reefs include dive training reefs, coastal resilience/Nature-Based Solutions, hybrid reefs, and memorial reefs.

Questions & Answers/Comments/Discussion:

- N/A due to time constraints.

Break

V. Water Quality Improvement Program Updates

Dimael Lopez-Ramon, USACE, updated the Steering Committee on the latest progress within the Florida Keys Water Quality Improvements Program (FKWQIP). The team managing the program for the Jacksonville District includes Brenda Calvente, Hector Cruz, Richard Butler, and Dimael Lope. The local partners are also integral to the program's execution.

The program's purpose is to improve the quality of nearshore waters within the Florida Keys National Marine Sanctuary by implementing projects from wastewater and stormwater master plans for Monroe County and its various municipalities. This effort has been ongoing since 2006. Public Law 106-554, Section 109, authorizes the USACE to provide technical and financial assistance for these projects. The Water Resources Development Act (WRDA) 2022 expanded the program authorization from \$100 million to \$200 million for this effort (representing a 65% federal share of program costs). Non-Federal Interests are responsible for the remaining 35%, or approximately \$107.7 million, for a total program amount of \$307.7 million.

To date, \$86 million from the initial \$100 million authorization has been reimbursed to the municipalities; approximately \$9.2 million remains to be reimbursed to Key Largo, Marathon, and Islamorada. USACE is expecting to receive funding in FY26, and by FY27, 100% of the remaining \$100 million balance is projected to be reimbursed.

USACE has also been working on executing Project Partnership Agreement (PPA) agreement amendments with the various local governments. The Islamorada PPA amendment was executed on May 12, 2025, the Key Largo PPA amendment is currently under review for approval, and the Marathon PPA amendment is under review for submission. Work is also underway to develop PPAs for the other municipalities.

WRDA Funds Authorization: Funding for the program is secured through Water Resources Development Act (WRDA) earmarks, and involves a multi-step process that includes Congress, USACE and the Non-Federal Sponsors (NFS). Congress ultimately authorizes expenses for the program, with earmark requests first going through the House and Senate. Many entities submit requests, so it's important for the NFS to work through their members of Congress to explain the importance of these projects and prioritize them for funding. Members of Congress then submit these requests for specific projects within their districts or states. Once a project is included on the list, a work plan is developed and submitted for congressional review. If projects from that list are included in the budget for the next year, USACE receives the funding and will then work with the NFS to implement projects.

Funds thus far have come from different sources, including ARRA funding, Congressional Ad funding, and Workplan funding. In May 2024, USACE requested \$9.9 million for reimbursement in FY25 through the Earmark process, however, no funding has been received for FY25. FY26 reimbursements will be dependent on the receipt of workplan funding, which is tied to the passing of the FY26 budget for USACE (the program is still operating under a continuing resolution). If FKWQIP is included in the appropriations bill and signed into law, earmarked funds will be allocated to the project in that fiscal year. USACE should know in September 2025 if they will receive funding.

The next \$100 million involves coordination with seven local entities in the Keys: Islamorada, Marathon, Layton, Key Colony Beach, Key Largo [Wastewater Treatment District], Key West, and Monroe County. To initiate the Section 109 process, a municipality submits a request letter to USACE, including background, location, scope of work, and if possible, cost and priority ranking. USACE evaluates the request, makes a preliminary eligibility determination, and assesses NEPA requirements. If eligible, USACE begins drafting a Letter Report and Section 109 Agreement for approval and execution. Once

these are approved, construction may begin, followed by reimbursement for that work. USACE developed a submission template for municipalities and is currently working on request letters. They are in the process of receiving these requests and developing the scopes of work for the next \$100.

Once funding is received via earmarks, that authorizes money to be spent. The Government will process reimbursement payments based on invoices submitted by the Non-Federal Sponsor as per the Section 109 agreement. This year, USACE expressed capability for \$9.2 million. Until funding is received USACE is concentrating on executing PPAs. It is very important for NFS to coordinate with Congressional members to prioritize funding for this program to move forward with the next \$100 million authorization.

Questions & Answers/Comments/Discussion:

- George Garrett: Noted this has been a 20-year process and \$9 million still needs to be expended from the first \$100 million. That money will go to the three members who were part of the original MOA. Currently we are working on a second MOA for future congressional appropriations. No money was received this year, but almost \$7 million is in the budget for next year; hopefully that will be approved. An updated MOA is needed for all entities to utilize the funding, which USACE will disperse based upon a pre-agreed separation of those funds.
- Wade Lehmann: Asked if any proposed projects would have more substantial water quality benefits, or if some were less obvious.
- Sue Heim: Inquired if USACE slides could be used for a board meeting presentation.
 - Dimael Lopez-Ramon: Confirmed that the slides could be used.

VI. WQPP Communications Subcommittee

Scott Atwell, FKNMS, provided an update on the activities of the WQPP Communications Subcommittee and requested Steering Committee attention and a potential vote on two topics. Scott is the Communications Manager for FKNMS and the Chair of the WQPP Communications Subcommittee.

Scott thanked the members of the Subcommittee, which includes four members who also sit on the Steering Committee. This group assisted in drafting a scope of work (SOW) for the Communications Subcommittee, which the group that was important to memorialize aspects of their mission and to ensure that they say in their lane. The SOW has 4 sections: Purpose, Objectives, Immediate Tasks, and Long-Term Tasks. Referring to “long term” tasks is relative, because the Communications Subcommittee was originally created for a two year term. This SOW was developed based on notes from the various discussions the Steering Committee has had about this group over the past couple of meetings. Scott emphasized that this is an advisory body with a purpose to assist the WQPP in external communications efforts, with a special emphasis on the Report to Congress. The group is not intended to replace the communications and programs of the individual entities, but to capitalize on networks and partnerships. The Subcommittee meets before and after each Steering Committee meeting to plan and follow-up on action items. The Communications Subcommittee is seeking feedback or a vote to approve this SOW.

The first bullet under the immediate tasks is the WQPP website. On the current website, meeting info is regularly updated, but the look, feel and user interface could use a refresh. The technical partners who host the site will have bandwidth for a refresh beginning in September of this year. The Communications Subcommittee is also looking for direction and for the Steering Committee to authorize a process to move forward with website updates. Scott has a lot of experience with this, including overseeing a refresh of the FKNMS website and developing a new Mission: Iconic Reefs website this past year. Others on the Communications Subcommittee have expertise in this area as well, but the group wants to make sure they are working within the bounds of what the Steering Committee is comfortable with.

Questions & Answers/Comments/Discussion:

- Sandy Walters: Speaking as a member of the subcommittee, we are ready to get going and start improving communications. Today's update and these requests for Steering Committee approval are to ensure we are on the same page.
 - Scott Atwell confirmed that we are seeking approval on the SOW and for direction on website updates.
- Wade Lehmann: Clarified that for the website, is the Communications Subcommittee seeking authority to refresh the website without coming back to the Steering Committee to approve every detail?
 - Scott Atwell: Yes. We want to know if the Steering Committee wants to see the proposed changes before they are made, or if we can move forward with updates and come back to the Steering Committee to report on the progress. We can come up with a first cut of how an updated website might look, so the question is whether the Steering Committee wants to review and approve those changes before they are implemented? We hope to update the website before the congressional report comes out, so that is the impetus to get moving sooner than later.
- Sandy Walters: The concept is to make the website more intuitively obvious, so that the information is more accessible. We won't necessarily change any information per se, but we do want to organize and present the information more effectively.
- Sue Heim: Requested that everyone take a look at the "Reports Section" - we don't know if these reports are current; we want to ensure they are current and not outdated.
 - Scott Atwell: Clarified that the Subcommittee can identify reports and other information that is outdated, and can reach out to the appropriate individuals to ensure the information is updated.
 - Sue Heim: Noted that canal restoration planning may be affected by cuts in funding, and inquired about who is responsible for ensuring the website has the most up to date information? Can the Communications Subcommittee identify the types of reports and who provided them, and send a query to those agencies to check their accuracy by a certain deadline? The entire Steering Committee needs to be familiar with authorities; if the Communications Subcommittee is tasked with this, that's fine.
 - Sandy Walters: We should make the review and updates a tight circle; if we have to send requests to everyone it will take longer. This is a procedural thing.
- Wade Lehmann: Believes we should give Subcommittee approval to make non-novel updates. Novel updates should still be routed to the Steering Committee.
 - Scott Atwell sought clarification about what needs to be brought back to Steering Committee before handoff to FWC [the technical website team].
 - Wade Lehmann voiced his support for autonomy for this group to make updates, although he does acknowledge Sue's point about not getting too far ahead of the Steering Committee.
 - Dave Whiting. The threshold is minor vs. major changes. Reformatting of existing materials can occur without Steering Committee input. For anything larger, we'd want to see proposed changes before those edits are implemented.

Motion (passed)

George Garret made a motion to approve the SOW as written. Sue Heim seconded the motion. The motion passed with no objections.

Motion (passed)

Wade made a motion to give the Communications Subcommittee autonomy to update the existing website to be more easily navigable and to send those non-novel edits to FWC. Novel updates should be approved by the Steering Committee, but can be communicated via email vs. waiting for a Steering Committee

meeting to discuss and approve. George Garrett seconded the motion. The motion passed with no objections.

VII. WQPP Congressional Report

Wade Lehmann, EPA, provided an overview of the progress and next steps for completing the WQPP Congressional Report.

As a reminder, the implementing language in the statute says that we issue a Report to Congress every other year that includes the following items: . We have not provided a report since 2013 (which provided information up to 2012). We have been working on this updated report for a while. The draft was a compilation of a lot of input that was sent in; that worked through FKNMS and some temporary help, then DEP, and it is now with EPA to take it over the finish line. The Steering Committee should have gotten a copy of the draft as it currently stands. There are still some gaps, and we need pictures as well. Wade requested that additional content edits be provided from the Steering Committee by August 15th. This will also be shared with the Communications Subcommittee, who will also be welcome to submit comments prior to August 15th.

Wade briefly reviewed updates to the document. The document was over 50 pages, but that has been trimmed to ~25 pages. The audience is congressional staffers, so we don't want to bury them in too much detail. Thus, we have tried to compress this down. We have also tried to be consistent in where funding came from, partners involved, and future direction. Please read this and send comments back by August 15th. It is ok to reach out to others to get the necessary information.

For next steps, this will be shared with the EPA Office of Public Affairs who will cleanup formatting and language. Then, EPA's Regional leadership will need to review, after which the report will be submitted back to the Steering Committee for a final vote on yes/no. That vote may have to occur by email to keep this moving. Once we have that final Steering Committee vote, the report will go to EPA Headquarters who will turn it over to OMB for their approval. Once that is issued, they will do a final cleanup and print copies to hand walk over to the congressional offices. Once that is cleared, it can be put on the website and shared.

We expect that this will take approximately another two months beyond August 15th. Early September will be the deadline for the Communications Subcommittee and Public Affairs Office to look at it and clean up the formatting, graphics, maps, etc. It is important to adhere to this timeline. Funding discussions are happening now and we want to show the value of this program.

Questions & Answers/Comments/Discussion:

- Sue: How current do you want updates?
 - The cut off date for this report is 2023; any new information will be rolled into the next report. The intent with this template is to modify the document and update more regularly (every other year).

Motion (passed)

George Garreett made a motion to proceed with the Report to Congress as outlined. Shelly Krueger seconded the motion. The motion passed with no objections.

VIII. Public Comment

NONE

IX. Steering Committee Member Updates

The following Steering Committee members offered updates:

Dave Burke, NOAA FKNMS: Provided an update on the current status of the Restoration Blueprint. This was published and went into effect in March of this year. Per the National Marine Sanctuaries Act (NMSA), the Governor has the ability to review and accept or reject what is in the rule the federal government put in place. The governor has certified the Restoration Blueprint as unacceptable in state waters, so at this point the new rule is in place in federal waters and the legacy 1997 rule is in effect in state waters. NOAA is working through what that looks like moving forward and is considering taking public input on whether the resultant situation with two rules in place is still accomplishing the objective of the Restoration Blueprint, or if we should withdraw and revert the rules in federal waters back to the old rules and essentially start over. The Sanctuary Explorer App is up to date with the latest information and we are working to ensure the website is accurate as well.

Heather Stewart, USFWS: Heather is also the new USFWS member on the FKNMS SAC, which will allow an additional opportunity to collaborate with FKNMS.

Gil McRae, FWC: Recognized the Florida Coral Reef Coordination Team (FCRCT), which was formed under the Everglades Restoration Framework, and encouraged the WQPP to keep up to speed on the activities of this group. The FCRCT is focused on water quality issues, including assessing monitoring programs in place and trying to manage the data from multiple different programs. Gil also encouraged the WQPP to try and stay up to speed on coral restoration planning. Mission: Iconic Reefs is ongoing in the Keys, and there are also efforts at larger scale to build out propagation infrastructure and prioritize sites for restoration across Florida's Coral Reef. Contact FWC to learn more. FWC can also give more detailed updates at a future meeting.

Sue Heim, KLWTD: KLWTD is coming up on its 20th year of physical operation. After 20 years, they are already having infrastructure issues and replacement. KLWTD is also dealing with the 2032 mandate that treated wastewater be co-mingled with or converted to potable water. They are also working with USACE and trying to get the interlocal agreement with all participants submitted for the additional \$100M authorized for FKWQIP. Per the current negotiations, everyone will get 12.5% spread equally across the partners.

Commissioner Craig Cates, Monroe County: Thanks to Dr. Hanna Koch for providing the presentation on the Artificial Reef program. This legislative session the county was awarded \$1.5M to move forward with an upland facility on Stock Island for the mooring field at Boca Chica Basin.

George Garrett, City of Marathon: It is important for the Interlocal Agreement to keep moving. We have had two meetings thus far, and there is a need to get back together. The goal is to get an equal between the funds for the time being, until serious negotiations can occur. Starting August 15th Marathon will be putting in transmission lines to connect the other wastewater treatment plants to the Area 6 plant for disposal down a deep injection well. The directional drilling is fully permitted. Marathon is still seeking funding from multiple sources.

Marisa Carrozzo, FKNMS Sanctuary Advisory Council (SAC): In June, the SAC passed a resolution in support of the sustained funding, infrastructure and staffing for FKNMS and National Marine Sanctuary System. That resolution should be available online.

Alison Higgins, City of Key West: Key West released a request for proposals (RFP) for the city's water quality monitoring program, but there were some snafus. The RFP was rescinded at last night's council meeting and will be reissued. The City of Key West will seek support from their internal water quality team.

Sandy Walters, Eco Legacy Solutions, LLC: Noted that she enjoyed the presentations today. Yesterday, I attended the Biscayne Bay Commission meeting yesterday, and flagged that there are some parallels and potential opportunities for mutual sharing. Yesterday, they gave reports on similar topics we get reports on. It is interesting to see what is going on with water quality in Biscayne Bay. They have more riverine impacts in different basins than the Keys does, but some of the data might be useful to WQPP. A summary presentation may be helpful so the WQPP can understand that other agencies are collecting similar data to what we're collecting; some awareness of this data may be useful as this is our immediate neighbor to the north with similar habitat types.

Wade Lehmann, EPA: Briefly showed the list of projects that have been issued grants and funded through the EPA South Florida Program this year. There are 8 additional outstanding projects that are also in the process of having grants awarded.

Karen Bohnsack, NOAA FKNMS: The WQPP Management Committee will meet August 4th and begin planning the next meeting

Mollie Cordo, DEP: The Biscayne Bay Commission meeting recording is available online, for anyone who would like to listen to the presentations from yesterday.

<https://protectingfloridatogether.gov/BiscayneBayCommission>

Meeting Wrap-Up and Adjourn

Wade Lehmann thanked everyone for participating in the meeting and reviewed accomplishments and next steps. The next WQPP meeting will be held on October 8-9, 2025 in Marathon, and will include a 1 day Steering Committee meeting and a one day mini-research symposium. More details will follow. The meeting adjourned at 12:20 pm.