Total Maximum Daily Load for Total Phosphorus For Lake Apopka Lake and Orange Counties, Florida

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1.0 Introduction

1.1 Purpose of Report

This report presents a Total Maximum Daily Load (TMDL) for Total Phosphorus (TP) for Lake Apopka and describes the projected impact of proposed TP reductions on the concentration of dissolved oxygen and turbidity in the lake. Using the methodology to identify and verify water quality impairments described in Chapter 62-303, Florida Administrative Code, (Identification of Impaired Surface Waters or IWR), Lake Apopka, Gourd Neck Spring located in the southwest corner of the lake, and the Lake Apopka Outlet (Apopka-Beauclair Canal) were verified as impaired by nutrients, and were included on the verified list of impaired waters for the Ocklawaha Basin that was adopted by Secretarial Order on August 28, 2002. The TMDL process quantifies the amount of a pollutant that can be assimilated in a waterbody, identifies the sources of the pollutant, and recommends regulatory or other actions to be taken to achieve compliance with applicable water quality standards based on the relationship between pollution sources and in-stream water quality conditions.

Lake Apopka discharges to Lake Beauclair through the Apopka-Beauclair Canal, which was verified as impaired under the IWR for dissolved oxygen (DO) and BOD and included in the Secretarial Order. The reductions in TP needed to meet the TMDL for Lake Apopka are expected to address the DO impairment in the Apopka-Beauclair Canal.

1.2 Identification of Waterbody

Lake Apopka, located in central Florida approximately 15 miles northwest of Orlando is the headwater lake of the Harris chain of lakes and the Ocklawaha River (Figure 1). It has a drainage basin of approximately 119,773 acres and is the fourth largest lake in Florida. At a lake surface elevation of 66.5 ft National Geodetic Vertical Datum (NGVD), the lake has a surface area of approximately 12,500 ha (30,100 acres) and an average depth of 1.6 m (5.4 ft). The only surface outflow from the lake is through the Apopka-Beauclair Canal (dredged in the late 1800's for navigation and agricultural use). Discharge from the canal and lake is regulated by the Apopka-Beauclair Lock and Dam.

For assessment purposes, the watersheds within the Ocklawaha River Basin have been broken out into smaller watersheds, with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed. Lake Apopka had been assigned WBID 2835B in the assessment for the 1998 303(d), but the lake has been reassigned WBID 2835D. Lake Apopka Outlet (Apopka-Beauclair Canal) has been assigned WBID 2835A and Gourd Neck Spring has been assigned WBID 2835C.

2.0 Statement of Problem

The lake has undergone cultural eutrophication since the late 1800's, which accelerated in the 1940's when the 19,000 acre sawgrass marsh along the north end of the lake was diked, ditched, and drained for agriculture. Farming practices have used the lake as both a source of irrigation water and a reservoir for disposal of excess water.

The following text has been copied from the St. Johns River Water Management District's website for the Lake Apopka Restoration Project (http://sjr.state.fl.us/programs/acq_restoration/s_water/lapopka/project.html):

> "Lake Apopka is the headwater of the Ocklawaha River and the first lake of the Ocklawaha chain of lakes (Lakes Beauclair, Dora, Eustis, Harris, Griffin, and Yale). In 1895, the Apopka-Beauclair Canal was constructed. This canal links Lake Apopka to the rest of the chain.
>
> "Beginning in the 1920s, a series of external nutrient loadings, sewage from the town of Winter Garden, wastewater from citrus processing plants, and drainage waters from bordering muck farms, impinged on the lake. In 1947, a hurricane destroyed much of the lake's aquatic vegetation; one month later, the first of many recorded algae blooms occurred.
>
> "Until its decline in 1947, Lake Apopka was clear, densely vegetated, and nationally known for its sports fishery...Today, Lake Apopka is pea green in color from the continuous algal blooms. The lake experiences frequent fish kills and a general decline in environmental and economic value. Additionally, it is believed that Lake Apopka is contributing to the decline of water quality in lakes downstream."

As part of the 1985 Lake Apopka Restoration Act (LARA), the Florida Legislature established the Lake Apopka Restoration Council and set a goal of "restoring Lake Apopka to a Class III waterbody" (Chapter 85-148, Laws of Florida). This was followed by the 1987 Surface Water Improvement and Management (SWIM) Act, which also identified Lake Apopka as a priority waterbody in need of restoration.

As part of the resultant SWIM Program assessments of the lake, the St. Johns River Water Management District (SJRWMD) considered three methods to determine appropriate phosphorus, chlorophyll, and Secchi depth targets. The three methods included the use of reference lakes, empirical models, and input-output models. All of these methods relied upon information and/or relationships developed from long-term datasets or steady state conditions. Based upon this analysis, a phosphorus target of 55 ppb was recommended[1] (Lowe et al., 1999).

The Florida Legislature subsequently stated in 373.461(1)(a), Florida Statutes (FS), it's intent to enhance and accelerate the restoration process that was begun through the LARA and SWIM Acts. Section 373.461(3), FS, stated that if the SJRWMD did not adopt a rule establishing a phosphorus criterion for Lake Apopka by January 1997, the phosphorus criterion for the lake would be 55 ppb. It also required the SJRWMD to adopt by rule, discharge limitations for all permits issued by the district for discharges

[1] Table 5 in the Lowe et al. document summarized results and most probable ranges for the trophic state variables.

into Lake Apopka, the Lake Level Canal, and the McDonald Canal. The SJRWMD adopted the phosphorus criterion as part of the Applicant's Handbook: Management and Storage of Surface Waters (Section 11.7) prior to the January 1997 deadline.

The lake and several adjacent water bodies were listed as impaired in Florida's 1998 303(d) list of impaired waters. Lake Apopka was listed as impaired for nutrients [listed as Water Body ID (WBID) 2835B on 1998 list, now WBID 2835D]. Gourd Neck Spring (WBID 2835C) located at the southwest corner of Lake Apopka was also on the 1998 303(d) list for nutrients. The outlet from the lake, Lake Apopka Outlet (Beauclair Canal, WBID 2835A) was listed in 1998 for dissolved oxygen, nutrients, turbidity, total suspended solids, biochemical oxygen demand, and un-ionized ammonia. And finally, Apopka Marsh (WBID 2856) located on the northeastern shore of the lake was on the 1998 303(d) list for dissolved oxygen, nutrients, turbidity, and un-ionized ammonia. Figure 2 illustrates the location of each of these segments within the Apopka Basin. The Apopka Basin is part of the Ocklawaha Basin and falls within the eight-digit United States Geological Survey hydrologic unit code 03080102.

While the 2002 assessment verified the impairment for the above waters and parameters, the assessment also indicated that Lake Apopka Outlet met standards for turbidity, total suspended solids, and un-ionized ammonia, and these parameters were proposed for delisting as part of the 2002 update submitted to EPA. The Apopka Marsh WBID was also proposed to be delisted because it is a marsh treatment system for the lake that was constructed on muck farms purchased over the 1988-1992 period. Turbidity was not identified as a parameter of concern in the 1998 303(d) list for Lake Apopka, however it was placed upon the planning list for Lake Apopka following the 2002 assessment methodology. This was based upon the number of valuesgreater than 29 NTU's. Based upon the criteria, it would be necessary to determine appropriate natural background conditions for comparison before an actual turbidity impairment was verified.

Plots of key water quality parameters over the 1989 – 2002 period for Lake Apopka, Gourd Neck Spring, and the Apopka-Beauclair Canal indicate that water quality has fluctuated over this period, but that the ranges for some parameters have decreased over time (Figures 3[2] through 8[3]). Table 1 summarizes DO, turbidity, and Chlorophyll a or Trophic State Index (TSI) annual averages used to assess these waters under the IWR. Statistical summaries of key water quality parameters are presented for the three WBIDs in Table 2.

In recent years, additional attention has been focused on blue-green algal (cyanobacteria) blooms in Florida lakes. Burns, et al. (2001) reported the presence of *Microcystis sp.* in samples collected in Lake Apopka during the summer of 1999. Measurable levels of microcystins (a cyanotoxin) were also reported in some samples. Although *Cylindrospermopsis sp.* was not identified in the lake, it was present in lakes of the Upper Ocklawaha River Basin. The *Cylindrospermopsis* genera represents a filamentous bloom-forming cyanobacteria that can fix nitrogen from the atmosphere. The *Microcystis* genera is a non-filamentous bloom-forming cyanobacteria that has not

[2] . Figures 3-5 present water quality information on an annual basis and suggests some reduction in ranges for some parameters over time along with cycles that may be related to climate,.
[3] Figures 6-8 presents the individual observations over time and includes trendlines. Although the r^2 values were low, slopes for many of the WQ parameters were negative, suggesting improving water quality with tim4.

been demonstrated to have the ability to fix nitrogen. The SJRWMD has contributed funds to the Lake County Water Authority (LCWA) which has funded a monitoring program that measures cyanobacteria abundance and microcystin levels in lakes in the UORB, including Lake Apopka. Results of the monitoring to date are shown in Figures 9 and 10 (provided by Mr. Mike Perry, personal communication of the LCWA). Figure 10 indicates that microcystin levels peaked in August 2002 at 0.6 ug/l but have remained below the World health Institute threshold for drinking water.

3.0 Description of the Applicable Water Quality Standards and Numeric Water Quality Target

Lake Apopka, Gourd Neck Spring, and the Apopka-Beauclair Canal are Class III waterbodies with designated uses of recreation, propagation and maintenance of a healthy, well balanced population of fish and wildlife. Class III water quality criteria applicable to the observed impairment include a minimum DO of 5.0 mg/l, and the narrative nutrient criterion (nutrient concentrations of a body of water shall not be altered so as to cause an imbalance in natural populations of aquatic flora or fauna). Because the nutrient criterion is narrative only, a nutrient related target was needed to represent levels at which imbalance in flora or fauna are expected to occur. In this case, the TP target developed and adopted for the lake by the SJRWMD (55 ppb) as a rule was used as the TP target.

It should be noted that the IWR provides a threshold of impairment for nutrients in lakes based on a Trophic State Index (TSI). While the IWR thresholds were not used as the water quality target for this TMDL (they are not water quality criteria), resultant changes in the TSI for the lake are included in the document to demonstrate that reductions in TP would be expected to result in decreases in lake chlorophyll a levels that would be consistent with a nonimpaired lake.

Reductions in TP loading are also expected to result in additional benefits with respect to other parameters of concern, including dissolved oxygen, un-ionized ammonia, turbidity, and total suspended solids. Reductions in phosphorus will result in lower algal biomass levels in the lake, and lower algal biomass levels will mean smaller diurnal fluctuations in dissolved oxygen, less algal based total suspended solids and turbidity, and lower pH levels in the lake.

The expectation that reductions in phosphorus loading will provide improvements in other parameters is supported by statistical evaluation of the Lake Apopka data. Based on Pearson correlation coefficients (Table 3) for the Lake Apopka data set, total phosphorus is positively correlated with BOD_5, turbidity (TURB), total suspended solids (TSS), corrected chlorophyll a (Chlac), uncorrected chlorophyll a (Chla) ammonia (NH_4) , un-ionized ammonia ($UNNH_4$), total Kjeldahl nitrogen (TKN), nitrate (NO_3),total organic carbon (TOC), and TN. The correlation was negative between dissolved oxygen and total phosphorus in the Lake Apopka data set. The simple linear regressions of total phosphorus versus BOD, corrected chlorophyll a, uncorrected chlorophyll a, ammonia, nitrate, total Kjeldahl nitrogen, total nitrogen, total organic carbon, total suspended solids, turbidity, and un-ionized ammonia were significant at an alpha level of 0.05.

Proposed reductions in phosphorus will also result in a smaller input of nitrogen from nitrogen fixation by cyanobacteria that gets recycled in the lake through processes such as grazing and settling. In addition, additional treatment in the watershed to achieve the required phosphorus reduction will also result in additional nitrogen removal. Fulton et al.'s (2003) summary of 13 storm water treatment systems in Florida suggested a mean treatment efficiency of 42% for nitrogen. Those same treatment systems had a mean treatment efficiency of 63% for phosphorus.

Both the PLRG and this TMDL establish the allowable load for phosphorus only, and not nitrogen. Fulton et al. (2003) reported that ratios of nitrogen to phosphorus in the UORB suggest that algal production is potentially limited by phosphorus availability, except in lakes where excessive phosphorus loading has led to potential nitrogen or co-limitation. Total nitrogen to total phosphorus values less than 10 indicate nitrogen limitation, while ratios greater than 30 indicate phosphorus limitation. Figure 11 illustrates that this ratio for measurements in Lake Apopka over the 1989 – 2002 period indicate co-limitation of nitrogen and phosphorus and some phosphorus limitation. Measurements of nitrogen and phosphorus from agricultural pump sites around the northern portion of the lake reflect elevated concentrations of both nitrogen and phosphorus with TN/TP ratios in the range of nitrogen or co-limitation (Table 4).

Loehr et al. (1980) point out that due to the ability of various cyanobacterial species to fix gaseous nitrogen, it is very difficult to control eutrophication problems in freshwater systems through limitations on nitrogen input. They indicate that phosphorus inputs must be lowered to the point where phosphorus replaces nitrogen as the limiting factor, and then further reduced so that the growth and yield of algal forms is reduced.

Whitton and Potts (2000) cite a study by Sas (1989) where phytoplankton and cyanobacterial components responded to phosphorus reduction in four stages:

- Stage 1: no biomass reduction because phosphorus is in excess of algal requirements
- Stage 2: declining amount of unused phosphorus results in a small reduction in Algal biomass
- Stage 3: phytoplankton biomass falls, with minimal unused phosphorus remaining
- Stage 4: further decline in biomass and changes in composition of the phytoplankton.

4.0 Assessment of Sources

4.1 Types of Sources

An important part of the TMDL analysis is the identification of source categories, source subcategories, or individual sources of phosphorus in the watershed and the amount of pollutant loading contributed by each of these sources. Sources are broadly classified as either "point sources" or "nonpoint sources." Historically, the term point sources has meant discharges to surface waters that typically have a continuous flow via a discernable, confined, and discrete conveyance, such as a pipe. Domestic and industrial wastewater treatment facilities (WWTFs) are examples of traditional point sources. In contrast, the term "nonpoint sources" was used to describe intermittent, rainfall driven, diffuse sources of pollution associated with everyday human activities, including runoff from urban land uses, runoff from agriculture, runoff from silviculture, runoff from mining, discharges from failing septic systems, and atmospheric deposition.

However, the 1987 amendments to the Clean Water Act redefined certain nonpoint sources of pollution as point sources subject to regulation under EPA's National Pollutant Discharge Elimination Program (NPDES). These nonpoint sources included certain urban stormwater discharges, including those from local government master drainage systems, construction sites over five acres, and from a wide variety of industries (see Appendix A for background information about the State and Federal Stormwater Programs).

To be consistent with Clean Water Act definitions, the term "point source" will be used to describe traditional point sources (such as domestic and industrial wastewater discharges) AND stormwater systems requiring an NPDES stormwater permit when allocating pollutant load reductions required by a TMDL (see Section 6). However, the methodologies used to estimate nonpoint source loads do not distinguish between NPDES stormwater discharges and non-NPDES stormwater discharges, and as such, this source assessment section does not make any distinction between the two types of stormwater.

4.2 Source Assessment

To determine the annual P mass loading to the lake, Stites et al. (2001) evaluated phosphorus sources and summarized the 1990 land use in the Lake Apopka basin. The main land uses in the basin are agriculture (45 percent) and water (28 percent). Other land uses in the basin include urban and built up (10 percent), wetlands (8 percent) and "other", which included rangeland, upland forests, barren land, transportation, communication, and utilities (6 percent). Figure 12 illustrates major land use categories within the Lake Apopka Basin.

The external phosphorus budget for Lake Apopka (Stites et al., 2001) considered the following sources: atmospheric deposition, stormwater runoff, Apopka Spring, lateral seepage, Winter Garden WWTF, Scotts Hyponex Peat Mine, tributary inflows, and farm discharge pumps. Sinks in the phosphorus budget included: outflow through Apopka-Beauclair Canal, lateral seepage, deep seepage through the lake bottom, and discharges from the lake to farmlands. Based upon the average from annual budgets calculated for the 1989 – 1994 period, sources contributed 62.37 metric tons (MT) of phosphorus to the lake and sinks lost 10.98 MT for an overall annual net load of 51.39 MT.

Among the sources, farm pumps contributed 53.08 MT (over 85% of total source load), followed by atmospheric deposition at 5.03 MT (8 % of total source load), tributaries at 1.45 MT (2.3% of total source load), and Apopka Spring at 1.00 MT (1.6 % of total source load). The Scotts Hyponex Peat Mine contributed 0.36 MT (0.6% of total source load) of phosphorus to the lake. Since completion of the phosphorus budget, the Scotts Hyponex Peat Mine ceased operation (around 2000). The Winter Garden WWTF contributed 0.28 MT (0.4% of total source load) of phosphorus to the lake.

5.0 Loading Capacity – Linking Water Quality and Pollutant Sources

Once the phosphorus criterion of 55 ppb was established for the lake, the next step was to establish the PLRG for the lake, the phosphorus loading that would achieve the target concentration.

As described by Coveney (2000), the SJRWMD used the steady-state formulation of Vollenweider's 1969 input-output model to determine the allowable phosphorus loading for the lake. The Vollenweider model can be expressed in the form:

$$P = W/(Q + \sigma V)$$

where P = steady-state P concentration; W = annual P mass loading
Q = annual water outflow volume; V = lake volume
σ = net sedimentation coefficient for P.

Coveney (2000) describes how long-term average values for Q, V, and σ were determined for the lake. The total annual outflow represented the sum of discharge to the Apopka-Beaclair Canal, seepage losses, and consumptive use of lake water and totaled 8.10×10^7 m^3. The 30 year mean value for the Apopka-Beauclair Canal discharge was 7.05×10^7 m^3 (water years 1959-1988, USGS).

Seepage outflow was estimated at 0.5×10^7 m^3 (Stites et al., 2000). Consumptive use was estimated to be 0.55×10^7 m^3. The lake volume was set at 2.04×10^8 m^3, which is based upon a long-term mean lake stage of 66.5 ft NGVD. Coveney (2000) describes a time weighted approach to calculate a long-term net sedimentation rate of 1.019 yr^{-1}.

Substitution of these values into the Vollenweider equation along with the phosphorus criterion of 55 ppb, yields an annual phosphorus mass loading of 15.9×10^6 gP (15.9 Metric Tons) that represented the maximum total loading from all sources that would not result in an exceedance of the phosphorus criterion.

6.0 Critical Conditions

Stites et al. (2001) described the methodology used to develop an external phosphorus budget over the January 1989 through December 1994 period. Using the six-year averages from this phosphorus budget to determine an allowable phosphorus annual load captures a variety of rainfall and flow related "critical conditions," Over this period, rainfall varied between approximately 35.1 and 55.5 inches (mean $\cong$ 42.5 inches, standard deviation $\cong$ 7.6 inches) compared to a historic average of 50 inches. This variability was also reflected in the phosphorus budget in the farm pump and rainfall loadings. Annual contributions from atmospheric deposition varied between 2.67 and 8.95 MT (mean = 5.03 MT and standard deviation = 2.33 MT). Annual Muck Farm pumped contributions varied between 17.26 and 113.67 MT (mean = 53.8 MT and standard deviation = 33.0 MT).

The TMDL was based on long-term average conditions rather than critical/seasonal conditions because a) the methodology used to determine the assimilative capacity does not lend itself very well to short-term assessments, and b) we are generally more concerned with the net change in overall primary productivity, which is better addressed on an annual basis. In addition, annual average conditions are appropriate because the average detention time for the lake is 2.5 years which provides some "buffering" or moderating capability for the lake to respond to short-term loading fluctuations. Finally, application of the steady state Vollenweider equation was based upon long-term averages.

7.0 Determination of TMDL

A TMDL can be expressed as the sum of all point source loads (Waste Load Allocations), nonpoint source loads (Load Allocations), and an appropriate margin of safety (MOS), which takes into account any uncertainty concerning the relationship between effluent limitations and water quality:

$$TMDL = \Sigma\ WLAs + \Sigma\ LAs + MOS$$

The objective of a TMDL is to allocate loads among all of the known pollutant sources throughout a watershed so that appropriate control measures can be implemented and water quality standards achieved. Federal regulations [40 CFR §130.2 (i)] states that TMDLs can be expressed in terms of mass per time (e.g. pounds per day), toxicity, or other appropriate measure. TMDLs for Lake Apopka are expressed in terms of pounds per year, and represent the maximum annual load the lake can assimilate and maintain the narrative nutrient criterion (Table 5). The TMDL includes the atmospheric contribution (5.03 MT/yr), which would be part of the LA. The TMDLs are also expressed in terms of the percent reduction required to achieve water quality criteria.

Table 5. TMDL Components

WBID	WLA (MT/yr)	Parameter	LA (MT/yr)	MOS	TMDL (MT/yr)	Percent Reduction[1]
2835D	1.21`	**Total Phosphorus**	14.16	0.53 and implicit	15.9	75.6

[1] Note that this percent reduction was based upon the total annual average load which included atmospheric contributions.

7.1 Load Allocations (LAs)

To determine an equitable allocation of the TMDL, the Department followed guidance in the document "A Report to the Governor and the Legislature on the Allocation of Total Maximum Daily Loads in Florida." (DEP, 2001). This report recommends a 3-step allocation process that first focuses on reductions in nonpoint sources in steps 1 and 2 and then requires reductions in all controllable sources in step 3. However, the report acknowledges that the Department should use Best Professional Judgement (BPJ) when allocating loads, and the Department ultimately decided to maintain the source reductions of the PLRG rather than reallocate loads because a) it would maintain the implementation plan for the PLRG, b) the PLRG reductions were focused on nonpoint sources, as envisioned in the report, and c) additional reductions are not warranted at the only NPDES permitted source (the Winter Garden WWTF) in the basin.

Load Allocations

Source	Existing P Loading ($MT\ yr^{-1}$)	Allowable P Loading ($MT\ yr^{-1}$)
Atmospheric Deposition	5.03	5.03
Apopka Springs	1.00	1.00
Seepage	0.55	0.55
Direct Run-Off	0.60	0.60
Tributaries	1.45	1.45
North Shore Restoration Area	53.08	5.53
TOTAL	**61.71**	**14.16**

It should be noted that significant reductions in nitrogen loading to the lake will be realized as a result of measures implemented to meet the LA for the North Shore Restoration Area. Nitrogen concentrations from agricultural pump sites (Table 4) averaged between 5.12 and 9.88 mg/l. One of the goals of the restoration is to minimize runoff from this area into the lake. This would also reduce the total suspended solids loading and corresponding turbidity.

It should also be noted that the LA includes loading from stormwater discharges regulated by the Department and the Water Management Districts that are not part of the NPDES Stormwater Program (see Appendix A).

7.2 Wasteload Allocations (WLAs)

Winter Garden WWTF (Permit number FL0020109) is the only NPDES permitted facility with discharge to Lake Apopka. The facility already provides advanced treatment for Total Phosphorus (effluent limit of 0.5 mg/l), is reducing loadings further via reuse, and is a small percentage of the total loading (0.4% of existing loading, without considering reuse) to the lake.

Both the exiting and the allowable phosphorus loading rates for the Winter Garden WWTF were based upon maximum loading allowed under the current NPDES permit. The load was calculated by multiplying the permitted annual average flow (2 MGD) by the permitted annual average phosphorus limit of 0.5 mg/l, which yielded 3.78 kg/day. Over the 5/1/97 – 4/30/2002 period, the annual average flow was 0.98 MGD, the phosphorus concentration was 0.17 mg/l, and the daily discharge averaged 0.66 kg/day, which is only 17.5 percent of the permitted load (data from PCS).

The NPDES permit for the Winter Garden WWTF incorporates requirements for the facility to provide reuse water to the Cities of Apopka and Ocoee. At present up to 250,000 gallons per day from the WWTF is proposed for reuse. Implementation of this level of reuse with the permitted annual average phosphorus limit would reduce the allowable annual phosphorus load from 1.38 MT to 1.21 MT (12.5% reduction).

Based upon the 2000 census, many counties and municipalities in Florida are now required to submit Municipal Separate Sewer and Storm water System (MS4) permits under “Phase II” of the NPDES Stormwater Program. EPA guidance specifies that MS4 permits would fall under the WLA and be allocated a percentage reduction of the load. The Lake Apopka Basin includes portions of both Orange and Lake Counties. The source assessment, however, has shown that the north shore restoration area (previously muck farms) represents 86 percent of the existing load to the lake and would not be part of a MS4 program operated by a county or municipality. Another 8 percent of the existing load comes from atmospheric deposition, also not addressed through an MS4 program. Consequently, the WLA does not include an explicit load or percent reduction for possible MS4 programs within the Lake Apopka Basin.

Unlike many states, however, a wide variety of nonpoint source management programs have been implemented in Florida to reduce nonpoint source pollution. Florida was the first state in the country to require the treatment of stormwater from all new development with the adoption of the Stormwater Rule in 1981. The SJRWMD recently adopted revisions to Chapters 40C-4 (environmental resource permits: surface water management systems), 40C-40 (standard general environmental resource permits), and 40C-44 (environmental resource permits: agricultural surface water management system) for the Lake Apopka Basin to ensure that post-development phosphorus loads are less than or equal to pre-development phosphorus loads (Appendix B). Technical support for the type and level of additional stormwater treatment required in the Lake Apopka Basin is described by Harper and Baker (2001).

Wasteload Allocations

Source	Existing P Loading ($MT\ yr^{-1}$)	Allowable P Loading ($MT\ yr^{-1}$)
Winter Garden WWTF	1.38	1.21
TOTAL	**1.38**	**1.21**

7.3 Relationship between Lake Apopka and Lake Beauclair TMDLs

The proposed TMDL for Lake Beauclair estimated that discharge from Lake Apopka via the Apopka-Beauclair Canal currently contributes approximately 93 percent of the total annual phosphorus load for Lake Beauclair. Reductions in phosphorus loading to and from Lake Apopka as a result of this TMDL will also become a significant factor in how the TMDL for Lake Beauclair is met.

7.4 Margin of Safety (MOS)

Both an explicit and an implicit margin of safety (MOS) have been incorporated into this TMDL. The implicit MOS was incorporated through the use of long-term average values in the Vollenweider model application for Lake Apopka to establish an allowable annual phosphorus load for a system that has a mean retention time of 2.5 years. Assumption of either a larger lake volume or a higher sedimentation rate from short-term calculations would have resulted in a higher allowable phosphorus load. Under below average rainfall years, there are smaller discharges from the farms and contributions from tributaries.

The allowable load was partitioned among sources incorporating six year average phosphorus loads from all sources except the North Shore Restoration Area and the Winter Garden WWTF. As noted in section 7, the allowable loading from the Winter Garden WWTF assumed that the facility was operating at the maximum permitted limits in its NPDES permit. Discharge monitoring reports indicate that the current discharge is well below it's permitted phosphorus load.

There is also an explicit margin of safety of 0.53 MT. The difference of 0.36 MT between the allowable load of 15.9 MT and the sum of the LAs (6.58 MT) and WLAs (8.96 MT) represents the earlier contribution from the Scotts Hyponex Peat Mine that ceased operation in 2000 plus the 0.17 MT from implementation of reuse requirements in the Winter Garden WWTF.

8.0 Seasonal Variation

As discussed in section 4, an annual period was considered more appropriate based upon the hydraulic detention time of the lake and use of long-term averages for terms in the Vollenweider equation..

Since DO is a gas, its saturation level is a function of water temperature and salinity. Increased water temperatures and/or salinities reduce the amount of oxygen that can remain in solution. Salinity is not a factor in Lake Apopka or the Apopka-Beauclair Canal. Consequently, summer and early fall would represent periods of highest water temperature where DO saturation and DO would be expected to be lower. Algal production during these periods can increase oxygen levels during the day however; the increased respiration will result in lower levels at night and the possibility of large diurnal fluctuations. Reductions in the algal biomass will reduce these fluctuations.

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Figure 1. Lake Apopka and Upper Chain of Lakes

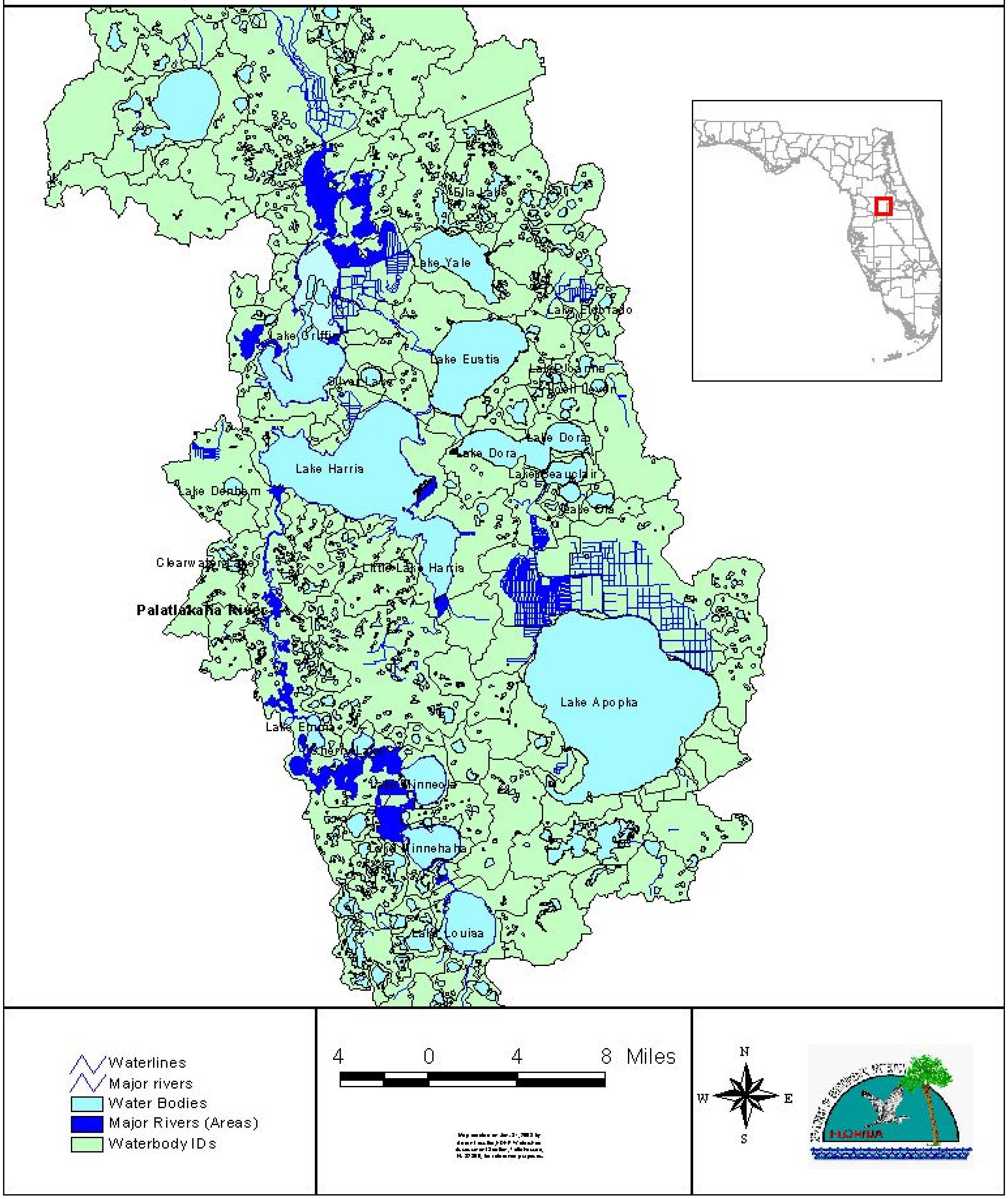


Figure 2. Lake Apopka Basin

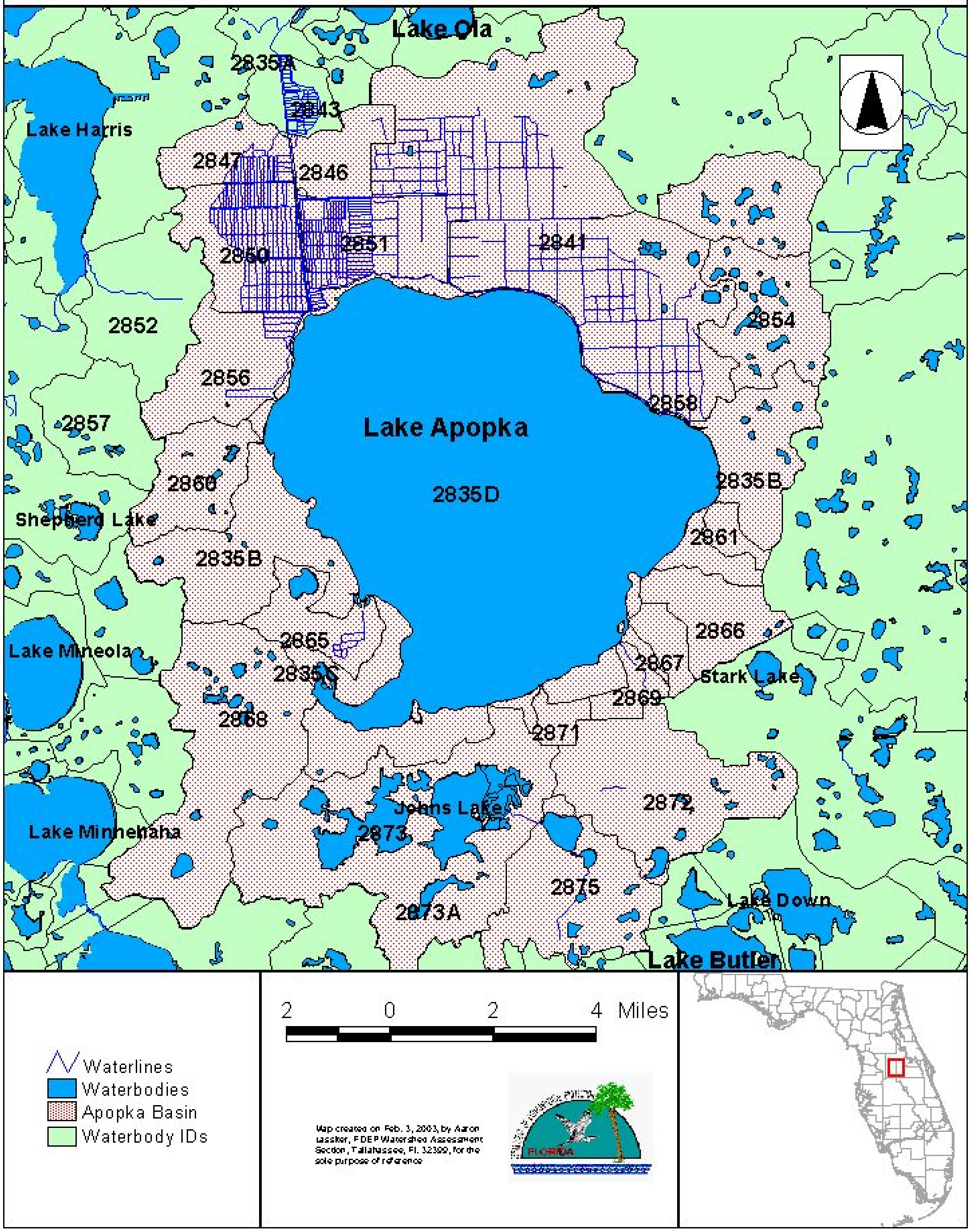


Figure 3a. Boxplots of Apopka-Beauclair Canal (WBID 2835A) water quality data over the 1989-2002 period.

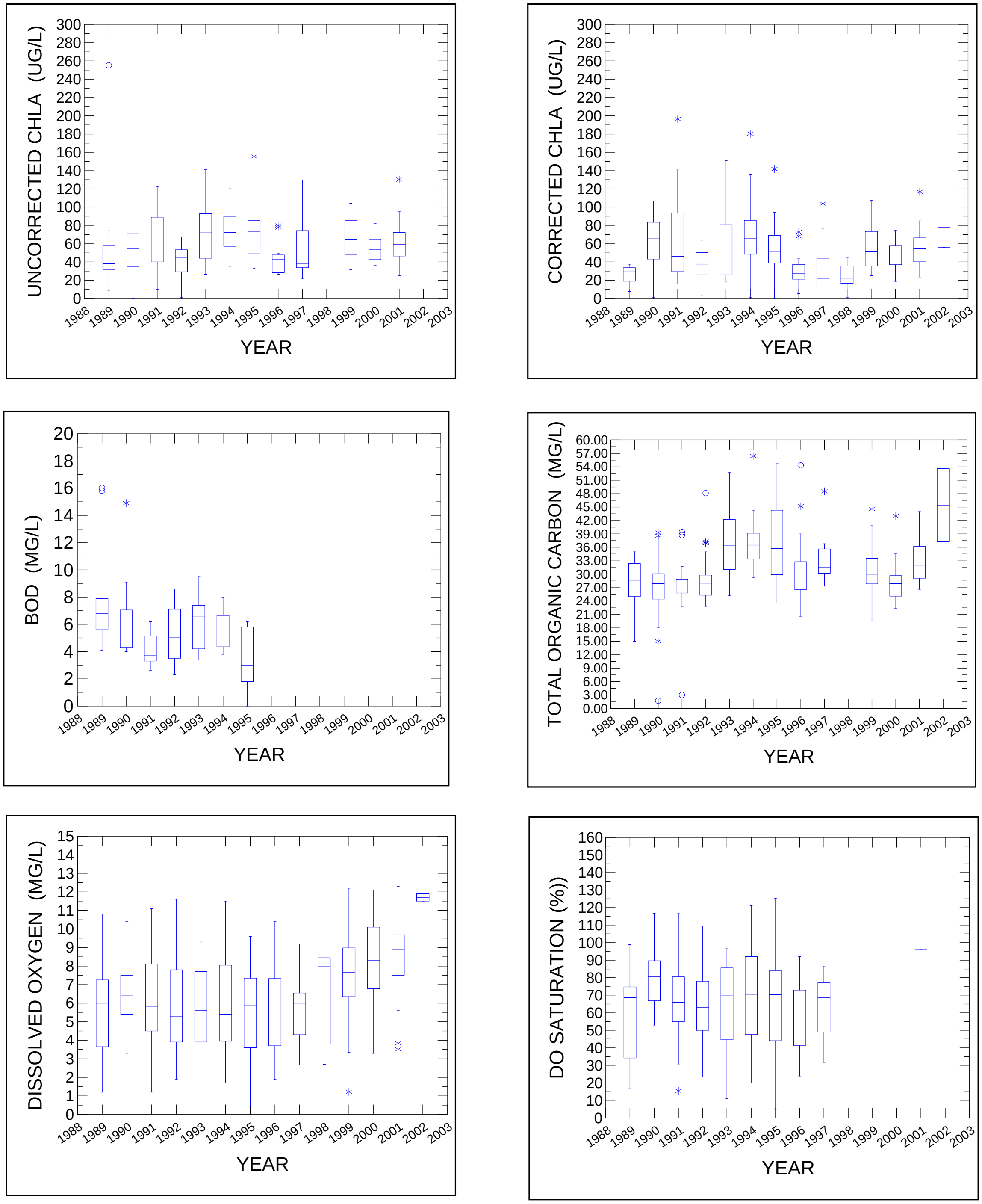


Figure 3b. Boxplots of Apopka-Beauclair Canal (WBID 2835A) water quality data over the 1989-2002 period.

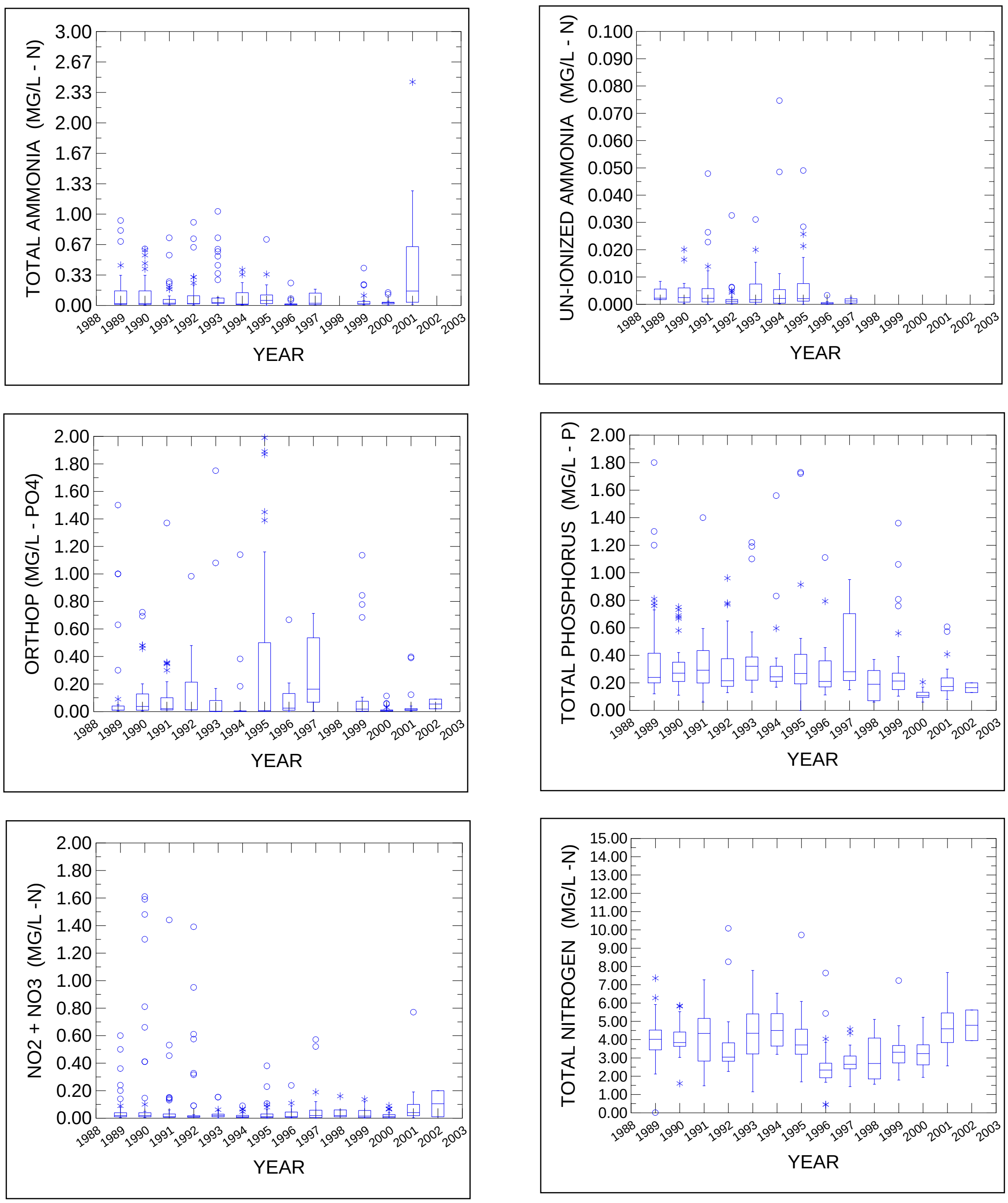


Figure 3c. Boxplots of Apopka-Beauclair Canal (WBID 2835A) water quality data over the 1989-2002 period.

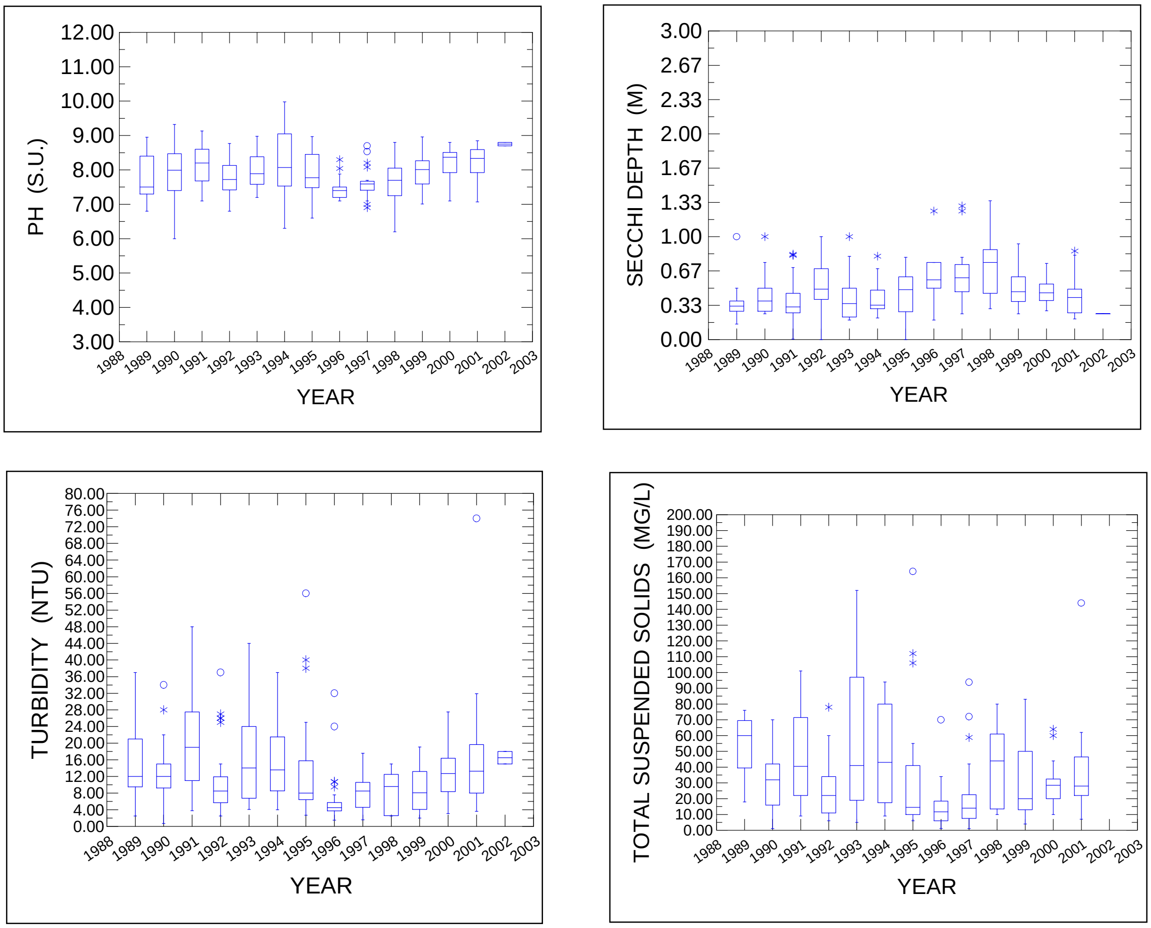
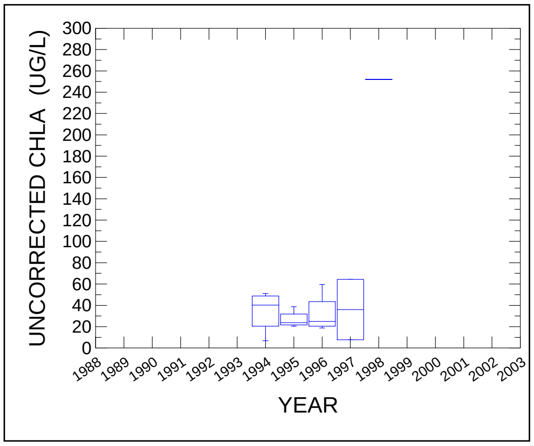
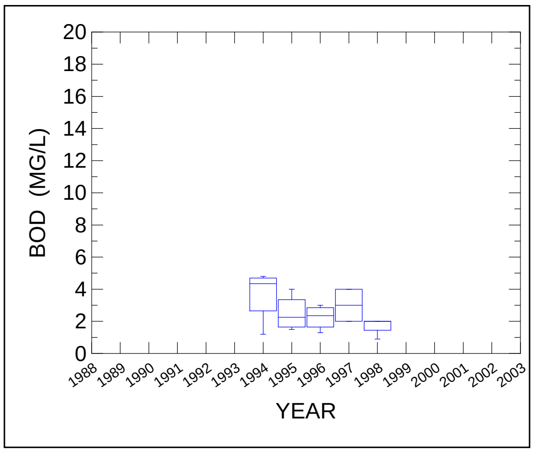
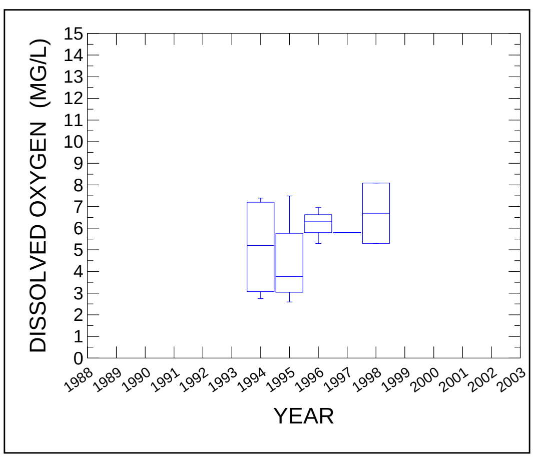


Figure 4a. Boxplots of Gourd Neck Spring (WBID 2835C) water quality data over the 1989-2002 period.







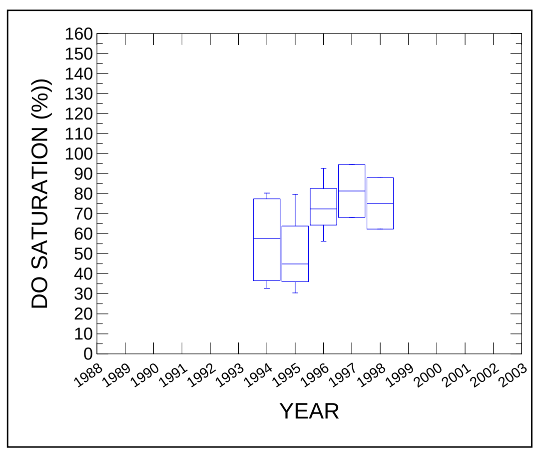
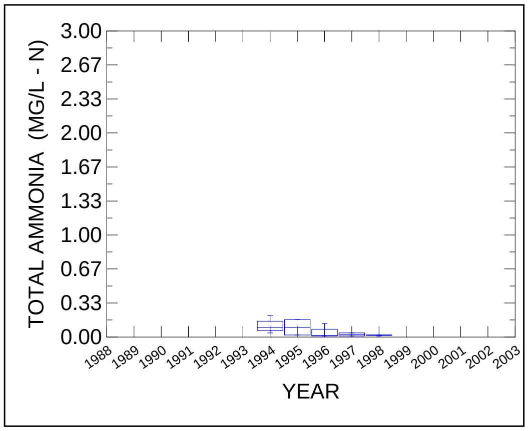
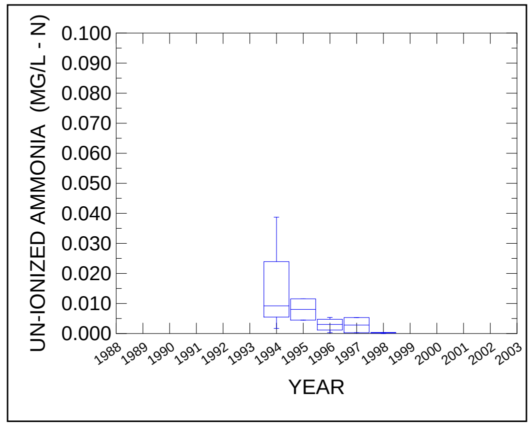
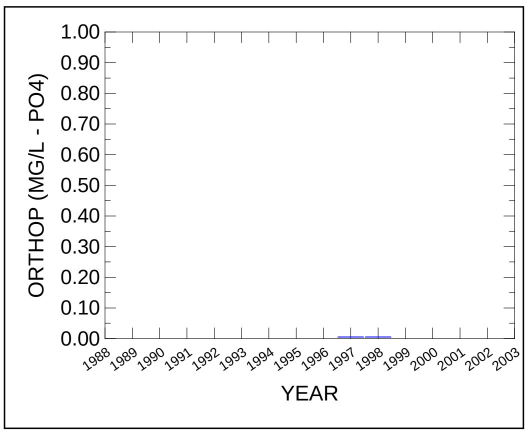
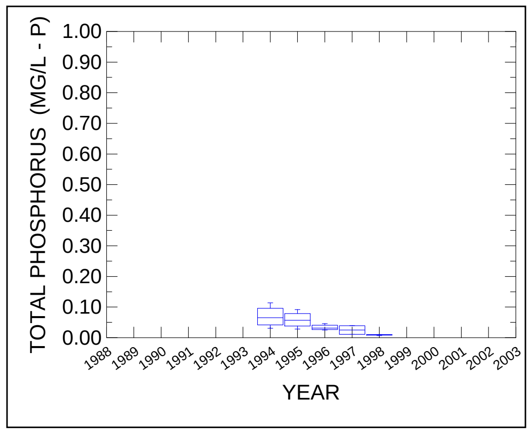


Figure 4b. Boxplots of Gourd Neck Spring (WBID 2835C) water quality data over the 1989-2002 period.









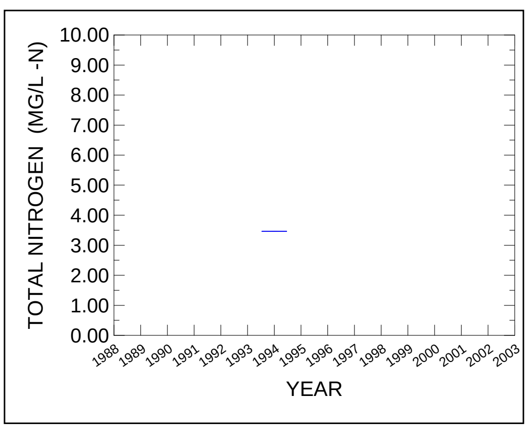
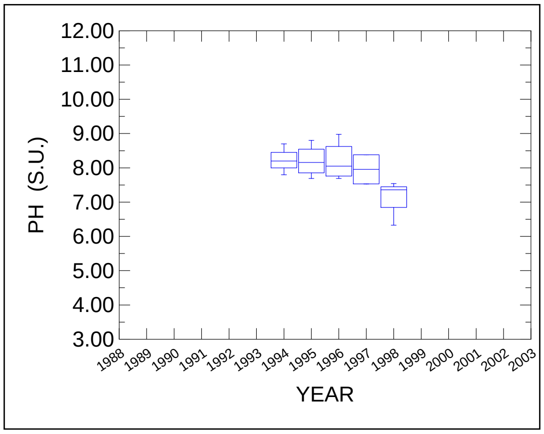
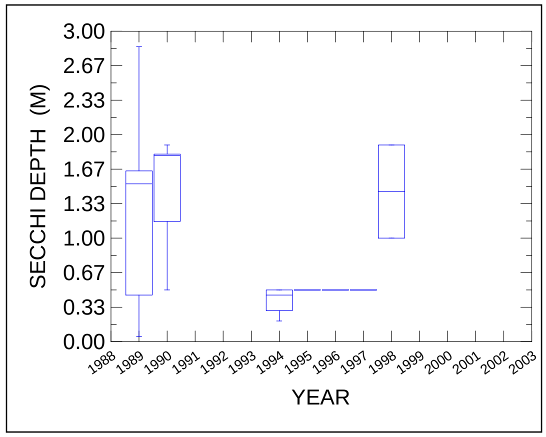
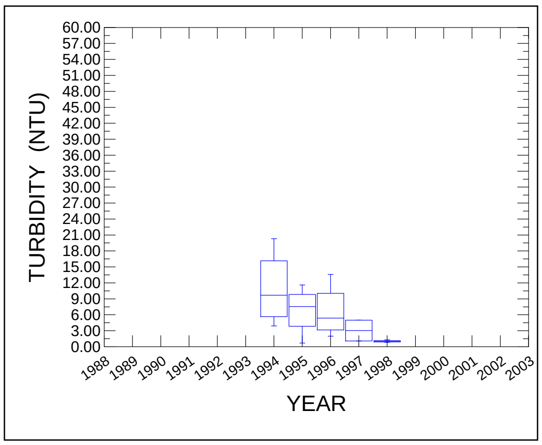


Figure 4c. Boxplots of Gourd Neck Spring (WBID 2835C) water quality data over the 1989-2002 period.







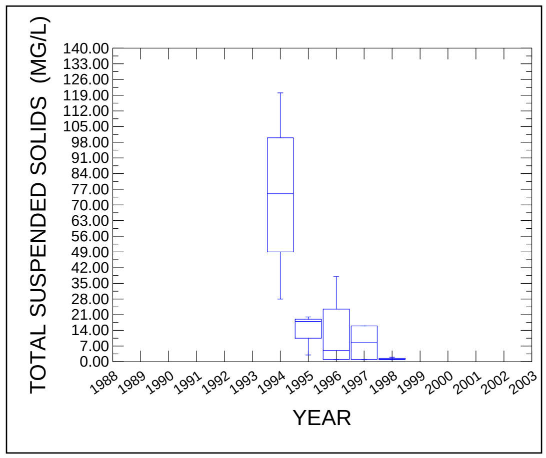
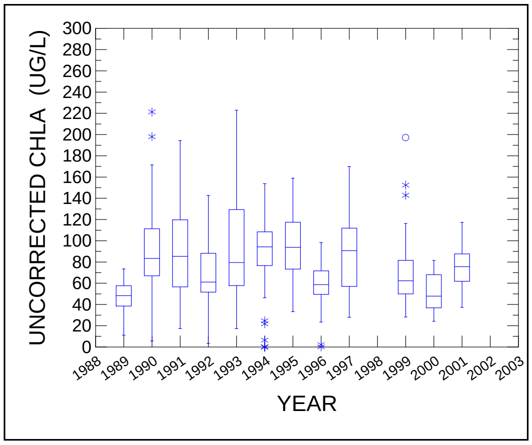
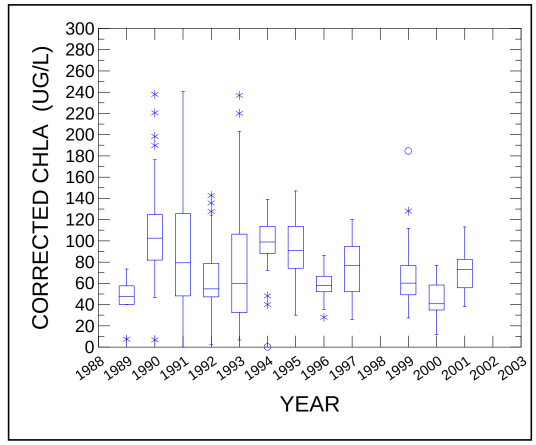
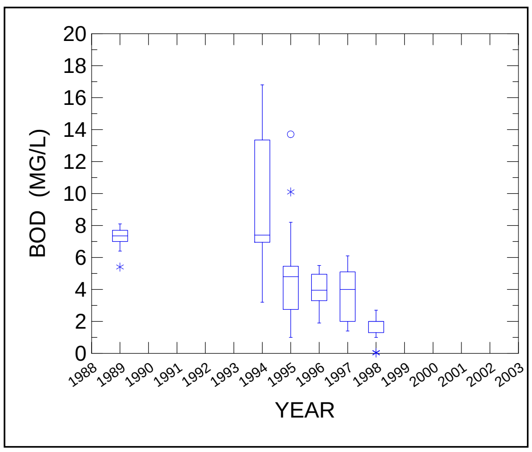
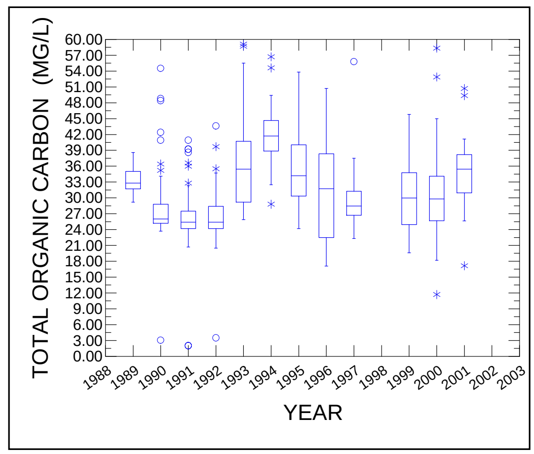


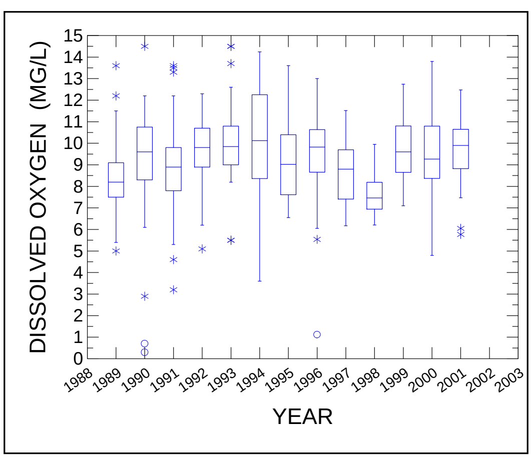
Figure 5a. Boxplots of Lake Apopka (WBID 2835D) water quality data over the 1989-2002 period.











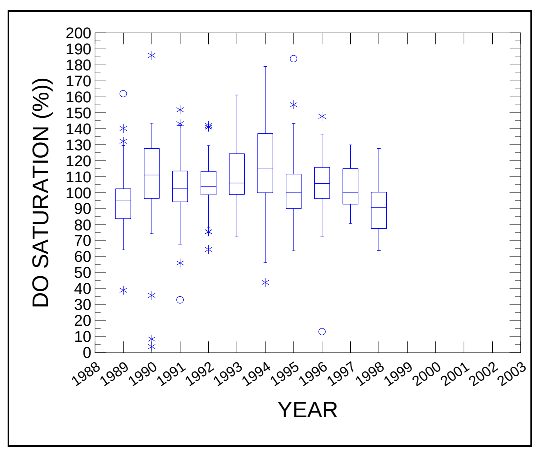


Figure 5b. Boxplots of Lake Apopka (WBID 2835D) water quality data over the 1989-2002 period.

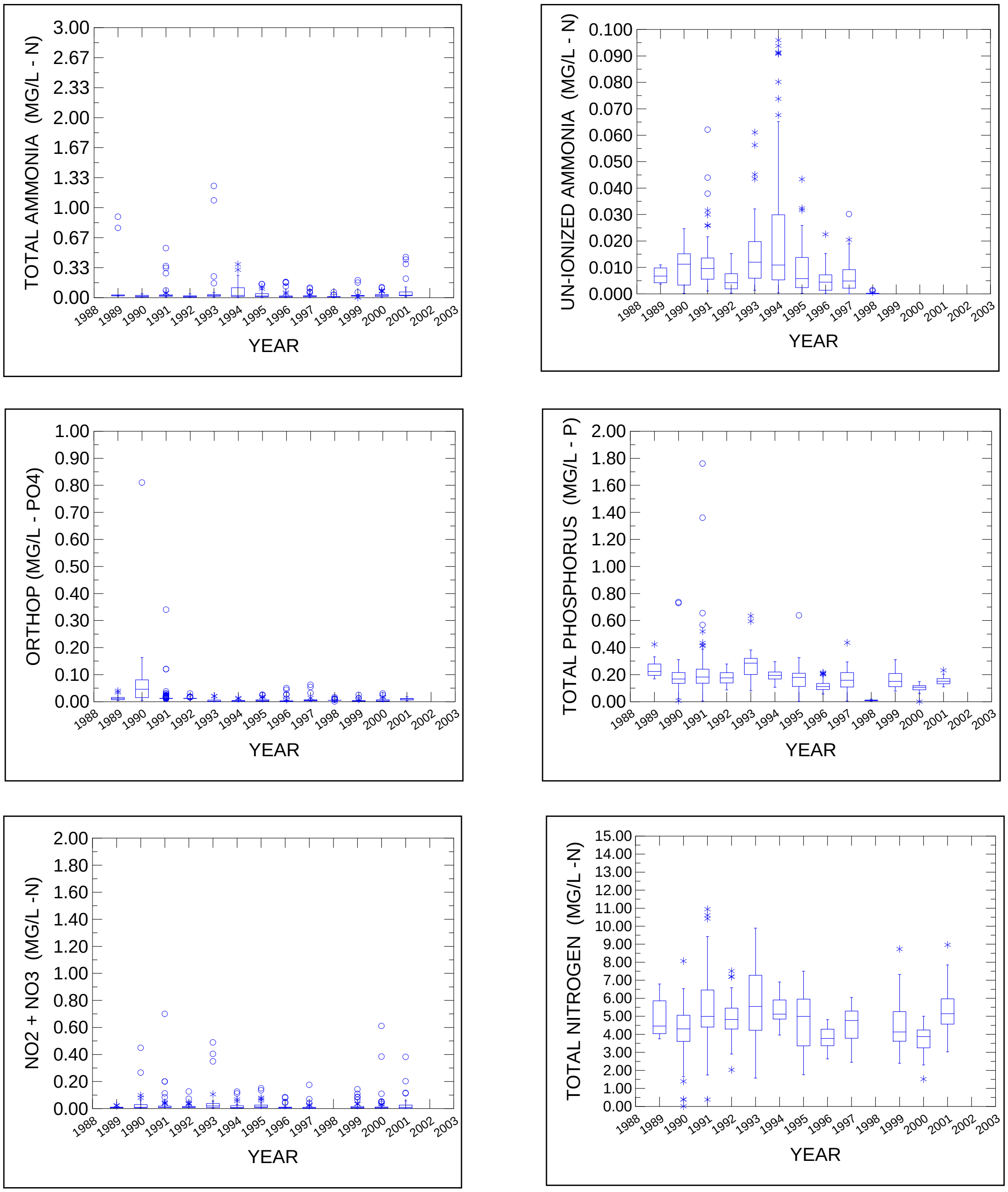


Figure 5c. Boxplots of Lake Apopka (WBID 2835D) water quality data over the 1989-2002 period.

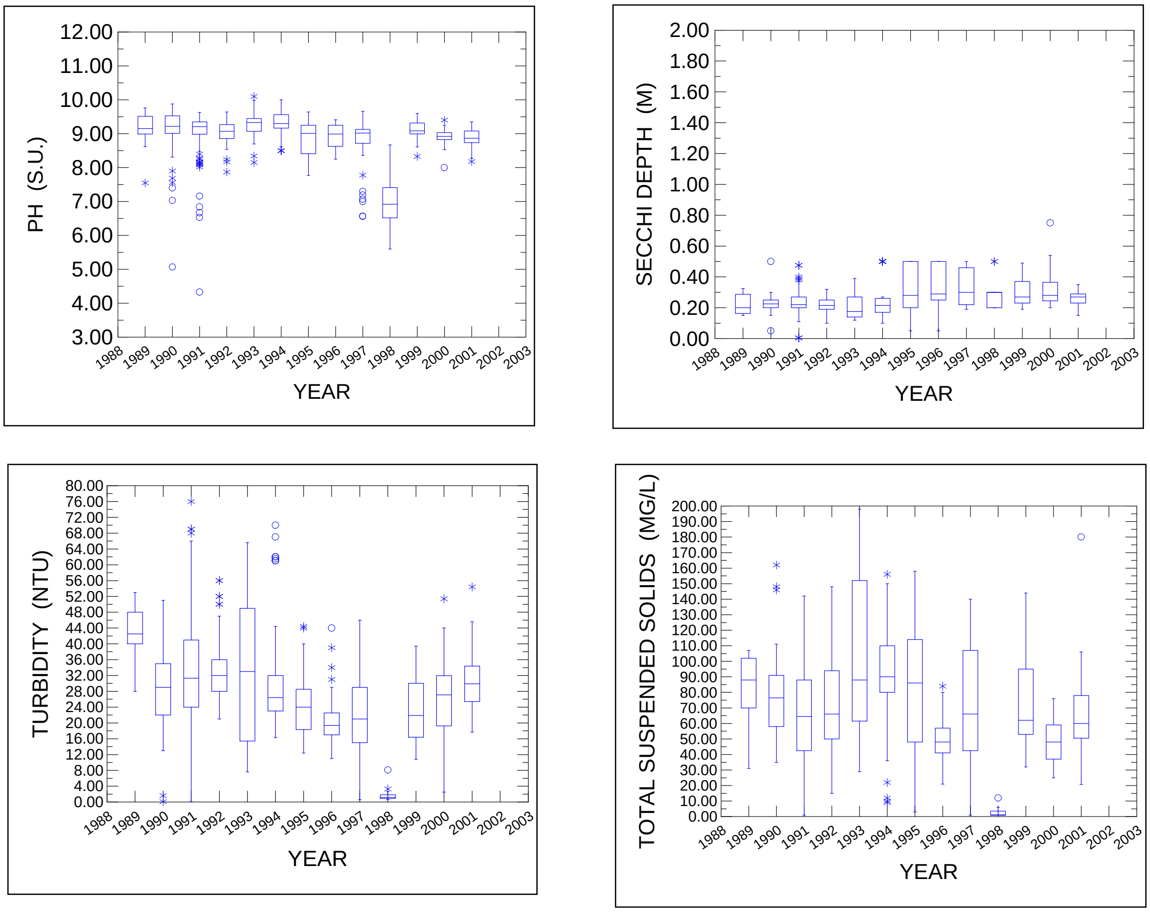
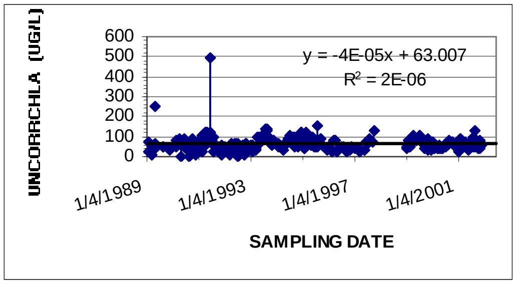
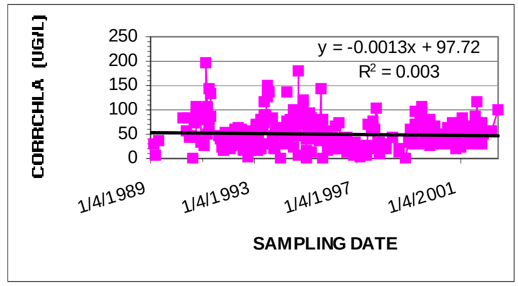
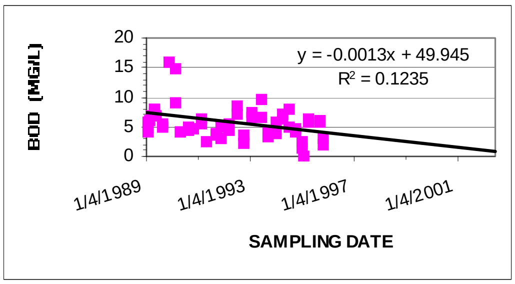
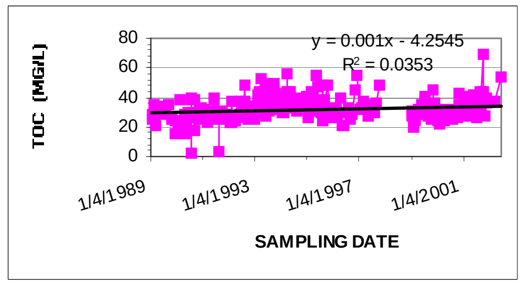


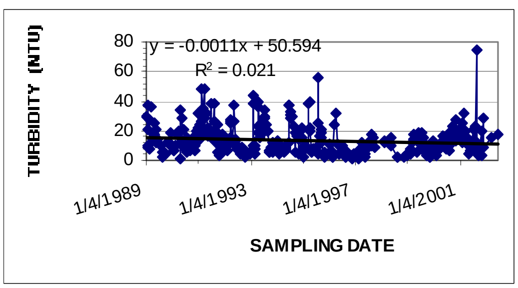
Figure 6a. Time series of Apopka-Beauclair Canal (WBID 2835A) water quality data over the 1989-2002 period.

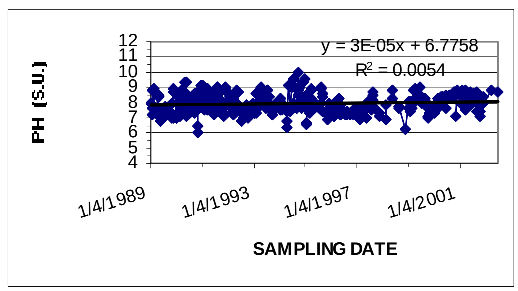


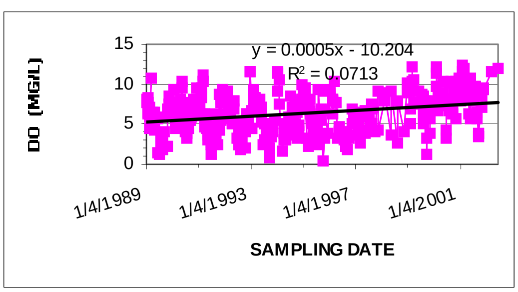












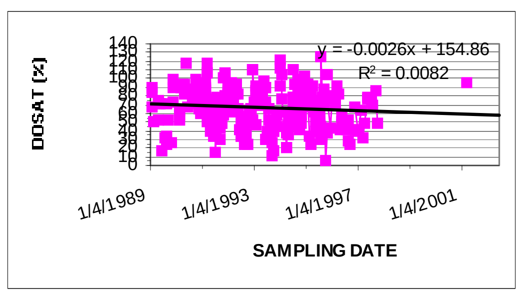


Figure 6b. Time series of Apopka-Beauclair Canal (WBID 2835A) water quality data over the 1989-2002 period.

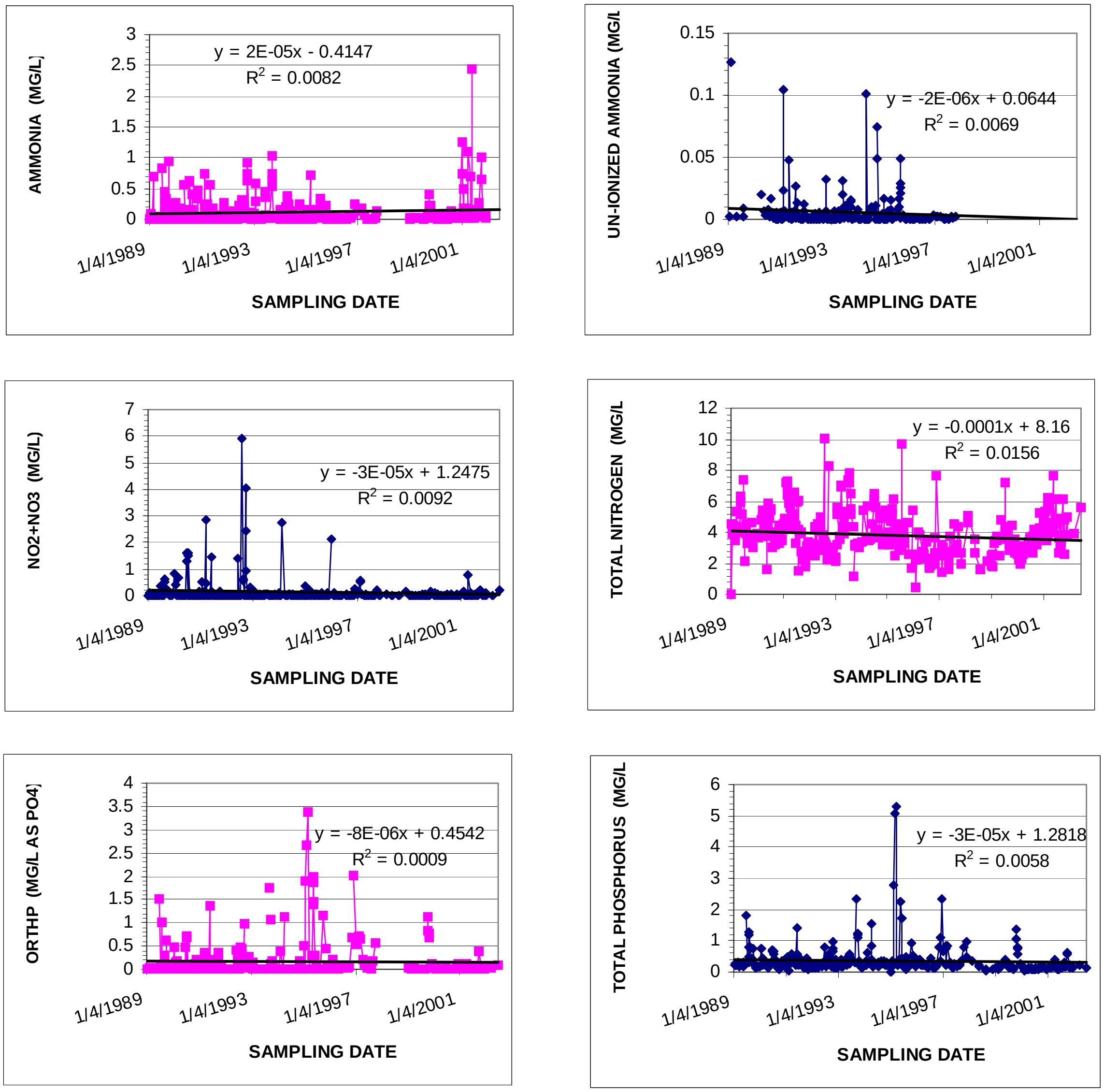


Figure 7a. Time series of Gourd Neck Spring (WBID 2835C) water quality data over the 1989-2002 period.

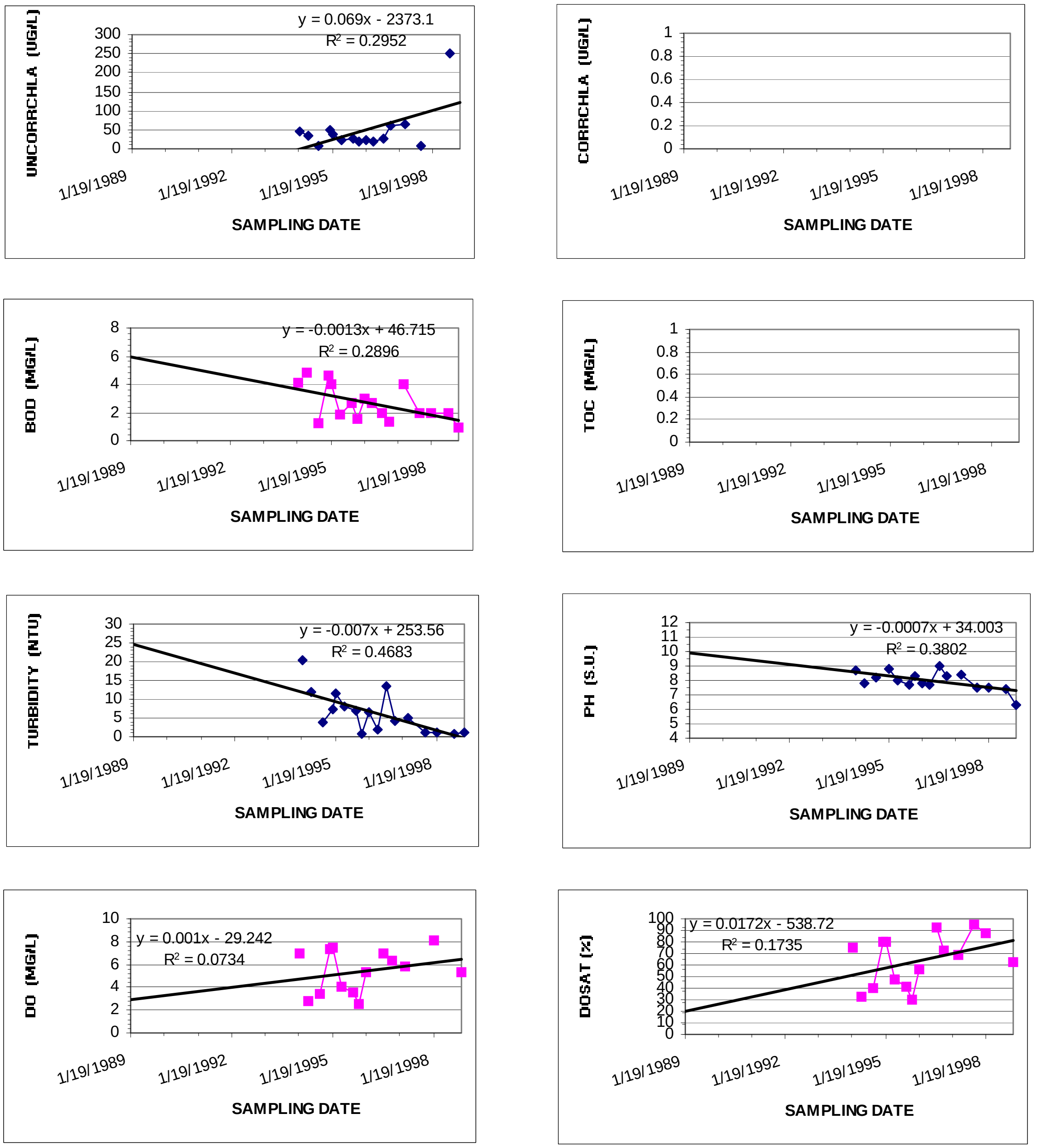


Figure 7b. Time series of Gourd Neck Spring (WBID 2835C) water quality data over the 1989-2002 period.

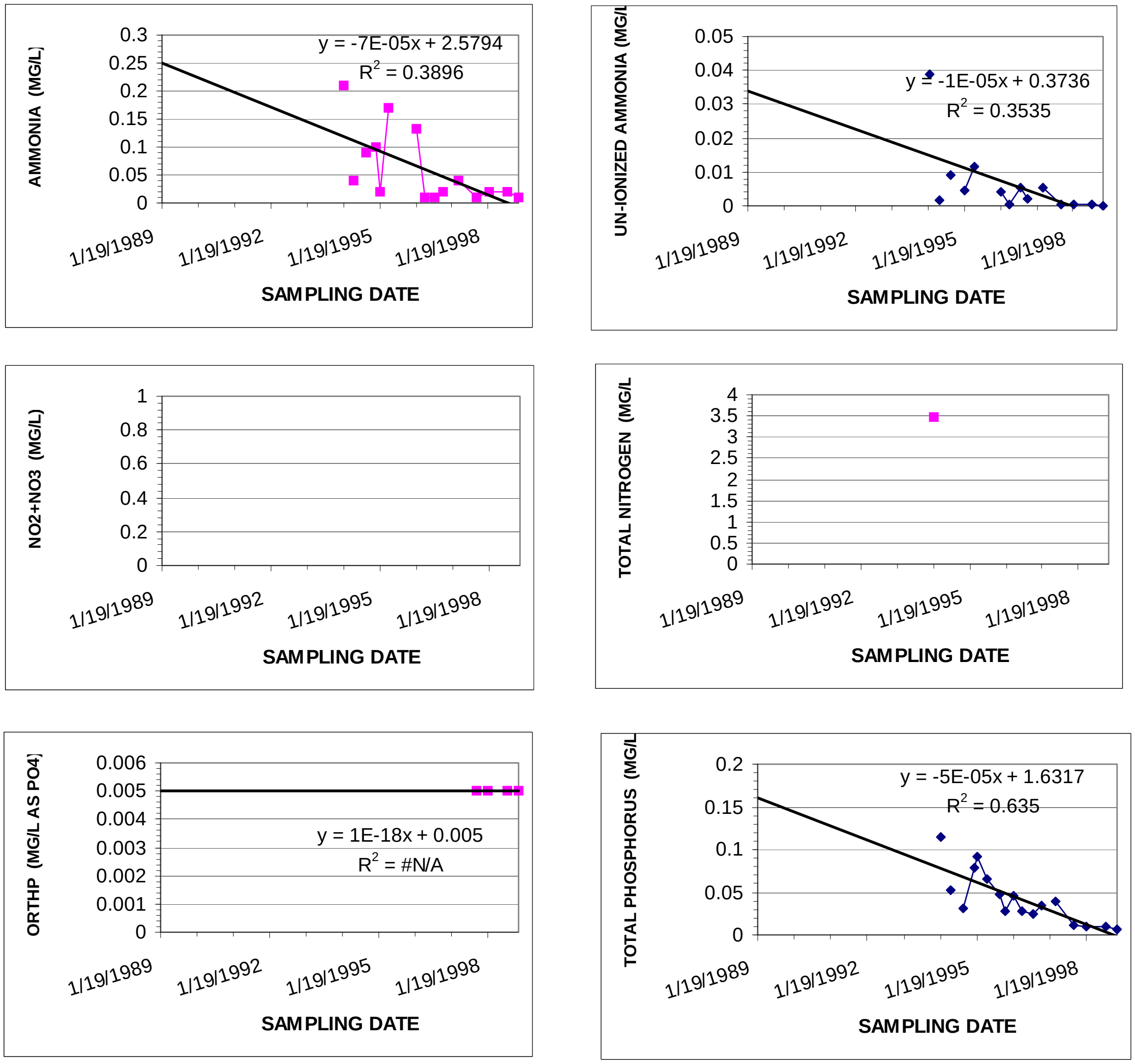
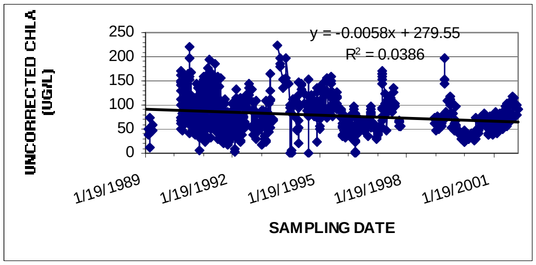
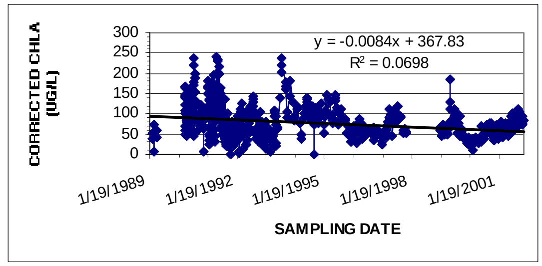
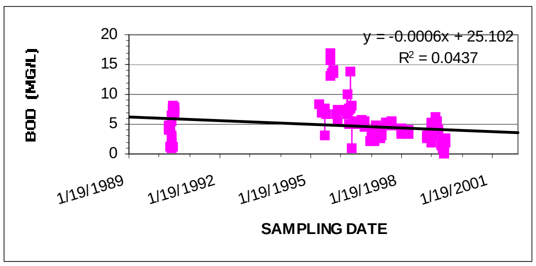
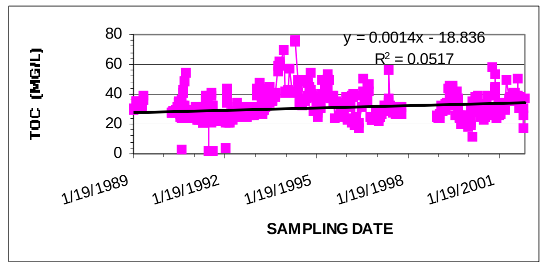


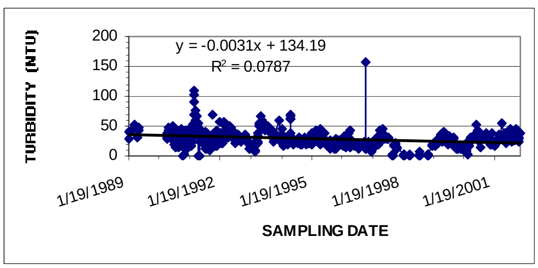
Figure 8a. Time series of Lake Apopka (WBID 2835D) water quality data over the 1989-2002 period.

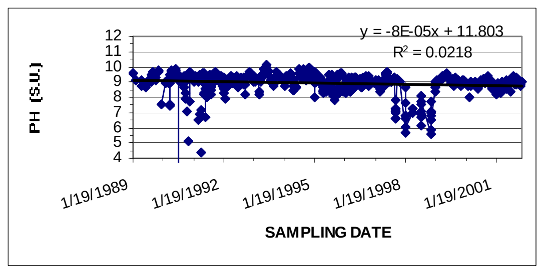


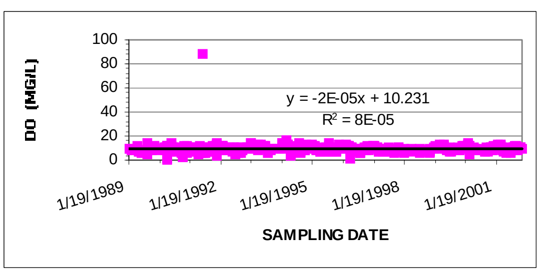












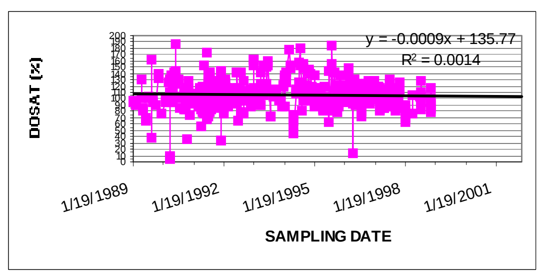


Figure 8b. Time series of Lake Apopka (WBID 2835D) water quality data over the 1989-2002 period.

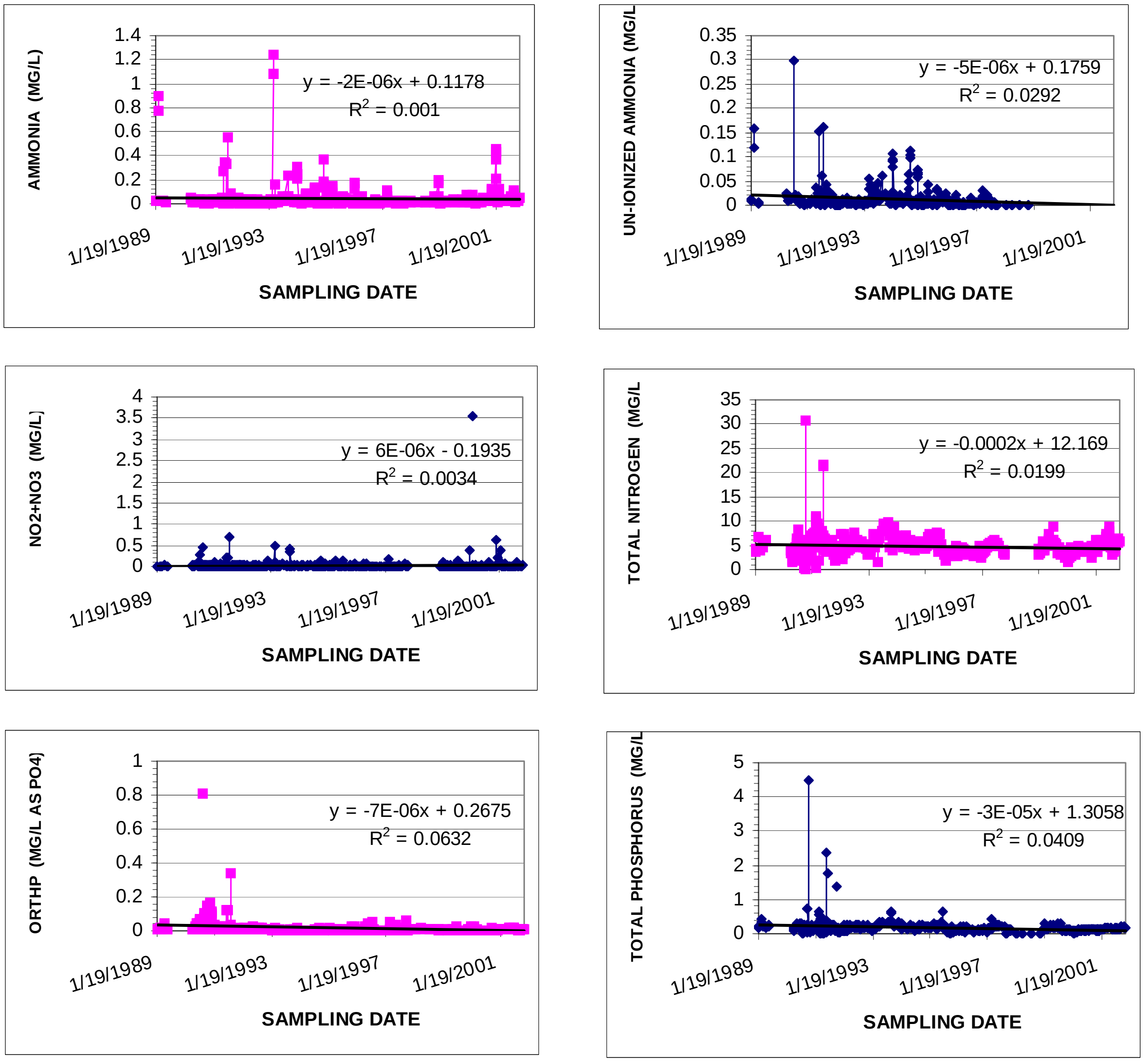


Figure 9. Cyanobacteria levels (biovolumes) in Lake Apopka from Lake County Water Authority.

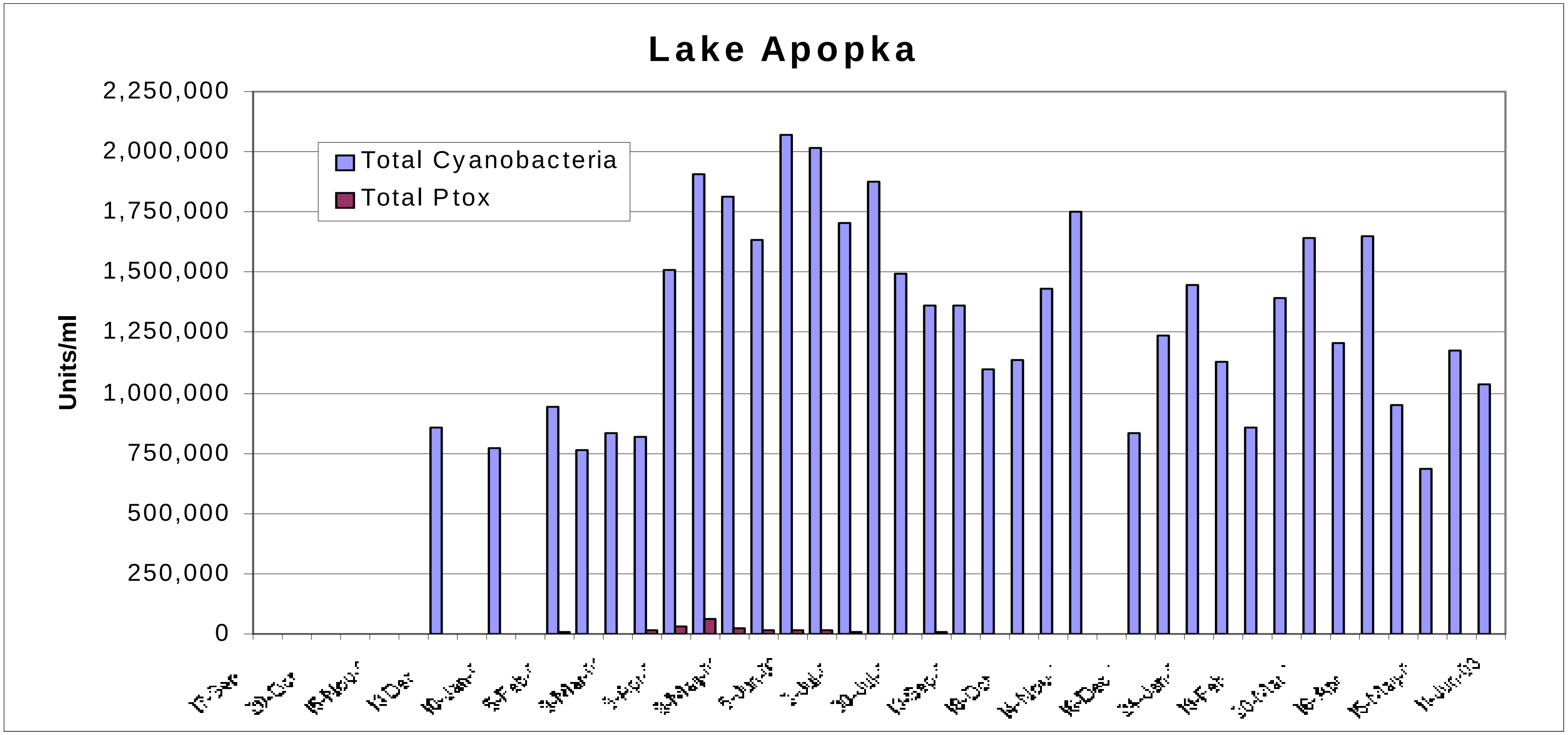


Figure 10. Microcystin levels in Lake Apopka from Lake County Water Authority.

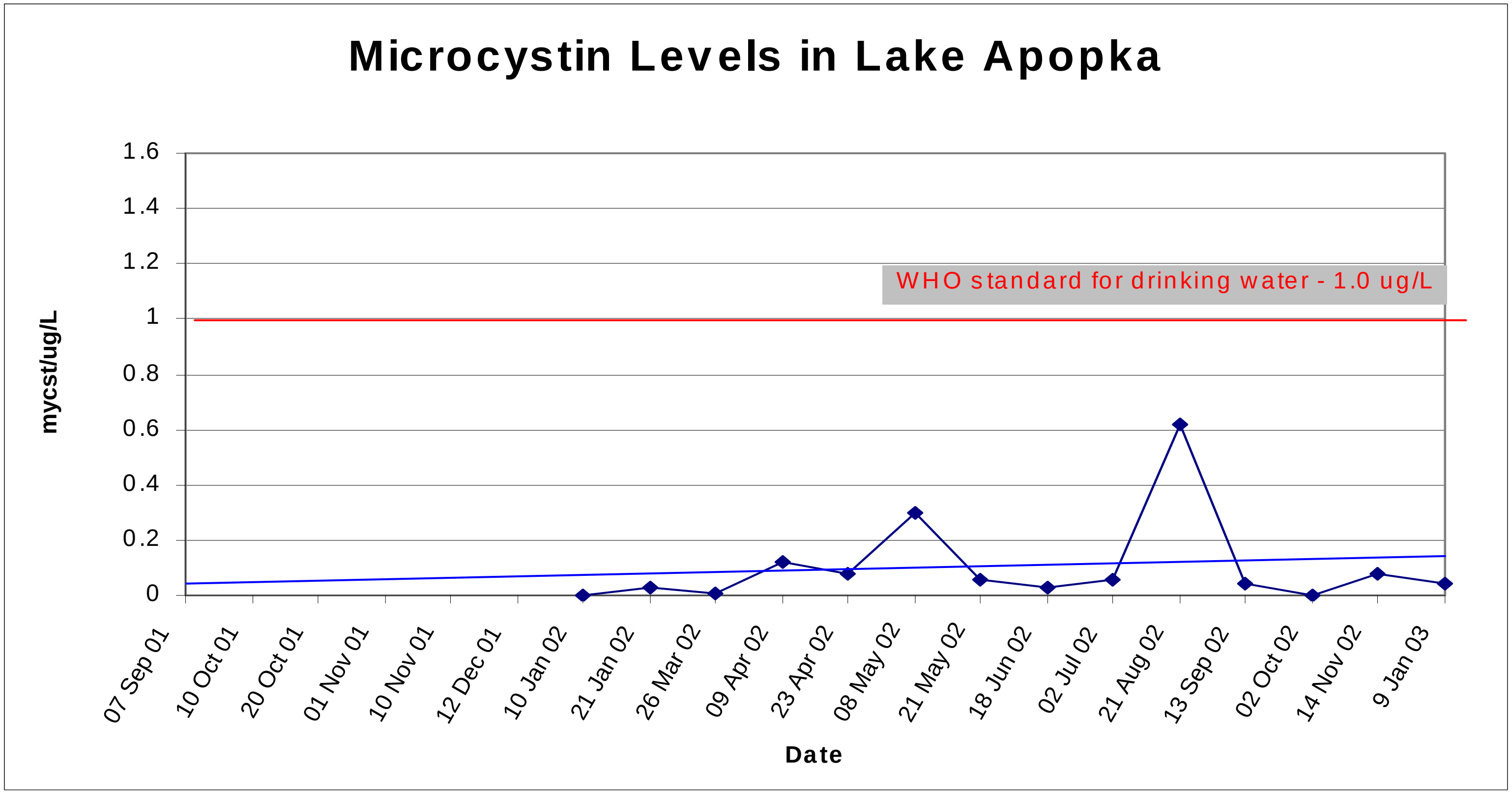


Figure 11. Plot of TN/TP ratio calculated for measurements in Lake Apopka
(WBID 2835D) over the 1989 – 2002 period.

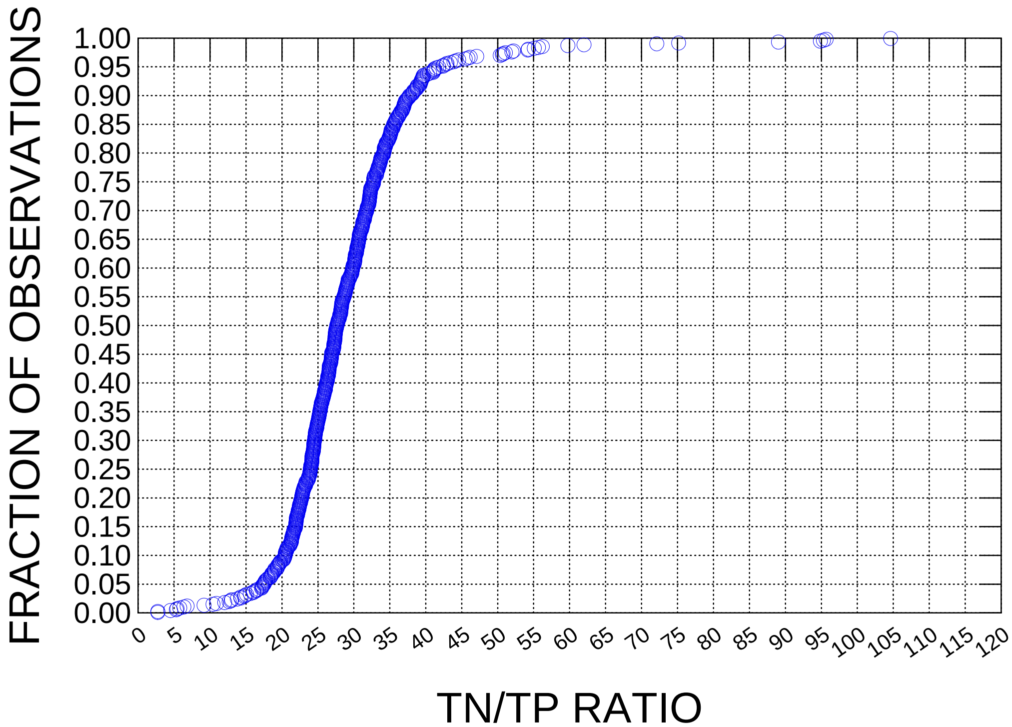
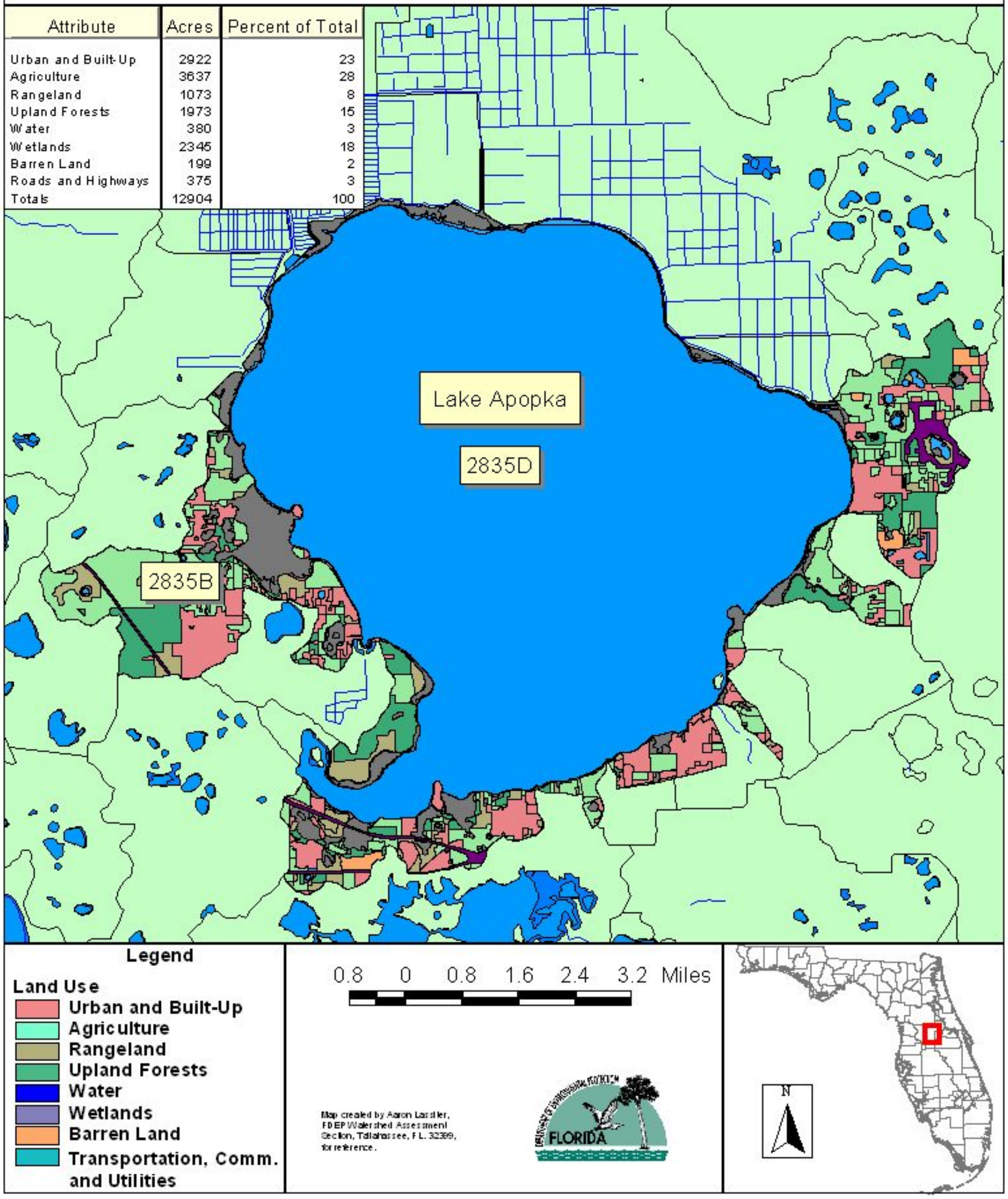


Figure 12: Lake Apopka Landuse



Attribute	Acres	Percent of Total
Urban and Built-Up	2922	23
Agriculture	3637	28
Rangeland	1073	8
Upland Forests	1973	15
Water	380	3
Wetlands	2345	18
Barren Land	199	2
Roads and Highways	375	3
Totals	12904	100

Table 1. Lake Apopka, Gourd Neck Spring, and Apopka-Beauclair Canal dissolved oxygen, turbidity, Chlorophyll a and/or TSI assessments under the IWR.

Parameter of concern	Apopka-Beauclair Canal	Gourd Neck Spring	Lake Apopka
Annual Chlorophyll a or TSI	Chlorophyll a (ug/l)	Chlorophyll a (ug/l)	Trophic State Index
1989	59.9		
1990	58.4		
1991	75.2		82.8
1992	38.6		81.3
1993	71.6		86.4
1994	69.2	34.6	82.1
1995	52.9	26.7	84.4
1996	31.6	32.0	77.3
1997	37.2		81.0
1998	21.6		
19999	59.0		80.4
2000	49.3		78.3
2001	57.4		85.1
Dissolved Oxygen	PP – 103/278 Potentially Impaired VP – 43/163 Verified	PP – 5/16 Potentially impaired VP – 3/12 Insufficient data	PP – 7/485 Not impaired VP – 2/326 Not impaired
Turbidity	PP – 26/258 Not impaired VP – 6/162 Not impaired	PP – 0/17 Not impaired VP – 0/13 Insufficient data	PP – 182/470 Potentially impaired VP – 87/323 Verified
PP – Planning Period which was the January 1989 thru December 1998 period VP – Verified Period which was the January 1995 thru June 2002 period			

Table 2. Summary statistics of key water quality parameters for Apopka-Beauclair Canal, Gourd Neck Spring, and Lake Apopka over the 1989 – 1002 period.

Apopka-Beauclair Canal (WBID 2835A)

	VBOD	VCHLA	VCHLAC	VDO	VDOSAT
N of cases	57	301	319	414	273
Minimum	0.000	0.395	0.000	0.400	4.940
Maximum	16.000	495.936	196.465	12.300	125.333
Median	5.500	55.596	44.104	6.300	67.048
Mean	5.726	61.668	50.787	6.334	66.351
Standard Dev	3.027	38.774	30.614	2.453	22.886

	VNH4	VNO2	VNO3	VPH	PORD
N of cases	376	45	1	411	325
Minimum	0.000	0.010	0.080	6.000	-0.017
Maximum	2.448	0.140	0.080	9.980	3.370
Median	0.026	0.010	0.080	7.860	0.012
Mean	0.114	0.024	0.080	7.940	0.164
Standard Dev	0.229	0.029	.	0.627	0.406

	VSD	VTEMP	VTKN	VNO3O2	VTN
N of cases	487	424	367	416	366
Minimum	0.000	9.000	0.360	-0.005	0.007
Maximum	29.000	34.300	9.710	5.920	10.080
Median	0.440	25.000	3.600	0.016	3.661
Mean	0.585	23.975	3.722	0.120	3.835
Standard Dev	1.837	5.377	1.307	0.469	1.410

	VTOC	TP	VTSS	VTURB	VUNNH4
N of cases	308	418	313	395	244
Minimum	1.700	0.000	1.000	0.700	0.000
Maximum	68.700	5.280	164.000	74.000	0.126
Median	29.775	0.240	26.000	10.700	0.002
Mean	31.640	0.363	35.444	13.534	0.006
Standard Dev	7.701	0.477	29.734	9.931	0.015

	TNTPRATIO
N of cases	364
Minimum	0.933
Maximum	81.564
Median	15.145
Mean	16.500
Standard Dev	9.463

Table 2. Continued.

Gourd Neck Spring (WBID 2835C)

	VBOD	VCHLA	VCHLAC	VDO	VDOSAT
N of cases	17	15	0	14	15
Minimum	0.900	6.800	.	2.590	30.471
Maximum	4.800	252.000	.	8.090	94.540
Median	2.000	27.500	.	5.545	68.131
Mean	2.624	46.477	.	5.421	64.159
Standard Dev	1.250	59.445	.	1.879	21.562

	VNH4	VNO2	VNO3	VPH	PORD
N of cases	15	14	17	16	4
Minimum	0.010	0.005	0.010	6.330	0.005
Maximum	0.210	0.019	5.780	8.980	0.005
Median	0.020	0.007	2.800	7.925	0.005
Mean	0.060	0.009	2.565	7.963	0.005
Standard Dev	0.065	0.004	1.793	0.648	0.000

	VSD	VTEMP	VTKN	VNO3O2	VTN
N of cases	36	17	17	0	1
Minimum	0.050	18.570	0.400	.	3.460
Maximum	4.300	30.510	5.000	.	3.460
Median	0.962	24.040	1.600	.	3.460
Mean	1.210	23.369	1.865	.	3.460
Standard Dev	0.958	3.122	1.382	.	.

	VTOC	TP	VTSS	VTURB	VUNNH4
N of cases	0	17	16	17	14
Minimum	.	0.007	1.000	0.700	0.000
Maximum	.	0.114	120.000	20.300	0.039
Median	.	0.035	12.500	5.000	0.003
Mean	.	0.042	25.562	6.271	0.006
Standard Dev	.	0.030	35.168	5.514	0.010

	TNTPRATIO
N of cases	1
Minimum	30.351
Maximum	30.351
Median	30.351
Mean	30.351
Standard Dev	.

Table 2. Continued.

Lake Apopka (WBID 2835D)

	VBOD	VCHLA	VCHLAC	VDO	VDOSAT
N of cases	116	963	749	750	603
Minimum	0.020	0.000	0.000	0.300	3.797
Maximum	16.800	223.000	240.570	88.000	185.897
Median	4.500	75.873	70.755	9.300	103.696
Mean	5.016	81.615	79.739	9.416	105.493
Standard Dev	3.346	36.686	41.496	3.452	21.292

	VNH4	VNO2	VNO3	VPH	PORD
N of cases	680	101	115	747	675
Minimum	-0.008	0.005	0.010	0.210	-0.003
Maximum	1.240	0.019	0.380	10.100	0.810
Median	0.020	0.005	0.010	9.080	0.012
Mean	0.039	0.006	0.034	8.936	0.016
Standard Dev	0.093	0.003	0.051	0.720	0.040

	VSD	VTEMP	VTKN	VNO3O2	VTN
N of cases	996	757	792	652	653
Minimum	0.004	0.300	0.200	-0.005	0.005
Maximum	24.000	32.600	38.800	3.540	30.700
Median	0.250	24.000	4.450	0.009	4.687
Mean	0.340	22.822	4.572	0.028	4.911
Standard Dev	1.148	5.566	2.444	0.149	2.026

	VTOC	TP	VTSS	VTURB	VUNNH4
N of cases	641	788	764	769	479
Minimum	2.000	0.001	1.000	0.100	0.000
Maximum	75.900	4.500	1926.000	158.000	0.297
Median	28.100	0.164	64.500	27.000	0.007
Mean	30.528	0.182	72.929	28.286	0.013
Standard Dev	8.576	0.207	77.767	14.097	0.024

	TNTPRATIO
N of cases	646
Minimum	2.771
Maximum	1518.000
Median	27.721
Mean	32.987
Standard Dev	68.600

Table 3. Pearson correlation matrix for Lake Apopka (WBIDS 2835D).

	YEAR	MONTH	BOD	CHLA	CHLAC
YEAR	1.000				
MONTH	-0.071	1.000			
BOD	-0.545	-0.241	1.000		
CHLA	-0.187	-0.100	-0.132	1.000	
CHLAC	-0.258	-0.089	-0.658	0.942	1.00
DO	-0.000	-0.101	0.060	-0.150	-0.30
DOSAT	-0.046	0.003	-0.059	-0.082	-0.17
NH4	-0.023	-0.113	0.272	-0.012	-0.04
NO2	-0.073	-0.289	-0.024	-0.186	.
NO3	-0.324	0.131	0.127	0.179	.
PH	-0.152	0.068	0.497	-0.076	-0.06
PORD	-0.263	0.141	0.572	0.045	0.16
SD	-0.023	0.005	-0.355	0.025	0.03
TEMP	-0.041	0.322	-0.229	0.260	0.32
TKN	-0.163	-0.080	0.268	0.394	0.56
NO3O2	0.061	-0.037	0.007	0.095	-0.03
TN	-0.131	-0.120	0.346	0.581	0.56
TOC	0.223	0.064	0.362	0.170	0.13
TP	-0.199	-0.031	0.712	0.505	0.46
TSS	-0.123	-0.047	0.622	0.410	0.42
TURB	-0.267	-0.141	0.665	0.354	0.44
UNNH4	-0.171	0.008	0.344	0.038	0.13

	DO	DOSAT	NH4	NO2	NO3
DO	1.000				
DOSAT	0.964	1.000			
NH4	-0.004	-0.039	1.000		
NO2	0.349	0.221	0.379	1.000	
NO3	0.112	0.114	0.440	0.258	1
PH	0.191	0.166	-0.079	0.089	0
PORD	-0.042	-0.011	0.149	0.237	-0
SD	0.001	0.021	-0.011	-0.183	0
TEMP	-0.205	0.087	-0.173	-0.325	-0
TKN	-0.038	-0.013	0.088	0.126	0
NO3O2	-0.060	-0.025	0.212	.	
TN	-0.125	-0.078	0.111	.	
TOC	-0.038	0.005	0.050	.	
TP	-0.044	-0.027	0.119	0.076	0
TSS	-0.024	0.015	0.093	0.064	0
TURB	-0.032	-0.014	0.035	0.020	0
UNNH4	0.017	0.024	0.549	0.133	0

	PH	PORD	SD	TEMP	TKN
PH	1.000				
PORD	-0.021	1.000			
SD	0.035	-0.012	1.000		
TEMP	-0.016	0.094	0.067	1.000	
TKN	0.173	-0.004	-0.019	0.077	1.0
NO3O2	-0.105	0.166	0.005	-0.001	-0.0
TN	-0.136	-0.029	-0.027	0.153	0.9
TOC	0.068	-0.094	-0.025	0.145	0.1
TP	0.028	0.003	-0.032	0.044	0.6
TSS	0.288	0.003	-0.064	0.118	0.2
TURB	0.304	0.001	-0.027	0.027	0.4
UNNH4	-0.156	0.436	0.005	0.053	0.1

	NO3O2	TN	TOC	TP	T
NO3O2	1.000				
TN	0.020	1.000			
TOC	-0.084	0.182	1.000		
TP	-0.012	0.796	0.108	1.000	
TSS	0.008	0.289	0.113	0.276	
TURB	-0.094	0.580	0.015	0.569	
UNNH4	0.303	0.102	-0.011	0.145	

	TURB	UNNH4
TURB	1.000	
UNNH4	0.149	1.000

Table 3. Continued. Pairwise frequency table

	YEAR	MONTH	BOD	CHLA
YEAR	1346			
MONTH	1346	1346		
BOD	116	116	116	
CHLA	963	963	73	963
CHLAC	749	749	6	745
DO	750	750	112	652
DOSAT	603	603	111	509
NH4	680	680	103	621
NO2	101	101	93	62
NO3	115	115	106	72
PH	747	747	108	651
PORD	675	675	36	617
SD	996	996	114	646
TEMP	757	757	113	660
TKN	792	792	116	702
NO3O2	652	652	10	625
TN	653	653	10	617
TOC	641	641	10	614
TP	788	788	116	698
TSS	764	764	111	698
TURB	769	769	116	699
UNNH4	479	479	94	426

	DO	DOSAT	NH4	NO2
DO	750			
DOSAT	603	603		
NH4	628	485	680	
NO2	99	98	101	101
NO3	113	112	101	101
PH	741	594	625	97
PORD	553	411	593	30
SD	720	575	627	101
TEMP	747	603	631	100
TKN	662	518	678	101
NO3O2	530	387	572	0
TN	528	389	563	0
TOC	522	379	564	0
TP	661	517	677	101
TSS	640	497	674	101
TURB	644	500	674	101
UNNH4	477	477	479	96

	PH	PORD	SD	TEMP
PH	747			
PORD	552	675		
SD	716	550	996	
TEMP	743	555	722	757
TKN	659	670	647	665
NO3O2	529	638	527	532
TN	527	628	518	530
TOC	521	624	519	524
TP	658	666	646	664
TSS	637	666	639	643
TURB	641	667	643	647
UNNH4	479	398	473	479

	NO3O2	TN	TOC	TP
NO3O2	652			
TN	642	653		
TOC	633	625	641	
TP	645	646	639	788
TSS	645	637	634	755
TURB	646	638	635	764
UNNH4	376	371	368	476

	TURB	UNNH4
TURB	769	
UNNH4	473	479

Table 4. Nitrogen and phosphorus concentrations from agricultural areas surrounding Lake Apopka.

Station	Location	Dates	Ammonium –Diss (mg/l as N)	Nitrate&nitrite-Diss (mg/l as N)	Ortho P - Diss (mg/l as P)	Total Kjeldahl nitrogen (mg/l as N)	Total nitrogen (mg/l as N)	Total phosphorus (mg/l as P)	Total suspended solids (mg/l)	TN/TP ratio
Median Mean										
CPS	Ag pumps	6/88-12/90	1.625 2.403	0.044 0.055	0.033 0.154	6.86 7.02	6.89 7.08	0.381 0.473	37.5 72.4	18.4 18.5
DFD	Ag pumps	5/88-1/92	0.593 0.853	0.280 1.417	0.632 0.741	4.41 5.86	4.86 6.81	0.765 0.878	46.0 89.8	6.8 8.3
DPG	Ag pumps	5/88-2/92	0.774 1.003	0.385 0.636	0.546 0.675	5.02 6.13	5.71 6.70	0.817 0.930	50.0 75.7	8.4 8.6
DPH	Ag pumps	5/88-9/90	0.714 0.862	0.190 0.460	0.362 0.477	4.28 4.74	4.64 5.12	0.624 0.725	39.0 53.0	7.9 8.9
HPO	Ag pumps	5/88-6/91	2.970 3.015	0.191 1.587	0.425 0.520	6.72 8.40	7.20 9.88	0.657 0.789	41.5 131.3	13.2 15.1
HPT	Ag pumps	1/88-9/90	2.655 2.792	0.080 0.782	0.501 0.685	5.51 5.79	5.77 6.60	0.561 0.800	12.0 18.8	10.5 11.5
NSPMP1	NSRA pump	9/99-12/02	0.577 0.753	0.530 1.080	0.829 0.854	4.46 4.45		1.003 0.994	6.2 16.3	
ZPF	Ag pumps	2/88-1/91	0.489 0.755	0.146 0.581	0.467 0.583	4.04 4.36	4.64 5.13	0.601 0.770	28.0 40.2	7.8 10.0
ZPT	Ag pumps	7/87-12/02	1.350 1.658	0.493 1.362	0.802 0.861	5.50 5.96	6.29 7.04	0.999 1.163	21.0 46.9	7.0 8.3

Appendix A

In 1982, Florida became the first state in the country to implement statewide regulations to address the issue of nonpoint source pollution by requiring new development and redevelopment to treat stormwater before it is discharged. The Stormwater Rule, as authorized in Chapter 403, Florida Statutes (F.S.), was established as a technology-based program that relies upon the implementation of BMPs that are designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Chapter 62-40, Florida Administrative Code (F.A.C.).

The rule requires Water Management Districts (WMDs) to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a SWIM plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation part of a TMDL. To date, stormwater PLRGs have been established for Tampa Bay, Lake Thonotosassa, Winter Haven Chain of Lakes, the Everglades, Lake Okeechobee, and Lake Apopka. No PLRG has been developed for Newnans Lake at the time this study was conducted.

In 1987, the U.S. Congress established section 402(p) as part of the Federal Clean Water Act Reauthorization. This section of the law amended the scope of the federal NPDES to designate certain stormwater discharges as “point sources” of pollution. These stormwater discharges include certain discharges that are associated with industrial activities designated by specific Standard Industrial Classification (SIC) codes, construction sites disturbing five or more acres of land, and master drainage systems of local governments with a population above 100,000 [which are better known as “municipal separate storm sewer systems” (MS4s)]. However, because the master drainage systems of most local governments in Florida are interconnected, EPA has implemented Phase 1 of the MS4 permitting program on a county-wide basis, which brings in all cities (incorporated areas), Chapter 298 urban water control districts, and the DOT (Department of Transportation) throughout the 15 counties meeting the population criteria.

An important difference between the federal and the state stormwater permitting programs is that the federal program covers both new and existing discharges while the state program focuses on new discharges. Additionally, Phase 2 of the NPDES stormwater permitting program will expand the need for these permits to construction sites between one and five acres, and to local governments with as few as 10,000 people. These revised rules require that these additional activities obtain permits by 2003. While these urban stormwater discharges are now technically referred to as “point sources” for the purpose of regulation, they are still diffuse sources of pollution that can not be easily collected and treated by a central treatment facility similar to other point sources of pollution, such as domestic and industrial wastewater discharges. The DEP recently accepted delegation from EPA for the stormwater part of the NPDES program. It should be noted that most MS4 permits issued in Florida include a re-opener clause that allows permit revisions to implement TMDLs once they are formally adopted by rule.

APPENDIX B
St. Johns River Water Management District Lake Apopka Rule

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

RULE NO.:	RULE TITLE
40C-4.091, F.A.C.	Publications Incorporated by Reference

NOTICE OF CHANGE

Notice is hereby given that the following changes have been made to the proposed rule in accordance with subparagraph 120.54(3)(d)1., F.S., published in Volume 28, Number 16, of the Florida Administrative Weekly, on April 19, 2002. These changes are being made to address testimony and evidence received at public hearings held on the rule and to establish an effective date of March 7, 2003. Section 11.7 and Appendix K of the Applicant's Handbook: Management and Storage of Surface Waters, are incorporated by reference in section 40C-4.091, F.A.C.

40C-4.091 Publications Incorporated by Reference

Proposed effective date 3-07-03.

11.7 Lake Apopka Hydrologic Basin

(a) Pursuant to section 373.461(3)(a), F.S~~A.C~~., the total phosphorus criterion for Lake Apopka is 55 parts per billion. To meet this total phosphorus criterion, the applicant must provide reasonable assurance of compliance with the following total phosphorus discharge limitations and comply with the relevant monitoring requirements in section~~s~~ 11.7(b) ~~through 11.7(e)~~ and relevant inspection requirements of section 11.7(c):

(1) Sites Within Lake Apopka Hydrologic Basin

Applicants required to obtain a permit pursuant to chapters 40C-4, 40C-40, 40C-42, or 40C-44, F.A.C., for a surface water management system located within the Lake Apopka Hydrologic Basin shall demonstrate: (i) that the system provides stormwater treatment equivalent to or greater than any of the applicable stormwater treatment options contained in Table 11.7-1 for the removal of total phosphorus; (ii) that the post-development total phosphorus load discharged from the project area will not exceed the pre-development total phosphorus load discharged from the project area; or (iii) that the system, under the soil moisture conditions described in section 10.3.8(a), will not discharge water to Lake Apopka or its tributaries for the 100-year, 24-hour storm event. Systems described under section 11.7(a)(1)iii shall be considered to discharge to a land-locked lake that must meet the criteria in sections 10.4.1 and 10.4.2. Any alteration of a system originally permitted pursuant to section 11.7(a)(1)iii which results in an increase in discharge of water to Lake Apopka or its tributaries shall be considered an interbasin diversion that must meet the criteria in sections 11.7(a)(2) and 11.7(b)(4e).

(2) Interbasin Diversion of Water to Lake Apopka Hydrologic Basin

Applicants required to obtain a permit pursuant to chapters 40C-4, 40C-40, 40C-42, or 40C-44, F.A.C., for a surface water management system that will cause the importation of water from another hydrologic basin into the Lake Apopka Hydrologic Basin shall not discharge any phosphorus from the project area to Lake Apopka or its tributaries, unless the applicant implements measures to reduce the existing total phosphorus load to Lake Apopka or its tributaries from another existing source by at least an equivalent amount of total phosphorus. The imported water shall consist only of stormwater runoff. The imported water shall not be discharged to Lake Apopka or its tributaries when the water level of Lake Apopka is in Zone A of the Lake Apopka Regulation Schedule set forth in Figure ~~Table~~ 11.7-2. All measures to reduce existing phosphorous loads to Lake Apopka or its tributaries must be constructed and operating in compliance with the environmental resource permit prior to any importation of water into the Lake Apopka Hydrologic Basin. Measures that reduce existing phosphorous loads to Lake Apopka or its tributaries shall not include those measures taken on the District's land.

(3) Methodology for Determining Total Phosphorus Loads

Determination of Pre-Development Total Phosphorus Loads

Pre-development total phosphorus loads shall be based upon the land uses in place as of *(effective date)*. For systems which have been constructed in accordance with a permit issued pursuant to chapters 40C-4, 40C-40, 40C-42, or 40C-44, F.A.C., at the permit applicant's option, the pre-development total phosphorus loads shall be based upon the land uses in place at the time the prior permit was issued. Pre-development total phosphorus loads shall be determined by: monitoring the total phosphorus loads from the project area for a period of one year prior to construction, alteration, abandonment, or removal of the proposed or existing system; calculating total phosphorus loads using the appropriate mean annual total phosphorus loadings in Table 11.7-3, or calculating total phosphorus loads for pre-development land uses not listed in Table 11.7-3 using mean annual total phosphorus loadings from the scientific literature. When the pre-development total phosphorus loads are determined by monitoring, the calculation of pre-development total phosphorus loads shall be adjusted by interpolation or extrapolation to reflect mean annual rainfall conditions.

Determination of Post-Development Total Phosphorus Loads

Post-development total phosphorus loads shall be based upon the land uses proposed in the permit application and shall be determined by: calculating total phosphorus loads using the appropriate mean annual total phosphorus loadings in Table 11.7-3 and then reducing the total phosphorus load according to the appropriate total phosphorus removal efficiency values for systems listed in Tables 11.7-4 through 11.7-33. For purposes of Tables 11.7-4 and 11.7-6 through 11.7-33, the term "retention" includes stormwater reuse and underdrain and underground exfiltration trench systems as those terms are defined in section 2.0 of the Applicant's Handbook: Regulation of Stormwater Management Systems, Chapter 40C-42, F.A.C., which is adopted by reference in section 40C-42.091(1), F.A.C. The calculation of total phosphorus loads for post-development land uses not listed in Table 11.7-3 or total phosphorus removal efficiency values for systems not listed in Tables 11.7-4 through 11.7-33 may be calculated using mean annual total phosphorus loadings and total phosphorus removal efficiency values from the scientific literature.

(b) Monitoring

(1) Monitoring for Retention Systems

A surface water management system to be permitted under section 11.7(a)(1)i which utilizes only retention, shall be monitored as set forth in this paragraph. Water elevations in such a system shall be monitored from the date that construction of the system is completed or any part of the system is used for its intended purpose, whichever is sooner. The monitoring shall continue for three years following completion of construction of the entire system, including all associated residential, commercial, transportation, or agricultural improvements. If the results of the monitoring indicate that the system is not recovering the treatment volume in accordance with the permitted design, then the permittee shall either perform maintenance on the system, or obtain a modification to the permit and implement measures, to bring the system into compliance, and in either event the monitoring shall continue for three years after the date the system is brought into compliance.

(2~~c~~) Monitoring for Systems Permitted Under Section 11.7(a)(1)iii

A surface water management system to be permitted under section 11.7(a)(1)iii, shall be monitored as set forth in this paragraph. Water elevations in such a system shall be monitored from the date that construction of the system is completed or any part of the system is used for its intended purpose, whichever is sooner. The monitoring in such a system shall continue for ten years following completion of construction of the entire system, including all associated residential, commercial, transportation, or agricultural improvements. If the results of the monitoring indicate that either the system is not recovering storage in accordance with the permitted design or causes water to be discharged to Lake Apopka or its tributaries for events less than the 100-year, 24-hour storm event, then the permittee shall either perform maintenance that brings the system into compliance or obtain a modification to the permit and implement measures to bring the system into compliance, and in either event the monitoring shall continue for ten ~~three~~ years after the date the system is brought into compliance.

(3~~d~~) Monitoring for Other Systems

A surface water management system to be permitted, other than a system described in sections 11.7(b)(1), 11.7(b)(2)~~(c)~~ or 11.7(b)(4)~~(e)~~, shall be monitored as set forth in this paragraph. Except as provided below, t~~T~~he total phosphorus load from the project area shall be monitored from the date that construction of such a system is completed or any part of the system is used for its intended purpose, whichever is sooner. The monitoring shall continue for three years following completion of construction of the entire system, including all associated residential, commercial, transportation, or agricultural improvements. If the results of the monitoring indicate that post-development total phosphorus loads exceed pre-development total phosphorus loads, then the permittee shall either perform maintenance on the system, or obtain a modification to the permit and implement measures, to reduce the total phosphorus loads to no more than pre-development levels, and in either event the monitoring shall continue for three years after the date the system is maintained or modified as described herein.

No monitoring shall be required under section 11.7(b)(3) when an applicant demonstrates that the system provides stormwater treatment equivalent to or greater than any of the applicable stormwater treatment options contained in Table 11.7-1 for the removal of total phosphorus. Alternatively, no monitoring shall be required under section 11.7(b)(3) when an applicant demonstrates that the post-development total phosphorus load discharged from the project area will not exceed the pre-development total phosphorus load discharged from the project area when determined using the appropriate mean annual total phosphorus loadings and total phosphorus removal efficiency values from Tables 11.7-3 through 11.7-33 .

(4~~e~~) Monitoring for Interbasin Diversion of Water to Lake Apopka Hydrologic Basin

A surface water management system to be permitted under ~~described in~~ section 11.7(a)(2) shall be monitored as set forth in this paragraph. The total phosphorus load shall be monitored from: (i) any system designed to reduce the existing total phosphorus load to Lake Apopka or its tributaries, and (ii) the system that is importing water to the Lake Apopka Hydrologic Basin. Monitoring of the system that is importing water to the Lake Apopka Hydrologic Basin shall commence from the date that construction of such system is completed or any part of the system is used for its intended purpose, whichever is sooner. Monitoring of systems designed to reduce the existing total phosphorus load to Lake Apopka or its tributaries shall commence from the date that construction of such system is completed. Monitoring shall continue for as long as water is imported from the system to the Lake Apopka Hydrologic Basin. If monitoring results indicate that the reductions in total phosphorus load are less than that in the imported water, then the permittee shall either perform maintenance or obtain a permit modification to bring the system(s) into compliance.

~~(f) Determination of Pre-development Total Phosphorus Loads~~

~~Pre-development total phosphorus loads shall be based upon the land uses in place as of *(effective date)* and shall be calculated by: monitoring the total phosphorus loads from the project area for a period of one year prior to construction, alteration, abandonment, or removal of the proposed or existing system; or calculating total phosphorus loads for the same land uses from the scientific literature. That calculation of pre-development total phosphorus loads shall be adjusted by interpolation or extrapolation to reflect average annual rainfall conditions.~~

(c~~g~~) Inspecting Systems

No change

TABLE 11.7-1

STORMWATER TREATMENT CRITERIA TO ACHIEVE NO NET INCREASE IN POST- DEVELOPMENT LOADINGS WITHIN THE LAKE APOPKA HYDROLOGIC BASIN

LAND USE CATEGORY	HYDROLOGIC ~~DOMINANT~~ SOIL GROUP	RETENTION[1] ONLY[2] ~~[1]~~	RETENTION[1]/ WET DETENTION OPTION[3] ~~[2]~~
Low-Density Residential (max. 15% impervious)	A B C D	2.75" 1.75" 1.25" 1.00"	1.00"/14 days 0.50"/14 days 0.50"/14 days 0.25"/14 days
Single-Family Residential (max. 25% impervious)	A B C D	2.75~~2.50~~" 2.00" 1.75" 1.50"	1.00"/14 days 0.75"/14 days 0.75"/14 days 0.50~~0.75~~"/14 days
Single-Family Residential (max. 40% impervious)	A B C D	3.75” 3.00~~2.50~~" 2.00" 1.50~~1.75~~"	1.25"/14 days 1.00~~0.75~~"/14 days 0.75"/14 days 0.50"/14 days
Multi-Family Residential (max. 65% impervious)	A B C D	4.00” 3.75" 3.25~~3.00~~" 2.75"	2.50"/14 days 2.00"/14 days 1.75~~1.50~~"/14 days 1.50"/14 days
Commercial (max. 80% impervious)	A B C D	4.00” 3.75~~3.00~~" 2.75~~2.50~~" 2.25"	2.75"/14 days 2.25~~1.75~~"/14 days 1.50"/14 days 1.25"/14 days
Highway (max. 50% impervious)	A B C D	4.00" 3.00" 2.50" 2.25"	2.00"/14 days 1.50"/14 days 1.25"/14 days 1.00"/14 days
Highway (max. 75% impervious)	A B C D	4.00” 3.75" 2.75" 2.25"	2.75"/14 days 2.25"/14 days 1.75"/14 days 1.25"/14 days

1. For purposes of this Table, the term “retention” includes stormwater reuse and underdrain and underground exfiltration trench systems as those terns are defined in section 2.0 of the Applicant’s Handbook: Regulation of Stormwater Management Systems, Chapter 40C-42, F.A.C., which is adopted by reference in section 40C-42.091(1), F.A.C.

2 ~~1~~. Required dry retention volume (inches of runoff over project area)

3 ~~2~~. Required dry retention volume (inches of runoff over project area) followed by wet detention with listed minimum residence time

TABLE 11.7-3

MEAN ANNUAL LOADINGS OF TOTAL PHOSPHORUS FOR LAND USE TYPES IN THE LAKE APOPKA HYDROLOGIC BASIN

LAND USE CATEGORY	MEAN ANNUAL TOTAL PHOSPHORUS LOAD (kg/ac-yr)			
	HSG A	HSG B	HSG C	HSG D
Low-Density Residential (max. 15% impervious)	0.069	0.135	0.215	0.284
Single-Family Residential (max. 25% impervious)	0.227	0.286	0.383	0.465
Single-Family Residential (max. 40% impervious)	0.250	0.333	0.446	0.536
Multi-Family Residential (max. 65% impervious)	1.082	1.156	1.257	1.336
Commercial (max. 80% impervious)	0.899	0.916	0.943	0.964
Highway – max. 50% impervious	0.710	0.756	0.817	0.871
Highway – max. 75% impervious	1.053	1.076	1.106	1.133
Agriculture – Pasture	0.026	0.118	0.239	0.347
Agriculture – Crops, Ornamentals, Nurseries	0.040	0.180	0.366	0.531
Agriculture – Groves	0.007	0.036	0.079	0.123
Open Land/Recreational/Fallow Groves and Cropland	0.004	0.017	0.035	0.051
Forests/Abandoned Tree Crops	0.004	0.021	0.045	0.070

HSG = Hydrologic Soil Group

TABLE 11.7-4

REMOVAL EFFICIENCIES FOR TOTAL PHOSPHORUS IN DRY RETENTION SYSTEMS THAT MEET THE DESIGN AND PERFORMANCE CRITERIA IN RULE 40C-42.026, F.A.C.

LAND USE	HSG A		HSG B		HSG C		HSG D	
	STAN-DARD	OFW	STAN-DARD	OFW	STAN-DARD	OFW	STAN-DARD	OFW
Low-Density Residential (max. 15% impervious)	78%	82%	67%	74%	63%	72%	60%	71%
Single-Family Residential (max. 25% impervious)	90%	92%	78%	83%	69%	77%	65%	74%
Single-Family Residential (max. 40% impervious)	84%	88%	72%	80%	65%	75%	63%	73%
Multi-Family Residential (max. 65% impervious)	74%	83%	69%	79%	64%	75%	62%	74%
Commercial (max. 80% impervious)	65%	76%	63%	74%	62%	72%	61%	71%
Highway (max. 50% impervious)	75%	85%	70%	80%	65%	76%	63%	74%
Highway (max. 75% impervious)	65%	76%	63%	74%	62%	72%	61%	71%

Standard Meets design and performance criteria in rule 40C-42.026, F.A.C., for discharges to Class III waters

OFW Meets design and performance criteria in rule 40C-42.026, F.A.C., for discharges to Class I, Class II, or Outstanding Florida Waters

TABLE 11.7-5

REMOVAL EFFICIENCIES FOR TOTAL PHOSPHORUS IN WET DETENTION SYSTEMS THAT MEET THE DESIGN AND PERFORMANCE CRITERIA IN RULE 40C-42.026, F.A.C.

Residence Time (days)	Phosphorus Removal Efficiency (%)
14	61.5
21	64.5

Table 11.7-6
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Low-Density Residential (max. 15% impervious) For Hydrologic Soil Group A

Retention Depth (inches)	**Annual Total P Removal (%)**			
	Dry Retention[1]	**Retention / Wet Detention[2]**		
		t_d=7 days	**t_d=14 days**	**t_d=21 days**
0.25	70	86	88	89
0.50	78	90	92	92
0.75	82	92	93	94
1.00	85	93	94	95
1.25	88	94	95	96
1.50	90	95	96	96
1.75	91	96	96	97
2.00	92	96	97	97
2.25	93	97	97	97
2.50	93	97	97	98
2.75	94	97	98	98
3.00	95	98	98	98
3.25	96	98	98	99
3.50	97	98	99	99
3.75	97	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-7

Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Low-Density Residential (max. 15% impervious) For Hydrologic Soil Group B

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	53	78	82	83
0.50	67	85	87	88
0.75	74	88	90	91
1.00	79	91	92	93
1.25	83	92	93	94
1.50	85	93	94	95
1.75	88	94	95	96
2.00	89	95	96	96
2.25	90	96	96	97
2.50	92	96	97	97
2.75	93	97	97	97
3.00	93	97	97	98
3.25	94	97	98	98
3.50	94	97	98	98
3.75	95	98	98	98
4.00	95	98	98	98

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-8

Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Low-Density Residential (max. 15% impervious) For Hydrologic Soil Group C

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	46	75	79	81
0.50	63	83	86	87
0.75	72	87	89	90
1.00	78	90	91	92
1.25	82	92	93	94
1.50	85	93	94	95
1.75	87	94	95	96
2.00	89	95	96	96
2.25	91	96	96	97
2.50	92	96	97	97
2.75	93	97	97	97
3.00	94	97	97	98
3.25	94	97	98	98
3.50	95	98	98	98
3.75	95	98	98	98
4.00	96	98	98	98

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-9

Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Low-Density Residential (max. 15% impervious) For Hydrologic Soil Group D

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	42	74	78	79
0.50	60	82	85	86
0.75	71	87	89	90
1.00	78	90	91	92
1.25	82	92	93	94
1.50	85	93	94	95
1.75	88	94	95	96
2.00	90	95	96	96
2.25	91	96	97	97
2.50	92	96	97	97
2.75	93	97	97	98
3.00	94	97	98	98
3.25	95	98	98	98
3.50	95	98	98	98
3.75	96	98	98	98
4.00	96	98	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-10

Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Single-Family Residential (max. 25% impervious) For Hydrologic Soil Group A

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	82	92	93	94
0.50	90	95	96	96
0.75	92	96	97	97
1.00	94	97	98	98
1.25	95	98	98	98
1.50	96	98	98	98
1.75	96	98	99	99
2.00	97	98	99	99
2.25	97	99	99	99
2.50	98	99	99	99
2.75	98	99	99	99
3.00	98	99	99	99
3.25	99	99	99	99
3.50	99	99	100	100
3.75	99	100	100	100
4.00	99	100	100	100

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-11

Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Single-Family Residential (max. 25% impervious) For Hydrologic Soil Group B

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	65	84	87	88
0.50	78	90	91	92
0.75	83	92	94	94
1.00	87	94	95	95
1.25	89	95	96	96
1.50	91	96	96	97
1.75	92	96	97	97
2.00	93	97	97	98
2.25	94	97	98	98
2.50	95	98	98	98
2.75	95	98	98	98
3.00	96	98	98	98
3.25	96	98	99	99
3.50	96	98	99	99
3.75	97	99	99	99
4.00	97	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-12

Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Single-Family Residential (max. 25% impervious) For Hydrologic Soil Group C

Retention Depth (inches)	**Annual Total P Removal (%)**			
	Dry Retention[1]	**Retention / Wet Detention[2]**		
		t_d=7 days	**t_d=14 days**	**t_d=21 days**
0.25	54	79	82	84
0.50	69	86	88	89
0.75	77	90	91	92
1.00	82	92	93	94
1.25	85	93	94	95
1.50	88	95	95	96
1.75	90	95	96	96
2.00	91	96	97	97
2.25	92	97	97	97
2.50	93	97	97	98
2.75	94	97	98	98
3.00	95	98	98	98
3.25	96	98	98	98
3.50	96	98	98	99
3.75	96	98	99	99
4.00	97	98	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-13

Estimated Total P Removal Efficiencies for Various Treatment Options in Single-Family Residential (max. 25% impervious) For Hydrologic Soil Group C

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	48	76	80	81
0.50	65	84	86	87
0.75	74	88	90	91
1.00	81	91	93	93
1.25	84	93	94	94
1.50	87	94	95	95
1.75	89	95	96	96
2.00	91	96	96	97
2.25	92	96	97	97
2.50	93	97	97	98
2.75	94	97	98	98
3.00	95	98	98	98
3.25	95	98	98	98
3.50	96	98	98	98
3.75	96	98	99	99
4.00	97	98	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-14
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Single-Family Residential (max. 40% impervious) for Hydrologic Soil Group A

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	71	90	93	94
0.50	86	95	96	97
0.75	90	97	98	98
1.00	93	97	98	99
1.25	94	98	99	99
1.50	95	98	99	99
1.75	96	99	99	99
2.00	97	99	99	99
2.25	97	99	99	99
2.50	97	99	99	99
2.75	98	99	99	100
3.00	98	99	99	100
3.25	98	99	100	100
3.50	98	99	100	100
3.75	99	100	100	100
4.00	99	100	100	100

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-15

Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Single-Family Residential (max. 40% impervious) for Hydrologic Soil Group B

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	61	86	90	92
0.50	77	92	94	95
0.75	83	94	95	97
1.00	87	95	97	97
1.25	89	96	97	98
1.50	91	97	98	98
1.75	93	97	98	99
2.00	94	98	98	99
2.25	94	98	99	99
2.50	95	98	99	99
2.75	95	99	99	99
3.00	96	99	99	99
3.25	97	99	99	99
3.50	97	99	99	99
3.75	97	99	99	99
4.00	97	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-16
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Single-Family Residential (max. 40% impervious) for Hydrologic Soil Group C

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	51	82	87	90
0.50	68	88	91	93
0.75	77	92	94	95
1.00	83	94	95	96
1.25	86	95	96	97
1.50	89	96	97	97
1.75	91	96	97	98
2.00	92	97	98	98
2.25	93	97	98	98
2.50	94	97	98	98
2.75	95	98	98	98
3.00	95	98	98	99
3.25	96	98	98	99
3.50	96	98	99	99
3.75	97	98	99	99
4.00	97	98	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-17

Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Single-Family Residential (max. 40% impervious) for Hydrologic Soil Group D

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	48	82	87	90
0.50	65	88	91	93
0.75	75	91	94	95
1.00	81	93	95	96
1.25	85	95	96	97
1.50	88	96	97	98
1.75	90	96	97	98
2.00	92	97	98	98
2.25	93	97	98	99
2.50	94	98	98	99
2.75	94	98	99	99
3.00	95	98	99	99
3.25	96	98	99	99
3.50	96	99	99	99
3.75	97	99	99	99
4.00	97	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-18
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Multi-Family Residential (max. 65% impervious) for Hydrologic Soil Group B

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	53	78	82	83
0.50	74	88	90	91
0.75	83	92	94	94
1.00	88	95	96	96
1.25	91	96	97	97
1.50	93	97	97	98
1.75	95	98	98	98
2.00	95	98	98	98
2.25	96	98	98	99
2.50	97	98	99	99
2.75	97	99	99	99
3.00	97	99	99	99
3.25	98	99	99	99
3.50	98	99	99	99
3.75	98	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-19
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Multi-Family Residential (max. 65% impervious) for Hydrologic Soil Group B

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	49	77	81	82
0.50	69	86	88	89
0.75	79	90	92	92
1.00	85	93	94	95
1.25	89	95	96	96
1.50	91	96	96	97
1.75	92	97	97	97
2.00	94	97	98	98
2.25	95	98	98	98
2.50	95	98	98	98
2.75	96	98	98	99
3.00	96	98	99	99
3.25	97	99	99	99
3.50	97	99	99	99
3.75	98	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-20
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Multi-Family Residential (max. 65% impervious) for Hydrologic Soil Group C

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	45	75	79	81
0.50	64	84	86	87
0.75	75	89	90	91
1.00	82	92	93	94
1.25	86	94	95	95
1.50	89	95	96	96
1.75	91	96	97	97
2.00	93	97	97	97
2.25	94	97	98	98
2.50	95	98	98	98
2.75	95	98	98	98
3.00	96	98	98	99
3.25	96	98	99	99
3.50	97	98	99	99
3.75	97	98	99	99
4.00	97	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-21
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Multi-Family Residential (max. 65% impervious) for Hydrologic Soil Group D

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	43	74	78	80
0.50	62	83	85	86
0.75	74	88	90	91
1.00	80	91	92	93
1.25	85	93	94	95
1.50	88	95	95	96
1.75	90	96	96	97
2.00	92	96	97	97
2.25	93	97	97	98
2.50	94	97	98	98
2.75	95	98	98	98
3.00	96	98	98	98
3.25	96	98	99	99
3.50	97	99	99	99
3.75	97	99	99	99
4.00	97	99	99	99

Table 11.7-22
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Commercial (max. 80% impervious) for Hydrologic Soil Group A

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	41	73	77	79
0.50	65	84	86	87
0.75	76	89	91	91
1.00	83	92	93	94
1.25	88	95	95	96
1.50	91	96	96	97
1.75	93	97	97	97
2.00	94	97	98	98
2.25	95	98	98	98
2.50	96	98	98	99
2.75	97	98	99	99
3.00	97	99	99	99
3.25	97	99	99	99
3.50	98	99	99	99
3.75	98	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-23
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Commercial (max. 80% impervious) for Hydrologic Soil Group B

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	41	73	77	79
0.50	63	83	86	87
0.75	74	88	90	91
1.00	81	92	93	93
1.25	87	94	95	95
1.50	89	95	96	96
1.75	92	96	97	97
2.00	93	97	97	98
2.25	94	97	98	98
2.50	95	98	98	98
2.75	96	98	98	99
3.00	97	98	99	99
3.25	97	99	99	99
3.50	97	99	99	99
3.75	98	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-24
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Commercial (max. 80% impervious) for Hydrologic Soil Group C

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	39	72	77	78
0.50	62	83	85	86
0.75	72	87	89	90
1.00	80	91	92	93
1.25	85	93	94	95
1.50	88	95	96	96
1.75	91	96	97	97
2.00	92	97	97	97
2.25	94	97	98	98
2.50	95	98	98	98
2.75	96	98	98	98
3.00	96	98	99	99
3.25	97	98	99	99
3.50	97	99	99	99
3.75	97	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-25
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Commercial (max. 80% impervious) for Hydrologic Soil Group D

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	39	72	76	78
0.50	61	82	85	86
0.75	71	87	89	90
1.00	79	90	92	93
1.25	84	93	94	94
1.50	88	94	95	96
1.75	90	96	96	97
2.00	92	96	97	97
2.25	94	97	98	98
2.50	94	97	98	98
2.75	95	98	98	98
3.00	96	98	98	99
3.25	97	98	99	99
3.50	97	99	99	99
3.75	97	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-26
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Highway (max. 50% impervious) for Hydrologic Soil Group A

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	54	79	82	83
0.50	75	88	90	91
0.75	85	93	94	95
1.00	90	95	96	96
1.25	92	97	97	97
1.50	94	97	98	98
1.75	95	98	98	98
2.00	96	98	99	99
2.25	97	99	99	99
2.50	97	99	99	99
2.75	98	99	99	99
3.00	98	99	99	99
3.25	98	99	99	99
3.50	98	99	99	99
3.75	98	99	99	99
4.00	99	99	99	100

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-27
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Highway (max. 50% impervious) for Hydrologic Soil Group B

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	50	77	81	82
0.50	70	86	89	89
0.75	80	91	92	93
1.00	86	93	94	95
1.25	89	95	96	96
1.50	91	96	97	97
1.75	93	97	97	97
2.00	94	97	98	98
2.25	95	98	98	98
2.50	96	98	98	98
2.75	96	98	99	99
3.00	97	98	99	99
3.25	97	99	99	99
3.50	97	99	99	99
3.75	98	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-28
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Highway (max. 50% impervious) for Hydrologic Soil Group C

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	47	76	79	81
0.50	65	84	87	88
0.75	76	89	91	91
1.00	83	92	93	94
1.25	87	94	95	95
1.50	89	95	96	96
1.75	91	96	97	97
2.00	93	97	97	97
2.25	94	97	98	98
2.50	95	98	98	98
2.75	96	98	98	98
3.00	96	98	98	99
3.25	97	98	99	99
3.50	97	99	99	99
3.75	97	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-29
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Highway (max. 50% impervious) for Hydrologic Soil Group D

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	44	74	78	80
0.50	63	83	86	87
0.75	74	88	90	91
1.00	81	91	93	93
1.25	85	93	94	95
1.50	89	95	96	96
1.75	91	96	96	97
2.00	92	96	97	97
2.25	93	97	97	98
2.50	94	97	98	98
2.75	95	98	98	98
3.00	96	98	98	99
3.25	96	98	99	99
3.50	97	98	99	99
3.75	97	99	99	99
4.00	97	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-30
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Highway (max. 75% impervious) for Hydrologic Soil Group A

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	41	73	77	79
0.50	65	84	86	87
0.75	76	89	91	91
1.00	83	92	93	94
1.25	88	95	95	96
1.50	91	96	96	97
1.75	93	97	97	97
2.00	94	97	98	98
2.25	95	98	98	98
2.50	96	98	98	99
2.75	97	98	99	99
3.00	97	99	99	99
3.25	97	99	99	99
3.50	98	99	99	99
3.75	98	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-31
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Highway (max. 75% impervious) for Hydrologic Soil Group B

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	41	73	77	79
0.50	63	83	86	87
0.75	74	88	90	91
1.00	81	91	93	93
1.25	87	94	95	95
1.50	89	95	96	96
1.75	92	96	97	97
2.00	93	97	97	98
2.25	94	97	98	98
2.50	95	98	98	98
2.75	96	98	98	99
3.00	97	98	99	99
3.25	97	99	99	99
3.50	97	99	99	99
3.75	98	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-32
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Highway (max. 75% impervious) for Hydrologic Soil Group C

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	39	72	77	78
0.50	62	82	85	86
0.75	72	87	89	90
1.00	80	91	92	93
1.25	85	93	94	95
1.50	88	95	95	96
1.75	91	96	97	97
2.00	92	97	97	97
2.25	94	97	98	98
2.50	95	98	98	98
2.75	96	98	98	98
3.00	96	98	99	99
3.25	97	98	99	99
3.50	97	99	99	99
3.75	97	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Table 11.7-33
Removal Efficiencies for Total Phosphorus Using Various Treatment Options in Highway (max. 75% impervious) for Hydrologic Soil Group D

Retention Depth (inches)	Annual Total P Removal (%)			
	Dry Retention[1]	Retention / Wet Detention[2]		
		t_d=7 days	t_d=14 days	t_d=21 days
0.25	38	72	76	78
0.50	61	82	85	86
0.75	71	87	89	90
1.00	79	90	92	93
1.25	84	93	94	94
1.50	88	94	95	96
1.75	90	96	96	97
2.00	92	96	97	97
2.25	94	97	98	98
2.50	94	97	98	98
2.75	95	98	98	98
3.00	96	98	98	99
3.25	97	98	99	99
3.50	97	99	99	99
3.75	97	99	99	99
4.00	98	99	99	99

1. Dry retention alone.
2. Dry retention followed by wet detention with various residence times.

Complete Rewording of Appendix K

APPENDIX K

LEGAL DESCRIPTION

LAKE APOPKA HYDROLOGIC BASIN

Begin at the Northeast corner of Section 29, Township 22 South, Range 28 East; thence South along the Section lines to the Southeast corner of the Northeast quarter of Section 32, Township 22 South, Range 28 East; thence west along the quarter section line to the Southeast corner of the Northwest quarter of Section 31, Township 22 South, Range 28 East; thence South along the quarter section line to the Southeast corner of the Southwest quarter of Section 31, Township 22 South, Range 28 East; thence West along the Section lines to the Southwest corner of the Southeast quarter of Section 36, Township 22 South, Range 27 East; thence South along the quarter section line to the Southeast corner of the Southwest quarter of Section 1, Township 23 South, Range 27 East; thence West along the Section line to the Southeast corner of Section 2, Township 23 South, Range 27 East; thence South along the Section line to the Southeast corner of Section 11, Township 23 South, Range 27 East; thence West along the Section lines to the Southeast corner of the Southwest quarter of Section 7, Township 23 South, Range 27 East; thence South along the quarter section line to the Southeast corner of the Northeast quarter of the Northwest quarter of Section 18, Township 23 South, Range 27 East; thence West along the south line of the Northeast quarter of the Northwest quarter and along the south line of the Northwest quarter of the Northwest quarter, to the Southwest corner of the Northwest quarter of the Northwest quarter of Section 18, Township 23 South, Range 27 East; thence North along the Section line to the Southwest corner of Section 7, Township 23 South, Range 27 East: thence West along the Section line to the Southwest corner of the Southeast quarter of Section 12, Township 23 South, Range 26 East; thence North along the quarter section line to the Southeast corner of the Southwest quarter of Section 1, Township 23 South, Range 26 East; thence West along the Section lines to the Southwest corner of the Southeast quarter of Section 6, Township 23 South, Range 26 East; thence North along the quarter section line to the Northwest corner of the Northeast quarter of Section 6, Township 23 South, Range 26 East; thence East along the Section line to the Southwest corner of Section 32, Township 22 South, Range 26 East; thence North along the Section line to the Northwest corner of Section 32, Township 22 South, Range 26 East; thence East along the Section line to the Southwest corner of Section 28, Township 22 South, Range 26 East; thence North along the Section line to the Southeast corner of the Northeast Quarter of Section 5, Township 22 South, Range 26 East; thence West along the quarter section line to the Southwest corner of the Northwest Quarter of Section 5, Township 22 South, Range 26 East; thence North along the Section lines to the Northwest corner of Section 32, Township 21 South, Range 26 East; thence East along the Section line to the Northeast corner of the Northwest quarter of Section 32, Township 21 South, Range 26 East; thence North along the quarter section lines to the Northwest corner of the Northeast quarter of Section 20, Township 21 South, Range 26 East; thence East along the Section line to the Southwest corner of Section 16, Township 21 South, Range 26 East; thence North along the Section line to the Northwest corner of Section 16, Township 21 South, Range 26 East; thence East along the Section line to the

Southwest corner of the Southeast quarter of Section 9, Township 21 South, Range 26 East; thence North along the quarter section line to the Northwest corner of the Southeast quarter of Section 4, Township 21 South, Range 26 East; thence West along the quarter section line to the Southwest corner of the Northwest quarter of Section 4, Township 21 South, Range 26 East; thence North along the Section line to the Northwest corner of Section 4, Township 21 South, Range 26 East and the South line of Section 33, Township 20 South, Range 26 East; thence West along said South line to the Southwest corner of said Section 33, Township 20 South, Range 26 East; thence North along the section lines to the Northwest corner of Section 28, Township 20 South, Range 26 East; thence East along the section lines to the Southwest corner of the Southeast quarter of Section 24, Township 20 South, Range 26 East; thence North along the quarter section line to the Northwest corner of the Southeast quarter of Section 24, Township 20 South, Range 26 East; thence East along the quarter section line to the Northeast corner of the Southeast quarter of Section 24, Township 20 South, Range 26 East; thence North along the Section line to the Northwest corner of Section 19, Township 20 South, Range 27 East; thence East along the Section lines to the Northwest corner of Section 21, Township 20 South, Range 27 East; thence North along the Section line to the Northwest corner of the Southwest quarter of Section 16, Township 20 South, Range 27 East; thence East along the quarter section line to the Northeast corner of the Southeast quarter of Section 16, Township 20 South, Range 27 East; thence North along the Section line to the Northwest corner of Section 15, Township 20 South, Range 27 East; thence East along the Section line to the Northeast corner of Section 14, Township 20 South, Range 27 East; thence South along the Section lines to the Southeast corner of Section 23, Township 20 South, Range 27 East; thence West along the Section line to the Southwest corner of the Southeast quarter of Section 23, Township 20 South, Range 27 East; thence South along the quarter section line to the Northwest corner of the Northeast quarter of Section 35, Township 20 South, Range 27 East; thence East along the Section line to the Northeast corner of Section 35, Township 20 South, Range 27 East; thence South along the Section line to the Southeast corner of Section 35, Township 20 South, Range 27 East; thence East along the Section line to the Southwest corner of the Southeast quarter of Section 36, Township 20 South, Range 27 East; thence North along the quarter section line to the Northwest corner of the Southeast quarter of Section 36, Township 20 South, Range 27 East; thence East along the quarter section line to the Northeast corner of the Southeast quarter of Section 36, Township 20 South, Range 27 East; thence North along the Section line to the Northwest corner of Section 31, Township 20 South, Range 28 East; thence East along the Section lines to the Northeast corner of the Northwest quarter of Section 33, Township 20 South, Range 28 East; thence South along the quarter section lines to the Southeast corner of the Southwest quarter of Section 9, Township 21 South, Range 28 East; thence East along the Section line to the Northwest corner of the Northeast quarter of the Northeast quarter of Section 16, Township 21 South, Range 28 East; thence South along the quarter-quarter Section lines to the Southwest corner of the Southeast quarter of the Southeast quarter of Section 16, Township 21 South, Range 28 East; thence West along the Section line to the Southwest corner of the Southeast quarter of Section 16, Township 21 South, Range 28 East; thence South along the quarter section line to the Southeast corner of the Southwest quarter of Section 21, Township 21 South, Range 28 East; thence West along the Section line to the Southeast corner of Section 20, Township 21 South, Range 28 East; thence South along the Section line to the Southeast corner of Section 32, Township 21 South, Range 28 East; thence West along the Section

line to the Southwest corner of the Southeast quarter of Section 32, Township 21 South, Range 28 East; thence South along the quarter section line to the Southwest corner of the Northeast quarter of Section 8, Township 22 South, Range 28 East; thence East along the quarter section line to the Southeast corner of the Northeast quarter of Section 8, Township 22 South, Range 28 East; thence South along the Section line to the Southeast corner of Section 8, Township 22 South, Range 28 East; thence West along the Section line to the Southeast corner of Section 7, Township 22 South, Range 28 East; thence South along the Section line to the Southeast corner of the Northeast quarter of Section 18, Township 22 South, Range 28 East; thence West along the quarter section line to the Northeast corner of the Southeast quarter of Section 13, Township 22 South, Range 27 East; thence South along the Section line to the Southeast corner of Section 13, Township 22 South, Range 27 East; thence West along the Section line to the Southwest corner of the Southeast quarter of Section 13, Township 22 South, Range 27 East; thence South along the quarter section line to the Northwest corner of the Northeast quarter of Section 25, Township 22 South, Range 27 East; thence East along the Section lines to the Northeast corner of Section 29, Township 22 South, Range 28 East, and the Point of Beginning.

NOTE: This description is based on U.S. Geological Survey 7.5 minute series quadrangle maps and St. Johns River Water Management District Hydrologic Basin maps.

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

RULE NO.:	RULE TITLE:
40C-41.011, F.A.C.	Policy and Purpose
40C-41.023, F.A.C.	Basin Boundaries
40C-41.033, F.A.C.	Implementation
40C-41.043, F.A.C.	Application of Chapter
40C-41.051, F.A.C.	Exemptions
40C-41.063, F.A.C.	Conditions for Issuance of Permits

NOTICE OF CHANGE

Notice is hereby given that the following changes have been made to the proposed rule in accordance with subparagraph 120.54(3)(d)1, F.S., published in Volume 28, Number 16, of the Florida Administrative Weekly on April 19, 2002. This Notice of Change is being submitted to establish an effective date of March 7, 2003, for the following rule sections.

40C-41.011, Policy and Purpose

Proposed effective date 3-07-03.

40C-41.023 Basin Boundaries.

Proposed effective date 3-07-03.

40C-41.033, Implementation

Proposed effective date 3-07-03.

40C-41.043 Application of Chapter.

Proposed effective date 3-07-03.

40C-41.051 Exemptions.

Proposed effective date 3-07-03.

40C-41.063 Conditions for Issuance of Permits.
Proposed effective date 3-07-03.

ST. JOHNS RIVER WATER MANAGEMENT DISTERICT

RULE NO.:	RULE TITLE:
40C-42.023, F.A.C.	Requirements for Issuance

NOTICE OF CHANGE

Notice is hereby given that the following changes have been made to the proposed rule in accordance with subparagraph 120.54(3)(d)1, F.S., published in Volume 28, Number 16, of the Florida Administrative Weekly on April 19, 2002. This Notice of Change is being submitted to establish an effective date of March 7, 2003, for the following rule section.

40C-42.023 Requirements for Issuance

Proposed effective date 3-07-03.

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

RULE NO.:	RULE TITLE:
40C-44.065, F.A.C.	Performance Standards
40C-44.091, F.A.C.	Publications Incorporated by Reference

NOTICE OF CHANGE

Notice is hereby given that the following changes have been made to the proposed rule in accordance with subparagraph 120.54(3)(d)1, F.S., published in Volume 28, Number 16, of the Florida Administrative Weekly on April 19, 2002. This Notice of Change is being submitted to establish an effective date of March 7, 2003, for the following rule sections.

40C-44.065 Performance Standards

Proposed effective date 3-07-03.

40C-44.091 Publications Incorporated by Reference

Proposed effective date 3-07-03.