

Florida Water Resources Monitoring Council (FWRMC)
Public Meeting of Salinity Network Workgroup – October 26, 2011

Attendees:

Agency	Name
DEP	Rick Copeland
DEP	Gail Sloane
DEP	Stephanie Sunderman
DEP	Tom Seal
DEP	Kate Muldoon
DEP	Gary Maddox
DEP	Cindy Fischler
DEP	Paul Hansard
DEP	Rodney DeHan
NWFWMD	Chris Richards
NWFWMD	Nick Wooten
NWFWMD	Chris Barrios
SRWMD	Megan Wetherinton
SJRWMD	Don Boniol
SJRWMD	Rob Brooks
SJRWMD	Bob Shelton
SWFWMD	Roberta Starks
SWFWMD	Dave DeWitt
SWFWMD	Granville Kinsman
SWFWMD	Eric DeHaven
SWFWMD	Darrin Herbst
SFWMD	Cindy Bevier
USGS	Richard Verdi
USGS	Brian Katz
USGS	Lester Williams
Alachua County	Jim Myles
DACS	John Teem

Introduction and Background Information

Gail Sloane (GS) welcomed everyone, and noted that as part of the Florida Water Resources Monitoring Council (FWRMC), the Salinity Network Workgroup is a great opportunity for information exchange.

Rick Copeland (RC), FDEP, presented background information

- RC reviewed agenda.
- FWRMC asked FDEP to check into feasibility of having salinity network, find out if there was support for the salinity network from stakeholders, and develop a strategy for what the salinity network might look like.
- Reasons for having salinity network: concerns about declining ground water (GW) levels and concerns about changing GW salinity.

- Examples of previous publications:
 - o “Regional and Statewide Trends in Florida’s Spring and Well Groundwater Quality (1991-2003)” (2009, Florida Geological Survey; Bulletin 69)
 - o “Relation of Aquifer Confinement and Long-Term Groundwater-Level Decline in the Floridan Aquifer System” (Williams, L.J., Dausman, A.,D., and Bellino, J.C., 2011, Proceedings of the 2011 Georgia Water Resources Conference, April 11-13, University of Ga., Athens, Ga.)
- Summary of “Regional and Statewide Trends in Florida’s Spring and Well Groundwater Quality (1991-2003)” (Bulletin 69)
 - o Initial interest was in nutrient trends in springs, but included well data where available
 - o Study found statewide decreasing trends in spring flow and GW levels, and increasing trends in salinity indicators in both springs and in wells
 - o Used data from the greatest number of fixed stations with the longest coinciding period of record: 57 springs, 46 wells, 48 analytes, 1991-2003
 - o For the trend analysis: preformed Mann-Kendall test for each spring/well and assigned significant trends (up or down), then performed sign test for proportions of upward & downward trends at WMD scale & statewide scale
 - o Nitrate trends in springs: SWFWMD mostly up, SJRWMD mostly down, SRWMD some upward some downward – trends were dependant on land use in springsheds
 - o Sodium trends in springs: mostly upward in all 3 WMDs
 - o Sign test for trends in springs: upward for all saline indicators, and downward for spring flow
 - o Possible confounding factors example: Atlantic multidecadal oscillation (sea surface temp) correlates well with rainfall into lake Okeechobee
 - o Noted that it is important to consider the time period and confounding natural cycles when interpreting trends
 - o Severe drought in late 1998 through 2000. At the statewide scale (but based on limited number of stations), GW levels and spring flows have not fully recovered since that time, and GW quality has degraded (concentrations of salinity indicators have increased). These trends are likely due to decreases in rainfall and subsequent recharge, and possibly changes in GW withdrawals.
 - o Example data from several springs: inverse relationship between sodium concentration and flow – magnitude of change is greatest on coast, but relationship is also observed inland

Questions / Discussion:

- Eric DeHaven suggested using “water level index” instead of “quantity index”.
- Rodney DeHan suggested defining the monitoring unit according to the 3-dimentional ground watershed, instead of just saying “surface water” and “ground water”.
- Granville Kinsman noted that SWFWMD and SJRWMD publish monthly reports that qualifies the GW levels according to a percentile, and suggested that this method may be useful for developing an index.

Lester Williams, USGS, presented information from “Relation of Aquifer Confinement and Long-Term Groundwater-Level Decline in the Floridan Aquifer System” (Williams, L.J., Dausman, A.,D., and Bellino, J.C., 2011)

- This work is part of an ongoing regional study by the USGS GW resource program (GWRP) that began in fall 2010, with goals to understand long term trends and hydrologic responses and processes in the Floridan aquifer system.
- Floridan aquifer system underlies about 100,000 sq mi in FL, GA, AL, and MS, and is the principal aquifer throughout the region (except for S. FL where surficial and intermediate are used). Large volume (avg. 3640 Mgal/day in 2000) pumped, with seasonal differences in demand due to agriculture, etc, and regional decline has been observed in some areas.
- Floridan aquifer system is a two aquifer system with upper and lower aquifers separated by middle confining units, but the two aquifers act as a single hydrologic unit, and are mostly

confined below sands and clays of the Hawthorn group, with a few unconfined areas in SW GA and Central and N Central FL. Confined areas have limited direct recharge.

- Example: focused study of confined area in S Central GA, where GW levels have been declining.
- Expanded study to entire aquifer: Compiled data from USGS and 5 WMDs in FL – 33,251 periodic data sites and 2,755 daily value data, from 1965-2010 – data selected were those well with ≥ 20 years of data with at least 3 records. Used best-fit line slope as an indicator of decreasing or increasing water levels, then produced contoured maps of the slopes to examine spatial trends in water level changes for 10 year, 20 year, and 40 year time periods.
- Conclusions: water levels across the entire aquifer system are generally declining over the past 40 years, and the 40 year avg rate of decline was 3 times greater in confined vs. unconfined portions of the aquifer, with reduced spring flow observed in some areas. Long term declines in confined areas can be attributed to a combination of lower recharge rates, increased pumpage, and prolonged drought.

Questions / Discussion:

- Rodney DeHan asked if they've looked at episodic extensive withdrawal events (e.g. increased pumpage to minimize agricultural crop damage.) Rick Copeland (RC) responded that it hasn't been looked at because data has not been available. Gail Sloane (GS) suggested that local organizations may have better data available for such events that have occurred in their areas.
- RC mentioned another investigation (Coastal GW Quality Monitoring Network/Water-Use Permit Net. Report Volume VI – SWFWMD) and asked Dave DeWitt to give a presentation summarizing this study (especially trends in chloride and sulfate) during the next meeting.
- RC showed a screenshot of the USGS Ground Water Watch map, of water level data, and nominates Scott Prino to give a presentation during a future meeting. Tom Seal asked why there is a lack of wells in NFWMD and SRWMD. USGS and WMD staff responded that the wells depicted on the map reflect areas where USGS and USGS collaborators, although but wells are being monitored in the other WMDs by district staff (e.g. SRWMD has 200 wells, with ~80 continuous records and some data going back 40 or 50 years).

Summarizing Information Available

RC asked each WMD to describe what data is available.

- SRWMD: 25-30 springs monitored quarterly for flow & water quality (WQ); 200 wells monitored monthly or continuous records with WQ collected for ~70 trend wells; Period of record is variable (longest record goes to 1948 but most wells began in 1970s and springs began in 1998; ~80% of well are in Floridan aquifer
- NFWMD: 200 wells monitored for water levels with continuous recorders in ~12 wells; period of record is variable but some go back to 1940s, 1960s, or 1970s; wells mostly in surficial and Floridan aquifers with some intermediate; Only spring with WQ monitoring is Wakulla sampled quarterly, but nutrient data from some other springs is available for limited time periods; WQ monitoring for coastal intrusion in 12 wells sampled sporadically
- SJRWMD: 748 active wells monitoring water level with most having continuous recorders; variable depth (several in each aquifer system) and period of record with some dating back to 1950s-60s but most to 1980s; 331 wells in WQ monitoring network, mostly in the Floridan aquifer, sampled 1-2 times per year; 21 springs sampled 4-6 times per yr for cations, anions, discharge, and pool elevation.
- SWFWMD: 370 wells with 215 in coastal network and 152 in Water Use permit network; $\frac{3}{4}$ in upper Floridan aquifer, some in intermediate, and a few in surficial; all 370 wells sampled annually, 227 sampled 3 times per year, including all of the 152 water use permit wells; period of record is fairly continuous for past 15-20 years and some go back to mid 1980s; analytes are temp, specific conductance, pH, major ions; 70 springs sampled annually, multiple spring vents at five 1st magnitude springs groups, about 55 springs sampled quarterly, 15 annually, period of record is 15-20 yrs; 90 wells Upper Floridan aquifer nutrient monitoring program, annual sampling frequency since 2006, period of record for some wells back to early 90s. About 1400 wells sampled monthly for water level with about half on continuous monitors, period of record is mostly since 1980s; USGS monitors an additional 54 wells; 741 surface water sites monitored for

water levels; USGS monitors and additional 131 sites for flow (including 18-20 springs) sites; evapotranspiration monitored at 9 sites, also use UF FAWN data; 182 rainfall sites with period of record since 1990s; radar rainfall since 1995 (cooperative effort w/ other WMDs); monthly pumping data for water use permits over 100,000_gal/day.

- SFWMD: 580 wells with continuous recorders (420 in surficial, others in intermediate and Upper Floridan aquifers) with period of record since 1990s; 83 wells with water level data sampled monthly along east coast; Regional Upper Floridan sampling twice a yr for WQ; No surficial aquifer WQ except through monthly or quarterly permit compliance data; Some evapotranspiration stations; many long term rainfall stations
- USGS: in the panhandle, springs initiative cuts resulted in loss of several gauges in springs but half have been picked up by DEP & SRWMD; Over 100 wells in GA near border (mostly continuous recorders, some WQ)

GS asked about online mapping application or databases with locations of wells and/or station information/metadata/data

- NFWFMD doesn't have online mapping application for GW data, but can distribute data per requests
- SRWMD has information online for active sites, and can distribute other information per requests
- SJRWMD can distribute information and shapefiles per requests
- SFWMD has GW wells available through WMIS online data portal with downloading and online mapping capabilities
- SFWMD has data available in tabular form and shapefile online with downloading capabilities

Potential Model for Salinity Network

Rick Copeland (RC), FDEP, presented a Salinity Network "Straw Man" model

- Network could be supported by Florida Water Resources Monitoring Council (FWRMC)
- Goals: 1) to define status & trends of GW in FL, based on ground-water levels, and quality, as constrained by salinity; and to develop a corresponding GW index or indices; 2) to exchange and provide data at a variety of scales (state/WMD/county/other); 3) to encourage GW monitoring programs in FL to participate in FWRMC activities
- Justification - FS 373.026(5): (paraphrased) Study those areas of the FL where saltwater intrusion is a threat to freshwater and report ...to the WMDs, counties, and the public.
- Action Items (from FWRMC): AI 2 – Increase coordination among monitoring entities; AI2-4 – Increase integration of freshwater & coastal monitoring; AI2-5 – create/sustain collaboration among monitoring entities
- Need to be mindful of difference between intrusion (migration of saltwater into freshwater under influence of GW development) and encroachment (displacement of fresh GW by advance of SW due to its greater density)
- Data and information exchange can include data, metadata, and interpretation of data. Reports could be developed and distributed.
- Target audience is primarily general public and policy makers (12th grade reading level) with more technical reports for scientists.
- Needs: existing trend sampling (minimum sampling frequency = annual) station for wells and springs, and possibly surface water.
- Same concept as National Ground Water Monitoring Network ("Network of Existing Networks")
- Desired analytes
 - o Field: water level, specific conductance, flow, pH, water temperature
 - o Lab: sodium, potassium, chloride, sulfate, total dissolved solids, calcium, magnesium
 - o Other: rainfall, air temperature, GW pumpage, evaporation, evapotranspiration)
- Not required: new funding, new stations, changes in current monitoring activities
- Group could be managed through guidance of FWRMC and would be a cooperative effort of all participating entities. Statewide efforts could be coordinated by FWRMC, DEP, FGS, and WMDs. Regional efforts could be coordinated by FWRMC, WMDs, counties, other organizations. Local efforts could be coordinated by FWRMC, counties and local organizations.

- If reports are produced, they should follow standard / similar format and appearance regardless of scale or specific issue.
- Projected work efforts: exchanging data, participate in discussions (use experts from each agency to discuss specific topics/analysis/etc), produce statewide reports, produce reports at other scales as desired. DEP volunteers to produce statewide report if desired.
- Future discussions: goal refinement, analytical and report refinements, interaction w/ FWRMC, developing framework document. DEP volunteer to make the first draft of the framework document, if desired.
- Next steps: report back to FWRMC(RC will speak at FWRMC next month, with an update from the group). Agencies are asked to give RC feedback regarding if they would like to pursue the Salinity Network idea by **11/15/11**. Participating agencies are also asked to send RC a summary of the information that they presented today with maps of stations if available. Next discussion can include framework document development (mission statement, organizational structure, decision making process)

Questions / Discussion:

- Tom Seal voiced concern that some types of data (e.g. pumpage) won't be available statewide (ex. Pumpage). GS responds that having that data available will be helpful to share information among managers and be used in smaller scale analyses and reports,
- Lester Williams noted that he would send out a link to the presentation the he gave.
- Rodney DeHan noted that reports would be most useful if the reports focused on ~~ground~~ a watershed scale analyses. RC asked Rodney DeHan to prepare a summary of his proposal so that it could be sent to the group.
- Roberta Starks noted that this sounds like a great effort and that SWFWMD has a lot of data available and they are ready to share it and work together on this project.