The Droplet

Florida Water Environment Association
Integrated Water Resources Committee

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Gainesville Regional Utilities' Paynes Prairie Sheetflow Restoration Project: An Innovative Approach to Integrated Water Management

The Paynes Prairie Preserve State Park is a 21,000 acre natural and historical landmark situated in Alachua County just south of Gainesville, Florida. Paynes Prairie is considered an Outstanding Florida Water and is a valuable resource that has been enjoyed by surrounding communities long before its inauguration as Florida's first State Preserve in 1971. Gainesville Regional Utilities (GRU) and the City of Gainesville Public Works Department are implementing a $26 million innovative project that will reestablish the natural flow of water onto the prairie, improve water quality, and meet nutrient reduction requirements under the total maximum daily load (TMDL) and numeric nutrient criteria (NNC) regulations. The project will help to restore 1,300 acres of natural wetlands within the park, protect drinking water, and provide a public park with hiking trails, boardwalks and other facilities.

In the late 1600's the largest cattle ranch in Spanish Florida was located at Paynes Prairie. Historically, there have been times when the sinkholes that drain the prairie were completely plugged, allowing water that flows onto the prairie to accumulate. That happened most recently in 1871. For fifteen years there was sufficient water on the prairie to allow steamboats to ferry goods across the lake. The water level in the lake gradually fell over several years and then, within two weeks, Alachua Lake drained entirely, except for the creek and the water immediately around the sinks.

Alachua Sink is a 14 acre lake located within the preserve near the northern edge of the preserve. The lake receives flow from Sweetwater Branch and directly recharges the Floridan aquifer via a sinkhole. Alachua Sink is currently listed as an impaired water body due to high nitrogen levels. A TMDL has been developed for Alachua Sink, which requires reductions in total nitrogen loads from urban runoff, wastewater discharge and other sources.

Sweetwater Branch flows through what is now urban Gainesville. Under natural conditions, Sweetwater Branch flowed onto the prairie in a sheetflow pattern, hydrating wetlands on the prairie. This water eventually made its way to Alachua Sink. The natural sheetflow of Sweetwater Branch onto the Prairie was disrupted by ranchers, in the 1930s when they constructed a ditch to drain portions of the Prairie to expand grazing areas. The ditch diverts the Sweetwater Branch flow directly to Alachua Sink, and has caused the dehydration and alteration of more

than 1,300 acres of prairie wetlands. The ditching of Sweetwater Branch provides a more direct conduit into the Floridan Aquifer, preventing natural attenuation of the nutrients and causing depreciation of the water quality flowing into Alachua Sink. The overall water balance to Paynes Prairie has also been affected by diversion of inflows to the Prairie at other locations.

Because most of the urban development in the Sweetwater Branch drainage area occurred long before modern stormwater management and other pollution control regulations, Sweetwater Branch, and in turn the Prairie have been heavily impacted by stormwater runoff. Sweetwater Branch has been highly channelized and incised in its upland sections, receives significant urban stormwater flows, carries nutrients from the Gainesville area directly to Alachua Sink, and deposits large amounts of trash and sediment onto the prairie.

The Main Street Water Reclamation Facility also discharges treated effluent to Sweetwater Branch and is the main contributor of nutrients to the stream. During dry periods effluent from the Main Street Water Reclamation Facility constitutes most of the base flow of Sweet Water Branch.

The Florida Department of Environmental Protection (FDEP) assembled a Basin Management Action Plan (BMAP) Working Group to address the Alachua Sink TMDL, which was adopted in 2006. The TMDL requires reductions in TN loads from point and non-point sources (see Table 1). TN sources to Alachua Sink include the discharge from the Gainesville Regional Utilities (GRU) Main Street Water Reclamation Facility (MSWRF), urban stormwater runoff, and septic tank drainage, all of which flow into Sweetwater Branch. There are also other upstream impaired water bodies, not connected to Sweetwater Branch which contribute nutrients to Alachua Sink.

Table 1. Summary of Estimated Total Nitrogen (TN) Reductions

Source	TN Reduction (%)	TN Reduction (lb/year)
MSWRF	55%	48,000
Stormwater	45%	13,000
Other Sources	45%	145,000

Conceptual Plan

The focus of the project is a 125 acre constructed enhancement wetland that will polish the base flow from Sweetwater Branch before it is discharged to a mile long sheetflow distribution channel. Two miles of agricultural drainage canals will be filled so that wetland hydrology can be resorted.

The conceptual plan for the project is shown in Figure 1 and includes the following primary components:

MSWRF Upgrades for phosphorus removal

Although the TMDL did not require reductions in phosphorus, it was necessary to reduce phosphorus concentrations in the MSWRF discharge to achieve the desired water quality for discharge onto Paynes Prairie. Phosphorus removal will be achieved through the addition of alum upstream of the existing effluent filters.

Enhancement Wetland

All of the flow from Sweetwater Branch will be diverted to a 125-acre enhancement wetland that is being constructed on the prairie. Figure 2 shows the conceptual plan for the enhancement wetland in detail. The inlet structure will include a sediment removal basin, trash rack, and forebay. Under non-storm flow conditions the flow will be distributed into the wetland treatment cells, which will flow into the distribution channel. During storm events, stream flows can exceed 3,000 cubic feet per second (cfs) (over 300 times normal flow) as a result of stormwater inputs. To protect the wetland cells from damage during storm events, excess flow will be

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diverted through a forested slough and bypass channel that flow directly into the sheetflow distribution channel.

Sheetflow distribution channel

The sheetflow distribution channel will receive the flow from the wetland treatment cells and flow from the forested slough and bypass channel during storm events. The distribution channel will discharge onto the prairie, reestablishing the natural flow pattern in the Sheetflow Restoration Area (Figure 1). The natural wetlands on the prairie receiving the flow will provide further water quality improvement. The flow from the natural wetlands will eventually reach Alachua Sink.

Backfilling and removal of the existing 10,000 ft channel

The existing man-made channel must be backfilled in order to reestablish the natural sheetflow pattern.

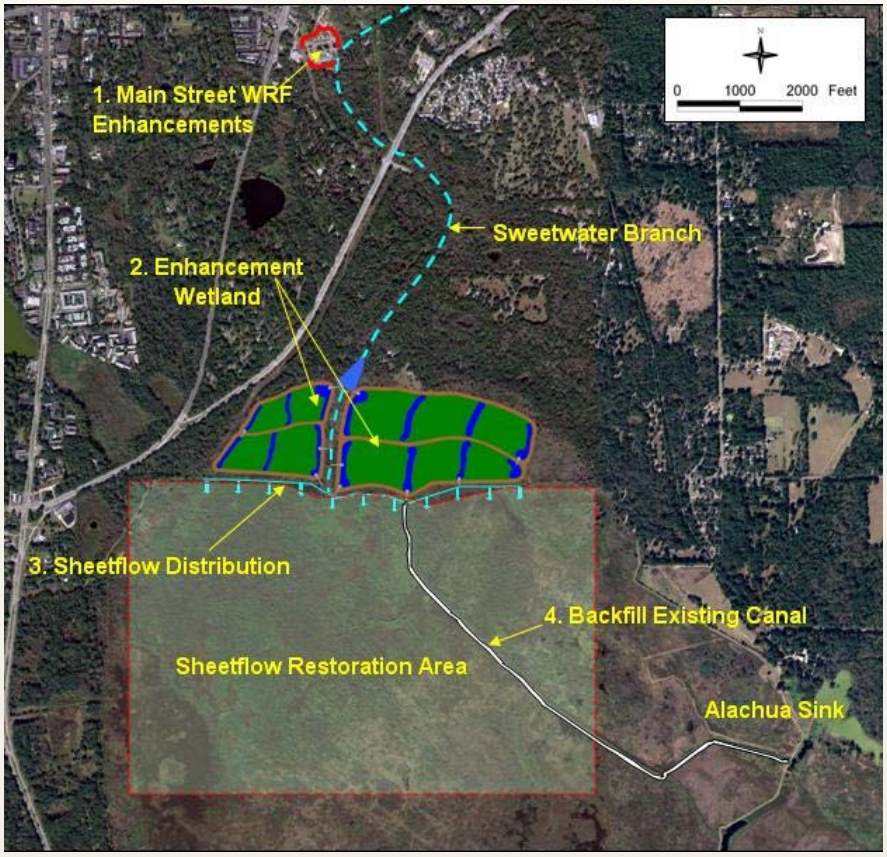

Figure 1 - Conceptual Plan

Project Benefits

The project will restore Sweetwater Branch sheetflow to Paynes Prairie and at a minimum this project is expected to provide the following benefits:

1. Restore (re-hydrate) more than 1,300 ac of formerly-impacted wetlands in Paynes Prairie;
2. Cost effectively attain regulatory TMDL requirements for the City of Gainesville and the Florida Department of Transportation, District Two,
3. Create about 150 ac of high-quality wetland wildlife habitat and a public use area for bird-watching and nature study within the Sweetwater Branch Wetland Park;
4. Naturally assimilate other nutrients, sediments and other pollutants in the Sweetwater Branch in order to protect the PPPSP Sheetflow Restoration Area, Alachua Sink, and the Floridan Aquifer; and
5. Restore part of the overall water balance to Paynes Prairie, which has been impacted by diversion of water from the Prairie at other locations.

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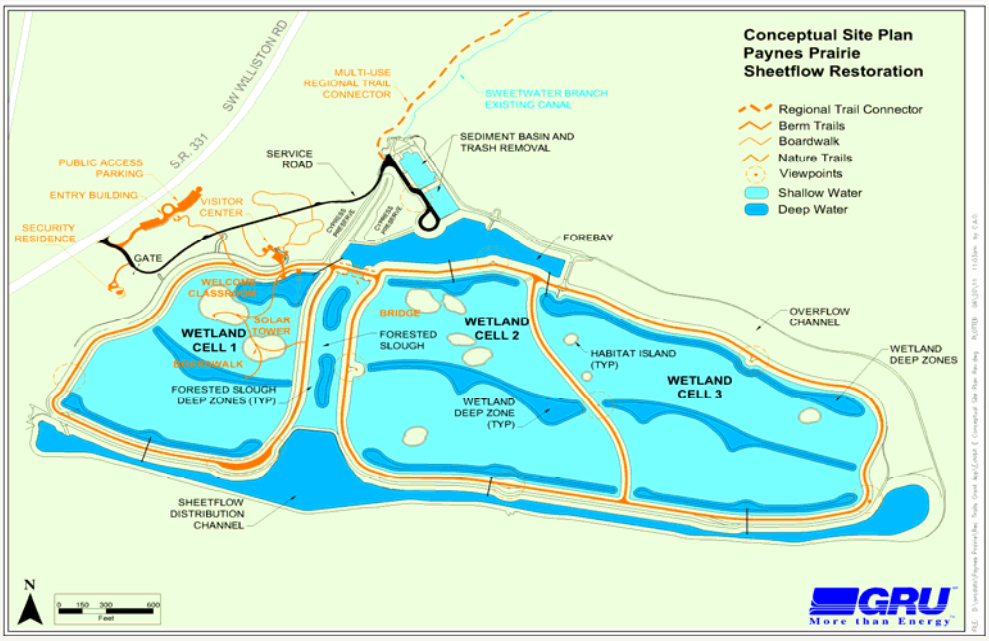

Figure 2 - Enhancement Wetland Detail

Implementation

Construction of the Sweetwater Branch/Paynes Prairie Sheetflow Restoration Project began in August of 2012and is expected to be complete in summer of 2014. Figure 3 shows the site under construction. One of the challenges of the construction project is working in Sweetwater Branch which is an active stream which can have flows of over 3,000 cfs during storm events. The estimated overall project cost is approximately $26 million. However, the numerous valuable benefits to the environment and to the citizens of the State of Florida make this project well worthwhile and in the public interest.

Figure 3 Enhancement Wetland Construction – April 2013

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FWEA 2013 IWRC Award Winner – Sandra Fox

Congratulations to Ms. Sandra Fox for winning this year's FWEA 2013 IWRC Award.

Sandra is an environmental scientist at the St Johns River Water Management District (SJRWMD) specializing in regional-scale geospatial analyses and data development. Current projects range from improving LiDAR data in floodplain wetlands to using GIS and remote sensing to model environmental impacts of management decisions including restoration efforts. Her work evaluating wetland hydroperiod was integral to the wetlands impact assessment for the recent SJRWMD Water Supply Impact Study of which she is a co-author. As part of a statewide effort evaluating the Arc Hydro data model for water management, she developed the first Districtwide Arc Hydro prototype geodatabase that led to the development of SJRWMD's enterprise water resources geodatabase. She has organized workshops for the Florida Arc Hydro Users Group and she was the general chair for the VI American Water Resources Association specialty conferences "GIS and Water Resources" (Orlando, 2010) bringing national leaders in water resources geospatial technology to Florida. She is currently the associate editor for geospatial analyses for the Journal of the American Water Resources Association.

2013 FWEA Student Chapter Design Competition at FWRC

Reported by Kunal Nayee – Brown and Caldwell and Rebecca Oliva – CDM Smith

The FWEA Student Design Competition is intended to promote "real world" design experience for students interested in pursuing an education and/or career in water engineering and sciences. Student design teams competed in one of two categories, wastewater design or environmental design, and took place on Sunday, April 28, 2013, in Orlando, at the Florida Water Resources Conference (FWRC).

UCF Team – Engineering Infrastructure Plan for the Bithlo Rural Community

The student design teams who competed in the wastewater category were:
· Florida Gulf Coast University: "Anaerobic Degradation of Cadaver Waste with an Attached Growth Recycle System"
· University of Florida: "Phosphorus Sequestration in Wastewater for Reclaimed Water Use"
· University of Miami: "Upgrade of Wastewater Sistema Central in Havana, Cuba"
· University of North Florida: "North Fletcher Wastewater I&I Improvements by Stormwater Management Project"
· University of South Florida: "The City of St. Petersburg Biogas Utilization Project"

The student design teams who competed in the environmental category were:
· Florida Gulf Coast University: "Soil Remediation of Southwest Florida Oil Field Properties"
· Florida State University/ Florida Agriculture & Mechanical University: "Killearn Lakes Wastewater Treatment Plant Reuse Study"
· University of Central Florida: "Strategic Environmental Engineering Infrastructure Plan for the Bithlo Rural Community"
· University of Florida: "Can Airport Stormwater Basins be Re-designed for Water Chemistry Constituent Load Management?"
· University of Miami: "Bagasse for Hydrogen Production in Cuba"
· University of South Florida: "Booker Creek Watershed Evaluation and Design"

USF won the Student Design Competition in both categories- Wastewater and Environmental. All of the teams had very well prepared presentation and well prepared designs.

Committee News & Information

Newsletter Advertising, Sponsorship and Feedback

To advertise or become an official sponsor of The Droplet, or to offer your feedback regarding topics that are of interest to you, topics that you would like to see discussed in the newsletter in an upcoming issue or any general comment about the newsletter. Please email your ideas to Ricky Ly at Ricky.Ly@Stantec.com.

IWRC Membership

If you would like further information about the IWRC or are interested in becoming a member, feel free to email any of our officers (see contact information in left margin) or visit our website at http://www.fwea.org/integrated_water_resources_com.php.

IWRC Goals and Focus

The goals of the IWRC are:

- To further the dialogue between water professionals throughout Florida to meet our growing needs in all areas of water resources.
- To provide timely, high-quality information and education on water as a valuable resource that can be used to meet current and future water resources and water supply challenges throughout Florida.
- To provide rewarding leadership opportunities to water professionals at all levels of experience.

The focus of the IWRC encompasses the following areas of water resources practice:

- water quality
- watershed and stormwater management
- water supply
- water conservation and reuse
- ecological and hydrologic restoration
- groundwater recharge
- hydrologic and hydraulic modeling
- funding and grant opportunities
- regulations and policies

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IWRC Calendar of Events

Date	Description
July 2, 2013	IWRC Monthly Teleconference
August 4, 2013	IWRC Monthly Teleconference
September 3, 2013	IWRC Monthly Teleconference
January, 2014	Integrated Water Resources Conference (details TBA)