

**bold italicized text is used to indicate items requiring attention before next meeting*

Florida Water Resources Monitoring Council (FWRMC)
Public Meeting of Statewide Council –January 21 & 22 2015
Day one- January 21 2015: Continuous Monitoring

Attendees (X indicates present, * indicates guest attending as a representative for a Council member):

Agency	Primary Members	In Person	Webinar
Department of Agriculture & Consumer Services (DACS)	Kal Knickerbocker		
Department of Health (DOH)	Charlie Donahue	X	
Fish & Wildlife Conservation Commission (FWC)	Amber Whittle		X
Department of Environmental Protection (DEP)	Kate Muldoon	X	
Northwest FL Water Management District (NFWMD)	Kris Barrios	X	
Suwannee River Water Management District (SRWMD)	Erich Marzolf	X	
St Johns River Water Management District (SJRWMD)	Aiša Cerić	X	
Southwest FL Water Management District (SWFWMD)	Roberta Starks		X
South FL Water Management District (SFWMD)	Linda Crean		X
US Environmental Protection Agency (USEPA)	David Melgaard		X
National Oceanic & Atmospheric Administration (NOAA)	Chris Sinigalliano		
US Geological Survey (USGS)	Scott McBride		
FLERA – Northwest; Escambia County (Co.)	Keith Wilkins		
FLERA - Suwannee River; Alachua Co.	Gus Olmos		
FLERA - St Johns River; City of Jacksonville	Tom Carey	X	
FLERA – Southwest; Manatee Co.	Rob Brown	X	
FLERA – South; Miami–Dade Co.	Lisa Spadafina		X
Volunteer Monitoring Programs; FL LAKEWATCH	Mark Hoyer	X	
FL Lakes Management Society (FLMS)	Sean McGlynn		X
Coastal Ocean Observing System (COOS Consortium)	Patrick Welsh		
Agency	Alternate Members	In Person	Webinar
DOH	Bob Vincent		
FWC	Paul Carlson		X
DEP	Rick Copeland	X	
NFWMD	Edward Chelette*	X	
SRWMD	Tom Mirti	X	
SWFWMD	Granville Kinsman		X
SFWMD	Julianne LaRock		X
USGS	David Sumner		
FLERA – Northwest; Escambia County (Co.)	Chips Kirshenfeld		
FLERA - Suwannee River; Alachua Co.	Chris Bird		
FLERA - St Johns River; Volusia Co.	Michelle Leigh		X
FLERA – Southwest; Pinellas Co.	Kelli Levy		
FLERA – South; Palm Beach Co.	Rob Robbins		
Agency	Council Chair	In Person	Webinar
DEP	Gail Sloane		X
Agency	Council Liaison	In Person	Webinar
DEP	Lisa Van Houdt	X	

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Agency	Guests	In Person	Webinar
DEP	Kyle Ferris		X
DEP	Rick Owen		X
DEP	Cindy Fischler		X
DEP	Ann Lazar	X	
DEP-ANERR	Lauren Levi	X	
ORCA	Warren Falls	X	
ORCA	George L. Jones	X	
ORCA	Dr. Edie Widder	X	
FWC	Jessica Griffith		X
City of Jacksonville	Betsy Deuerling		X
SJRWMD	Charles Jacoby		X
SJRWMD	Ashley Parks	X	
SJRWMD	Sue Connors		X
SJRWMD	Margie Lasi		X
SJRWMD	Brian Sparks	X	
SJRWMD	Elizabeth Mace		X
SJRWMD	Robert Burks		
SJRWMD	David Hornsby	X	
NWFWMD	Trevor Fagan		X
SWFWMD	Dave DeWitt		X
SWFWMD	Catherine Wolden		X
SFWMD	Brad Robbins		X
SFWMD	Robert Shufford		X
Florida Parks Service	Dana Bryan	X	
University of South FL (USF)	Jan Allyn		X
EPA- R.4	Simona Platukyte		X

Introduction

Gail Sloane (GS) welcomed everyone to the meeting and summarized the accomplishments from the 2011-2014 FWRMC efforts. GS indicated that today's meeting would include presentations on continuous monitoring efforts, and a facilitated discussion regarding challenges and successes.

Julie Espy, Water Quality Assessment Program, DEP:

Julie Espy, the program administrator for the Water Quality Assessment Program (WQAP) presented on the continuous monitoring efforts of the Florida Department of Environmental Protection's (FDEP) Division of Environmental Assessment and Restoration (DEAR).

Presentation Overview:

FDEP defines Continuous Monitoring as "data collected over a series of time using a recording device". Because a significant amount of data can be collected over a series of days or weeks, much more can be understood about dynamic waterbodies. DEAR currently uses continuous monitoring to obtaining diel measurements for Dissolved Oxygen (D.O.) studies, especially in tidal and intermediate zones, as well as to obtain field parameters and nutrient measurements.

Rick Hicks, Groundwater Protection Section (GWP), DEP:

Rick Hicks, an administrator, the presented on the continuous monitoring efforts of the Florida Department of Environmental Protection's (FDEP) Groundwater Protection Section (GWPS).

Presentation Overview:

Rick described the GWP section projects, which have continuously monitoring sondes with telemetry systems uploading to websites. The GWP Section has contracts with the Water Management Districts, Cardno-Entrix, and Loche Consulting. Has automated sondes in Ginnie Springs for monitoring rain events and agricultural activity in real time that allow DEP to understand potential causation by comparing analytes monitored. In addition, these sondes also use telemetry to monitor the sonde connections and maintenance needs.

The contract with Cardno-Entrix is to monitor groundwater seepage into surface water systems, especially useful for tracking septic system effluent. GWP Section models results using ArcInlet, for which Rick presented a slide of residential septic tank GW flow into SW systems. (The model currently has no calibration). Model predictions can lead to additional monitoring wells and stations. Also employs the Krupa-Seep to monitor GW flow into SWs, although GWP Section plans to develop its own seepage meter. The GWP Section obtains flow direction in wells for models by measuring the heat pulse.

Ann Lazar, Florida Coastal Office (FCO), DEP:

Ann Lazar presented on the continuous monitoring efforts of the Florida Department of Environmental Protection's (FDEP) Florida Coastal Office.

Presentation Overview:

Ann reiterated that the FCO includes the National Estuary Research Reserves, Aquatic Preserves, Gulf of Mexico Alliance, and the liaison for the RESTORE Act funding. She addressed the fact that NOAA has been conducting continuous monitoring studies in the National Estuarine Research Reserves for about two decades, and already has a nationwide network that uses specific makes and models of sondes, has developed SOPs, training, a centralized database (CDMO), and other features that serve as a template for continuous monitoring efforts. The database also has a webpage to share data with the public. Lauren Levi indicated that the NERRS use YSI EXOs, which cost about \$14,000 each; there are two/site that are swapped out every two weeks for

maintenance. These are less prone to fouling, have interchangeable probes, and are accurate and precise. The Charlotte Harbor APs and St. Martin's Marsh AP also use continuous monitoring devices.

Catherine Wolden, Southwest Florida Water Management District (SWFWMD):

Catherine Wolden presented on the continuous monitoring efforts of the Southwest Florida Water Management District.

Presentation Overview:

Most of SWFWMD's continuous monitoring is used to determine flow and for meteorological purposes. Most of these will be going to near-time to obtain information on minimum flows and levels (MFL). It does not monitor nutrients with these automated devices, but plans to use Cycle-P, and SUNA devices to collect nutrient data in the future. SWFWMD has ~1269 continuous monitoring events (Sondes deployed for various on-going monitoring projects). The WMD uses YSI EXOs, 6600, 6000 series to collect, and it shares data with others working on MFLs and springs. Its focus in 2015 is developing MFL for the Central Florida Water Initiative; the focus in 2016 is nutrients in springs.

Erich Marzolf, Suwannee River Water Management District (SRWMD):

Erich Marzolf presented on the continuous monitoring efforts of the Suwannee River Water Management District.

Presentation Overview:

SRWMD is working closely with the Florida Geological Survey (FGS), U.S. Geological Survey (USGS), DEP's GWP section and State Parks to understand springs spatially and temporally. To this end, the WMD deploys continuous monitoring devices in many springs and waterways, and has created innovations to protect them, as well as allow easy retrieval. Sometimes, three different types of continuously-monitoring sondes are deployed together. The accuracy and precision of the deployed sondes are checked using 1) monthly manual sampling for analytes of interest and 2) telemetry to allow near real-time data checking for outliers, or junk data. Erich emphasized that continuous monitoring devices are useful in understanding systems, but should not be used in regulatory manners (no EPA-approved methods).

Brian Sparks, St. Johns Water Management District (SJRWMD):

Brian Sparks presented on the continuous monitoring efforts of the St. Johns River Water Management District.

Presentation Overview:

The WMD uses YSI EXOs, Cycle (PO4), and SUNA V2 (nitrates) continuous monitoring devices at 20 sites, but only a subset of the data are on its public site. Its website includes a Continuous Water Quality Data Tool that can pull any parameter, any status, as well as the max, min, and mean for its measurements. It stores the hourly data in the WMD's HYDSTRA database. All its sites are on telemetry to monitor the sondes for accuracy, precision, and outliers.

Paul Carlson, Florida Fish and Wildlife Commission, Fish and Wildlife Research Institute (FWCC/FWRI):

Paul Carlson presented on the continuous monitoring efforts of the **Fish and Wildlife Research Institute (FWCC/FWRI)**

Presentation Overview:

FWRI is focusing on continuous monitoring using remote sensing, thereby precluding the issues with vandalism and biofouling. This effort, known as the Virtual Buoy System (VBS) is funded by NASA, and is useful for obtaining optical water data, such as river discharge, optical quality, nutrient loads and seagrass losses. It

monitors 200 sites annually in the Big Bend area of Florida. MODIS allows visualization of the Suwannee River plume into the Gulf. Different wavelengths can be used to determine whether sediments/detritus (CDOM) or algae (Chl-a) are causing the plume.

Dr. Edie Widder, Ocean Research and Conservation Association (ORCA):

Dr. Edie Widder presented on the continuous monitoring efforts of the Ocean Research and Conservation Association.

Presentation Overview:

Orca deploys several types of continuous monitoring devices in the Indian River Lagoon (IRL). Besides EXOs and YSIs, it deploys devices, known as Kilroys, that are custom-designed to be wireless, inexpensive, easily mounted and maintained, and to collect field measurements. ORCA is especially interested in measuring biotoxicity caused by runoff and GW discharge into the IRL. Systems cannot function in the clean water/dirty water pulses that characterize inflow into the IRL. Currently, ORCA is installing a new system into creeks and canals that contribute to the IRL.

Discussion:

To prepare for the discussion, Lisa Van Houdt (LVH) and Kate Muldoon (KM) grouped and summarized continuous monitoring challenges and potential solutions in a PowerPoint for Julie Espy (JE), the facilitator. The four priority challenges are:

- Equipment Maintenance and Associated Costs
- QA/QC and SOPs
- Data Sharing, Availability, and Comparability
- Design and Implementation

Equipment Maintenance and Associated Costs

This may vary based on seasonality and waterbody types, with continuous monitoring sondes in marine or estuarine waters requiring higher maintenance (every 1-2 weeks) than those in freshwater bodies (every 2-4 weeks), where there are fewer fouling organisms. NOAA typically changes out its sondes every 2-3 weeks, based on fouling and need for battery changes.

It was noted that turbidity and optical sensors are the most difficult to maintain. In terms of staff time, a YSI EXO unit generally requires ~ 1 full time employee (FTE). Any unit in a marine environment will require nearly .5 FTE

Maintenance solutions include:

- Use solar panels as power sources for telemetry and to preclude maintenance for battery changes, since solar-powered batteries need replacement only once every three years;
- Install a pump to pump water through and over sensors (however, pumps require a lot of power);
- Use UV light to disinfect & clean sensors, although this requires a lot of battery power also;
- To reduce power usage, turn on telemetry modems for 10 minutes only once or twice/day;
- 50W solar panels can be used to power pumps.

To protect expensive sondes from vandalism, participants had developed a number of strategies, such as:

- Place sonde and signage in public locations, such as state parks;
- waterside owners willing to oversee a nearby sonde;

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- Sondes locked in a flow-through container and submerged;
- Use crowd-sourced technology to report on sonde condition;
- Decorate sonde containers with an American flag, a Confederate flag, or a large number “3”, which was Dale Earnhardt’s NASCAR number.

QA/QC and SOPs

SOPS and QA/QC differ from instrument to instrument as well as among manufacturers, so this issue complicates things. The SUNA 2 is not approved by the EPA, and the YSI EXO2 is approved by EPA only for field methods. The Cycle doesn’t need any on-site calibration but requires that it be sent back annually to manufacturer for maintenance and calibration. The Kilroy runs a calibration standard before each sample. The WMDs validate their CM data via grab samples. Current Council consensus is that the YSI nitrate probe needs many improvements before Council members would recommend it.

NOAA SOPS already exist for continuous monitoring devices, so these can be used as a template, or starting place:

- Installation
- Maintenance
- Three level data review
- All SOPS are updated annually
- an annual tech training
- data management and handling
- Calibration

The Council/Florida monitoring entities must determine the amount of acceptable variability in monitoring results. We should also make decisions about whether alternative methods would be appropriate. Participants in the discussion recommended that we provide information on the Nutrient Sensor Method, and on products developed by the NWQMC’s Continuous Monitoring workgroup.

Data Sharing, Availability, and Comparability

The Council will be able to share CM data via the Watershed Information Network (~2017) or other specific websites.

ORCA has its own database, with the size of ORCA’s data files currently at 1 Terabyte.

SJRWMD is using Hydstra to both evaluate and manage CM data.

DEP is currently looking at Aquatics Informatics to store CM data, and may collaborate with NFWMD on a license for data management and storage.

Design and Implementation

The Council agrees that it will develop a document to inform monitoring entities who are considering continuous monitoring of its pros and cons and considerations.

The SJRWMD identified common failures in deploying a continuous monitoring device:

- Modem failure;
- One instrument stops communicating;
- One of the probes fails.

A suggested solution for fouling is to wrap the sonde in saran wrap, and secure with duct tape. This layer can simply be cut off to inspect the sonde. The sondes are also deployed in pre-drilled PVC pipes to

preclude corrosion and bent brushes. SJRWMD also uses sondes on vertical, moveable platforms to address water level changes and prevent vandalism.

To successfully deploy these devices, staff to address telemetry and water sampling are both needed. For example, the operations and management group and the data collectors must work together to achieve a successful outcome. In fact, technical errors can be reduced by using a team “check” approach when installing devices. In terms of the data collectors, SWRWMD indicated that joint water quality and hydrological teams can best address issues that arise from CM devices, as well as work together to understand the system being monitored. In some cases, the data dictionary may need to be modified if the device is moved to another location.

On more technical note, Council members indicated that specific conductance probes may not work if the temperature exceeds a certain range. In addition, switching manufacturers can result in new logistics, causing disruptions. The telemetry equipment and sampling devices may not be compatible, resulting in additional costs. However, telemetry is very useful, not only for obtaining data in real-time, but also as a means to ensure data quality (e.g. weird or no measurements may result if a probe fails or the device gets fouled or vandalized).

Questions / Comments / Open Member Dialog

GS concluded the meeting and indicated that the meeting will continue tomorrow and will include product updates from the all FWRMC workgroups, including the Catalog Workgroup (Water-CAT), Salinity Network Workgroup (Groundwater level and quality indices), and the Coastal Monitoring Workgroup (adverse event response plan). The meeting will also include Council business items such as follow-up from the Planning Meeting held in October, and next steps for continuous monitoring.

Meeting Evaluations

Do you have any comments or suggestions on how to improve the new “Themed Meeting” format?

- Liked it
- Everything was super
- This format has gotten off to a great start! The continuous/real-time monitoring presentations and associated discussions were great. We have hit on a very "needed attention" item!
- Good start... next time inviting federal counterparts that may have more experience on this particular themed meeting
- I thought it was a good webinar/meeting
- Enjoyed the meeting and learning what others are doing with respect to continuous monitoring.
- This discussion part should not include the call-in people

What topics / presentations were most useful?

- All of the real time monitoring presentations were good, and the Big Bend sea grass talk was very good
- Everything was useful, & provided a comprehensive overview of continuous monitoring issues.
- All Themed Meeting presentations and discussions on real-time monitoring trials and tribulations. Make sure we don't leave out levels and discharge monitoring for soon to be Workgroup discussions.
- Who's using what technology and the solutions found for some of the common challenges
- All were useful (2 votes)

What topics / presentations were least useful? Why?

- None (two votes)
- Discussion, Couldn't hear it on the webinar.

What topics would you like to see at the next FWRMC meeting?

- Lakes monitoring, stream water quality, and discharge monitoring

Meeting at Tallahassee (DEP – Bob Martinez Center)

- Good (votes 6) / Fair (votes) / Poor (vote)

Webinar

- Good (votes 2) / Fair (votes 3) / Poor (vote)

Presentation time / format

- Good (votes) / Fair (votes) / Poor (vote)

Discussion time / format

- Good (votes 7) / Fair (votes) / Poor (vote 1)
- Call-in issues limited some discussion time.

Other comments / suggestions

- Senior management from Council membership should attend.
- All seemed to go well except webinar connections were acting up with long meeting time, but staff troubleshoot well.