Appendix 11-1. Annual Permit Compliance Monitoring Report for the Non-ECP Discharge Structures

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INTRODUCTION

The Non-Everglades Construction Project (Non-ECP) permit (DEP No. 06,502590709) authorizes the South Florida Water Management District (District) to operate and maintain thirty-seven structures within the control of the District discharging ***into***, ***within***, or ***from*** the Everglades Protection Area (EPA) which are not included in the Everglades Construction Project (ECP).

This is the third Annual Permit Compliance Monitoring Report for the Non-ECP Discharge Structures for all required water quality parameters, except for mercury monitoring. The reporting requirements for Mercury (Specific Condition 11) are fulfilled in Chapter 7 Appendices. This report summarizes water quality data collected during Water Year 2000 (May 1, 1999 through April 30, 2000). It extends water quality constituent analyses presented in Chapter 4 (including Chapter 4 Appendices) of last year's Everglades Consolidated Report (SFWMD 1999a) and analyzes water quality constituent data sampled at Non-ECP structures during the third year of monitoring in compliance with reporting requirements, as stated in Specific Conditions 5 and 12 of the Non-ECP Permit.

METHODS

WATER QUALITY AND HYDROLOGIC DATA SOURCES

The water quality and hydrologic data evaluated in this report were retrieved from the South Florida Water Management District's (District's) DBHYDRO database. Before water quality data are entered into the database, the District follows strict Quality Assurance/Quality Control (QA/QC) procedures approved by the DEP for both data collection and analytical methods. These methods are documented in the District's Comprehensive Quality Assurance Plan #870166G (SFWMD, 1998), which is annually reviewed, updated and approved by DEP. Contract laboratories used by the District must also have its comprehensive plans approved by DEP. Methods for hydrological data collection are documented in the Guidelines for the Collection of Hydrologic and

Meteorologic Data (SJRWMD et. al., 1994) and procedures for QA/QC of hydrological data are found in Guidelines for Quality Control and Quality Assurance of Hydrologic and Meteorologic Data (SJRWMD et al., 1999).

PERMIT SAMPLING SITES

In addition to authorizing the operation and maintenance of the thirty-seven structures, the Non-ECP permit required the establishment of a routine water quality monitoring program to characterize the quality of water discharged through the structures. The Non-ECP permit also required a monitoring program at four additional ***C-111 basin*** structures (upstream) controlled by the District, two structures controlled by the Village of Wellington, and one structure controlled by the North Springs Improvement District where potential water quality problems may exist.

The District expanded its existing monitoring program in 1997 to collect the water quality data at those 44 structures. The structure locations are shown in **Figure A11-1.1**. In accordance with Specific Condition 16, the District previously submitted a Monitoring Locations Report to DEP on July 15, 1998 with detailed information on the specific locations for sample collection for all 44 structures. The monitoring program encompasses 38 locations in all, which provide the representative information to characterize the quality of water discharged through the 44 structures. The structure names, representative water quality monitoring location names, and the sampling frequencies of the various categories of chemical constituents and physical properties required by the monitoring schedule denoted in the permit are shown in **Appendix 11-1a**, **Table A11-1a.1**.

PERMIT DATA ANALYSIS PERIODS

Specific Condition 7 of the Non-ECP Permit required the District to first update the District's water quality data base for Non-ECP structures and then evaluate these data based on a comparison to State water quality standards. This permit condition also required the District to complete a second water quality data evaluation to update the first data evaluation by including the first 12 months of data collected since the issuance of the Non-ECP permit.

In addition, Specific Condition 12 required the District to continue to submit annual monitoring reports providing updates on water quality data and associated comparisons with state water quality standards. The water quality characterization includes an evaluation of compliance with Class III criteria for each structure. The data evaluations for the first and second data evaluation reports (Specific Condition 7(a) and 7(b), respectively) were submitted as part of the Non-ECP Permit's first annual monitoring report on April 20, 1999 (SFWMD, 1999b). The Non-ECP Permit’s second annual monitoring report was incorporated within chapters 4 and 11 of the Everglades Consolidated Report (ECR) submitted January 2000 (SFWMD, 1999a).

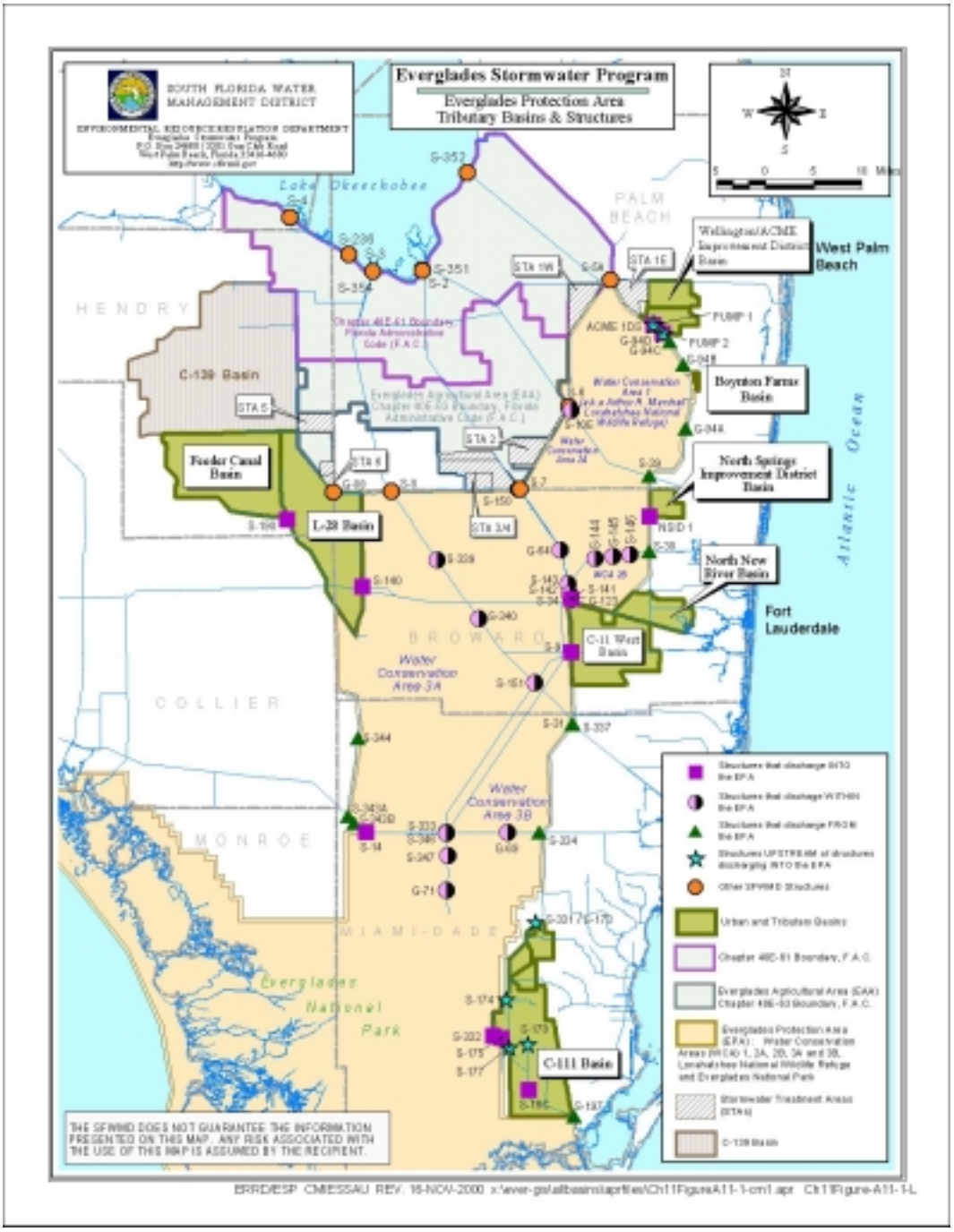


Figure A11-1-1. Non-ECP discharge structures and additional upstream structures.

This report provides the annual update of the Non-ECP Permit monitoring program (Specific Condition 12) and a comparison of water quality data at Non-ECP structures to State water quality standards from May 1, 1999 to April 30, 2000 (Non-ECP third year's data). The year ending on April 30, 2000 corresponds to Water Year 2000 (WY2000). These comparisons fulfill Non-ECP permit requirements to measure progress toward achieving and maintaining compliance with State water quality standards.

METHOD DETECTION LIMITS

Each water quality constituent has a Method Detection Limit (MDL) that essentially defines the minimum concentration or level at which the constituent can be quantified. The MDL is usually twice the background noise level associated with a test and will not represent an exact measurement. The Practical Quantitation Limit (PQL) represents a higher level of measurement certainty, i.e., greater precision, for a constituent than the MDL and is generally considered to be the lowest level achievable among laboratories within specified limits during routine laboratory operations. Different laboratories establish PQLs at two to five times the MDL. In this report, trace metal data reported to be less than the MDL were assigned a value of the MDL. TP data less than the MDL of 4 ppb were assigned the value of 4 ppb to provide a conservative basis for statistical analysis purposes. For pesticide detections, concentrations greater than the PQL were considered to be reliable data.

EXCURSION ANALYSIS FOR CLASS III CONSTITUENTS AND PESTICIDES

To evaluate compliance with water quality criteria in WY2000, constituent concentrations were compared to their respective Class III numeric criteria. If a constituent concentration exceeded the numeric criteria, an excursion was recorded. The total number of excursions and the percent of excursions for the Non-ECP structures were tabulated.

Trace Metals and Un-ionized Ammonia

The un-ionized portion of dissolved ammonia measured in a water sample was calculated and compared to the 0.02 mg/L criterion only if temperature and pH had been recorded for that sample. For trace metals, the most recent trace metal calculated criteria were used for evaluating the data, even if the criteria had changed over time. When comparing the calculated criteria with trace metal concentrations, only water samples that had hardness determined from the same sample as the trace metal were used, i.e. no extrapolations to samples without hardness data were made. The equations used in this report for calculated criteria for trace metals and un-ionized ammonia were derived from the equations listed in rule 62-302.503, of the Florida Administrative Code (F.A.C.).

Total Phosphorus

Since there is no numeric criterion for TP at this time, TP data were presented in time series plots and statistical box plots. For TP, any site with data >50 ppb would be viewed as a concern, any site with data >10 ppb would be viewed as a potential concern, and below 10 ppb would be of no concern. This approach is consistent with the federal

Settlement Agreement (1991), which indicates that the District's STAs are located and sized to deliver a uniform long-term annual flow-weighted mean TP concentration of 50 ppb or less at each inflow point to the EPA. Additionally, the Everglades Forever Act (EFA) mandates that the phosphorus criterion shall be 10 ppb in the Everglades Protection Area (EPA) in the event the department (DEP) does not adopt by rule such criterion by December 31, 2003. The reader should be aware there are additional compliance TP concentration limits for inflows to Everglades National Park (Park) by way of Shark River Slough (S12s and S333), Taylor Slough (S332 and S175), and the Coastal Basin (S18C) outlined in Appendix A of the Settlement Agreement (1991). However, this report does not track compliance with the interim or long-term TP concentration limits set forth in the Settlement Agreement.

The District's categorization of concern, potential concern or no concern is based upon a common sense understanding of water resource protection. These terms, however, are not intended to be interpretations of state water quality standards or state water quality law. The DEP, not the District, is responsible for interpreting whether a given constituent violates its numeric criterion, narrative criterion, a water body's designated uses or the anti-degradation policy.

Pesticides

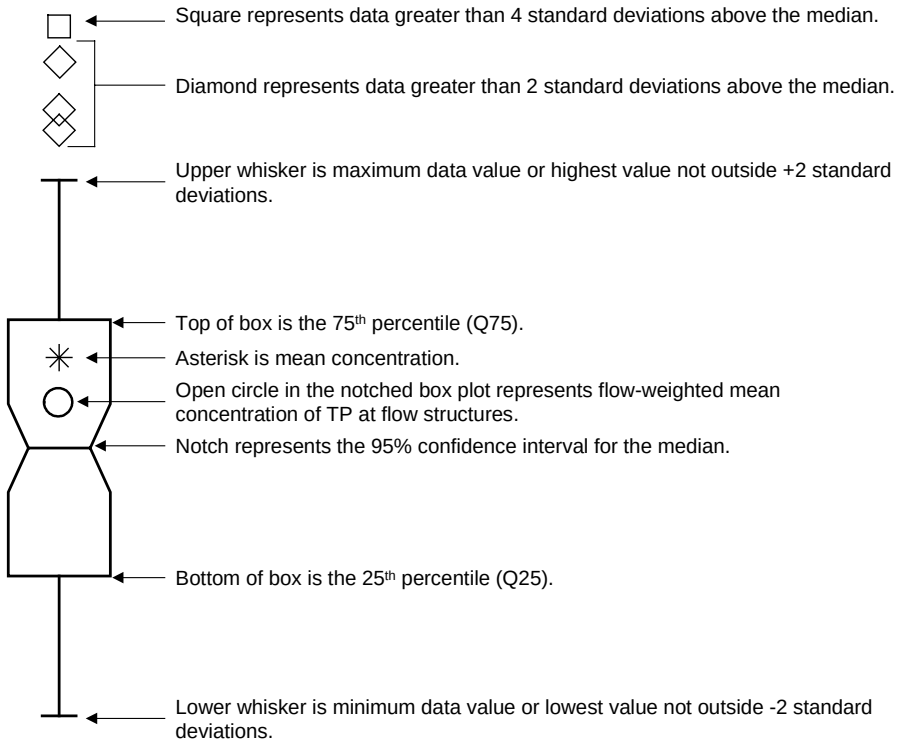
The EPA pesticide monitoring program includes Non-ECP permitted structures. For the purposes of this report the WY2000 surface water pesticide analyses are presented in tables for just the Non-ECP structures. The sediment pesticide analyses for WY2000 are presented in a separate table. Five upstream structures in the C-111 Basin are included in the pesticide monitoring program as they represent potential warning sites for pesticides that might be discharged into the Park.

DESCRIPTION OF NOTCHED BOX AND WHISKER PLOTS

Notched box and whisker plots were created to summarize data for each constituent that exceeded its numerical criteria. These plots were also created to summarize the TP data collected at all monitoring locations. A notched box and whisker plot summarizes selected statistical properties of the data sets. Notched box and whisker plots can be used to test for statistical significance between data sets at roughly a 95 percent confidence interval, to detect changes in constituent concentration variability over time and to determine if trends exist. The notched box and whisker plot used for these summaries follows McGill, et al., 1978, (**Table A11-1.1**).

It is recognized that determining differences between data sets with large differences in sample size using notched box and whisker plots may cause significant findings that are artifacts of the number of samples and the amount of variation in the data sets. The objective of providing the plots was to compare the current water year (2000) to previous individual permit water years (1998 and 1999), and previously established baseline data sets for the Non-ECP discharge structures.

Table A11-1.1. Description of the Notched box and whisker plots used in this report.



1. Notches surrounding the medians provide a measure of the significance of differences between notched box plots If the notches about two medians do not overlap, the medians are significantly different at about a 95 percent confidence level.
2. At times the variability in a data set may be quite high. When highly variable data are presented in a notched box and whisker plot, the width of the notch may be greater than the 25th or 75th percentile. When this occurs, the box plot appears as if it is folded from the end of the notch back towards the median. This is done automatically by the statistic program to save space within the figure being presented.
3. Notches are calculated using the following equation:

$$Notch = Median \pm \frac{1.58(Q75 - Q25)}{\sqrt{n}}$$

Where: n = number of data points

WATER QUALITY DATA EVALUATION AND CRITERIA EXCURSION ANALYSIS

In accordance with Specific Conditions 5 and 12(h) of the Non-ECP permit, this section presents an update of constituent concentrations and physical properties measured during the third year of permit monitoring, WY2000, (May 1, 1999 through April 30, 2000). For standards with numeric criteria, the data from the structures are assessed for compliance with those standards using the procedures in rule 62-4.246, F.A.C. For parameters that have narrative water quality criteria, the concentrations obtained at each structure are reported utilizing plots and summary statistics.

PHYSICAL PARAMETER, NUTRIENTS, MAJOR ION, AND TRACE METAL MONITORING

Descriptive Statistics

Procedures used for summarizing and analyzing data in the first and second annual permit compliance monitoring reports for Non-ECP structures (SFWMD, 1999b & 1999a, respectively) were followed for this WY2000 update. Summarization of the data begins with a presentation of descriptive statistics for all water quality constituent concentrations and physical properties (excluding pesticides and priority pollutants) measured for Non-ECP monitoring locations during WY2000 (**Appendix 11-1b, Table A11-1b.2**). The descriptive statistics (summary tables) are presented by monitoring location for each water quality parameter collected for the site. A reference table is also provided in **Appendix 11-1b, Table A11-1b.1,** reflecting current state Class III criteria.

The statistical summary tables report the range of constituent concentrations, median values, number of sample observations, selected data percentiles (25th and 75th), and flag parameters exhibiting excursions from Class III numeric criteria. Concentrations observed to be less than the lower limit of the analytical method (MDL) were set equal to the MDL for statistical analysis.

For parameters such as nutrients, which have only narrative criteria, the tables provide basic information to assist with identifying water quality constituents that may be of concern. The nutrient deemed of particular concern for the Non-ECP structures is TP, and additional discussion is provided in this section.

Excursions from Class III Criteria (Numeric)

Further analysis of excursions from Class III criteria was accomplished by summarizing the excursions, plotting the data for parameters exhibiting the excursions, discussing the parameters, and noting which ones are of concern. The excursion analysis is based on 11 water quality parameters (with a numeric criteria) shown in **Table A11-1.2** that are collected for the Non-ECP monitoring program which can be compared with applicable Class III water quality criteria listed rule 62-302.530, F.A.C.

Table A11-1.2. Summary of total number of excursions from state Class III criteria for all Non-ECP monitoring sites during WY2000 (May 1, 1999 through April 30, 2000) and previous periods.

Parameter	WY2000	WY1999	WY1998	Non-ECP Baseline	EFA Baseline
Total Alkalinity	(0:559)	(0:502)	(0:525)	(0:2845)	(1:2677)
Dissolved Oxygen	(558:697)	(485:581)	(459:551)	(2177:3018)	(1694:2615)
Specific Conductance	(5:698)	(0:589)	(3:551)	(12:3058)	(59:2615)
PH	(1:698)	(10:589)	(12:551)	(37:3008)	(6:2586)
Turbidity	(3:645)	(4:504)	(0:527)	(12:2842)	(10:2637)
Un-Ionized Ammonia	(1:622)	(20:501)	(7:448)	(10:2661)	(12:2548)
Total Iron	(0:270)	(1:244)	(0:261)	(5:1655)	(5:836)
Total Cadmium	(0:133)	(0:126)	(1:127)	(4:785)	(9:362)
Total Lead	(0:119)	(0:112)	(0:120)	(2:785)	(1:364)
Total Copper	(0:132)	(0:126)	(0:127)	(0:779)	(1:373)
Total Zinc	(0:129)	(0:125)	(0:127)	(2:786)	(3:363)

Note: 1st number in parenthesis indicates number of excursions, 2nd number in parenthesis indicates total number of samples collected.

WY1999 (May 1, 1998 – April 30, 1999); WY1998 (May 1, 1997 – April 30, 1998); Non-ECP Baseline (October 1, 1988 – April 30, 1997); EFA Baseline (October 1, 1978 – September 30, 1988)

Of the eleven parameters listed in **Table A11-1.2**, the following five parameters exhibited excursions at one or more locations during WY2000: **dissolved oxygen**, **specific conductance**, **pH**, **turbidity**, and **un-ionized ammonia**. Previous Non-ECP annual monitoring reports provided summary tables showing the total number of excursions by individual monitoring location. **Table A11-1.2** summarizes the previously reported information and compares the results with the current water year. The reader is referred to previous reports (SFWMD 1999a & 1999b) for information on individual sites. A summary of observed excursions from Class III criteria for individual Non-ECP monitoring locations during WY2000 is presented in **Table A11-1.3**. The monitoring locations are categorized in the table as either ***into***, ***within***, ***from*** or ***C-111 basin*** locations as defined by the Non-ECP permit.

Calculated criteria for the parameters were derived from the equations listed in rule 62-302.530, F.A.C. When comparing the calculated criteria with trace metal or major ion concentrations, only samples that had hardness determined from the same sample as the trace metal or major ion were used.

For parameters which exceeded Class III criteria during WY2000, time series plots and box-whisker plots are provided in **Appendix A11-1c**. These plots report the range of the data, magnitude of the excursions, and assist with detecting if there are any increasing or decreasing trends observed in the data. In order to assess how far above or below a Class III numeric criteria a physical parameter, major ion, or trace metal deviates, a percent departure line was added to the time series plots and box-whisker plots. These departure lines clearly indicate whether a parameter value ranges more than 1, 10 or 100

percent beyond the numeric criteria. For the physical parameters, these appear as horizontal lines across the plots. For the major ions and trace metals, the criteria for each parameter for a particular sample is calculated based on the hardness data calculated from the same sample. Therefore the criteria changes from sample to sample. For data values that show an excursion, the percentage departure is annotated on the plot above the data value.

Dissolved oxygen

DO concentrations exhibited consistent excursions from Class III criteria during WY2000 (**Table A11-1.3**). About 80 percent of the 697 DO concentrations measured at Non-ECP monitoring locations were less than the minimum criterion of 5.0 mg/L. The DO concentrations measured for WY2000 are consistent with concentration levels and the frequency of excursions seen in previous water years. The DO time series and box whisker plots are shown in **Appendix 11-1c**.

Due to the natural conditions within the EPA, the low concentrations observed are due in part to the shallow water depths, type of aquatic vegetation habitat, concentrations of nutrients and diel variation of temperature and the amount of photosynthetic activity.

Thus, DO concentrations in EPA marshes and tributaries are typically lowest in the early morning hours around dawn because microbial and vegetation respiration has consumed the DO produced during daylight hours the previous day. Low DO levels are of concern. However, low concentrations and resultant excursions can represent natural conditions and may not necessarily reflect an impairment of waters within the EPA except in areas that have been impacted by high phosphorus concentrations (McCormick and Laing, 1999).

A process has been required in the administrative orders associated with the EFA and NPDES permits for the STAs which acknowledges dissolved oxygen concentration fluctuations in marsh environments which routinely fall below the Class III criterion of 5.0 mg/L. This process shall result in DEP agency action to revise the dissolved oxygen criterion for natural marshes, to create a site specific alternative criterion for natural marshes or some other moderating provision that reflects these natural fluctuations.

Table A11-1.3. Summary of excursions from state Class III criteria for individual Non-ECP monitoring sites during WY2000 (May 1, 1999 through April 30, 2000).

AREA	STRUCTURE	SAMPLING SITE	PARAMETERS										
			Alkalinity	Do	Specific Conductance	pH	Turbidity	Un-Ionized Ammonia	Iron	Cadmium	Lead	Copper	Zinc
INTO	ACME1DS	ACME1DS	(0 : 14)	**(5 : 14)**	(0 : 14)	(0 : 14)	(0 : 14)	(0 : 14)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	ACME1 (Upstream of ACME1DS)	L40-1	Data Collection Discontinued										
	G-94D	G94D	(0 : 14)	**(8 : 14)**	(0 : 14)	(0 : 14)	(0 : 14)	(0 : 14)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	ACME2 (Upstream of G94D)	L40-2	Data Collection Discontinued										
	G-123	G123	(0 : 11)	**(10 : 10)**	(0 : 10)	(0 : 10)	(0 : 11)	(0 : 10)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-9	S9	(0 : 20)	**(50 : 51)**	(0 : 51)	(0 : 51)	(0 : 20)	(0 : 20)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-14	S14	No Data (Structure Closed)										
	S-18C	S18C	(0 : 24)	**(16 : 25)**	(0 : 25)	(0 : 25)	(0 : 24)	(0 : 22)	(0 : 23)	(0 : 13)	(0 : 13)	(0 : 13)	(0 : 11)
	S-140	S140	(0 : 19)	**(15 : 20)**	(0 : 20)	(0 : 20)	(0 : 19)	(0 : 19)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-175	S175	(0 : 16)	**(34 : 45)**	(0 : 45)	(0 : 45)	(0 : 38)	(0 : 36)	(0 : 15)	(0 : 12)	(0 : 12)	(0 : 12)	(0 : 11)
	S-190	S190	(0 : 18)	**(9 : 17)**	(0 : 17)	(0 : 17)	(0 : 18)	(0 : 17)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-332	S332	(0 : 25)	**(36 : 45)**	(0 : 45)	(0 : 45)	(0 : 46)	(0 : 44)	(0 : 24)	(0 : 14)	(0 : 14)	(0 : 14)	(0 : 14)
	NSID1 (S38B)	S38B	(0 : 5)	**(1 : 5)**	(0 : 5)	(0 : 5)	(0 : 5)	(0 : 5)	(0 : 2)	(0 : 1)	(0 : 1)	(0 : 1)	(0 : 1)
WITHIN	G-64	G64	(0 : 21)	**(21 : 21)**	(0 : 21)	(0 : 21)	(0 : 21)	(0 : 21)	(0 : 4)	(0 : 2)	ND	(0 : 2)	(0 : 2)
	G-69	G69	No Data (Structure Closed)										
	G-71, S-346, S-347	S12D	(0 : 20)	**(24 : 25)**	(0 : 25)	(0 : 25)	(0 : 20)	(0 : 18)	(0 : 20)	(0 : 12)	(0 : 12)	(0 : 12)	(0 : 11)
	S-10E	S10E	(0 : 12)	**(8 : 11)**	**(2 : 11)**	(0 : 11)	**(2 : 12)**	**(1 : 11)**	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-141	S34	Same as Data for S34 Shown Below										
	S-142	S142	(0 : 16)	**(14 : 16)**	(0 : 16)	(0 : 16)	(0 : 16)	(0 : 16)	(0 : 4)	(0 : 2)	ND	(0 : 2)	(0 : 2)
	S-143	S11A	(0 : 13)	**(5 : 13)**	(0 : 13)	(0 : 13)	(0 : 13)	(0 : 12)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-144	S144	(0 : 18)	**(11 : 19)**	(0 : 19)	(0 : 19)	(0 : 18)	(0 : 18)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-145	S145	(0 : 17)	**(9 : 16)**	(0 : 16)	(0 : 16)	(0 : 17)	(0 : 16)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-146	S146	(0 : 17)	**(11 : 17)**	(0 : 17)	(0 : 17)	(0 : 17)	(0 : 17)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-151	S151	(0 : 16)	**(16 : 17)**	(0 : 17)	(0 : 17)	(0 : 16)	(0 : 15)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-333	S333	(0 : 18)	**(23 : 25)**	(0 : 25)	(0 : 25)	(0 : 18)	(0 : 17)	(0 : 18)	(0 : 12)	(0 : 12)	(0 : 12)	(0 : 12)
	S-339, S-340	C123SR84	(0 : 18)	**(13 : 17)**	(0 : 18)	(0 : 18)	(0 : 18)	(0 : 18)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
FROM	G-94A, G-94B, G-94C	G94B	(0 : 12)	**(10 : 12)**	(0 : 12)	**(1 : 12)**	(0 : 12)	(0 : 12)	(0 : 4)	(0 : 2)	ND	(0 : 2)	(0 : 2)
	S-31, S-337	S31	(0 : 13)	**(11 : 14)**	(0 : 14)	(0 : 14)	(0 : 13)	(0 : 12)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-34	S34	(0 : 17)	**(14 : 16)**	(0 : 16)	(0 : 16)	(0 : 17)	(0 : 16)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-38	S38	(0 : 22)	**(16 : 21)**	(0 : 21)	(0 : 21)	(0 : 22)	(0 : 21)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-39	S39	(0 : 17)	**(10 : 17)**	**(2 : 17)**	(0 : 17)	(0 : 17)	(0 : 17)	(0 : 4)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-197	S197	(0 : 10)	**(2 : 10)**	(0 : 10)	(0 : 10)	(0 : 10)	(0 : 9)	(0 : 4)	(0 : 2)	ND	(0 : 2)	(0 : 2)
	S-334	S334	(0 : 13)	**(10 : 13)**	(0 : 13)	(0 : 13)	(0 : 13)	(0 : 13)	(0 : 4)	(0 : 2)	ND	(0 : 2)	(0 : 2)
	S-343A, S-343B	US41-25	(0 : 20)	**(23 : 25)**	(0 : 25)	(0 : 25)	(0 : 19)	(0 : 18)	(0 : 20)	(0 : 13)	(0 : 13)	(0 : 12)	(0 : 13)
	S-344	S344	(0 : 4)	**(4 : 4)**	**(1 : 4)**	(0 : 4)	(0 : 4)	(0 : 4)	(0 : 4)	(0 : 2)	ND	(0 : 2)	(0 : 2)
C-111 BASIN	S-174	S176	(0 : 18)	**(38 : 39)**	(0 : 39)	(0 : 39)	**(1 : 40)**	(0 : 38)	(0 : 18)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-177	S177	(0 : 23)	**(20 : 22)**	(0 : 22)	(0 : 22)	(0 : 23)	(0 : 21)	(0 : 22)	(0 : 4)	(0 : 4)	(0 : 4)	(0 : 4)
	S-178	S178	(0 : 12)	**(12 : 12)**	(0 : 12)	(0 : 12)	(0 : 12)	(0 : 12)	(0 : 12)	(0 : 2)	(0 : 2)	(0 : 2)	(0 : 2)
	S-331, S-173	S331-173	(0 : 26)	**(49 : 49)**	(0 : 49)	(0 : 49)	(0 : 48)	(0 : 49)	(0 : 4)	(0 : 2)	ND	(0 : 2)	(0 : 2)
Totals			(0:559)	**(558:697)**	**(5:698)**	**(1:698)**	**(3:645)**	**(1:622)**	(0:270)	(0:133)	(0:119)	(0:132)	(0:129)

Note: 1st number in parenthesis indicates number of excursions. 2nd number in parenthesis indicates total number of samples collected. -ND- indicates that no data collected

Specific Conductance

Specific conductance was measured in 682 samples taken among the monitoring sites. From the 682 samples, 5 were observed to be excursions exceeding the Class III criteria. These excursions represented less than 1% of the samples taken during WY2000. The criteria for Class III waters requires that specific conductance not exceed a level greater than 50% above background or 1,275 µmhos/cm, whichever is greater. The excursions occurred at S10E (2 of the 11 samples), S39 (2 of the 17 samples), and S344 (1 of the 4 samples) monitoring locations. Specific conductance is not a parameter of concern for the Non-ECP monitoring locations.

pH

The pH of a solution is defined as the negative base-10 logarithm of the hydrogen-ion activity and can range from 0 (very acidic) to 14 (very alkaline). For freshwater systems, the Class III criteria for pH ranges from 6.0 to 8.5 units. For WY2000, excursions from the pH criterion occurred for less than 1% of the 682 samples collected. As shown in **Table A11-1.3**, only one excursion was observed at the G94B site having a value less than 6.0 pH units. The pH data for G94B are plotted in **Appendix 11-1c**. This parameter was identified in previous Non-ECP monitoring reports as a potential concern for structures in the ***C-111 basin***. Although only one excursion was evident in the data, pH should still be considered as a potential concern in the ***C-111 basin***.

Turbidity

The criterion for Class III waters requires that turbidity not exceed 29 NTU above natural background conditions. In general, the median value can be used to determine what the average background levels are on a site to site basis for the Non-ECP monitoring locations in order to compare the measured turbidity at a site with Class III criteria. For instance, if background levels at a particular location indicate a median turbidity level around 3 NTUs, and a turbidity measurement of 30 NTU was measured, then this would indicate that the measurement is 27 NTU above background levels. This measurement would not be considered an excursion. However, in the absence of sufficient background data to calculate a median value for comparison, the 30 NTU measurement taken alone might be construed as an excursion of the criterion.

Turbidity was measured in 682 samples taken during WY2000 among the 38 Non-ECP monitoring locations. Out of the 682 samples, two locations had samples with values that were flagged as potential excursions. At S10E, two of twelve samples collected exceeded the criterion (50 NTU and 35.5 NTU). One of forty samples collected at S174 exceeded the criterion (36.2 NTU). The majority of the data are characterized by low values of turbidity, below 10 NTU. The median turbidity values for all Non-ECP sites ranged between 0.5 NTU and 9.4 NTU (see **Table A11-1b.3**). Turbidity does not appear to be a parameter of concern since excursions have occurred on very few occasions during the past several water years.

Un-Ionized ammonia

The Class III surface water quality criterion for ammonia was established for the un-ionized portion of dissolved ammonia. The un-ionized portion of dissolved ammonia measured in a water sample can be calculated and compared to the Class III criterion only if temperature and pH had been recorded for that sample. Less than 1 percent of the 622 samples analyzed for ammonia at all locations during WY2000 had concentrations that exceeded the un-ionized criterion of 0.02 mg/L. The only excursion that occurred was associated with one of eleven samples collected at structure S10E. During WY2000, no

excursions were observed in the surface waters discharging to the Park through Non-ECP structures. This parameter was identified in previous Non-ECP monitoring reports as a potential concern for structures discharging ***into*** the Park and the upstream structures in the ***C-111 basin***. Although only one excursion was evident in the data for WY2000, un-ionized ammonia is still considered to be a potential concern in the upstream ***C-111 basin*** structures and the ***into*** structures discharging to the Park from the basin.

Trace metals and total iron

Monitoring for total iron and the trace metals cadmium, copper, lead and zinc is conducted quarterly in accordance with the monitoring requirements of the Non-ECP permit. There were no observed iron or trace metal concentrations in WY2000 which exceeded their respective Class III criteria. These have not been viewed as a concern.

Evaluation of Total Phosphorus

Collection of TP at Non-ECP structures established by the Non-ECP permit is in accordance with the monitoring schedule shown in **Appendix 11-1a**. Sample collection is accomplished mainly through a grab sample collection program. Samples are collected for a majority of the structures on a biweekly basis (if flow is occurring at the structure), otherwise collection occurs at least once a month. Nutrients are the most frequently sampled parameters in the Non-ECP monitoring program. A few exceptions exist for some Non-ECP structures where sampling is conducted biweekly only during flow events. During August and September 1999, sample collection at ***C-111 basin*** structures was increased to cover additional monitoring requirements due to the initial S-332D operational pump test.

Only in one case (at structure S9) does sampling occur on a weekly basis as a result of the deployment of an autosampler. During WY2000, the Everglades Stormwater Program (ESP) initiated the process to install autosamplers at the ACME1, ACME2 NSID1, S190, and S140 pump structures. Deployment of the autosamplers at these locations was previously identified as an improvement in the monitoring program for collecting TP at ***into*** structures. It is anticipated that data from the autosamplers at these sites will be available for analysis and inclusion in the WY2001 annual compliance monitoring report.

The TP concentration data collected for all monitoring locations during the third year of permit monitoring (WY2000) are plotted in time series and notched box and whisker plots in **Appendix 11-1d**. The plots are constructed to provide a comparison of TP concentration data between WY2000 and previous periods (WY99, WY98, EFA and Non-ECP baseline) in order to detect changes and trends in TP concentrations at Non-ECP monitoring locations. To assist with evaluation of the TP concentration data for a particular location discharging ***into***, ***within*** or ***from*** the EPA, horizontal lines representing the 10 ppb and 50 ppb concentration levels were added to the TP time series and box-whisker plots. TP concentrations are reported in parts per billion (ppb) or micrograms per liter (µg/L), unless otherwise noted.

For WY2000, a statistical comparison of TP concentration data for all monitoring locations is presented as notched box and whisker plots in **Figure A11-1.3**. The figures represent ***into*** (**Figure A11-1.2a**), ***within*** (**Figure A11-1.2b**), and ***from*** (**Figure A11-1.2c**) monitoring locations. Additionally, notched box and whisker plots were constructed for TP concentration data for the upstream ***C-111 basin*** monitoring locations

(**Figure A11-1.2d**). A discussion of the TP concentration data observed during WY2000 is provided below.

Into structures

The highest TP concentrations for Non-ECP structures discharging directly to the EPA during WY2000 were observed for the monitoring locations (**Figure A11-1.2a**) at the ACME1DS and G94D culverts. Grab sample collection at the respective upstream monitoring locations L40-1 (ACME pump station 1) and L40-2 (ACME pump station 2) was discontinued in January 1999. Previous statistical analysis showed that no differences were observed in the TP data collected when the discharge culvert data were compared with the upstream monitoring site data (ACME1DS vs. L40-1 and G94D vs. L40-2). The ACME1DS and G94D culverts, operated by the ACME Improvement District (Village of Wellington), remain open at all times and discharge to the Refuge when pump stations ACME1 and/or ACME2 are operating. More than 75 percent of the data collected at the two monitoring sites were above 69 ppb, with median TP values ranging between 79 and 106 ppb. Discharge data were not available for the ACEM1DS and G94D culverts. However, the discharge data during WY2000 from the upstream pump stations (19,220 and 19,790 acre-feet for ACME1 and ACME2, respectively) can be used as an indication of the magnitude and occurrence of flow through the culverts.

The second highest TP concentrations were observed for structures S190 (Feeder Canal basin) and S140 (L-28 basin), having median TP concentrations of 50 ppb and 42 ppb, respectively. During WY2000, these structures discharged 97,585 and 178,300 acre-feet, respectively, into the western portion of WCA-3A (**Figure A11-1.1**). The lowest TP concentrations were observed at structures S18C, S175 and S332 (C-111 basin) which discharge to the southeastern portion of the Park. The TP data for these monitoring locations had an observed median concentration of 7 ppb, with 75 percent of the samples having concentrations below 9 ppb.

Structures S9 (C-11 West basin) and G123 (North New River basin) discharge directly to the eastern side of WCA-3A. The notched box and whisker plot for S9 (based on grab sampled data) depicts a TP concentration range from 4 to 17 ppb for 75 percent of the data (49 samples), a median concentration of 14 ppb and a maximum of 74 ppb (**Figure A11-1.2a**). In contrast, 75 percent of the data collected by the autosampler at S9 ranged between 11 and 21 ppb, with a median concentration of 17 ppb and a maximum of 73 ppb. The summary statistics for the S9 autosampler (S9auto) are presented separately from the S9 grab sample data in **Appendix 11-1b**, **Table A11-1b.3**. The monitoring schedule for structure G123 requires sampling on a biweekly basis during flow events, otherwise the samples are collected monthly. Eleven samples were collected at this location during WY2000. Modernized instrumentation has not been installed to date at the pump structure to determine the volume of water discharged from the North New River canal into the EPA. However, field maintenance notes provided some information for WY2000 that indicates that the structure discharged approximately 1,303 acre-ft over the entire period. From the available data, the median concentration of TP at G123 was 17 ppb, with 75 percent of the data ranging between 8 and 22 ppb, and having a maximum of 25 ppb.

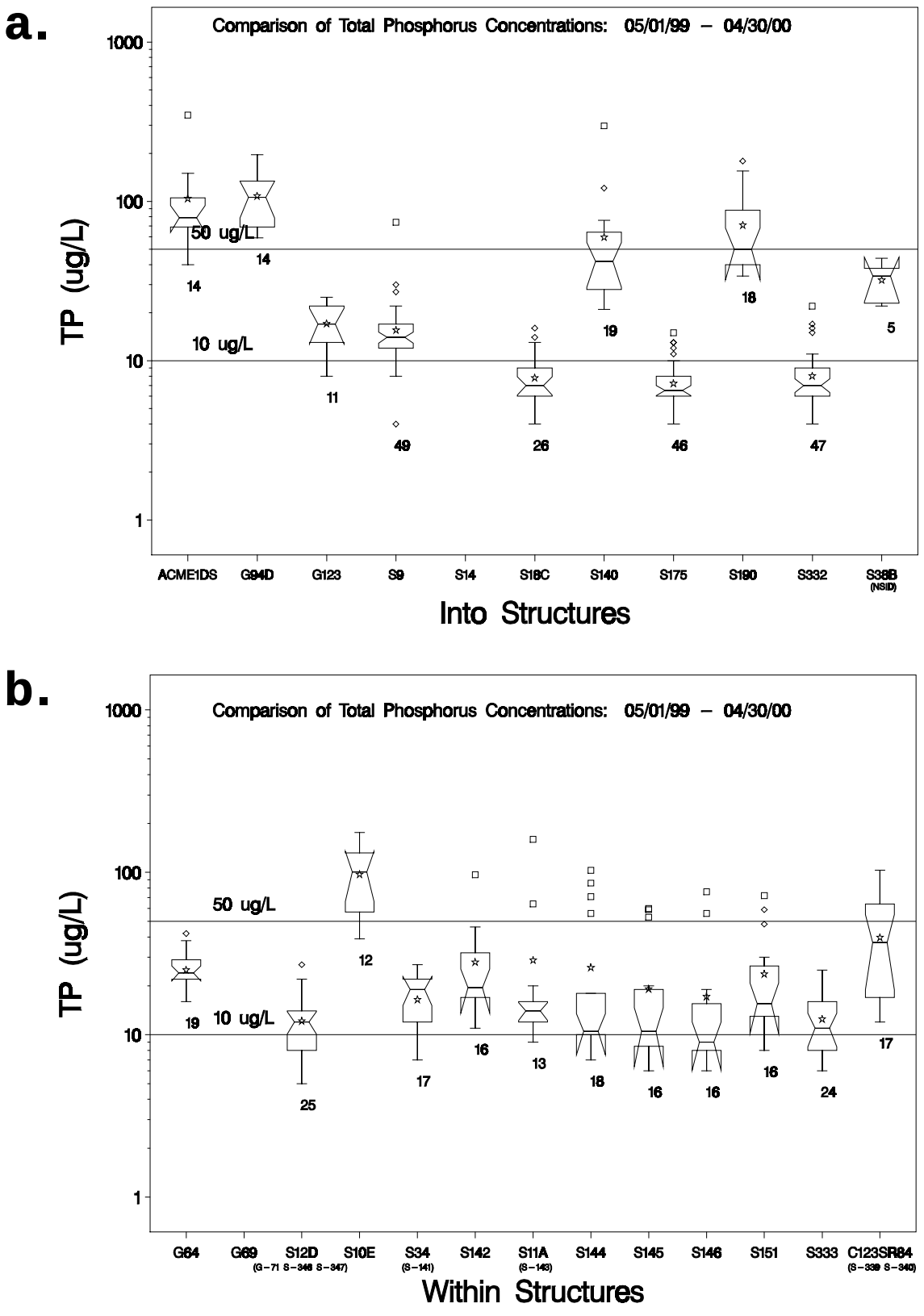
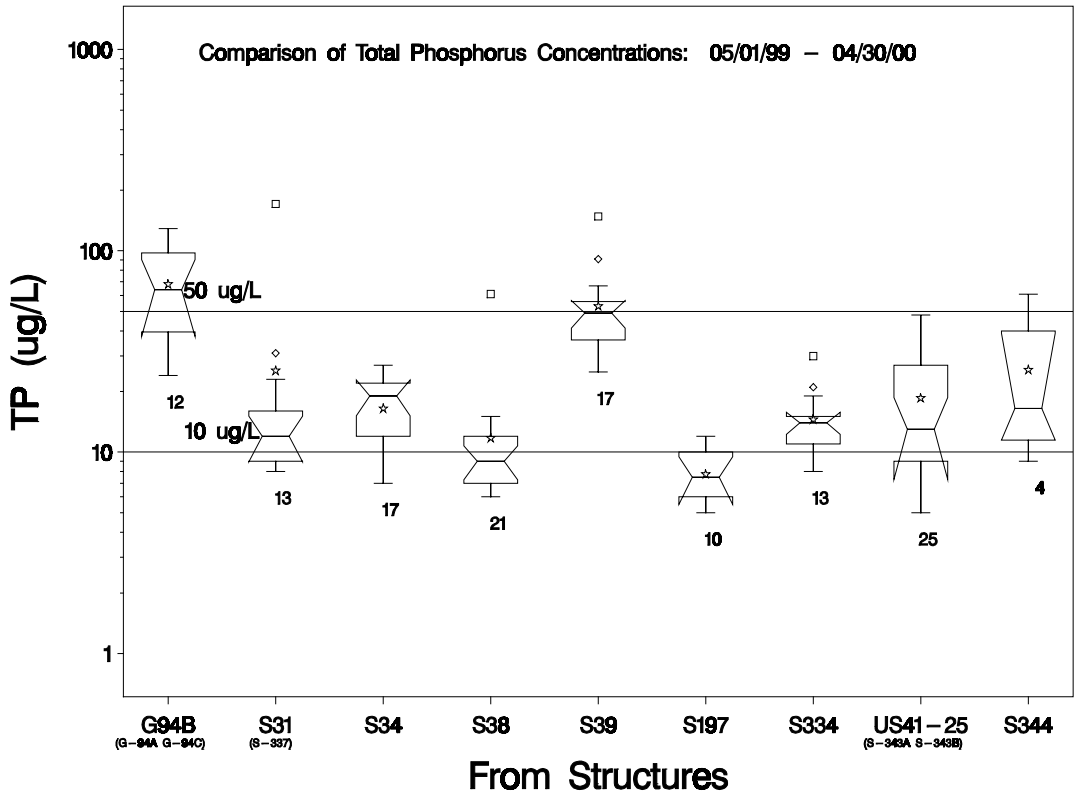


Figure A11-1. 2. Notched box and whisker plots of TP data collected at Non-ECP structures during WY2000 at **a.** Into and **b.** Within sites.

c.



d.

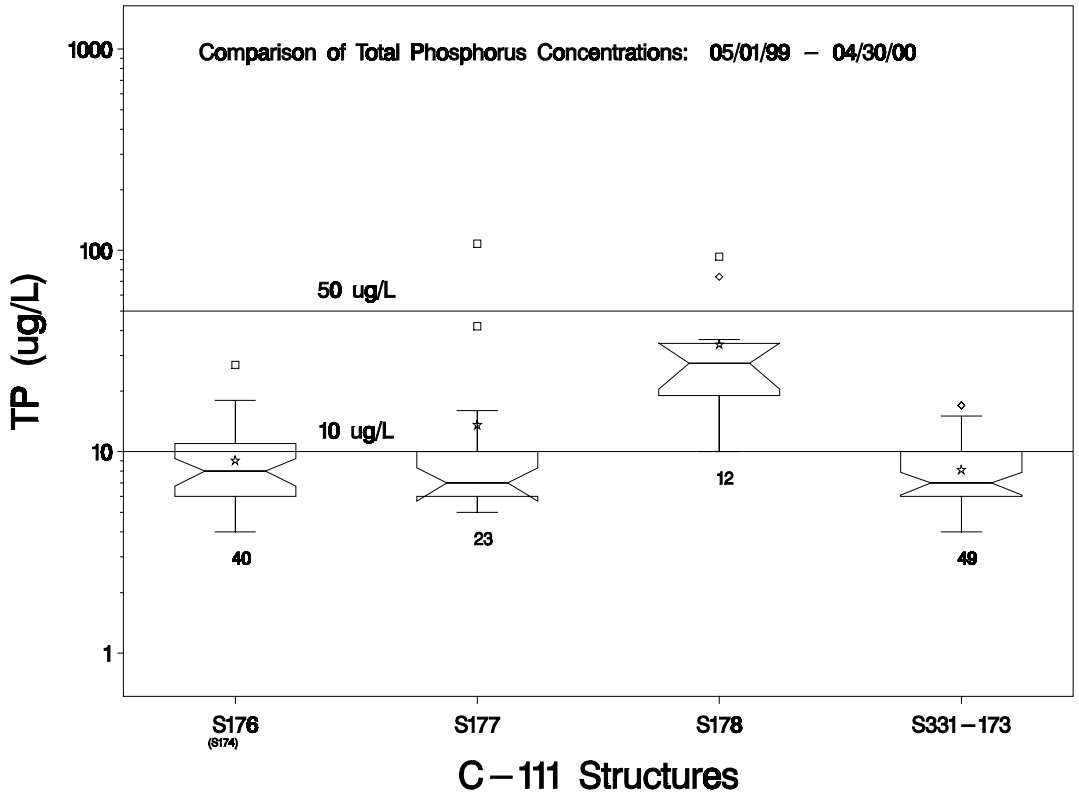


Figure A11-1.2. (Continued) Notched box and whisker plots of TP data collected at Non-ECP structures during WY2000 at **c.** From and **d.** C-111 basin sites.

North Springs Improvement District operates several pump stations to remove excess runoff from the basin. Pump Station No. 1 (NSID1) has the capability to discharge directly to WCA-2A, although discharges occur on a relatively infrequent basis. NSID1 discharged approximately 9,800 acre-feet to WCA-2A during WY2000. In contrast, discharges from the other into structures ranged between 19,220 acre-feet (ACME pump 1) and 271,000 acre-feet (S-9). The sampling schedule for NSID1 requires a sample to be collected biweekly only during flow events. The sampling location is designated S38B and is on the WCA-2A side of the structure. During WY2000, four of the five samples collected at S38B were collected during flow events. The TP concentrations of the four samples ranged from 22 to 44 ppb.

The remaining structure, S14, is in the northwest corner of Shark River Slough in the Park. It is situated a short distance to the west of structure S12A. According to operational records the S14 structure has remained closed since 1986. Therefore, no samples were collected for this location based on the "biweekly if flowing" sampling schedule required by the permit. If this structure were to be operated, it would convey some of the discharge from WCA-3A outflow structures S343A and S343B and some overland runoff from the southeastern portion of Big Cypress National Preserve to the Park.

No data was collected during WY2000 to characterize the water quality from the Boynton Farms basin. Therefore, no discussion can be provided on this basin.

Within Structures

The lowest TP concentrations (**Figure A11-1.2b**) for structures discharging ***within*** the EPA during WY2000 were observed for structures S12D and S333, which convey discharges from WCA-3A to the Park. The monitoring location for S12D serves as a surrogate monitoring location for Non-ECP permit structures G71, S346 and S347. The median TP concentration at these monitoring locations was 12 ppb (S12D) and 11 ppb (S333), with 75 percent of the data falling below 16 ppb. The maximum concentrations observed were 27 ppb (S12D) and 25 ppb (S333).

The S333 structure was designated a ***from*** structure in the final permit, whereas the function and operation of the structure is more consistent with structures designated ***within.*** This structure functions principally to make water deliveries from WCA-3A through the Tamiami Canal to northeastern Shark River Slough and southern and eastern Miami-Dade County. It can also be used to make regulatory releases from WCA-3A. This case was made to DEP in a minor permit modification request during WY2000, and DEP subsequently approved the re-designation of S333 to a ***within*** structure. The re-designation of S333 was implemented for this report.

Higher concentrations were observed at structures S144, S145 and S146, which convey discharges from WCA-2A to WCA-2B. The structures usually operate at the same time. Maximum concentrations ranged from 60 ppb (S145) to 103 ppb (S146), median values ranged from 9 ppb (S146) to 11 ppb (S144), and 75 percent of the data (50 samples) was below 19 ppb for these locations. Discharge volumes ranged between 26,7000 acre-ft (S146) and 35,500 acre-ft (S145).

In addition to monitoring the water quality at structure S34, the data from the location is representative of the water quality conditions for structure S141, which conveys discharges from WCA-2B to the North New River Canal just upstream of S34.

The TP concentrations from the S34 location ranged from 7 to 27 ppb with a median value of 19 ppb.

The highest TP concentrations were observed at structures S10E and S151 and the C123SR84 monitoring site, which is the surrogate location for structures S339 and S340. The S10E structure conveys discharges from the Refuge to the northern portion of WCA-2A downstream of pump station S6. Sampling at the S10E location occurs upstream of the structure and is near the western rim canal in the Refuge. During WY2000, the S10E structure remained closed (**Table A11-1a.2**). The TP concentrations for S10E ranged from 39 to 176 ppb with a median concentration of 101 ppb. Structure S151 discharged approximately 193,000 acre-feet during WY2000, and phosphorus concentrations ranged from 8 to 72 ppb with a median value of 16 ppb. Structures S339 and S340, located upstream of S-151 in the Miami Canal, discharged about 155,000 and 157,000 acre-feet, respectively. Phosphorus concentrations at C123SR84 ranged from 12 to 103 ppb with a median value of 37 ppb.

From structures

The TP concentrations collected for the structures classified as ***from*** are summarized in the box and whisker plot shown in **Figure A11-1.2c**. Structure G94B exhibited the highest TP concentrations, which ranged from 24 to 129 ppb. The median TP concentration was 69 ppb with 75 percent of the data falling below 98 ppb. G94B is the surrogate sampling site for G94A and G94C. All three structures are located in the L40 levee on the eastern side of the Refuge and provide water supply releases from the Refuge to the Lake Worth Drainage District (LWDD). The G94 A, B and C structures are operated by the LWDD. An operational record was unavailable to determine the frequency and magnitude of any water supply releases to LWDD canals.

The next highest TP concentrations were observed at S39 with phosphorus concentrations ranging between 25 and 148 ppb with a median value of 49 ppb. The structure discharged approximately 206,000 acre-feet during WY2000.

Last years monitoring report indicated that sampling would continue on a quarterly basis at S344 because of concerns of elevated phosphorus levels in the western area of WCA-3A, due in part to inflows from the Feeder Canal and L28 basins. Therefore, in WY2000, four samples were collected at S344 (two samples during flow conditions). TP concentrations ranged from 9 to 61 ppb,. The median value for the four samples was 17 ppb.

For the remainder of the ***from*** structure monitoring locations, 75 percent of the observed TP concentrations were below 22 ppb, with median values ranging between 8 and 19 ppb.

C-111 Basin Upstream Structures

Structures S176, S177, S178, S331, and S173 shown in **Figure A11-1.2d** are C-111 basin structures located upstream of ***into*** structures S18C, S332 and S175. Seventy-five percent of the TP concentration data collected for these structures were below 35 ppb, with the median values ranging between 7 and 28 ppb.

Flow-Weighted Mean TP Concentrations for All Structures

Extending the analysis from previous water years, flow-weighted mean TP concentrations were calculated for all the structures during WY2000. It should be noted that the Non-ECP permit does not require an annual flow-weighted mean concentration to be calculated. However, the analysis is useful for determining if additional sampling may be required during flow events and provides a more accurate depiction of concentrations expected during flow events. The calculation for flow-weighted mean TP concentrations was accomplished for structures having sufficient TP and available flow data for WY2000.

There are several common methods that can be used to calculate a flow-weighted mean. The most common method is to multiply the concentration data by the flow data (on days with flow), sum the results, and then divide the sum by the total accumulated flow for those days. This method utilizes only the data that were collected, and does not involve estimating concentration data for other days when flow occurred. The annual flow-weighted mean TP concentrations. Monthly, and annual flow volumes for the ***into***, ***within***, ***from***, and ***C-111 basin*** structures during WY2000 are provided in **Appendix 11-1a**, **Table A11-1a.2**.

A more detailed analysis of the WY2000 annual flow-weighted mean TP concentration (fwmc) data for each ***into*** structure is shown in **Table A11-1.4**. The calculations were based on two methods for determining flow-weighted mean concentrations. The first method calculates the fwmc for TP using only days of flow and associated TP data. The second method utilizes an estimation algorithm to determine TP concentrations on all days with positive flow for which no observed values are available.

The two methods resulted in similar calculations for the fwmc at most of the ***into*** structures. The calculation methods yielded slightly different results for the ACME1DS (130 vs 153 ppb) and NSID1 (36 vs 27 ppb) sites. A table similar to **Table A11-1.4** presented the results (Table 11-3) for the fwmc TP values at ***into*** sites during WY99 in the 2000 Everglades Consolidated Report. A comparison between the two tables indicates an increase in the fwmc for TP between WY99 and WY2000 at the S190 (from 73 to 111 ppb) and NSID1 (from 18 to 36 ppb) sites. The highest fwmc TP values for the ***into*** structures during WY2000 were observed at the ACME pump stations, followed by the S190 and S140 pump stations. These sites are of concern for TP.

The lowest fwmc TP values were observed at the S18C, S175, and S332 monitoring locations. These locations are the subject of interim and long-term compliance limits stipulated in the Settlement Agreement, therefore, these are viewed as a potential concern for TP.

Table A11-1.4. Annual flow-weighted mean TP concentrations for WY2000 (May 1, 1999 through April 30, 2000).

Hydrologic Basin	Structure	Water Quality Station Id	Total Flow Volume (acre-feet)	Sample Size (Grab)	Number of Days with Positive Flow	Arithmetic Average (Grab)(µg/L)	Sample Size (Comp)	Sample Type	Total Samples/Samples During Flow	(1) Flow-Weighted Mean Concentration (µg/L)	(2) Flow-Weighted Mean Concentration (µg/L)
ACME (Basin B)	ACME1DS	ACME1DS	19,220[1,6]	14	107[1,6]	105	0	Grab[4]	14/7	130[7]	153[7]
	ACME1	L40-1	ND[1,9]								
	G94D	G94D	19,790[1,6]	14	104[1,6]	109	0	Grab[4]	14/8	122[7]	136[7]
	ACME2	L40-2	ND[1,9]								
North Springs Improv. District	NSID1	S-38B (WCA-2A near NSID1)	9,881	5	48	32	0	Grab[4]	5/4	36	27
North New River	G-123	G123	1,303 [8]	11	ND[1]	17	0	Grab[4]	11/1	ND[1]	ND[1]
C-11 West	S-9	S9	273,612	49	213	16	39	Auto[5] & Grab[4]	88/66	26	30
C-111	S-175	S175	97,537	46	190	7	0	Grab[4]	46/22	8	8
	S-332	S332	199,949	47	316	8	0	Grab[4]	47/33	8	7
	S-18C	S18C	193,256	26	334	8	0	Grab[4]	26/23	9	8
L-28	S-140	S140	180,011	19	195	60	0	Grab[4]	19/13	67	70
Feeder Canal	S-190	S190	97,586	18	197	71	0	Grab[4]	18/12	111	110
Boynton Farms	ND[1]	ND[1]									

1) ND - no data available

2) Flow-weighted Mean Concentration Column (1) based on days of flow and monitored TP data only.

3) Flow-weighted Mean Concentration Column (2) based on estimation algorithm to determine TP concentration on non-flow days.

4) (Grab) indicates samples collected by grab sampling methodology.

5) (Auto) indicates that samples were collected by automatic composite samples.

6) Flow data from upstream pump structures, ACME1 and ACME2, is representative of the flow through these culverts.

7) Flow weighted mean concentrations for ACME1DS and G94D were calculated using the flow data at upstream structures ACME1 and ACME2.

8) Daily pumping records are not available for G-123, estimates of yearly volume were established through year start and year end readings of hour meters.

9) Grab sampling discontinued at this location in January 1999 in favor of downstream site, autosampler installation pending for summer 2000.

PESTICIDES AND PRIORITY POLLUTANT MONITORING

Pesticides in Surface Waters and Sediments

The quarterly surface water and semiannual sediment pesticide sampling at the 15 Non-ECP sites (**Figure A11-1.3**) for WY2000 was performed during April, August, and November 1999 and February 2000. The pesticide analytes, representative minimum detection limits (MDL), and practical quantitation limits (PQL) are listed in **Table A11-1.5**. All analytical work is performed by the DEP, Central Laboratory in Tallahassee, Florida. The reader is referred to the *Quality Assurance Evaluation* section of the individual pesticide event reports for a summary of any limitations on data validity that might influence the utility of these data. The individual reports can be found at the web site shown below:

http://www.sfwmd.gov/curre/pest/pestindex.htm.

To evaluate the potential impacts on aquatic life, due to the pulsed nature of exposure, the maximum observed concentration is compared to the Criterion Maximum Concentration published by the USEPA under Section 304 (a) of the Clean Water Act, and as promulgated in Chapter 62-302 (F.A.C.). For compounds not specifically listed, rule 62-302.200 (F.A.C.) allows for acute and chronic toxicity standards which are calculated as one-third and one-twentieth, respectively, of the amount lethal to 50% of the test organisms in 96 hours, where the 96 hour EC_{50} or LC_{50} is the lowest value which has been determined for a species significant to the indigenous aquatic community. **Table A11-1.6** lists representative toxicity levels for selected freshwater aquatic invertebrates and fishes.

Table A11-1.7 lists the pesticides detected in the surface water during WY2000. A total of four samples were collected at each site and analyzed for all parameters with the exception of the atrazine metabolites. Atrazine desethyl and atrazine desisopropyl analysis started during the November 1999 sampling event. Pesticides with concentrations greater than their respective Class III criterion or toxicity limit were assigned to the excursion category of Potential Concern, whereas those lower than the PQL were assigned to the No Concern excursion category. Only two detections were of concern. The diazinon concentration detected during the November 1999 sampling event at S38B (0.059 µg/L), should not have an acute, detrimental impact for fish. However, for aquatic invertebrates, this level is slightly greater than the calculated chronic toxicity (0.04 µg/L) for *Daphnia magna*, a sensitive indicator species for aquatic macroinvertebrates. At this concentration, long term exposure can cause impacts to the macroinvertebrate populations, but the pulsed nature of urban runoff releases to the EPA precludes drawing any conclusions about long term average exposures. The sampling site for S38B is located on the WCA3A side of the NSID1 pump station.

The endosulfan (α plus β) surface water concentration detected during the February 2000 sampling event at S178 (0.058 µg/L) exceeds the Florida Class III surface water quality standard (rule 62-302.530, F.A.C.) of 0.056 µg/L. This is the first time an exceedance of the water quality standard has occurred at S178 since January 1996.

Table A11-1.8 lists the pesticide detections in sediment samples collected during WY2000. Pesticides with concentrations greater than their PQL were assigned to the excursion category of Potential Concern, whereas those lower than the PQL were

assigned to the No Concern excursion category. However, no freshwater sediment quality assessment guidelines or criteria have been established for pesticides.

Priority Polutants

The Non-ECP permit required that priority pollutants listed in the routine monitoring program list be sampled during one wet season and one dry season at the following structures: G94D, ACME1DS, NSID1 (aka S38B), G123, S9, S18C, S142, S174, S177, S178 and S331. In October 1999, the District submitted a minor permit modification request to DEP to eliminate the requirement for priority pollutant sampling at the Non-ECP sites. The DEP allowed a minor modification of the permit requirements in early November 1999, to delete these parameters based on limited detections during the previous four data sets.

Prior to receiving the minor modification approval, the District conducted the last sampling for priority pollutants during August 1999 (one wet season). Only two of the priority pollutants were detected during the August 1999 sampling event. Toluene was detected at S38B at 1.2 µg/L, under conditions of no flow from the NSID1 pump structure. Trichlorofluoromethane was detected at ACME1DS at 0.28 µg/L. As both of the levels detected were between the MDL and the PQL, these compounds are not of concern. Additional information concerning these compounds can be found in Chapter 4 and Appendix 4-4.

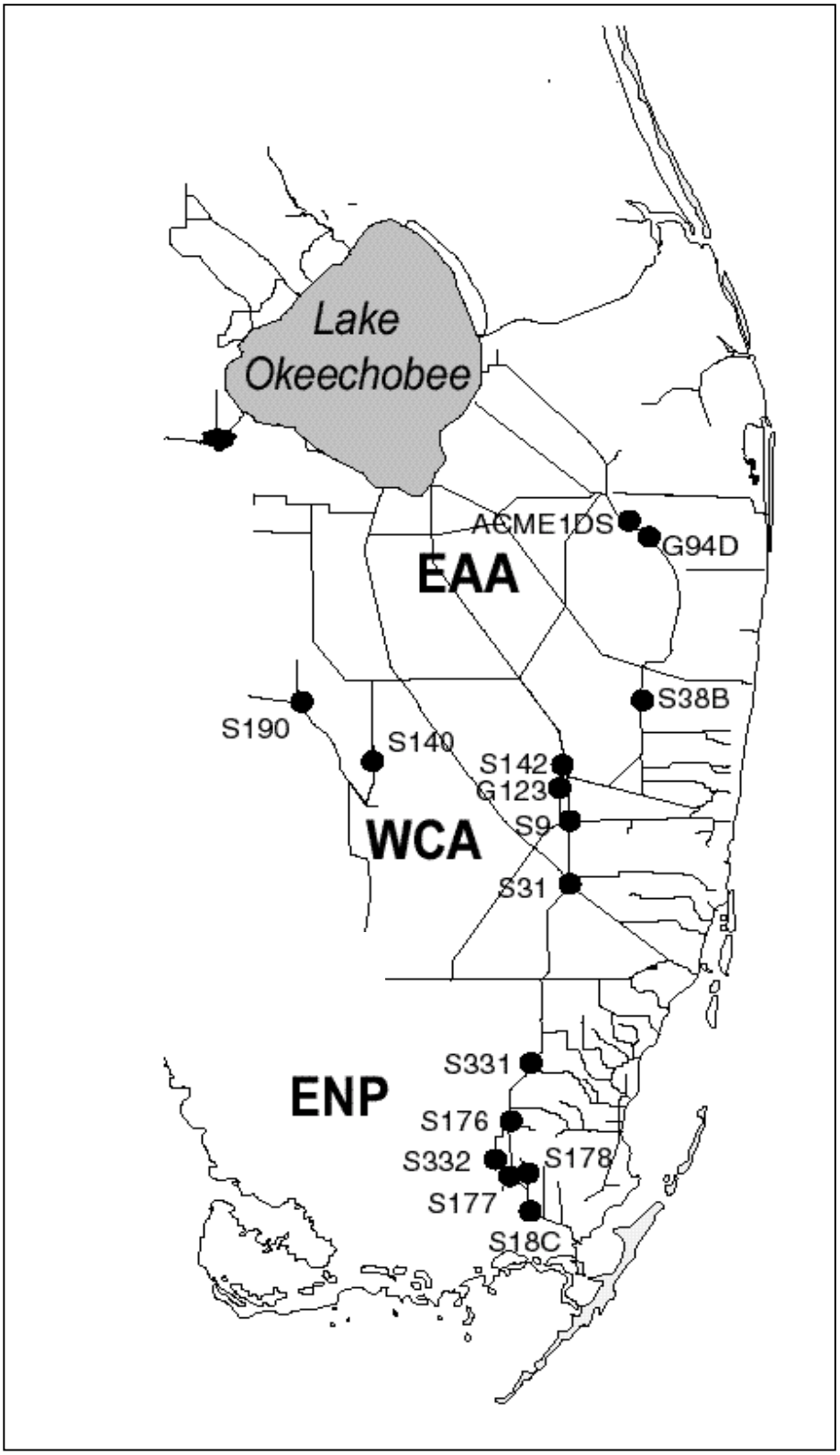


Figure A11-1.3. Pesticide monitoring network for Non-ECP structures.

Table A11-1.5. Minimum detection limits (MDL) and practical quantitation limits (PQL) for pesticides determined in November 1999.

Pesticide or degradation product	Water range of MDL-PQL (µg/L)	Sediment range of MDL-PQL (µg/Kg)	Pesticide or degradation product	Water range of MDL-PQL (µg/L)	Sediment range of MDL-PQL (µg/Kg)
2,4-D	2 - 4	33 – 420	endosulfan sulfate	0.0019 - 0.01	0.85 - 9.7
2,4,5-T	2 - 4	33 – 420	endrin	0.0019 - 0.01	1.7 - 38
2,4,5-TP (silvex)	2 - 4	33 – 420	endrin aldehyde	0.0019 - 0.01	0.85 - 19
alachlor	0.048 - 0.25	12 – 290	ethion	0.019 - 0.1	1.9 - 48
aldrin	0.00094 - 0.005	0.49 - 9.8	ethoprop	0.019 - 0.1	4.0 - 98
ametryn	0.0094 - 0.05	1.9 - 48	fenamiphos (nemacur)	0.029 - 0.15	12 - 290
atrazine	0.0094 - 0.05	1.9 - 48	fonofos (dyfonate)	0.019 - 0.1	4.0 - 48
Atrazine desethyl	0.0094 - 0.05	NA	heptachlor	0.00095 - 0.005	0.49 - 9.8
Atrazine desisopropyl	0.0094 - 0.05	NA	heptachlor epoxide	0.00095 - 0.01	0.49 - 9.8
Azinphos methyl (guthion)	0.019 - 0.010	2.0 – 190	hexazinone	0.019 - 0.1	8.1- 190
α-BHC (alpha)	0.00094 - 0.005	0.49 - 9.8	imidacloprid	0.4 - 0.8	NA
β-BHC (beta)	0.0019 - 0.010	0.49 - 9.8	linuron	0.4 – 0.8	8.1 - 77
δ-BHC (delta)	0.00094 - 0.005	0.85 - 9.7	malathion	0.029 - 0.15	6.1 - 98
γ-BHC (gamma) (lindane)	0.00094 - 0.005	0.49 - 9.8	metalaxyl	0.057 - 0.3	1.3 - 66
bromacil	0.038 - 0.20	12 – 290	methamidophos	NA	41 – 380
butylate	0.019 - 0.10	NA	methoxychlor	0.0038 - 0.04	2.1 - 77
Carbophenothion (trithion)	0.029 - 0.03	1.2 – 38	metolachlor	0.048 - 0.25	21 – 290
chlordane	0.0094 - 0.10	6.1 – 190	metribuzin	0.019 – 0.1	8.1 – 190
chlorothalonil	0.019 - 0.02	0.85 - 38	mevinphos	0.038 - 0.2	9.8 – 250
Chlorpyrifos ethyl	0.019 - 0.10	4.1 – 98	mirex	0.0019 – 0.01	0.85 - 19
Chlorpyrifos methyl	0.019 - 0.10	4.1 – 98	monocrotophos (azodrin)	NA	81 – 770
cypermethrin	0.0048 - 0.05	ND	naled	0.076 - 0.4	33 – 290
DDD-p,p'	0.0019 - 0.01	0.85 - 19	norflurazon	0.029 - 0.15	12 – 290
DDE-p,p'	0.0019 - 0.01	0.85 - 19	parathion ethyl	0.019 - 0.1	4.0 – 98
DDT-p,p'	0.0019 - 0.01	1.2 – 19	parathion methyl	0.019 - 0.1	4.0 – 98
demeton	0.094 - 0.50	40 – 960	PCB	0.019 - 0.1	9.5 – 290
diazinon	0.019 - 0.10	4.0 – 48	permethrin	0.048 - 0.02	NA
Dicofol (kelthane)	0.019 - 0.04	0.85 - 75	phorate	0.029 - 0.15	4.0 – 48
dieldrin	0.0019 - 0.005	0.49 - 9.8	prometryn	0.019 - 0.1	4.0 – 98
disulfoton	0.029 - 0.15	6.1 – 98	simazine	0.019 - 0.1	2.1 – 48
diuron	0.4 - 0.8	8.1 – 77	toxaphene	0.071 - 0.3	30 – 430
α-endosulfan (alpha)	0.0019 - 0.01	0.49 - 9.8	trifluralin	0.0095 - 0.01	1.6 - 38
β-endosulfan (beta)	0.0019 - 0.01	0.49 - 9.8	zinc phosphide	0.50 - 2.0	NA

NA – not analyzed

Table A11-1.6. Toxicity of pesticides to selected freshwater aquatic invertebrates and fishes (µg/L).

Common name	48 hr EC_{50} Water flea *Daphnia Magna*		acute toxicity (*)	chronic toxicity (*)	96 hr LC_{50} Fathead Minnow (#) *Pimephales Promelas*		acute toxicity	chronic toxicity	96 hr LC_{50} Bluegill *Lepomis macrochirus*		acute toxicity	chronic toxicity	96 hr LC_{50} Largemouth Bass *Micropterus salmoides*	acute toxicity	chronic toxicity	96 hr LC_{50} Rainbow Trout (#) *Oncorhynchus mykiss*		acute toxicity	chronic toxicity	96 hr LC_{50} Channel Catfish *Ictalurus punctatus*		acute toxicity	chronic toxicity
ametryn	28,000	(6)	9,333	1,400	-		-	-	4,100	(4)	1,367	205	-	-	-	8,800	(4)	2,933	440	-		-	-
atrazine	6,900	(6)	2,300	345	15,000	(6)	5,000	750	16,000	(4)	5,333	800	-	-	-	8,800	(4)	2,933	440	7,600	(4)	2,533	380
bromacil	-		-	-	-		-	-	127,000	(6)	42,333	6,350	-	-	-	36,000	(6)	12,000	1,800	-		-	-
diazinon	0.8	(1)	0.3	0.04	7,800	(6)	2,600	390	168	(1)	56	8.4	-	-	-	90	(1)	30	4.5	-		-	-
	0.9	(8)	0.3	0.045	-		-	-	165	(3)	56	8.3	-	-	-	1,650	(3)	550	83	-		-	-
	-		-	-	-		-	-	16,000	(4)	5,333	800	-	-	-	2,900	(4)	967	145	-		-	-
diuron	1,400	(6)	467	70	14,200	(6)	4,733	710	5,900	(4)	1,967	295	-	-	-	5,600	(4)	1,867	280	-		-	-
endosulfan	166	(6)	55	8	1	(1)	0.33	0.05	1	(1)	0.33	0.05	-	-	-	1	(1)	0.33	0.050	1	(1)	0.3	0.05
	-		-	-	-		-	-	2	(3)	0.67	0.10	-	-	-	3	(2)	1	0.15	1.5	(6)	0.5	0.08
	-		-	-	-		-	-	-		-	-	-	-	-	1	(3)	0.33	0.050	-		-	-
	-		-	-	-		-	-	-		-	-	-	-	-	0.3	(5)	0.10	0.015	-		-	-
hexazinone	151,600	(6)	50,533	7,580	274,000	(4)	91,333	13,700	100,000	(6)	33,333	5,000	-	-	-	180,000	(6)	60,000	9,000	-		-	-
metolachlor	23,500	(6)	7,833	1,175	-		-	-	15,000	(4)	5,000	750	-	-	-	2,000	(4)	667	100	4,900	(5)	1,633	245
metribuzin																							
norflurazon	15,000	(6)	5,000	750	-		-	-	16,300	(6)	5,433	815	-	-	-	8,100	(6)	2,700	405	>200,000	(4)	>67,000	>10,000

(*) Florida Administrative Code (FAC) 62-302.200, for compounds not specifically listed, acute and chronic toxicity standards are calculated as one-third and one-twentieth, respectively, of the amount lethal to 50% of the test organisms in 96 hours, where the 96 hour LC_{50} is the lowest value which has been determined for a species significant to the indigenous aquatic community.

(#) Species is not indigenous. Information is given for comparison purposes only.

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Table A11-1.7. Pesticide surface water detections and excursions for samples collected from November 1999 to February 2000[1]. A blank space indicates that the compound was below the minimum detection limit for all four sampling events.

structure	Compound													
	ametryn	atrazine	atrazine desethyl	atrazine desisopropyl	bromacil	diazinon	diuron	alpha endosulfan	beta endosulfan	endosulfan sulfate	hexazinone	metolachlor	metribuzin	norflurazon
ACME1DS	3:1:0*	2:2:0	2:0:0	2:0:0							4:0:0	4:0:0		
G-94D	4:0:0	2:2:0	2:0:0	2:0:0	4:0:0		4:0:0					4:0:0		
G-123	4:0:0	2:2:0												
S-9	4:0:0	3:1:0									4:0:0			
S-18C	4:0:0	3:1:0							4:0:0	4:0:0				
S-140	4:0:0	3:1:0									4:0:0			4:0:0
S-190	3:1:0	4:0:0											4:0:0	4:0:0
S-332		4:0:0									4:0:0			
S-38B	4:0:0	0:4:0	2:0:0			3:0:1								
S-142	4:0:0	2:2:0												
S-31	4:0:0	0:4:0												
S176		4:0:0	2:0:0								4:0:0			
S-177		4:0:0						3:1:0	4:0:0	4:0:0	4:0:0			
S-178		4:0:0	2:0:0					3:0:1	3:0:1	3:1:0				
S-331/ S-173		3:1:0									4:0:0			

[1] Four samples were collected for each site and analyzed for all parameters with the exception of the atrazine metabolites. Atrazine desethyl and atrazine desisopropyl analysis started with the April 1999 sampling event.

* number of samples <= PQL (No Concern) : number of samples > PQL (Potential Concern) : number of samples exceeding criterion or toxicity limit (Concern)

Table A11-1.8. Pesticide sediment detections and excursions for samples collected from November 1999 to February 2000[1]. A blank space indicates that the compound was below the minimum detection limit for both sampling events.

structure	Compound							
	bromacil	chlordane	DDD-p,p'	DDE-p,p'	DDT-p,p'	endosulfan sulfate	ethion	heptachlor
ACME1DS								
G-94D			1:0*	0:1				
G-123								
S-9								
S-18C								
S-140								
S-190								
S-332								
S-38B	1:0	1:0						
S-142				0:2				
S-31				1:1				
S-176	1:0			1:0			1:0	
S-177			1:1	0:2	1:0			
S-178	1:0			0:2		0:1		
S-331/ S-173				2:0				

[1] Two samples were collected for each site and analyzed for all parameters.

* number of samples <= PQL (No Concern) : number of samples > PQL (Potential Concern)

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