UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

MAR 12 2013

Herschel T. Vinyard
Secretary
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Dear Secretary Vinyard:

The U. S. Environmental Protection Agency has completed its review of the site specific alternative criterion (SSAC) for total nitrogen for Alachua Sink. The Florida Department of Environmental Protection (FDEP) submitted revised Chapter 62-302, including the SSAC, to the EPA on June 13, 2012 as a new or revised water quality standard with the necessary certification by FDEP general counsel, pursuant to 40 CFR Part 131. The SSAC was included in the list of site specific numeric interpretations of paragraph 62-302.530(47)(b), Florida Administrative Code (F.A.C.), referenced in Chapter 62-302(2)(a), F.A.C., and published at the FDEP's website at (http://www.dep.state.fl.us/water/wqssp/swq-docs.htm). FDEP submitted the numeric interpretation of the state narrative nutrient criterion expressed in the Alachua Sink WBID 2720A Total Maximum Daily Load report as the SSAC. Florida intends for this SSAC to serve as the numeric nutrient criterion for total nitrogen for Alachua Sink in the place of the otherwise applicable criterion set out in paragraph 62-302.531(2)(c), F.A.C.

In accordance with Section 303(c) of the Clean Water Act, I am hereby approving the SSAC for the Alachua Sink WBID 2720A as a revised water quality standard for total nitrogen. Any other criteria applicable to this waterbody remain in effect. The details of the SSAC are discussed in the enclosed documentation. We would like to commend you and your staff for your continued efforts in environmental protection for the State of Florida. If you have any questions regarding the EPA's approval, please contact me at (404) 562-9345 or have a member of your staff contact Annie M. Godfrey, Water Quality Standards Section Chief, at (404) 562-9967.

Sincerely,

James D. Giattina
Director
Water Protection Division

Enclosure

cc: Thomas M. Beason, FDEP
Daryll Joyner, FDEP

Decision Document for Hierarchy 1 Site Specific Alternative Criterion for Alachua Sink

Summary Information

WBID	Description	Class	Waterbody Type	Listing Parameter
2720A	Lake (Sink hole lake)	Class III	Lake (>40 Platinum Cobalt Units (PCU))	Nutrients Chlorophyll-*a* (chl-*a*)

A nutrient Total Maximum Daily Load (TMDL) for Alachua Sink WBID 2720A was developed by Florida Department of Environmental Protection (FDEP) and approved by the Environmental Protection Agency on December 20, 2006, pursuant to section 303(d) of the Clean Water Act (CWA). This TMDL was developed to identify the level of nutrients that would prevent an imbalance of flora and flora as required by the state's narrative nutrient criterion at paragraph 62-302.47(b), Florida Administrative Code (F.A.C). FDEP determined that a total nitrogen load (TN) of 256,322 lbs/yr, not to be exceeded as a long-term annual average, would meet their narrative criterion and adopted that load as a TMDL load at subsection 62-304.500(19), F.A.C. FDEP has submitted the TN load from the TMDL for the EPA review as a hierarchy 1 site specific alternative nutrient criterion (SSAC) for the Alachua Sink, pursuant to section 303(c) of the CWA and the EPA's implementing regulations at 40 C.F.R. Part 131. This decision document approves the SSAC of 256,322 lbs/yr TN, not to be exceeded as a long-term annual average, as a hierarchy 1 criterion for Alachua Sink WBID 2720A. The long-term annual average will be calculated as a rolling three year average of the annual averages. Any other criteria applicable to this waterbody remain in effect.

In a letter dated June 13, 2012, from Thomas M. Beason, General Counsel for FDEP, to Gwendolyn Keyes Fleming, Regional Administrator of the EPA's Region 4 Office, FDEP submitted the numeric interpretation of the state narrative nutrient criterion as expressed in the Alachua Sink WBID 2720A Total Maximum Daily Load (TMDL) as the SSAC for the Alachua Sink. This SSAC serves as a primary site specific interpretation of Florida's narrative water quality criterion for nutrients set out in paragraph 62-302.530(47)(b), F.A.C., in accordance with paragraph 62-302.531(2)(a), F.A.C. Pursuant to section 303(c) of the CWA, this revised water quality standard is subject to review and approval by the EPA since FDEP intends for this SSAC to serve as a numeric nutrient criterion for TN for Alachua Sink in the place of the otherwise applicable criterion set out in paragraph 62-302.531(2)(c), F.A.C. In the June 13, 2012 letter, FDEP General Counsel certified that the revised water quality standard was duly adopted pursuant to Florida law.

The EPA's decision to approve this criterion is subject to the results of consultation under Section 7 of the Endangered Species Act with the U.S. Fish and Wildlife Service. By approving the standards "subject to the results of consultation," the EPA retains its discretion to take appropriate action if the consultation identifies deficiencies in the standards requiring remedial

action by the EPA. The EPA will notify FDEP of the results of the Section 7 consultation upon completion of the action.

Description of waters for which a SSAC has been proposed

According to the 2008 TMDL, Alachua Sink lies in a physiographic region of the state known as the Central Valley within the Ocklawaha Basin. The dominant, underlying geologic component of the area is the Ocala limestone formation which is a soft, porous limestone, interbedded with dense, hard limestone and dolomite. Sink formations have occurred in the area through subterranean erosion by ground water solution. The drainage basin for Alachua Sink is approximately 2,758 acres. There are two well-defined inflows into Alachua Sink: Sweetwater Branch and a culverted canal that connects Alachua Lake to Alachua Sink. See maps and images contained on pages 4 and 5 of this document for details. These combined inflows drain an area of approximately 39,373 acres. Alachua Lake is the inundated portion of Paynes Prairie. It is presumed that any runoff coming into Paynes Prairie that does not sink into the ground is incorporated into Alachua Lake and some portion of that runoff is directed to Alachua Sink during high-water conditions. Major sources of flow to Paynes Prairie include Bivens Arm, Prairie Creek (which connects the prairie to Newnans Lake), and Camps Canal. About 41% of the flow from Newnans Lake goes south into Paynes Prairie and the rest of the flow goes towards Orange Lake by way of Camps Canal.

The watershed area that discharges to Alachua Sink through Sweetwater Branch appears to be influenced more by urban and residential land uses than the watershed area discharging through Alachua Lake. For the 4,087 acres that discharge into Sweetwater Branch, 2,615 acres are occupied by urban open and residential land uses, which account for 64% of the total watershed area. About 5,878 acres out of 35,286 acres of the watershed discharging into Alachua Lake is dominated by urban and residential land uses, which account for about 17% of total land uses.

Discussion of how the load was derived

According to the 2008 TMDL, Alachua Sink was identified as impaired due to a Trophic State Index (TSI) score of 78 during 2000-2002. The TSI is a composite measurement used in evaluating the level of enrichment in lakes and estuaries. This TSI assessment threshold methodology is identified in Florida's Impaired Waters Rule (IWR) at section 62-303, F.A.C. The Sink was included on Florida's verified list of impaired waters on August 28, 2002. In addition, data from the St. Johns River Water Management District (SJRWMD) also demonstrated elevated nutrient and chl-*a* levels in the Sink. The ratio between TN and total phosphorus (TP) of less than 10 suggests that the phytoplankton community in the sink is nitrogen limited; therefore TN is the nutrient addressed in the TMDL.

A natural background TSI was determined using model inputs without anthropogenic influences for the Sink. The TSI methodology used in this TMDL is based on corresponding measurements of chl-*a*, TN and TP concentrations. This methodology is detailed in the *Northwest Florida District Water Quality 1996 305(b) Technical Appendix* (Hand et al., 1996). The Florida-specific TSI was determined based on the analysis of data from 313 Florida lakes. The index was adjusted so that a chl-*a* concentration of 20 µg/L equates to a TSI value of 60. A TSI of 60 was then set as the threshold for nutrient impairment for most lakes (for those with a color higher than 40 PCUs) because generally phytoplankton may switch to communities dominated by blue-

green algae at chl-*a* levels above 20 µg/L. These blue-green algae are often an unfavorable food source for zooplankton and many other aquatic animals. In addition, a TSI above the recommended 60 indicates excessive growth of phytoplankton is more likely and the subsequent death of excessive algae may consume large quantities of dissolved oxygen (DO) and result in anaerobic conditions in lakes. All of these conditions may adversely affect lake health and cause imbalance of native fauna and flora.

For this study, FDEP used modeling to estimate the natural background TSI by setting land uses to natural or forested land, and then comparing the resulting TSI with the IWR thresholds. The trophic status was determined through nutrient and chl-*a* concentrations taking into consideration the uniqueness of the sink system. The watershed model provided predictions for annual TN and TP concentrations in Alachua Sink over a variety of hydrologic conditions for the 2000–2004 period. Chlorophyll predictions were made and took into account the responsiveness of Alachua Lake and Sink to increased rainfall after prolonged dry periods. The calculated natural background TSI with point source discharges was 68.04 for the dry period and 65.86 for the wet period. The natural background TSI with no point source discharges was 67.87 for the dry period and 65.46 for the wet period. The corresponding chl-*a* concentrations in Alachua Sink for these conditions ranged from 20.5µg/l to 11.7µg/l and TN concentrations ranged from 1.31mg/L to 1.48mg/L. In contrast to FDEP's TSI threshold value, the site specific TSI for Alachua Sink is slightly higher and the associated chl-*a* values are slightly lower than what would be expected. When the natural background TSI is greater than the target TSI in the IWR, FDEP allows an increase of 5 TSI as an insignificant change while continuing to protect designated uses. In this case, the nutrient loadings under the TMDL should be those loads that result in a TSI of no more than 73.04 in dry periods and 70.86 in wet periods. The Department allocated loadings between point and nonpoint sources based on dry and wet year conditions, respectively, because the point sources are the dominant source of TN loading during dry-weather conditions, particularly during very low-flow conditions under which water quality based effluent limits for point sources are typically determined. TN loadings resulting in a TSI of 73.04 were modeled to determine the TMDL load for TN of 256,322 lbs/yr for Alachua Sink.

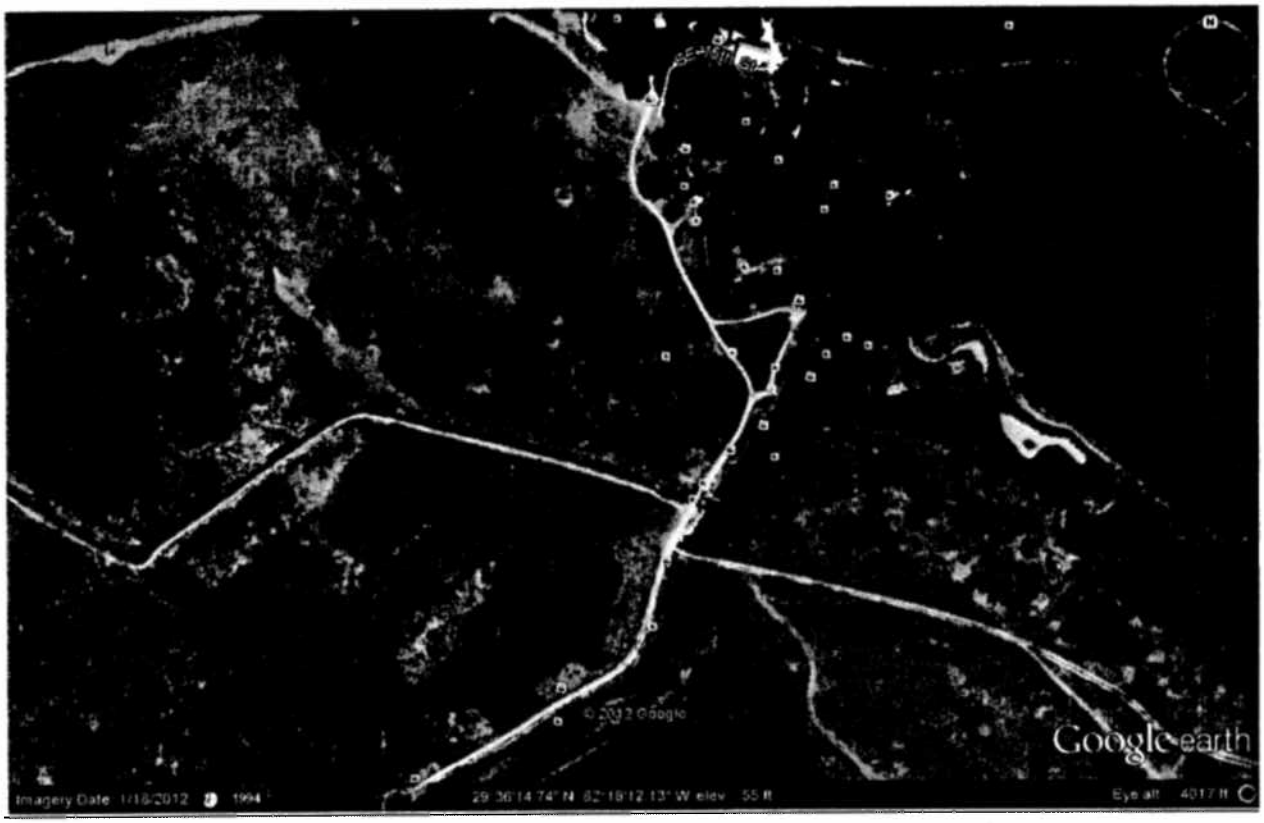
FDEP adopted the TN TMDL for Alachua Sink WBID 2720A of 256,322 lbs/yr as a long-term annual average, as identified in subsection 62-304.500(19), F.A.C.

Consideration of the TMDL load as a new or revised water quality standard

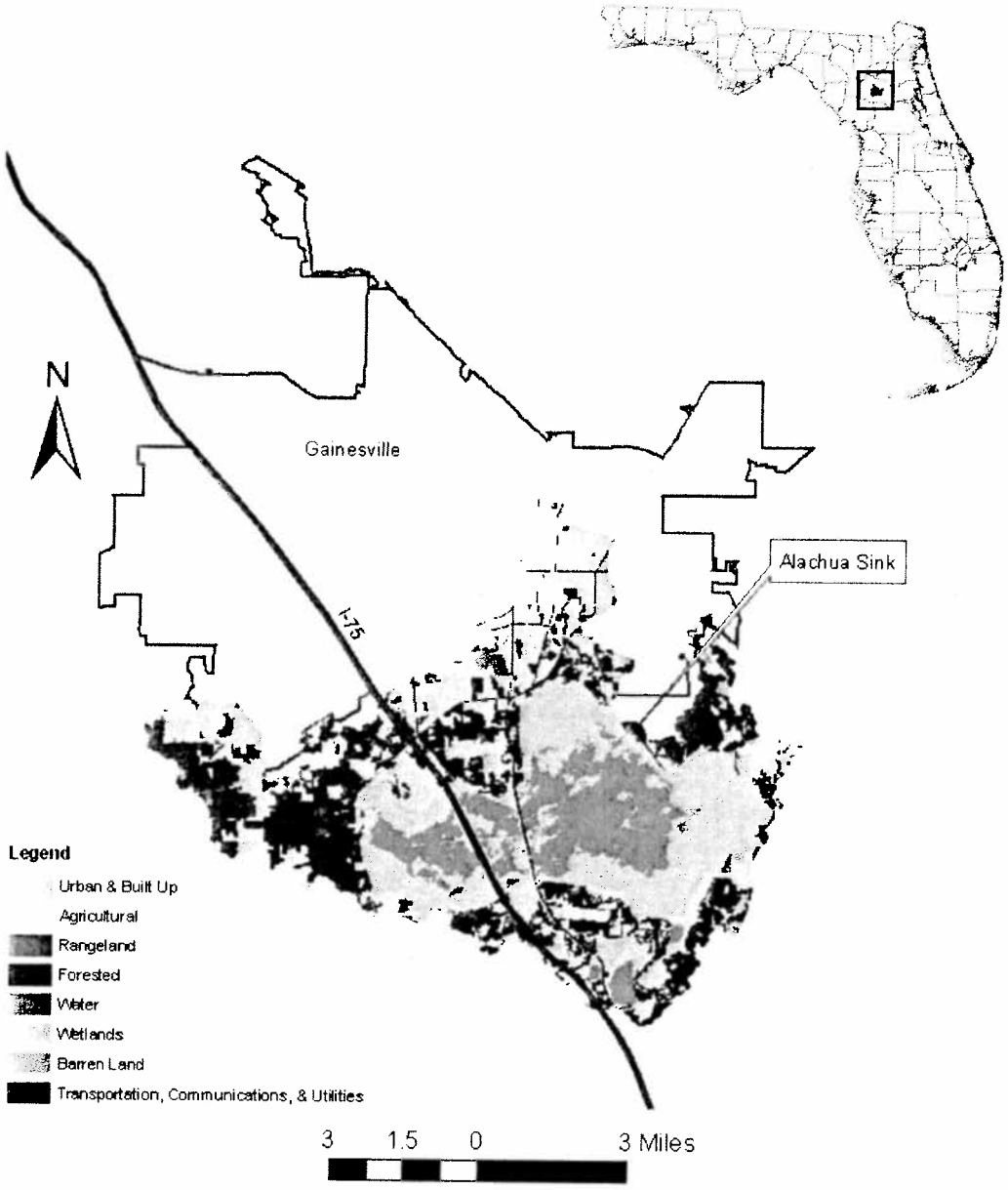
Alachua Sink was identified as impaired using an IWR methodology that considered chl-*a* levels, TSI scores, and nutrient concentrations. The modeled natural background TSI provided predictions for annual TN and chl-*a* concentrations in Alachua Sink over a variety of hydrologic conditions. The model information for the system and observed concentrations of TN and chl-*a* in the system supported this approach. The resulting calculated TSI of 73.04 for dry periods was selected to determine TN load reductions for point sources and the calculated TSI of 70.86 was used to determine reductions for nonpoint sources protective of water quality and associated waterbody uses of Alachua Sink. FDEP determined the natural background TSI and allowed an increase of 5 TSI units to represent the site specific TSI for the waterbody. The allowance of a 5 TSI unit increase is consistent with the IWR and is protective of designated uses.

Conclusion

Based on the chemical, physical and biological data presented in the development of the SSAC, the EPA concludes that the SSAC for TN established for Alachua Sink WBID 2720A protects healthy, well-balanced biological communities in the waters to which the SSAC applies and is consistent with the CWA and its implementing regulations. More specifically, the SSAC is consistent with both 40 C.F.R. 131.11(b)(1)(ii), and the EPA's 304(a) guidance on nutrient criteria. The TN SSAC for WBID 2720A, which is a TN loading of 256,322 lbs/yr as a long-term annual average, will protect water quality and aquatic life, in accordance with 40 CFR 131.10. In accordance with section 303(c) of the CWA, the site-specific water quality criterion for TN of 256,322 lbs/yr, not to be exceeded as a long-term annual average, for WBID 2720A is hereby approved.



Google Earth Image of Alachua sink, lake and a portion of Paynes Prairie to the south/southwest.



Land use map of the Alachua Sink, Paynes Prairie and southern portion of the city of Gainesville, FL.

Appendix 1 – Summary of the TMDL Background

Name(s) of Addressed Water(s) **Waterbody Type(s)** **WBIDs** **Latitude/Longitude**	Alachua Sink Sink/Lake 27290A latitude 29' 36' 18" N longitude 82' 18' 9" W
Description	Alachua Sink lies in a physiographic region of the state known as the Central Valley where sink formations are observed. The drainage basin for Alachua Sink is approximately 2,758 acres. There are two well-defined inflows into Alachua Sink: Sweetwater Branch and a culverted canal that connects Alachua Lake to Alachua Sink. These combined inflows drain an area of approximately 39,373 acres. Alachua Lake is the inundated portion of Paynes Prairie. It is presumed that any runoff coming into Paynes Prairie that does not sink into the ground is incorporated into Alachua Lake and some portion of that runoff is directed to Alachua Sink during high-water conditions. Major sources of flow to Paynes Prairie include Bivens Arm, Prairie Creek (connecting prairie to Newnans Lake), and Camps Canal.
Description of Watershed and Land Use Characterization	The watershed area that discharges to Alachua Sink through Sweetwater Branch appears to be influenced more by urban and residential land uses than the watershed area discharging through Alachua Lake. For the 4,087 acres that discharge into Sweetwater Branch, 2,615 acres are occupied by urban open and residential land uses, which account for 64% of the total watershed area. About 5,878 acres out of 35,286 acres of the watershed discharging into Alachua Lake is dominated by urban and residential land uses, which account for about 17% of total land uses.
Classification(s)	Alachua Sink is classified as a Class III freshwater body, with a designated use of recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife.
Basin	Ocklawaha Basin
Date Placed on Verified List	August 28, 2002
Date EPA approved TMDL	September 22, 2008
Reference Streams	None
Source of majority of flow	Alachua Sink receives surface water primarily from Sweetwater Branch, Alachua Lake, and the watershed area directly connecting to Alachua Sink. The majority of the surface water flowing into, or occurring in, Paynes Prairie drains through Alachua Sink. Major sources of flow to Paynes Prairie include Bivens Arm, Prairie Creek (connects prairie to Newnans Lake), and Camps Canal. Sweetwater Branch collects surface runoff from the Sweetwater Branch watershed and part of the Extension Ditch watershed (UED).

Indicators	In 2000-2002, the St. Johns River WMD determined the waterbody to be impaired based on an average TSI score of 78 with elevated nutrients/ chl-*a* identified as causes. During this time average annual TN, TP and chl-*a* were 4.33mg/l, 1.279mg/l and 40.8ug/l, respectively. Mean color was calculated as 106 PCUs.
Causative Pollutants	TN was determined to be the limiting nutrient for Alachua Sink based on phytoplankton communities. (TN/TP long term annual average ratio was less than 10.) The Alachua Sink TMDL addressed TN loadings only.
Total Nitrogen Load Reduction	The TMDL includes a wasteload allocation for FDEP National Pollutant Discharge Elimination System (NPDES) Wasterwater Permitting Program sources of 41,003 lbs/yr, a 45% reduction in point source loads of total nitrogen from Municipal Stormwater Permitting Program activities permitted under NPDES and a 45% reduction for nonpoint sources. It should be noted that the TMDL developed for Alachua Sink assumes that the Newnans Lake TMDL will be met. TN/TP TMDLs were adopted for Newnans Lake and limit the annual load of TN and TP to the lake to 85,470 lbs and 10,924 lbs, respectively.
TSI Target	'Natural background' plus 5 TSI units was used as the target for the TMDL development. In this case, the TN and TP loadings under the TMDL should be those loads that result in a TSI of no more than 73.04 in dry periods and 70.86 in wet periods. (Natural background was determined to be 65.48 and 68.04.) A TSI target of 60 is generally expected to meet the chl-*a* threshold of 20 ug/l; however individual TSIs and corresponding chlorophyll *a* levels can also be determined. (For additional chl-*a* information on this waterbody see table page 64 in the TMDL.) The Florida-specific TSI was determined based on the analysis of data from 313 Florida lakes. The index was adjusted so that a chl-*a* concentration of 20 µg/L was equal to a TSI value of 60. A TSI of 60 was then set as the threshold for nutrient impairment for most lakes (for those with a color higher than 40 PCUs) because generally, phytoplankton may switch to communities dominated by blue-green algae at chl-*a* levels above 20 µg/L. However, each lake is site specific and in this case a natural background TSI of 65/68 (wet/dry) plus 5 (70-73) was determined to be protective. Extrapolating from table 46 on page 64 of the TMDL, it is expected that the TN concentrations at the target TSI would be within EPA/DEP recommended levels of 1.27- 2.23 mg/l. See pages 56-69 and Appendix A of the TMDL for more detail on the TSI analysis.
Sources of Nutrient Enrichment	Of the total TN and TP loadings carried through these sub-basins, TN and TP loadings from the Main Street WWTP were the dominant components throughout the study period. For TN, the loadings contributed by the Main Street WWTP were 79,563, 104,925, 81,298,

	88,720, and 65,922 pounds per year in 2000, 2001, 2002, 2003 and 2004, respectively. This represents 78.5%, 79.9%, 70.0%, 75.2%, and 63.3% of the total TN loadings to Alachua Sink from its contributing watershed (excluding the contribution from Alachua Lake). Surface runoff from the watershed (Upper and Lower Sweetwater Branch, Extension Ditch, and Alachua Sink) contributed 21,035, 25,775, 33,843, 28,615, and 35,763 pounds of TN per year, which represents 21.5%, 20.1%, 30.0%, 24.8%, and 36.7% of the total TN loading in 2000, 2001, 2002, 2003, and 2004, respectively. TN and TP loadings from the other point source, the John R. Kelly Generating Station, are relatively insignificant and represent less than 2% of the total TN and TP loadings carried through Sweetwater Branch in the period of this analysis. Prairie Creek can represent a large source of TN and TP into Alachua Lake. Based on model simulations for 2003/2004, Prairie Creek contributed about 35% of the TP load to Alachua Lake and nearly 60% of the TN input. Note that in the absence of actual gauged inflow data, simulations for both years assumed that 41% of the annual Prairie Creek flow went to Paynes Prairie.