

Appendix F. Details of Selected Alachua Sink Nutrient Load Reduction Projects (Not Including the Sweetwater Branch / Paynes Prairie Sheetflow Project)

Point source load reduction projects

Two traditional point sources affect Alachua Sink: GRU's Main Street Water Reclamation Facility (MSWRF), and the J.R. Kelly Generating Station. Total Nitrogen loading from the J.R. Kelly Generating Station contributes less than one percent of the Total Nitrogen load to Alachua Sink, and therefore further reductions are not discussed in this BMAP.

The Main Street Water Reclamation Facility is operated by Gainesville Regional Utilities, whose service area is 115 square miles. Approximately 35% of this area is served by the Main Street plant, from which there is discharge of treated wastewater into Sweetwater Branch. The plant underwent a \$16 million upgrade in 1989-1992.

GRU projects with significant promise for reducing TN loading to Alachua Sink are:

- o **Main Street Water Reclamation Plant water re-use through diversion to new Depot Avenue stormwater park (2003).** The Depot Avenue stormwater park is described in more detail in section 3.4.4.1.2. Once the public access reuse is available from the Main Street WRF, it is estimated that between 5 and 9 million gallons per year will be delivered to the Depot Avenue Stormwater Park. Under current effluent conditions, this volume of water represents as much as 400 lb/year of Total Nitrogen, which now has the opportunity for better uptake and attenuation through the wetland system at Depot Park as compared with direct discharge into Sweetwater Branch and Alachua Sink.
- o **MSWRF design, permitting and construction of water reuse infrastructure.** GRU has nearly completed a Reclaimed Water Master Plan whose recommendations have the potential to affect Alachua Sink loading through diverting treated wastewater for reuse rather than discharge into Sweetwater Branch. In addition, in 2003 GRU began an intensive study of nutrient loading at Alachua Sink and water reuse feasibility, which is still underway. GRU will spend an estimated \$1 Million in capital improvements by December 2006 to make up to 1.3 mgd of public access reuse from Main Street WRF.
- o **Main Street Water Reclamation Plant Annual Operation and Maintenance.** The Main Street plant is currently achieving relatively high removal of Total Nitrogen, despite the fact that its equipment does not include advanced Total Nitrogen removal capabilities. Total Nitrogen concentrations discharged to Sweetwater Branch ranged from 3.94 to 5.56 during the TMDL development period. This compares with effluent concentrations of around 3 mg/L for advanced treatment with Total Nitrogen removal. GRU is currently considering advanced wastewater treatment at the Main Street station and reclaimed water as potential means of achieving nutrient loading reductions to Alachua Sink and Sweetwater Branch.

Nonpoint source load reduction projects

The majority of the Total Nitrogen load to Alachua Sink is in the form of nonpoint sources. The most controllable of these sources is improved stormwater management, especially projects to retrofit areas with inadequate stormwater treatment. Most of the opportunities for this type of improvement are within the City of Gainesville, although urban areas outside the City may offer some opportunities for loading reductions as well.

Alachua County

- Land acquisition in Sweetwater Preserve. This property was purchased by the Alachua Forever land acquisition program. The 121 acre Sweetwater LTD property is located off Williston Road, and a portion of the property falls within the Gainesville city limits. The Sweetwater LTD property is adjacent to Paynes Prairie Preserve State Park, the City of Gainesville Boulware Springs Park and the Gainesville-Hawthorne Trail State Park. The key features of the property are its connectivity to adjacent conservation areas, its protection of water resources including Sweetwater Branch that transverses the property and high quality seepage wetlands and floodplain forest.
- The Alachua County water quality code, expanded nutrient monitoring, and buffer restoration projects also help to decrease nutrient loads into Alachua Sink.

City of Gainesville Stormwater Projects

Sweetwater Branch Watershed Management Plan

The City of Gainesville developed the Sweetwater Branch Watershed Management Plan in June of 2004 to update the Sweetwater Branch Stormwater Management Master Plan developed in April of 1993. While the 93 plan focused primarily of flood control in the watershed, the primary goal of the 2004 update was to incorporate the improvement of surface water quality of the base flow and stormwater in this watershed by reducing nutrient and sediment loads. This improvement of water quality is essential to the sensitive and diverse ecosystem of Paynes Prairie, groundwater quality as it enters the Floridian aquifer, and the health of the streams themselves. As outlined in this plan, the most noted water quality concerns in the watershed and its receiving water body includes elevated nutrients and fecal coliforms, along with excessive erosion and deposition.

The initial effort of a management plan update included a collection and synthesis of existing information on the watershed, followed by field data collection efforts to characterize the stream system and the hydrology of its watershed. The data were then used to perform a geomorphic analysis, a hydrologic and hydraulic analysis, and a water quality analysis of the stream system. Findings from these analyses were used to formulate the restoration alternatives.

The plan's recommended alternatives comprise 11 projects that include 8 subregional ponds, a trash trap, grade control structures and other localized stabilization measures, and a regional wetland treatment system with a second trash trap. The total nitrogen reduction from the recommended alternatives is estimated to be approximately 45%, not including any reductions that would result from advanced nitrogen treatment at the Main Street Wastewater Treatment Plant (MSWWTP). The total nutrient load with the recommended alternatives in place may be low enough to restore sheet flow to Paynes Prairie from the Sweetwater Branch watershed without causing a significant adverse impact to the ecological community in the Prairie while significantly restoring the historical hydrology in the Prairie.

This plan serves a guide for potential future City of Gainesville projects to improve water quality in the Sweetwater Branch watershed. All of the projects in the plan are dependent upon commission approval.

Duck Pond Restoration Project

The Duck Pond is a linear City park located on Sweetwater Branch Creek in the northeast portion of Gainesville. The Duck Pond Restoration Project, which began in 2002 and was

completed in 2005, was designed to restore a series of small wetlands along a 2600 foot reach of Sweetwater. This project focused on a section of Sweetwater Branch paralleling East Boulevard between 10th Avenue and 5th Avenue and attempted to correct several problems; poor water quality, rapid sediment transport, poor flow management and detrimental aesthetic quality. Before restoration, the upper 2100 feet of the stream channel was lined with concrete that had numerous breaks and fractures. This channelized condition contributed to higher velocities and transport of more sediment than a comparable natural stream. Frequently, storm events caused flooding of residential property in a historic district that adjoins the park. The lower 500 feet of the stream was a shallow 'pond' (one foot deep) with 3 to 4 foot high vertical walls constructed of stacked bags filled with concrete mix. The pond was filled with sediments transported by the stormwater, and hydrilla choked the water column with excessive growth. A resident duck population also contributed to the organic loading of the pond. Algal blooms, anoxic conditions and odor occurred throughout the year creating unacceptable eutrophic conditions. Specifically the project was designed to: 1) increase water storage capacity during peak storm events; 2) increase the collection of water borne sediments; 3) decrease the nutrient (nitrogen and phosphorus) loading from the stormwater through selective native plantings; and, 4) provide a setting where educational restoration information can be presented. Additionally, the park area surrounding the improvements was designed to continue neighborhood use of the park as well as serve as a connector to adjoining parks/recreational facilities

Restoring this section of Sweetwater Branch began with a series of wetlands, pools and natural stream segments in the upper section to improve water quality and flow regulation in this section of the creek. Additionally, two CDS units were added to prevent gross pollutants from entering the creek. The pond was dredged and deepened and a littoral zone was added for natural treatment of pollutants. Design and completion of this project required hydrologic and hydraulic modeling of the existing and proposed stream components; sampling and testing for key chemical parameters of the water both before and post restoration; selecting native wetland plant species with affinity for specific nutrients; and, meeting with neighborhood representatives in developing the conceptual plan for the project that included the park and educational components of the project proposal..

The purpose of restoring this section of Sweetwater Branch with a series of wetlands, pools and natural stream segments in the upper section and improvement of the pond in the lower section is to improve water quality and flow regulation in this section of the creek. Project plans include future monitoring to determine the effectiveness of nutrient removal.

Sweetwater Branch Sediment Traps

Several sediment traps have been installed in the Sweetwater Branch Watershed for purposes of water quality improvement.

The first device installed was a baffle box. This device employs the fundamental principle that things more dense than water sink. The main section of this device is a reservoir that spans the entire structure from side to side and nearly to the bottom. Baffles block the flow from going directly to the outlet. Instead the water is slowed and suspended particles have a chance to settle. Once the water level is high enough, it flows over the edge into the next chamber and more particulates can settle. Screens at these overflow points trap large pieces of trash and debris preventing them from continuing into the natural hydrological network. After flowing through the series of baffles, runoff is then relatively sediment free. The box is located near the intersection of the creek and SE 1st Avenue. The installation was a joint venture between the Alachua County Environmental Protection Department, the St. Johns River Water Management

District and the City of Gainesville. The sediment trap was installed in November, 1996 on a 24 inch stormwater pipe. The trap catches the coarser sediments from 10 acres of downtown. In conjunction with the project, a kiosk was placed at the site that explains the function of the unit, its construction and the benefits. Brochures are also available at the kiosk that present additional information. Quarterly, the unit is cleaned. The City transports all of the collected material to a storage yard and maintains a data log on the quantities removed from each of the three cells in the trap. Since its installation, several environmentally oriented citizen tours have featured the sediment trap as one of the stops on their program.

The second sediment trap was installed in 2002 near the intersection of the creek and SE 2nd Avenue. There, a new type of trap was installed called a Vortech box. This is an EPA award-winning design that efficiently removes contaminated sediment, floating oil and debris from surface runoff. It is a compact, below grade system that is fabricated near the jobsite from pre-cast concrete and marine grade aluminum. Its unique design allows for easy inspection and unobstructed maintenance access. Features include low capital cost per unit of treatment and a shallow excavation depth that reduces installation costs. The Vortech System's swirl concentrator and flow controls work together to prevent pollutant re-suspension and washout. This works even during high-intensity storm events. Annual Total Suspended Solids (TSS) removal efficiencies have been shown to be 80% for typical urban runoff particle distributions. Each system is custom-designed to suit site conditions and local regulatory requirements, treating design flows from 1.6 CFS to 25 CFS. Larger flows are treated using Vortech Systems that are cast-in-place.

In 2003, yet another type of sediment trap was introduced to the Sweetwater Branch's stormwater system. Two CDS units were added to the Sweetwater Branch at NE West Boulevard and NE East Boulevard in the Duckpond Neighborhood. CDS stands for Continuous Deflective Separation. Polluted runoff enters the unit and is introduced at a tangent inside the separation screen forming a vortex. The slow moving center of the vortex pulls in floatables and suspended solids. The solids settle out to an undisturbed sump chamber below. The water then passes counter-currently through a separation screen. Floatables remaining at the water surface are trapped within the screen. The separation screen is hydraulically designed to be self cleaning and non-blocking. CDS systems are easy to maintain because they have no moving parts and require no power or supporting infrastructure. However, other sediment traps may be more effective in areas where additional storm water pollutants, such as dissolved nutrients, oil and grease, or metals, are prevalent.

Springhill Regional Stormwater Park Project

This 3.6-acre stormwater park provides treatment for approximately 7 acres of untreated stormwater runoff from residential areas of the Springhill neighborhood. The retrofit project was completed in 2001. Water quality treatment is provided by wet detention.

Depot Park Regional Stormwater Park Project

The Depot Park Regional Stormwater Project is a U.S. Environmental Protection Agency (USEPA) and DEP designated Brownfield pilot project. EPA and the State of Florida awarded grants to determine the feasibility of developing a 38-acre site as a park/wetlands augmented stormwater facility. Conceptually, the stormwater facility will provide quality and flow regulation improvements for 50 to 100 acres of downtown Gainesville. Additionally, there are petroleum plumes migrating in the direction of the proposed basin. It is anticipated that these plumes can be intercepted and directed to the basin for bio-remediation. The project includes the cleanup of contaminated soils, construction of the regional stormwater management facilities, installation of reuse water system for irrigation, and development of the recreational components of the park.

This downtown revitalization project is a \$30.2 million project to revitalize the traditional heart of Gainesville by reclaiming a brownfield site and creating an urban park with stormwater management facilities.

Aerial View of Depot Park Site in 2004



This project will:

- Capture and treat stormwater runoff from downtown Gainesville
- Improve the quality of surface- and groundwater affecting the Floridan Aquifer
- Provide recreation amenities for skateboarding, walking, jogging, and biking
- Provide passive recreation and culture including nature observation and concerts
- Revitalize adjacent, historically minority neighborhoods; and
- Preserve and restore the historic Gainesville Train Depot as an activity center.

The Project is located on the southern boundary of Downtown Gainesville. Downtown Gainesville is located within the Sweetwater Branch watershed, which covers approximately 3 square miles. Stormwater discharges into Sweetwater Branch, which drains into Payne's Prairie Preserve, a part of the State of Florida Park System and designated an Outstanding Florida Water. The Branch discharges into a part of the prairie where Alachua Sink, a natural sinkhole located on the northeast boundary of the prairie, directly discharges to the Floridan Aquifer, Florida's main drinking water source.

The urbanization of east Gainesville took place prior to implementation of regulations requiring on-site treatment of stormwater. As a consequence, most of the stormwater runoff is discharged from commercial, industrial and residential land use areas directly to the creek without receiving treatment. These stormwater discharges cause significant pollution loads to enter the creek. The St. Johns River Water Management District (SJRWMD) non-point source-screening model indicates that the stormwater impact to Sweetwater Branch is significant. The water quality within Sweetwater Branch adversely impacts the Payne's Prairie ecosystem and contributes to the degradation of the



Depot Park Phase 1 stormwater pond under construction

Floridan Aquifer.



The Depot Park concept

The construction of the stormwater facility, now underway, will reduce contaminant levels discharging to Sweetwater Branch, resulting in greater environmental protection of Payne's Prairie State Preserve and the Floridan Aquifer. Protection of the Floridan Aquifer decreases a known threat to the source of drinking water in our region, helping to protect long-term reliance on this essential resource. Stormwater ponds on this site will help sustain Downtown redevelopment by providing stormwater treatment for approximately 100 acres of the urban area. While no official pollutant loading strategy has been completed as yet for these ponds, plans are to reserve the West Pond for retrofit of the largely developed downtown area; this pond will not be available for redevelopment credits. The East Pond will serve as a new and redevelopment credit bank. The system for development stormwater credits is being developed currently. In the future, this park will also serve to provide

educational outreach program opportunities with informational kiosks as an integral part of the setting providing information about wetlands and stormwater and how they become mutually beneficial in this setting.