

Florida Water Resources Monitoring Council (FWRMC)
Public Meeting (Webinar) of Salinity Network Workgroup – February 9, 2012

Attendees:

Agency	Name
DEP	Rick Copeland
DEP	Gail Sloane
DEP	Stephanie Sunderman
DEP	Gary Maddox
DEP	Tom Seal
DEP (FGS)	Cindy Fischler
NWFWMD	Chris Richards
SRWMD	Megan Wetherington
SJRWMD	Don Boniol
SJRWMD	Tom Mirti
SWFWMD	Dave DeWitt
SWFWMD	Granville Kinsman
SWFWMD	Ken Romie
SFWMD	Cindy Bevier
SFWMD	Lucia Baldwin
USGS	Scott Prinos
Alachua Co.	Jim Myles

Welcome / Introductions

Rick Copeland (RC) welcomed everyone to the third meeting of the Salinity Network Workgroup and reviewed the agenda for the meeting.

Review of December Meeting / Monitoring Sites

Rick Copeland (RC), FDEP, presented information covering a review of the December 2011 meeting and the monitoring site locations to potentially include in the network
 (presentation slides can be found in the 2012 archive section of FWRMC website)

- Action items from the December 2011 meeting:
 - o Gail Sloane (GS) thanks Salinity Network (SalNet) participants for assisting in compiling site information. In the future, this information can also be included in a publically accessible online statewide Water Resource Monitoring Catalog.
 - o Begin the development of a framework document for SalNet (on today's agenda)
 - o Polled group regarding formation of a subgroup to address indices. Poll indicated that most SalNet members wanted to participate in the discussion of indices, so there is no need for a subgroup.
 - o Will continue to work closely with the surface water (SW) monitoring programs.
 - o RC will present an update of SALNET activities at the Statewide FWRMC meeting on February 21-22, 2012 in Tampa.
- At the December 2011 meeting, Rodney DeHan made several recommendations to the FWRMC to address the unique nature of karstic watershed and the national-level projects and policies that must be implemented in order to manage them. RC noted that the recommendations are commendable and suggested that the Florida Geologic Survey (FGS) recommend that the Hydrogeology Consortium (<http://hydrogeologyconsortium.org/index.html>) explore the feasibility of taking the lead on these tasks. FWRMC and SalNet participants can support and assist as appropriate.

- Monitoring site information submitted by SalNet participants
 - o Groundwater (GW) levels have a good distribution statewide from WMDs
 - Floridan aquifer system (FAS) has good density throughout the state but is sparser in south FL
 - intermediate aquifer system (IAS) has good distribution in areas where it is of greater interest / use (southwest FL and St. Johns have greatest density).
 - surficial aquifer system (SAS) has good distribution throughout the state, with greatest density in southwest, south, and St. Johns.
 - o Groundwater Quality (WQ) distribution is more limited than GW level monitoring sites, and density varies across the state from WMDs
 - FAS density is greatest in southwest, south, and St. Johns
 - IAS has limited coverage, with greatest density in southwest
 - SAS has few wells (mostly DEP Trend Network), dispersed across the state
 - o Alachua Co. has several additional GW level and WQ monitoring sites, though some may be the same well as those reported by the WMDs or DEP
 - o SFWMD has dense network of consumptive use permit (CUP) wells, mostly along both coasts. SalNet participants will need to discuss if/how data from CUP wells will be used for SalNet analyses and reports.

Issues of Concern

Dave DeWitt (DD), SWFWMD, presented information on additional statewide issues of concern for SalNet development

(presentation slides can be found in the 2012 archive section of FWRMC website)

- Presentation mentioned several additional big picture topics that may be considered / mentioned in the framework document
 1. The Lower Floridan aquifer (LFA) and its prospects for water quality monitoring. Currently the SalNet group has been grouping all FAS data together. It is important to acknowledge that the FAS is a complex system.
 2. Occurrence, distribution, and numbers of wastewater injection/disposal wells and aquifer storage and recovery facilities. These may need to be considered in the development of the SalNet.
 3. Public supply wells and compliance monitoring may have additional data that could be useful to the SalNet effort.
- Areas of interest in SWFWMD:
 - o Central Florida Coordination Area – looking at available GW for future use, and supplemental GW sources from deeper aquifers. It is a collaboration of efforts by SWFWMD, SFWMD, SJRWMD, and local governments. Visit Central Florida Water Initiative (CFWI) website (<http://cfwiwater.com>) for more information.
 - o Southern Water Use Caution Area (SWUCA) – looking at agricultural supply and salt water intrusion
- Issue 1 - aquifer zonation
 - o Important to consider vertical complexity when developing monitoring framework
 - Upper Floridan aquifer (UFA) has two monitoring zones within it
 - Additional potable / usable GW appears in the Lower Floridan aquifers (in places, there is more than one aquifer in the Lower Floridan)
 - o Also Important to consider geographic / lateral variability when developing monitoring framework
 - FAS is the primary aquifer system used / monitored in most of the state (except western panhandle and southern peninsula). Most of this effort is focused on the UFA, but there is potential for efforts in the Lower Floridan aquifers to increase.
 - Confinement of UFA varies. Most large magnitude springs are in unconfined areas in central west FL.
 - The context of the Lower Floridan aquifer is important. Within the CFWI, middle confining unit I and II overlap, resulting in two Lower Floridan aquifer zones. Water quality beneath middle confining unit II is brackish / saline / not potable, but water

- quality beneath middle confining unit I is usable (and is being used by SJRWMD and SWFWMD).
- o SFWMD recently installed deep exploratory wells in CFWI area to evaluate the LFA at depths of up to 2,700 feet.
- o SWFWMD and SJRWMD have active monitoring of LFA wells
 - SJRWMD has 45 wells with GW levels and WQ data
 - SWFWMD has recently begun collecting WQ data at several wells, with several more proposed
- Issue 2 – wastewater injection wells and aquifer storage and recovery facilities
 - o Good statewide distribution of permitted sites (active and inactive), but greatest density is in coastal areas and near major urban areas. These sites will need to be acknowledged in a network that includes coastal GW and salinity monitoring. However, usefulness of associated data to SalNet analyses will need to be determined.
 - o Several types: Class I = domestic wastewater disposal; Class V = aquifer storage and recovery facilities (ASR); Class V non ARS (stormwater, geothermal heat pump, etc)
 - o Active Class I injection sites
 - 189 wells at 112 sites
 - Mostly used for domestic wastewater disposal or blended saline reverse osmosis reject water
 - Mostly injected into LFA, but some older facilities near Tampa Bay inject into the UFA
 - o Active Class V ARS sites
 - 115 wells at 42 active facilities (7 new sites proposed or under construction)
 - Mostly treated surface water stored in UFA
- Issue 3 – Is data available from facility compliance monitoring (public supply or other GW facilities) useful for SalNet monitoring efforts?
 - o Could be used for filling data gaps in southwest and south FL, especially in LFA
 - o Possible data available: public supply (production and monitoring data) / Class I injection facilities (monitoring well data above injection zone)
 - o Would need to acknowledge purpose that data was being collected for

Questions / Discussion

If we are interested in using this information, we will need to assess if it is available / in an electronic format. For example, public supply data was compiled for CFWI area, and is available electronically.

It is important to consider all of these potential data sources to make sure that the SalNet effort is as thorough as possible. These sources will also be helpful for the FWRMC Monitoring Catalog effort, to show a statewide picture of all water resource monitoring being conducted in FL.

Framework Document / Indices

Rick Copeland (RC), FDEP, presented information on developing a framework document for the SalNet and indices for GW levels and salinity

(presentation slides can be found in the 2012 archive section of FWRMC website)

- Legal justification for forming the SalNet - FS 373.036 has language that justifies
 - o Conducting research and investigations into all aspects of water use and water quality
 - o Having a central repository and cooperating in making available scientific and factual data
 - o Cooperating in exchanging ideas and conserving water in the State
 - o Disseminating to the public, current and useful information relating to the water resources of the State.
 - o Identifying areas of the State where saltwater intrusion is a threat to freshwater and reporting to the WMDs, counties, and the public.
- FWRMC Action Plan includes justification to
 - o Improve coordination among monitoring entities
 - o Increase integration of freshwater and coastal monitoring
 - o Create / Sustain collaboration among monitoring entities
- EPA 10 Elements (<http://water.epa.gov/type/watersheds/monitoring/statemonitoring.cfm>) can be used as a guide for the framework document

- Will send out all drafted items related to framework documents to the SalNet members for editing and comments. It is important that the framework document capture what the participating agencies feel is important.
- Draft preamble - Encroachment of saline water into FL's freshwater regimes can potentially and adversely affect drinking water supplies, agriculture production, surface water habitats, and thus the overall economy of FL.
- Draft mission statement - The mission of the Salinity Network is to assist in the protection, preservation, management, and restoration of Florida's GW and SW resources, by teaming with the FWRMC and monitoring entities of the state in order to coordinate and improve monitoring activities. Emphasis is on the monitoring of GW levels, saline indicators, and both surface water and spring flows, as they pertain to potential and real encroachment of saline water into FL's freshwater resources.
- Draft goal - The goal is to provide scientifically defensible data and information on the important chemical, physical, and biological characteristics of water that can be used by public and governmental agencies in order to better understand the status and trends regarding the encroachment of saline water into FL's fresh water regimes.
- Draft objectives:
 - o Encourage GW and SW monitoring programs in FL to participate in FWRMC (Council) activities and work toward common goals.
 - o Develop methods for the easy transfer of relevant data as necessary.
 - o Through the Council, encourage relatively frequent reporting of the status and trends for saline indicators, GW levels, and both surface water and spring flows.
 - o Develop and use indices and other tools to evaluate the status and trends of saline encroachment that, to the extent practical, are uniform among monitoring entities in calculation methodologies, and are relatively easy to understand by the general public and policy makers.
 - o Use indices and other tools to assist in evaluating the threat of encroachment to water supplies and determining the cause of saline encroachment.
- Additional Important Issues to discuss / resolve
 - o Decision making process – RC and GS suggested adopting consensus guidelines similar to those used by the FWRMC (the system described below was presented at the Statewide FWRMC meeting on 8/30/2011)
 - A quorum is defined as a majority of the overall voting membership. (50% plus 1)
 - Decisions can only be made at meetings at which a quorum is present.
 - Every attempt will be made to make decisions by consensus.
 - Consensus is shown as follows with a ranking of 5 through 1:
 - 5 means wholehearted support
 - 4 means support
 - 3 means neutral but will support fully to outside world
 - 2 means you still have questions you need to ask
 - 1 blocks any decision
 - Consensus is defined as everyone displaying a ranking of no less than 3.
 - In the event anyone gives a ranking of 1 or 2, discussion will continue to answer questions or concerns of those blocking. If there are no 1's or 2's, then consensus is reached on that issue and you will move on to the next issue to be discussed.
 - Voting will be used only if consensus cannot be reached in a reasonable amount of time.
 - If a vote is necessary, a supermajority (67%) of voting representatives present will be required to pass an item.
 - o Who / What organization is to chair the SalNet? The Chair does not need to be from DEP. Options can include rotating the Chair position among agencies, or having a Co-Chair.
 - o How to address other non-salinity related issues? Potential solutions include changing the group name to "GW Issues" or forming other groups to focus on other specific issues.
- Development of an index or indices
 - o Use of percentile ranks for GW levels had support at the December 2011 SalNet meeting

- o At least two of the WMD's and USGS already use percentile ranks for some types of reporting
- o The index for salinity could use specific conductance or chloride data (more specific conductance data seems to be available than chloride). Scott Prinos will discuss more detailed ideas for the salinity index at the next SalNet meeting.
- Focus on percentile ranks as an index for GW levels - Ideally, this index should have the following characteristics:
 - o Use uniform methodology to calculate
 - o Can be used at a variety of scales
 - o Can be used for an aquifer or aquifer system
 - o Recognized by public, policy makers, and scientists
 - o A tool to be used by policy makers
 - o Tool should consider GW/SW interactions if applicable
- Potential products could be Potentiometric surface maps and contour maps of percentile ranks.
- Clarified definition of parameter as a discrete chemical or microbiological entity which can be assigned a value. Parameter, analyte, and indicator are used similarly, but using "parameter" is preferred for specific conductance measurement data, as there is no implied need for analysis.
- Clarified definition of index as a single number calculated from an array of quantities.
- Clarified definition of saltwater encroachment as the displacement of fresh ground water by the advance of saltwater due to its greater density. This is usually observed along the base of the aquifer.
- Clarified definition of saltwater intrusion as the migration of saltwater into freshwater aquifers under the influence of GW development. This can be observed in many areas, especially along manmade structures.

SWFWMD Aquifer Resource Indicator

Granville Kinsman (GK), SWFWMD, presented information on the SWFWMD Aquifer Resource Indicator (presentation slides can be found in the 2012 archive section of FWRMC website)

- SWFWMD Data Collection Bureau is responsible for taking data from over 2500 GW, surface water, rainfall, and evapotranspiration sites (over 1100 have hourly recorded data), and putting it into context for evaluating hydrologic conditions in a monthly report to the Governing Board.
- GW monitoring network is extensive. Sites are located in all three aquifer systems, but the FAS has the greatest number of sites. Many sites have records of 50 years. ~700 sites have continuous recorders and ~400 have near real time data upload.
- Wells selected for inclusion in Aquifer Resource Indicator analysis (51 wells) have a period of record of at least 20 years of daily records, known well construction, are preferably located in the FAS (though some IAS wells with long period of record are included), and have an even geographic distribution
- Data set is created using daily maximum elevations or daily instantaneous elevations. Data gaps less than 60 days are in-filled, and data gaps greater than 60 days are considered missing.
- Percentiles are calculated by creating weekly percentile tables, which are maintained for at least a year. Rankings are rounded up to the nearest percentile, and when a single value is represented by multiple percentiles, the maximum percentile is assigned.
- The weekly report is created using SAS to perform a routine grab from SCADA system. Individual well elevations are compared against stats for the same week and reports are generated summarizing percentiles and regional mean percentiles. The last report is published in the monthly hydrologic condition report.
- Report includes the regional averages, regional relation to median and 25th percentile (to allow for easier tracking of improving / worsening conditions), and individual well elevations and percentiles.
- Regional percentiles are graphed over time and have been found to be correlative with 12-month cumulative rainfall, and are a good indicator of drought conditions.
- Limitation to methodology:
 - o Varying period of record (Wells with longer records have wider range of conditions but less frequent readings. Wells with shorter records have daily and hourly readings.)

- o Not adjusted for long-term trends (Areas with longer periods of records are affected by regional water use. Areas with shorter periods of record are affected by drought and flood cycles, therefore “normal” conditions for short period wells will be much lower than those observed for longer period wells.)

Questions / Discussion

RC asked what the distribution of evapotranspiration (ET) stations was. GK responded that they are scattered throughout the district. GK also indicated that the SWFWMD ET station monitoring may be discontinued in the near future because similar data is available through the University of Florida's statewide ET data collection network (part of the Florida Automated Weather Network – FAWN, <http://fawn.ifas.ufl.edu/>).

Other analysis methods, without some of the limitations mentioned, are showing similar trends regarding the relationship between rainfall deficit and deficit in GW recharge.

SJRWMD Upper Floridan Aquifer Water Level Report

Don Boniol (DB), SJRWMD, presented information on the SJRWMD Upper Floridan aquifer Water Level Report

(presentation slides can be found in the 2012 archive section of FWRMC website)

- SJRWMD water level network currently has 717 wells (234 SAS, 92 IAS, 324 UFA upper permeable zone, 22 UFA lower permeable zone, 45 LFA); does not include Consumptive Use Permitting monitoring or wetland monitoring
- Main objectives:
 - o Evaluate the response of aquifer systems to changes in climate and the demand to meet growing water supply needs.
 - o Provide data from long-term measurement of water levels from wells and springs needed to assess current aquifer conditions, analyze trends, and calibrate models.
 - o Share data and information about characterization of the hydrogeologic system, climate, pumping, and land use changes.
- UFA monthly water level report
 - o Graphically and spatially depicts where current UFA levels are with respect to period of record highs and lows.
 - o Uses percentile ranks to normalize data
 - o Monthly report started in 2007, in response to drought conditions.
 - o Percentile ranks are also used in monthly hydrologic condition report to SJRWMD Governing Board.
- Data preparation
 - o For each well, a daily average water level is computed from recorder hourly values. The Daily averages are used to compute the monthly mean. The period of record (POR) monthly mean water levels are ranked.
 - o Percentile indicates percent of monthly mean water levels for a well ranked at or below the mean water level of the month of interest.
 - o Percentile rank indicates percentage of values that fall at or below the mean water level of the month of interest.
 - o Highest and lowest monthly mean water levels have a percentile rank of 1 (100%) and 0 (0%), respectively.
- District-wide percentile rank
 - o Calculated by determining current monthly percentile rank for each well, then finding the median of all percentile ranks for all wells within the district.
- UFA Monthly Water Level Report
 - o Period of interest for report determined by calculating percentile ranks for more than 200 UFA wells with monthly continuous records since 1980. Highest and lowest UFA water levels occurred in 1998 and 2001, respectively. Thus, report uses wells with telemetered water levels and data since 1998 to report monthly changes in UFA water levels based on percentile rank.

- o Currently, 107 UFA wells selected for inclusion have near real-time monthly data for a minimum POR of 1998 – present.
- o Highlighting May and September median monthly UFA water levels as a percentile usually captures district-wide yearly low and high points.
- o Using percentile rank method is an effective way to compare observations, reduce effects of outliers, and provide an easily interpretable relative standing.
- o Normalizing water levels to percentile ranks allows for comparison and tracking of district-wide and regional changes.
- o Table is produced for regional (north / central / south) comparison, listing the percentile rank of the current month, highest water level (March 1998), lowest water level (May 2001), same month of the previous year, and the preceding month.
- o Maps are produced to evaluate water levels spatially. Individual wells are plotted with their respective current month percentile rank. Maps from current month are also compared to maps of same month from previous years.

Questions / Discussion

Tom Mirti indicated that the map prepared for the monthly report to the Governing Board also uses percentile ranks, but it uses a kriging analysis to show differences in regions and does not display individual wells.

DB also added a quick summary of the processing steps and software used to analyze the data for the UFA Monthly Water Level Report, clarifying that there is a QA step needed after pulling the near real-time data, before analysis can begin.

Discussion

Use of percentile ranks

RC asked GK and DB if their analysis methods could be used with data collected less frequently than hourly. They indicated that it could be done, but cautioned that the precision would be reduced. Using hourly data allows them to base the report on the daily maximums, while using less frequent data would likely result in having a report based on means.

RC asked if SFWMD uses percentile ranks. Cindy Bevier responded that they also collect high frequency water level data. There is no report produced that uses percentile ranks, although they do report on information found on USGS trend compensated site.

RC asked if SRWMD uses percentile ranks. Megan Wetherington responded that they produce a monthly hydro conditions report based on percentiles. The analysis has many of the same limitations that have already been mentioned, but a kriging analysis is performed to produce a map with coarse categories that are less limited by differences in POR. The POR for the monthly report is 1976 - present.

RC asked if NFWMD uses percentile ranks. Chris Richards indicated that they do not regularly report based on percentile ranks. The POR is highly variable among wells, with limited high frequency data available.

RC asked what limitations might be encountered if the SalNet tried to calculate a statewide GW level index using percentile ranks.

- Limitations include finding common sampling frequency and POR (limits to how often analyses / maps could be produced, and which wells could be included)
- Trends may be problematic – may need to show trends and frequencies
- May want to do individual well analysis or separate confined and unconfined wells, as response in confined wells is usually lagged compared to unconfined wells.

Action Items

- RC will send out drafted portions of framework document for editing and comments
- RC will send out questionnaire about use of percentile ranks

- GS asked RC to give an overview of Salinity Network progress at the Statewide FWRMC meeting on Feb 21-22, 2012 in Tampa (visit <http://www.dep.state.fl.us/water/monitoring/council/index.htm> for more information - all are invited to attend the meeting in person or via the webinar).

Next Meeting

- Scott Prinos will present information on salinity chemistry and developing an index for salinity
- Next meeting will likely be in April 2012