Wastewater Treatment Plant Inspection Program
2010 and 2011 Data Report

Prepared by:
Alachua County Environmental Protection Department

August 2012

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1. Report Scope

This data report focuses on the results from Alachua County Environmental Protection Department's (ACEPD) inspections of wastewater treatment facilities (WWTFs) within Alachua County. This report concentrates on the data collected in 2010 and 2011, but includes data extending as far back as 2007 for the purpose of demonstrating data trends. Groundwater monitoring data were provided by the Florida Department of Environmental Protection Department (FDEP) for those treatment facilities that are required to submit this information, generally the larger municipal facilities. Loading rates were calculated by multiplying self reported flow and effluent data together. Self reported concentrations of nutrients vary by permit and data were provided by FDEP. Effluent data collected during inspections conducted by ACEPD was also utilized. FDEP also provided data on biosolids/sludge disposal.

2. Background and Introduction

There are 18 wastewater treatment facilities (WWTFs) permitted by FDEP located in Alachua County (Table 1 and Figure **1**). The operators or owners of the WWTFs are required by their FDEP permit to self monitor the quality of the effluent and to report the results to FDEP on a monthly basis. The Alachua County Environmental Protection Department (ACEPD) has a wastewater program partially funded by the annual fees paid to the County by the owners of 16 of WWTFs. ACEPD does not inspect the UF WWTF, because they are considered a state entity and Gainesville Raceway does not pay annual fees. ACEPD does not permit the facilities, but currently conducts inspections and collects effluent samples on a quarterly basis. After each inspection ACEPD staff writes a letter communicating inspection results, noted concerns and any compliance issues. The inspection form, the effluent data, and the summary letter are sent to the plant owner, plant operator, and FDEP's Northeast District Office Domestic Wastewater staff.

The wastewater facilities are inspected by ACEPD to insure that they are operating properly, with an emphasis on nutrient removal. The FDEP permit does not require all the facilities to sample for nutrient species in their monthly sampling, therefore ACEPD samples are usually analyzed for nitrite + nitrate, total Kjeldahl nitrogen, ammonia, total nitrogen, and total phosphorus. This report will focus on nitrate (as it is the most mobile and environmentally sensitive form of nitrogen), total nitrogen, and total phosphorus. Nitrate + nitrite is used as a surrogate for nitrate in situations where nitrate data are not

available. The nitrite portion of nitrate + nitrite in wastewater effluent is normally low, with nitrate and ammonia typically composing the dominant forms of nitrogen.

The treated effluent is disposed in various permitted ways including: public access re-use, treatment wetlands, sprayfields, injection wells, surface water discharges, absorption fields, and percolation ponds (also called rapid infiltration basins). The effluent disposal methods for each facility are listed in Table 1 and in the text boxes in the facility sections. FDEP considers all effluent disposal methods that recharge groundwater, including sprayfields, as re-use. However, for this report re-use refers to effluent that is treated to public access re-use standards and used in place of potable water, such as landscape irrigation. Regardless of disposal method, treated wastewater eventually becomes groundwater or surface water and can contribute to environmental degradation if it has high concentrations of phosphorus and/or nitrogen. Excessive nutrients can cause algal blooms, prolific plant growth, and fish kills in springs and surface waters. However, this water can provide the important function to help recharge the aquifer.

Nutrient data used for this report include data from the facility's monthly Discharge Monitoring Report (DMR) and ACEPD's effluent data are discussed in the following sections. Effluent samples are collected as grab samples and are analyzed by a Florida Department of Health certified laboratory. Some of the FDEP nutrient permit limitations for the larger treatment facilities are based on flow proportioned composite samples, to compensate for variability of flow throughout the day. Since samples collected during ACEPD inspections are grab samples, the data collected by ACEPD for these parameters cannot be used to verify that the effluent at the larger facilities is in compliance with their permits. However, the data do indicate what the treatment facilities are releasing to the environment at the time of inspection and sampling. Facilities discharging effluent to groundwater either directly or indirectly are required to submit groundwater reports to FDEP. These data are included in this report. The municipal facilities are discussed first, followed by the package plants (smaller facilities).

Concentration of nutrients alone can be deceiving because the flow rates vary significantly between the facilities. To gain perspective on possible environmental impacts from treated effluent, loading rates were calculated using monthly average flows from 2010 and 2011 and effluent nutrient concentration data collected by the facilities or ACEPD inspectors. The loading rates are discussed for each facility in the

following sections and Table 2 compares all of the facilities. Data on flow rates were reported by each facility in their Discharge Monitoring Report (DMR), which were provided by FDEP.

Sewage sludge is a semi-solid byproduct material that is created as a residual during the wastewater treatment process. The mass of sewage sludge is typically an accumulation of the dead microorganisms which are utilized to remove carbon and nutrients from the influent. Sewage sludge can be further processed and treated to create biosolids. Biosolids that have been treated to the applicable standards can be land applied to dispose of the material while adding nutrients to the soil. The small package plants in Alachua County do not have the technology to process sewage sludge into biosolids, so they pay to have the sludge hauled off to larger facilities for treatment and disposal. These smaller facilities generate less sludge, since they treat lower volumes of wastes. The following sections will present the mass of sewage sludge or biosolids generated from the municipal facilities (Table 3 and Table 4).

Endocrine disrupting chemicals and pharmaceuticals and personal care products are increasingly documented in surface water and groundwater in the U.S. and throughout the world. Domestic effluent is one documented source of these chemicals. ACEPD conducted a preliminary investigation of several wastewater treatment facilities and of Sweetwater Branch (receiving water for the treated effluent from one of Gainesville's municipal wastewater treatment facilities) in Alachua County. These results are summarized in a report titled, "Results of a Screening Analysis for Organic Wastewater Contaminants in Effluent from Four Wastewater Treatment Facilities and Two Surface Water Sites on Sweetwater Branch". Check Alachua County's website (www. AlachuaCountyWater.org) for the report.

The industrial park that feeds the Electro Energy (formerly Moltech) wastewater plant has been under ownership transition. The plant's permit expired on May 30, 2006. The plant is designed as a zero discharge plant, and therefore is currently not required to maintain a wastewater permit by FDEP. The treated effluent is stored in a tank and is used as process water at the industrial park after it has gone through treatment and reverse osmosis. Since this facility was not inspected by ACEPD during 2010 and 2011 it will not be discussed further in this report.

Table 1. Permitted Wastewater Treatment Facilities in Alachua County (2010 and 2011)

Facility Name	Effluent Disposal	Permit Expiration	Maximum Permitted Capacity (gallons per day)	Nutrient* effluent limitations (mg/L)
Archer Community School	Rapid Infiltration Basin	8/18/2014	5,000	Nitrate < 12 mg/L
Archer Homes	Absorption Field	10/13/2015	8,300	Nitrate < 12 mg/L
Arredondo Village MHP	Rapid Infiltration Basin	12/14/2014	60,000	Nitrate < 12 mg/L
Brittany Estates MHP	Surface Water Discharge to Little Hatchet Creek	8/28/2016	60,000	Nitrate < 12, , Total organic nitrogen <6.4, ammonia <4.8 mg/L , and total phosphorus must be reported
Camp Kulaqua	Rapid Infiltration Basin	9/13/2014	20,100	Nitrate < 12 mg/L
Camp McConnell YMCA	Absorption Field	3/15/2015	7,500	Nitrate < 12 mg/L
City of Alachua	Spray Irrigation and Public Re-use	7/19/2016	1,500,000	Nitrate + nitrite and TKN must be reported
City of Gainesville- GRU Main Street	Surface Water Discharge and Public Re-use	3/18/2015	7,500,000	Total organic nitrogen < 3.5, ammonia < 4.87 or 3.64 (depending on season), unionized ammonia < 0.02 mg/L, total nitrogen, TKN, and total phosphorus must be reported. Total nitrogen must be less than 40,380 lb/yr.
City of Gainesville- GRU Kanapaha	Underground Injection and Public Re-use (also have a permitted surface water discharge for emergencies)	11/11/2015	14,900,000	Nitrate < 10 mg/L, total organic nitrogen, ammonia, TKN, total phosphorus, and ortho phosphate must be reported.
City of Hawthorne	Rapid Infiltration Basin	10/3/2015	150,000	Total nitrogen, total phosphorus, nitrate + nitrite must be reported
City of High Springs	Spray Irrigation	3/30/2013	240,000	Nitrate must be reported
City of Newberry	Spray Irrigation	3/3/2016	415,000	Total nitrogen and Total phosphorus must be reported
City of Waldo	Treatment Wetland to Surface Water	4/27/2013	99,000	Total nitrogen < 6, ammonia < 3.2, unionized ammonia < 0.02, total phosphorus < 2mg/L (post wetland)
Florida Welcome Station	Rapid Infiltration Basin	3/10/2015	9,000	Nitrate < 12 mg/L
Gainesville Raceway	Spray Irrigation	12/18/2012	8,250	No limitations
Knight's Inn Micanopy	Spray Irrigation	4/25/2015	15,000	Nitrate must be reported
Prairie View Apartments	Rapid Infiltration Basin	9/9/2015	4,200	Nitrate <12 mg/L
University of Florida	Underground Injection and Public Re-use	11/23/2015	3,000,000	Total nitrogen and total phosphorus must be reported

***- Facilities with groundwater effluent disposal do not have phosphorus permit limitations.**

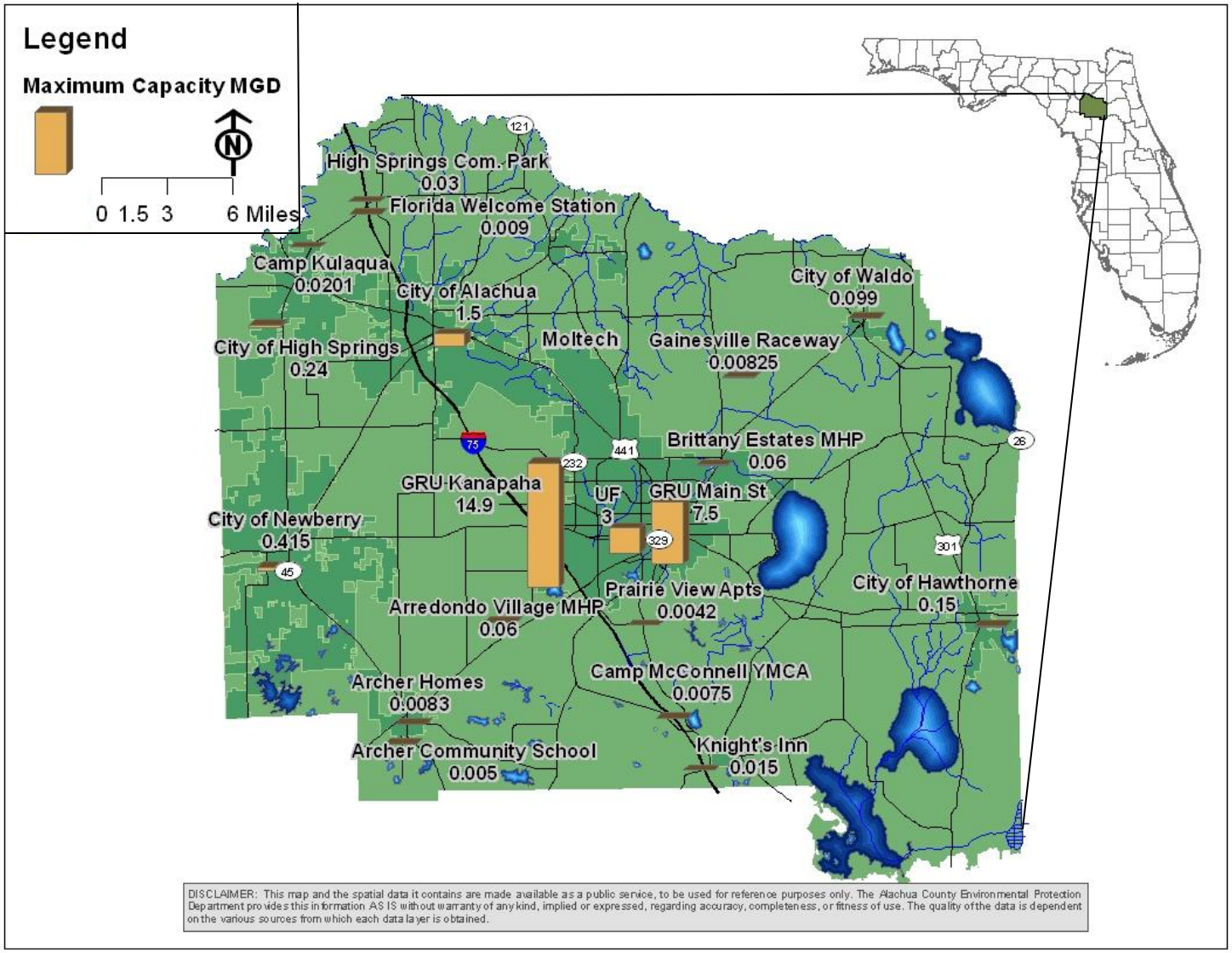

Figure 1. Permitted Wastewater Treatment Facilities located in Alachua County, Florida and their maximum capacity in million gallons per day.

Table 2. Estimated Average Nutrient Loading* for Wastewater Treatment Facilities (2010 and 2011)

Facility	Total Nitrogen [lb/year]	Total Phosphorus [lb/yr]
GRU Kanapaha	115,193	48,814
GRU Main Street	105,443	19,040
University of Florida	15,003	12,045
Newberry	8,511	3,195
Alachua[&]	5,886	8,029
High Springs	4,081	1,463
Hawthorne	2,957	1,729
Arredondo Village MHP	2,242	637
Brittany Estates MHP	736	196
Waldo (post)	656	189
Archer Homes	539	54
Florida Welcome Center	429	109
Archer Com. School	332	49
Prairie View Apts.	266	49
Knights Inn	153	35
Camp Kulaqua	97	18
Camp McConnell YMCA	30	9

**Loading rates and how they were calculated are discussed in the respective chapters for each facility.*

[&]*Data presented for the City of Alachua are for the plant currently operating.*

3. Municipal Facilities

There are eight municipal wastewater treatment facilities in Alachua County, including the University of Florida's facility. Municipal facilities treat a larger volume of wastewater compared to package plants, and the treatment facility is built on-site. Package plants are typically pre-fabricated and shipped to the site as one unit (WEF 1985). The municipal plant capacities in Alachua County range in permitted treatment volumes from 99,000 (City of Waldo) to 14,900,000 (GRU Kanapaha) gallons per day. The plant operators are required to spend more time at the municipal facilities (due to their larger treatment volume) and the facilities tend to utilize more advanced technologies compared to package plants, which tend to reduce nutrient concentrations further than package plants. The municipal facilities treat and discharge large volumes of effluent, which increases their potential to degrade water quality.

Figure 2 displays the average total nitrogen and total phosphorus concentrations for effluent data from the ACEPD inspections and reported nutrient data from monthly DMRs

by municipal facilities. Effluent quality varied among the sampling events and among the various facilities. Some facilities were sampled more frequently than others and some have different requirements for values to report in their DMRs. Each individual municipal facility is discussed in the following sections.

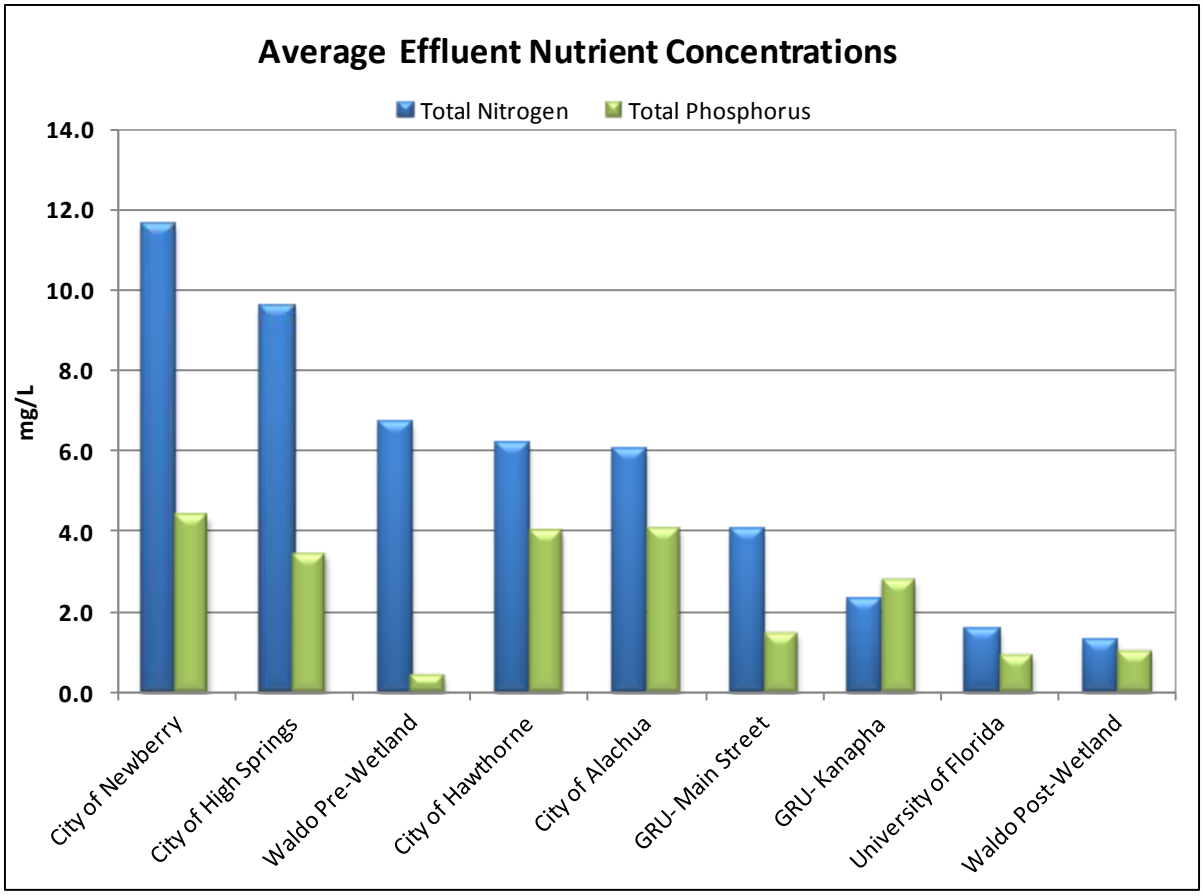

Figure 2. Average effluent data from grab samples collected during ACEPD inspections for 2010 and 2011.

Figure **3** displays the average environmental nutrient loading rates calculated by multiplying average flow rates by average nutrient concentrations for 2010 and 2011.
The nutrient loading is largely driven by the flow rates, so it is no surprise that the Gainesville Regional Utilities Kanapaha plant has the greatest loading of total nitrogen (greater than 115,000 lbs/year), since it has the greatest flows (permitted at 14.9 million gallons per day).

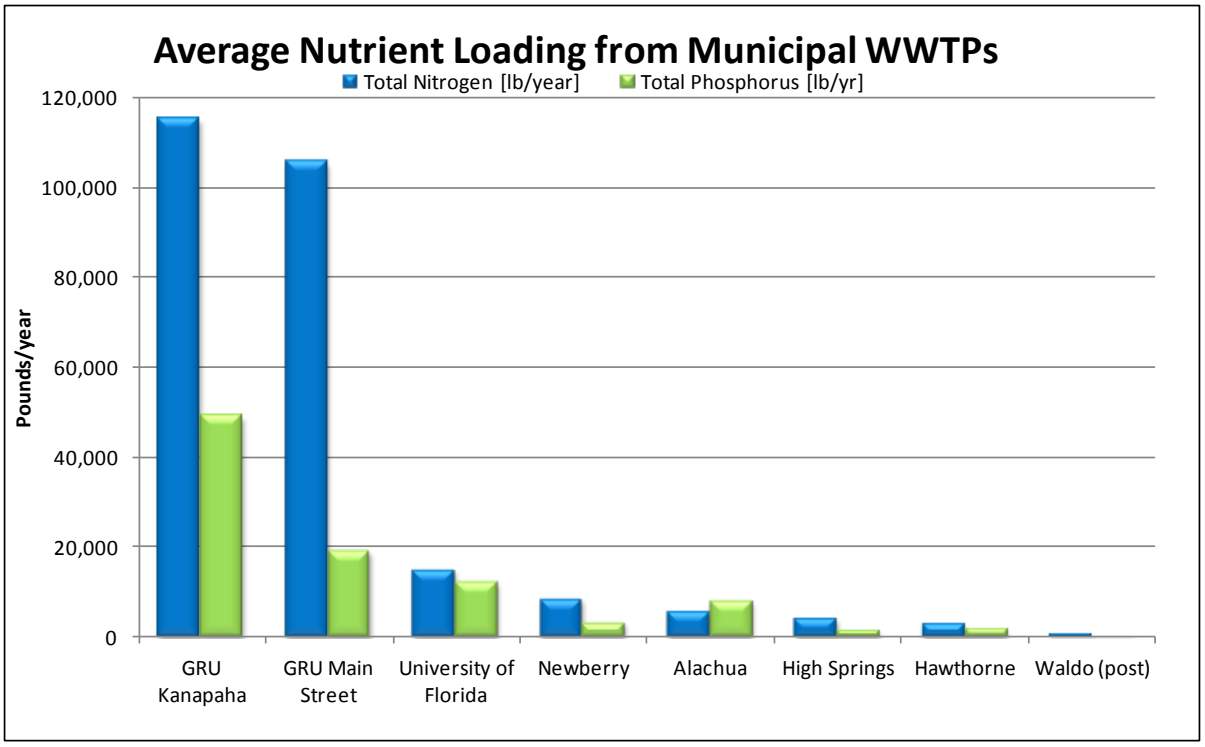

Figure 3. Estimated Average effluent loading rates from 2010 and 2011.

Table 3 displays the annual quantity of biosolids or treated sewage sludge produced at each facility during 2010 and 2011. The disposal methods for each individual facility are discussed in the following sections. Biosolids (Class B) from the GRU Kanapaha and Main Street facilities are land applied at Whistling Pines Ranch southwest of Archer. Many of the other WWTFs transport their sludge (or biosolids) to GRU for treatment and land application.

Table 3. Biosolids/Sludge Disposal Data for Municipal Wastewater Treatment Facilities in Alachua County

Facility	2010 Annual Quantity (dry-ton)	2011 Annual Quantity (dry-ton)	Disposal Method	Final Disposal Location
City of Alachua	112.4	198	Hauled	Hauled to farms in Columbia and Suwannee Counties
City of Gainesville GRU Kanapaha	2495	2349	Land Application	Whispering Pines Ranch
City of Gainesville GRU Main Street	1077	1239	Land Application	Whispering Pines Ranch
City of Hawthorne	25	17	Hauled to GRU	Whispering Pines Ranch
City of High Springs	24	15	Hauled to GRU	Whispering Pines Ranch
City of Newberry	17.4	17.2	Land Application	City of Newberry Treatment Facility Spray Field Site
University of Florida	169	268	Hauled to GRU	Whispering Pines Ranch
City of Waldo	22	14	Hauled to GRU or Florida Septic	Whispering Pines Ranch or other application site

3-1 The City of Alachua

Facility size: 1.50 MGD

Permitted effluent disposal: 105 acre sprayfield, 244 acre area for re-use irrigation, and 197 acre golf course (public access re-use); course is currently inactive

Residuals disposal: Hauled to Class I landfill or treated and land applied in Columbia and Suwannee Counties.

Permit expiration date: July 19, 2016

The City of Alachua domestic wastewater treatment facility was upgraded in 2011. The plant now consists of two 0.75-MGD oxidation ditches for biological nutrient removal (BNR) using a Modified-Ludzack Ettinger process configuration, two secondary clarifier basins, return/waste activated sludge (RAS/WAS) pumping stations, sand filter, and two chlorine contact chambers. Both the old and current facilities were found to be in compliance during the seven ACEPD inspections conducted in 2010 and 2011. However, effluent quality varied among the inspections and was greatly improved by the new facility (Figure 4). Data collected prior to the operation of the new plant indicate large variability in nutrient removal in previous plant. The current plant has two oxidation ditches which create zones of aerobic and anaerobic activity allowing microbes to breakdown nitrogen species into N_2 gas which is released into the atmosphere. Effluent from this plant should be able to maintain N concentrations lower than the previous plant. Operation of the old plant ended in February 2011. Data will be presented for operation of the old plant January 2010 to February 2011, and new plant March 2011 to December 2011.

The monthly average flow in 2010 and 2011 (monitoring location EFA-1 and EFB-1, monitoring group R-001) were used to calculate an average flow of 0.52 million gallons per day (MGD) for the old plant and 0.55 MGD at the new plant. Nutrient concentrations collected by ACEPD and operators were then multiplied by this flow rate to calculate an average loading rate from the facility. Nitrate + Nitrite data reported as maximum observed values by the facility and collected by ACEPD were used to calculate a loading of 10,904 lbs/year at the old plant and 4,084 lbs/year at the new plant. The city of Alachua is not required to monitor for Total phosphorus or Total nitrogen. Therefore, ACEPD total nitrogen and total phosphorus data were used to calculate loadings of 13,606 lbs/year and 5,301 lbs/year respectively for the old plant. At the new plant ACEPD data for total nitrogen and total phosphorus were used to calculate loadings of 5,886 lbs/year and 8,029 lbs/year, respectively. Table 1 compares the effluent from the new treatment facility to other wastewater treatment facilities in Alachua County. There was a noticeable decrease in total nitrogen loading and a similar decline of nitrate+nitrogen loading (Figure 5).

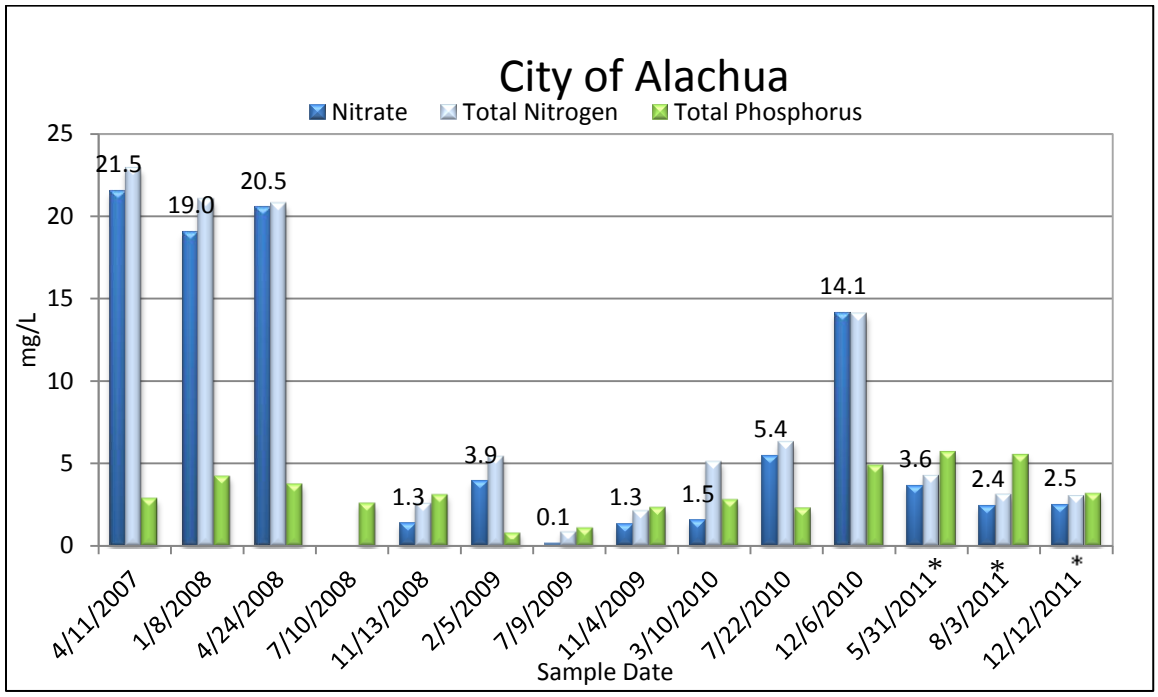

Figure 4. Effluent data from grab samples collected during ACEPD inspections at the City of Alachua WWTF from 2007 through 2011, new plant was operating starting in early March 2011.
*indicates samples collected from the new WWTF

Large nitrate loads, regardless of the source, are a concern in such proximity to the Santa Fe River and its springs. A dye trace study conducted by Karst Environmental Services for

ACEPD found a connection from nearby Lee Sink and the Mill Creek Sink to Hornsby Springs, a first magnitude spring on the Santa Fe River (Butt et al 2006). When the City of Alachua recently expanded their plant it was designed to maximize de-nitrification at the facility with a new oxidation ditch treatment facility. If nitrogen concentrations remain constant, the new facility would be able to double its treatment volume and have the same loading rate as the previous WWTF. Loading rates for Total Phosphorus indicate that the new plant and its larger volumes are associated with greater loads of Phosphorus. Typically waste water treatment does not focus on Phosphorus removal; however, it may be important for the City of Alachua to keep watch on their Total Phosphorus loading so it does not accumulate in the soil over time and cause problems.

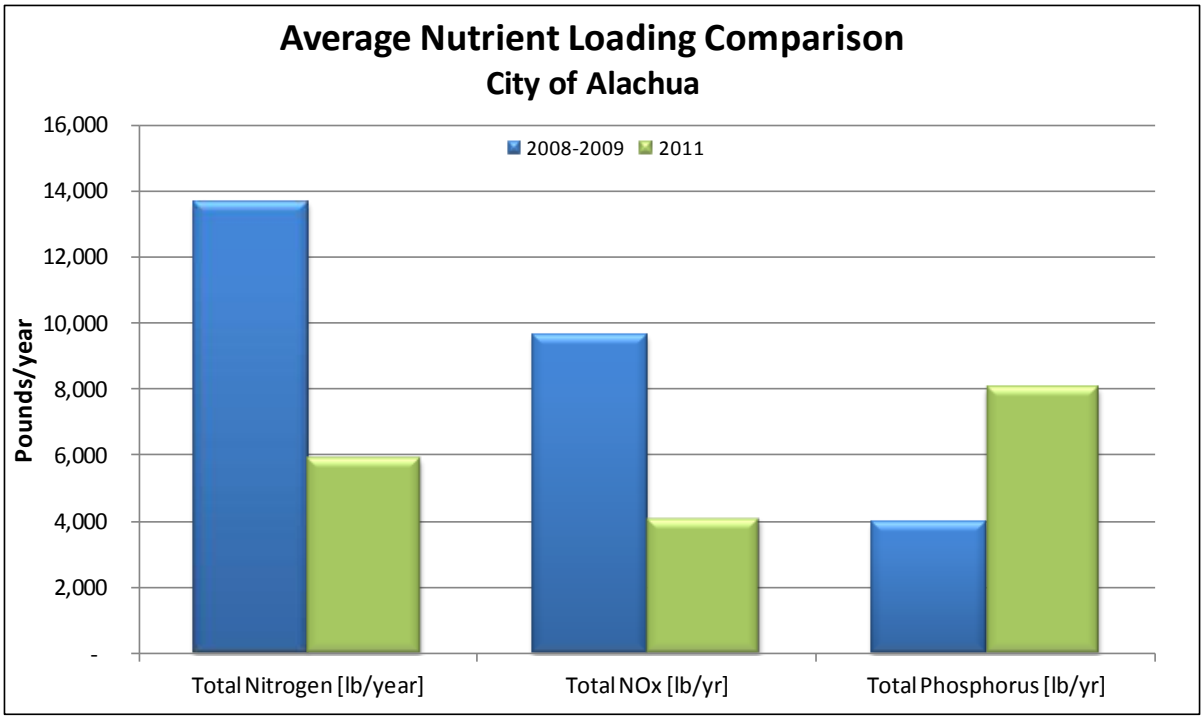

Figure 5. Comparison of calculated nutrient loading for 2008 - 2009 at the old City of Alachua WWTF with new WWTF in 2011. Discharge data were attained from FDEP discharge monitoring reports (DMR) and nutrient concentrations in the DMR were averaged with samples from ACEPD inspections.

The City of Alachua is required by FDEP to sample their groundwater monitoring wells on a quarterly basis. The background wells are labeled with a B, compliance wells are labeled with a C, and intermediate wells are labeled with an I. High nitrate values were consistently measured at Compliance Well One (MWC-1, data not shown here), and the City of Alachua argued in 2006 that this well is up-gradient of their effluent disposal. FDEP worked with the City of Alachua and re-designated this well as a background monitoring well (MWB-1 in

Figure 6). The high nitrate values detected at this well are thought to be influenced from the groundwater contamination at the adjacent site which is the former Copeland Sausage Plant (JEA, 1998 and Universal Engineering Sciences, 2010). The concentration of nitrates in the groundwater of this area often exceed the drinking water standard of 10 mg/L. With the expansion of the facility a new compliance well was installed (MWC-8).

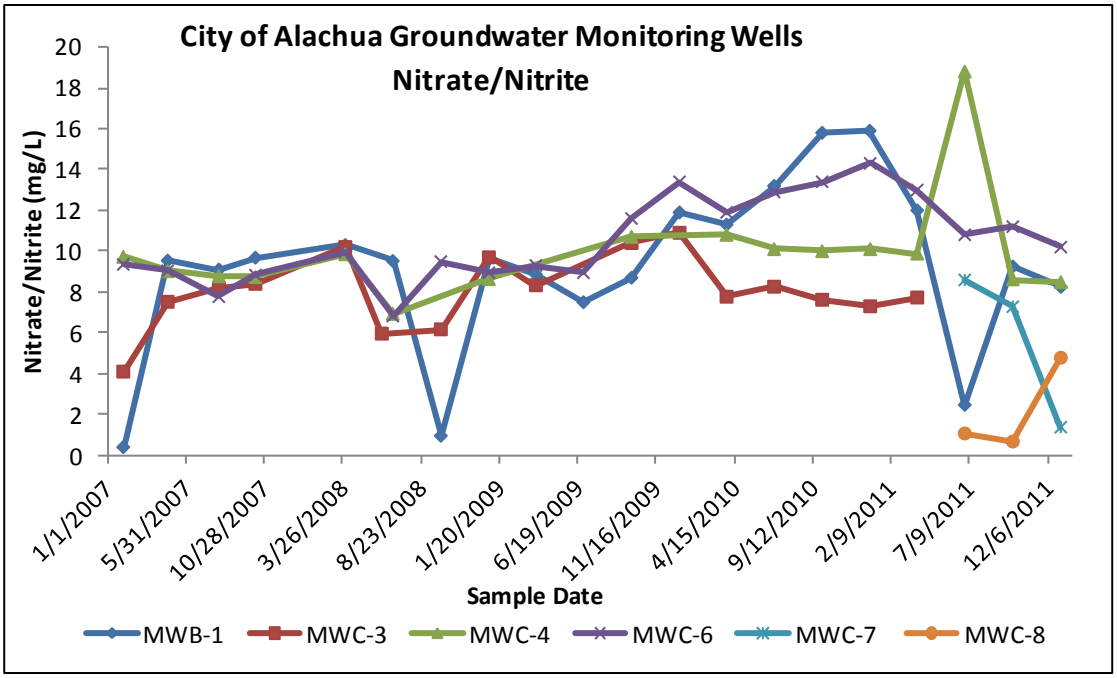

Figure 6. Nitrate + nitrite data from the City of Alachua WWTF Groundwater Monitoring Reports from late 2007 through 2011. Less than 10 mg/L is the drinking water standard for nitrate.

The treatment facility is permitted to land apply biosolids that have achieved class B pathogen reduction. According to data provided by FDEP, the facility produced 112.4 dry tons of biosolids in 2010 and 198 dry tons in 2011. These biosolids are treated and are land applied to the Glenn Farms RAF and Rolling R Ranch RAF in Columbia and Suwannee Counties.

3-2 City of Gainesville – Kanapaha Facility

Kanapaha Facility

Facility Size: 14.9 MGD

Permitted effluent disposal: Underground injection well and 6.89 MGD public access re-use.

Residuals disposal: land applied to Whispering Pines Ranch

Permit expiration date: 11/11/2015

The clarifiers at the GRU Kanapaha facility

The Kanapaha plant includes a 10 MGD Modified Ludzak-Ettinger extended aeration activated sludge and a 4.9 MGD oxidation ditch system with pre-denitrification biological nitrogen removal. The plant is inspected annually by ACEPD and was found in compliance during the 2010 and 2011 inspections. The effluent was within the FDEP permit limitations, and the nutrient concentrations were relatively low (Figure 7).

The majority of the Kanapaha effluent is injected into the Floridan aquifer via deep well injection, at a depth interval of 450 – 1200 feet via four wells. The average flow injected into the aquifer was 6.92 MGD in 2010 and 5.79 MGD in 2011. Up to 6.89 MGD of Kanapaha effluent is permitted for public access re-use for applications such as irrigating schools, residential lawns, parks, fire protection, Kanapaha Botanical gardens, and tanker trucks for pesticide application, dust control, and other activities. An average of 2.02 MGD of effluent was utilized for public re-use in 2010, while an average of 2.40 MGD was re-used in 2011.

The monthly average flows of influent entering the Kanapaha plant from 2010 and 2011 were used to calculate an average flow of 8.55 Million Gallons per Day (MGD). Average maximum nutrient concentrations, as reported, were then multiplied by this flow rate to calculate an average maximum loading rate from the facility. Nitrate + nitrite data and total nitrogen data collected by the facility and ACEPD during 2010 and 2011 were used to calculate loadings of 116,890 lbs/year and 115,193 lbs/year respectively. Both GRU and ACEPD total phosphorus data were used to calculate a loading of 48,814 lbs/year. Table 2 compares these values to those of the other wastewater treatment facilities located in Alachua County.

Loading from 2010 - 2011 were lower than those observed in 2008 - 2009 (Figure 8). Lower loading rates are a result of lower flows in 2010 - 2011 because GRU has been directing a portion of the flow to the GRU-Main St. WWTF so it can be operated at capacity.

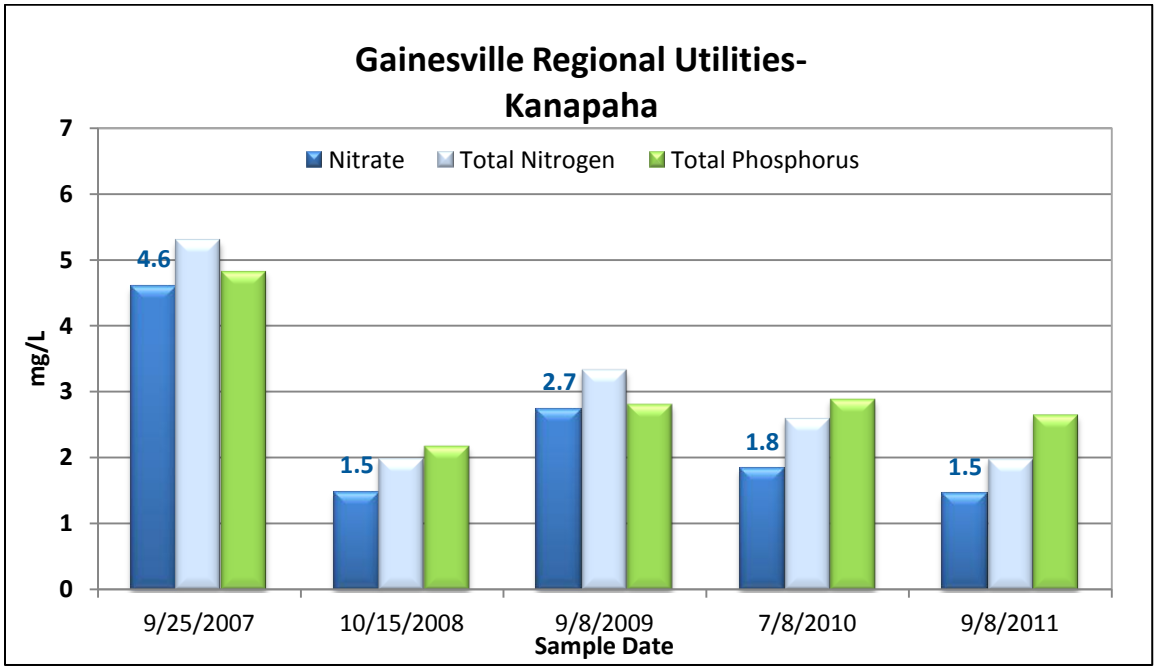

Figure 7. Effluent data from grab samples collected during ACEPD inspections at the GRU WWTFs during 2007-2011. The nitrate concentrations are denoted on the graph.

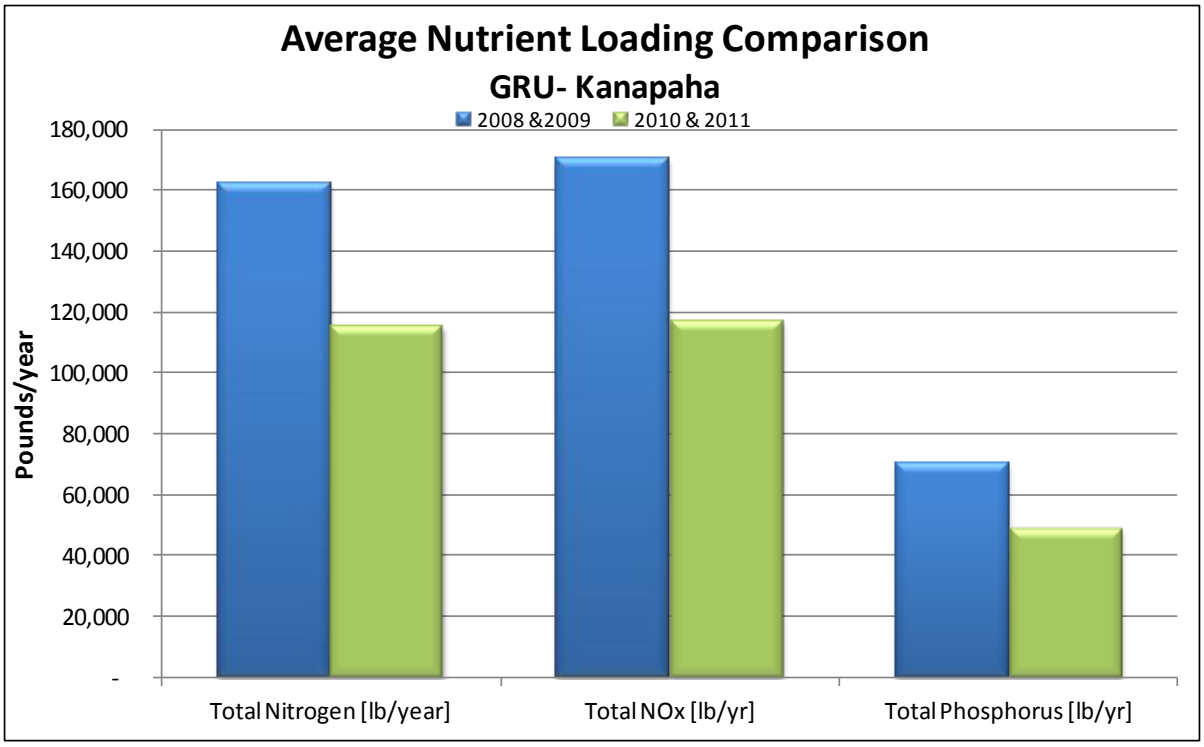

Figure 8. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from GRU- Kanapaha.

GRU is required to sample their groundwater monitoring wells at the Kanapaha plant and submit the results to FDEP. The background wells are labeled with a B and the compliance wells are labeled with a C. Two specific conductive zones are monitored by the wells, a shallow zone above 250 feet below the land surface and a deeper zone below 450 feet below land surface. The MWC-2 wells are located less than one-tenth of a mile west of the facility. The nitrate + nitrite concentrations at monitoring well MWC-2D bounce up and down, but appear to be increasing (Figure 9). A longer period of record would be needed to confirm this observation. The December 21, 2010 sample several of the compliance wells exceeded 40 mg/L, this was the only time that compliance wells exceeded the permitted concentration.

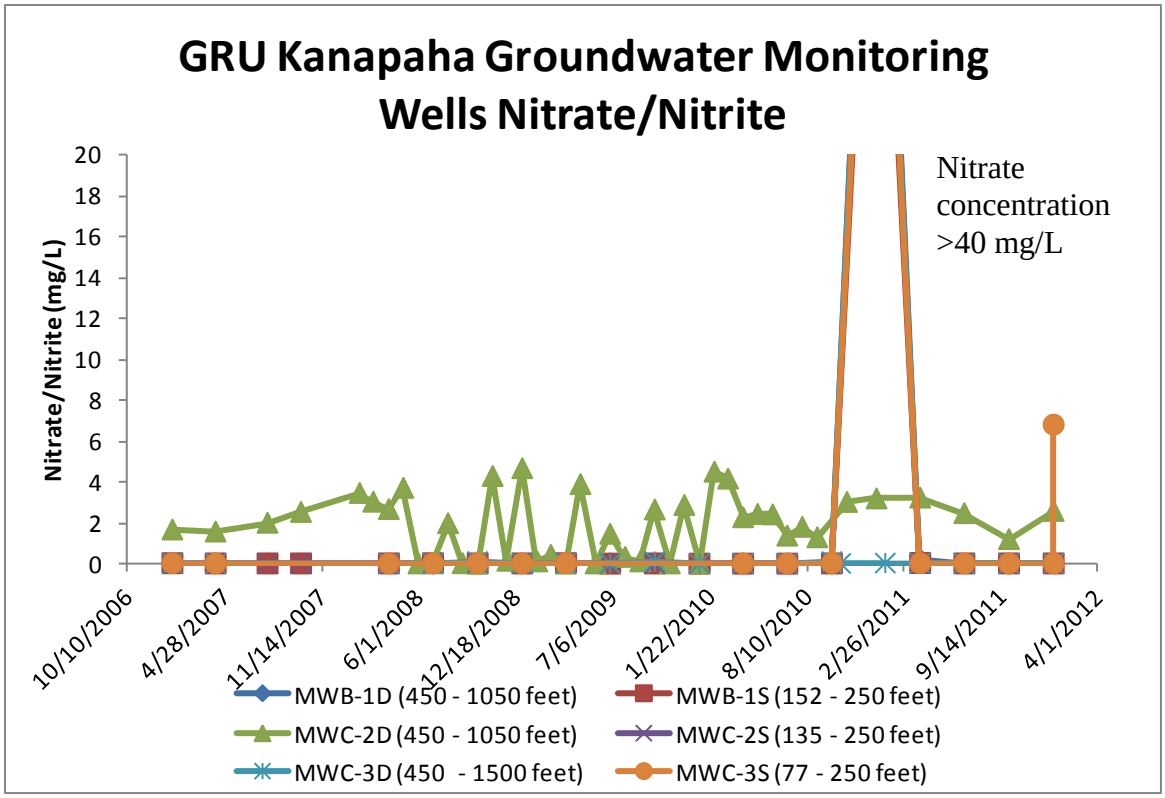

Figure 9. Nitrate + nitrite data from the GRU Kanapaha WWTF Groundwater Monitoring Reports from 2007 to 2011. Drinking water standards require nitrate to be less than 10 mg/L.

The wastewater residuals (sludge) are treated to Class B standards and then land applied as outlined in the facility's Agriculture Use Plan(s). The disposal site is Roger Williams Farm/Whispering Pines Ranch. According to FDEP's records, 2,495 dry tons of biosolids were produced in 2010, while 2,349 dry tons were produced in 2011.

3-3 City of Gainesville – Main Street Facility

Main Street Facility

Facility Size: 7.5 MGD

Permitted effluent disposal: 7.5 MGD discharge to Sweetwater Branch and 3.309 MGD public re-use

Residuals disposal: land applied to Whispering Pines Ranch

Permit expiration date: March 18, 2015

The clarifiers at the GRU Main Street facility

The Main Street facility is an advanced secondary activated sludge plant and is inspected annually by ACEPD. The plant was found in compliance during the 2010 and 2011 inspections. The effluent was within the FDEP permit limitations. The effluent from the Main Street facility is discharged to Sweetwater Branch which flows through Paynes Prairie State Preserve before entering the aquifer via Alachua Sink. There are no groundwater monitoring wells associated with the Main Street facility, since this plant discharges to surface waters.

Alachua Sink has a Total Maximum Daily Load (TMDL) requiring a 45% reduction in nitrogen inputs. Plans are underway to reduce nutrient concentrations to Alachua Sink by implementing a sheetflow restoration project, eliminating the direct discharge of water from Sweetwater Branch to Alachua Sink. This project will use wetland treatment to reduce nutrients and hydrate Paynes Prairie. There are also plans to upgrade the Main St WWTF to further reduce nutrient loading to Sweetwater Branch and Paynes Prairie to meet the TMDL.

Monthly average effluent flow data from 2010 and 2011 were used to calculate an average flow of 6.11 Million Gallons per Day (MGD). Nutrient concentrations were then multiplied by this flow rate to calculate an average loading rate from the facility (Figure 10). Monthly maximum total nitrogen data reported by the facility and ACEPD data were averaged to calculate a maximum loading of 105,443 lbs/year. Facility data on total phosphorus and nitrate were used to calculate loadings of 19,040 lbs/year and 34,772 lbs/year respectively. The total nitrogen and total phosphorus loads were slightly greater for 2010 and 2011 compared to 2008 and 2009 as expected, since flows were greater during this period (Figure 11). Nitrate loading for the 2010 and 2011 were lower than in 2008 and 2009 even though flows were higher, indicating greater concentration of ammonia in the later period, since a majority of the nitrogen in treated waste water is typically either nitrate or ammonia. Disproportionately lower nitrate loads indicate the nitrogen was leaving as ammonia which can be converted to nitrate and at high levels can be toxic to aquatic habitats.

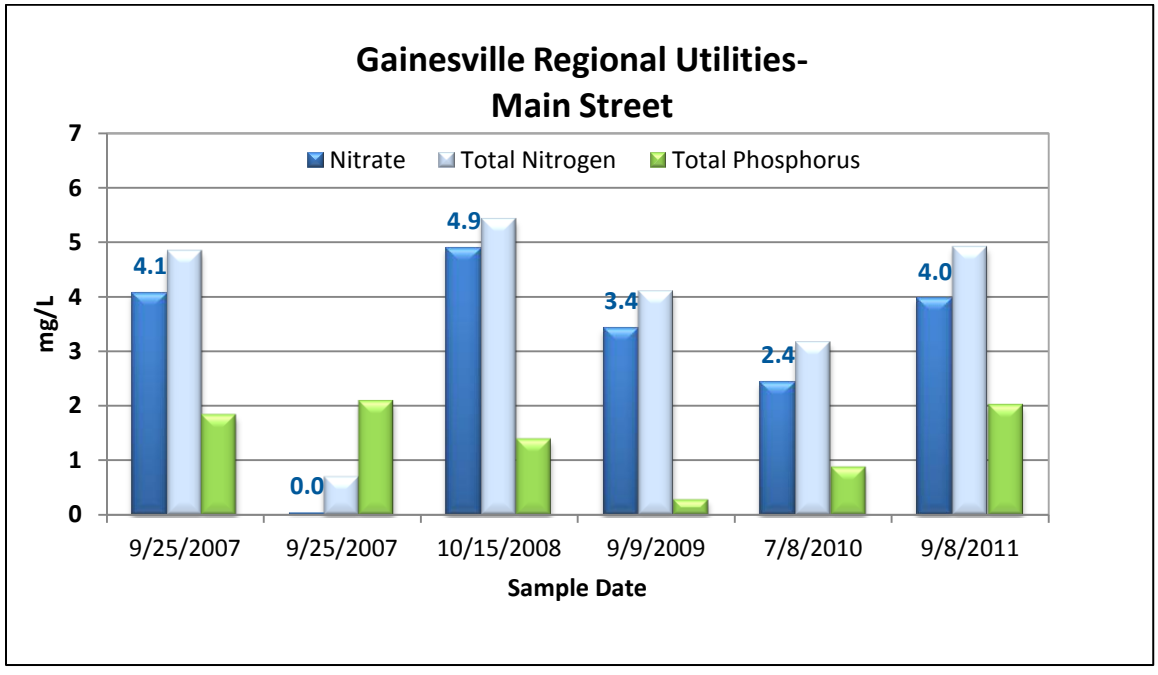

Figure 10. Effluent data from grab samples collected during ACEPD inspections at the GRU WWTFs during 2007-2011. The nitrate concentrations are denoted on the graph.

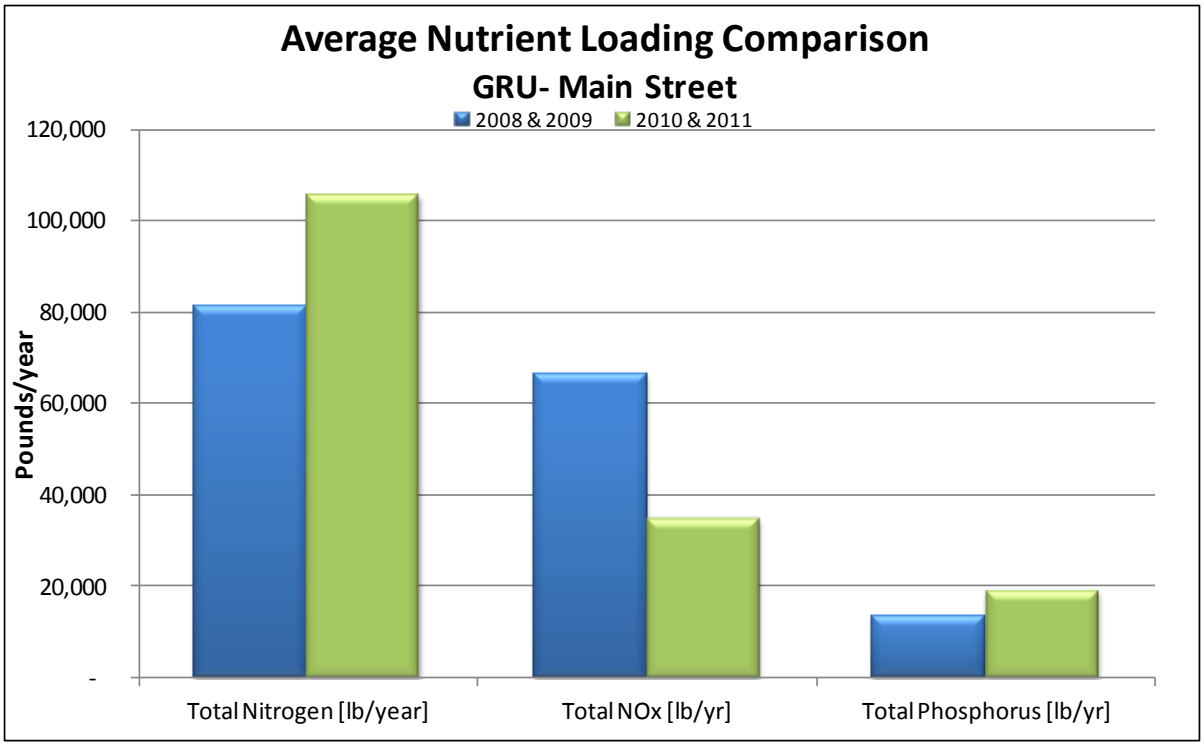

Figure 11. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from GRU- Main Street.

The wastewater residuals (sludge) are treated to Class B standards and then land applied as outlined in the facility's Agriculture Use Plans. The disposal site is Roger Williams Farm/Whispering Pines Ranch. According to FDEP's records, 1,077 dry tons of biosolids were produced in 2010, while 1,239 dry tons were produced in 2011 at the Main Street Facility.

3-4 The City of Hawthorne

Facility size: existing 0.15 MGD to be expanded to 0.50 MGD

Permitted effluent disposal: 1.79 acres of rapid infiltration basins to be expanded to 4.77 acres

Residuals disposal: Transported to GRU

Permit expiration date: Oct. 3, 2015

The City of Hawthorne Wastewater Treatment Facility

The City of Hawthorne municipal wastewater treatment plant is an extended aeration secondary treatment plant. This facility was found to be in compliance during all six of the ACEPD inspections conducted in 2010 and 2011. Effluent nitrogen values were relatively low for most of 2010 and 2011 except for samples collected on 8/26/2009 and 1/20/2010 when the total nitrogen concentrations spiked to 16.7 and 28.4 mg/L (Figure 12). Elevated nitrate and phosphorus concentrations levels are a concern with the proximity of Little Orange Lake. However, the effluent was in compliance with the FDEP permit, as this permit does not have numeric limitations for nutrients.

The City of Hawthorne hires Gainesville Regional Utilities to pump their residuals (sewage sludge) and to haul it for further treatment at one of Gainesville Regional Utilities' treatment facilities. According to FDEP's records, 25 dry tons of biosolids were produced in 2010 and 17 dry tons were produced in 2011.

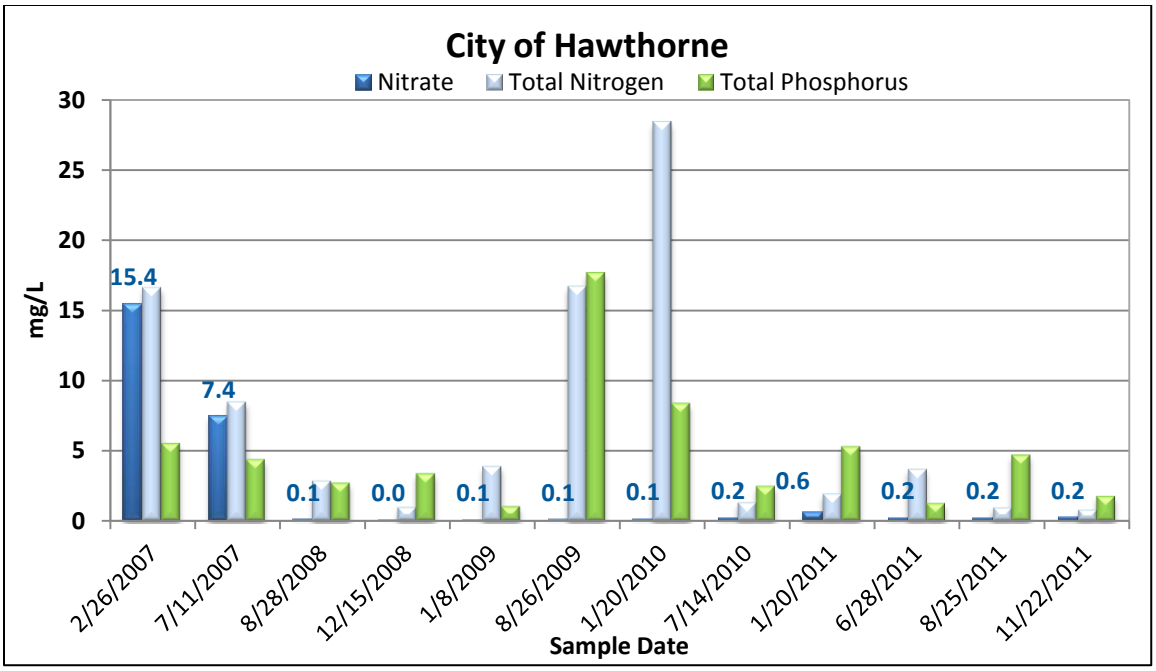

Figure 12. Effluent data from grab samples collected during ACEPD inspections at the Hawthorne WWTF during 2007-2011. The nitrate concentrations are denoted on the graph.

The monthly average flows of effluent from 2010 and 2011 were used to calculate an average flow of 0.13 Million Gallons per Day (MGD). Nutrient concentrations were then multiplied by this flow rate to calculate an average loading rate from the facility. Average maximum nutrient concentration of Nitrate + nitrite as reported by DMRs and data collected by ACEPD during 2010 and 2011 were used to calculate a loading of 447 lbs/year. Although the facility does not have a numeric limitation for total nitrogen and total phosphorus, they are required to report the concentrations in their effluent. Operator reported and ACEPD data were used to calculate loading rates of total Nitrogen 2,957 and total Phosphorus 1, 729 lbs/year. Total nitrogen loading in 2010 and 2011 was slightly greater than that observed in 2008 and 2009 (Figure 13). Nitrate loading in 2010 - 2011 was approximately half that of 2008 - 2009, because nitrate concentrations in the effluent were much lower in recent years (Figure 13). The decline in nitrate loads and elevated total nitrogen loading indicates that nitrogen is leaving the facility as ammonia. Ammonia can be converted back to nitrate by soil microbes and become an environmental concern. Table 2 compares these values to those of the other wastewater treatment facilities located in Alachua County.

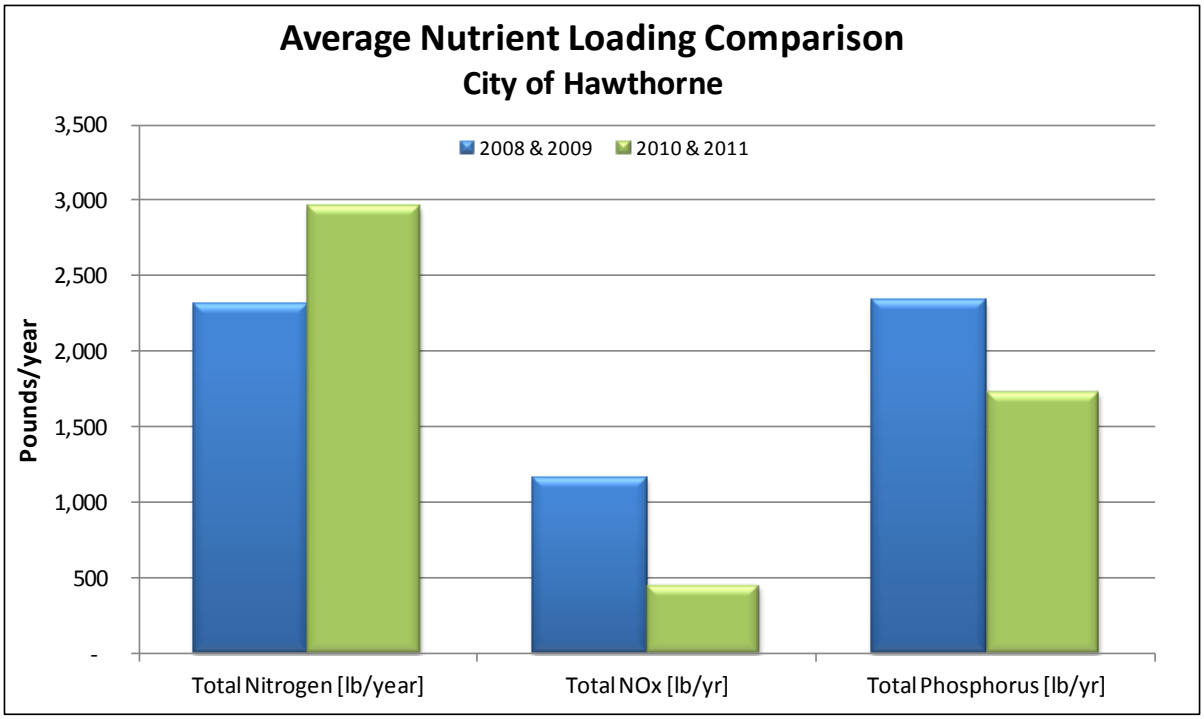

Figure 13. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from City of Hawthorne.

The City of Hawthorne is required to sample their groundwater monitoring wells and submit the results to FDEP on a quarterly basis. The background well is labeled with a B and the compliance wells are labeled with a C. All of these wells are open to the surficial aquifer. The nitrate + nitrite concentrations varied among the wells and the sampling events but none exceed the drinking water standard of 10mg/L (Figure 14). It should be noted that the background well nitrate concentrations are greater than those observed in compliance well 3 (MWC-3) (Figure 14). This may be due to a change in the background conditions or groundwater flow from the infiltration basins.

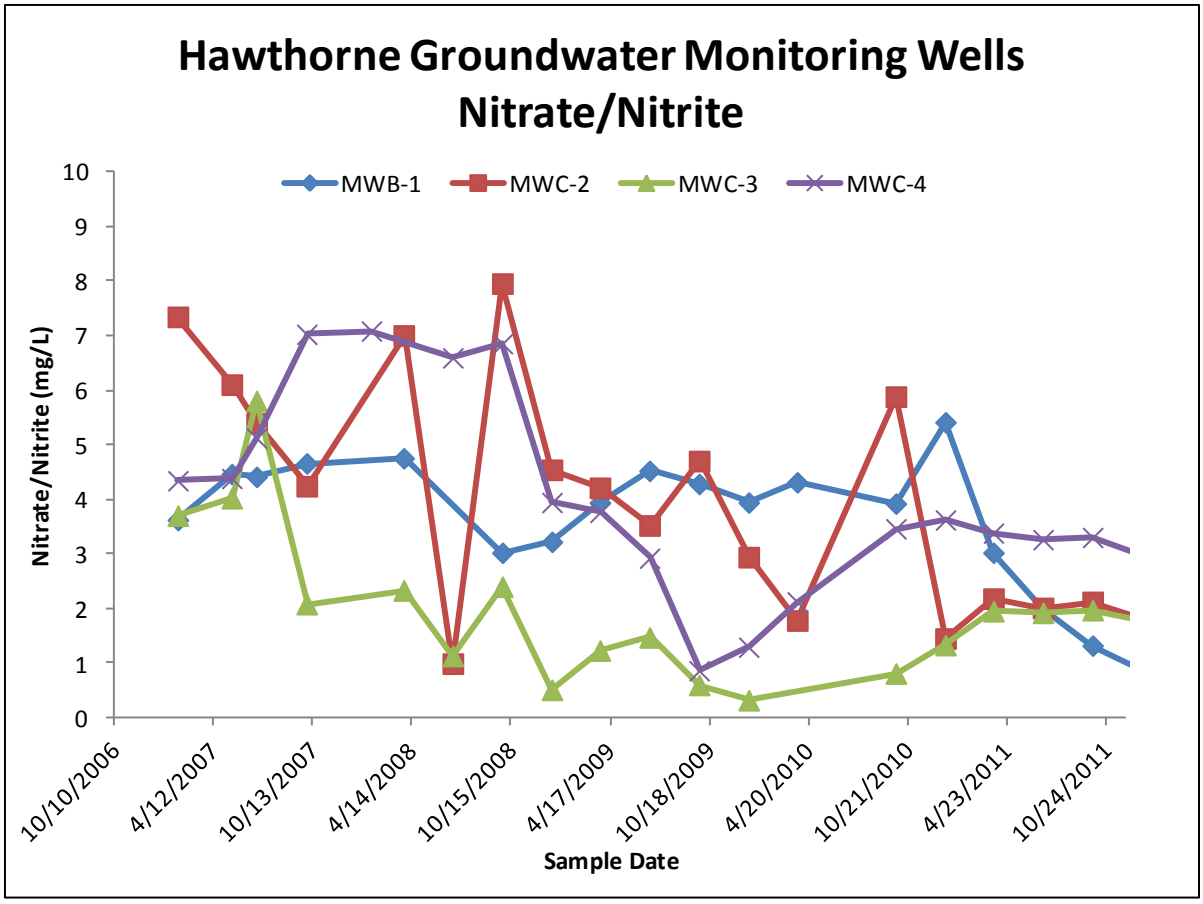

Figure 14. Nitrate + nitrite data from the City of Hawthorne WWTF Groundwater Monitoring Reports from 2007 through 2011, 2010 data were not available from FDEP. Drinking water standards are less than 10 mg/L for nitrate.

The City of Hawthorne hires Gainesville Regional Utilities to pump their residuals (sewage sludge) and to haul it for further treatment at one of Gainesville Regional Utilities' treatment facilities. According to FDEP's records, 25 dry tons of biosolids were produced in 2010 and 17 dry tons were produced in 2011.

3-5 The City of High Springs

Facility size: 0.24 MGD
Permitted effluent disposal: 16.25 acres of sprayfield
Residuals disposal: Transported to GRU
Permit expiration date: March 30, 2013

The City of High Springs WWTF

The City of High Springs municipal wastewater treatment plant is a Ludzak-Ettinger activated sludge plant. This facility was found to be in compliance during all seven of the ACEPD inspections conducted in 2010 and 2011. The occasional elevated nitrogen and phosphorus concentrations in the treated effluent (Figure 15) are of concern in the karst setting of the plant's sprayfield and with its proximity to the Santa Fe River and its springs. FDEP has required The City of High Springs to demonstrate an established cover crop on the existing sprayfield before the sprayfield can be expanded as planned in the most recent permit.

The City of High Springs hires Gainesville Regional Utilities to pump their sewage sludge and to haul it for further treatment to one of Gainesville Regional Utilities' treatment facilities. According to FDEP's records, 24 dry tons of sludge were produced in 2010 and 15 dry tons were produced in 2011.

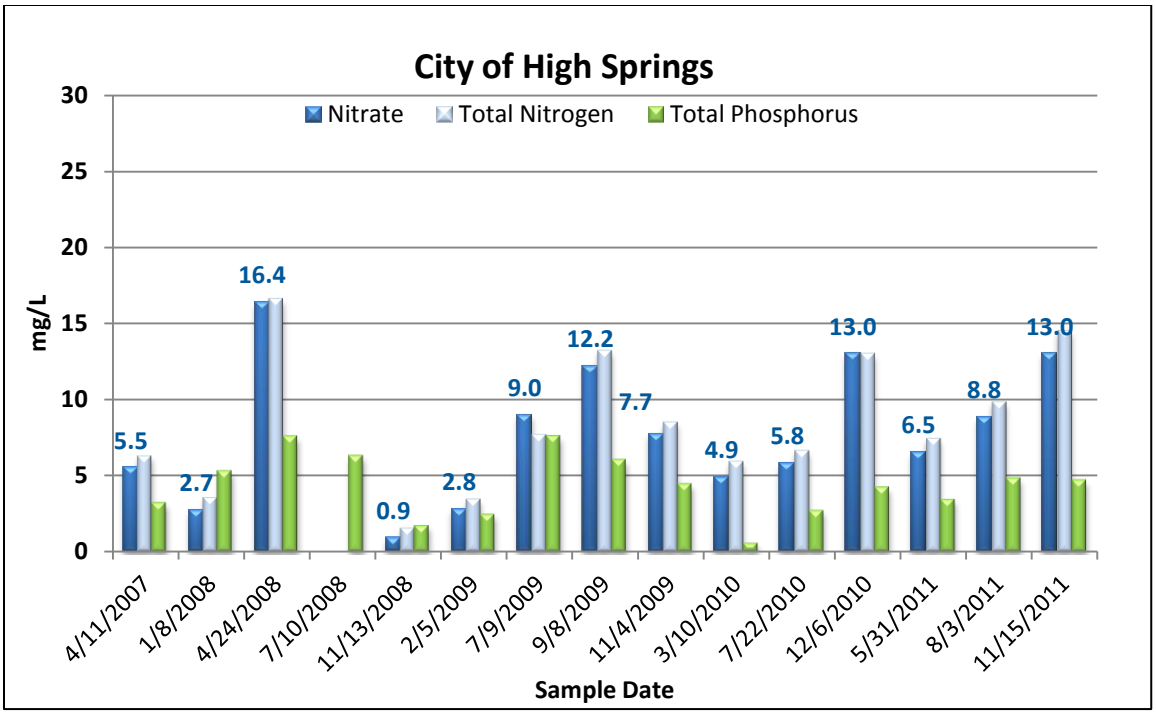

Figure 15. Effluent data from grab samples collected during ACEPD inspections at the High Springs WWTF from 2007 through 2011. The nitrate concentrations are denoted on the graph.

The monthly average flow of effluent from 2010 and 2011 were used to calculate an average flow of 0.14 Million Gallons per Day (MGD). Average nutrient concentrations were then multiplied by this flow rate to calculate an average loading rate from the facility. Average maximum nitrate data reported by the facility and data collected by ACEPD during 2010 and 2011 were combined to create an average for calculating a loading of 3,544 lbs/year. The facility is not required to sample for total nitrogen and total phosphorus, so ACEPD data were used to calculate total nitrogen and phosphorus loadings of 4,081 and 1,463 lbs/year, respectively. Table 2 compares these values to those of the other wastewater treatment facilities located in Alachua County. The increased treatment volume to the High Springs WWTF since the previous report accounts for the increased loading of total nitrogen, and nitrate between the two periods (Figure 16). However, total phosphorus loading does not increase at the same rate, indicating a disproportionate TP removal from the influent.

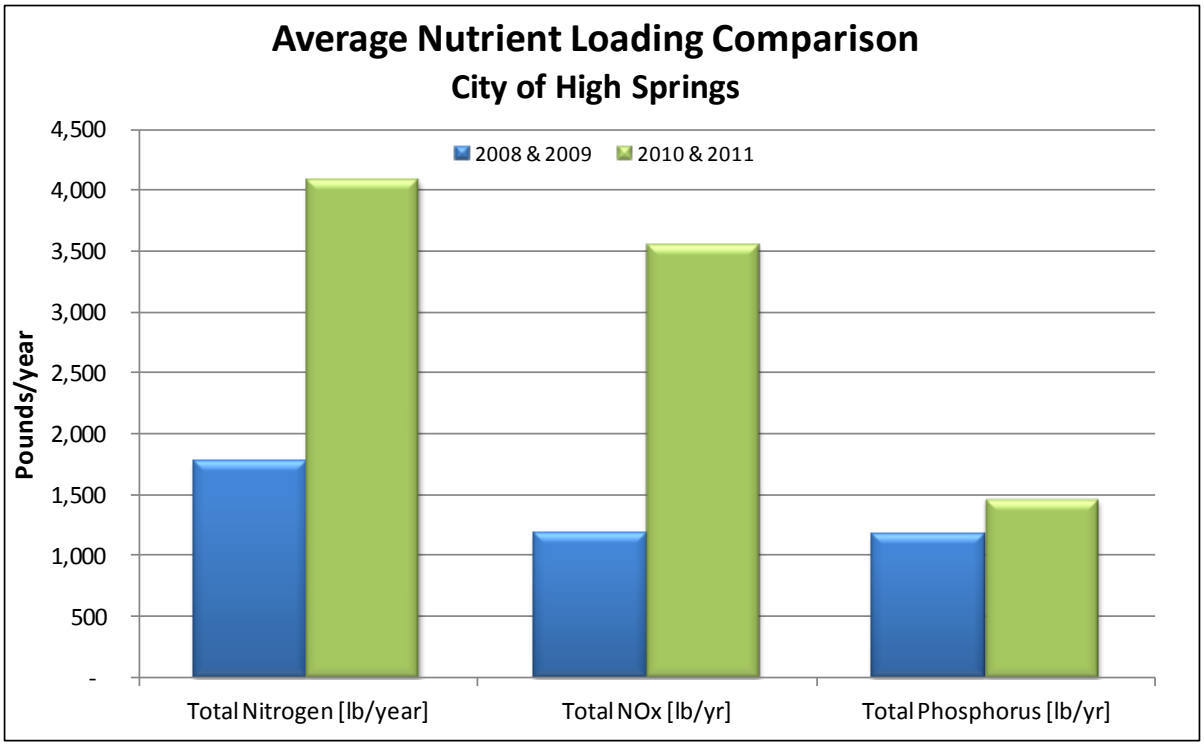

Figure 16. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from City of High Springs.

The City of High Springs is required to sample the groundwater monitoring wells and submit the results to FDEP on a quarterly basis. The background well is labeled with a B, intermediate wells are labeled with an I, and the compliance wells are labeled with a C. These monitoring wells are open to the Floridan aquifer, which is unconfined in this portion of Alachua County. The elevated nitrate + nitrite concentrations in the background well are a concern and makes one question the relative location of the well in regards to the sprayfield with respect to ground water movement. Figure 17 displays the groundwater data from 2007 through 2011. It seems that nitrate + nitrite values have decreased in the background well since it was installed. Compliance wells have maintained a relatively constant concentration. Concentrations in MWB-1 and MWI-2, which is in the center of the spray field, had a similar trend of decreasing concentrations when they stabilized.

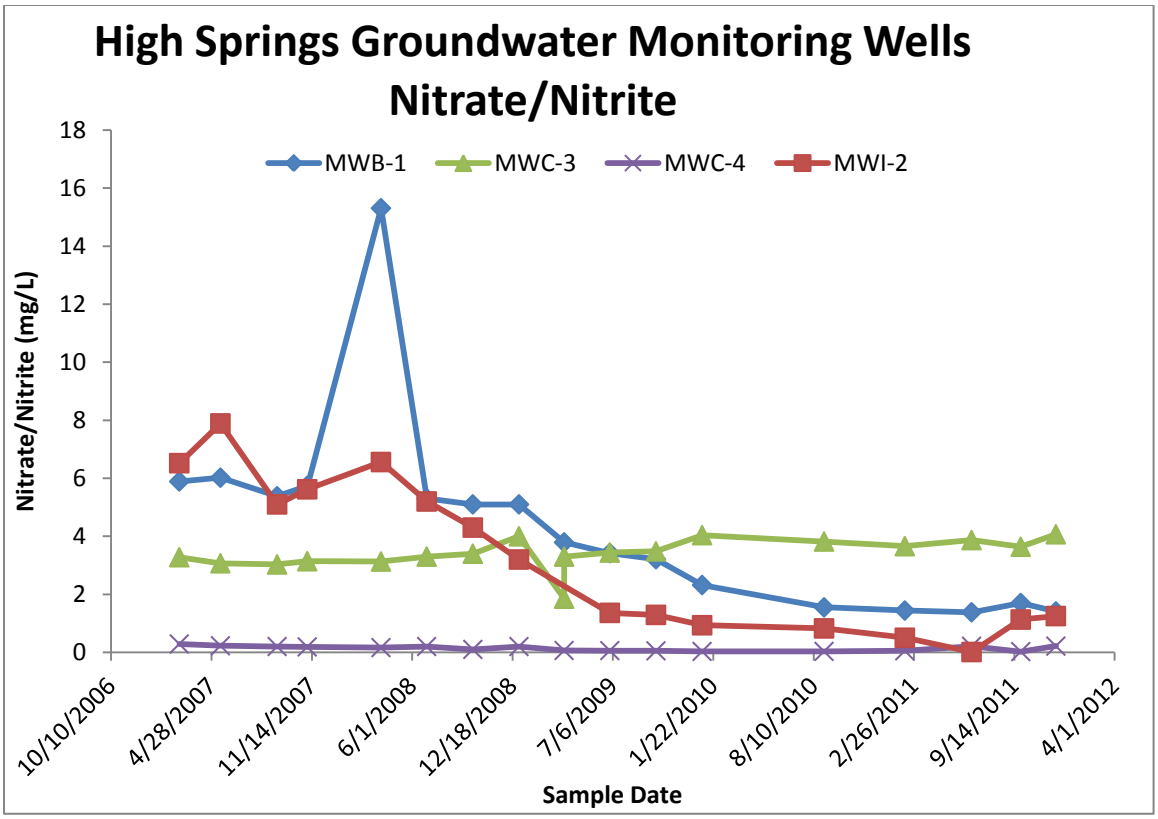

Figure 17. Nitrate + nitrite data from the City of High Springs WWTF Groundwater Monitoring Reports from 2007 through 2011. Drinking water standards require that nitrate is less than 10 mg/L.

3-6 The City of Newberry

Facility size: up to 0.415 MGD
Permitted effluent disposal: 40 acres of sprayfield
Residuals disposal: Land applied to sprayfield on site
Permit expiration date: August 3, 2016

The headworks, carousal, and equalization basin at the City of Newberry WWTF

The City of Newberry's municipal wastewater treatment plant is an activated sludge secondary treatment plant. The most recent permit includes plans for expansion by adding 0.21 MGD to its capacity. This facility was in compliance for four out of six of the ACEPD inspections conducted during 2010 and 2011. Plant appearance and compliance has decreased slightly from 2008-2009 when there were no inspections out of compliance. The out of compliance observations were cited for total residual chlorine being lower than the permitted 0.5mg/L on July 22, 2010 and August 8, 2011. During hot summer days chlorine treatment has to be increased to maintain the permitted concentration. Effluent nitrogen and phosphorus concentrations appeared to be declining until July 2010 when total nitrogen concentrations increased drastically for subsequent inspections (Figure 18).

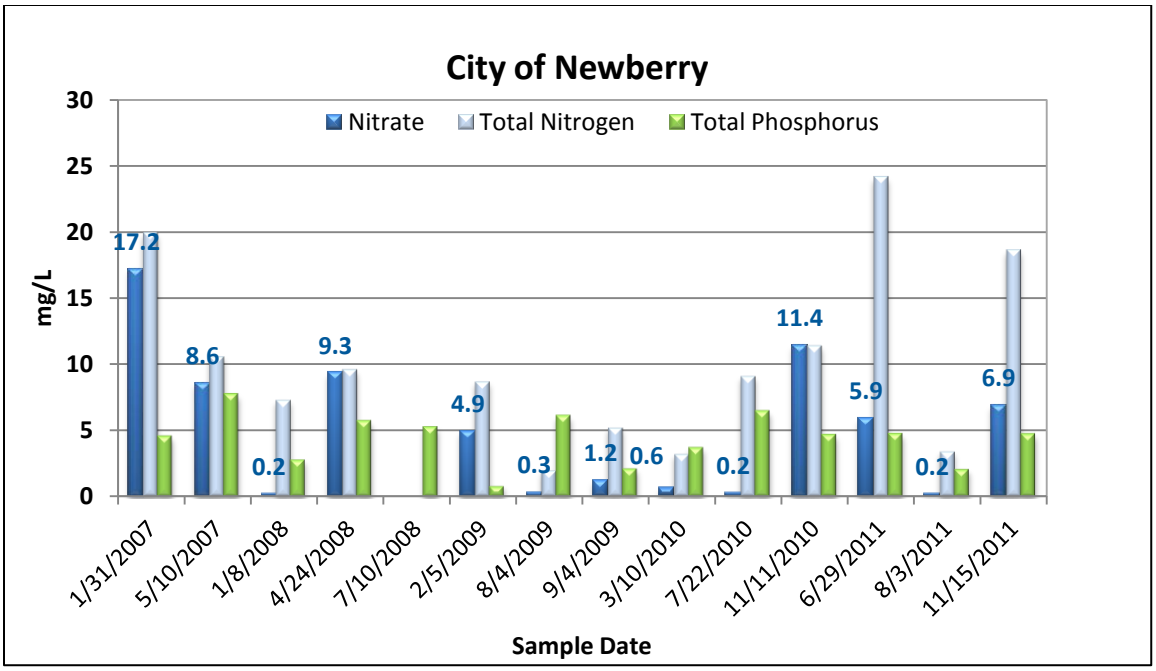

Figure 18. Effluent data from grab samples collected during the ACEPD inspections of the City of Newberry WWTF from 2007 through 2011. The nitrate concentrations are denoted on the graph.

The monthly average flow of effluent from 2010 and 2011 were used to calculate an average flow of 0.24 Million Gallons per Day (MGD). Average nutrient concentrations were then multiplied by this flow rate to calculate average loading rates from the facility. This facility is not required to monitor total nitrogen and phosphorus concentrations, therefore data collected by ACEPD during their inspections for 2010 and 2011 were used to calculate average loading of 8,511 and 3,195 lbs/year, respectively. Average maximum nitrate+nitrite concentrations as reported by the facility and data collected by ACEPD were combined to determine the average nitrate loading for 2010 and 2011 to be 7,969 lbs/year. Table 2 compares these values to those of the other wastewater treatment facilities located in Alachua County. In comparing load data for 2008-2009 and 2010-2011, total nitrogen loads decreased slightly while Nitrate+nitrite loads were noticeably larger indicating nitrate contributed the majority of the nitrogen to total nitrogen concentrations, and denitrification in the facility should be increased (Figure 19). Total phosphorus is slightly elevated, because both flows and concentrations were greater during 2010 and 2011 in comparison to the previous period (Figure 19).

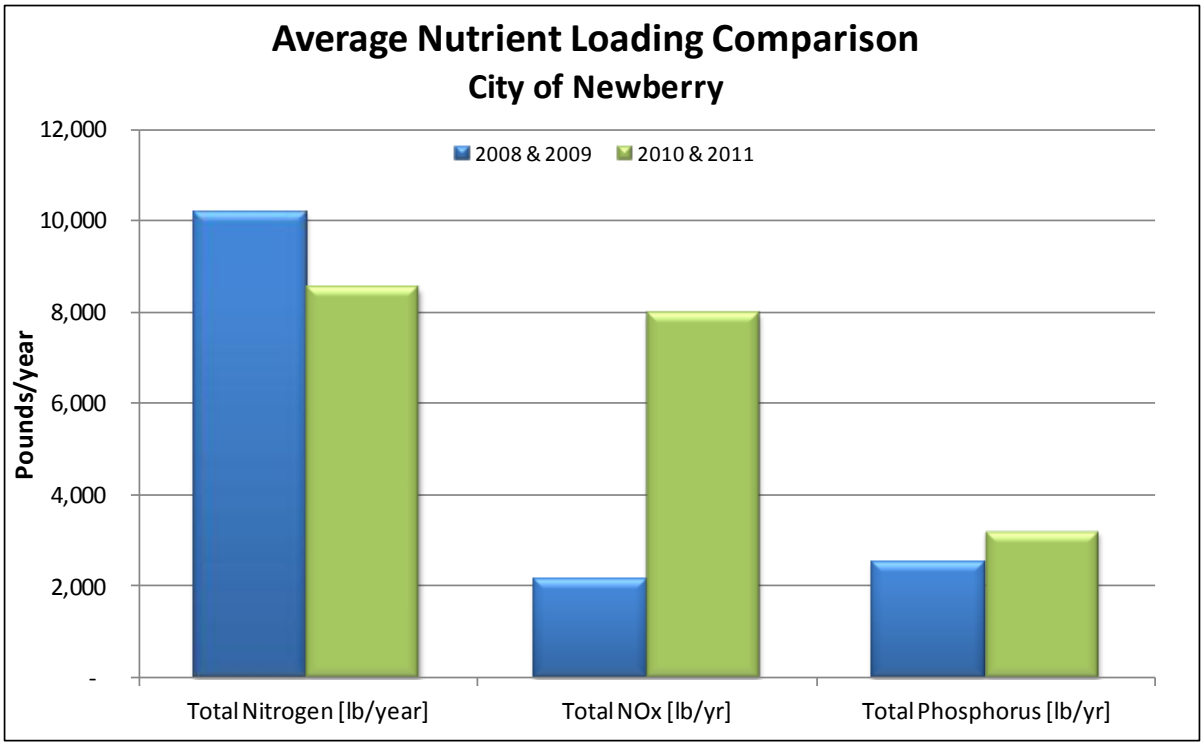

Figure 19. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from the city of Newberry.

The Newberry treatment facility is permitted to land apply biosolids that have achieved class B pathogen reduction. According to FDEP's records, the facility produced 17.4 dry tons of biosolids in 2010 and 17.2 dry tons in 2011. These biosolids are land applied at the city of Newberry wastewater treatment facility sprayfield site.

The City is required to sample their groundwater monitoring wells and submit the results to FDEP on a quarterly basis. The background wells are labeled with a B, compliance wells are labeled with a C, and intermediate wells are labeled with an I. These wells are open to the Floridan aquifer, which is unconfined in this portion of Alachua County. Nitrate + nitrite levels are higher at all of the monitoring wells in comparison to the background well (Figure 20). Data for sampling events after January 2011 were not available during the writing of this report. Elevated nutrient concentrations in the effluent and the groundwater monitoring wells are of concern in the karst setting of the plant's sprayfield, for the Santa Fe Spring system. None of the wells are in violation of drinking water standards of 10 mg/L.

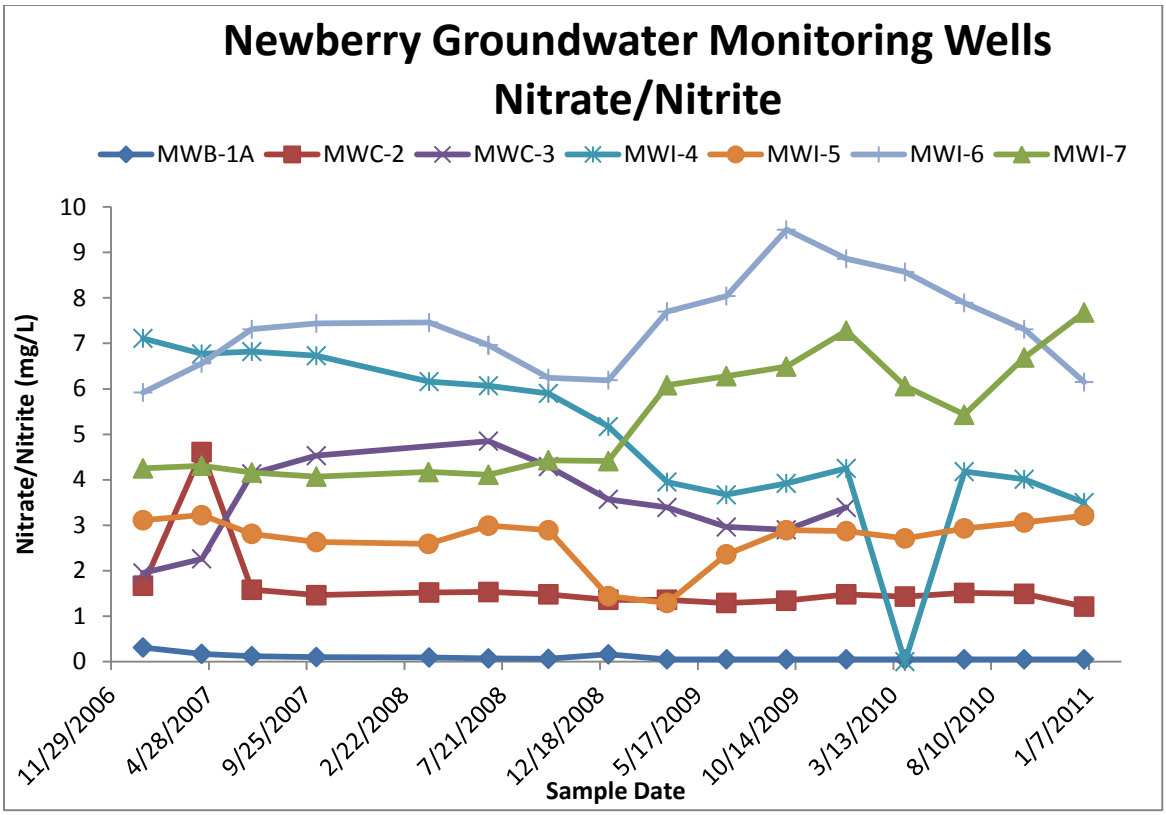

Figure 20. Nitrite + Nitrate data from the City of Newberry WWTF Groundwater Monitoring Reports from 2007 to 2011. Drinking water standards are required to be less than 10 mg/L.

3-7 The University of Florida

Facility size: 3.0 MGD

Permitted effluent disposal: 3.0 MGD underground injection and 0.96 MGD public access re-use

Residuals disposal: Hauled to GRU

Permit expiration date: November 23, 2015

University of Florida WWTF

The University of Florida wastewater treatment plant is an advanced treatment Kruger Process (phased isolation oxidation ditch) treatment plant. This facility was inspected for the final time by ACEPD in 2010 and was found to be in compliance during the inspection. The effluent from the plant met FDEP permit limitations when select regulated parameters were collected as grab samples. The effluent is relatively low in nitrogen (Figure 21) and concentrations fluctuate with the seasons. Loads of total nitrogen, nitrate and total phosphorus are greater in 2008 -2009 which is because of larger concentrations and slightly greater flows than 2010-2011 (Figure 22).

The monthly average flow of influent from 2010 and 2011 was used to calculate an average flow of 1.63 million gallons per day (MGD). Monthly maximum nutrient concentrations reported by the facility were averaged and then multiplied by this flow rate to calculate average loading rates. The estimated nitrate+nitrite loading was 10,824 lbs/year, total nitrogen was calculated as 15,003 lbs/year, and total phosphorus was 12,045 lbs/year. Table 2 compares these values to those of the other wastewater treatment facilities located in Alachua County.

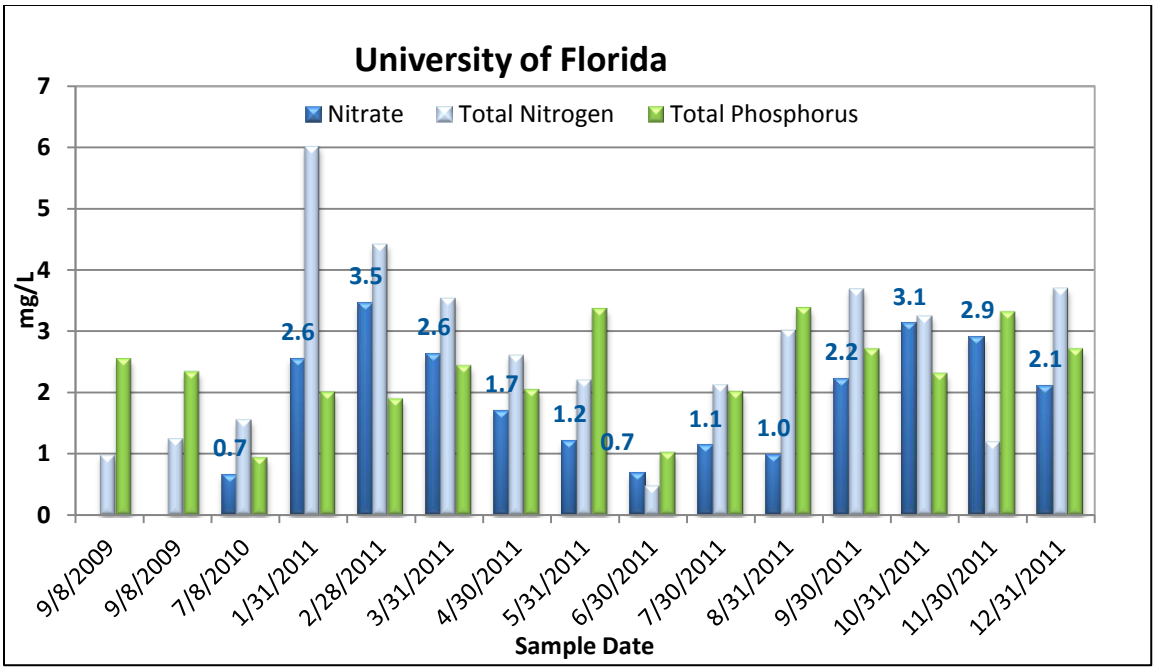

Figure 21. Effluent data from grab samples collected during the ACEPD inspections of the University of Florida WWTF in 2009-2010 and by UF operators for 2011. Duplicate samples were taken during the 9/8/2009 sampling event. The nitrate concentrations are denoted on the graph.

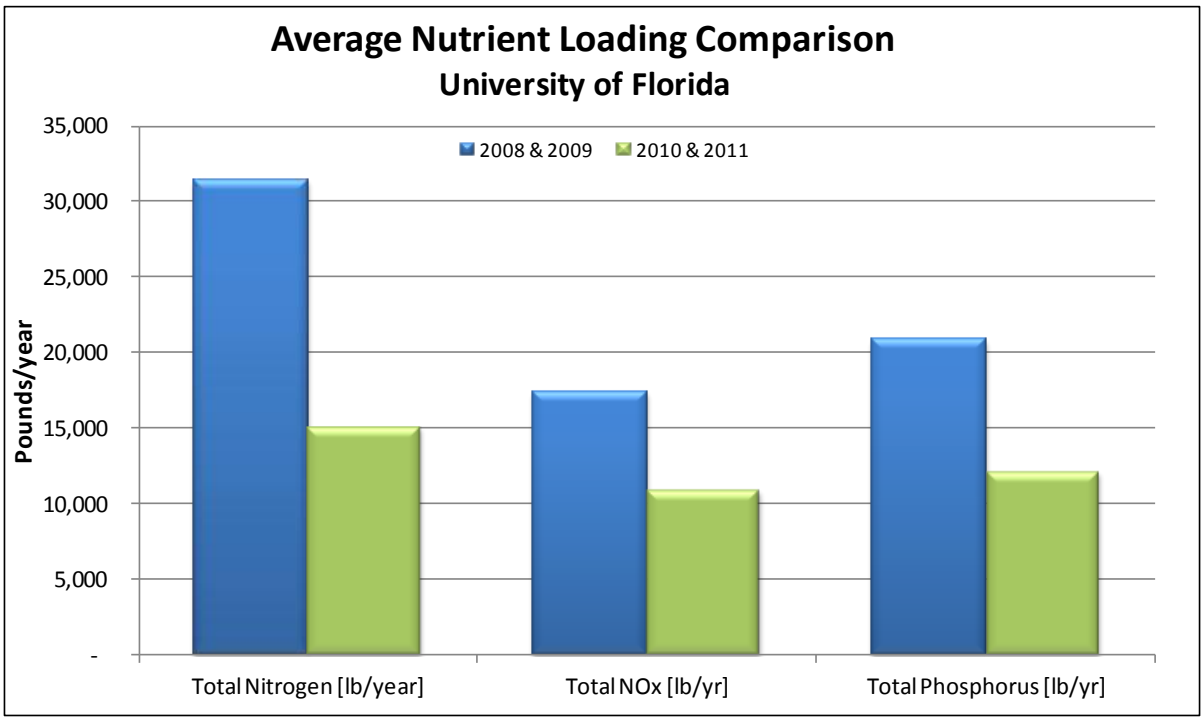

Figure 22. Comparison of calculated nutrient loading for 2008-2009 with the 2010-2011 data from the University of Florida.

The University of Florida is required to sample groundwater monitoring wells and submit the results to FDEP. Monitoring well data were not available for the complete period of record because all of the treated water is being utilized as public access re-use. During periods that the water is not discharged into the injection well system, groundwater monitoring is not required. The background wells are labeled with a B and compliance wells are labeled with a C. The monitoring wells are open to the Floridan aquifer, which is semi-confined in this area and are located within two different zones of the aquifer. Wells designated with a "D" (for deep) are between 250 and 300 feet in total depth. Shallow monitoring wells, designated with an "S", are 60 to 65 feet in total depth. Nitrate + nitrite levels appear to be elevated, especially in background well MWB-3S (Figure 23). However, a larger period of record would be needed to verify any trends. No observations exceed drinking water standards for nitrate+nitrogen.

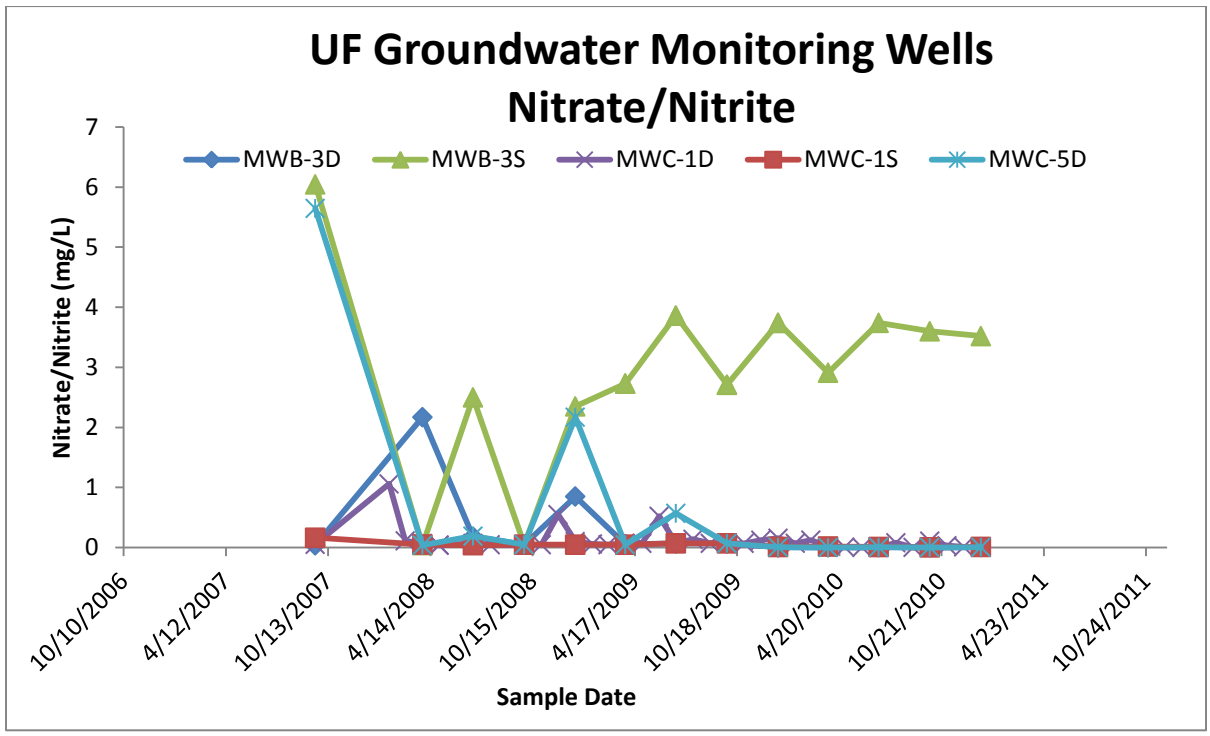

Figure 23. Nitrite + Nitrate data from the University of Florida WWTF Groundwater Monitoring Reports from 2007 to 2010. Drinking water standards require concentrations lower than 10 mg/L.

The University of Florida hires Gainesville Regional Utilities to pump their sewage sludge and to haul it for further treatment at one of Gainesville Regional Utilities' treatment facilities. According to FDEP's records, 169 dry tons of sludge were produced in 2010, while 268 dry tons were produced in 2011.

3-8 The City of Waldo

Facility size: 0.099 MGD
Permitted effluent disposal: 3 constructed wetlands to a receiving wetland
Residuals disposal: Hauled to GRU
Permit expiration date: April 27, 2013

The aeration basins, digester, and clarifier at the Waldo WWTF.

The City of Waldo's municipal wastewater treatment plant is an extended aeration plant. This facility was inspected by ACEPD six times in 2010 and 2011. The plant was found out of compliance during one of the inspections, due to lower than permitted total residual chlorine concentration of 0.5 mg/L in the treated effluent. The effluent is routed through treatment wetlands for additional treatment and nutrient removal prior to discharge to an adjacent natural wetland (Figure 24 and Figure 25). Generally, the effluent leaving the treatment wetland is of high quality with low nutrient concentrations (Figure 24 and Figure 25) and likely has little if any impact on the receiving wetland. Since the effluent is discharged to surface water, the plant is not required by FDEP to monitor groundwater. The City of Waldo is planning to close the wastewater plant and to connect to the Gainesville Regional Utilities' collection system in the near future.

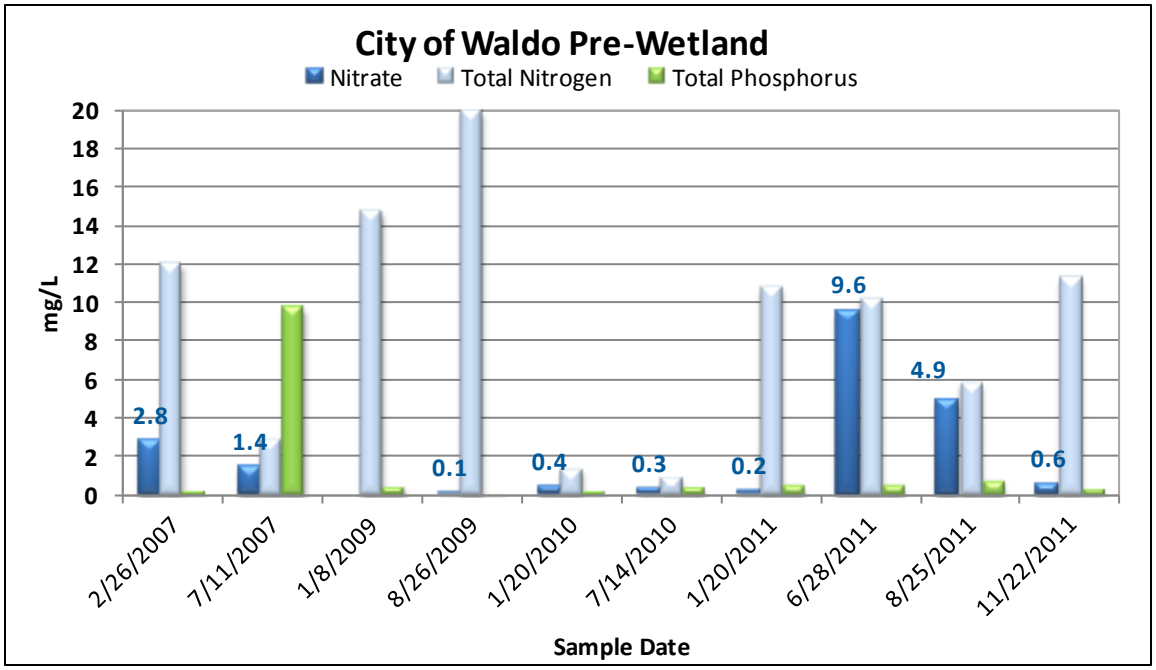

Figure 24. Effluent data from grab samples collected from the facility prior to the treatment wetland during the ACEPD inspections of the City of Waldo WWTF from 2007 through 2011. The nitrate concentrations are denoted on the graph.

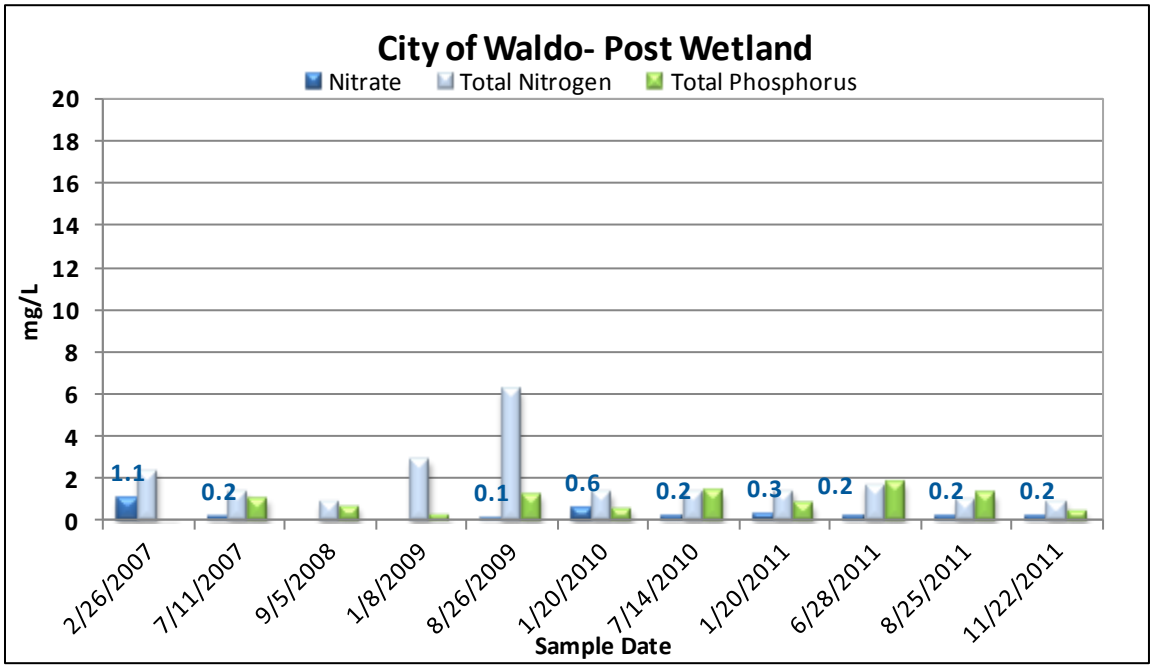

Figure 25. Effluent data from grab samples collected from the treatment wetland during ACEPD inspections of the City of Waldo WWTF from 2007 through 2011. The nitrate concentrations are denoted on the graph.

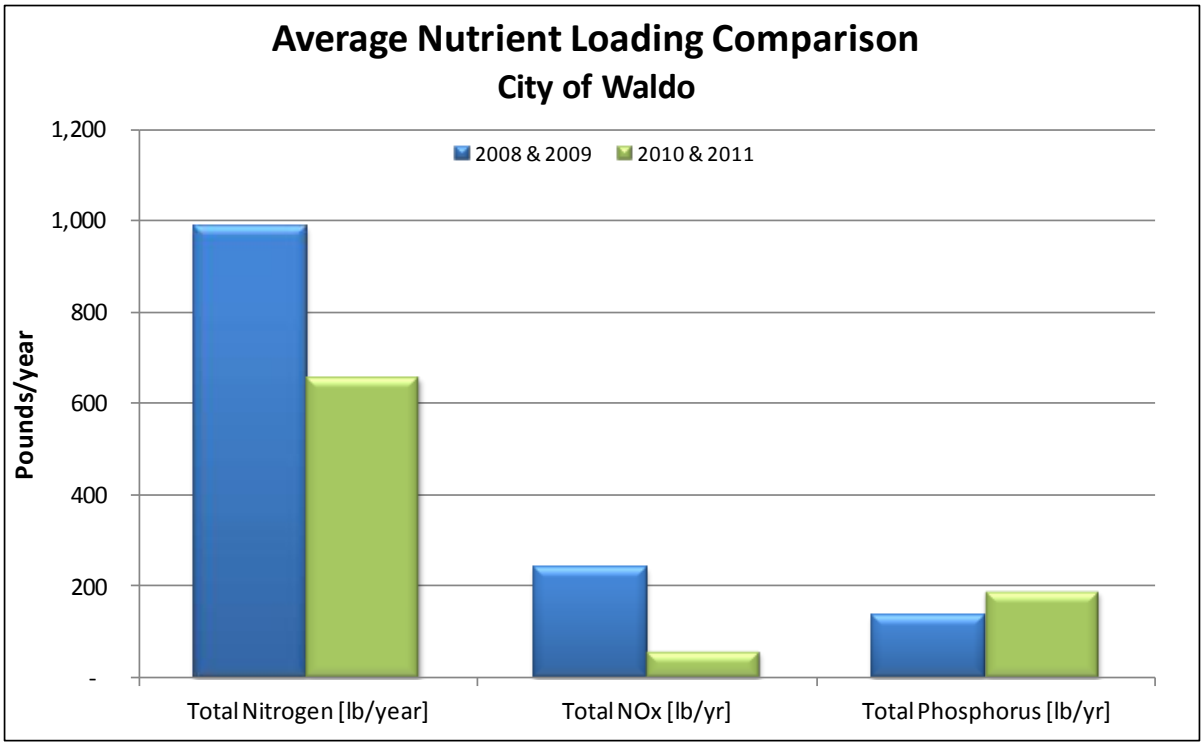

Figure 26. Comparison of calculated nutrient loading for 2008 -2009 with the 2010 - 2011 data from the city of Waldo.

Monthly average flow data for effluent from 2010 and 2011 were used to calculate an average flow of 0.07 Million Gallons per Day (MGD). Data collected by ACEPD and by the facility were then multiplied by this flow rate to calculate average loading rates from the facility, therefore samples utilized were those collected after the treatment wetland. Total nitrogen was calculated as 656 lbs/year, and total phosphorus was 189 lbs/year. The permit does not require monitoring of nitrate so only ACEPD data were used to estimate nitrate loading of 58 lbs/year. When 2010 - 2011 data was compared with that from the previous report loads from 2008 - 2009, nitrogen loads decreased in recent years (Figure 26). Table 2 compares these values to those of the other wastewater treatment facilities located in Alachua County.

The city of Waldo is permitted to transport their sewage sludge to the Gainesville Regional Utilities Main Street Facility or to Florida Septic for further treatment and disposal. According to FDEP's records, 22 dry tons of sludge were produced in 2010, while 14 dry tons were produced in 2011.

4. Package Plants

Package plants are smaller pre-fabricated wastewater treatment facilities designed to treat domestic wastewater for a localized area, such as a mobile home park or camp. There were 10 package plants located in Alachua County in 2010 and 2011. There were formerly many more package plants in Alachua County, but the trend has been to abandon package plants as they are able to connect to the centralized wastewater collection systems.

Effluent quality varied among the package plants (Figure 27). The level of treatment/ nutrient removal tends to be less at package plants compared to municipal facilities; however, the volume of effluent is much less at package plants. However, the high total nitrogen concentrations at many of the package plants are concerning. Most of the nitrogen was not in the mobile nitrate form and was instead in the ammonia form which is likely to be converted to nitrate once released to the environment. The nutrient loading rates to the environment were calculated for each plant by multiplying the average flow by the average nutrient concentrations (Figure 28). The individual package plants are discussed in the following sections of this report. Data on quantity of sludge hauled are presented in Table 4. All of these facilities contract to transport and process their sludge. Facilities which are operating below capacity do not generate enough sludge to haul annually.

Table 4. Sludge Disposal Data for package plants in Alachua County

Facility	2010 Annual Quantity (dry-ton)	2011 Annual Quantity (dry-ton)
Archer Community School	0.417	No haul
Archer Homes	1.2	0.9
Arredondo Farms MHP	24.06	9.81
Brittany Estates MHP	5.43	4.14
Camp Kulaqua	0.33	0.33
Camp McConnell	0.58	No haul
Florida Welcome Station	No haul	0.33
Knights Inn (Micanopy Inn)	0.33	No haul
Prairie View Apts.	No haul	0.72

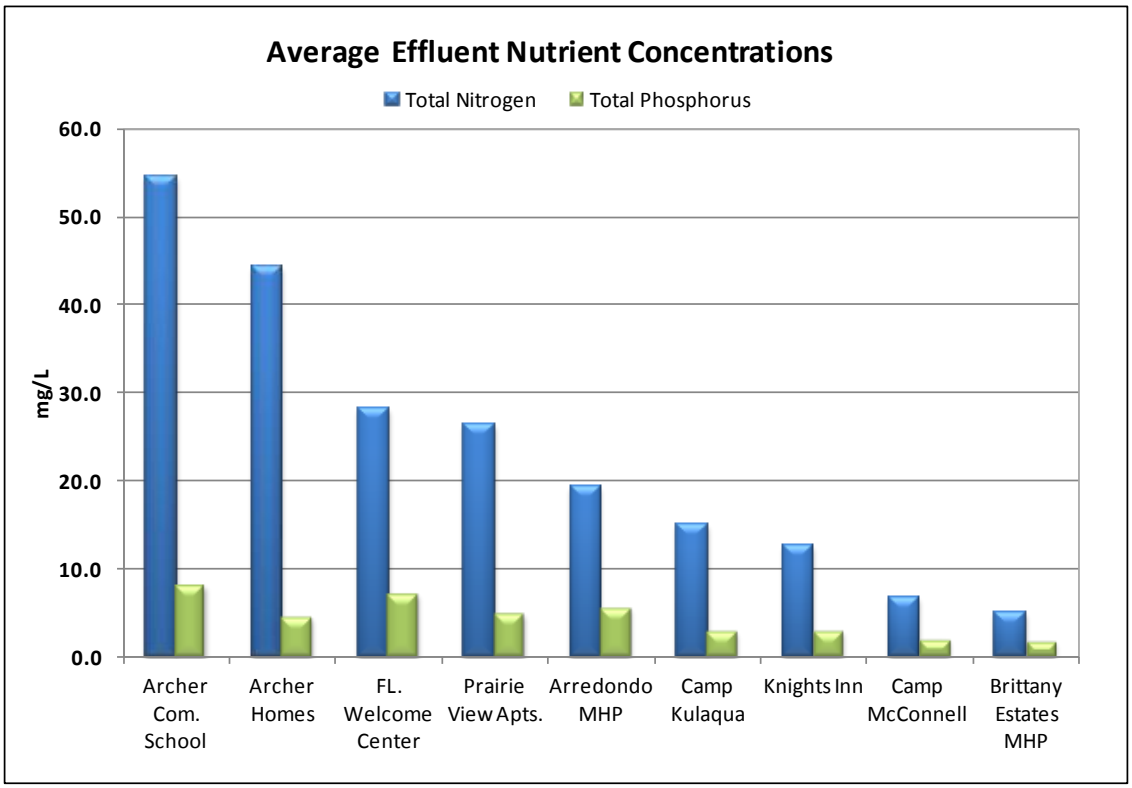

Figure 27. Average effluent data from grab samples collected during ACEPD inspections from 2010 to 2011.

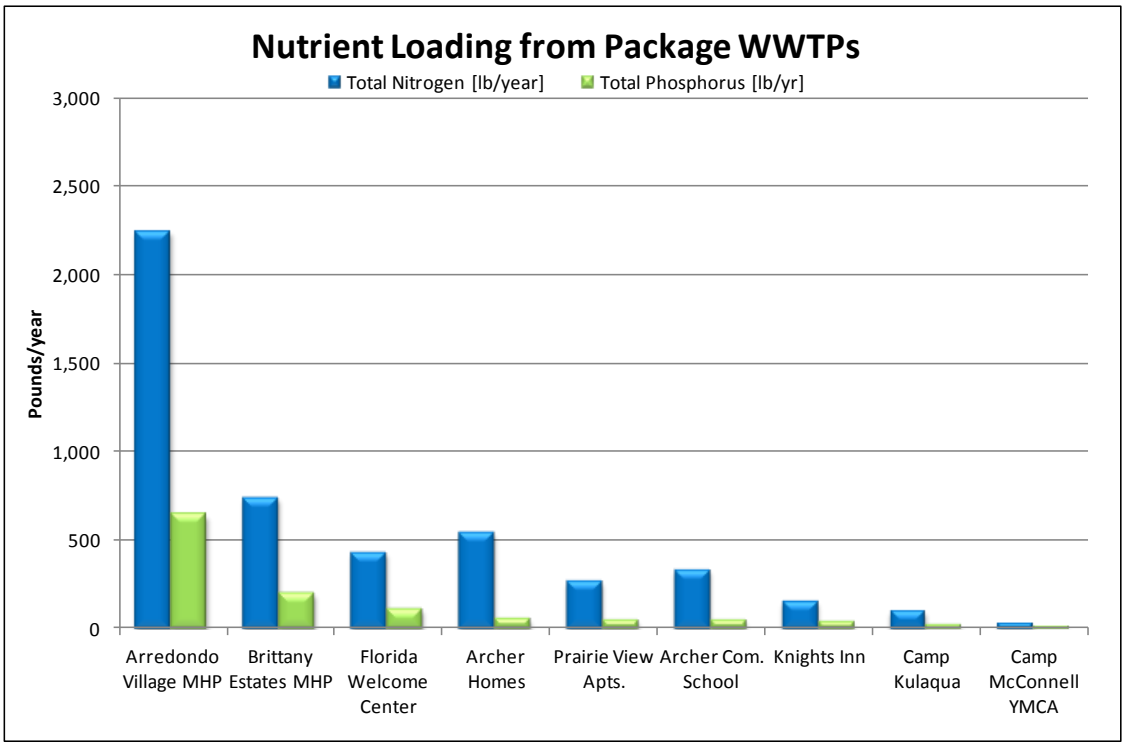

Figure 28. Average effluent loading rates of package plants from 2010 and 2011.

4-1 Archer Community School

Facility size: 0.005 MGD

Permitted effluent disposal: three rapid infiltration basins (0.124 acres)

Residuals disposal: Hauled off-site

Permit expiration date: August 18, 2014

An aeration basin at the Archer Community School WWTF.

The package plant at the Archer Community School is an extended aeration activated sludge plant. This facility was inspected six times in 2010 and 2011 and was found out of compliance during three inspections. The chlorine residual was below the FDEP permit minimum during the three out of compliance inspections. FDEP was notified concerning these permit violations. Total nitrogen values at this plant were high during the sampling events but nitrate levels did not exceed the FDEP permit limitation of 12 mg/L. High concentrations of total nitrogen and decreased concentration of nitrate+nitrite indicate that ammonia is the dominant form of nitrogen present in the effluent and which can be converted back to nitrate in the environment. High nitrogen concentrations are of concern in this part of the county where the Floridan aquifer is unconfined and vulnerable to pollution.

The monthly average flow of influent from 2010 was used to calculate an average flow of 0.002 Million Gallons per Day (MGD), 2011 data was not available from FDEP. Nutrient concentrations from ACEPD inspection samples were then multiplied by this flow rate to calculate average loading rates. The estimated nitrate loading was 5 lbs/year, total nitrogen was calculated as 332 lbs/year, and total phosphorus was 49 lbs/year. Total nitrogen load

from 2010 - 2011 is nearly double that of 2008 - 2009 (Figure 30). Table 2 compares loading among wastewater treatment facilities located in Alachua County.

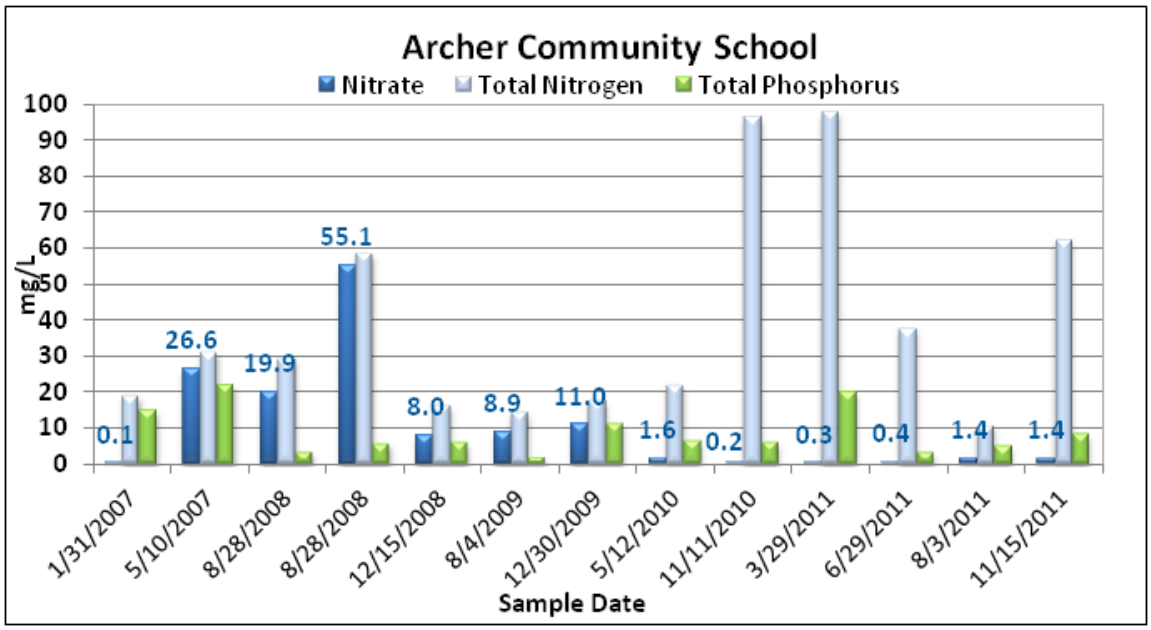

Figure 29. Averages of the effluent data from grab samples collected during the ACEPD inspections in 2007 through 2011. The nitrate concentrations are denoted on the graph.

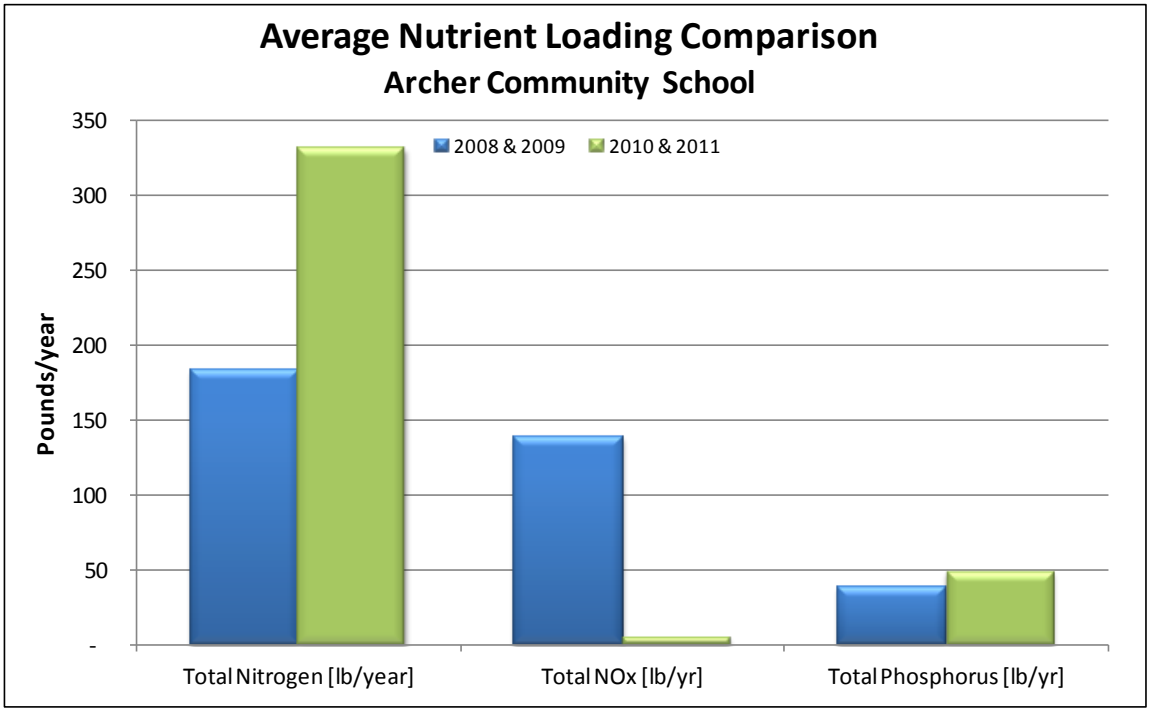

Figure 30. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from Archer Community School.

4-2 Archer Homes

Facility size: 0.0083 MGD
Permitted effluent disposal: 0.22 acre absorption field
Residuals disposal: Hauled off-site
Permit expiration date: October 13, 2015

Solids in the chlorine contact chamber at the Archer Homes WWTF.

The package plant at Archer Homes is an extended aeration treatment plant. This facility was inspected seven times in 2010 and 2011 and was found out of compliance during four of the inspections. The chlorine residual was below the FDEP permit minimum of 0.5 mg/L during two of the inspections and total suspended solids exceeded the permitted value of 10 mg/L during two of the inspections.

The effluent was high in ammonia, indicating the oxygen levels in the plant may not be sufficient to support nitrification. High nitrogen values in this effluent (Figure 31) are a concern in this area because the Floridan aquifer is unconfined in this portion of the county. Although the nitrogen in the effluent is not in the mobile nitrate form, it is likely to be converted to nitrate under the aerobic conditions in the unsaturated zone of the unconfined Floridan aquifer. The permit violations and nutrient concerns were expressed in the inspection letters sent to the operator, owner, and FDEP and during several meetings held at this facility in 2010 and 2011.

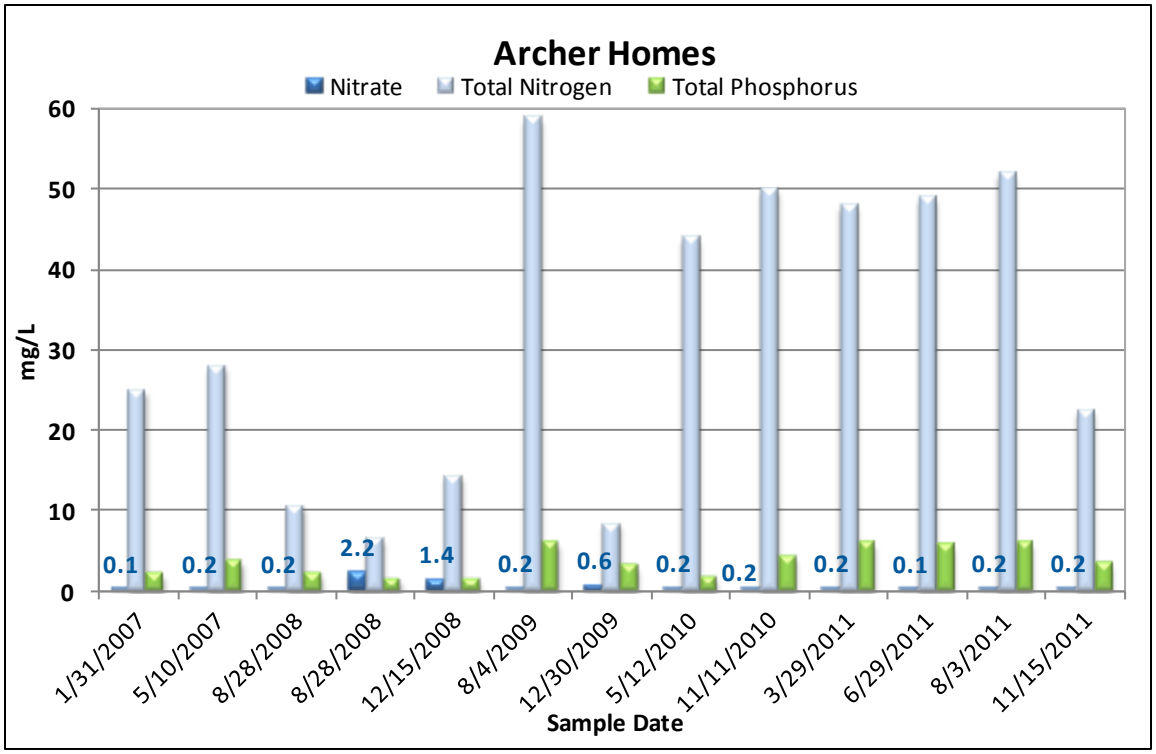

Figure 31. Averages of the effluent data from grab samples collected during the ACEPD inspections at Archer Homes package plant in 2007 – 2011. The nitrate concentrations are denoted on the graph.

The monthly average flow of influent from 2010 and 2011 was used to calculate an average flow of 0.004 Million Gallons per Day (MGD). Effluent nutrient concentrations were then multiplied by this flow rate to calculate average loading rates to the environment. Monthly nitrate+nitrite data collected by the facility was combined with ACEPD inspection data to calculate a loading rate of 13 lbs/year. Since the facility is not required to monitor for total nitrogen or total phosphorus, ACEPD data were used to calculate these loadings of 539 and 54 lbs/year respectively. Total nitrogen loading in 2010 - 2011 was significantly increased from the 2008 - 2009 monitoring period (Figure 32). High nitrogen loads in the area are of concern because the Floridan aquifer is unconfined in this portion of the county. Although the majority of the nitrogen is not in the nitrate form it can be easily converted back to nitrate from ammonia. Table 2 compares loading values among wastewater treatment facilities located in Alachua County.

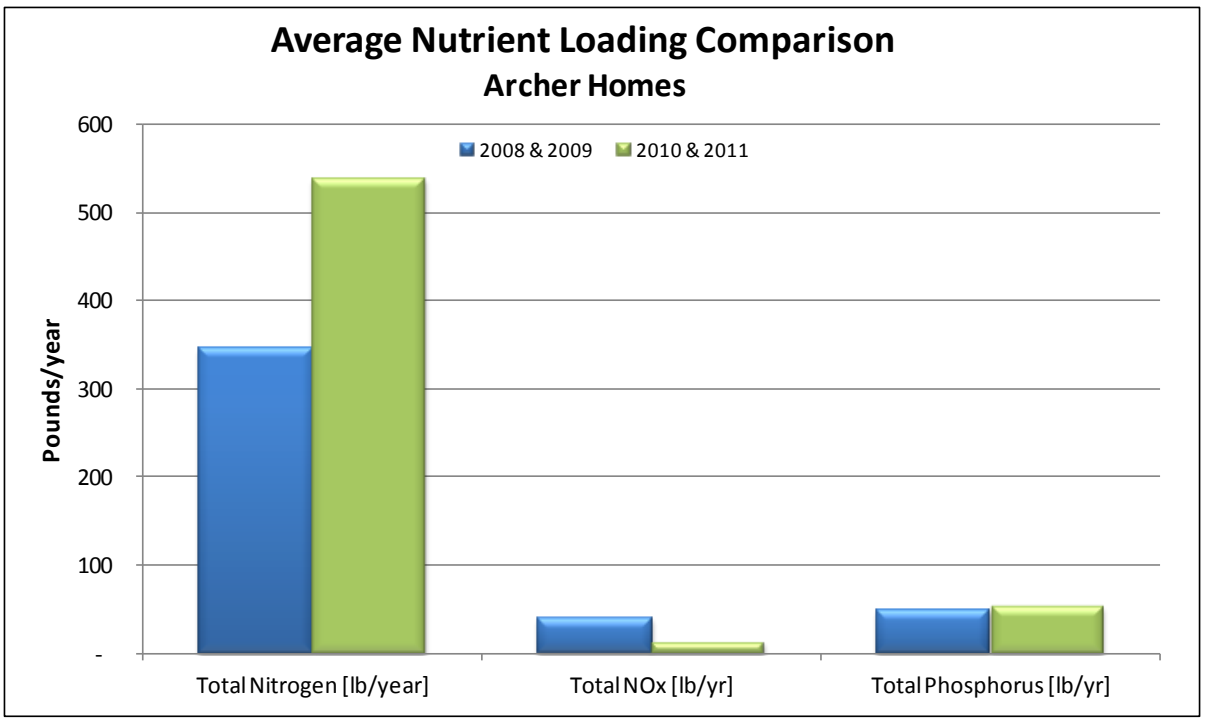

Figure 32. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from Archer Homes.

4-3 Arredondo Farms Mobile Home Park (MHP)

Facility size: 0.060 MGD
Permitted effluent disposal: two rapid infiltration basins
Residuals disposal: Hauled off-site
Permit expiration date: December 14, 2014

Aeration tanks in front of photo and inspector looking at one of the clarifiers in the rear of the package plant at the Arredondo Farms

The package plant at Arredondo Farms MHP is an extended aeration treatment plant. This facility was inspected seven times and found out of compliance during two of the ACEPD inspections conducted during 2010 and 2011. The residual chlorine level was less than the FDEP permit requirement during one of the inspections. Nitrate+nitrite concentrations exceeded the permitted 12 mg/L during two of the inspections. Total nitrogen levels appear to be rising (Figure 33); however, a longer period of record would be needed to confirm this trend. Modifications were made to this facility in 2010, which improved the effluent quality initially but has resumed its decline in effluent quality despite the modifications.

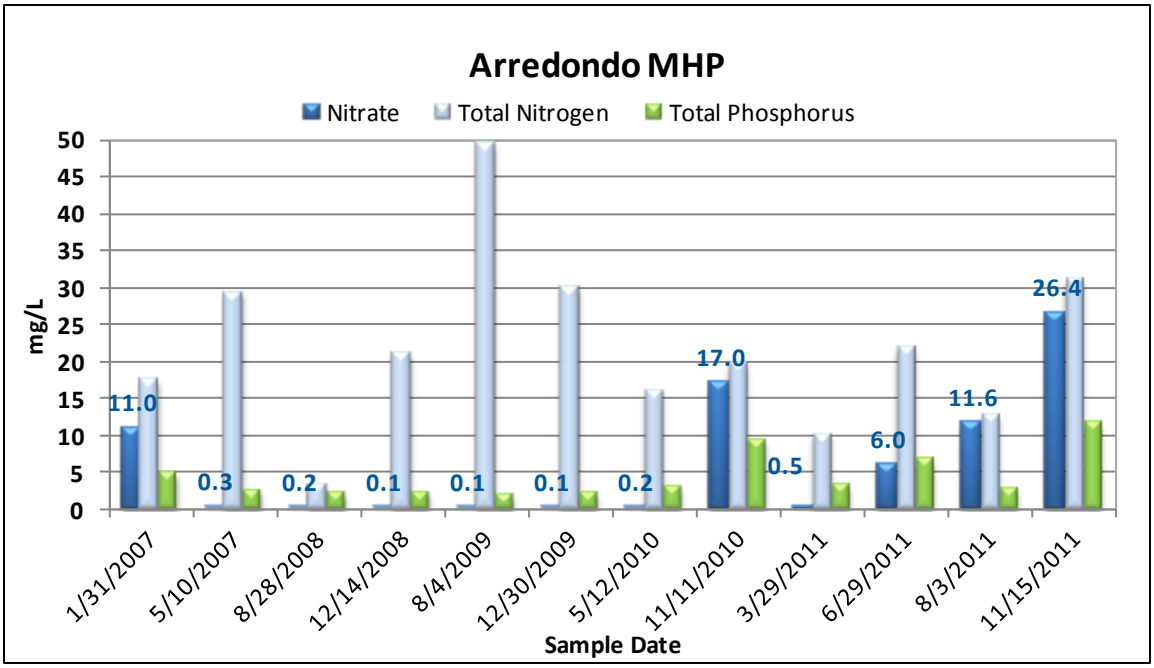

Figure 33. Effluent data from grab samples collected from the Arredondo Estates WWTF during the ACEPD inspections in 2007 - 2011. The nitrate concentrations are denoted on the graph.

The monthly average effluent flow from 2010 and 2011 were used to calculate an average flow of 0.038 Million Gallons per Day (MGD). Effluent nutrient concentrations were then multiplied by this flow rate to calculate average loading rates to the environment. Monthly nitrate+nitrite data collected by the facility were combined with ACEPD inspection data to calculate a loading rate of 564 lbs/year. Since the facility is not required to monitor for total nitrogen or total phosphorus, ACEPD data were used to calculate these loadings of 2,242 and 637 lbs/year, respectively. Although total nitrogen loading was less in 2010 - 2011 than it was in 2008 - 2009, nitrate+nitrite loading more than doubled because of the increased concentrations (Figure 34). Table 2 compares loading among wastewater treatment facilities located in Alachua County.

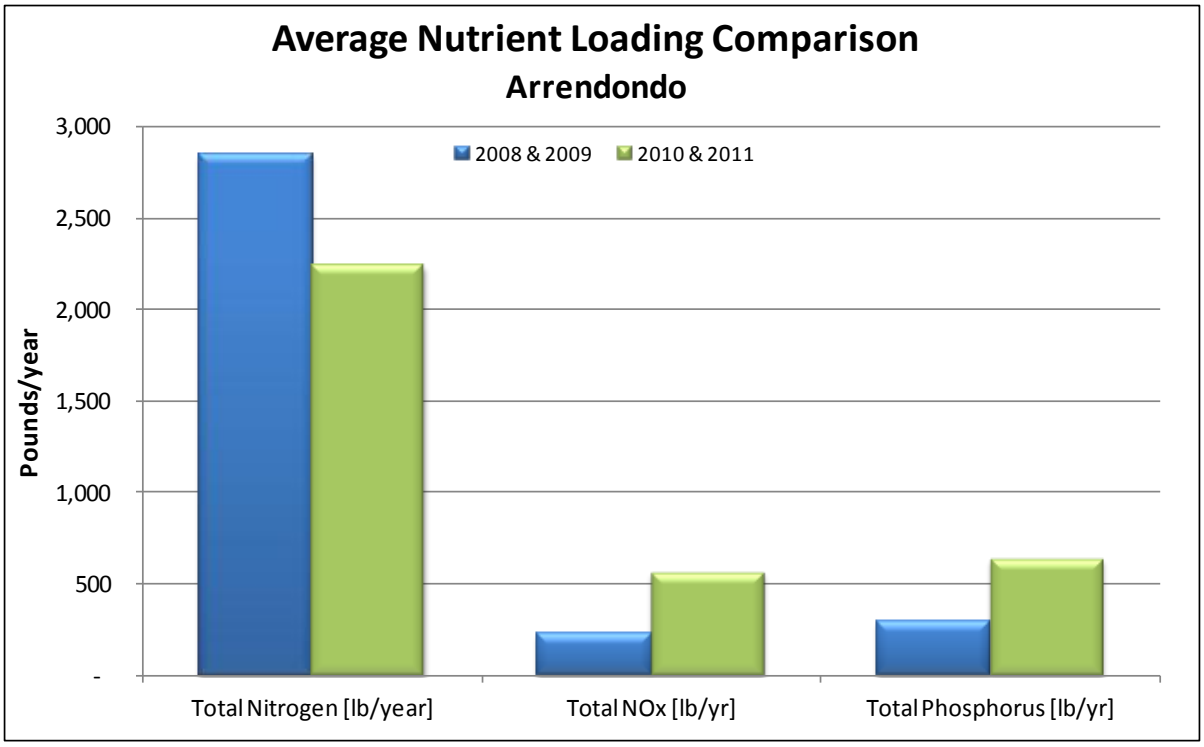

Figure 34. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from Arrendondo Village MHP.

4-4 Brittany Estates Mobile Home Park (MHP)

Facility size: 0.06 MGD
Permitted effluent disposal: Little Hatchet Creek
Residuals disposal: Hauled off-site
Permit expiration date: August 28, 2016

The Brittany Estates package WWTF

The package plant at Brittany Estates MHP can be operated as an activated sludge extended aeration or contact stabilization plant. This facility was found in compliance during five of the six of the inspections conducted by ACEPD during 2010 and 2011. Total chlorine levels were below the permit level of 0.5 mg/L during the out of compliance inspection. Nitrogen levels decreased in July 2010, which was an improvement, but have been gradually increasing since then (Figure 35).

The monthly average effluent flow from 2010 and 2011 was used to calculate an average flow of 0.043 Million Gallons per Day (MGD). Effluent nutrient concentrations were then multiplied by this flow rate to calculate average loading rates to the environment. Monthly total nitrogen, total phosphorus, and nitrate data collected by the facility were combined with ACEPD inspection data to calculate a loading of 736, 196, and 611 lbs/year, respectively. Loading of nitrogen and nitrate+nitrite decreased during 2010 -2011 compared to 2008 - 2009 (Figure 36). Nutrients in discharge from this plant are a concern because they are discharged to a tributary of Little Hatchet Creek, where a Total Maximum Daily Load recently was developed for Newnans Lake, the downstream receiving water body, to

address water quality issues in the Basin. Table 2 compares loading rates among wastewater treatment facilities in Alachua County.

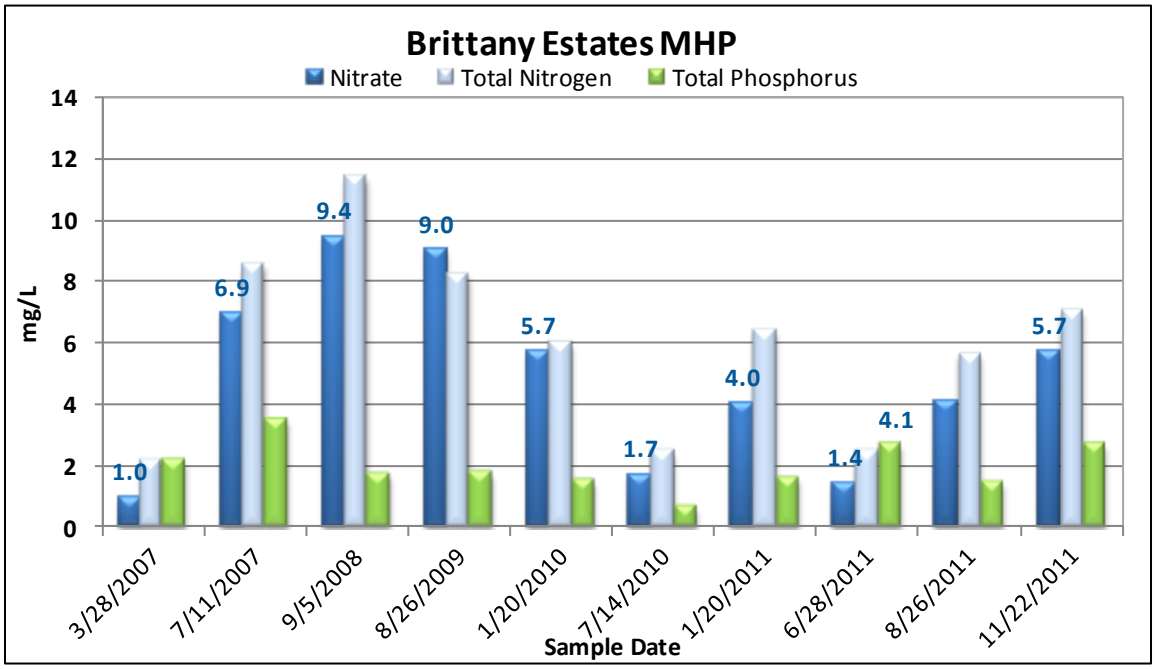

Figure 35. Effluent data from grab samples collected from the Brittany Estates WWTF during the ACEPD inspections in 2007-2011. The nitrate concentrations are denoted on the graph.

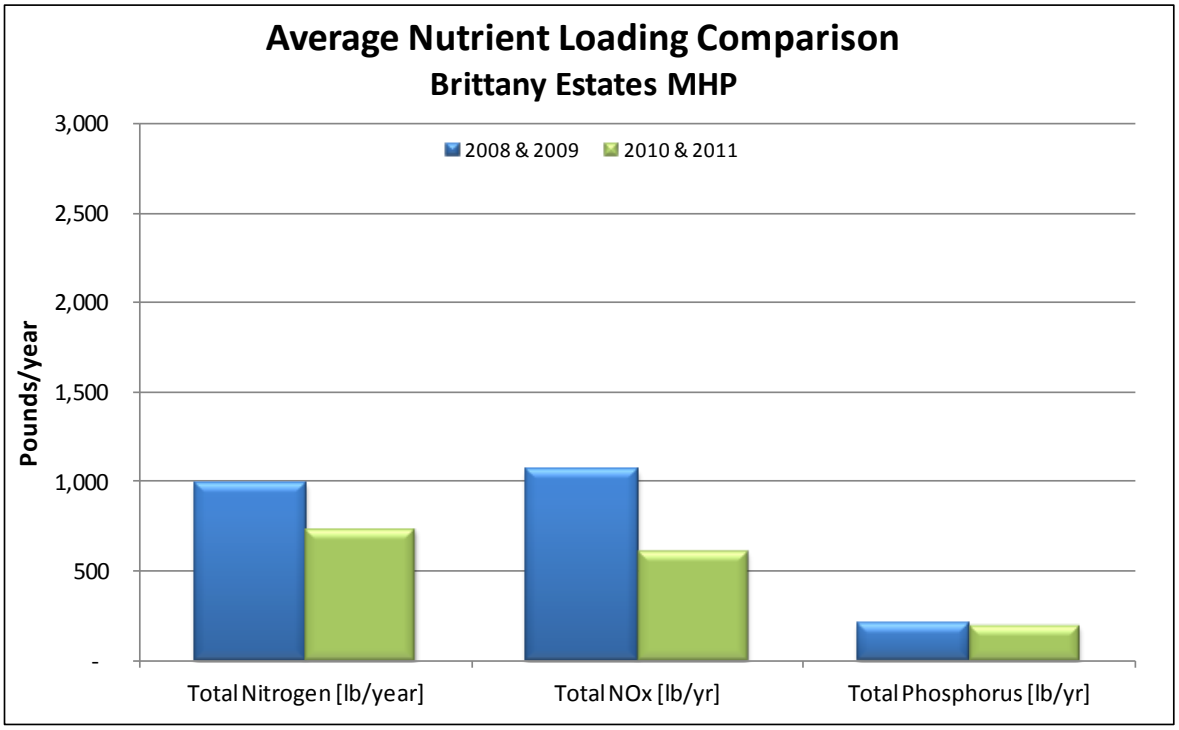

Figure 36. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from Brittany Estates MHP.

4-5 Camp Kulaqua

Facility size: 0.0201 MGD

Permitted effluent disposal: Two rapid infiltration basins (0.372 acres)

Residuals disposal: Hauled off-site

Permit expiration date: September 13, 2014

Aeration basins, clarifier, and chlorine contact chamber at the Camp Kulaqua WWTF.

The package plant at Camp Kulaqua in High Springs is an extended aeration activated sludge treatment plant. This facility was inspected seven times during 2010 and 2011 and in-compliance for five inspections. The chlorine residual was under the FDEP permit limitation 0.5 mg/L during one of the inspections and the 12.0 mg/L FDEP permit limitation for nitrate was exceeded during the two inspections. The high nitrogen values during some of the sampling events (Figure 37) are a concern with the proximity of Hornsby Springs and the Santa Fe River, especially since the nitrogen in the effluent is often in the mobile nitrate form. During low flows to the plant, operators have to maintain the microbial communities by adding dog food. These periods of low flow also correspond with elevated nutrient levels. Permit violations and nutrient concerns were expressed in the inspection letters sent to the plant owner, operator, and FDEP.

The monthly average effluent flow from 2010 and 2011 was used to calculate an average flow of 0.0018 Million Gallons per Day (MGD). Effluent nutrient concentrations were multiplied by this flow rate to calculate average loading rates to the environment. Monthly nitrate data collected by the facility were combined with ACEPD inspection data to calculate a nitrate loading rate of 26 lbs/year. Since the facility is not required to monitor total nitrogen or total phosphorus, ACEPD data were used to calculate these loadings of 97 lbs/year and 18 lbs/year, respectively. In comparison to 2008 - 2009 the total nitrogen load

was greater during 2010-2011, but nitrate loading decreased (Figure 38). Table 2 compares loading among wastewater facilities in Alachua County.

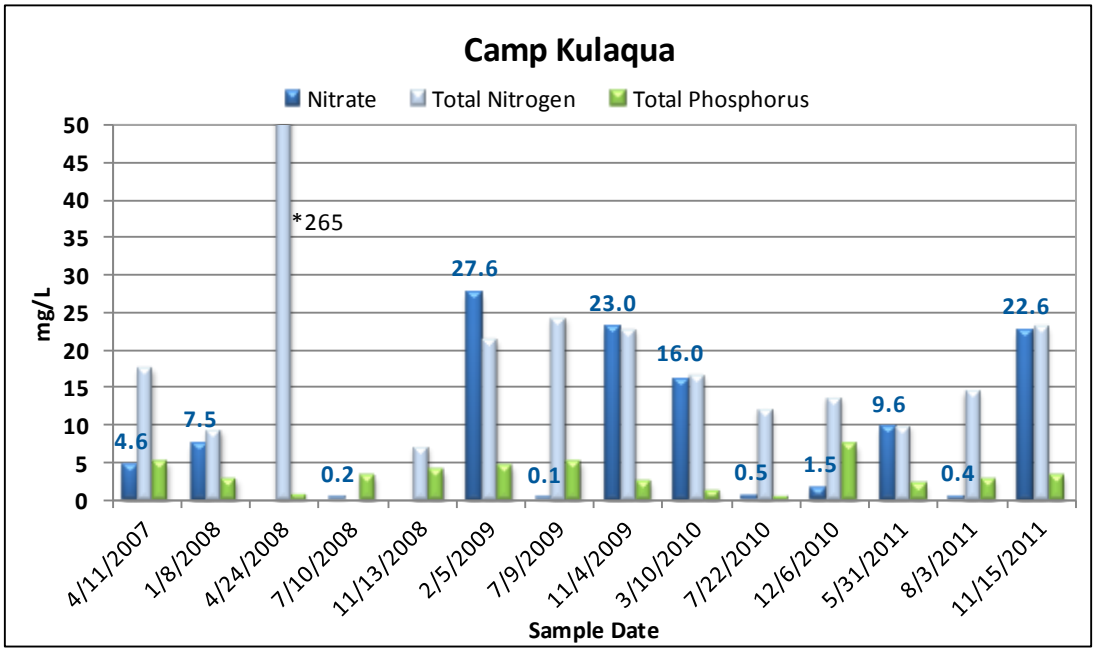

Figure 37. Effluent data from grab samples collected from the Camp Kulaqua WWTF during the ACEPD inspections in 2007-2011. The nitrate concentrations are denoted on the graph. *Total nitrogen concentration exceeded 50mg/L for 4/24/2008 and concentration of 265mg/L denoted on graph.

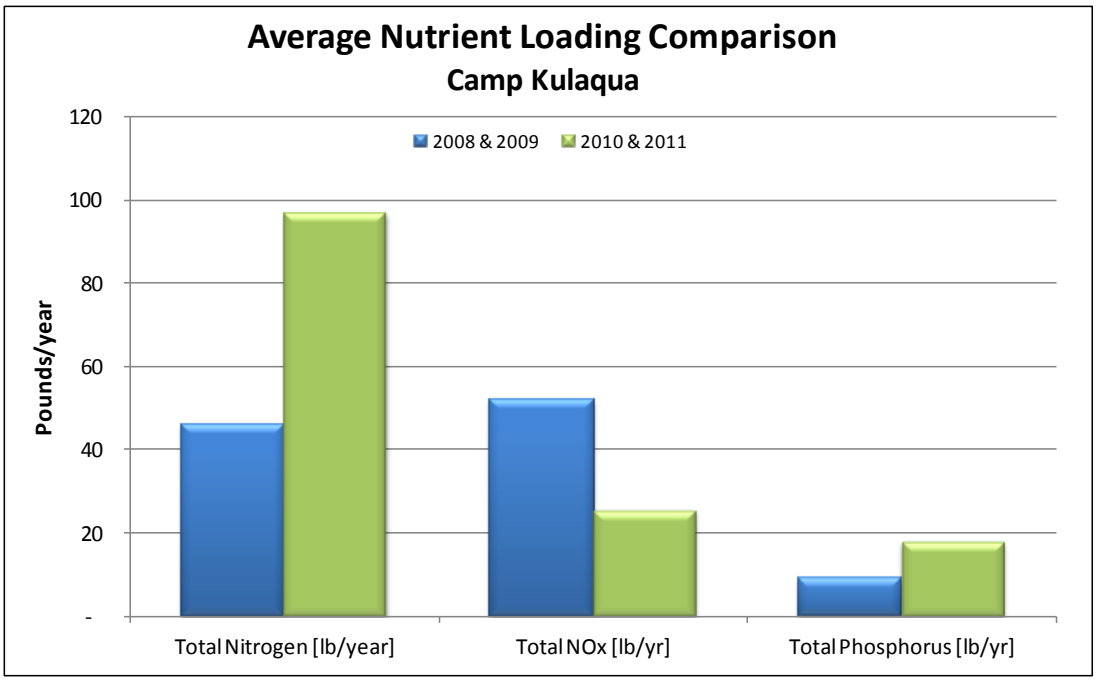

Figure 38. Comparison of calculated nutrient loading for 2008 and 2009 with the 2010 and 2011 data from Camp Kulaqua.

4-6 Camp McConnell- YMCA

Facility Size: 0.0075 MGD

Permitted effluent disposal: Two absorption fields (0.0388 acres)

Residuals disposal: Hauled off-site

Permit expiration date: March 15, 2015

An inspector looking towards the aeration basins at the Camp McConnell WWTF

The package plant at Camp McConnell is an extended aeration plant. ACEPD conducted five inspections at this facility during 2010 and 2011 and there were no permit violations during these inspections. This is an improvement over the past two year's inspections where there were nutrient exceedances. High nutrient concentrations in the effluent (Figure 39) are a concern with the proximity to Georges Pond. The flow rate at this facility is intermittent and is dependent on the programming at the camp. The operator often adds dog food as food for the microbes that are essential to the proper operation of this plant during periods of low influent flows.

The monthly average effluent flow from 2010 and 2011 were used to calculate an average flow of 0.0015 Million Gallons per Day (MGD). Effluent nutrient concentrations were then multiplied by this flow rate to calculate average loading rates to the environment. Monthly nitrate data collected by the facility were combined with ACEPD inspection data to calculate a nitrate loading rate of 12 lbs/year. Since the facility is not required to monitor total nitrogen or total phosphorus, ACEPD data were used to calculate these loadings of 30 lbs/year and 9 lbs/year respectively. Total Nitrogen load decreased in 2010 and 2011; however, nitrate load decreased dramatically (Figure 40). Table 2 compares loading rates among wastewater treatment facilities in Alachua County.

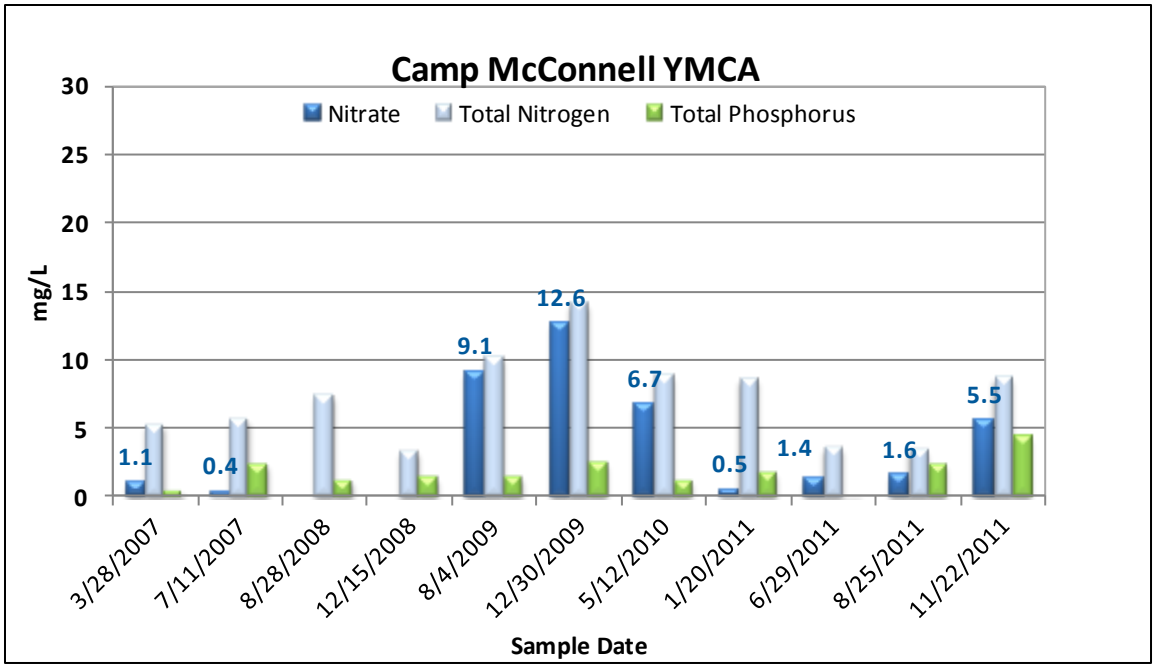

Figure 39. Effluent data from grab samples collected from the Camp McConnell WWTF during the ACEPD inspections in 2007–2011. The nitrate concentrations are denoted on the graph.

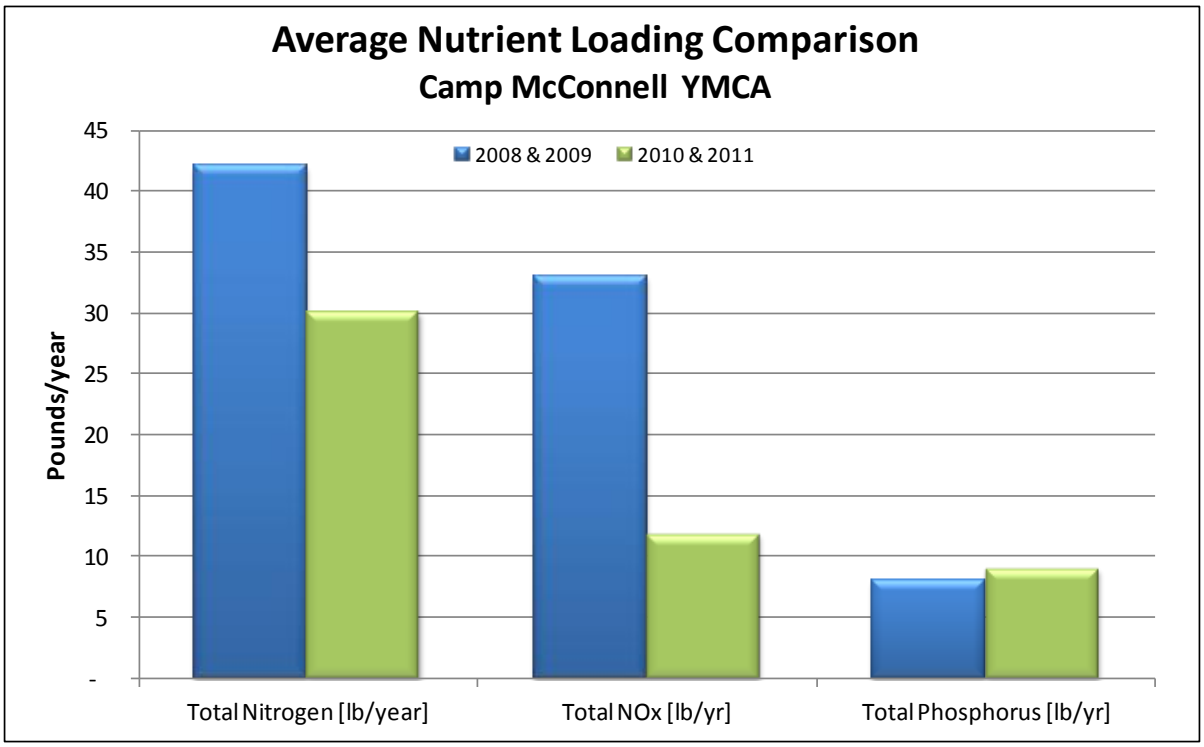

Figure 40. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from Camp McConnell YMCA.

4-7 The Florida Welcome Center

Facility size: 0.009 MGD
Permitted effluent disposal: Rapid infiltration basin (0.25 acres)
Residuals disposal: Hauled off-site
Permit expiration date: March 10, 2015

Aeration basins and blower at the Florida Welcome Center WWTF

The Florida Welcome Center wastewater treatment plant is an extended aeration plant. This facility was found in compliance during six of the seven inspections conducted by ACEPD during 2010 and 2011. The effluent did not meet the FDEP permit requirement of 0.5 mg/L chlorine in the chlorine contact chamber during one inspection. The high total nitrogen concentrations (Figure 41) are of concern in proximity to the Santa Fe River and its springs. The Floridan aquifer is semi-confined in this area which is on the edge of the Cody Scarp. Although the nitrogen in the effluent is not always dominated by the mobile nitrate form, ammonia may be easily converted to nitrate.

The monthly average influent flow from 2010 and 2011 was used to calculate an average flow of 0.005 Million Gallons per Day (MGD). Effluent nutrient concentrations were then multiplied by this flow rate to calculate average loading rates to the environment. Monthly nitrate data collected by the facility were combined with ACEPD inspection data to calculate a nitrate loading rate of 18 lbs/year. Since the facility is not required to monitor for total nitrogen or total phosphorus, ACEPD data were used to calculate these loadings of 429 lbs/year and 109 lbs/year respectively. Nutrient loads varied greatly from 2008-2009 to 2010- 2011 (Figure 42). Table 2 compares loading rates among wastewater treatment facilities located in Alachua County.

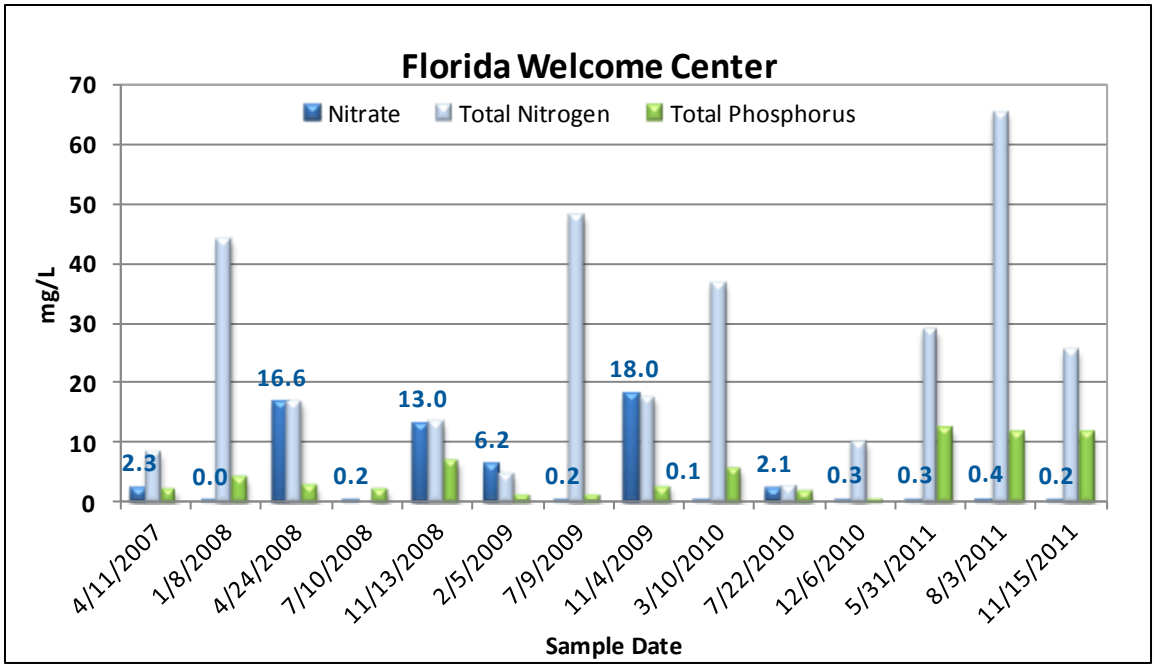

Figure 41. Effluent data from grab samples collected from the Florida Welcome Center WWTF during the ACEPD inspections in 2007-2011. The nitrate concentrations are denoted on the graph.

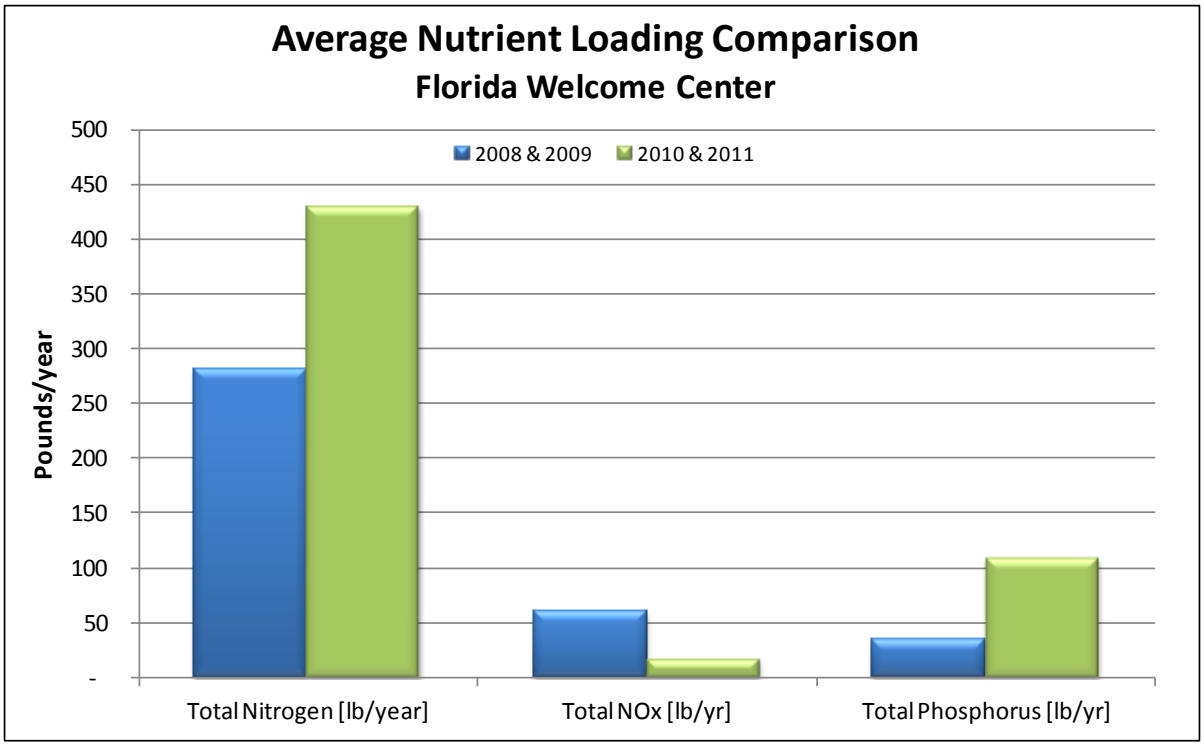

Figure 42. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from Florida Welcome Center.

4-8 The Gainesville Raceway

Facility size: 0.00825 MGD
Permitted effluent disposal: Spray irrigation (3.25 acres)
Residuals disposal: None Produced
Permit expiration date: December 18, 2012

An aeration basin at the Gainesville Raceway WWTF

The Gainesville Raceway plant is an extended aeration batch treatment system that was designed to treat the intermittent flows of the Gainesville Raceway including the extreme flows of Gator Nationals. This facility was inspected once during 2010 and 2011 and was found to be in compliance. No effluent is discharged through the sprayfields due to operator management of the aeration basins, therefore no samples were taken of effluent. This plant operates during special events at the Gainesville Raceway and receives and treats wastewater pumped from portable toilets. This plant is over-designed and historically has been found to be in compliance. Due to its intermittent nature, this plant is not required to pay wastewater fees to the County.

4-9 Knights Inn (Micanopy Inn)

Facility size: 0.015 MGD

Permitted effluent disposal: 1.26 acre sprayfield

Residuals disposal: Hauled off-site

Permit expiration date: April 25, 2015

The Knights Inn Package WWTF

The package plant at the Knight's Inn which has changed its name to the Micanopy Inn is an extended aeration plant. This facility was inspected six times by ACEPD during 2010 and 2011. The plant was found out of compliance during two of the inspections because the chlorine residual was less than the FDEP permit required 0.5 mg/L. There are no effluent nutrient limitations in the FDEP permit. The elevated nutrients in the effluent (Figure 43) are of concern in this area of the County where the Floridan aquifer is semi-confined to unconfined.

The monthly average flow of influent from 2010 and 2011 were used to calculate an average flow of 0.004 Million Gallons per Day (MGD). Monthly nitrate data collected by the facility were combined with ACEPD inspection data to calculate a nitrate loading rate of 88 lbs/year. Since the facility is not required to monitor total nitrogen or total phosphorus, ACEPD data were used to calculate these loadings of 153 lbs/year and 35 lbs/year, respectively (Figure 44). Table 2 compares loading values among wastewater treatment facilities located in Alachua County.

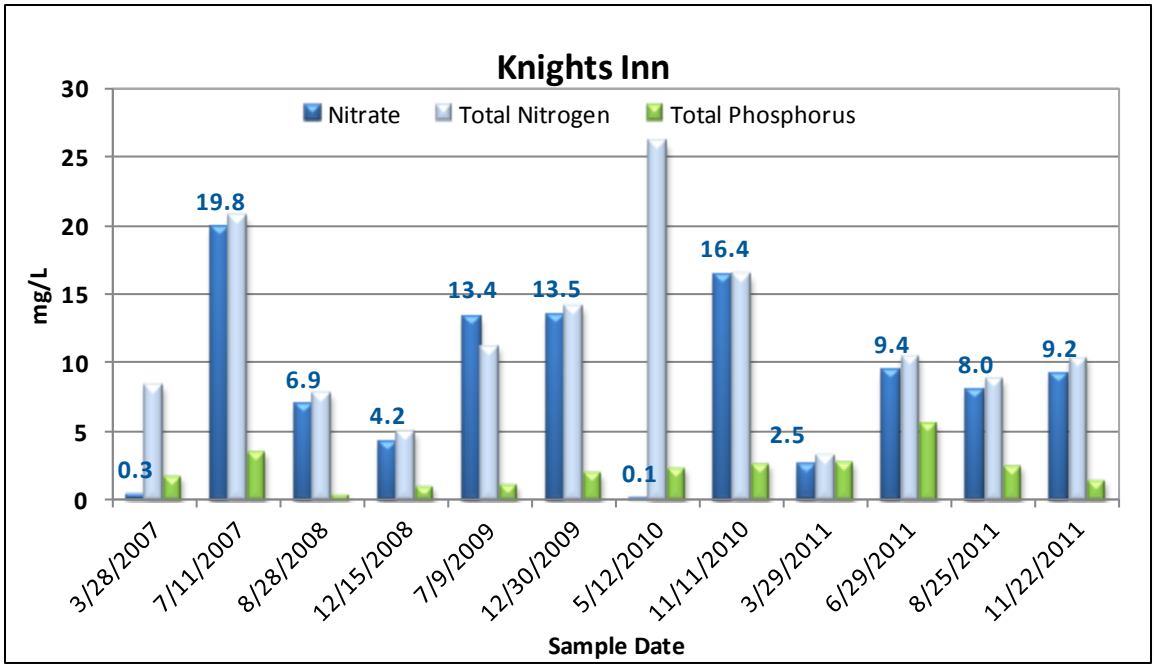

Figure 43. Effluent data from grab samples collected from the Knights Inn (Micanopy Inn) WWTF during the ACEPD inspections in 2007-2011. Nitrate values are denoted on the graph.

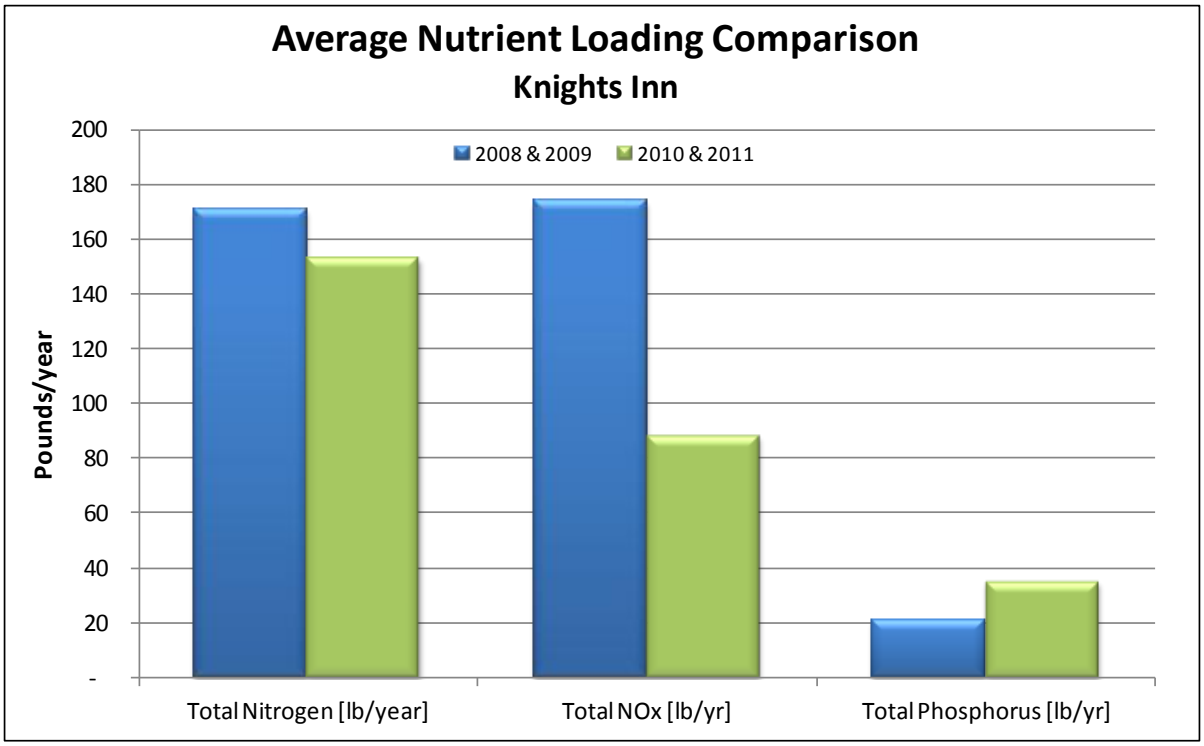

Figure 44. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from Knights Inn (Micanopy Inn).

4-10 Prairie View Apartments

Facility size: 0.00424MGD

Permitted effluent disposal: percolation pond (6,608 square feet)

Residuals disposal: Hauled off-site

Permit expiration date: 9/9/2015

Prairie View package WWTF

The package plant at Prairie View Apartments is an activated sludge secondary treatment plant. This facility was inspected seven times during 2010 and 2011 and was found to be out of compliance for three of these inspections. Out of compliance was cited for the plant having total residual chlorine below the permitted level of 0.5 mg/L during two of the six inspections, permitted nitrate concentration and total suspended solids exceeded permit level during one inspection. The operator, plant owner, and FDEP were notified concerning these compliance issues. Extensive maintenance was conducted on the plant in 2010 which has helped to reduce solids in the chlorine contact chamber and overall functioning of the facility. The poor effluent quality (Figure 45) is of concern with the proximity of Paynes Prairie Preserve State Park, an Outstanding Florida Water. ACEPD met with FDEP staff and the facility engineer in 2010 to discuss compliance issues and possible solutions to increase the treatment of the effluent.

The monthly average flow reported on the discharge monitoring report (DMR) from 2010 - 2011 was used to calculate an average flow of 0.0033 Million Gallons per Day (MGD). Effluent nutrient concentrations were then multiplied by this flow rate to calculate average loading rates to the environment. Monthly nitrate data collected by the facility were combined with ACEPD inspection data to calculate a nitrate loading rate of 26 lbs/year.

Since the facility is not required to monitor total nitrogen or total phosphorus, ACEPD data were used to calculate loadings of 266 lbs/year and 49 lbs/year respectively (Figure 44). Table 2 compares loading rates among wastewater facilities in Alachua County.

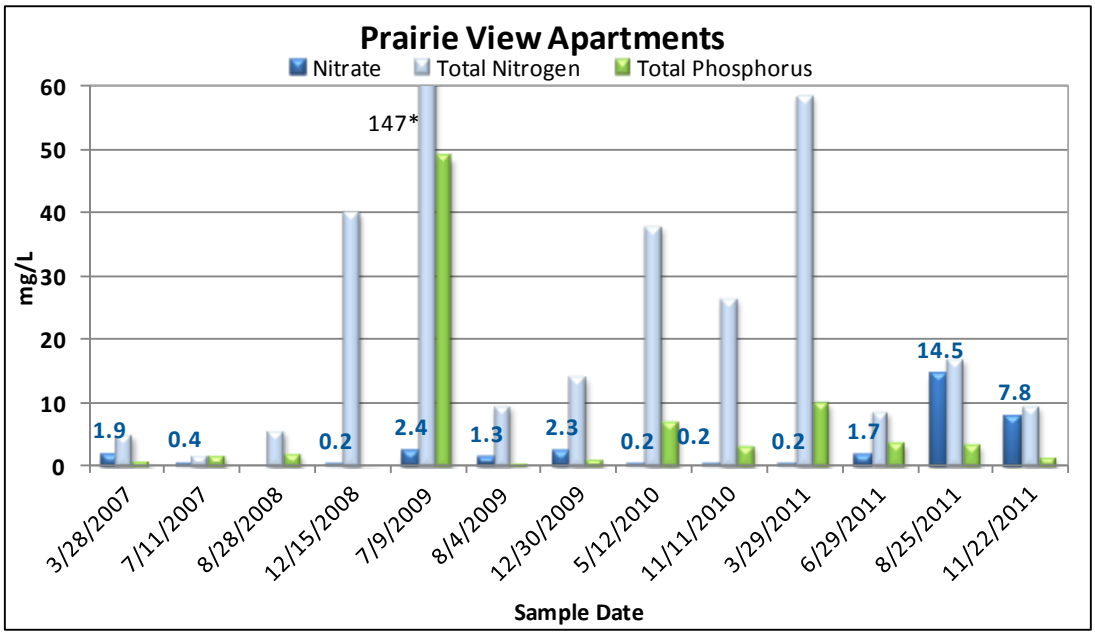

Figure 45. Effluent data from grab samples collected from the Prairie View WWTF during the ACEPD inspections in 2007-2011. The nitrate concentrations are denoted on the graph.*Total Nitrogen concentration exceeded 60mg/L for 7/9/2009 and concentration of 147mg/L denoted on graph.

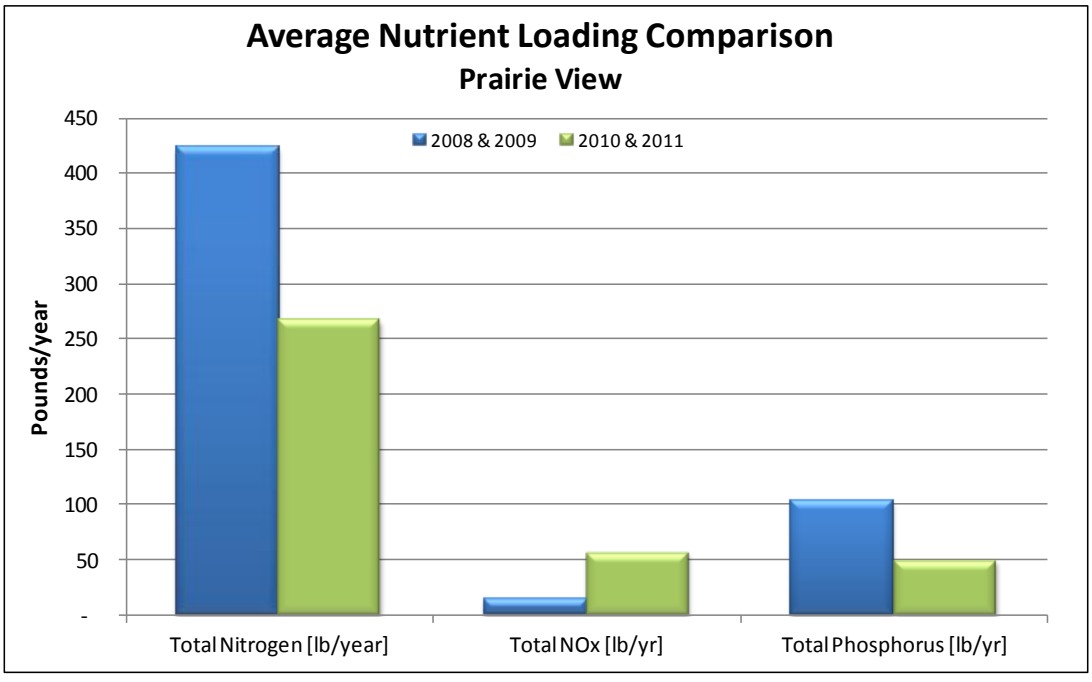

Figure 46. Comparison of calculated nutrient loading for 2008 - 2009 with the 2010 - 2011 data from Prairie View Apartments.

5. Summary and Recommendations

ACEPD will continue to monitor the WWTFs in Alachua County. Effluent will be analyzed for nutrient species (nitrate, nitrate + nitrite, ammonia, total nitrogen, and total phosphorus). If the effluent is discolored and appears to be out of compliance with its FDEP permit limitations, parameters such as fecal coliform, CBOD, and TSS may be monitored to assist FDEP in enforcing permit limitations. ACEPD intends to inspect all facilities at least three times a year, with the exception of the two GRU facilities, and the Gainesville Raceway which are monitored on an annual basis. UF is no longer inspected by the ACEPD.

ACEPD plans to increase communication concerning problematic facilities with the Florida Department of Environmental Protection Domestic Wastewater Compliance staff. It is ACEPD's hopes to assist in getting all of the WWTFs in compliance with their FDEP permits. In 2013 ACEPD anticipates adding enforcement capabilities to its wastewater program, which will give ACEPD the authority to issue civil citations for effluent and reporting violations.

ACEPD will continue to encourage all of the wastewater treatment facilities to upgrade to more advanced treatment with the goal of reducing nutrient concentrations in treated effluent. An emphasis will be placed on treatment facilities within the area where the Floridan aquifer is unconfined, within delineated springsheds of the springs of the lower Santa Fe River, and to those in the watersheds of Outstanding Florida Waters or Impaired Waters.

ACEPD will promote additional nutrient monitoring (nitrogen species and total phosphorus) requirements for inclusion in FDEP permits. Some of the Alachua County waterbodies, including Lake Santa Fe (Outstanding Florida Waters), are phosphorus limited. Newnans Lake, Lake Wauberg and Lockloosa Lake have TMDLs set for TN and TP, Orange Lake is impaired by nutrients and will have a TMDL set, Alachua Sink has a TMDL for TN and the Santa Fe River has a TMDL for nitrate, these may change depending on the numeric nutrient criteria and the method in which they are implemented.

6. References

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