

**LOWER ST. JOHNS RIVER TECHNICAL ADVISORY COMMITTEE (TAC) MEETING
St. Johns County Utility Department, Matanzas Conference Room
1205 State Road 16, St. Augustine, Florida 32084
March 7, 2013**

Participants

Sam Arden, AMEC	Don Jacobovitz, Putnam County
David Bolam, CCUA	Tom Kallemeyn, FDEP
Derek Busby, SJRWMD	Kerry Kates, Florida Fruit and Vegetable Association
Tiffany Busby, Wildwood Consulting	Brian Katz, FDEP
Greg Caldwell, St. Johns County	Matt Kershner, FDEP
Ed Cordova, JEA	Pam Livingston Way, SJRWMD
Darrell Damrow, CCUA	Greg McGrath, CDM Smith
David Evans, Water and Air Research	Mark Nelson, Jones Edmunds
George Getsinger, NOAA NMFS	Marcy Policastro, Wildwood Consulting
Brett Goodman, Jones Edmunds	Douglas Tarbox, St. Johns County
Kevin Hayes, City of Jacksonville	Patrick Victor, CDM Smith
John Hendrickson, SJRWMD	Ming Ye, FSU
Mike Hollingsworth, USACE	Jennifer Zimmerman, Hach Hydromet
Adam Hoyles, Onsite Environmental	

Welcome and Introductions

John Hendrickson welcomed everyone to the first quarter’s meeting of the Lower St. Johns River (LSJR) Technical Advisory Committee (TAC) meeting. John stated that the idea for this meeting was now that the total maximum daily load (TMDL) for the LSJR Basin is in place, to discuss what projects the stakeholders are implementing and how the water supply efforts are starting to merge with the TMDL efforts so that the goals for both programs can be achieved.

Clay-Putnam Minimum Flows and Levels (MFLs) Recharge Project

David Bolam stated the Clay County Utility Authority (CCUA) serves 47,476 active water accounts that use about 11.791 million gallons per day (MGD) of water. They also serve 9,661 active reclaimed water accounts using 3.818 MGD of reclaimed water. This gives a total water demand of 15.609 MGD. The average wastewater flow is 7.418 MGD. About 52.5% of the total demand is used for irrigation, and the potable water demand for irrigation is 37.1% (without reclaimed water). In 2000, CCUA had about 5 MGD of reclaimed water surplus that has now decreased to about 3.5 MGD of surplus. David noted that, over time, the supply of reclaimed water and the demand for it will merge and there will not be enough reclaimed water to meet the demand. In putting together the Integrated Water Resource Program (IWRP), they are looking to provide augmentation for reclaimed water and storage to allow CCUA to continue to expand the reclaimed water system to meet the demand, without supplementing the demand with groundwater. Another goal of the program is to supplement the surface groundwater in the Upper Etonia Chain of Lakes. CCUA is working with the St. Johns River Water Management District (SJRWMD) to identify the best locations to inject water into the system to help recharge the Floridan aquifer system.

CCUA’s long-term water supply strategy is to continue to implement tough water conservation measures and expand the reclaimed water system. David noted that Brett Goodman would talk more about the conservation measures later in the meeting. Brett looked at utility data between 2000 and 2010 and he found about a 30%-35% decline in per capita water use from conservation measures. Matt Kershner asked if the utilities have used the cost of water as a means of water conservation. David responded that the utilities have used cost to help with water conservation. CCUA has implemented a declining block rate structure, in which the cost of water for essential indoor use is at a reasonable price. However, in higher tiers that include outdoor irrigation, the price goes up substantially. This structure has caused most

of CCUA's customers to move into the first two tiers of the four-tier structure. David stated that CCUA wants to build a wet weather storage to expand the reclaimed water system. They currently have a 3.38 MGD consumptive use permit (CUP) for reclaimed water augmentation wells, and CCUA wants to develop alternative water sources so that they do not have use groundwater. One of the options that CCUA is evaluating to achieve this goal is to harvest stormwater, and they are working with SJRWMD on a regional project.

Lake Brooklyn in Keystone Heights is located in southwest Clay County, and the lake has lost 27 feet of its lake levels in the last 50 years. The primary reason for this drop in lake level is long-term drought; however, changes in land uses around the lake are also a factor. With the change in land uses, there has been an increase in groundwater withdrawals around lake, which are impacting lake levels. CCUA is moving all their Upper Floridan aquifer withdrawals to the Lower Floridan around the lake. This is one of the strategies that the Clay-Putnam MFLs group has identified as a recovery strategy for this lake. Matt asked what facility would be affected by moving the wells. David responded that CCUA owns the water utility in this area and they would move the current nine Upper Floridan wells into two Lower Floridan wells. Tiffany Busby asked if CCUA has already moved their wells. David responded that the wells and plant have been constructed, so the new wells should go into effect this year. When the lake levels are down, it affects the home values and economy in this area.

David stated that the proposed IWRP cost-share project with SJRWMD is to build a 135 million gallon storage reservoir near Lake Asbury. CCUA also has an agreement with SJRWMD, the Florida Department of Transportation (FDOT), Clay County, Keystone Heights, and two homeowners associations to conduct a study of the First Coast Outer Beltway to determine the potential yield from harvesting stormwater. The next phase of this project is more conceptual, and CCUA will be evaluating options to create artificial wetlands on a tract of land that SJRWMD owns near the beltway. The stormwater collected from the beltway would be pumped to the artificial wetlands for treatment before it is pumped to replenish the lakes in Keystone Heights.

There are several reasons why stormwater reuse is being evaluated. FDOT is interested in this project because of the newly imposed requirements to reduce greater levels of nutrients to achieve TMDLs. Harvesting stormwater would help to reduce loading. The state is also considering assigning reuse credits, which would encourage utilities and other entities that need a CUP to pursue this option to obtain consumptive use credits for alternative water supply. CCUA's main focus for stormwater harvesting is to supplement the reclaimed water supply. Stormwater harvesting is a proven technology that has been used around the state, mainly for golf course irrigation systems.

CCUA is proposing to add horizontal wells along the First Coast Outer Beltway to capture stormwater. The University of Central Florida Stormwater Academy has created a product, Black and Gold, which has had success with removing nutrients at the source. Tiffany asked if this is the product with chopped up tires in it. David responded that it is and it removes nutrients but it periodically must be removed and replaced. Tiffany asked if the material has to be replaced or just flushed. David responded that it has to be replaced, similar to a carbon water filter. David noted that they are also looking at adding direct filtration out of the ponds, to reduce the discharge loads from the tributaries, which flow to the LSJR.

David stated that there are hurdles to implementing the beltway stormwater harvesting project. They must evaluate the environmental harm from the project and determine a safe yield because the horizontal wells also remove a portion of the surficial aquifer water, and they need to ensure the project does not affect nearby wetlands. They will also need to prepare a water balance because a lot of water flows into the FDOT right-of-way from outside the right-of-way. The project engineer is calculating how much additional stormwater comes from development in the area compared to the pre-development runoff. The additional runoff from the new impervious areas over the runoff that historically flowed to the LSJR

would be the maximum safe yield for stormwater harvesting. A small stormwater reuse system is readily implemented but an extensive study is needed for a regional project. The benefits of this stormwater reuse project is that it provides an alternate water supply, provides wetlands for rehydration, optimizes water resource management, provides a regional freshwater storage area, provides a large storage capacity, reduces pollutants to surface water, maintains the hydrologic balance in the watershed, creates wildlife habitat, and should positively impact Keystone Height's economy.

Tiffany asked if SJRWMD is offering to fund any of these efforts. David responded that SJRWMD is participating in the 135 million gallon pond. SJRWMD is providing 50% cost share for the \$7 million project. Once the project moves into the water resource phase, this is where CCUA will be looking for a lot of help from the state and other agencies. CCUA is a water, sewer, and reclaimed water utility and unless major credits are assigned for recharging the groundwater, there is no benefit to CCUA funding this project, other than maintaining the water supply. John noted that there is an annual cycle for reuse water demand and the idea for the reservoir is to bank the extra water when demand is low. He asked if CCUA has an idea of what they will discharge once the reservoir is in place. David responded that CCUA is hoping to be 100% out of the river. As the demand for reclaimed water starts to merge with the supply, the storage pond will be critical to meet the demand. However, as the demand goes beyond the supply, CCUA will need the stormwater harvesting project to meet demand. CCUA has already talked to the Florida Department of Environmental Protection (FDEP) about turning all the wastewater facility outfalls to A Prototype Realistic Innovative Community of Today (APRICOT) (wet-weather only) discharges once the pond is in service. Derek Busby stated that the SJRWMD funds used to cost share the pond had a water quality benefit requirement attached to them. Therefore, the project had to look first at water quality and second at water conservation. Any future funds for the project would be more water supply oriented.

Tom Kallemeyn asked if they had any discussions about the potential for nitrogen-fixing bacteria in the pond that might cause an increase in nitrogen. David responded that they have not thought about this. John noted that the water would be used for reuse so concern over the potential presence of algal toxins in the pond is not an issue. He stated that he was not sure how much phosphorus was in the wastewater effluent, which would affect the presence nitrogen-fixing bacteria. David responded that CCUA uses chemical precipitation of phosphorus at the wastewater treatment facility (WWTF) so the phosphorus concentrations are low. They have also considered adding Beemats (floating wetland islands) in the ponds to help with additional nutrient removal. Pam Livingston Way stated that SJRWMD added floating islands to the inflow canal that goes to the wetland at the Yarborough Regional Stormwater Treatment (RST) Facility. The results were questionable because while the nutrient uptake in the plants was phenomenal, there were no water quality benefits in the canal when comparing the sampling upstream and downstream of the mats. Tiffany stated that City of Jacksonville (COJ) completed a pilot project with the Beemats and there were issues with fish eating the roots. Tiffany noted that the results from these mats have varied, and they seem to be more effective where nutrient concentrations are lower. Greg McGrath added that COJ did have problems with the predation of the plant roots. There are two other ongoing studies with the Beemats and one is showing good results. Another study is nearly complete at Patrick Air Force Base.

John stated that he had heard another option for the CCUA storage pond involved JEA providing water from their Southwest WWTF. David stated that this was an alternative that the Clay-Putnam MFL working group evaluated. There was even discussion during TMDL development about tying this JEA WWTF to the CCUA reclaimed water system. CCUA and JEA meet annually to discuss the potential for this connection as a requirement of the CUPS. However, it is very expensive to move water from the Southwest WWTF to southern Clay County.

Using Tracers to Assess Sources and Chronology of Groundwater Contamination

Brian Katz stated that groundwater tracers are any matter or energy (heat) that are carried by groundwater that will provide information about the direction and/or velocity of flow and contaminants in groundwater. The ideal groundwater tracer is difficult to find because it must be non-toxic, inexpensive, move with water, easy to detect in low concentrations, chemically stable over the study time period, neither filtered nor absorbed by the aquifer material, and does not alter the natural direction of groundwater flow. Tracers include those that are intentionally introduced, such as fluorescent dyes, anions (bromide or chloride), and solid particles (to mimic movement of bacteria). There are also naturally occurring tracers including stable isotopes, radon, and carbon-14. Finally, there are also unintentionally introduced tracers including chlorofluorocarbons (CFCs), tritium, organic waste compounds, and pharmaceuticals. Geoforensics is a new field that uses chemical fingerprints to examine sources and chronology of contamination. Groundwater can be age dated within a 0-50 year timeline. Using CFCs (freons), sulfur hexafluoride, and tritium and its decay product helium-3, an estimate of the date of discharge into the groundwater system can be determined.

A septic tank contamination study was conducted by the U.S. Geological Survey (USGS), FDEP, and Florida State University (FSU) Department of Oceanography to determine the fate of septic tank effluent beneath the drainfields in the Woodville Karst Plain in Northwest Florida. Wakulla Springs is located in this area and nitrate concentrations in the springs have increased substantially over the last 30-40 years due to inputs from septic tanks, fertilizers, and application of wastewater effluent. The increase in nitrate in the springs has caused a proliferation of algae and nuisance aquatic vegetation.

There are about 15,000-20,000 tanks within the Woodville Karst Plain but little information was available on the affects of the septic tanks on water quality. Most of the lots are 1-2 acres in size and while there are some areas of medium density residential, this is mostly a rural area. The purpose of this study was to assess movement of nutrients, microorganisms, organic wastewater compounds, and pharmaceuticals from septic tanks to the Upper Floridan aquifer. They collected soil corings at each site and metered the homes so they knew how much water was used during the study. The study design involved collecting effluent samples from the septic tank, installing lysimeters at one meter and two meters below the surface to measure what was coming out of the drainfields, installing a well near the drainfield, and installing a background well that was up gradient of the septic tank. The study used several tracers including major ions, nutrients, stable isotopes, wastewater contaminants, pharmaceuticals, and microbial indicators. The soil cores were evaluated for similar compounds. The wastewater compounds that were analyzed include fragrances and flavorants, detergents, pesticides, polycyclic aromatic hydrocarbons (PAHs), solvents, disinfectants, and plasticizers. The pharmaceuticals evaluated included commonly used over the counter drugs and commonly prescribed drugs such as acetaminophen, caffeine, carbamazepine, codeine, cotinine, and sulfamethoxazole (common antibiotic).

Caffeine, acetaminophen, cotinine, and sulfamethoxazole were found in much lower concentrations in the lysimeter and drainfield well samples than in the septic tank effluent. Sulfamethoxazole was found in the drainfield well at all sites in the study. The total nitrogen concentrations range from 15-65 mg/L in the septic tanks. As nitrogen moves through the treatment system, it becomes nitrate. Nitrate concentrations ranged from 10-20 mg/L coming out of the drainfield. There is a 50% apparent loss in total nitrogen from the septic tank effluent to the groundwater due to denitrification, which is the conversion of nitrate to nitrogen gas by bacteria. A lot of denitrification is occurring beneath the drainfield based on changes in nitrogen isotopic composition. There was one owner fertilizing new sod on top of the drainfield, and the fertilizer nitrogen signature was detected during one of the sampling events. This study found that about 4-20 kilograms of nitrate per household enter the groundwater annually from septic tanks. There is a high variability in nitrate loadings to the groundwater due to differences in soils, water use, and products used in each household.

Brian stated that another study was conducted by USGS on the effects of the City of Tallahassee's sprayfield. The city disposes of 20 MGD treated wastewater at a farm site that is about 220 acres in size through 16 sprayfields, each with a center pivot. This facility has been in operation since 1980. The purpose of this study was to look at the movement of contaminants, mainly nitrate, from the sprayfield into the Wakulla Karst Plain to see if the sprayfield is affecting Wakulla Springs. During this same time, FDEP contracted with a consultant to conduct dye trace studies at the sprayfield, and they found that dye moved to Wakulla Springs within 60 days. In looking at the nitrogen isotope data, where dye was found in the springs, there were clusters of nitrogen isotopes that indicated water from the sprayfield. As a result of these two studies, the City of Tallahassee decided to spend about \$220 million to upgrade the WWTF to advanced treatment. This upgrade will result in a nitrogen concentration of 3 mg/L in the water that is applied to the land surface. Through other uptakes, the nitrogen concentration will be reduced by another 75% before it goes to the springs. The WWTF upgrade is part of the city's contribution to address the TMDL and basin management action plan (BMAP) for Wakulla Springs.

There are other tracers that can be used to identify wastewater sources. Boron is found in soaps and detergents and is a good indicator for both septic tanks and WWTFs. Sucralose, which is the main chemical ingredient in Splenda, has been detected in studies around the world. Sucralose mostly passes through the wastewater treatment system into the final effluent, and it is not affected by chlorination or tertiary level treatment. This is the only compound that exhibited no false positives or negatives in samples of wastewater effluents, waters with known wastewater inputs, and waters without wastewater inputs. Therefore, sucralose is a very effective tracer. FDEP is using sucralose detection in surface waters as a pilot study to identify other emerging contaminants in surface waters. The benefits of using groundwater tracers include obtaining dates and rates of recharge to aquifers, identifying sources of contaminants, looking at timescales of contamination, determining connections between different locations in the subsurface, identifying groundwater flow velocity and direction, refining hydrological models, and assessing the susceptibility of groundwater supply wells.

Tiffany asked if the City of Tallahassee WWTF improvements have been observed at Wakulla Springs. Brian responded that the concentration at the springs has been going down over the last few years. However, this is a complicated system, and there is some dilution with the flow connection to the Spring Creek system. There have not been changes at the springs yet from the WWTF upgrade. Matt asked what groundwater levels were tested between the drainfield and groundwater in the first study. Brian responded that the groundwater level varied between 10-20 feet. John noted that if a groundwater sample is rich in heavy isotopes, then the nitrogen was subject to denitrification along way. Brian responded that organic sources have a higher ratio, and if the water gets denitrified along the way, the ratio does go higher. John noted that this is something to look for when designing systems to reduce nitrogen.

Adam Hoyles asked if any of this information is being used to improve the water quality of other springs. In the case of Tallahassee, there is a source that is easy to fix, although the fix is expensive. However, in the rural areas around Ichetucknee Springs, it seems that improvement in septic tank treatment is needed. Brian stated that studies have found that fertilizers are the dominant source in Ichetucknee Springs. The Florida Department of Agriculture and Consumer Services (FDACS) is working with growers to implement best management practices (BMPs) in this area. The Lake City sprayfield is located in the Ichetucknee Springs basin, but it had very little impact on the springs. George Getsinger asked what upgrades were made at the City of Tallahassee WWTF. Brian responded that the city added deep bed denitrification filters.

George asked what types of BMPs are used on farms. Brian responded that BMPs include the timing of fertilizer application, drip irrigation systems, and other efforts to reduce the inputs of fertilizer. Matt asked if FDACS, the water management districts, and the Natural Resources Conservation Service (NRCS) are all saying the same things to the growers. Kerry Kates responded that that FDACS has

representatives at each of the water management districts so they are providing the same information to the growers. Pam stated that the NRCS develops conservation plans and they have a lot of practices with nutrient and water quantity benefits. The NRCS plans use crop management systems and include University of Florida–Institute of Food and Agricultural Sciences (UF-IFAS) recommendations. The NRCS plans have a lot of federal cost share dollars associated with them, and the Suwannee area has benefitted from this funding. All the agencies are working together to implement agricultural BMPs, and there are a lot of partnerships around the state.

John noted that a nitrate concentration of about 20 mg/L below the drainfield seems high. Brian responded that this site did have a high concentration but some of this was from the fertilizer application on the sod above the tank. John stated that it seems as if septic tanks should be prioritized to help with groundwater. Brian responded that this is the concentration right at the septic tank and once the nitrate goes into the groundwater, it will be reduced significantly. The question was asked about how old the septic tanks were in the study. Brian responded that they were about 10-20 years old. One of the drainfields had to be replaced during the study, which is why the sod was being fertilized.

An Overview of ArcNLET and Associated Tools for Estimation of Nitrate Load from Septic Systems to Surface Waterbodies

Ming Ye stated that to simulate the process of septic tank effluent leaving the drainfield, the modelers at FSU created VZMOD as the vadose zone model for soil processes, ArcNLET to model groundwater processes, and ArcNLET-MC to quantify uncertainty with the simulations. They are also in the process of improving the model to include ammonium in the simulation. When the model software is downloaded, it becomes part of ArcGIS, and the user can prepare the input files and outputs from Geographic Information Systems (GIS). There are two parts to the model: (1) the conceptual/mathematical model behind the software, and (2) the software itself.

Ming noted that there are existing models for nitrate, but the models either are complicated to run but provide detailed information, or are easy to run but the output is simple. The goal was to create a model that is a compromise between the existing models so that this model would include key processes but would be user friendly. ArcNLET simulates nitrate fate and transport, including denitrification, and has the ability to treat septic tanks in different ways. The model considers the flow process from septic tanks to a waterbody, as nitrate moves with the water and spreads out into a plume. The model also includes a denitrification process, which factors in that not all septic tank plumes reach a waterbody. The user interface includes tabs for groundwater flow, particle tracking, transport, denitrification, and total load. The model simulates nitrate plumes and loads to surface waters so that the user can identify which waterbodies have a high loading to them. The model provides an estimation for loading from different septic tanks and in different parts of the system.

There were several simplifications made in ArcNLET. For the groundwater flow component, the model treats the water table as a subdued replica of the topography. This means that, in a sense, the user can process the topography to approximate the shape of the water table. Another simplification is that everything in the vertical plane is assumed to be the same, so that the model only has to simulate in 2-D instead of 3-D. There are some limitations to the model because of these simplifications. Since the model is 2-D, any differences in the vertical are unknown. The model was created as a steady state model but it is for a dynamic system. Velocity is calculated using Darcy's Law, and the gradient curve of the groundwater is determined using topography. Sam Arden asked how boundary conditions with a lake on one end of the model are included. Ming responded that they assume the lake is the same as the water table so the same smoothing for the topography is used. Ming stated that for the vertical portion of the groundwater flow model, there is a pseudo 3-D model to calculate load. This pseudo 3-D model provides an analytical solution that runs in about 10-15 minutes instead of a more detailed model that would take days to run.

There were also simplifications made in the nitrate transport model. This portion of the model provides an analytical solution, and uses a linear kinetic reaction to represent denitrification. The limitations of this model are that it only considers nitrate, although they are looking to add ammonium; includes a pseudo 3-D model; provides a steady state model for a dynamic system; simplifies the size of the source plane, which is difficult to determine; and simplifies the decay coefficient, which is difficult to obtain in field conditions. The input data needed in the model are topography (either Digital Elevation Model [DEM] or Light Detecting and Ranging [LIDAR]), septic tank locations, and waterbody locations (National Hydrography Dataset [NHD]). Parameters that are needed include a smoothing factor to process the topography data, hydraulic conductivity, porosity, dispersivity for the plume size, decay coefficient, and source plane dimension and concentration. All of this information must be in GIS. The user interface makes the model easier to use, although some GIS skills are needed to prepare the input data. The user also needs some understanding of hydrogeology because the model is a tool to organize thinking and engineering judgment. Additional skills are needed to interpret and improve the model, and a fundamental understanding of the area and site-specific information are required.

The model has been applied to the Eggleston Heights and Julington Creek neighborhoods in Jacksonville. Eggleston Heights has about 3,500 septic tanks and Julington Creek has about 2,000 septic tanks. These areas were selected because they have SJRWMD monitoring wells to help adjust the model. The challenge of applying the model to a specific site with specific characteristics is that it needs to be calibrated to the situation. Typically, information is available on topography; hydraulic conductivity for groundwater, which can be estimated using the hydraulic conductivity and porosity for soil from the Soil Survey Geographic (SSURGO) database; hydraulic head and nitrate concentration, which were collected by SJRWMD in the groundwater wells in these areas; and evidence of denitrification based on ratios of nitrogen isotopes. For these areas, they smoothed the DEM to agree well with the mean observed hydraulic head, based on the average over time at the monitoring wells. The nitrate transport results were not great because there is a big variation in the data, but the model is steady state. Therefore, they decided to match the mean nitrate values. The modelers were able to get pretty close to the mean values for the monitoring wells in Eggleston Heights but there were several wells in Julington Creek they could not match. Adjusting different model parameters affects the total loading. The modelers used the Monte Carlo (MC) method to address this parametric uncertainty, which led to the development of the ArcNLET-MC for uncertainty quantification. They just finished development of this model and it has not yet been released. They conducted a calibration and comparison with reality, and they found that parametric uncertainty could be reduced dramatically by incorporating field observations into the model calibration to narrow the range of results.

FSU also created the VZMOD model for the soil processes. This model also includes a user interface and it shares a lot of information with ArcNLET so that the two models can be used together. The model can simulate multiple septic tanks, and each tank has its own plot profile of nitrate and ammonium for different soil types. FSU is almost finished analyzing the groundwater wells data that SJRWMD has collected. They are working with COJ to validate ArcNLET using existing and new data. FSU is also working with FDEP to select representative sites to better characterize model parameters. They are developing more functions in ArcNLET, such as ammonium, and they are getting ready to start applying the model to other parts of state, including the St. Lucie River and Estuary Basin. The software is available in the public domain (<http://people.sc.fsu.edu/~mye/ArcNLET/index.html> and <http://people.sc.fsu.edu/~mye/VZMOD/index.html>). Ming stated that he believes this is a good project that provided a product that can be used by real people.

Ed Cordova asked if there is a timeline before COJ can quantify loads for septic tanks using this model. Kevin Hayes responded that he does not know the timeline yet. John noted that he understands in the TMDL context that there is a need to give credit or identify responsibility. However, in a practical sense,

the output from this model shows where improvements are needed, which makes this a great tool. Matt asked who conducted the groundwater monitoring. John responded that this was a project SJRWMD conducted. Ming added that the groundwater monitoring project was completed in 2010. John noted that there are about six years of groundwater monitoring data and the wells are permanent if more monitoring is needed. Sam asked how other sources of nitrogen, such as fertilizer, are accounted for in the model. Ming responded that fertilizer was not a factor in the Eggleston Heights neighborhood but it was in the Julington Creek neighborhood. The source term in the model can be increased to account for all sources of nitrate, and then this factor can be decreased if the user only wants to predict the septic tank load. Matt asked if there is way to tease out the amount of nitrate from fertilizer. Ming responded that this could be done in an empirical way. For Julington Creek, they calibrated the source term for both fertilizer and septic tanks. They could then compare this to the load in Eggleston Heights, which was only from septic tanks, to estimate the fertilizer load.

Water Conservation: Public Supply

Brett Goodman stated that his presentation was previously given to the North Florida Regional Water Supply Partnership at their January meeting. SJRWMD and Suwannee River Water Management District (SRWMD) put together the partnership to represent different industries in the area, with six representatives from the SJRWMD area and six representatives from the SRWMD area. The purpose of this group is to develop a regional water supply plan for North Florida, with a focus on public supply and water conservation. The North Florida Regional Water Supply Partnership water use is permitted at about 925 MGD, based on 2011 data. The estimated actual use is about 500 MGD, based on 2009 data. The estimated actual use has stayed fairly constant since 1985; however, the distribution of use for different sources has changed.

Public supply is water provided for public purposes through public or privately owned water supply systems, and includes residential, commercial, industrial, and recreational facilities use. For a while, water use was trending with population growth but now there is a flattening of water use, even though there is still population growth. Public supply is a highly regulated industry that has to comply with the U.S. Environmental Protection Agency (EPA) Safe Drinking Water Act, FDEP Drinking Water Programs, and water management district requirements for reasonable and beneficial use. The approach for water supply focuses first on conservation, which is the most cost effective way to extend water supply in the future. Conservation practices cost about \$1 million-\$10 million/MGD. The next focus is on reclaimed water, which costs \$5 million-\$15 million/MGD, but is not suitable for all applications and cannot be used everywhere. The most costly option for water supply is to look for new sources of water.

In north Florida, there are a lot of recognized leaders for water conservation and reclamation. The area has aggressive rate structures, been very proactive by having reclaimed programs since early the 1990s and adding dual piping in advance of needs for future reclaimed water, earned a lot of industry awards, and continued investment in infrastructure. It is really difficult to compare different utilities because they serve different service areas with different users. However, one method of comparison is residential water use, since indoor essential use is less variable than outdoor use. Tiffany stated that in the past she remembers CCUA talking about how new plumbing fixtures affected their estimates for the amount of wastewater generated, and she asked if Brett has seen water conservation practices affecting estimates. Brett responded that he does think the trajectory of demand and supply of reclaimed water will converge much faster because of the replacement of fixtures and appliances with new, more efficient equipment.

Brett stated that in an evaluation of how much water was conserved, they made the assumption that there were not a lot of conservation measures in place before 2000. Therefore, the period before 2000 was used to develop an understanding of water use related to temperature and rainfall. That line was then projected into the future without any conservation measures. When this line is compared to the actual use with conservation measures in place, there are significant reductions made in the last 10 years. Between 2005

and 2007, there was a large increase in water use because this was a dry period. There was a similar dry period recently, but there was not a large increase in water use. Brett stated that he thinks economics played a big part in why the water use did not increase much. John asked if education about water conservation helped. Brett responded that he does think education helps people to look at their bill and determine what they can do to reduce it.

Brett stated that there are several options to promote water conservation and each utility needs to determine which option(s) work best for their customers. Metering is one of key methods to achieve conservation because having accurate and calibrated meters helps the utility to know who is using what amount of water and when. Leak detection is a significant investment but helps to make sure the utilities are efficient. Metering and leak detection are actions on the supply side. There are also water conservation measures that can be implemented on the demand side. One method is rates to promote efficiency by having higher rates for higher water usage. The rates for utilities vary based on the water quality, treatment costs, infrastructure costs, and service area. The utilities in this area typically charge on tiers based on the gallons used. Around 5,000 gallons and less is essential use for a one-person home. A three-person home with irrigation uses about 10,000-15,000 gallons. In the study area, about 82% of the people fall into the essential use category (between 0-10,000 gallons), while the rest of the population has some outdoor irrigation.

Another supply side method for water conservation is through education. The utilities use information from EPA, FDEP, or water management district education campaigns. There are a lot of videos being used in social media, which makes it easier to reinforce the water conservation message. There are also new technologies that can be used in the home to conserve water. Many homes were built in the late 1990s that will need equipment replacement in the near future, so water usage will go down when those homes switch to more efficient technology. Reclaimed water can also be used for water conservation, and about 45 MGD of reuse and recharge occurs in this region. More than \$150 million has been invested to achieve this amount of reuse. The cost to add a new reuse service is about \$1,500 but to retrofit an old service to add reuse costs about \$8,000.

The challenges ahead for water conservation include lower revenues for utilities that will require higher rates to cover the costs of infrastructure, higher rates drive customers to different water supplies (private wells), most of the infrastructure is built on a peaking capacity and lower demands can affect the water quality, conservation sustainability depends on permanent changes in customer behavior, and alternate water supplies are expensive. Public water supply is an efficient use of water in this region, both in the state and nation. There has been about a 25% decrease in residential water use over the last 10 years. John asked if we are reaching the point where supply is a negative factor for population growth. Brett responded that the utilities are extending water supplies better than they have in the past. Depending on the location in the state, water could be an issue but he believes the economy is more of a driver to growth than water.

Technical Updates and Announcements

St. Johns River Water Management District

John stated that SJRWMD used to be aligned by programs, such as the LSJR program, but they are now aligned by function. The Environmental Science Bureau is starting to embark on restoration of springs, with a focus on Wekiva Springs and Silver Springs. They will continue the contract monitoring for phytoplankton and algal toxins. It will be time soon to work on coordination efforts for any algal blooms that occur during the spring. SJRWMD has also been working with the U.S. Army Corps of Engineers (USACE) on the effects of channel deepening in the river.

Pam stated that they are working on the Tri-County Agricultural Area (TCAA) Water Management Partnership (WMP). There are funds from FDEP and SJRWMD that have been dedicated to improving

water management measures in the TCAA to achieve the TMDL agricultural reductions. FDEP, FDACS, UF-IFAS, and SJRWMD are working together on this effort to improve water conservation. The growers typically use seepage systems, which are not water efficient, and the WMP is looking at overhead drip and subsurface irrigation systems that have been use in other areas and are more efficient. These systems are new to the Hastings area and new to growing potatoes in sandy soils. There are 8-9 growers that will be implementing projects, monitoring for water savings and loading reductions, and evaluating their crop yields. The project should start in the fall and they will monitor for 1-2 years. The practices that each grower is implementing are their ideas for their land.

John stated that SJRWMD has been discussing a gizzard shad harvesting project in Lake George, and the lake is a source of nutrients to the LSJR. Gizzard shad harvesting has been an effective technique to remove phosphorus in the Ocklawaha Chain of Lakes. SJRWMD has been in coordination with the Florida Fish and Wildlife Conservation Commission (FWC) and they seem to be getting closer to securing permits for shad harvesting in Lake George.

Pam stated that SJRWMD has also been working with St. Johns County on the Yarborough/Deep Creek RST Facility. Douglas Tarbox stated that the county purchased the Masters Tract property for another RST facility and they have just bid the project. This will be a cost share project with SJRWMD. Construction on the new RST facility should start in the next 30 days. The project involves excavating an agricultural field and restoring other portions of the site back to wetlands. Matt asked where the spoil from the project would be disposed. Douglas stated that they have no place to put it so the county will keep it onsite. The spoil will be landscaped and they will use erosion control measures. Greg Caldwell stated that the county is also looking to expand the volume of the Deep Creek RST Facility, and will potentially improve wetlands as part of the project. The county has funding from FDEP and SJRWMD for this project, which is currently in the design phase. They hope to start construction by the end of the year. Pam stated that both projects are located in the Deep Creek basin, which contributes nitrogen and phosphorus loading to the LSJR. Mark Nelson stated that the county received about \$2.6 million in cost share funds for these projects from SJRWMD and the county also applied an \$800,000 Section 319 grant for the Masters Tract project. Matt asked if the Edgefield RST Facility was used in the planning for Master Tract. Douglas responded that information from the Yarborough/Deep Creek RST Facility was used for Masters Tract. Pam added that SJRWMD built Yarborough first and then constructed Edgefield with lessons learned from Yarborough. Some of the enhancements the county is planning for Yarborough probably should have been done up front. Mark noted that there is the potential for tying the two facilities together with a stormwater harvesting component.

U.S. Army Corps of Engineers

Mike Hollingsworth stated that Jacksonville Harbor Deepening General Reevaluation Report is ongoing, and he thanked the TAC members who provided input. He specifically thanked SJRWMD for their water supply work because it is giving USACE the ability to complete a groundbreaking Environmental Impact Statement (EIS) for this project. The federally proposed project depth is 45 feet up to the cruise ship terminal. However, the Port Authority voted to pursue a locally preferred depth of 47 feet. USACE can now go back to their modeling efforts for the LSJR using these proposed depths. USACE will also be looking at the impacts of the deepening on the freshwater wetlands. The draft report is due May 6, and they are just starting the modeling. The final document is due in April 2014. Mike stated that he would appreciate it if the TAC took the time to review the draft report and provide comments. Next Tuesday, March 12, there will be a meeting at the Jacksonville Public Library on the confined blasting that may be needed if the project uses the locally preferred depth. There is rock in the area that has to be removed so USACE will have to include blasting as an option, because there are very few rock cutter dredgers that are owned by only one company.

Mike stated that for the Intracoastal Waterway project, USACE received the final permit from FDEP in February. However, they do not have an authorized project or funding. They are looking into several options for funding including the traditional route of having Congress authorize and fund the project, having Congress authorize the project but the Port Authority or state fund the project, or the Port Authority could decide not to wait for authorization and they could contract directly with USACE on the project. Mike stated that the Big Fishweir Creek Environmental Assessment and Ecosystem Restoration Report was approved by USACE Division Headquarters in Atlanta last week. They were provided with some funding to start the preliminary engineering and design of the project. USACE will start discussions with COJ on the cost share for this project.

Other Member Updates

Ed stated that JEA is being reorganized. The main difference is that environmental is now under public affairs instead of operations and maintenance. The environmental staff will continue to perform the same functions.

Kevin stated that COJ is working on some sampling for the septic plume investigation with their consultants, CDM Smith. There are also talks of reorganization at the city starting in the next few weeks. COJ recently put out a call for papers for the Environmental Protection Board symposium in August. The abstracts are due April 15.

Tom stated that FDEP is finishing up the St. Johns River sampling for the Group 2 impairment assessments. They are now moving onto sampling for the Nassau and St. Marys. FDEP is continuing to conduct stream condition index (SCI) evaluations for the new nutrient and dissolved oxygen rules. They are also working with COJ and CDM Smith on the Middle Trout River and Little Trout River site-specific alternative criteria (SSAC) development. FDEP deployed Fyke nets, which is a new assessment technique, last week and this was the first of three sampling events over the next 90 days. The FDEP Northeast District Office is also going through reorganization. Tom noted Matt will be taking over the duties for the surface water assessment group, and Tom will be moving back to the compliance side.

Next Meeting Date

Tiffany stated that if anyone has ideas for themes or presentations for future meetings or items that should be sent to the TAC list to let her know. The next meeting will be held in May and will be hosted by the City of Jacksonville. Jennifer Zimmerman noted that the Society for Freshwater Science has a conference May 19-23. Mark stated that he believes there is also a conference during the first week of May. Tiffany stated that a notice would be sent once a date for the meeting has been determined.

Adjourn

The meeting was adjourned at 2:08 PM.