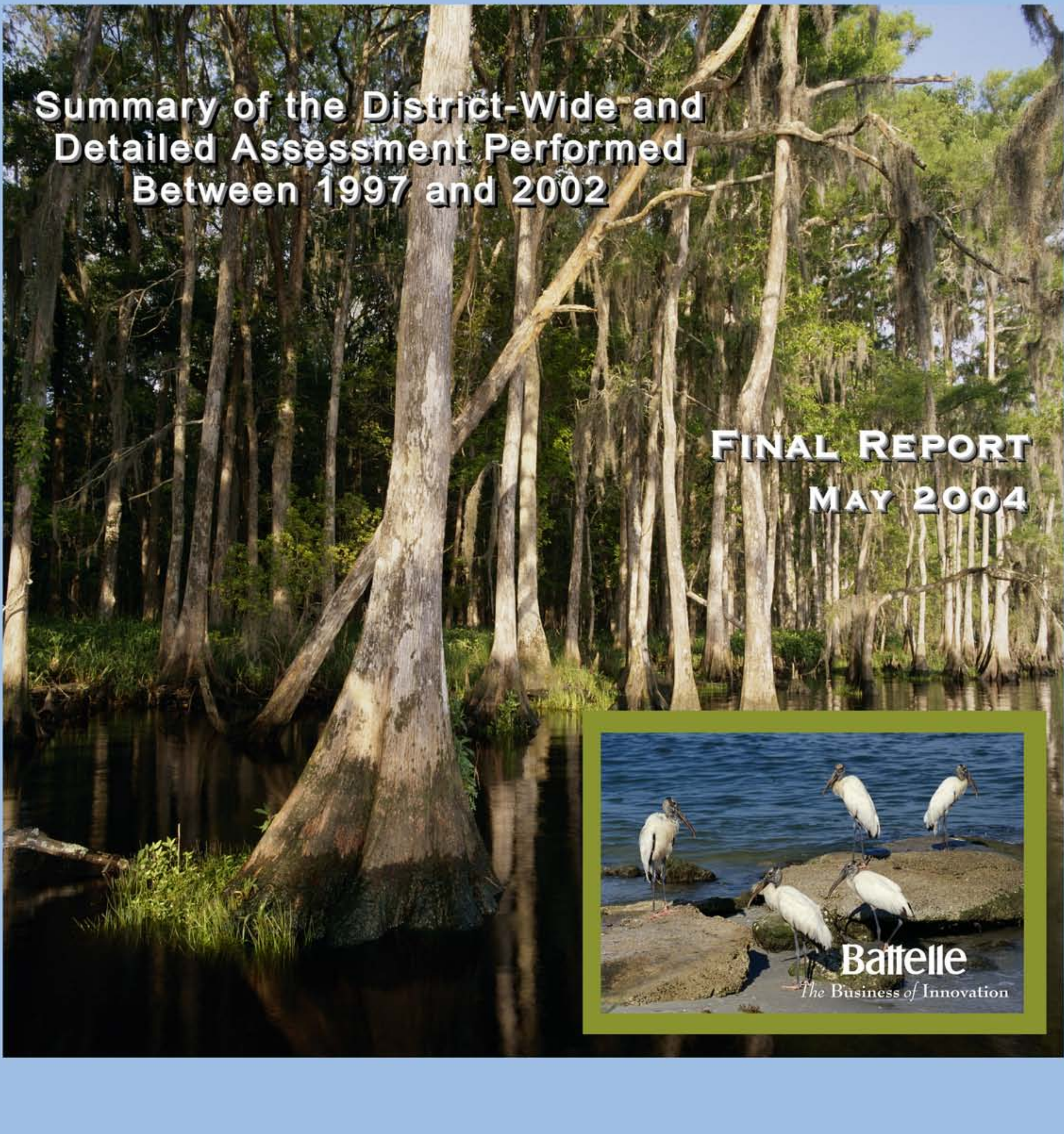
Special Publication SJ2004-SP32

Sediment Quality In The St. Johns River Water Management District



Summary of the District-Wide and Detailed Assessment Performed Between 1997 and 2002

Final Report
May 2004

Battelle
The Business of Innovation

SEDIMENT QUALITY IN THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

SUMMARY OF THE DISTRICTWIDE AND DETAILED ASSESSMENT PERFORMED BETWEEN 1997 AND 2002

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ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
FINAL REPORT
Contract Number: 98B274

May, 2004

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EXECUTIVE SUMMARY

Background

The St. Johns River Water Management District (SJRWMD) comprises 12,400 square miles in northeastern Florida — almost 21% of the total area of the state. The SJRWMD includes several major urban centers, many smaller cities, and large tracts of agriculture and forestry land. The region's population is growing rapidly, and currently is just under four million.

The SJRWMD was created in 1972 to protect and preserve the water resources, which are critical to many regional economies. The mission of the SJRWMD is to manage water resources to ensure their continued availability while maximizing both environmental and economic benefits.

In 1997 the SJRWMD conducted a Districtwide baseline monitoring project to assess the status of the freshwater sediment quality at 86 selected sites in the region. Additional sampling was conducted in 1999 and 2002 to have better coverage of the District, and a total of 171 Districtwide Assessment sites were sampled during these three sampling events. The Districtwide sampling revealed a few locations with contaminant concentrations that may be of concern and warranted further investigation. A Detailed Assessment study was therefore performed at the locations identified to be of potential concern, to provide more detailed geographical coverage at such locations so as to better understand any potential contamination issues. A total of 104 sites were sampled at 13 general locations for the Detailed Assessment work in 1999 and 2002.

The results from the 1997 and 1999 studies have been documented in earlier reports (SJRWMD, 1998; Battelle, 2000a); the data from the 2002 sampling effort have been reported to the District, but they have not been published in a report. This report is intended to compile and summarize the data from the three sampling efforts conducted between 1997 and 2002, by presenting the results for the Districtwide investigation as well as information from the Detailed Assessment, focusing on the locations that have been identified to be of particular concern.

Methods

Surface sediment samples were collected by District staff adhering to rigorous "clean" procedures to maintain the integrity and representativeness of the samples. Project-optimized analytical methods were used. It is widely recognized that the analytical methods used in most priority pollutant tracking programs nation-wide are not sufficiently sensitive to detect low, but environmentally relevant, levels of contaminants. Additionally, application of "standard" analyte lists are not always effective in addressing specific, or even broad-based, contaminant issues. Therefore, to meet the objectives of this program, analytical methods were used that could provide trace-level data for highly relevant toxic and/or persistent compounds.

Sediments were collected and analyzed for carefully selected constituents that included 92 organic compounds [semi-volatile organic compounds such as polycyclic aromatic hydrocarbons (PAH), pesticides, and polychlorinated biphenyls (PCB)] and 15 metals (including heavy metals such as mercury, cadmium, and lead). These data were generated to obtain a thorough understanding of the overall contaminant burden of the sediments in the District.

Optimized versions of the National Oceanic and Atmospheric Administration (NOAA) National Status and Trends (NS&T) analytical methods were employed for the analysis of trace metals and the nonpolar organic compounds. Generally, the very low detection limits provided by the NOAA NS&T analytical methods are achieved by using larger sample sizes, employing several additional sample cleanup steps prior to instrumental analysis, and targeted final instrumental analysis. The techniques that were used provide analytical data down to "clean" background concentrations, allowing for true risk-based analysis of the data and monitoring of subtle changes and elevations over background.

Findings

Districtwide Assessment

The contaminant concentration varied greatly within the District. Areas near urban locations had, as expected, higher concentrations of many contaminants (e.g., PAH, PCB, selected metals) than the more rural locations. Locations near agricultural activities generally had higher concentrations of persistent chlorinated pesticides [e.g., dichlorodiphenyltrichloroethane (DDT), benzenehexachloride (BHC), dieldrin] than other locations.

However, the sediment quality of the District as a whole can be considered quite good, based on sediment contaminant concentrations and the data assessment that has been conducted and presented in this and earlier reports (SJRWMD, 1998; Battelle, 2000a; Battelle, 2001). The most contaminated locations appear to have contaminant levels that are comparable to typical U.S. urban coastal sediments. A few specific locations were identified with highly elevated concentrations of some contaminants, and were subsequently studied further in the Detailed Assessment study.

Detailed Assessment

Sediment samples collected in and around Gainesville, in the upper Ocklawaha River chain-of-lakes, and in the northernmost sections of the Lower St. Johns River were identified as having elevated concentrations of sediment contaminants, and were investigated more thoroughly. The Lower St. Johns work has been reported elsewhere (Battelle, 2001; Battelle, 2002); the Gainesville and the upper Ocklawaha River chain-of-lakes data are presented in this report.

The sediment contaminant concentrations determined in the Detailed Assessment were assessed for geographical distribution, relationship to expected concentrations based on other sediment databases, and by comparing to sediment quality guideline values that are based on toxicity and sub-lethal effects on sediment-dwelling, benthic, organisms [e.g., freshwater threshold effects concentration (TEC) and probable effects concentration (PEC) values]. Highlights of these comparisons were:

- Bivens Arm and Tumbling Creek have the highest sediment contaminant concentrations of the locations sampled in the Gainesville area. Downstream locations of Sweetwater Branch also have elevated sediment contamination.
- The sediment contamination is the highest at the upstream locations in the upper Ocklawaha River chain-of-lakes. Sediments in Lake Apopka, the Lake Apopka-Beauclair Canal, and Lake Beauclair appear to be particularly contaminated. High contaminant concentrations were also measured in Lake Dora, and progressively lower concentrations further downstream.
- The comparison of sediment concentrations to conservative sediment quality guidelines suggests there is a potential for ecological harm from the sediment contamination in Bivens Arm, Lake Apopka, the Lake Apopka-Beauclair Canal, and Lake Beauclair.
- The contaminants that are contributing the greatest to the potential risk of the Bivens Arm sediments are PAH, lead, DDT, and chlordane; approximately 30% of the risk is due to PAH.
- DDT is the dominant contaminant of concern in the upper Ocklawaha River chain-of-lakes, contributing about 60% of the contaminant-based risk in the sediments of Lake Apopka, the Lake Apopka-Beauclair Canal, and Lake Beauclair. Other contaminants include BHC and arsenic.

The potential for biological impact from the contaminants measured in Bivens Arm, Lake Apopka, the Lake Apopka-Beauclair Canal, and Lake Beauclair appears to be moderate to high, based on the reported results, including assessments versus sediment quality guidelines. The complex nature of these sediments (e.g., very high total organic carbon content) confounds the analysis and interpretation of the contaminant data; high organic carbon may reduce the availability of contaminants to cause biological harm. However, the notable concentrations measured at these locations, and the *potential* for ecological impact, support the need to better understand the true environmental relevance of the measured contamination. This can be accomplished through studies that link biological and chemical measurements, and investigations of the physico-chemical characteristics of the sediment.

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LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviation or Acronym	Explanation
AVS	Acid volatile sulfide
BHC	Benzenehexachloride
CVAAS	Cold Vapor Atomic Absorption Spectroscopy
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
EAS	Environmental Assessment Section
EMAP	Environmental Monitoring and Assessment Program
ERL	Effects Range-Low
ERM	Effects Range-Median
FDEP	Florida Department of Environmental Protection
GFAAS	Graphite Furnace Atomic Absorption Spectroscopy
GPC	Gel Permeation Chromatography
GS/MS	Gas Chromatography/Mass Spectrometry
HPAH	High Molecular Weight Polycyclic Aromatic Hydrocarbon
HPLC	High Performance Liquid Chromatography
ICP/MS	Inductively Coupled Plasma/Mass Spectroscopy
LPAH	Low Molecular Weight Polycyclic Aromatic Hydrocarbon
MDL	Method Detection Limit
ND	Not Detected
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NS&T	National Status and Trends
OP	Ortho-Phosphate (Soluble Reactive Phosphorus)
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PEC	Probable effects concentration
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
RIS	Recovery Internal Standards
SEM	Simultaneously extracted metal
SIM	Selected Ion Monitoring
SIS	Surrogate Internal Standards
SJRWMD	St. Johns River Water Management District
STORET	Storage and Retrieval System for Water and Biological Monitoring Data
SWIM	Surface Water Improvement and Management
SWQMP	Surface Water Quality Monitoring Program
TEC	Threshold effects concentration
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TP	Total Phosphorus
TS	Total Solids
TVS	Total Volatile Solids

1. INTRODUCTION

1.1 Background

The St. Johns River Water Management District (SJRWMD) was created in 1972 by the Florida Legislature to protect and preserve the state's water resources. The mission of the SJRWMD is to manage water resources to ensure their continued availability while maximizing both environmental and economic benefits. The SJRWMD comprises 12,400 square miles in northeastern Florida, or about 21 percent of the state's total area. The SJRWMD has a population of nearly four million, or about 25 percent of the state's total population. The SJRWMD's population has grown rapidly in recent decades, is expected to continue growing at a comparable rate, and the population is projected to reach over 4.5 million by the year 2010. The most prevalent economic activities within the SJRWMD are tourism, agriculture, forestry, and paper manufacturing, and many regional economies depend on the SJRWMD's water resources. For instance, the SJRWMD contains about half of the state's pulp mills, one-third of the state's citrus acreage, and produces 10% percent of Florida's fresh winter vegetables. A generalized land use distribution is shown in Figure 1-1.

To facilitate the planning and management of surface water, the SJRWMD is divided into ten hydrologic units or surface water basins. The boundaries of these basins approximate drainage basins delineated by the U.S. Geological Survey. The St. Johns River and its tributaries drain approximately 70 percent of the SJRWMD. The St. Johns River and its principal tributary, the Ocklawaha River, drain about one-sixth of the total area of Florida. The remainder of the SJRWMD is drained by the Nassau and St. Mary's rivers in the north and by various streams in the coastal area along the Atlantic Ocean. The SJRWMD includes a major portion of Florida's lake region. The chain of interconnected lakes in the Ocklawaha River basin, including Lakes Apopka, Harris, Eustis, Griffin, and Dora, are important recreational assets. Large, shallow lakes along the main stem of the St. Johns River, such as Lakes George, Harney, and Monroe, are also distinctive features of the SJRWMD.

The SJRWMD's original focus on flood control has broadened to include water supply protection, water quality protection, and environmental enhancement. Various programs and projects have been initiated to address these responsibilities. Since 1987, the SJRWMD has been required by Florida Statute (Chap. 373.451-373.4595 F.S.) to develop and implement Surface Water Improvement and Management (SWIM) Plans. To date, six water bodies have been identified for priority restoration and protection: the Indian River Lagoon, Lake Apopka, the Upper Ocklawaha River, the Lower St. Johns River, the Middle St. Johns River, and the Orange Creek Basin.

Surface water quality monitoring began at the SJRWMD in 1979 as a component of the Upper St. Johns River Basin Project. A districtwide monitoring program, known as the Permanent Monitoring Network Project, began in 1983 with the objectives of locating polluted surface waters and creating a long-term water quality database for analyzing temporal trends in water quality. The project was renamed Surface Water Quality Monitoring Program (SWQMP) in 1988 to better reflect project activities and is managed by the Environmental Assessment Section (EAS) within the Environmental Sciences (ES) division at the SJRWMD.

In 1990, the SWQMP began monitoring sediments for priority pollutants, following several studies that documented the prevalence of toxic organic compounds in sediments of the Lower St. Johns River (Dames and Moore, 1983; Shropp and Windom, 1987; Pierce *et al.*, 1988; FDER, 1988). Priority pollutants include metals, hydrocarbons, pesticides and industrial chemicals known to be acutely or chronically toxic. The data have been added to the EPA's National Water Quality Data Base (STORET) and are used by the Florida Department of Environmental Protection (FDEP) for the State biennial assessment

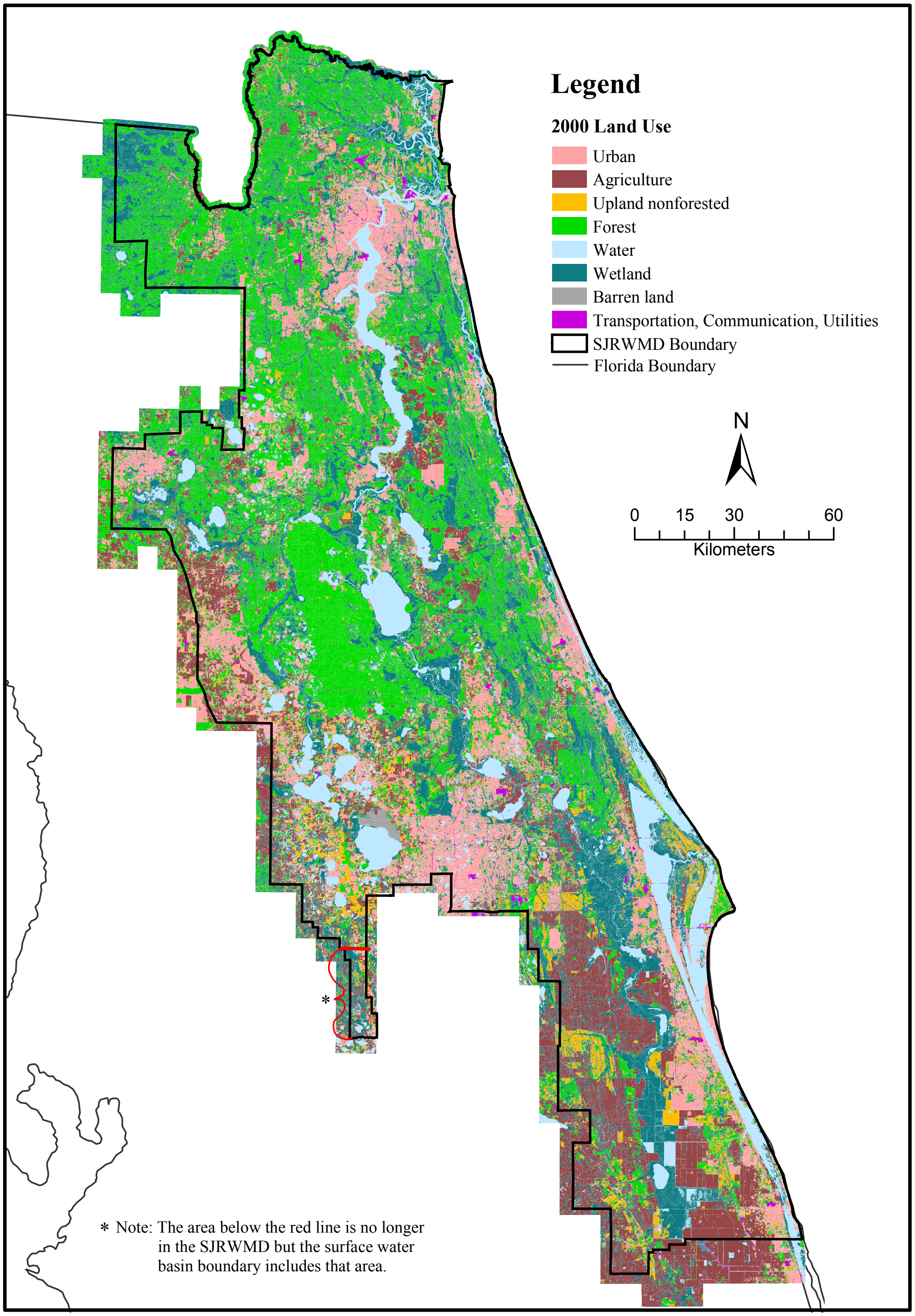


Figure 1-1. Land Uses in the St. Johns River Water Management District

ACKNOWLEDGEMENTS

The authors would like to thank the following St. Johns River Water Management District staff for their contributions to and participation in this study:

Project Management: Aisa Ceric, Supervising Environmental Scientist IV
Sample and Data Collection: Ken Riddick, Elizabeth Daneman, Warren Weeden, Scott Snyder, and Don Nickerson, Environmental Technicians
Data Management: Regina Fegan, Environmental Scientist II
Spatial Data Preparation: Marvin Williams, GIS Analyst III
Report Review Committee: John Applewhite, QA Officer
Rolland Fulton, Environmental Scientist V
John Higman, Environmental Scientist IV
Margaret Lasi, Environmental Scientist IV
Steve Winkler, Environmental Scientist IV

of water quality — the 305(b) report. Sediment studies continued under the SWQMP through 1993. More than half the stations surveyed indicated widespread contamination from polycyclic aromatic hydrocarbons (PAH; Delfino *et al.*, 1991 and 1993).

A districtwide base-line sediment monitoring project was performed in the winter of 1996-1997 to assess the status of freshwater sediments at 86 stations with the District. The stations were selected to provide a representative cross-section of the District. The objectives of the 1996-1997 project were to measure trace organic and trace metal contaminants in sediments, compare them to effects-based sediment quality guideline values, and to identify general problem areas and potential "hot spots" that may warrant further investigation. A districtwide sediment assessment report was prepared based on the data from this base-line monitoring project, and was published as a District Special Publication SJ 98-SP5, "*Sediment Quality in the St. Johns River Water Management District: Physical and Chemical Characteristics*" (SJRWMD, 1998). During the winter of 1998-1999 an additional 40 sites were sampled for the baseline districtwide assessment. Detailed follow-up sampling was also conducted in 1998-1999 at 10 general locations indicated to potentially have contamination issues, based on the original 1996-1997 districtwide assessment results (Battelle, 2000a); multiple sites were sampled at each general location for a total of 63 sites.

These reports indicated that the general quality of the fresh water sediments in the District were quite good. The most contaminated locations appeared to have contaminant levels that were comparable to typical U.S. urban coastal sediments. A few general locations, however, with elevated concentrations of a number of organic and metal contaminants were identified, and were recommended for further study. The 1996-1997 and 1998-1999 base-line monitoring studies generated valuable information and also identified some information gaps that needed to be addressed with additional work.

In the spring of 2002 a third sediment sampling activity was conducted, with samples being collected at 25 new sites to complete the districtwide baseline work. Detailed sampling was also conducted in 2002 at five general locations (41 sites total) based on the earlier data that suggested they warrant closer investigation; two of these five locations had been sampled in the 1998-1999 detailed assessment work, but warranted additional study. In addition, data from 15 Lower St. Johns River and five Cedar-Ortega River Basin sites were selected for inclusion in the overall districtwide data summary; these 20 sites were sampled in 2000 as part of a separate Lower St. Johns River (LSJR) sediment assessment project. The data from the 2002 work are compiled in this report, along with a summary of the data from the earlier work.

1.2 Objectives

This document was prepared with the following objectives:

- Summarize the results from the sampling of the 171 Districtwide Assessment sites; all Districtwide Assessment sites sampled in the three sampling events between 1996 and 2002.
- Summarize the results from the sampling at the 13 Detailed[1] Assessment locations; all Detailed Assessment sites sampled in the two sampling events in 1998-1999 and 2002, with an emphasis on the locations that appear to have contamination that may be of ecological concern.

[1] Note that "Detailed" in Detailed Assessment refers to the level of detail in the geographical coverage of the sampling, not the level of detail in the chemical analysis. Detailed assessment was performed at locations that were indicated to potentially have contamination issues based on the Districtwide sampling, and such locations were then resampled by collecting samples from larger number of sites in the area, to confirm/refute the initial observations, and to better characterize the magnitude and geographical extent of the contamination. The Detailed Assessment sampling focused on the contaminants that appeared to be of concern, and *fewer* contaminants were generally measured in the Detailed Assessment sampling than in the Districtwide Assessment.

- Present the detailed analytical results for the sites sampled in 2002, as the detailed data for those sites has not been reported in earlier documents.

The general objective of the work described in this report was to gain an understanding of the sediment quality within the District by sampling 171 representative water body locations (the Districtwide Assessment) and summarize those results, and perform a more detailed assessment of 13 locations (the Detailed Assessment) identified as potentially being areas of concern (Table 1-1). The sampling locations and sites are described in more detail in Section 2. Specific objectives were to determine the presence and concentration of potentially toxic organic compounds in the sediments to characterize the magnitude and geographical extent of any contamination that may potentially be of environmental significance.

Table 1-1: Summary of Sampling Effort
(individual site information is presented in Section 2)

Study Component	Number of Sites Sampled by Sampling Year			
	1996-1997	1998-1999	2002	Total
Districtwide Assessment	86	40	45	171
Detailed Assessment	0	63 (10 general locations)[a]	41 (3 general locations)	104

[a] "General locations" refers to a lake or other water body area from which generally only one sample was collected for the Districtwide Assessment and then resampled with generally 4-6 (sometimes more) sites sampled during the Detailed Assessment.

This report is intended to summarize the Districtwide and Detailed sediment assessment contaminant data that have been generated to date in one document; both the data that have been reported earlier (SJRWMD, 1998; Battelle, 2000a) and the new data generated in 2002. This report summarizes (1) a general assessment of the sediment quality at the Districtwide assessment sites, (2) an assessment of the locations that have sediment contaminant concentrations that may be of environmental concern, based on the detailed assessment data, and (3) recommendations for further studies. This document is intended to primarily be a summary of results from these sediment surveys, and is *not* intended to provide detailed information or an interpretive analysis of the contaminant data.

1.3 Scope of Work

Battelle and the SJRWMD jointly developed an analytical program in which Battelle would assist with the measurement and assessment of organic and trace metal contaminants in sediments from water bodies throughout the SJRWMD. Sediment sampling locations were selected and sampled by SJRWMD staff, and the samples were shipped to Battelle for chemical and physical-chemical analysis. Battelle was responsible for determining the sediment concentrations of the target organic compounds and major and trace metals, and Battelle's subcontracting laboratory (Mote Marine) performed the analysis for the nutrient and physical-chemical parameters. The target contaminant and ancillary measures list was developed based on the following considerations:

- Identification of the most important and persistent organic and metal contaminants found in sediments, as documented by major monitoring programs over the last 10-15 years (e.g., EPA EMAP, NOAA National Status and Trends Program). Central to this theme was the selection of those organic compounds that are sufficiently hydrophobic, and thus accumulate in sediments, and have demonstrated abilities to bioaccumulate in benthic and higher aquatic organisms.
- Inclusion of the most useful physical parameters and methods for their measurement.
- Comparability with the target analyte list that was used in the 1996-1997 and 1998-1999 sediment sampling (SJRWMD, 1998; Battelle, 2000a) and the list that is currently being used by the LSJR

project for the St. Johns River mainstem work, so as to ensure comparability, continuity in methods, detection limits, and appropriate quality control measures.
- The contaminants for the detailed assessment were based on potential contamination issues identified for those locations during earlier districtwide assessment work.

Sediment analytical results have been reported to the SJRWMD in both hardcopy and electronic format (for inclusion in the SJRWMD database). Battelle has also prepared two interpretive reports based on the 1996-1997 and 1998-1999 sampling (SJRWMD, 1998; Battelle, 2000a). Battelle was then responsible for preparing this condensed summary data report based on the results from all the districtwide and detailed assessment sample analyses. The report format and content were finalized through discussions between Battelle and SJRWMD staff. The report includes the following:

- Study background information
- Study objectives and scope
- Summary of the field sampling and laboratory analytical methods used
- Summary of the analytical results in tabular and, where applicable, graphical form, including
  - a summary of an intercomparison of the contaminant burdens among sampling sites
  - a summary of comparison of measured sediment burdens with selected reference values, such as concentrations observed nationally in sediment monitoring programs and sediment quality guideline values as first-level indicators of possible risks that in-place contaminants might pose to the benthic ecological systems
- Conclusions and recommendations

2. TECHNICAL APPROACH

2.1 Site Selection and Sample Collection

Site Selection

The Districtwide Assessment investigation performed in 1996-1997 consisted of 71 Surface Water Quality Monitoring Program (SWQMP) sites from throughout the District and 15 Lower St. Johns River Basin sites (SJRWMD, 1998). The 1998-1999 sampling activities included 40 new Districtwide Assessment study sites and 63 sites (from 10 locations) for the Detailed Assessment (Battelle, 2000a). The samples collected in 2002 consisted of 25 new Districtwide Assessment sites and 41 sites (from 3 general locations) for detailed assessment; and additional 20 Lower St. Johns River Basin sites were added for inclusion in the Districtwide Assessment dataset. The scope of the sampling is summarized in Table 1-1, and the sampling sites from all three sampling and analysis activities are listed in Table 2-1.

The districtwide assessment sites sampled in 1998-1999 and in 2002 were selected to provide an assessment of water bodies that were not included in the original study, and a desire to have more complete and representative geographical coverage. In addition, data from 20 more Lower St. Johns River sites, sampled in 2000 for a separate Lower St. Johns River sediment assessment project (which uses identical field and analytical protocols), were added for this report to provide an even more comprehensive dataset. This resulted in a total of 171 districtwide sites (Figure 2.1a).

The detailed assessment locations were chosen based on the districtwide data, and the 1998-1999 detailed assessment data, to gain a better understanding of the situation at locations that may have sediment contamination issues; the sampling was conducted to refute or confirm earlier results and provide more detailed information (Figure 2-1b), including to possibly learn about the sources of contamination. A total of 100 different sites, from 13 general locations, were sampled for the detailed assessment (4 sites, and 3 of the 5 locations, sampled in 2002 had also been sampled in 1998-1999). Most of the detailed assessment samples were collected in the upper Ocklawaha River chain-of-lakes (Figure 2-1c) and the Gainesville area (Figure 2-1d).

The sediment samples that were collected for the districtwide assessment were analyzed for the organic and inorganic contaminants, nutrients, and ancillary measure listed in Table 2-2. The samples collected for the detailed assessment were analyzed for only those classes of compounds (e.g., chlorinated pesticides, toxic metals) that warranted inclusion, based on earlier sampling results.

Sample Collection

The SJRWMD staff collected the samples for this project. Battelle provided the SJRWMD with clean, empty jars for the sample collection, along with labels, chain-of-custody forms, and coolers for sample storage and shipment. Three sediment grabs were collected at each of the detailed assessment sites, and those were composited at the laboratory prior to analysis. Discrete grab samples were collected and analyzed separately for the detailed assessment study.

SJRWMD staff used a Trimble Pro XR® GPS Unit to locate the sites and a petite Ponar dredges and/or Eckman dredges to collect the sediment samples. Surface sediments (top 10 cm) were collected. Rigorous quality control procedures were adhered to for sample collection, handling, and shipment to ensure sample integrity and representativeness. The sample collection and shipment was coordinated with the analytical laboratories to ensure that sample holding times were met. The sampling procedures are described in more detail in earlier Program reports (SJRWMD, 1998; Battelle, 2000a).

Table 2-1: Sediment Sites Sampled in the Districtwide and Detailed Assessment Studies

SITE	DRAINAGE BASIN	WATER BODY	STUDY YEAR	DESCRIPTION
Districtwide Assessment Sites				
02236000	Lake George	Stream	1997	St. Johns River, near Deland
20010002	Lake George	Stream	1997	St Johns River, at Hwy 40 near Astor
20030373	Lake George	Stream	1997	St Johns River, channel marker 72
BLSPR	Lake George	Spring	1997	Blue Springs, near Orange City
KER	Lake George	Lake	1997	Lake Kerr, near Eureka
KERR	Lake George	Lake	1999	Lake Kerr, south-western tip of Kauffmans Island
LAG	Lake George	Lake	1997	Lake George, at marker 9
LEO	Lake George	Lake	1997	Lake George, at markers 4 and 5
LKWOOD	Lake George	Lake	1997	Lake Woodruff, center
SELLERS	Lake George	Lake	1999	Lake Sellers Norheastern Lobe
02235000	Middle St. Johns River	Stream	1997	Wekiva River, near Sanford
20010003	Middle St. Johns River	Stream	1997	St Johns River, at Hwy 17 and 92
20010137	Middle St. Johns River	Stream	1997	Little Wekiva River, at SR 434
ASH	Middle St. Johns River	Lake	1997	Lake Ashby, center
BEAR	Middle St. Johns River	Lake	1999	Bear Lake, northwestern end of lake center
BWC44	Middle St. Johns River	Stream	1997	Blackwater Creek, at SR 44
BWCCPB	Middle St. Johns River	Stream	1997	Blackwater Creek, at Carter Property Bridge
CLH	Middle St. Johns River	Lake	2002	Lake Harney, center
DALHOUS	Middle St. Johns River	Lake	1999	Lake Dalhousie, eastern side of lake
DMR	Middle St. Johns River	Stream	1997	Deep Creek, at Maytown Road
DORR	Middle St. Johns River	Lake	1999	Lake Dorr, north end of lake
HOWELL	Middle St. Johns River	Lake	1999	Lake Howell, center-west end of lake
LH-T_1	Middle St. Johns River	Lake	2002	Lake Harney, tributary outlet to St Johns River
LMAC	Middle St. Johns River	Lake	1997	Lake Monroe, center
MAITL	Middle St. Johns River	Lake	1999	Lake Maitland, center
NORRIS	Middle St. Johns River	Lake	1999	Lake Norris, northern side in Cove
OW-4	Middle St. Johns River	Lake	2002	Lake Jessup, near White's Landing
OW-6	Middle St. Johns River	Lake	2002	Lake Jessup, in 4 ft hole off center of western arm
SJRJESUP	Middle St. Johns River	Stream	1999	St Johns River, near JJ Fish Camp
WIN	Middle St. Johns River	Lake	1997	Lake Winnemissett, center near Deland
WINN	Middle St. Johns River	Lake	1999	Lake Winnemisett
USJ055	Upper St. Johns River	Stream	1997	Crabgrass Creek, at SR 192
USJ918	Upper St. Johns River	Stream	1997	Wolf Creek #1, at St Johns River
WASH	Upper St. Johns River	Lake	1999	Lake Washington
27010875	Indian River Lagoon	Estuary	1997	Indian River, at channel marker 12 near Halov
CC03	Indian River Lagoon	Stream	1997	Indian River Lagoon, Crane Creek
20030400	Lower St. Johns River	Lake	1997	Georges Lake, 200 yds from west bank
20030411	Lower St. Johns River	Lake	1997	Crescent Lake, by marker #9
20030412	Lower St. Johns River	Lake	1997	Kingsley Lake, center
ARL109	Lower St. Johns River	Estuary	2000	Arlington River, near Mote Marine Site 109
BROWARD	Lower St. Johns River	Lake	1999	Lake Broward, eastern shoreline center
CDRC02	Lower St. Johns River	Stream	2000	St Johns River, at Mouth of Cedar Creek
CED01D	Lower St. Johns River	Stream	2000	Cedar River, upstream of Blanding Blvd Bridge
CED062	Lower St. Johns River	Stream	2000	Cedar River, downstream of Blanding Blvd Bridge
CLD	Lower St. Johns River	Lake	1997	Lake Disston, center

SITE	DRAINAGE BASIN	WATER BODY	STUDY YEAR	DESCRIPTION
CRES-T_1	Lower St. Johns River	Lake	2002	Crescent Lake, at mouth of Dunn's Creek
CRES-T_2	Lower St. Johns River	Lake	2002	Crescent Lake, at Crescent City
DIAS	Lower St. Johns River	Lake	1999	Lake Dias, north side of lake center
DUNN02	Lower St. Johns River	Stream	2000	St Johns River, downstream of Dunns Creek mouth, west bank
GBY01	Lower St. Johns River	Estuary	2000	St Johns River, near mouth of Goodby's Creek
GBY02	Lower St. Johns River	Estuary	2000	St Johns River, just upstream of Beauclerc Bluff
GCRB11	Lower St. Johns River	Estuary	2000	St Johns River, W. shore Green Cove Springs Red and Site RB1
GEN	Lower St. Johns River	Lake	1997	Lake Geneva
HAW	Lower St. Johns River	Stream	1997	Haw Creek, at Dead Lake
JOHNSON	Lower St. Johns River	Lake	1999	Lake Johnson, center
JUL021	Lower St. Johns River	Estuary	2000	St Johns River, at Mouth of Julington Creek near South Bank
LFW01	Lower St. Johns River	Estuary	2000	Little Fishweir, near mouth
LSJ01	Lower St. Johns River	Estuary	1996	St Johns River, outside mouth of Ortega River
LSJ05	Lower St. Johns River	Estuary	1996	St Johns River, at NASJAX
LSJ070	Lower St. Johns River	Stream	1997	Little Haw Creek, at Haw Creek
LSJ08	Lower St. Johns River	Estuary	1996	St Johns River, at N. Orange Point
LSJ087	Lower St. Johns River	Stream	1997	Durbin Creek, at Racetrack Rd
LSJ099	Lower St. Johns River	Stream	1997	Big Davis Creek, at Julington Creek
LSJ11	Lower St. Johns River	Estuary	1996	St Johns River, at Mandarin Point
LSJ14	Lower St. Johns River	Estuary	1996	St Johns River, outside mouth of Julington Creek
LSJ17	Lower St. Johns River	Estuary	1996	St Johns River, New Switzerland Point.
LSJ21	Lower St. Johns River	Stream	1996	St Johns River, outside mouth of Palmo Cove
LSJ28	Lower St. Johns River	Stream	1996	St Johns River, offshore Riverdale
LSJ32	Lower St. Johns River	Stream	1996	St Johns River, mid-river at channel marker 38
LSJ35	Lower St. Johns River	Stream	1996	St Johns River, south of Palatka in Wilson Cove
LSJ40	Lower St. Johns River	Stream	1996	St Johns River, north of Ocklawaha River mouth
LSJ918	Lower St. Johns River	Stream	1997	Rice Creek, at Simms Creek
LSJRC06	Lower St. Johns River	Stream	1996	St Johns River, at mouth of Rice Creek
LSJRC10	Lower St. Johns River	Stream	1996	St Johns River, outside SAV near mouth of Rice Creek
LSJRC17	Lower St. Johns River	Stream	1996	St Johns River, across from Warner Cove
LSJRC19	Lower St. Johns River	Stream	1996	St Johns River, at Verdiere Point
MCC01	Lower St. Johns River	Stream	2000	St Johns River, near mouth of McCullough Creek
MON104	Lower St. Johns River	Estuary	2000	Moncrief Creek, near Mote Marine Site 104
NAS01	Lower St. Johns River	Estuary	2000	St Johns River, W.shore near N. of NAS, near S. WWTP Outfall
NBLACK	Lower St. Johns River	Stream	1999	North Fork of Black Creek, at SR 21
ORT051	Lower St. Johns River	Estuary	2000	Ortega River, upstream of Ortega Bridge
ORT361	Lower St. Johns River	Estuary	2000	Ortega River, upstream of Roosevelt Blvd Bridge
RC051	Lower St. Johns River	Stream	2000	St Johns River, at mouth of Rice Creek
RIB105	Lower St. Johns River	Estuary	2000	Ribualt River, near Mote Marine Site 105
RICE02	Lower St. Johns River	Stream	2000	Rice Creek, just upstream of Rice Creek Bridge at US 17
SHEEL	Lower St. Johns River	Lake	1997	Lake Sheelar, at Gold Head State Park
SIM	Lower St. Johns River	Stream	1997	Simms Creek, near Bardin
SJRPLTKA	Lower St. Johns River	Stream	1999	St Johns River, at Palatka
SOUTH	Lower St. Johns River	Lake	1999	South Lake
SRS	Lower St. Johns River	Stream	1997	St Johns River, at SR 50
TRT01	Lower St. Johns River	Estuary	2000	Trout River, upstream of mouth of Ribault River
WEK021	Lower St. Johns River	Stream	2000	St Johns River, across from Welaka
WIO	Lower St. Johns River	Lake	1997	Lake Winona, center

SITE	DRAINAGE BASIN	WATER BODY	STUDY YEAR	DESCRIPTION
02248000	Northern Coastal	Stream	1997	Spruce Creek, near Samsula
27010024	Northern Coastal	Estuary	1997	Tomoka River, old Dixie Hwy Bridge
27010037	Northern Coastal	Estuary	1997	Halifax River, north side 100 ft from Memorial Bridge
27010579	Northern Coastal	Stream	1997	Tomoka River, at Eleventh Street Bridge
BUL	Northern Coastal	Estuary	1997	Bulow Creek
MAT	Northern Coastal	Estuary	1997	Matanzas River, at Washington Oaks
MR312	Northern Coastal	Estuary	1997	Matanzas River, at CR 312
MTC	Northern Coastal	Stream	1997	Moultrie Creek
PEL	Northern Coastal	Estuary	1997	Pellicer Creek, at US 1
TOL	Northern Coastal	Estuary	1997	Tolomato River, at Spanish Landing
19020002	Nassau River	Estuary	1997	Nassau River, at US 17
NRI	Nassau River	Stream	1997	Nassau River, near Italia
19010001	St. Marys River	Stream	1997	St Marys River, at Georgia line and US 17
19010006	St. Marys River	Stream	1997	St Marys River, at SR #2
MPS	St. Marys River	Stream	1997	Middle Prong St Mary's River, at CR 127
02240800	Ocklawaha River/Orange Creek	Stream	1997	Hatchet Creek, near Gainesville
20020404	Ocklawaha River/Orange Creek	Stream	1997	Orange Creek, 50 yds up from Hwy 21
CALF-T_1	Ocklawaha River/Orange Creek	Lake	2002	Calf Pond, center
HAT26	Ocklawaha River/Orange Creek	Stream	1999	Hatchet Creek, at SR 26
HOG30	Ocklawaha River/Orange Creek	Stream	1997	Hogtown Creek at SW 20th Ave.
INDUSPL	Ocklawaha River/Orange Creek	Stream	1999	Airport Ind. Park, between PCR and LHATNB at powerline
LHAT26	Ocklawaha River/Orange Creek	Stream	1999	Little Hatchet Creek, at SR 26
LHATSB	Ocklawaha River/Orange Creek	Stream	1999	Little Hatchet Creek, at airport runway
LHNBPL	Ocklawaha River/Orange Creek	Stream	1999	Little Hatchet Creek, north branch at powerline
LOCCR	Ocklawaha River/Orange Creek	Stream	1999	Lochloosa Creek, at SR 20
LOL	Ocklawaha River/Orange Creek	Lake	1997	Lochloosa Lake
LORANCRK	Ocklawaha River/Orange Creek	Stream	1999	Little Orange Creek, at SR 21
NEWLKA	Ocklawaha River/Orange Creek	Lake	1999	Newnans Lake, near mouth of Hatchet Creek
NEWLKB	Ocklawaha River/Orange Creek	Lake	1999	Newnans Lake, between Hatchet & Little Hatchet Creeks
NEWLKC	Ocklawaha River/Orange Creek	Lake	1999	Newnans Lake, at mouth of Little Hatchet Creek
NEWLKD	Ocklawaha River/Orange Creek	Lake	1999	Newnans Lake, at mouth of Lake Forest Creek
NEWLKE	Ocklawaha River/Orange Creek	Lake	1999	Newnans Lake, deepest spot, center of lake
NEWLKF	Ocklawaha River/Orange Creek	Lake	1999	Newnans Lake, south end of lake
OLK	Ocklawaha River/Orange Creek	Lake	1997	Orange Lake
OR908	Ocklawaha River/Orange Creek	Lake	1997	Bivens Arm West, at center of Lake
PCR-PL	Ocklawaha River/Orange Creek	Stream	1999	PCR stream, at powerline 3-5 m upstream of culvert
POSSUM-T_1	Ocklawaha River/Orange Creek	Stream	2002	Possum Creek
SUNLAND	Ocklawaha River/Orange Creek	Stream	1999	~5 m downstream of culvert on SR 26
SWBPP1	Ocklawaha River/Orange Creek	Stream	1997	Sweetwater Branch, at Paynes Prairie
TUBPP1	Ocklawaha River/Orange Creek	Stream	1997	Tumblin Creek, at Paynes Prairie
02238000	Ocklawaha River/Upper	Stream	1997	Haines Creek, at Lisbon
20020001	Ocklawaha River/Upper	Stream	1997	Ocklawaha River, at SR 464
20020012	Ocklawaha River/Upper	Stream	1997	Ocklawaha River, at SR 316
20020368	Ocklawaha River/Upper	Lake	1997	Lake Eustis, middle
20020371	Ocklawaha River/Upper	Lake	1997	Lake Yale, south lobe center
20020377	Ocklawaha River/Upper	Lake	1997	Lake Harris, south lobe center
20020381	Ocklawaha River/Upper	Lake	1997	Lake Griffin, middle offshore Treasure Island
CARL-T_1	Ocklawaha River/Upper	Lake	2002	Lake Carlton, south

SITE	DRAINAGE BASIN	WATER BODY	STUDY YEAR	DESCRIPTION
CARL-T_2	Ocklawaha River/Upper	Lake	2002	Lake Carlton
CHARLES	Ocklawaha River/Upper	Lake	1999	Lake Charles, southwestern part of lake
CHERRY	Ocklawaha River/Upper	Lake	1999	Cherry Lake, northwestern side of lake center
CLA	Ocklawaha River/Upper	Lake	2002	Lake Apopka, center station
CLW	Ocklawaha River/Upper	Lake	1997	Lake Weir, center
DOR	Ocklawaha River/Upper	Lake	1997	Lake Dora
HAHA-T_1	Ocklawaha River/Upper	Lake	2002	Lake Minnehaha, northwest end in Cypress Cove
HAHA-T_2	Ocklawaha River/Upper	Lake	2002	Lake Minnehaha, south end
HALFMOON	Ocklawaha River/Upper	Lake	1999	Halfmoon Lake, northwest lobe
HAR	Ocklawaha River/Upper	Lake	1997	Lake Harris, center
HELENA	Ocklawaha River/Upper	Stream	1999	Helena Run
JOHNS-T_1	Ocklawaha River/Upper	Lake	2002	Johns Lake, eastern half on west center side
JOHNS-T_2	Ocklawaha River/Upper	Lake	2002	Johns Lake, eastern half in center
LOUISA	Ocklawaha River/Upper	Lake	1999	Lake Louisa, north end of Lake
LYC	Ocklawaha River/Upper	Lake	1997	Lake Yale
MBU	Ocklawaha River/Upper	Stream	1997	Oklawaha River, at Moss Bluff
MILLD	Ocklawaha River/Upper	Lake	1999	Mill Dam Lake, eastern center side of lake
MINN-T_1	Ocklawaha River/Upper	Lake	2002	Lake Minneola, northwest end
MINN-T_2	Ocklawaha River/Upper	Lake	2002	Lake Minneola, east center
MUD-T_1	Ocklawaha River/Upper	Lake	2002	Mud Lake, at east end
MUD-T_2	Ocklawaha River/Upper	Lake	2002	Mud Lake, at outlet to Mud Creek
NLA	Ocklawaha River/Upper	Lake	2002	Lake Apopka, north station
OLA	Ocklawaha River/Upper	Lake	1999	Lake Ola, southeastern side
OLA-T_1	Ocklawaha River/Upper	Lake	2002	Lake Ola, wets side
OLA-T_2	Ocklawaha River/Upper	Lake	2002	Lake Ola, northeastern side
ORD	Ocklawaha River/Upper	Stream	1997	Oklawaha River, downstream of SR 40
SILRV	Ocklawaha River/Upper	Stream	1999	Silver River
SLA	Ocklawaha River/Upper	Lake	2002	Lake Apopka, south station, E of Gourd Neck Spring
WEIR-T_1	Ocklawaha River/Upper	Lake	2002	Lake Weir, southeast end
WEIR-T_2	Ocklawaha River/Upper	Lake	2002	Lake Weir, northwest end
Detailed Assessment Sites				
GEORGEA	Lake George	Lake	1998	Lake George, northeastern side
GEORGEB	Lake George	Lake	1998	Lake George, eastern side
GEORGEC	Lake George	Lake	1998	Lake George, southeastern side
GEORGED	Lake George	Lake	1998	Lake George, north side at outlet
GEORGEE	Lake George	Lake	1998	Lake George, north in outlet downstream
GEORGEF	Lake George	Lake	1998	Lake George, center
GEORGEG	Lake George	Lake	1998	Lake George, south center
GEORGEH	Lake George	Lake	1998	Lake George, southern side at inlet to lake
GEORGEI	Lake George	Lake	1998	Lake George, southwestern side
GEORGEJ	Lake George	Lake	1998	Lake George, western side
MONA	Middle St. Johns River	Lake	1998	Lake Monroe, south center
MONB	Middle St. Johns River	Lake	1998	Lake Monroe, south west
MONC	Middle St. Johns River	Lake	1998	Lake Monroe, center
MOND	Middle St. Johns River	Lake	1998	Lake Monroe, east at little
MONE	Middle St. Johns River	Lake	1998	Lake Monroe, north side
MONF	Middle St. Johns River	Lake	1998	Lake Monroe, east side
MONG	Middle St. Johns River	Lake	1998	Lake Monroe, south east

SITE	DRAINAGE BASIN	WATER BODY	STUDY YEAR	DESCRIPTION
NORRIS-T_1	Middle St. Johns River	Lake	2002	Lake Norris, north side near low density residential
NORRIS-T_2	Middle St. Johns River	Lake	2002	Lake Norris, northeast at tributary from Tracy Canal
NORRIS-T_3	Middle St. Johns River	Lake	2002	Lake Norris, southeast near Citrus Grove
NORRIS-T_4	Middle St. Johns River	Lake	2002	Lake Norris, south near outlet to Blackwater Creek
NORRIS-T_5	Middle St. Johns River	Lake	2002	Lake Norris, southwest at drainage basin
NORRIS-T_6	Middle St. Johns River	Lake	2002	Lake Norris, west at Blackwater Swamp
DISSA	Lower St. Johns River	Lake	1998	Lake Disston, northeast side
DISSB	Lower St. Johns River	Lake	1998	Lake Disston, center north
DISSC	Lower St. Johns River	Lake	1998	Lake Disston, south side
DISSD	Lower St. Johns River	Lake	1998	Lake Disston, southeast side
DISSE	Lower St. Johns River	Lake	1998	Lake Disston, east side
BIVENA	Ocklawaha River/Orange Creek	Lake	1998	Gainesville, Bivens Arm, east-center
BIVENB	Ocklawaha River/Orange Creek	Lake	1998	Gainesville, Bivens Arm, east near outlet
BIVENC	Ocklawaha River/Orange Creek	Lake	1998	Gainesville, Bivens Arm, west-center
BIVEND	Ocklawaha River/Orange Creek	Lake	1998	Gainesville, Bivens Arm, north near Tumbling Creek
BIVENE	Ocklawaha River/Orange Creek	Lake	1998/2002	Gainesville, Bivens Arm, east in outlet
BIVENF	Ocklawaha River/Orange Creek	Lake	1998	Gainesville, Bivens Arm, east downstream in outlet
BIVEN-T_G	Ocklawaha River/Orange Creek	Lake	2002	Gainesville, Bivens Arm, west end of lake
BIVEN-T_H	Ocklawaha River/Orange Creek	Lake	2002	Gainesville, Bivens Arm, center
BIVEN-T_I	Ocklawaha River/Orange Creek	Lake	2002	Gainesville, Bivens Arm, east at outlet
HOGA	Ocklawaha River/Orange Creek	Stream	1998	Gainesville, upstream in Hogtown Creek east
HOGB	Ocklawaha River/Orange Creek	Stream	1998	Gainesville, upstream in Hogtown Creek west
HOGC	Ocklawaha River/Orange Creek	Stream	1998	Gainesville, middle Hogtown Creek
HOGD	Ocklawaha River/Orange Creek	Stream	1998	Gainesville, downstream in Hogtown Creek
ROSE-T_1	Ocklawaha River/Orange Creek	Stream	2002	Gainesville, Sweetwater Branch, Rosewood Branch
SWEETA	Ocklawaha River/Orange Creek	Stream	1998/2002	Gainesville, Sweetwater Branch at outlet to Paynes Prarie
SWEETB	Ocklawaha River/Orange Creek	Stream	1998	Gainesville, Sweetwater Branch in Paynes Prarie
SWEETC	Ocklawaha River/Orange Creek	Stream	1998	Gainesville, Sweetwater Branch, upstream west branch
SWEETD	Ocklawaha River/Orange Creek	Stream	1998	Gainesville, Sweetwater Branch, downstream
SWEETE	Ocklawaha River/Orange Creek	Stream	1998	Gainesville, Sweetwater Branch, middle upstream
SWEET-T_1	Ocklawaha River/Orange Creek	Stream	2002	Gainesville, Sweetwater Branch, upstream east branch
TUMB-T_1	Ocklawaha River/Orange Creek	Stream	2002	Gainesville, Tumbling Creek, upstream in urban area
TUMB-T_2	Ocklawaha River/Orange Creek	Stream	2002	Gainesville, Tumbling Creek near mouth to Bivens Arm
AB-T_1	Ocklawaha River/Upper	Canal	2002	Apopka-Beauclair Canal, before McDonald Canal
AB-T_2	Ocklawaha River/Upper	Canal	2002	Apopka-Beauclair Canal, downstream of McDonald Canal
AB-T_3	Ocklawaha River/Upper	Canal	2002	Apopka-Beauclair Canal, N. of CR48 and S. of CR448
AB-T_4	Ocklawaha River/Upper	Canal	2002	Apopka-Beauclair Canal, in inlet to Lake Beauclair
CLA	Ocklawaha River/Upper	Lake	2002	Lake Apopka, center station
DORAA	Ocklawaha River/Upper	Lake	1998	Lake Dora, west near outlet to Eustis
DORAB	Ocklawaha River/Upper	Lake	1998	Lake Dora, center of western lobe
DORAC	Ocklawaha River/Upper	Lake	1998	Lake Dora, center of middle lobe
DORAD	Ocklawaha River/Upper	Lake	1998	Lake Dora, north side of eastern lobe
DORAE	Ocklawaha River/Upper	Lake	1998	Lake Dora, southeast side of eastern lobe
DORAF	Ocklawaha River/Upper	Lake	1998/2002	Lake Beauclair, east side near outlet to Dora
DORAG	Ocklawaha River/Upper	Lake	1998/2002	Lake Beauclair, center of western lobe
DORAH	Ocklawaha River/Upper	Lake	2002	Lake Beauclair, near mouth of inlet from AB canal
EUSTA	Ocklawaha River/Upper	Lake	1998	Lake Eustis, eastern side
EUSTB	Ocklawaha River/Upper	Lake	1998	Lake Eustis, southeaster side

SITE	DRAINAGE BASIN	WATER BODY	STUDY YEAR	DESCRIPTION
EUSTC	Ocklawaha River/Upper	Lake	1998	Lake Eustis, southern side near inlet from Dora
EUSTD	Ocklawaha River/Upper	Lake	1998	Lake Eustis, south near outlet to Harris
EUSTE	Ocklawaha River/Upper	Lake	1998	Lake Eustis, west near outlet to Griffin
EUSTF	Ocklawaha River/Upper	Lake	1998	Lake Eustis, northern side
EUSTG	Ocklawaha River/Upper	Lake	1998	Lake Eustis, northeastern side
GRIFFA	Ocklawaha River/Upper	Lake	1998	Lake Griffin, southern side
GRIFFB	Ocklawaha River/Upper	Lake	1998	Lake Griffin, in southwestern lobe
GRIFFC	Ocklawaha River/Upper	Lake	1998	Lake Griffin, southcenter
GRIFFD	Ocklawaha River/Upper	Lake	1998	Lake Griffin, eastern side at inlet from Eustis
GRIFFE	Ocklawaha River/Upper	Lake	1998	Lake Griffin, northcenter
GRIFFF	Ocklawaha River/Upper	Lake	1998	Lake Griffin, northern lobe
HARA	Ocklawaha River/Upper	Lake	1998	Lake Harris, southeastern lobe
HARB	Ocklawaha River/Upper	Lake	1998	Lake Harris, center
HARC	Ocklawaha River/Upper	Lake	1998	Lake Harris, southwestern side
HARD	Ocklawaha River/Upper	Lake	1998	Lake Harris, northwestern side
HARE	Ocklawaha River/Upper	Lake	1998	Lake Harris, northeastern side at inlet from Eustis
HARF	Ocklawaha River/Upper	Lake	1998	Lake Harris, western side
LA-R_1	Ocklawaha River/Upper	Lake	2002	Lake Apopka Random Site 1
LA-R_2	Ocklawaha River/Upper	Lake	2002	Lake Apopka Random Site 2
LA-R_3	Ocklawaha River/Upper	Lake	2002	Lake Apopka Random Site 3
LA-R_4	Ocklawaha River/Upper	Lake	2002	Lake Apopka Random Site 4
LA-R_5	Ocklawaha River/Upper	Lake	2002	Lake Apopka Random Site 5
LA-R_6	Ocklawaha River/Upper	Lake	2002	Lake Apopka Random Site 6
LA-R_7	Ocklawaha River/Upper	Lake	2002	Lake Apopka Random Site 7
LA-T_1	Ocklawaha River/Upper	Lake	2002	Lake Apopka, near unnamed stream in Gourd Neck
LA-T_2	Ocklawaha River/Upper	Lake	2002	Lake Apopka, near Lulu Creek WW treatment discharge
LA-T_3	Ocklawaha River/Upper	Lake	2002	Lake Apopka, near pumping station No. 3
LA-T_4	Ocklawaha River/Upper	Lake	2002	Lake Apopka, near pumping station No. 2
LA-T_5	Ocklawaha River/Upper	Lake	2002	Lake Apopka, near Lake Level Canal
LA-T_6	Ocklawaha River/Upper	Lake	2002	Lake Apopka, near Duda Ponds
LA-T_7	Ocklawaha River/Upper	Lake	2002	Lake Apopka, at Apopka-Beauclair Canal entrance
LA-T_8	Ocklawaha River/Upper	Lake	2002	Lake Apopka, trough south of Smith Island
LA-T_9	Ocklawaha River/Upper	Lake	2002	Lake Apopka, at Town of Montverde
NLA	Ocklawaha River/Upper	Lake	2002	Lake Apopka, north station
SLA	Ocklawaha River/Upper	Lake	2002	Lake Apopka, south station, E of Gourd Neck Spring

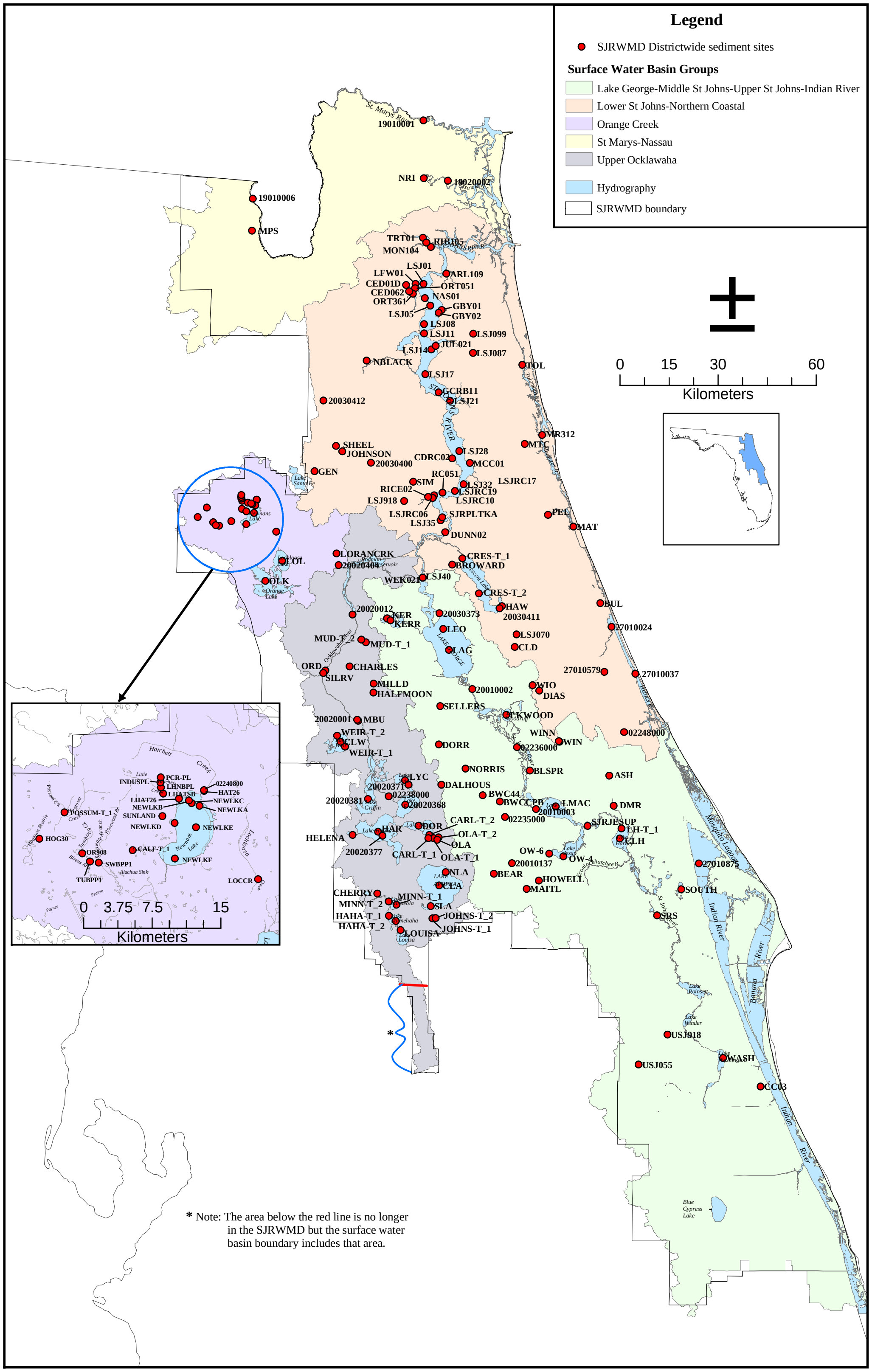


Figure 2-1a. Locations and IDs of the 171 Districtwide Sampling Sites

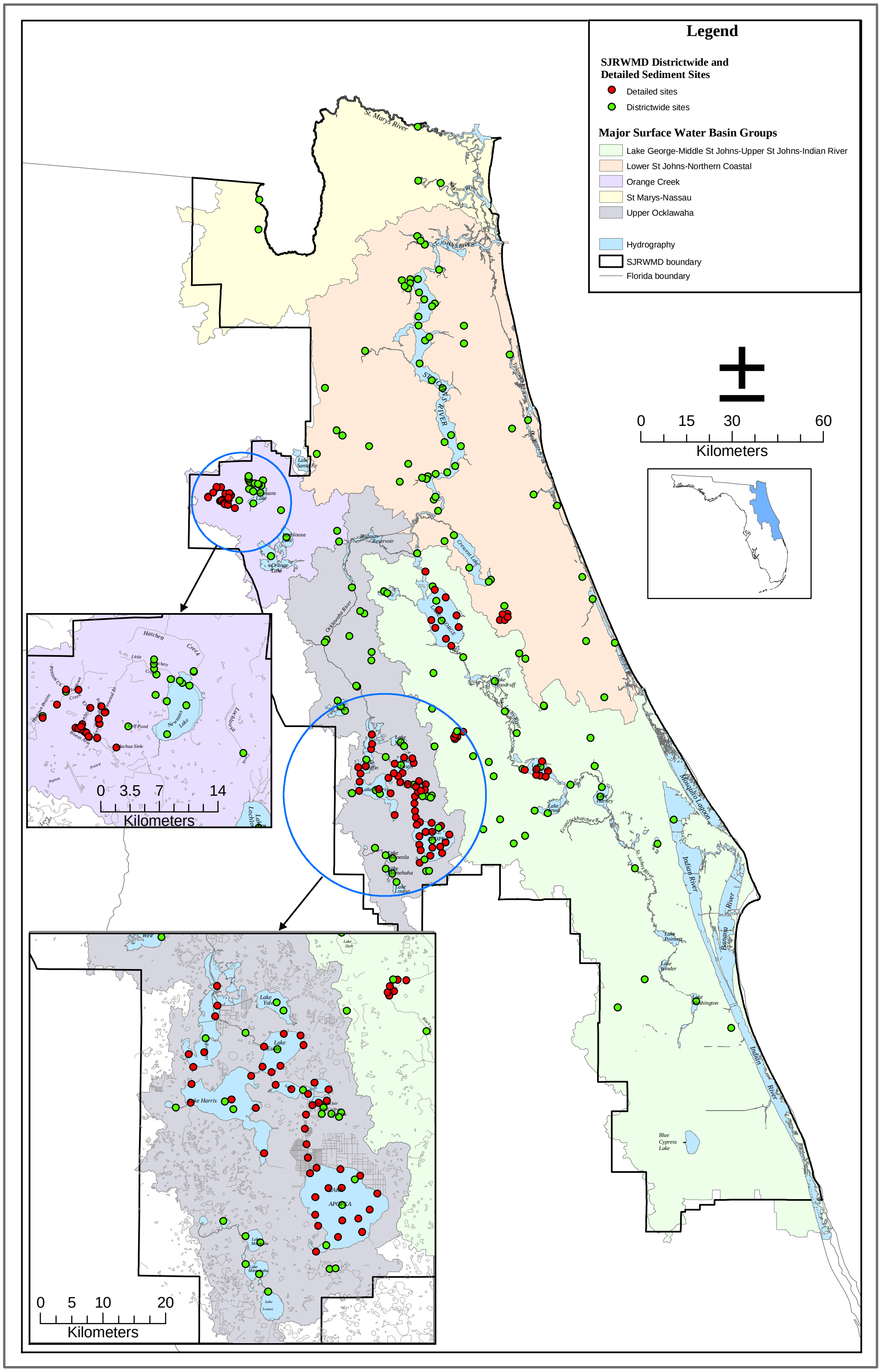


Figure 2-1b. Locations of the Districtwide (green) and Detailed (red) Assessment Sampling Sites

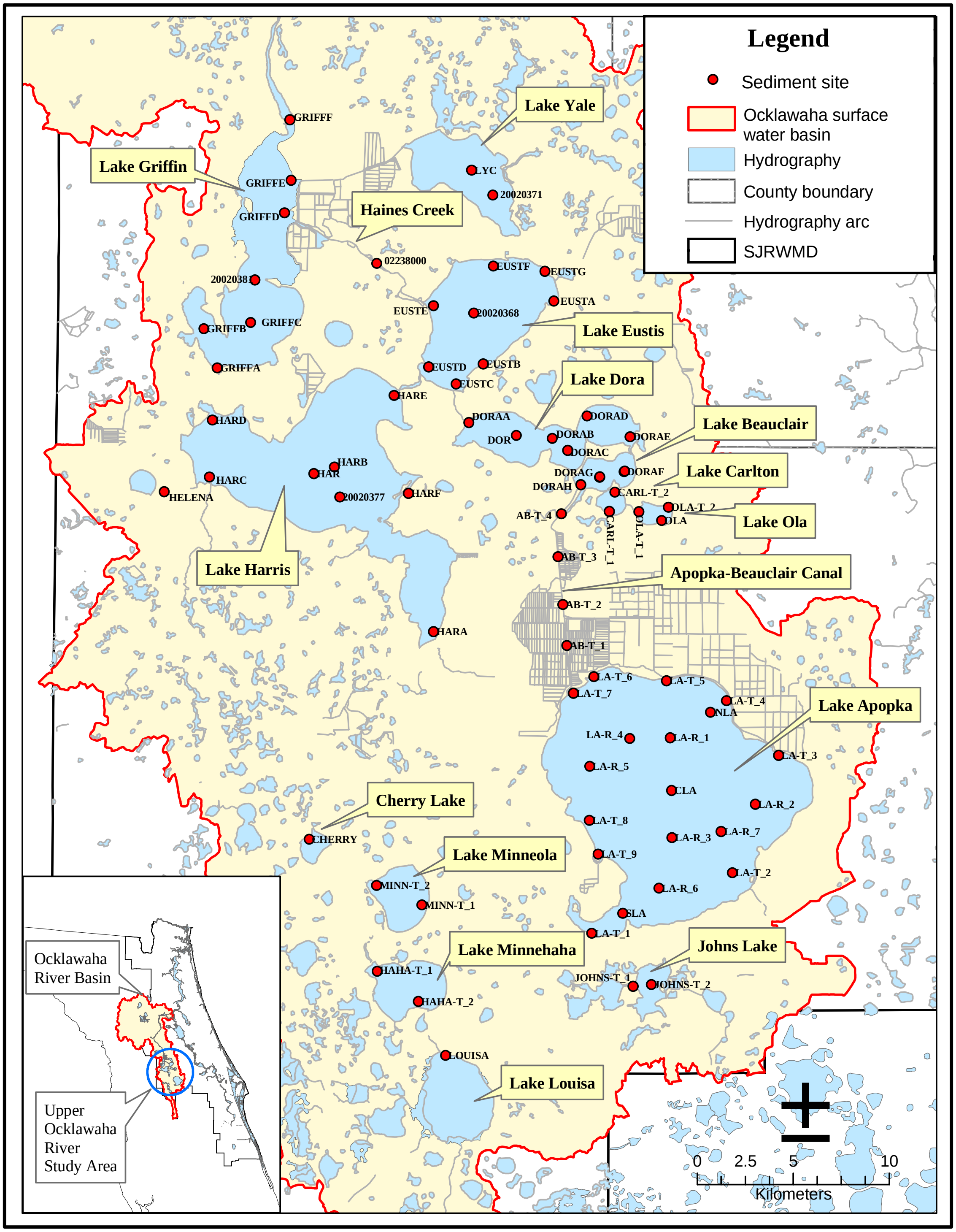


Figure 2-1c. Locations and IDs of the Upper Ocklawaha River Chain-of-Lakes Sites (Districtwide and Detailed Assessment Sites)

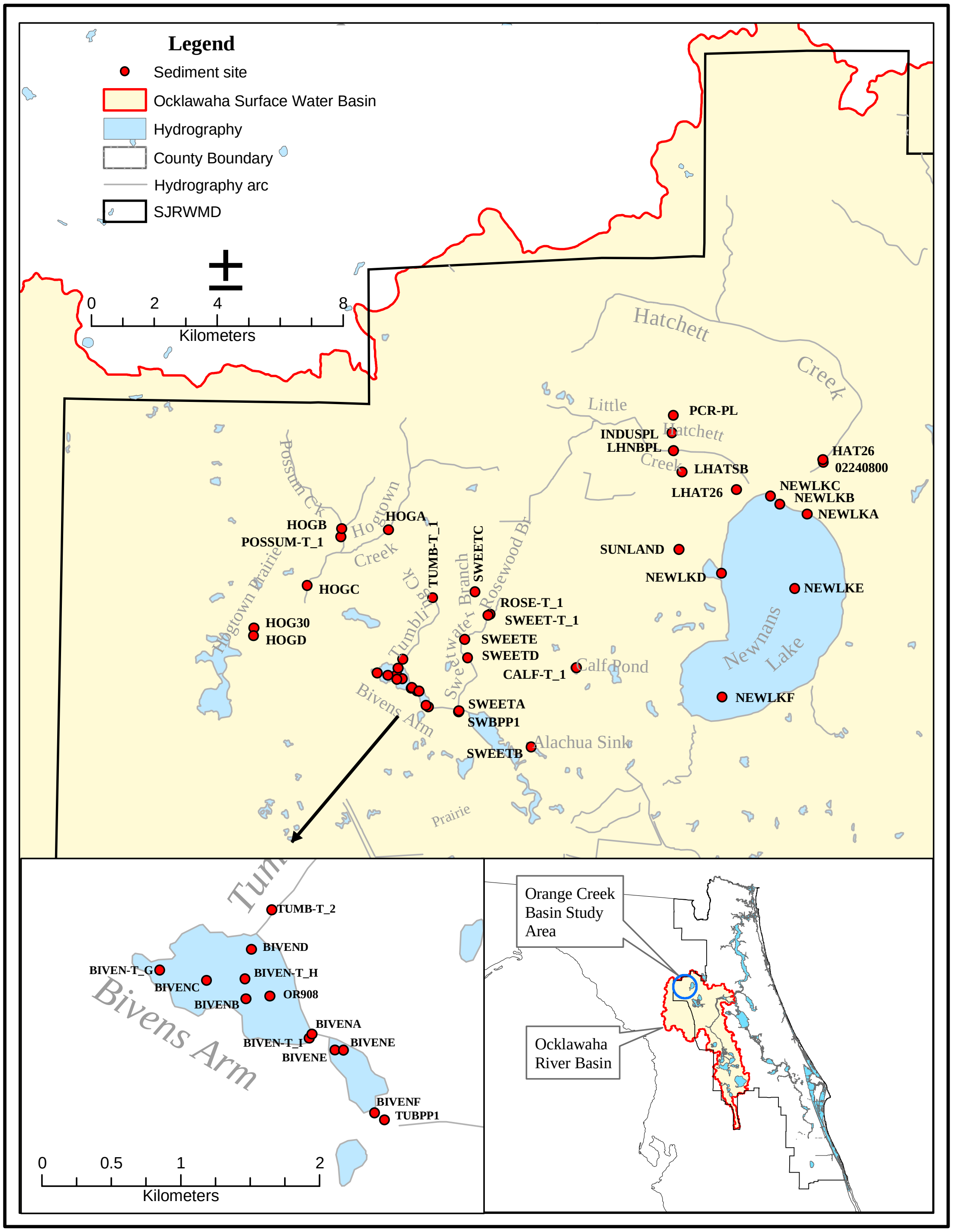


Figure 2-1d. Locations and IDs of the Gainesville Area Sites (Districtwide and Detailed Assessment Sites)

Table 2-2. Analytical Parameters and Method Detection Limits

TARGET ANALYTE	Sediment MDL (µg/kg, dry weight)	Analysis Method [a]
Organic Compounds - PAH		
1-Methylnaphthalene	0.46	8270M
1-Methylphenanthrene	0.30	8270M
2-Methylnaphthalene	0.71	8270M
1-Chloronaphthalene	0.43	8270M
2-Chloronaphthalene	0.47	8270M
2,6-Dimethylnaphthalene	0.36	8270M
2,3,5-Trimethylnaphthalene	0.32	8270M
Acenaphthene	0.40	8270M
Acenaphthylene	0.31	8270M
Anthracene	0.24	8270M
Benzo(a)anthracene	0.21	8270M
Benzo(a)pyrene	0.30	8270M
Benzo(e)pyrene	0.21	8270M
Benzo(b)fluoranthene	0.19	8270M
Benzo(g,h,i)perylene	0.83	8270M
Benzo(k)fluoranthene	0.24	8270M
Biphenyl	0.38	8270M
Chrysene	0.24	8270M
Dibenz(a,h)anthracene	0.16	8270M
Fluoranthene	0.29	8270M
Fluorene	0.34	8270M
Indeno(1,2,3-cd)pyrene	0.17	8270M
Isophorone	0.36	8270M
Naphthalene	0.60	8270M
Perylene	0.15	8270M
Phenanthrene	0.88	8270M
Pyrene	0.26	8270M
Organic Compounds - Phthalates		
Butylbenzylphthalate	1.97	8270M
Di-N-butylphthalate	6.00	8270M
Diethylphthalate	12.0	8270M
Dimethylphathalate	2.33	8270M
Bis(2-ethylhexyl)phthalate	8.97	8270M
Di-N-octylphthalate	2.03	8270M
Organic Compounds – Other Chlorinated		
1,2-Dichlorobenzene	1.31	8081M
1,3-Dichlorobenzene	0.80	8081M
1,4-Dichlorobenzene	1.32	8081M
1,2,4-Trichlorobenzene	0.29	8081M
1,2,4,5-Tetrachlorobenzene	0.11	8081M
Hexachlorobutadiene	0.16	8081M
Hexachloroethane	0.12	8081M
Hexachlorocyclopentadiene	0.20	8081M

TARGET ANALYTE	Sediment MDL (µg/kg, dry weight)	Analysis Method [a]
Organic Compounds - PCB Congeners		
Cl_2(8)	0.08	8081M
Cl_3(18)	0.09	8081M
Cl_3(28)	0.15	8081M
Cl_4(52)	0.09	8081M
Cl_4(44)	0.07	8081M
Cl_4(66)	0.07	8081M
Cl_4(77)/Cl_5(110)	0.07	8081M
Cl_5(101)	0.10	8081M
Cl_5(118)	0.07	8081M
Cl_6(153)	0.08	8081M
Cl_5(105)	0.07	8081M
Cl_6(138)	0.07	8081M
Cl_5(126)/Cl_6(129)	0.59	8081M
Cl_7(187)	0.07	8081M
Cl_6(128)	0.07	8081M
Cl_7(180)	0.06	8081M
Cl_6(169)	0.1	8081M
Cl_7(170)	0.10	8081M
Cl_8(195)	0.08	8081M
Cl_9(206)	0.11	8081M
Cl_{10}(209)	0.12	8081M
Organic Compounds - Pesticides		
4,4'-DDD	0.05	8081M
2,4'-DDD	0.06	8081M
4,4'-DDE	0.06	8081M
2,4'-DDE	0.08	8081M
4,4'-DDT	0.08	8081M
2,4'-DDT	0.08	8081M
Aldrin	0.12	8081M
α-BHC	0.09	8081M
β-BHC	0.08	8081M
δ-BHC	0.06	8081M
γ-BHC (Lindane)	0.09	8081M
Chlorpyriphos (Dursban)	0.10	8081M
α-Chlordane	0.08	8081M
γ-Chlordane	0.07	8081M
Oxychlordane	0.1	8081M
trans-Nonachlor	0.07	8081M
cis-Nonachlor	0.1	8081M
Dieldrin	0.07	8081M
Endosulfan I	0.08	8081M
Endosulfan II	0.06	8081M
Endosulfan sulfate	0.06	8081M
Endrin	0.09	8081M
Endrin aldehyde	0.10	8081M
Endrin ketone	0.07	8081M
Heptachlor	0.12	8081M
Heptachlor epoxide	0.08	8081M
Hexachlorobenzene	0.11	8081M

TARGET ANALYTE	**Sediment MDL (µg/kg, dry weight)**	**Analysis Method [a]**
Methoxychlor	0.10	8081M
Mirex	0.07	8081M
Toxaphene	5	8081M
Metals	**(mg/kg, dry weight)**	
Aluminum (Al)	14.3	200.8M
Arsenic (As)	1.03	200.9M
Cadmium (Cd)	0.074	200.8M
Chromium (Cr)	1.0	200.8M
Copper (Cu)	0.657	200.8M
Iron (Fe)	400	200.8M
Lead (Pb)	0.746	200.8M
Lithium (Li)	0.928	200.8M
Manganese (Mn)	0.662	200.8M
Mercury (Hg)	0.01	245.5
Nickel (Ni)	1.14	200.8M
Selenium (Se)	0.27	200.9M
Silver (Ag)	0.022	200.9M
Tin (Sn)	0.056	200.8M
Zinc (Zn)	3.26	200.8M
Nutrients	**(mg/kg, dry weight)**	
Total Kjeldahl Nitrogen (TKN)	5	EPA/CE-81-1
Total Phosphorus (TP)	5	EPA/CE-81-1
Orthophosphate (OP)	0.5	EPA/CE-81-1
Ancillary Measurements		
Total Organic Carbon (TOC)	0.01 % (dry weight)	9060
Total solids (TS)	0.5 % (wet weight)	SM 2540G
Total volatile solids (TVS)	0.5 % (dry weight)	SM 2540G
Grain Size	0.5 % (total wet sediment volume)	Coulter LS-200
% Moisture	0.5 %	SM 2540G

[a] The instrumental analysis methods listed apply the following analytical instrumentation:
8270M: Gas chromatography/mass spectrometry (GC/MS)
8081M: Gas chromatography/electron capture detection (GC/ECD)
200.8M: Inductively coupled plasma/mass spectrometry (ICP/MS)
200.9M: Graphite furnace atomic absorption spectroscopy (GFAAS)
245.5: Cold vapor atomic absorption spectroscopy (CVAAS)

2.2 Laboratory Sample Analysis

2.2.1 Selection of Analytical Parameters and Methods

Selection of Analytical Parameters

The collected sediment samples were analyzed for a series of organic and trace metal contaminants, nutrient parameters, and various physical and chemical ancillary measures to support the monitoring program objectives of this study (Table 2-2). The target parameters include key priority pollutants and the most environmentally important and persistent organic and metal contaminants found in sediment, as documented by major monitoring programs conducted in the U.S. over the past decade (e.g., NOAA's National Status and Trends, and EPA's EMAP program). The compounds had to be sufficiently non-polar to accumulate in sediments and have demonstrated abilities to bioaccumulate in benthic and higher aquatic organisms to be included in the consideration when selecting the organic target compounds. Additionally, an effort was made to provide comparability to other monitoring projects being conducted by the SJRWMD.

All the parameters listed in Table 2-2 were determined for the districtwide assessment sites. The analysis for the detailed assessment sites was based on potential contaminant issues that had been identified in the 1996-1997 and 1998-1999 studies. Additional information on target parameter selection can be found in SJRWMD (1998) and Battelle (2000a).

Selection of Analytical Procedures

The analytical work for this study required the use of specialized low detection limit procedures. Two principal considerations drove the selection of analytical methods for this study:

- In order to assess the true status of anthropogenic chemicals, analytical methods capable of measuring contaminants at ambient (background) concentrations were required. Using such methods it would be possible to develop a reliable picture of the background conditions, areas of impact, and severity of chemical contamination.

- Sensitive low-level measurements of contaminants needed to be performed in order to determine linkages between chemical presence and observed bioeffects (e.g., impact to the benthic community structure), ecological perturbations, or change. A large body of literature has been amassed demonstrating that such effects occur at contaminant concentrations well below concentrations capable of being measured by standard EPA methods of analysis (Figure 2-2).

Through the NOAA National Status and Trends (NS&T) Program and the EPA Environmental Monitoring and Assessment Program (EMAP), a set of analytical methods have been developed specifically to meet the low level detection limit requirements necessary for successful environmental quality monitoring (NOAA, 1998; EPA, 1993a, and those were applied in this project. Generally, the very low detection limits provided by the NOAA NS&T analytical methods are achieved by using larger sample sizes, employing several additional sample cleanup steps prior to instrumental analysis, and by employing instrumental analysis procedures that are highly targeted to the analytes of interest.

Battelle had obtained Florida Department of Environmental Protection (FDEP) approval for the analytical methods that were used in this work, and the methods had been incorporated into Battelle's FDEP CompQAP. A rigorous internal and external quality assurance and quality control Program was employed for the analysis of these samples, to ensure that representative data of the highest quality were generated. Additional information on the selection of analytical method and the quality assurance and quality control procedures can be found in SJRWMD (1998) and Battelle (2000a).

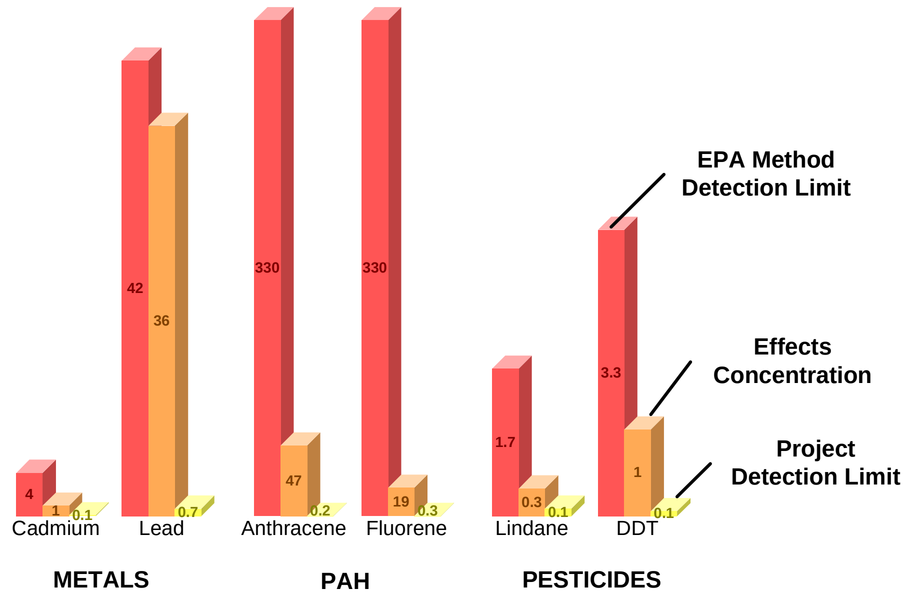


Figure 2-2. Analytical Sensitivity Relative to Effects Concentrations for Standard EPA Methods and Analytical Methods Used in this Program

2.2.2 Laboratory Sample Analysis Procedures

The general scheme that was used for the laboratory analyses of organic contaminants and metals is shown in Figure 2-3. The field samples arrived at Battelle's laboratory where they were sub-sampled for organic compound, metals, and ancillary measures analysis; each of those also consisted of multiple sample analyses, as indicated in Figure 2-3 and Table 2-2. The laboratory sample receipt, storage, handling, preparation, instrumental analysis, and data reporting procedures are all described in detail in SJRWMD (1998) and Battelle (2000a). These are briefly summarized below.

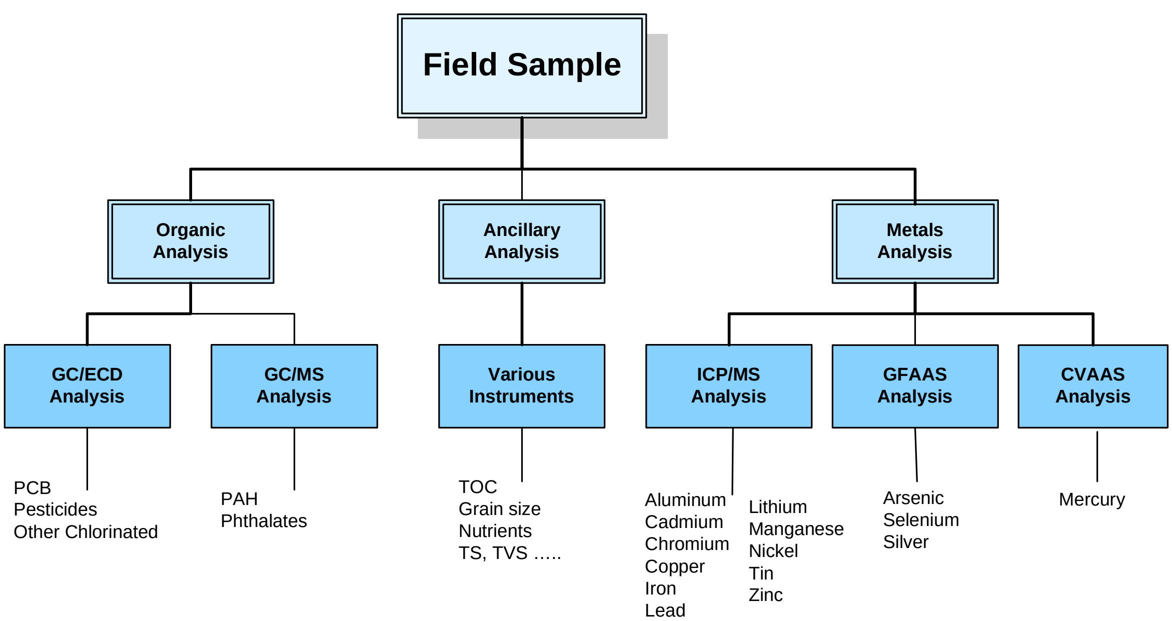


Figure 2-3. Laboratory Scheme for Organic Contaminant and Metals Analysis

Organic Compound Analysis

The sediment sample was thoroughly homogenized, centrifuged to remove excess water, re-homogenized, and fortified with surrogate internal standard (SIS) compounds and serially extracted with organic solvent. The combined extract was concentrated and purified using analyte-optimized alumina column and high performance liquid chromatographic (HPLC) gel permeation chromatography (GPC) cleanup procedures. The volume of the purified extract was reduced, the extract spiked with recovery internal standards (RIS), and split for the two instrumental analyses.

The concentrations of the Method 8270M target compounds (e.g., PAH, phthalates, kepone) were determined by high-resolution capillary gas chromatography/mass spectrometry (GC/MS), with the MS operating in the selected ion monitoring (SIM) mode to achieve the needed sensitivity and specificity. The Method 8081M target analytes (e.g., PCB, pesticides, and other chlorinated organic compounds) were analyzed by high-performance capillary gas chromatography with electron capture detection (GC/ECD).

The analytical data were corrected for surrogate compound recoveries for the purposes of this report, as was also performed for the earlier reports (SJRWMD, 1998; Battelle, 2000a). Surrogate corrected data typically provide a better representation of the actual field sample contaminant concentrations than non-corrected data, and this is the standard analytical approach in most major environmental monitoring programs (e.g., NOAA's National Status and Trends and EPA's EMAP programs). In addition to providing a better representation of the true contaminant levels, surrogate corrected data allow for more reliable comparisons among the study sites.

Metals Analysis

The analysis for inorganic parameters involved two digestion procedures to quantitatively recover all elements of interest and three separate instrumental analyses (Methods 200.8M, 200.9M, and 245.5). The procedures were designed for quantitative determinations of the 15 metals (Table 2-2). All 15 metals were determined for the districtwide sites. Iron, lithium, manganese, selenium, and tin were not determined for the detailed assessment sites, since these had not been identified as being of concern. The remaining nine metals are more commonly the cause of environmental issues; aluminum was also included in the detailed assessment analysis as a useful data normalizing parameter.

The sediment samples were dried using a freeze drying technique and blended in a mixer-mill. A total digestion procedure, using a mixture of nitric and hydrofluoric acids in a nitrogen vented digestion bomb system, was used for the majority of the metals. This procedure accomplishes a total digestion of the entire sample matrix and allows quantification of the crustal elements present as part of the matrix itself, as well as those metals bound to the surface of the material. A second Aqua Regia-based sealed digestion bomb system was used to achieve optimum recovery of silver, arsenic, selenium, and mercury. The Aqua Region method is most suitable for these metals, providing high element recovery and data that can reliably be interpreted along with the other elements, including using aluminum-normalization data analysis methods.

Three separate instrumental analyses were performed to obtain data for all metals (Table 2-2). Inductively coupled plasma/mass spectroscopy (ICP/MS; Method 200.8M), was used for aluminum, cadmium, chromium, copper, iron, lead, lithium, manganese, nickel, tin, and zinc. Method 200.9M analysis was performed by graphite furnace atomic absorption spectroscopy (GFAAS) for the analysis of trace levels of arsenic, selenium, and silver. Method 245.5 analysis is a cold vapor atomic absorption spectroscopy (CVAAS) procedure that was used for the mercury analysis.

Nutrient Analysis and Ancillary Measurements
Soluble reactive phosphorus (orthophosphate), total phosphorous, and total Kjeldahl nitrogen were determined for all districtwide assessment samples, using method EPA/CE-81-1. The nutrient analyses are quite sensitive to sample storage, and close coordination was needed between the field team and the laboratory to ensure that holding times were met.

Ancillary Measurements
Total organic carbon (TOC) analysis was performed in accordance with Method 9060, which involves converting the organic carbon by high temperature combustion to carbon dioxide and then measuring this by infrared absorbance. The determination of percent moisture, total solids, and total volatile solids was performed using Method 2540G of Standard Methods, 17^{th} Edition (APHA, 1989), and are routine physical soil/sediment measurements.

Grain size distributions of moist field sediment were determined using a laser diffraction instrument (Coulter LS-200), capable of measurement between 0.4 and 2000 µm equivalent spherical diameters. Results were generated for 26 grain size intervals, which represents the classical half-phi distribution (Folk, 1974). Total percent sand, silt and clay were calculated as the sum of volume percent between 2,830 and 62.5 µm, 62.5 and 3.91 µm, and 3.91 to 0.04 µm, respectively. Data for each of the 26 individual size intervals were also reported. The percent mud (defined as the sum of the silt and clay fraction) was also determined, and is often used to analyze contaminant data relative to grain size.

Benthic Community Structure Analysis
Benthic community structure analysis was performed by Water & Air Research (Gainesville, Florida) on sediment collected at a large number of the districtwide assessment sites between 1999 and 2002. The benthic community analysis was not a component of Battelle's project with the SJRWMD. However, a summary of selected benthic community data provided by Water & Air Research are included in this report because of the overlap in some sites, and because of the potential interest in reviewing contaminant and benthic data from the same location. Detailed information on the benthic community analysis, including detailed data presentation and analysis, can be found in dedicated benthic community analysis reports prepared by Water & Air Research.

Benthic macroinvertebrate samples were analyzed in accordance with Water & Air's state-approved Comprehensive Quality Assurance Plan (CQAP, #900322). The following benthic community metrics were calculated for each sampling site based on pooled data from four replicate grab samples:

- Total Abundance
- Organism Density (no./ m2)
- Pielou's Evenness
- Total Number of Taxa
- Shannon-Wiener Species Diversity Index
- Percent Dominant Taxon (excluding Chaoborus spp.)
- Percent Composition (excluding Chaoborus spp.)
    - % Chironomids
    - % Tubificids
    - % Mollusks
    - % Amphipods
    - % Polychaetes

- Number of Chironomid Taxa
- Number of ETO Taxa

- Percent Functional Feeding Groups
  - % Filter-Collectors
  - % Gatherer-Collectors
  - % Scrapers
  - % Shredders
- Augmented Florida Index

Various statistical analyses were applied to the benthic community data to determine relationships among the sites, and identify sites with good and compromised quality, based on the benthic ecology. In addition, Water & Air Research attempted to develop a Composite Benthic Sediment Quality Index (CBSI) based on benthic macroinvertebrate community metrics for lakes, streams, and estuaries, and incorporating sediment contaminant data, the Florida Water Quality Index for streams, and the Trophic State Index for lakes and estuaries.

2.3 Data Evaluation and Analysis

2.3.1 Data Evaluation Approaches

The districtwide sediment contaminant data were compiled and organized by site, drainage basin, and water body type (Table 2-1). The drainage basins were subsequently grouped into five groups of drainage basins for presentation and analysis purposes. The detailed assessment sites were grouped by the 13 general locations for presentation purposes. The data from the six general locations in the upper Ocklawaha chain-of-lakes and, separately, the three general locations in the Gainesville area were used together for analysis of the results from these locations, which were of particular interest. The compilation, presentation, and evaluation of the contaminant data included

- Preliminary Contaminant Distribution Evaluations
  - Inter-site comparisons of the contaminant data
  - Comparison of contaminant levels within a related sub-group of sites
  - Comparisons to general contaminant levels Districtwide
- Evaluations Using Reference Values
  - Comparison to national sediment contaminant data and “high” concentration levels established on a national level
  - Comparison to effects-based sediment quality guidelines (SQGs), as a conservative screening-level data review approach
- Evaluations Using Metals Interpretation Tools
  - Assessing the metals contamination, and enrichments over background, using two metals data interpretation tools that have been developed for Florida freshwater systems

2.3.2 Preliminary Contaminant Distribution Evaluations

The initial evaluation of the data consisted of identifying the general contaminant distribution patterns for the sites within the district, identifying sites with notably elevated levels compared to the rest and any geographical contaminant patterns. This first-level analysis of the data consisted of inter-site comparisons of the contaminant data, followed by comparing the data between sub-groups of sites, and finally by comparing the individual site data and sub-group data to general districtwide contaminant levels. The primary site groupings that were used for data evaluation purposes were based on grouping sites by drainage basins (Table 2-1).

2.3.3 Evaluation Using Reference Values

The sediment contaminant data were compared to the National Oceanic and Atmospheric Administration (NOAA) National Status and Trends/Mussel Watch (NS&T/MW) "high" values, which are useful reference values determined statistically using the NS&T/MW monitoring program dataset (Table 2-3; Daskalakis and O'Connor, 1995). The listed reference values were set as the geometric mean plus one standard deviation, using the NS&T/MW U.S. coastal monitoring program sediment site data. Daskalakis and O'Connor (1995) compiled a comprehensive Coastal Sediment Database (COSED) of chemical contaminant concentrations in US sediments, and this is a useful reference for contaminant concentrations measured around the country and what would typically be considered elevated concentrations, on a national level.

The sediment contaminant data were also compared to effects-based sediment quality guideline (SQG) values (Table 2-3). Effects range-low (ERL) and effects range-median (ERM) values are the most commonly used and referenced sediment quality guidelines. They were initially developed by scientists at NOAA (Long and Morgan, 1990) and were later revised after compiling additional data (Long *et. al*., 1995). These are scientifically derived values of potential for biological effects to sediment dwelling organisms from sediment-sorbed contaminants. The concentration below the ERL value represents a minimal-effect range; a range representing conditions in which ecologic and toxic effects are rarely expected. Concentrations between the ERL and ERM represent a possible-effects range within which effects would occasionally occur, and the concentrations above the ERM value represent a probable-effects range where effects would be expected to frequently occur.

After a careful review of currently available SQG information it was evident that the threshold effects concentration (TEC) and probable effects concentration (PEC) values developed by MacDonald *et. al*. (2000) for freshwater systems are most applicable to the sediments in this project. MacDonald has recently also adopted the TEC and PEC values for use with Florida freshwater sediments (FDEP, 2003). The TEC represents the concentration below which sediment toxicity would not be expected to be observed and the PEC is the concentration above which sediment toxicity would likely occur.

The representativeness of SQG values is sometimes hotly debated, and the application of SQGs should be made with caution. The reference values are *screening* tools that were developed to evaluate the general potential for impact to benthic organisms, and should be used in combination with other methods to assess contamination. It is widely recognized that ERL/ERM and TEC/PEC SQGs are general values that are based on large datasets, and may not fully represent the potential for effects at a specific location; there are site-to-site variations in bioavailability, and thus the toxicity of contaminants. Although these values were not intended as sediment quality criteria, and should not be used as such, they can be useful as a semiquantitative point of reference for reviewing sediment data. SQGs, their appropriate use, and their limitations are described in more detail in SJRWMD (1998) and Battelle (2000a), and the referenced base documents (e.g., Long *et al.*, 1995; MacDonald *et al.*, 2000).

Table 2-3: Sediment Quality Reference Values: Freshwater Sediment TEC and PEC Values, Marine/Estuarine Sediment ERL and ERM Values, and NS&T/MW "High" Values

Contaminant	Reference Value - Sediment Concentration (mg/kg, dry weight, for metals and μg/kg, dry weight, for organics)				
	Freshwater SQGs		Marine/Estuarine SQGs		NS&T/MW "High" Value[e]
	TEC[a]	PEC[b]	ERL[c]	ERM[d]	
As	9.79	33.0	8.2	70	13
Cd	0.99	4.98	1.2	9.6	0.54
Cr	43.4	111	81	370	125
Cu	31.6	149	34	270	42
Pb	35.8	128	46.7	218	45
Hg	0.18	1.06	0.15	0.71	0.22
Ni	22.7	48.6	20.9	51.6	42
Ag	NA[f]	NA	1	3.70	0.52
Zn	121	459	150	410	135
Total PCB	59.8	676	22.7	180	80
Total DDT	5.28	572	1.58	46.1	22
DDE	3.16	31.3	2.2	27	NA
DDD	4.88	28.0	2	20	NA
DDT	4.16	62.9	1	7	NA
Chlordane	3.24	17.6	0.5	60	4.5
Dieldrin	1.90	61.8	0.02	8	2.9
Endrin	2.22	207	NA	NA	NA
Lindane	2.37	4.99	NA	NA	NA
Heptachlor epoxide	2.47	16.0	NA	NA	NA
Total PAH	1,610	22,800	4,022	44,792	2,180
Low PAH	NA	NA	552	3,160	450
High PAH	NA	NA	1,700	9,600	1,730

[a] TEC: Threshold Effects Concentration (MacDonald *et al.*, 2000; FDEP, 2003).
[b] PEC: Probable Effects Concentration (MacDonald *et al.*, 2000, FDEP, 2003).
[c] ERL: Effects Range Low (Long *et al.*, 1995; Long & Morgan, 1990, for DDD, DDT, dieldrin and chlordane).
[d] ERM: Effects Range Median (Long *et al.*, 1995; Long & Morgan, 1990, for DDD, DDT, dieldrin and chlordane).
[e] NS&T/MW "High" data from Daskalakis and O'Connor (1995).
[f] NA: not applicable. There is no value for this parameter.

The TEC and PEC-values were used to generate hazard quotient (HQ) values. The HQ is defined as the measured concentration of the contaminant in the sediment sample divided by the freshwater TEC or PEC value. HQs were determined using both the lower TEC and higher PEC values. The HQs for each of the nine metals and eight organic contaminants (total DDT and total PAH were used to represent these compound classes) were also summed for each site to determine a hazard index (HI), which can be used as an overall measure of the potential "potency" of the sediment contamination.

2.3.4 Evaluation Using Metals Data Interpretation Tools

The sediment metals concentrations were determined for 15 elements. Three of the metals (aluminum, iron, and manganese) are considered major metals and are naturally abundant in most geological formations. The other 12 metals are potential environmental contaminants. The natural concentrations of the metals can vary significantly in sediments, based on the geological source, grain size, and other factors. The three major metals are commonly used as data normalizers for the contaminant metals, to distinguish between metals concentrations that can be attributed to the natural geology of the location, and those that can potentially be attributed to anthropogenic sources of contamination. Metals concentrations also tend to naturally increase with decreasing grain size of the sediment, and the percent fines is therefore also widely used to normalize metals data. The relationships among metals in sediments, and how to utilize that in data normalization and interpretation, is described in more detail in SJRWMD (1998) and Battelle (2000a).

Data normalization, and the identification of sediments contaminated with metals, becomes more complicated when the samples in the dataset are from a variety of different locations and environment, and therefore have different natural geological composition. Using simple ratios to the percent fines or aluminum concentration may then not be as effective as when the samples are from a similar general environment (e.g., from the same river, lake, or bay).

Two data interpretation tools have been developed in recent years specifically to address the variability in freshwater sediment samples in Florida, and to simplify and improve the reliability of the metals data analysis (Battelle, 2000b and FDEP, 2002). The two methods were both applied to the data from the 171 districtwide assessment sites to help identify potentially contaminated sites. The results from the two methods were also compared with each other, to evaluate the performance of the methods.

Metals Data Interpretation Method I (Battelle. 2000b)
The first of the two data interpretation tools is described in the document *Development of a Metals Data Analysis Method for Districtwide Assessment of Sediment Contamination*, which was prepared in 2000 by Battelle for the SJRWMD. The tool was developed using primarily the 1996-1997 SJRWMD districtwide data, and was developed specifically for SJRWMD fresh water sediments. The tool was developed to identify general problem areas and specific potential "hot spots", and can also be used to determine background metal concentrations.

The metals interpretive tool is based on sample clusters that were determined from 4 sediment characteristics; aluminum, manganese, percent mud, and percent TOC. Each sediment sample is a member of one of 5 clusters. For each base cluster the 95% upper confidence limit (UCL) was calculated for each contaminant metal. New sample data are input and sediment samples that exceed the 95% UCL for specific metals are considered to be contaminated. The assignment to a cluster, and the determination of exceedances (i.e., contamination) is determined automatically in a Microsoft Excel-based program, and the results are tabulated and displayed graphically. The advantage of this tool is that it uses multiple characteristics of the sediment (aluminum, manganese, percent mud, and percent TOC) to classify the samples into related sub-groups for the data comparison; it does not rely on just a single-parameter normalization approach. The tool is user-friendly and simple to use. One current limitation is that the tool does not efficiently handle large sets of data (many samples) at the same time. The document and accompanying program is available from the SJRWMD (Battelle, 2000b).

Metals Data Interpretation Method II (FDEP, 2002)
The second of the two data interpretation tools is described in the document *Development of an Interpretive Tool for Assessment of Metal Enrichment in Florida Freshwater Sediment*, which was prepared in 2002 by Carvalho *et. al* for the FDEP (FDEP, 2002). The tool was developed using

background sediment data from across the State of Florida, and was developed to be used with fresh water sediments state-wide. The tool was developed to identify samples with metal contaminant concentrations that exceed expected background concentrations.

This metals interpretive tool is based on the assumption that there exists a relatively constant relationship between the contaminant metals and two reference elements – aluminum and iron – in natural sediments. “Clean” lake, stream, and spring sediments samples from north and central Florida provided the natural reference concentrations to describe metal/aluminum and metal/iron linear regressions and prediction/confidence limits. The prediction/confidence limits were determined based on the natural variability in the metal/aluminum (and metal/iron) ratio in the base dataset. Using a Microsoft Excel spreadsheet that is provided with the tool, metals data from freshwater sediment samples are compared to the prediction limits to determine whether the metal concentrations exceed expected natural ranges. The results are displayed graphically.

The advantage of this tool is that it is based on a simple principle, is easy to use. The tool is based on standard contaminant-metal/aluminum data normalization principles, and assumes that this relationship is valid for sediments from across the state of Florida, and from a variety of different environments. However, the natural metal/aluminum (and metal/iron) ratio varies for sediments from different parts of the State, and because of this significant natural variability the tool employs wide prediction/confidence limits and may underestimate the number of potentially contaminated sediments. The document and accompanying program is available from the FDEP (FDEP, 2002).

3. RESULTS AND DISCUSSION

This section briefly summarizes and discusses the results of the organic [polycyclic aromatic hydrocarbons (PAH), phthalate esters, polychlorinated biphenyl (PCB), pesticides, other chlorinated compounds], metals, and nutrient analyses, along with the data from the geophysical (ancillary) analyses [total organic carbon (TOC), grain size, moisture content, total solids (TS), and total volatile solids (TVS)]. The data presented in this section are primarily summarized on a general location basis; summary data for all individual sites are presented in Appendix B (Districtwide Assessment sites) and Appendix C (Detailed Assessment sites). The detailed analytical data for the year 2002 sampling sites (see Table 2-1) are presented in Appendix C; the detailed analytical data for the sites that were sampled in earlier years are presented in SJRWMD (1998) and Battelle (2000a). The data tables in the Appendices are organized alphabetically by site name.

All chemistry data presented and discussed in this section are presented on a dry weight basis. The use of dry weight to report contaminant concentrations reduces data variability caused by varying amounts of water retained by the sediment, and provides for a more reliable data comparison. SJRWMD (1998) and Battelle (2000a) provide additional information on data presentation and normalization.

The data presentation and discussion in Section 3 is limited to higher-level summaries of the results. This report, and this section, does not include the level of detail in the data presentation, interpretation, and discussion that was presented in the two previous sediment assessment reports [SJRWMD (1998) and Battelle (2000a)]. For instance, the measured contaminant concentrations are in this report compared to results from the NOAA NS&T/MW and EPA EMAP databases, but not to concentrations measured in a large number of other studies nationwide, as was done in the earlier reports. Similarly, this report does not include information on uses and possible general sources of the different contaminants, or on the differences in contaminant composition (e.g., PAH and PCB compound composition differences). The information in this report is intended to present the general sediment contaminant conditions in the District, and describe the situation at locations that detailed sampling have demonstrated to potentially be areas of concern.

3.1 Districtwide Assessment Survey

The Districtwide Assessment data presented in this section are summarized on a drainage basin basis, for general regional comparisons of contaminant levels. The data for the 171 Districtwide Assessment sites are compiled by five basins or basin groups (Table 3-1). The summary data for individual sites are presented in Appendix B (Districtwide Assessment sites) and Appendix C (Detailed Assessment sites).

Table 3-1: Sampling Plan for Districtwide Assessment Investigations

Drainage Basin Group	Total # Sites	# Sites by Water Body Type
Lake George, Middle St. Johns River, Upper St. Johns River, and Indian River Lagoon Basin	38	1 estuary, 22 lake, 1 spring, 14 stream
Lower St. Johns and Northern Coastal Basin	65	25 estuary, 12 lake, 28 stream
Orange Creek Basin	25	10 lake, 15 stream
St. Marys and Nassau River Basin	5	1 estuary, 4 stream
Upper Ocklawaha River Basin	38	31 lake, 7 stream

3.1.1 Sediment Contamination and Chemical-Physical Characteristics

Concentrations for 95 organic compounds and 15 metals were determined for the districtwide assessment sites, in addition to nutrient analyses and geophysical measurements (Table 2-2). All individual contaminant data have been reviewed and reported. However, it is most illuminating to focus on classes of analytes for the organic compound data summary and analysis, and that is the approach used for most of this report; individual organic compounds are discussed when the data revealed them to be of particular interest. The individual organic compounds that comprise the different groups of contaminants (e.g., low-molecular weight PAH) and other data handling methods (e.g., how total PCB is generated from PCB congener data) are described in Battelle (2000a). For instance, the Total DDT is comprised of the 2,4- and 4,4-isomers of DDT, DDE, and DDD (i.e., the sum of these six compounds).

Hydrophobic organic contaminants have an affinity for the organic matter in the sediment, and tend to concentrate in organic-rich sediments to a higher degree than in low organic content sediments, given the same concentrations and conditions in the water phase. It can therefore be useful to normalize the organic contaminant data to the total organic carbon (TOC) content of the sediment for data analysis purposes, and both normalized (as µg/g TOC) and non-normalized organic contaminant data are presented. Metals distributions are also controlled by several factors in sediments. These include the grain size, the amount of organic carbon, the natural geology of the sediment, and the water column concentration and proximity to contaminant sources. Normalizing metals concentrations to aluminum (a major metal in the base geology of the sediment) proved to be the most useful metals normalization technique for differentiating anthropogenic contamination from naturally occurring metals concentrations, but should be used with caution because of the natural variability in the geology over such a large area. Both normalized and non-normalized data were reviewed to understand the contaminant characteristics. Data normalization is described in more detail in Battelle (2000a) and Battelle (2002).

3.1.1.1 Organic Compound Results

The organic contaminant data are summarized in Table 3-2a (non-normalized) and 3-2b (normalized to TOC). The mean, median, minimum, and maximum concentrations for all 171 districtwide assessment sites are presented, along with the same information broken out by the five previously described basins or basin groups. The site-specific summary data are presented in Appendix B. The districtwide total PAH data are also illustrated in Figures 3-1a (non-normalized) and 3-1b (normalized to TOC) for each of the 171 sites, and the median total PAH data for the districtwide sites and the five basins and basin groups are presented in Figure 3-2.

***PAH and Phthalate Compounds*.**

Total PAH in the districtwide assessment was quite variable. Total PAH ranged from 2.29 µg/kg [site LORANCRK (Little Orange Creek)] to 18,100 µg/kg [site CED01D (Lower St. Johns River)]. The high degree of variability may be due to population density differences, with urban sites contributing more of this contaminant than rural sites. The median total PAH concentration was 363 µg/kg. Total phthalate concentrations varied from 5.35 [site KERR (Lake Kerr)] to 1,970 µg/kg [site CED01D (Lower St. Johns River)]. The median total phthalate concentration was 83.5 µg/kg.

The variability in the sediment PAH and phthalate concentrations was fairly high even after the data were normalized to sediment TOC content (Table 3-2b). The TOC normalized total PAH median concentration was 5.11 µg/g TOC and the concentration ranged from 0.473 [site MUD-T_2 (Ocklawaha River/Upper)] to 1,020 µg/g TOC [site 20010137 (Middle St. Johns River)]. TOC normalized total phthalate concentrations ranged from 0.118 to 387 µg/g TOC [DMR (Middle St. Johns River)], with a median concentration of 2.18 µg/g TOC.

Figures 3-1a through 3-2 (and Table 3-2a and 3-2b) present total PAH concentrations in sediments from the Districtwide Assessment sites by basin. The PAH concentrations measured in the Lower St. Johns and Northern Coastal Basin sites were, as a whole, higher than one might typically expect in most freshwater sediments. It is, however, indicative of what one might expect for sediments within urban or near urban coastal locations.

Table 3-2a: Summary of Selected Sediment Organic Contaminant Concentrations for Districtwide Assessment Sites

	Sediment Organic Contaminant Concentrations (µg/kg, dry weight)													
	Total PAH	Low PAH	High PAH	Total Phthalates	Total PCB	Total DDTs	DDT	DDD	DDE	Total Chlordane	Total BHCs	Total Endosulfans	Dieldrin	Total Other Chlorinated
Districtwide Assessment – all sites														
Mean	1,350	231	1,120	242	73.0	16.0	3.06	5.17	7.73	2.05	0.48	0.78	0.45	12.3
Median	363	51.2	309	83.5	8.18	2.41	ND[a]	0.48	0.99	0.30	ND	ND	ND	3.16
Min	2.29	0.71	0.32	5.35	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Max	18,100	5,500	17,200	1,970	2,890	419	246	204	185	75.0	9.81	13.4	6.01	150
Lake George, Middle St. Johns River, Upper St. Johns River, and Indian River Lagoon Basin Sites														
Mean	396	47.8	348	167	20.3	7.45	0.80	2.52	4.13	1.01	0.44	0.10	0.12	6.09
Median	279	25.3	224	62.7	8.52	1.40	ND	0.39	0.60	0.23	ND	ND	ND	2.46
Min	3.61	2.08	0.78	5.35	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Max	1,800	249	1,550	1,320	93.4	104	7.91	35.9	65.7	8.17	8.88	1.35	1.32	28.4
Lower St. Johns and Northern Coastal Basin Sites														
Mean	2,580	384	2,190	221	153	12.7	3.27	4.60	4.78	4.00	0.87	1.73	0.70	13.8
Median	1,010	119	894	108	23.7	4.57	1.11	1.16	1.27	0.68	0.28	0.14	0.24	3.41
Min	3.59	1.24	1.63	5.66	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Max	18,100	3,800	17,200	1,970	2,890	116	44.8	53.1	93.1	75.0	9.81	13.4	6.01	150
Orange Creek Basin Sites														
Mean	798	80.4	718	204	22.7	3.67	0.55	0.82	2.29	1.14	0.15	0.38	0.69	17.3
Median	119	20.8	110	53.5	1.22	0.59	ND	ND	0.26	ND	ND	ND	0.16	3.15
Min	2.29	0.71	0.32	7.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Max	8,120	506	7,610	1,130	190	29.6	9.12	8.95	21.8	9.34	1.27	9.03	4.86	128
St. Marys and Nassau River Basin Sites														
Mean	778	486	291	112	12.8	0.63	0.07	0.43	0.12	0.97	0.02	0.00	0.19	2.97
Median	55.3	10.1	45.2	42.9	4.94	0.05	ND	ND	ND	ND	ND	ND	ND	2.24
Min	2.68	1.82	0.86	13.6	1.23	ND	ND	ND	ND	ND	ND	ND	ND	1.81
Max	2,360	2,170	1,220	291	33.9	2.76	0.32	2.15	0.61	4.44	0.08	ND	0.93	5.90
Upper Ocklawaha River Basin Sites														
Mean	647	219	427	499	30.5	40.3	7.0	12.3	20.9	0.51	0.14	0.19	0.23	14.4
Median	222	38.3	174	156	0.98	5.14	ND	0.99	3.30	0.18	ND	ND	ND	6.33
Min	4.75	1.90	2.85	7.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.89
Max	8,350	5,500	7,490	1,840	198	419	246	204	185	3.13	2.85	2.13	3.15	40.8

[a] ND: not detected.

Table 3-2b: Summary of Selected Sediment Organic Contaminant Concentrations for Districtwide Assessment Sites — TOC-normalized Data

	Sediment Organic Contaminant Concentrations (normalized to TOC; µg/g TOC)													
	Total PAH	Low PAH	High PAH	Total Phthalates	Total PCB	Total DDTs	DDT	DDD	DDE	Total Chlordane	Total BHCs	Total Endosulfans	Dieldrin	Total Other Chlorinated
Districtwide Assessment – all sites														
Mean	34.0	4.54	29.5	11.9	0.984	0.150	0.039	0.044	0.067	0.055	0.004	0.010	0.018	0.343
Median	6.65	1.09	5.11	2.18	0.349	0.062	0.000	0.019	0.023	0.007	ND	ND	ND	0.135
Min	0.473	0.131	0.238	0.118	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Max	1,018	63.0	956	387	21.5	2.14	2.12	0.658	0.935	1.92	0.038	0.153	0.738	9.43
Lake George, Middle St. Johns River, Upper St. Johns River, and Indian River Lagoon Basin Sites														
Mean	42.8	3.82	39.0	23.1	0.963	0.122	0.020	0.040	0.062	0.114	0.004	0.004	0.013	0.289
Median	5.92	1.06	5.09	3.39	0.434	0.063	0.000	0.023	0.031	0.007	ND	ND	ND	0.175
Min	0.863	0.131	0.440	0.118	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Max	1,018	62.0	956	387	7.82	0.519	0.268	0.387	0.410	1.92	0.031	0.046	0.221	1.17
Lower St. Johns and Northern Coastal Basin Sites														
Mean	40.5	5.22	35.3	5.29	1.56	0.172	0.062	0.055	0.054	0.050	0.007	0.019	0.009	0.204
Median	13.1	1.83	10.2	1.64	0.703	0.065	0.014	0.023	0.022	0.011	0.005	0.006	0.002	0.119
Min	1.22	0.181	1.01	0.226	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Max	405	43.9	392	51.0	21.5	2.14	2.12	0.441	0.935	0.660	0.038	0.153	0.076	1.26
Orange Creek Basin Sites														
Mean	33.7	4.70	29.0	15.5	0.483	0.048	0.006	0.015	0.027	0.056	0.002	0.005	0.073	0.540
Median	4.68	1.31	2.89	7.84	0.091	0.014	ND	ND	0.011	ND	ND	ND	0.008	0.186
Min	0.693	0.168	0.525	0.319	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Max	362	51.3	311	134	3.04	0.265	0.069	0.126	0.108	0.446	0.033	0.084	0.738	3.11
St. Marys and Nassau River Basin Sites														
Mean	24.8	10.7	14.2	23.5	1.68	0.026	0.003	0.018	0.005	0.016	0.001	0.000	0.008	2.16
Median	13.6	7.92	3.75	4.15	0.908	0.005	ND	ND	ND	ND	ND	ND	ND	0.551
Min	5.51	2.16	2.60	1.76	0.451	ND	ND	ND	ND	ND	ND	ND	ND	0.074
Max	59.8	31.0	50.0	59.2	5.35	0.114	0.012	0.088	0.025	0.063	0.003	0.000	0.038	9.43
Upper Ocklawaha River Basin Sites														
Mean	15.4	3.17	12.3	6.85	0.261	0.226	0.043	0.053	0.129	0.009	0.002	0.005	0.005	0.195
Median	2.48	0.421	2.01	2.11	0.029	0.137	ND	0.027	0.071	0.003	ND	ND	ND	0.118
Min	0.473	0.137	0.238	0.155	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.003
Max	287	63.0	257	54.0	1.95	1.68	0.984	0.658	0.596	0.067	0.030	0.073	0.073	0.604

[a] ND: not detected.

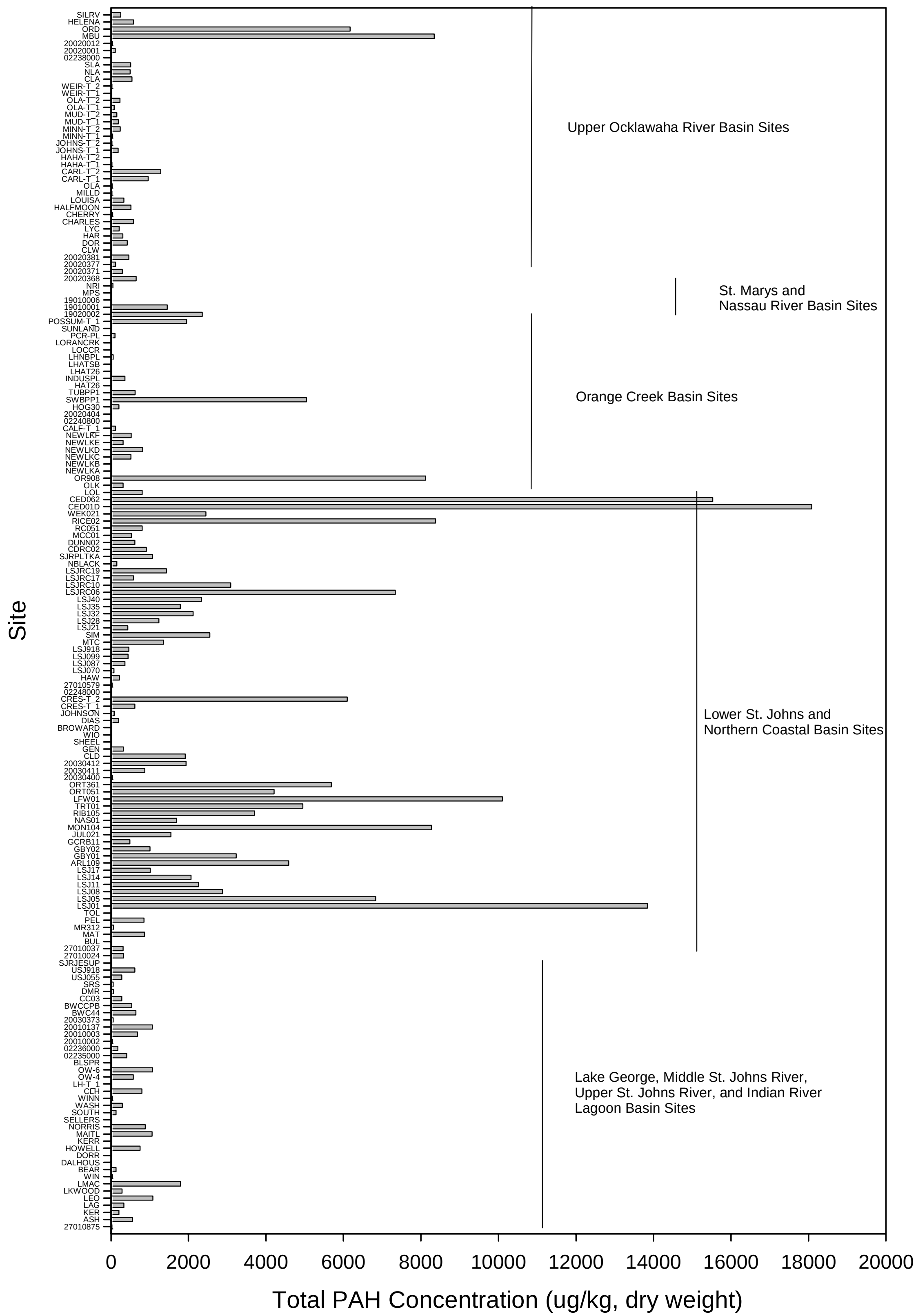


Figure 3-1a. Total PAH Concentrations in Sediments from Districtwide Assessment Sites (µg/kg, dry weight)

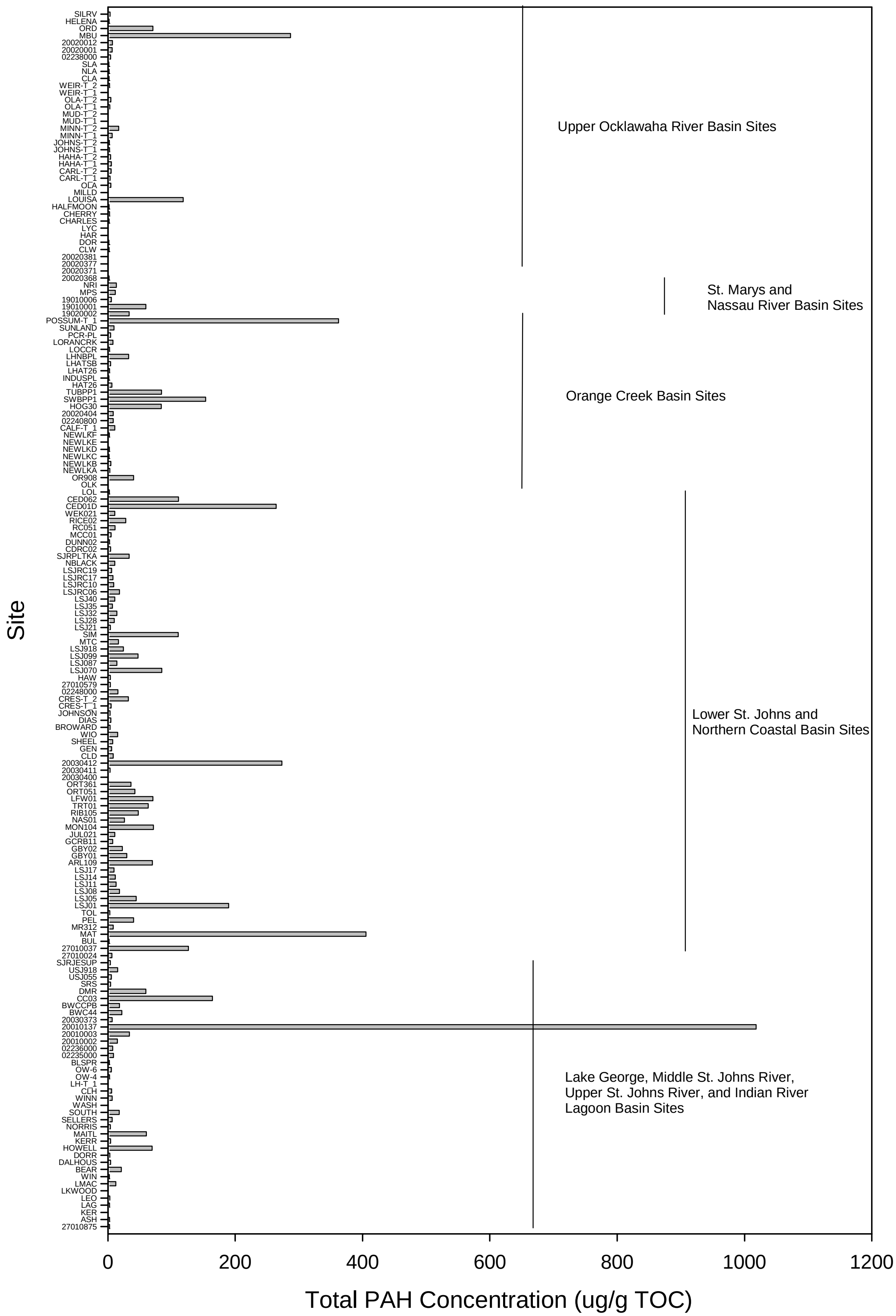


Figure 3-1b. Total PAH Concentrations in Sediments from Districtwide Assessment Sites — Normalized to TOC Content (µg/g TOC)

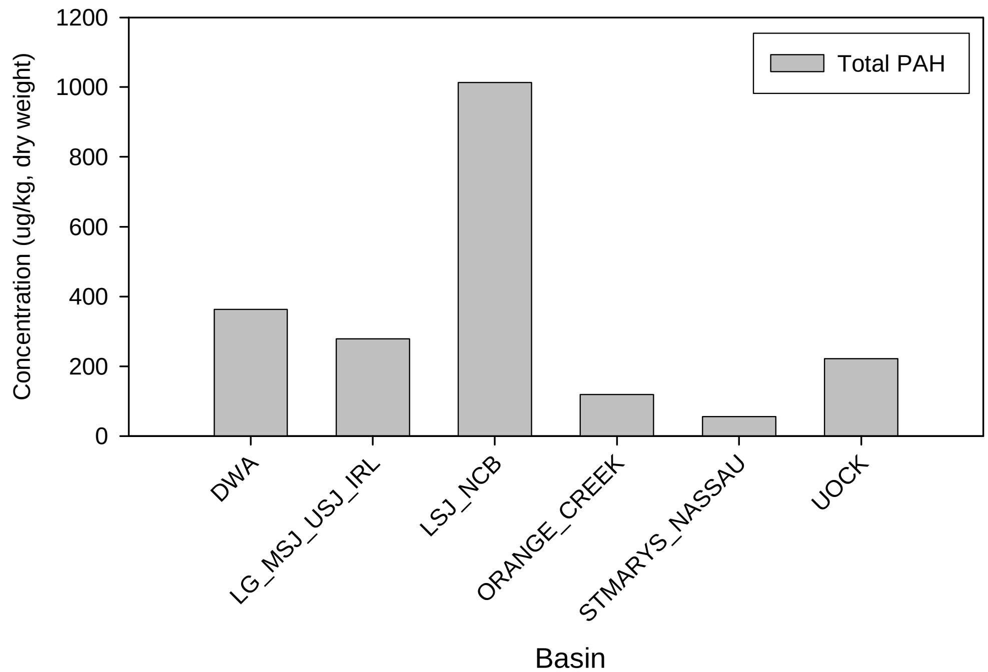


Figure 3-2. Median Total PAH Concentration in Sediments from Districtwide Assessment Sites, by Basin (µg/kg, dry weight)

For instance, Boston Harbor sediment samples taken in 1994 had total PAH values ranging from 700 to 40,000 µg/kg in 12 of the 14 stations sampled (Battelle, 1995). The highest sediment PAH concentrations were measured near combined sewer overflow (CSO) discharge locations. Samples collected in a Long Island Sound study had total PAH concentrations ranging from 700 to 22,000 µg/kg and were mostly collected from near urban areas (Battelle, 1991). Surface sediment samples taken from 18 sites throughout Presque Isle Bay in Erie, Pennsylvania had total PAH concentrations ranging from 1,700 to 40,700 µg/kg (Battelle, 1997).

Table 3-3 shows the percentage of districtwide assessment sites that have concentrations of sediment contaminants exceeding reference values developed from other large national monitoring programs, and sediment quality guidelines (Table 2-3). The reference values referred to as NS&T/MW "high" concentration values were developed by Daskalakis and O'Connor (1995) using the NOAA NS&T/MW dataset, which is comprised mainly of US coastal data. Since the majority of sites in the districtwide assessment are in freshwater systems, many of which are in relatively rural environments, the districtwide data would be expected to be closer to those observed for the EMAP's sites, which is almost always lower than for the NS&T/MW sites (exception for zinc). The NS&T/MW "high" values were calculated as the geometric mean plus one standard deviation using the NS&T/MW sediment site data, and were determined to be a useful reference for what would be considered elevated contaminant concentrations throughout the country. Table 3-3 shows the rates of NS&T/MW "high" value exceedances for the districtwide assessment sites; the data for some contaminants are also presented in Figure 3-3. Table 3-3 also presents the NS&T/MW "high" value exceedances for the NOAA NS&T/MW sites and the EMAP sites (Daskalakis and O'Connor, 1995), for comparison purposes.

Table 3-3: Percent of Districtwide Assessment Sites with Sediment Contaminant Concentrations Exceeding Sediment Quality Guidelines and Other Reference Values

Reference Measure	Rates of Reference Value Exceedance (% of sites with contaminant concentrations exceeding reference value)														
	Total PAH	Total PCB	Total DDT[a]	Chlordane	Lindane/BHC	Dieldrin	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc
National Monitoring Program Data (224 NS&T/MW sites; 500 EMAP sites)[b]															
NS&T/MW "High" (NS&T/MW sites)	14	15	18	14	NA	13	13	16	14	18	13	15	13	16	15
NOAA"High" (EMAP sites)	2	5	9	2	NA	1	8	12	3	10	12	12	5	8	17
SJRWMD Program Data															
Districtwide Assessment Sites (171 sites)															
TEC	20	23	46	11	5	6	6	6	19	9	20	29	2	3	9
PEC	0	2	8	2	2	0	0	0	1	0	2	1	1	0	1
NS&T/MW "High"	15	21	15	8	NA	5	4	16	1	6	14	25	1	10	9
Lake George, Middle St. Johns River, Upper St. Johns River, and Indian River Lagoon Basin Sites (38 sites)															
TEC	3	13	40	8	5	0	0	0	13	8	8	18	0	3	0
PEC	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0
NS&T/MW "High"	0	11	8	5	NA	0	0	5	0	5	3	16	0	5	0
Lower St. Johns and Northern Coastal Basin Sites (65 sites)															
TEC	42	37	54	17	8	9	11	12	37	17	31	46	5	5	22
PEC	0	6	8	6	3	0	0	0	2	0	3	3	2	0	3
NS&T/MW "High"	32	34	15	14	NA	6	6	32	2	14	25	40	2	22	20
Orange Creek Basin Sites (25 sites)															
TEC	12	16	28	12	0	12	0	4	8	4	12	24	0	4	4
PEC	0	0	0	0	0	0	0	0	4	0	8	0	0	0	0
NS&T/MW "High"	8	12	8	12	NA	12	0	16	4	0	12	20	0	4	4
St. Marys and Nassau River Basin Sites (5 sites)															
TEC	20	0	0	20	0	0	0	0	20	0	20	0	0	0	20
PEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NS&T/MW "High"	20	0	0	0	NA	0	0	0	0	0	20	0	0	0	20
Upper Ocklawaha River Basin Sites (38 sites)															
TEC	5	16	58	0	3	3	11	3	3	3	18	18	0	0	0
PEC	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0
NS&T/MW "High"	5	16	26	0	NA	3	8	3	0	0	5	13	0	0	0

[a] Total DDTs (DDT+DDE+DDD) reference value were used for NOAA "High" value. The individual DDT, DDE, and DDD concentration data and TEC/PEC reference values were used for the TEC/PEC evaluation, and the HQs calculated for DDT, DDE, and DDD were summed for assessing the overall Total DDT-based exceedance of the TEC and PEC.

[b] NS&T/MW "High" values and exceedances in NS&T/MW and EMAP Programs from Daskalakis and O'Connor (1995).

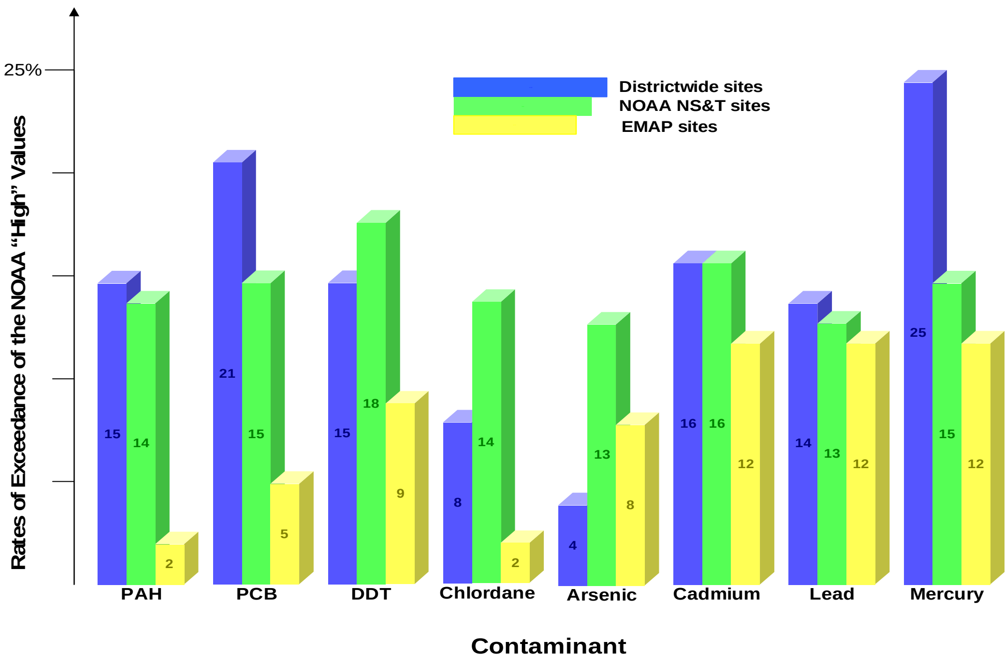


Figure 3-3. Rates of NS&T/MW "High" Value Exceedances for Sediments from Districtwide Assessment Sites, Compared to NOAA NS&T and EMAP Sites

NS&T/MW "high" concentration value for total PAH is 2,180 µg/kg, and is based on the same 24 PAH compounds that were measured in this study. Table 3-3 indicates that between 2 and 14% of sediments sampled in the NS&T/MW and EMAP monitoring programs contain concentrations of total PAH equal to or greater than the corresponding "high" value. Of the five different basin groups in the districtwide assessment, the Lower St. Johns River and Northern Coastal Basin had the highest number of sites (32%) with sediment contamination of total PAH greater than NOAA's "high" value. This was followed by St. Marys and Nassau River Basin sites with 20% of sites more contaminated than NS&T/MW "high" value, Orange Creek Basin Sites with 8% of sites greater than the "high" value, and the Upper Ocklawaha River Basin Sites with 5% of sites containing concentrations of total PAH greater than 2,180 µg/kg.

Furthermore, sediment quality guidelines for total PAH in freshwater include TEC and PEC values of 1,610 µg/kg and 22,800 µg/kg, respectively (Table 2-3). All of the concentrations of total PAH in the 171 districtwide assessment sites are below the PEC value, but 20% are above the TEC value. Table 3-3 shows the percentages of sites within each basin that exceed the TEC value. Again, the basin with the highest number of sites exceeding the TEC value is Lower St. Johns and Northern Coastal Basin with a total of 42% of the 65 sites exceeding the TEC value, followed by, in decreasing order, St. Marys and Nassau River Basin with 20% of sites exceeding the TEC value; Orange Creek Basin, 12%; Upper Ocklawaha River Basin, 5%; and finally the Lake George group, 3%.

***PCB, Pesticide, and Other Chlorinated Compounds*.**
The data indicate that concentrations of PCB, pesticides, and other chlorinated compounds are also quite variable in these sediments. In general the DDT and PCB concentrations were greater than the concentrations of other chlorinated compounds (e.g., chlordanes, BHCs, and endosulfans). Total PCBs ranged from not detected (ND) to 2,890 µg/kg [site RICE02 (Lower St. Johns River)] and total DDT compound concentrations ranged from ND to 419 µg/kg [site CARL-T_2 (Ocklawaha River/Upper)].

The median concentrations of PCB and DDT were 8.18 µg/kg and 2.41 µg/kg, respectively, at the districtwide sites.

The concentrations of the other major pesticides, chlordane, BHC, dieldrin, and endosulfan, were significantly lower and spanned a smaller concentration range. Total chlordane concentrations ranged from ND to 75 µg/kg [LFW01 (Lower St. Johns River)], total BHC concentrations were from ND to 9.81 µg/kg [site RICE02 (Lower St. Johns River)], and total endosulfans ranged from ND to 13.4 µg/kg [site LSJRC10 (Lower St. Johns River)]. Other chlorinated compounds ranged from ND to 150 µg/kg [site RIB105 (Lower St. Johns River)].

The variability in the sediment concentrations of chlorinated compounds was moderated when the data were normalized to sediment TOC content (Tables 3-2a). The TOC normalized PCB concentrations ranged from ND to 21.5 µg/g TOC [site CED01D (Lower St. Johns River)]. The TOC normalized total DDT concentrations ranged from ND to a high of 2.14 µg/g TOC [site PEL (Northern Coastal)], while the median TOC normalized total PCB and total DDT concentrations were 0.349 and 0.062 µg/g TOC, respectively. The range in TOC normalized individual pesticide compound (e.g., DDT, chlordane, BHC, and endosulfan) and other chlorinated industrial chemicals were similarly reduced upon TOC normalization.

PCB. NOAA's "high" concentration value for total PCBs is 80 µg/kg (Table 2-3). Table 3-3 indicates that between 5 and 15% of nationally monitored sites will have sediment concentrations of total PCBs that exceed this "high" value. Of the 171 districtwide assessment sites, 21% exceeded the NS&T/MW "high" value; 34% of the sites of Lower St. Johns River and Northern Coastal Basin sites had sediments with levels of PCBs above this value, followed by Upper Ocklawaha River Basin sites (16%), Orange Creek Basin sites (12%), and the Lake George group of basins (11%).

Freshwater sediment quality guidelines for total PCBs are 59.8 µg/kg and 676 µg/kg, for the TEC and PEC, respectively (Table 2-3). The basin group with the highest percentage of sites exceeding the TEC was Lower St. Johns River and Northern Coastal Basin with 37% of the sites having sediment PCB concentrations above 59.8 µg/kg. In addition, this basin group contained the only sites with sediment contamination of PCBs greater than the PEC – 6% of the 65 sites sampled within this group had total PCBs levels that exceeded 676 µg/kg.

Like total PAH, PCB concentrations are higher in the Lower St. Johns and Northern Coastal Basin sites than elsewhere in the country, again indicative of the location and geography of this basin. The Lower St. Johns River and its tributaries drain around 70% of the SJRWMD. This area includes nearby Jacksonville and many smaller urban areas, where sources of PCBs are higher than in more rural areas.

DDT. The NS&T/MW "high" value concentration for total DDT is 22 µg/kg, and 9-18% of the sediments sampled in the NS&T/MW and EMAP nationwide monitoring Programs exceed this value (Tables 2-3 and 3-3). As indicated in Table 3-3, 15% of the 171 sites of the districtwide assessment had sites with DDT levels that exceeded this value. The basin with the highest percentage of sites exceeding NS&T/MW "high" value is the Upper Ocklawaha River Basin, with 26% of its sites exceeding the value. Lower St. Johns and Northern Coastal Basin Sites had a total of 15% of sites with sediment contamination greater than NOAA reference value.

Sediment quality guidelines for total DDT are 5.28 µg/kg and 572 µg/kg for TEC and PEC, respectively. Almost half (46%) of the 171 districtwide assessment sites had total DDT concentrations that exceeded the TEC sediment quality guideline value. Two of the basin groups had high percentages of sites with concentrations of total DDT above the TEC; the Upper Ocklawaha River Basin (58% of sites exceeded the TEC) and Lower St. Johns and Northern Coastal Basin (54% of sites exceeded the TEC). This indicates that in over half of the sites in each of these areas, sediment concentrations of

DDT were greater than 5.28 µg/kg. The highest concentrations of DDT were found in the Upper Ocklawaha River Basin sites, specifically in Lake Apopka, Lake Carlton, Lake Dora, and Lake Beauclair. This can likely be attributed to the large tracts of agriculture and forestry land in the basin. Concentrations of the other chlorinated pesticides, such as chlordane, lindane/BHC, and dieldrin, were generally lower than DDT, and their concentration ranges were smaller. Exceptions were observed in some sites in St. Marys and Nassau River Basin, where concentrations of chlordane exceeded concentrations of DDT, and in Lower St. Johns and Northern Coastal Basin sites where chlordane had the highest percentage of sites greater than NOAA's "high" value. This is presented in Figure 3-4.

3.1.1.2 Metals Results

Sediment metals concentrations were determined for 15 elements for the 171 sites in the district wide assessment. Three of the metals (aluminum, iron, and manganese) are considered major metals and are naturally abundant in most geological formations. The other metals are typically considered to potentially be environmental contaminants. The metals data are summarized in Tables 3-4a and 3-4b; more detailed site-specific data can be found in Appendix B.

Metals Data. The ranges of major and trace metal concentrations varied widely in this study. The nonanthropogenic, crustal major metals, aluminum, iron, and manganese, were, as expected, present at the highest concentrations in the sediments, whereas the toxic trace metals arsenic, cadmium, chromium, copper, lead, lithium, mercury, nickel, selenium, silver, tin, and zinc, were detected at significantly lower concentrations. The sediment metals concentrations were less variable when normalized to the aluminum concentration (Table 3-4b). For instance, the aluminum-normalized copper concentration in the sediment samples ranged from 0.000146 to 0.0288 (unitless), a factor of approximately 197 in concentration range, as compared to the raw copper data which varied by a factor of approximately 515 between the high and the low concentrations. Some of the water bodies in the District receive the addition of alum (e.g., injection or floc), and this may need to be considered when aluminum-normalizing the data. However, alum applications on the upland soils around Lake Apopka, for instance, does not seem to have contributed enough aluminum to the lake sediments to impact the data interpretation.

Notable reductions in variability, by normalizing to aluminum, were also observed for chromium, lead, and zinc. Figures 3-5a and 3-5b, compare non-normalized lead and aluminum-normalized lead concentrations. Figures 3-6 and 3-7 show actual and median mercury concentration in sediments from the Districtwide Assessment sites by basin. In the non-normalized analysis, lead was found in high concentrations in Lower St. Johns and Northern Coastal Basin, and in Orange Creek Basin. When normalized to aluminum, elevated levels of lead still stand out at several of the Orange Creek Basin sites. The median concentrations were higher in the Lower St. Johns and Northern Coastal Basin than in other basins, for most metals. However, a number of Orange Creek Basin sites had high metals concentrations, and arsenic concentrations were relatively high at many of the Upper Ocklawaha River Basin sites.

Table 3-5 presents the results of the two different metals interpretation tools, the Battelle tool which is based on a cluster analysis with four related parameters, and the FDEP tool that uses straight contaminant-metal/aluminum normalization (Section 2.3.4). The results show that the FDEP approach generates the least number of "hits" of contaminated sites, with lead, copper, and chromium causing the most positive contaminated sites identifications. Battelle's approach results in the identification of a larger number of potentially contaminated sites, with most metals having comparable rates of positive contamination identification (except lead, which was lower). The complete site-specific results of each of these methods can be found in Appendix E.

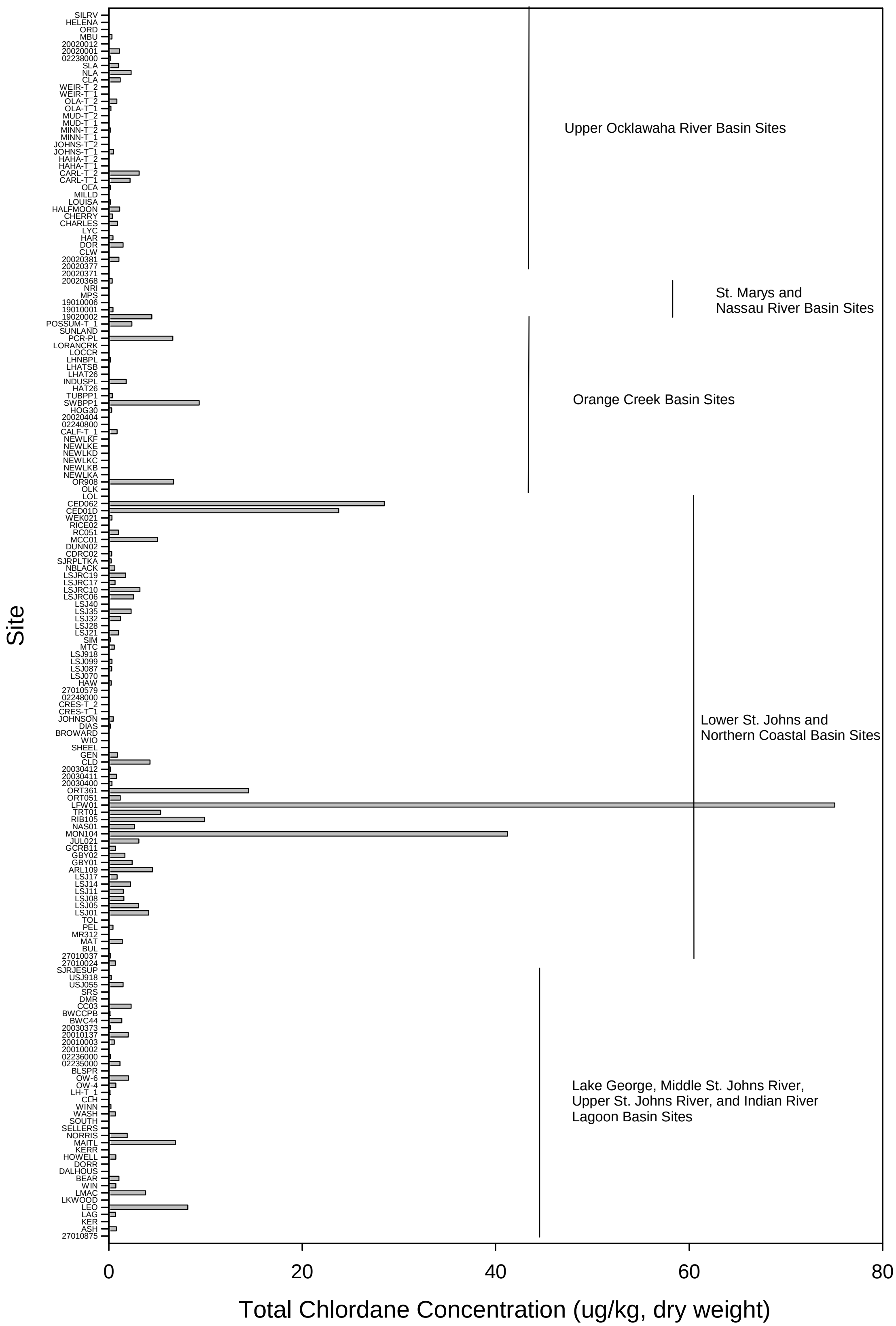


Figure 3-4. Total Chlordane Concentrations in Sediments from Districtwide Assessment Sites (µg/kg, dry weight)

Table 3-4a: Summary of Sediment Metals Concentrations for Districtwide Assessment Sites

	Sediment Metals Concentrations (mg/kg, dry weight)														
	Aluminum	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
Districtwide Assessment – all sites															
Mean	14,000	3.26	0.308	23.1	12.7	8,500	27.5	9.7	86.1	0.138	6.43	1.46	0.183	1.32	54.3
Median	7,370	1.56	0.171	13.0	4.63	4,500	13.5	4.18	60.0	0.078	4.06	0.840	0.075	0.679	24.0
Min	234	ND[a]	ND	0.51	0.26	63.6	0.61	ND	1.78	ND	ND	ND	ND	0.067	0.90
Max	60,900	18.3	2.96	175	134	42,000	343	50.0	425	1.23	53.8	28.1	2.18	11.7	966
Lake George, Middle St. Johns River, Upper St. Johns River, and Indian River Lagoon Basin Sites															
Mean	11,900	1.73	0.198	16.3	10.1	7,480	14.4	9.06	60.6	0.089	5.27	1.23	0.137	0.729	23.5
Median	4,640	0.765	0.109	9.59	3.15	3,660	9.44	4.13	44.8	0.039	2.37	0.585	0.055	0.511	15.1
Min	475	ND	ND	0.84	0.41	283	0.80	ND	5.50	ND	ND	ND	ND	0.08	2.26
Max	50,700	7.91	0.96	67.5	112	42,000	61.2	45.1	216	0.33	21.1	5.51	1.71	2.54	84.5
Lower St. Johns and Northern Coastal Basin Sites															
Mean	22,300	4.43	0.452	36.3	20.3	13,300	37.6	15.9	136	0.215	9.73	1.52	0.302	2.20	95.7
Median	19,900	3.27	0.270	26.9	9.34	11,400	24.1	11.4	107	0.161	7.39	1.47	0.141	1.62	41.8
Min	330	ND	ND	1.38	0.48	433	1.11	1.33	6.11	0.01	0.31	ND	ND	0.07	3.69
Max	60,900	18.3	2.96	175	134	34,700	333	50.0	425	1.23	53.8	6.93	2.18	11.7	966
Orange Creek Basin Sites															
Mean	6,520	1.57	0.252	15.9	5.53	3,320	40.1	3.55	33.1	0.091	3.87	0.642	0.120	1.12	32.1
Median	2,580	0.470	0.125	4.82	1.75	1,220	8.09	1.87	15.3	0.028	1.52	ND	0.060	0.430	12.6
Min	279	ND	ND	0.51	0.26	111	0.61	ND	1.78	0.01	0.14	ND	ND	0.08	0.90
Max	27,300	6.45	1.33	139	35.0	12,200	343	16.8	150	0.39	17.3	3.44	1.55	8.35	202
St. Marys and Nassau River Basin Sites															
Mean	12,100	2.13	0.061	16.5	2.74	6,850	19.0	10.4	130	0.024	3.13	0.168	0.016	0.866	87.4
Median	5,810	0.420	ND	7.97	1.61	3,230	5.74	2.77	131	0.008	0.864	ND	0.010	0.833	7.64
Min	331	ND	ND	0.92	0.26	201	0.67	1.31	4.86	ND	0.12	ND	ND	0.10	0.93
Max	38,700	8.00	0.18	49.3	6.33	21,500	61.5	37.7	343	0.07	11.1	0.56	0.04	1.85	361
Upper Ocklawaha River Basin Sites															
Mean	7,190	4.03	0.238	13.0	8.26	4,960	16.1	3.52	54.9	0.102	4.06	2.28	0.088	0.600	24.6
Median	5,420	2.10	0.168	12.3	5.29	2,710	10.4	2.13	46.8	0.064	4.18	1.66	0.078	0.536	24.4
Min	234	0.13	ND	1.35	0.49	63.6	1.31	ND	8.52	ND	ND	ND	ND	0.09	1.74
Max	25,200	15.2	2.26	52.7	37.8	13,300	52.9	12.3	173	0.33	10.8	28.1	0.27	1.81	72.2

[a] ND: not detected.

Table 3-4b: Summary of Sediment Metals Concentrations for Districtwide Assessment Sites — Aluminum-normalized Data

	Sediment Metals Concentrations (normalized to aluminum: unitless)								
	Arsenic	**Cadmium**	**Chromium**	**Copper**	**Lead**	**Mercury**	**Nickel**	**Silver**	**Zinc**
Districtwide Assessment – all sites									
Mean	0.000309	0.0000412	0.00270	0.00122	0.00345	0.0000141	0.000565	0.0000223	0.00682
Median	0.000192	0.0000192	0.00163	0.000748	0.00151	0.0000096	0.000408	0.0000118	0.00331
Min	ND	ND	0.000635	0.000146	0.000500	ND	ND	ND	0.000657
Max	0.00326	0.00159	0.0681	0.0288	0.0395	0.0000872	0.00901	0.000538	0.204
Lake George, Middle St. Johns River, Upper St. Johns River, and Indian River Lagoon Basin Sites									
Mean	0.000244	0.0000252	0.00183	0.000898	0.00213	0.0000095	0.000481	0.0000196	0.00415
Median	0.000165	0.0000130	0.00164	0.000691	0.00144	0.0000073	0.000413	0.0000089	0.00249
Min	ND	ND	0.00085	0.000146	0.00052	ND	ND	ND	0.00066
Max	0.00226	0.000145	0.00380	0.00477	0.0134	0.0000328	0.00134	0.0000951	0.0393
Lower St. Johns and Northern Coastal Basin Sites									
Mean	0.000210	0.0000194	0.00204	0.00132	0.00263	0.0000125	0.000454	0.0000124	0.00563
Median	0.000169	0.0000158	0.00153	0.000589	0.00124	0.0000076	0.000387	0.0000109	0.00291
Min	ND	ND	0.00064	0.000169	0.00050	0.0000011	0.000185	ND	0.00081
Max	0.00147	0.000111	0.0158	0.0288	0.0226	0.0000763	0.00149	0.0000667	0.0789
Orange Creek Basin Sites									
Mean	0.000230	0.0000467	0.00243	0.000964	0.00686	0.0000171	0.000566	0.0000306	0.00703
Median	0.000122	0.0000354	0.00196	0.000765	0.00160	0.0000145	0.000584	0.0000194	0.00547
Min	ND	ND	0.00100	0.000146	0.00072	0.0000031	0.000180	ND	0.00178
Max	0.00185	0.000205	0.00532	0.00250	0.0360	0.0000502	0.00170	0.000302	0.0293
St. Marys and Nassau River Basin Sites									
Mean	0.000109	0.0000029	0.00182	0.000379	0.00204	0.0000030	0.000233	0.0000014	0.00707
Median	0.000135	0.0000000	0.00137	0.000333	0.00184	0.0000026	0.000257	0.0000010	0.00165
Min	ND	ND	0.00127	0.000164	0.00056	0.0000008	0.000102	ND	0.00113
Max	0.000207	0.0000098	0.00278	0.000773	0.00484	0.0000066	0.000372	0.0000032	0.0284
Upper Ocklawaha River Basin Sites									
Mean	0.000620	0.0000957	0.00499	0.00165	0.00409	0.0000210	0.000884	0.0000394	0.0114
Median	0.000413	0.0000228	0.00156	0.00141	0.00232	0.0000151	0.000469	0.0000145	0.00397
Min	0.000090	ND	0.00088	0.00033	0.00073	0.0000026	ND	ND	0.00092
Max	0.00326	0.00159	0.0681	0.00685	0.0395	0.0000872	0.00901	0.000538	0.204

[a] ND: not detected.

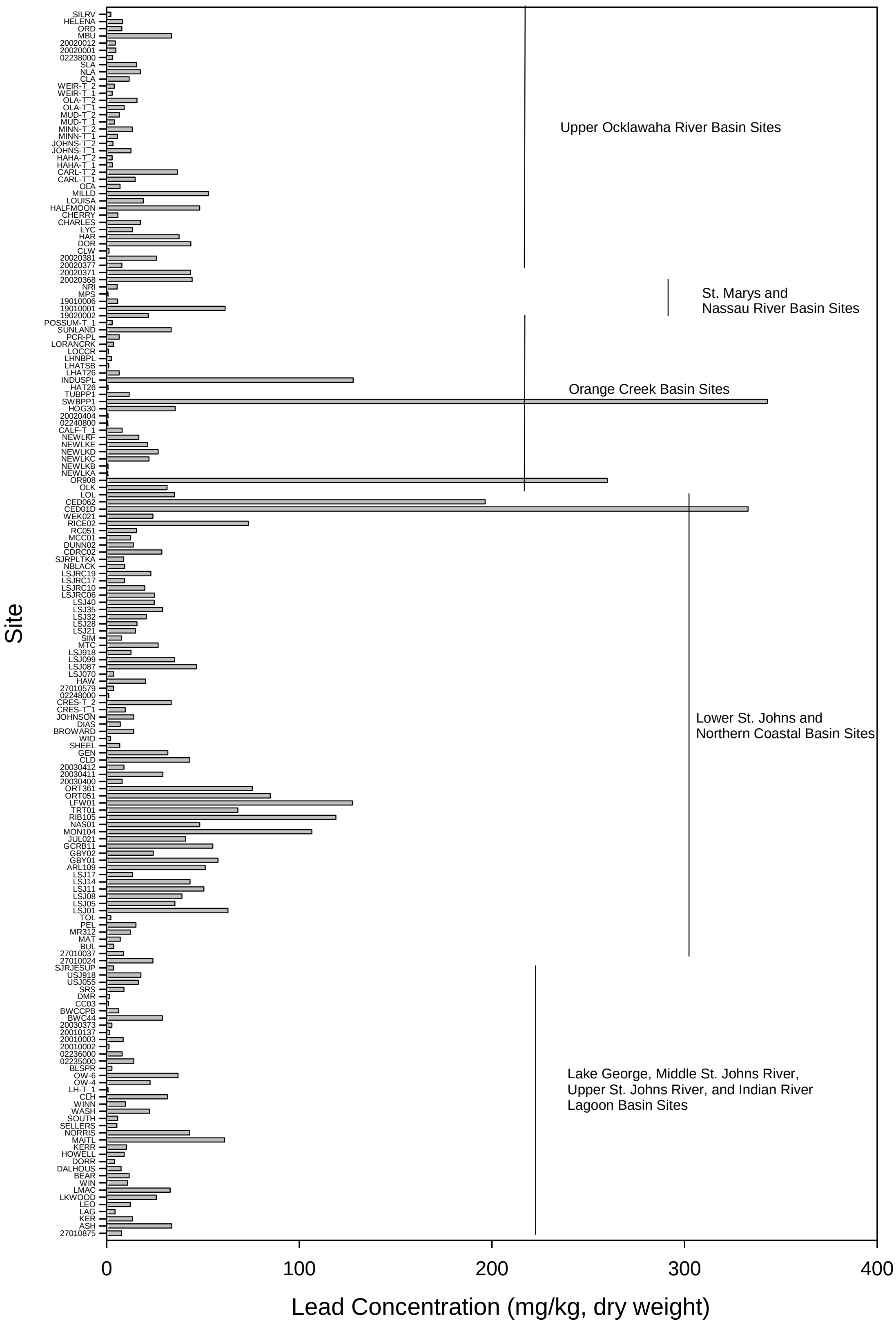


Figure 3-5a. Lead Concentrations in Sediments from Districtwide Assessment Sites (mg/kg, dry weight)

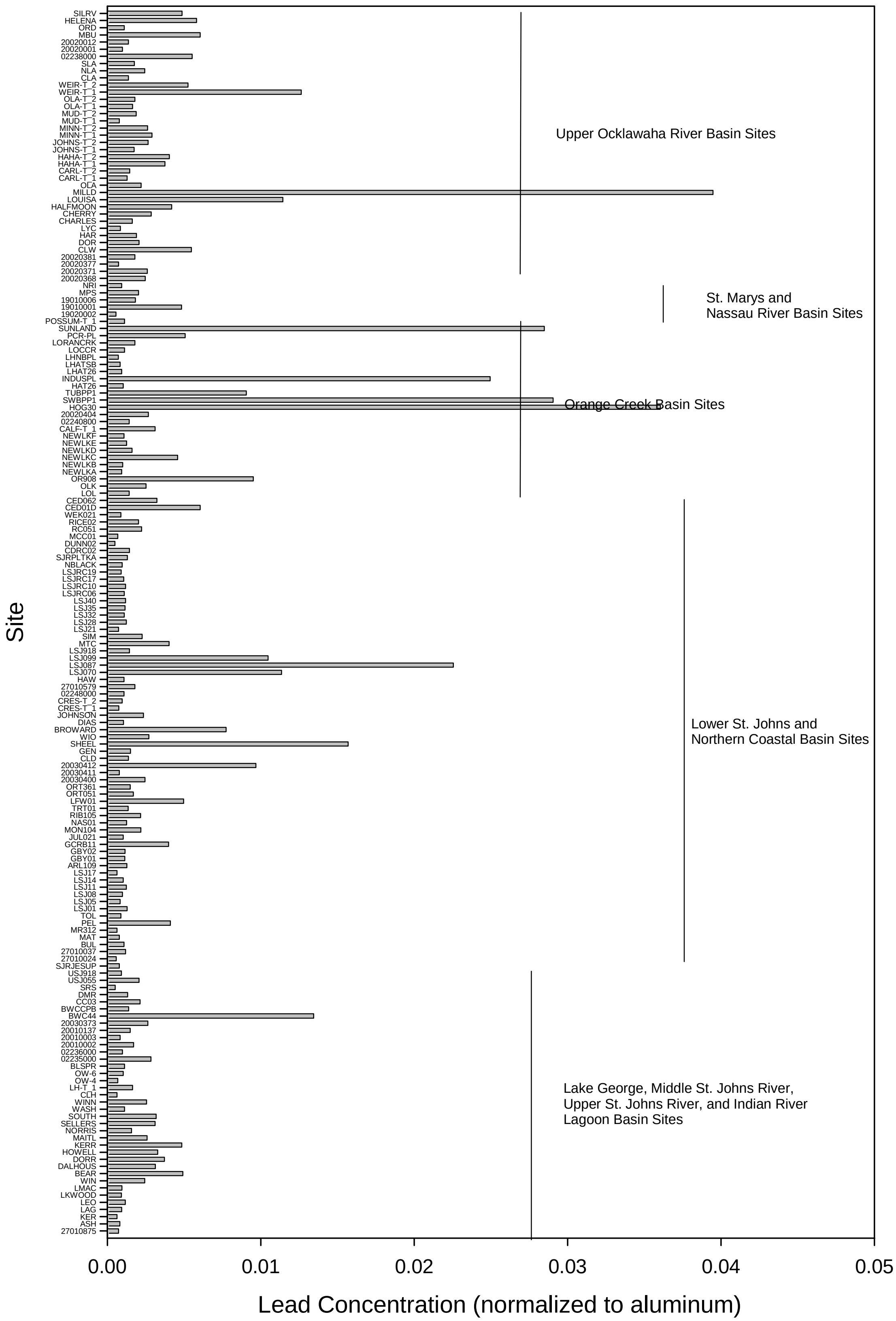


Figure 3-5b. Lead Concentrations in Sediments from Districtwide Assessment Sites — Normalized to Aluminum

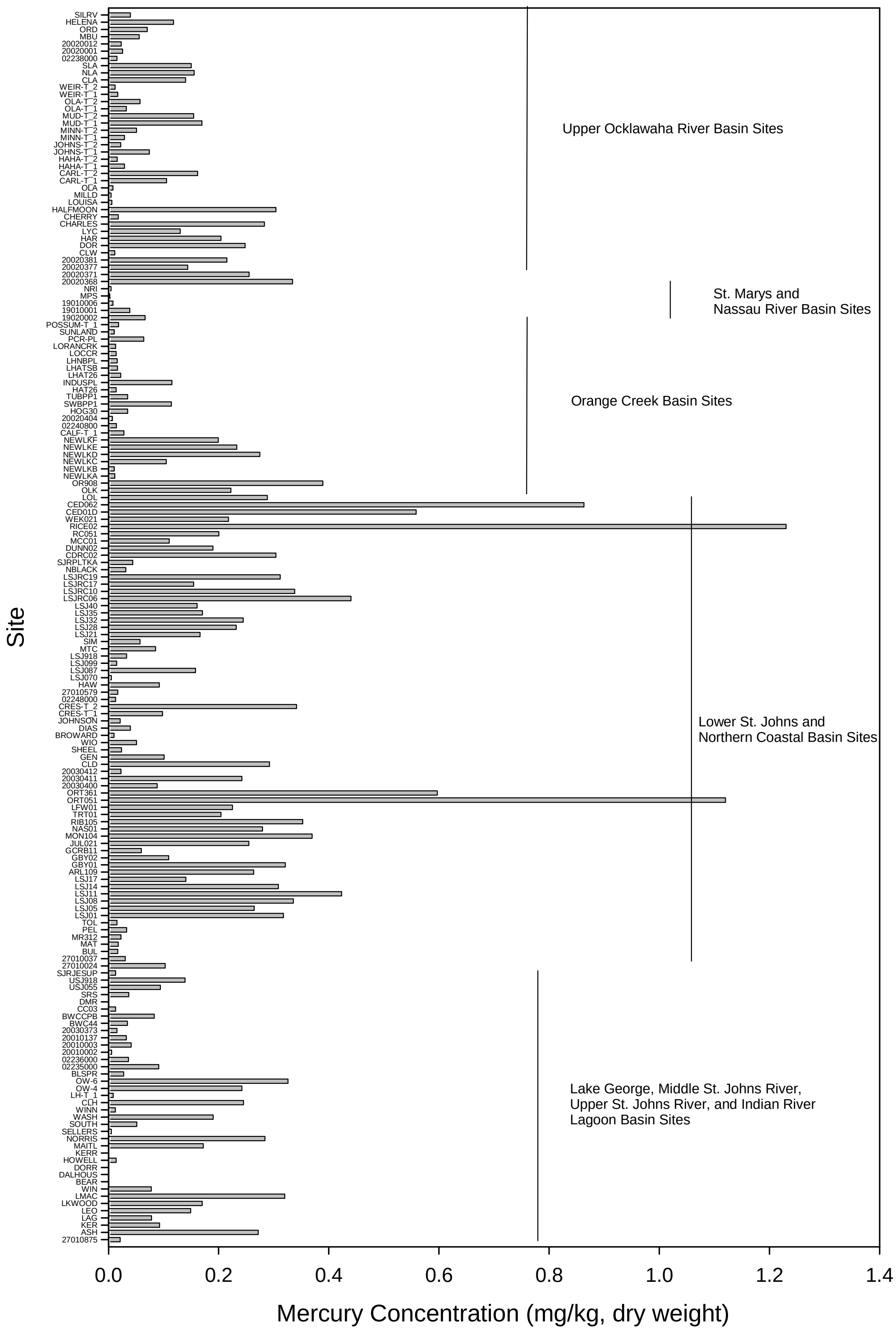


Figure 3-6. Mercury Concentrations in Sediments from Districtwide Assessment Sites (mg/kg, dry weight)

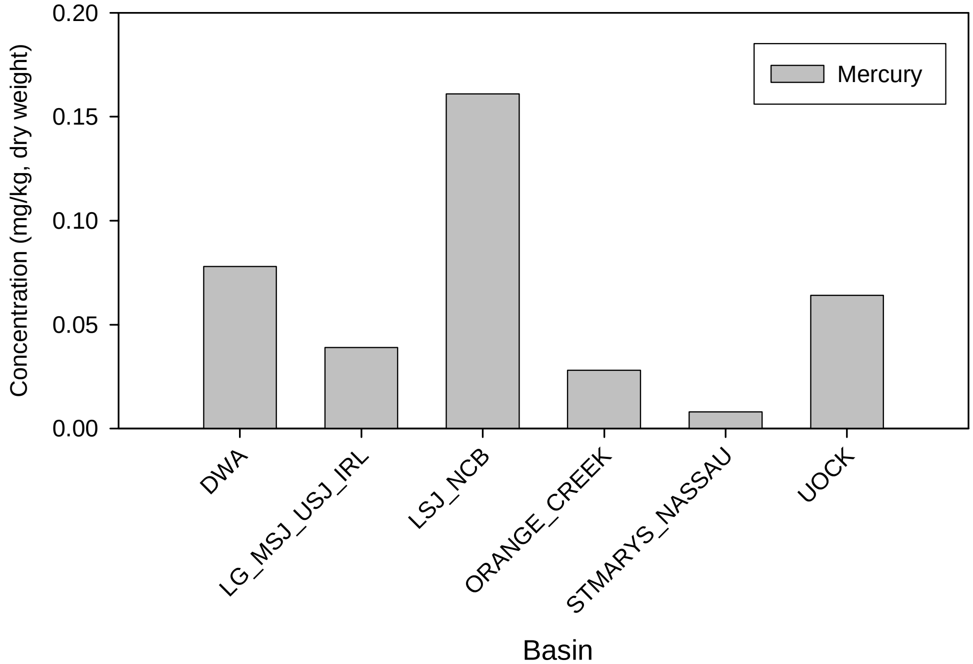


Figure 3-7. Median Mercury Concentration in Sediments from Districtwide Assessment Sites, by Basin (mg/kg, dry weight)

Table 3-5: Number of Districtwide Assessment Sites Identified as Potentially Contaminated Based on the FDEP and Battelle Metals Interpretation Tools

Description	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc
# Sites with NO by both FDEP and Battelle	123	122	120	102	103	111	114	85	117
# Sites with YES by both FDEP and Battelle	1	2	5	23	38	8	3	29	21
# Sites with YES by FDEP only	0	0	4	8	19	3	1	3	1
# Sites with YES by Battelle only	47	47	42	38	11	49	53	54	32
Total # Sites	171	171	171	171	171	171	171	171	171

[a] YES indicates that the site was identified as potentially contaminated with the listed metal, based on the indicated metals interpretation tool. NO indicates that the tool did not identify potential contamination.

Each of these metals data interpretation tools presents certain limitations and assumptions. The application of Battelle's tool is limited practically by the number of samples because it does not efficiently handle large sets of data simultaneously. However, the Battelle tool can be modified to accommodate large datasets simultaneously. The FDEP tool, on the other hand, is highly efficient but has significant technical limitations as discussed earlier, resulting in limited usefulness.

The FDEP tool assumes the presence of a natural contaminant/aluminum relationship for sediments from across the State. However, because of the natural variability in the concentration of metals in sediments throughout Florida, due to differing natural geologies, this tool produces very wide tolerance limits in the contaminant/aluminum ratio, and therefore may underestimate the number of potentially contaminated sediments. For instance, the upper and lower limits for "normal" (i.e., uncontaminated) conditions for arsenic and cadmium are about a factor 100 different from each other (see figures in Appendix E), which most likely means that some contaminated sites are not identified as such.

All 171 sites were assessed using both tools. The results show that the largest number of sites that were identified by both tools as potentially being contaminated (YES results) were for contamination resulting from lead (38 sites), silver (29 sites), and copper (23 sites). However, it is clear that the FDEP method underestimates the number of potentially contaminated sites relative to the Battelle method, and the FDEP method may only be useful for rough screening for locating grossly contaminated sites. For instance, between 47 and 49 sites were identified as potentially contaminated with arsenic, cadmium, and chromium using the Battelle method, but the FDEP method only identified between 1 and 9 sites as potentially contaminated with these three metals (Appendix E).

Between 3 and 18% of the NS&T/MW and EMAP sites have concentrations of the nine key contaminant metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) that exceed the NS&T/MW "high" values (Table 3-3). Of the 171 sites of the Districtwide Assessment, the dominant contaminating metals, based on this reference, were mercury (25%), cadmium (16%), and lead (14%). In addition, mercury had the largest number of TEC exceedances with 29% of the sites exceeding the mercury TEC, followed by lead (20% of the sites), and chromium with 19% of the sites in the District as a whole exceeding the TEC. The Lower St. Johns and Northern Coastal Basin sites had the most NS&T/MW "high" and TEC value exceedances, followed by the Orange Creek Basin. The *degree* to which a site exceeded these reference values varied significantly, with several of the sites with the highest metals contamination being in the Orange Creek Basin.

3.1.1.3 Results from Nutrient and Ancillary Measurements

The nutrient analysis results are summarized in Table 3-6, and are also compiled in Appendix B. Total Kjeldahl nitrogen (TKN), total phosphorus (TP), and soluble reactive phosphorus (orthophosphate; OP) are reported in mg/kg dry weight. Table 3-6 also presents the results of the ancillary measurement analyses [total organic carbon (TOC), grain size, moisture content, total solids (TS), and total volatile solids (TVS)] for the districtwide assessment sites. These data are also presented in more detail in Appendix B. The TOC and TVS data are presented as percent dry weight, and moisture and TS data as percent wet weight. The grain-size data are presented as percent sand, silt, clay, and mud.

Nutrients. TKN, TP, and OP concentrations were highly variable throughout the study area. The TKN concentrations measured in this study ranged from a low of 3.59 mg/kg [site MPS (St. Marys River)] to 48,900 mg/kg [site LOL (Ocklawaha River/Orange Creek)], while the TP concentrations ranged from 3.59 mg/kg [site MPS (St. Marys River)] to 8,070 mg/kg [site SWBPP1(Ocklawaha River/Orange Creek)]. Median concentrations for TKN and TP were 1,520 mg/kg and 318 mg/kg, respectively. The OP concentrations were somewhat less variable, than the TKN and TP concentrations, ranging from ND to 170 mg/kg [site OW-4 (Middle St. Johns River)]. The median OP concentration was 1 mg/kg.

TOC. The TOC content of the sediment varied greatly. The TOC content ranged from 0.02% [site MPS (St. Marys River)] to 45.1% [site OLK (Ocklawaha River/Orange Creek)]. The median TOC content was 4.4% and the average was as high as 10.2% for the districtwide sites; these are sediments with an uncommonly high organic content, compared to most other large sediment monitoring Programs. Low TOC concentrations are generally associated with coarse, sandy sediments (>90% sand). The TOC concentrations were less than 0.5% at all except 7 of the 171 sites samples that consisted of more than 90% sand. However, NEWLKC and MILLD, both in the Ocklawaha River/Orange Creek basin, had uncharacteristically high TOC content (25.9% and 4.4% respectively), considering their high proportion of sand. Some of this apparently high coarser "sand" content could have been the result of plant debris remaining in the sample, which would also contribute significant amounts of TOC.

Grain Size. The sediment grain-size distributions were variable and complex (Table 3-6). The sites included areas dominated by coarse sediments (primarily sand), with a median value of 76.7% of the 171 sites. Approximately 23% of the samples consisted of silt plus clay (mud).

Table 3-6: Summary of Nutrient and Sediment Physical-Chemical Characteristics Data for Districtwide Assessment Sites

	TKN (mg/kg)	**TP** (mg/kg)	**OP** (mg/kg)	**TOC** (%)	**Moisture** (%)	**TS** (%)	**TVS** (%)	**Grain Size (% of total wet sediment volume)**			
								Sand (%)	**Silt** (%)	**Clay** (%)	**Mud** (%)
Districtwide Assessment – all sites											
Mean	6,360	732	5.08	10.2	58.9	41.1	18.0	70.6	26.9	2.5	29.4
Median	1,520	318	1.00	4.4	64.4	35.6	11.2	76.7	21.2	1.8	23.2
Min	3.59	3.59	ND[a]	0.02	16.1	2.9	0.0	20.5	0.0	0.0	0.0
Max	48,900	8,080	170	45.1	97.1	83.9	71.2	100	72.7	13.4	79.5
Lake George, Middle St. Johns River, Upper St. Johns River, and Indian River Lagoon Basin Sites											
Mean	4,700	627	7.04	7.1	54.1	45.9	13.1	72.2	25.1	2.7	27.8
Median	2,030	316	0.90	1.7	56.1	44.0	5.3	77.4	20.5	2.0	22.6
Min	71.5	22.0	ND	0.10	16.1	5.4	0.4	20.5	0.8	0.0	1.1
Max	19,000	3,350	170	34.4	94.6	83.9	52.4	99.0	72.7	13.4	79.5
Lower St. Johns and Northern Coastal Basin Sites											
Mean	2,595	418	1.50	10.1	65.2	34.8	18.3	59.7	36.8	3.6	40.3
Median	1,267	242	0.65	7.3	75.0	25.1	17.7	56.7	40.0	3.2	43.3
Min	34.4	12.3	ND	0.08	18.7	10.2	0.10	21.2	0.7	0.2	0.9
Max	13,547	1,300	17.0	39.6	89.9	81.3	58.2	99.1	71.7	9.8	78.8
Orange Creek Basin Sites											
Mean	8,380	1,600	3.38	10.0	47.9	52.1	16.8	84.3	14.6	1.0	15.6
Median	406	717	1.90	0.5	27.3	72.7	1.9	92.0	7.6	0.6	7.6
Min	21.9	12.7	ND	0.03	17.8	3.9	0.0	47.7	0.0	0.0	0.0
Max	48,900	8,080	29.5	45.1	96.2	82.2	71.2	100	51.1	4.4	52.3
St. Marys and Nassau River Basin Sites											
Mean	988	241	0.97	2.1	37.6	62.4	4.0	83.0	14.3	2.7	17.0
Median	273	103	0.38	0.4	33.3	66.7	1.3	90.2	7.8	2.0	9.8
Min	3.59	3.59	0.10	0.02	16.6	26.7	0.0	49.9	0.1	0.0	0.1
Max	3,570	798	3.45	7.0	73.3	83.4	13.0	100	42.7	7.4	50.1
Upper Ocklawaha River Basin Sites											
Mean	10,400	577	7.60	14.9	63.0	37.0	25.2	77.2	21.5	1.4	22.8
Median	3,420	494	1.85	7.1	72.3	27.8	11.9	80.9	18.7	0.8	19.1
Min	120	19.4	ND	0.26	16.6	2.9	0.5	23.6	1.40	0.0	1.5
Max	34,500	2,730	68.0	38.5	97.1	83.4	68.5	98.6	66.1	10.4	76.5

[a] ND: not detected.

Sediment Moisture Content, Total Solids, and Total Volatile Solids. Sediment moisture content, total solids (TS), and total volatile solids (TVS) also varied greatly for the different sediment samples. Moisture, TS, and TVS content were characterized by a range of distributions, with no obvious groupings of sediment types. The moisture content of the sediment collected ranged from 16.1 to 97.1%. The TS ranged from 2.9 [site MUD-T_1 (Ocklawaha River/Upper)] to 83.9% [site CC03 (Indian River Lagoon)] and the TVS ranged from ND to 71.2% [site OLK (Ocklawaha River/Upper)]. The median percent moisture, total solids, and total volatile solids were 64.4%, 35.6%, and 11.2% respectively for the districtwide assessment sites; the districtwide sediment had, in general, uncommonly high moisture content, compared to most coastal sediments and many other freshwater sediments.

3.1.2 Benthic Ecology

Most of the Districtwide Assessment sites were also sampled for and analyzed to characterize the benthic ecology, and the quality of the sediment based on benthic measures. Various statistical analyses were applied to the benthic community data to determine relationships among the sites and to identify sites with good and compromised quality, based on the benthic ecology. This work was performed by Water & Air Research (WAR), and a separate report has been prepared by WAR specifically with the benthic ecology results and they are not described or further discussed in this report. WAR has also developed a new benthic ecological quality index [the Composite Benthic Sediment Quality Index (CBSI)] based on benthic macroinvertebrate community metrics for lakes, streams, and estuaries, and the contaminant data generated in this study. The summarized ecological index results can also be found in Appendix B; the detailed data are in WAR's report.

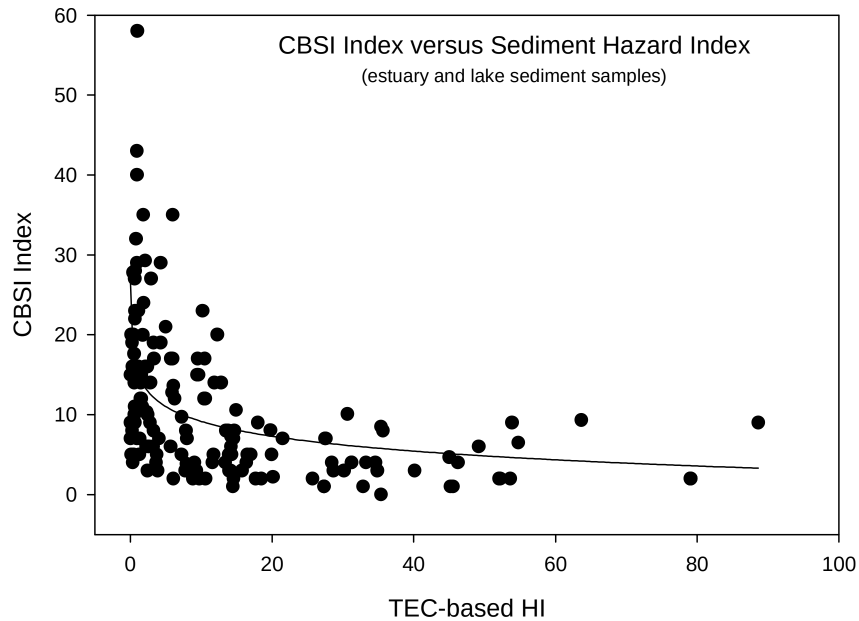
Figure 3-8 shows the relationship of the contaminant-based hazard index (HI) values verses two different benthic ecological assessments; the CBSI and number of taxa. There appears to be a relationship between the contaminant loading and the benthic community response, with a notable negative response of the benthic ecology to contaminant loadings in a range equivalent to a TEC-based HI of approximately 5-20, and higher. It is also clear that the ecological response is, as can be expected, not linear with contamination; once a tolerance level has been reached and then exceeded, noticeable adverse effects may be observed.

3.1.3 Potential Ecological Implications of Measured Contamination

Sediments of the SJRWMD are contaminated with a wide variety of metal and organic contaminants, probably derived in large part from urban, agricultural, and industrial activities in the river drainage basin. Estimating or predicting the toxicity of chemicals in sediments is difficult because many factors affect the bioavailability and toxicity of sediment-associated chemicals.

A major factor affecting bioavailability of organic contaminants is the organic enrichment of the sediments (Swartz *et al*., 1994; EPA, 2003; EPA, 1993b; Persaud *et al*., 1992). Many of the areas that were investigated in the districtwide and detailed assessment studies had sediments with very high TOC content. A high acid volatile sulfide (AVS) concentration in the sediment also appears to reduce the bioavailability of certain toxic metals, including cadmium, copper, nickel, lead, and zinc (Di Toro *et al*.; 1990 and 1992).

Sediment chemistry screening values for estimating ecological effects include both empirically derived values, based on observations with field-collected samples (e.g., ERL/ERM and TEC/PEC), and theoretically determined values. The empirically derived values are based on directly using the sediment contaminant concentration, and predicting an effect from that sediment concentration based on prior observations and research (e.g., Long and Morgan, 1990; long et. al, 1995; MacDonald, 2000; and FDEP, 2003). The theoretically derived values are based on calculated predictions of the amount of the



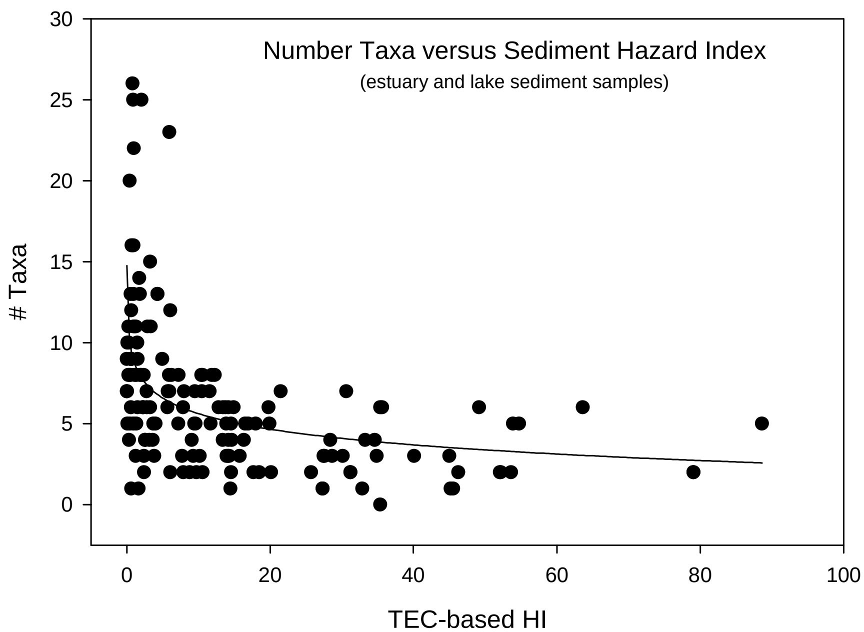


Figure 3-8. Biological Benthic Quality Indices versus TEC-based HI Values for Sediments from Districtwide Assessment Sites (estuary and lake sediments)

contaminant that would be released to the water phase, and predicting an effect from the water concentration based on water toxicity data (e.g., Di Toro *et al*., 1991; Swartz *et al*., 1994; EPA, 2003). The theoretically derived values rely on physical/chemical properties of the sediment, and incorporate considerations of potential bioavailability of the contamination based on the organic carbon content (i.e., organic contaminants) and the AVS (i.e., some metals) of the sediment. The theoretically derived screening values are based on principles described by Di Toro *et al*. (1991), and include fresh water sediment guidelines developed in Ontario, Canada in the early 1990's (Persaud *et al*., 1993), draft sediment quality criteria that were published by EPA for a few pesticides and PAH compounds in the early 1990's (e.g., EPA, 1993b), and recently published procedures for deriving equilibrium partitioning sediment benchmarks (ESBs) for a few pesticides and PAH (e.g., EPA, 2003). The draft sediment quality criteria and ESBs that EPA has published do not include values for DDT, which is a pesticide of particular interest in the District.

The empirically derived sediment quality guideline (SQG) values (e.g., TEC/PEC values) were developed based on sediments with an average TOC content of approximately 1%, and the TOC content of the sediment is generally not considered when applying these SQGs. However, it is widely recognized that the amount and type of organic matter, and the AVS, can significantly impact the availability of contaminants to cause harm; the higher the TOC content, the less organic contaminant would generally be expected to be released from the sediment. The theoretically derived equilibrium partitioning based screening values (e.g., ESBs) incorporate the TOC content of the sediment in the assessment, but ESBs have only been developed for a few contaminants and, although they are increasingly being used, they have not become as widely adopted as the empirically derived SQGs. The equilibrium partitioning derived sediment benchmark values are generally higher than the empirically derived values; ESBs generally predict a lower potential for impact than the more widely used SQGs, even for sediments with relatively low organic content. For instance, the dieldrin ESB_{WQC} (concentration below which adverse effects are not expected) is 12 $\mu g/g_{OC}$. The dieldrin TEC and PEC values are equivalent to 0.19 and 6.18 $\mu g/g_{OC,}$, respectively, based on a 1% TOC sediment (or 0.019 and 0.618 $\mu g/g_{OC}$ for a 10% TOC sediment); the ESB_{WQC} is less likely to be exceeded than the TEC/PEC values, for sediments with a wide range of organic content.

Neither of these approaches fully incorporate site-specific considerations, and the specific nature of a sediment being assessed. Since the chemical structure and origins of the organic matter are unknown in the District sediments described in this report, it is not possible to definitively link the fraction of mud, the TOC concentration, the contaminant concentration, and the potential ecological effect in the sediments. Smaller dissolved/colloidal organic matter will readily bind nonpolar organic chemicals and some metals in sediment. Larger organic particles such as plant detritus, bind little chemical contaminants. Because of the heterogeneity of the TOC in these sediments, there is poor correlation between TOC concentration and any metal or organic contaminant concentration in many of the sediment. Therefore, it is not possible to reliably estimate the bioavailable fraction of organic compounds in sediment pore water based on equilibrium partitioning theory and the available data.

The higher TOC levels in these sediments indicate that oxygen levels in the sediments are probably low. This, coupled with the normally high concentration of sulfur in both marine and freshwater sediment, indicate that most metals in the sediment are probably associated with reduced phases, sulfides, and organic matter. Thus, even those metals that are present at high concentrations may have a limited bioavailability and toxicity to aquatic organisms.

Generally, because of the organic enrichment of the SJRWMD sediments, and a lack of detailed information on the structure of the organic matter and the sediment, it is not possible to accurately determine the risk of sediment contaminants on animals in these aquatic systems. However, a conservative (protective) estimate of potential for sediment toxicity can be made by assuming that the bioavailability of metals and organic contaminants in the sediments are similar to those in most other freshwater sediments. Sediment concentrations can then be compared to sediment quality guidelines that were generated empirically based on large datasets, to identify sediments that contain sufficient concentrations of one or several contaminants to potentially cause toxicity in benthic organisms.

Using sediment quality guidelines, a hazard quotient (HQ) was estimated for 19 abundant contaminants or contaminant groups (e.g., total PAHs) in each of the sediment samples from the districtwide assessment. The HQ is defined as the measured concentration of the contaminant in the sediment sample divided by the freshwater TEC or PEC values for chemicals in the sediments (see Section 2.2.3). HQs were determined using both the lower TEC and higher PEC values from Table 2-3. A summary of the rates of TEC and PEC exceedances (i.e., HQs >1), by basin group and contaminant, was presented in Table 3-3. The HQs were summed for each site to determine a hazard index (HI), which can be used as an overall determination of the potential "potency" of the sediment contamination. A detailed list of all the HQs and HIs for each site can be found in Appendix B.

3.1.4 Areas and Contaminants of Potential Concern

Sites with TEC-based HI results above 10, as well as PEC-based HI results between 1.5 and 2.0 and higher, indicate that the sediments may be toxic to benthic organisms (Lee *et al*., 2001). Figure 3-9 shows the mean and median TEC-based HI values, grouped according to basin. The basins with the highest overall TEC-based HIs were Lower St. Johns River and Northern Coastal Basin; and Upper Ocklawaha River Basin. Some Gainesville area locations within the Orange Creek Basin also had particularly high HIs. The areas within the Upper Ocklawaha River Basin and Orange Creek Basin that appeared to be of greatest potential concern were studied further, and are described in detail in the following section; the Detailed Assessment Investigation. The other general location with highly contaminated sediments, the segments of the Lower St. Johns River and the Cedar-Ortega River Basin, is discussed in detail in two other reports, *Sediment Quality of the Lower St. Johns River and Cedar-Ortega River Basin* (Battelle, 2001) and *Chemical Contamination of Sediments in the Cedar-Ortega River Basin*, (Battelle, 2002). The Lower St. Johns River and the Cedar-Ortega River Basin will therefore not be discussed further in this report.

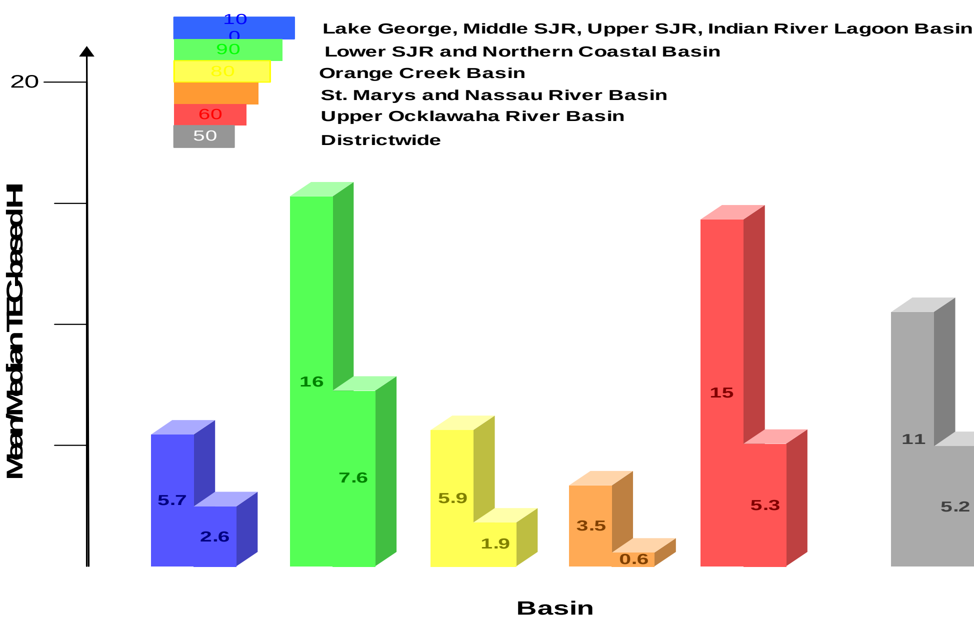


Figure 3-9. Mean (left bar) and Median (right bar) TEC-based Hazard Index Values for Sediments from Districtwide Assessment Sites, by Basin

Based on an assessment of the TEC-based HQ results, it appears that the potential for contaminant toxicity in the sediments is caused primarily by DDT, mercury, PCB, lead, and PAH in the District as a whole, with notable contributions from chromium, chlordane, and cadmium in some sediments. For instance, the DDT concentrations resulted in an HQ greater than 1 in sediments at 46% of the 171 sites. However, the set of contaminant(s) contributing the most to the potential for toxic effects varied significantly for different locations in the District. Industrial/urban contaminants, including PAH, PCB, lead, chromium, and mercury were major contaminants in parts of the Lower St. Johns River and Northern Coastal Basin, and the Orange Creek Basin, while DDT, other pesticides, and arsenic were elevated in parts of the Upper Ocklawaha River Basin where there has been more agricultural activities.

As discussed, the estimated chemical toxicity could be overshadowed by effects of organic enrichment and resulting sediment anoxia. The organic enrichment of these sediment also most likely reduces the bioavailability of the organic contaminants compared to most sediments, including the sediments the SQGs were based on. The assessment that was performed relative to TEC/PEC SQGs is therefore most likely quite conservative, possibly overestimating the potential for effects on benthic organisms in many of the sediments. Sediment bioassays, coupled with benthic community structure analysis, and analytical chemistry (the sediment quality triad; Chapman *et al*., 1997) could be performed to verify the predictions and identify the toxicants that contribute most to the toxicity of the sediments.

3.2 Detailed Assessment Investigations

3.2.1 Review of Detailed Investigations

The Detailed Assessment Investigation consisted of 73 sites that were divided into three major regions: the upper Ocklawaha River chain-of-lakes, the Gainesville area, and Other locations. These regions were further sub-divided into specific water bodies. A summary of the number of sites sampled in each water body, along with the potential contaminants investigated are listed in Table 3-7.

Table 3-7: Sampling Plan for Detailed Assessment Investigations

Location	# Sites	Potential Contaminants Investigated
Upper Ocklawaha River Chain-of-Lakes		
Lake Apopka	19	Pesticides, metals
Apopka-Beauclair Canal and Lake Beauclair	7	Pesticides, metals
Lake Dora	5	Pesticides, PCB, metals
Lake Eustis	7	Pesticides, PCB, metals
Lake Griffin	6	Pesticides, PCB, metals
Lake Harris	6	Pesticides, PCB, metals
Gainesville Area		
Bivens Arm and Tumbling Creek	11	PAH, pesticides, PCB, metals
Sweetwater Branch and Rosewood Branch	7	PAH, pesticides, PCB, metals
Hogtown Creek	4	Pesticides, PCB, metals
Other Locations		
Lake Disston	5	Pesticides, PCB
Lake George	10	Pesticides, PCB
Lake Monroe	7	Pesticides, PCB, metals
Lake Norris	6	Pesticides

Table 3-8 summarizes the mean and median concentration data for six key organic contaminants (total PAH, total DDT, total PCBs, total chlordane, total BHCs, and dieldrin), six metals (arsenic, cadmium, chromium, lead, mercury, zinc), and percent TOC and percent grain size. A more detailed listing of the results for each site can be found in Appendices C and D.

Table 3-8: Summary of Selected Sediment Organic and Metals Contaminant Concentrations at Detailed Assessment Sites

	Sediment Contaminant Concentrations (organics: µg/kg; metals: mg/kg)													
	Total PAH	Total PCB	Total DDT	Total Chlordane	Total BHC	Dieldrin	Arsenic	Cadmium	Chromium	Lead	Mercury	Zinc	TOC (%)	Grain Size (% mud)
DISTRICTWIDE ASSESSMENT SITES														
Mean	1,350	73.0	16.0	2.05	0.48	0.45	3.26	0.31	23.1	27.5	0.14	54.3	10.2	29.4
Median	363	8.18	2.41	0.30	0.00	0.00	1.56	0.17	13.0	13.5	0.08	24.0	4.42	23.2
UPPER OCKLAWAHA CHAIN-OF-LAKES SITES														
Lake Apopka														
Mean	518	NA[a]	223	4.58	ND[a]	0.32	8.91	0.21	12.3	16.6	0.14	27.2	29.5	33.3
Median	510	NA	153	1.18	ND	ND	9.16	0.23	13.6	17.5	0.15	28.1	32.0	38.8
Apopka-Beauclair Canal and Lake Beauclair														
Mean	NA	4.12	723	33.2	1.00	1.70	7.70	0.19	14.3	11.3	0.10	29.1	25.1	21.6
Median	NA	ND	203	5.34	ND	ND	8.46	0.24	15.6	13.8	0.13	37.8	27.0	27.6
Lake Dora														
Mean	NA	23.0	70.3	7.87	4.80	2.82	12.6	0.29	14.9	30.6	0.18	51.0	29.2	20.1
Median	NA	22.2	78.5	5.69	5.05	3.03	13.0	0.39	17.6	37.2	0.20	64.9	35.9	26.0
Lake Eustis														
Mean	NA	43.0	22.5	4.76	2.57	2.08	7.24	0.27	13.1	34.8	0.18	43.1	20.9	22.2
Median	NA	29.9	19.6	3.30	3.43	2.25	9.21	0.35	18.6	35.0	0.27	52.4	29.4	24.3
Lake Griffin														
Mean	NA	26.6	17.3	2.50	3.63	ND	10.2	0.31	20.6	31.2	0.23	42.9	37.5	32.3
Median	NA	24.1	15.5	2.44	3.79	ND	9.89	0.30	19.4	30.8	0.24	36.2	39.6	34.2
Lake Harris														
Mean	NA	17.7	19.3	1.64	2.92	ND	7.65	0.28	16.8	26.9	0.20	31.4	28.8	22.2
Median	NA	14.3	14.9	1.64	2.91	ND	8.98	0.30	15.9	30.9	0.21	34.6	31.0	22.6
GAINESVILLE AREA SITES														
Bivens Arm and Tumbling Creek														
Mean	24,600	75.0	33.9	9.79	0.33	1.67	4.59	0.83	83.7	157	0.24	138	21.7	28.0
Median	14,500	67.3	27.1	5.42	ND	0.89	4.47	0.98	95.0	155	0.29	162	24.8	34.1
Sweetwater Branch and Rosewood Branch														
Mean	2,660	44.9	9.14	8.08	0.60	2.01	1.33	0.59	23.7	38.4	0.09	54.7	2.54	10.7
Median	1,820	21.1	2.68	3.67	0.06	1.24	0.83	0.34	14.1	17.9	0.04	26.8	0.22	4.2
Hogtown Creek														
Mean	NA	13.0	4.99	5.31	0.44	0.42	0.00	0.22	16.0	7.10	0.03	13.7	0.56	6.2
Median	NA	10.6	3.16	4.68	0.42	0.37	0.00	0.25	9.40	7.07	0.03	13.6	0.35	7.2
OTHER SITES														
Lake Disston														
Mean	NA	7.18	11.5	0.38	0.20	0.01	NA	NA	NA	NA	NA	NA	4.85	19.4
Median	NA	1.69	0.50	ND	ND	ND	NA	NA	NA	NA	NA	NA	0.42	13.2

	Sediment Contaminant Concentrations (organics: µg/kg; metals: mg/kg)													
	Total PAH	Total PCB	Total DDT	Total Chlordane	Total BHC	Dieldrin	Arsenic	Cadmium	Chromium	Lead	Mercury	Zinc	TOC (%)	Grain Size (% mud)
Lake George														
Mean	NA	8.54	3.39	0.46	1.16	0.21	NA	NA	NA	NA	NA	NA	10.4	40.6
Median	NA	5.81	2.23	0.21	0.64	0.00	NA	NA	NA	NA	NA	NA	8.16	51.4
Lake Monroe														
Mean	NA	23.3	9.29	2.54	1.34	1.01	3.45	0.30	31.5	22.0	0.16	44.7	8.71	43.8
Median	NA	15.1	7.05	1.56	0.87	0.52	2.39	0.16	21.8	15.1	0.09	27.1	5.34	33.8
Lake Norris														
Mean	NA	ND	66.8	ND	ND	ND	NA	NA	NA	NA	NA	NA	24.8	70.3
Median	NA	ND	50.4	ND	ND	ND	NA	NA	NA	NA	NA	NA	27.0	74.7

[a] NA: not analyzed for this parameter for the detailed assessment, based on the results from the baseline assessment.
[b] ND: not detected.

Among the four lakes sampled for the additional locations, Lake Monroe was the only lake that displayed sediment contaminant concentrations slightly higher than the districtwide average for a variety of contaminants. Lake Monroe contained slightly elevated levels of total PCB, total DDT, chlordane, arsenic, chromium, and lead. Lake Norris contained a significant amount of DDT, when compared to the districtwide average concentration (66.8 µg/kg versus 16 µg/kg). The sediments in this lake, however, also contained a high percentage of TOC (24.8%) with over 70% of the sediment characterized as mud. Much of the DDT, therefore, will be trapped in the sediment and be less bioavailable to benthic organisms.

The elevated contamination that was identified in parts of these lakes was quite spotty, and was generally focused in a few areas with high organic carbon containing sediment, and was, as a whole, of no significant concern. Although there may be some “hot spots” of elevated contamination in these lakes, when taking into account other factors, sediments from these locations generally do not appear to pose significant levels of toxicity risk.

3.2.2 Upper Ocklawaha River Chain-of-Lakes Investigation

Table 3-8 presents the mean and median concentrations of the key contaminants determined in the detailed assessment at locations in the upper Ocklawaha River chain-of-lakes, the Gainesville area, and Other locations. Table 3-8 also summarizes the mean and median concentrations of these contaminants for the entire SJRWMD districtwide assessment.

Split samples from a few Lake Apopka sites were analyzed for toxaphene, in addition to the other chlorinated pesticides, by both Battelle and EnChem (Madison, WI). The toxaphene analysis was performed because high levels of toxaphene have been measured in the surrounding soils. Neither of the laboratories detected toxaphene in any of these sediment samples, possibly because the toxaphene is significantly less mobile that the DDT and does not enter Lake Apopka to any large degree, or because the toxaphene could not be identified by the relatively standard analytical techniques that were employed (e.g., analysis by gas chromatography/electron capture detection). Toxaphene is quite susceptible to environmental transformation and the analysis of toxaphene in Lake Apopka sediment is most reliably performed using high-resolution gas chromatography/high-resolution mass spectrometry.

Organic Contaminants

All sites sampled in the upper Ocklawaha River chain-of-lakes had median concentrations of total DDTs well above the median concentration (2.41µg/kg) for the districtwide assessment sites. This was expected, given the extensive historical agriculture activities in this area, and results from earlier sampling. The range of concentrations was quite variable, with median values of total DDT ranging from 14.9 µg/kg in Lake Harris to 153 and 203 µg/kg in Lake Apopka, and Lake Beauclair and the Apopka-Beauclair Canal. Figures 3-10 and 3-11 represent total DDT concentration in the upper Ocklawaha River chain-of-lakes.

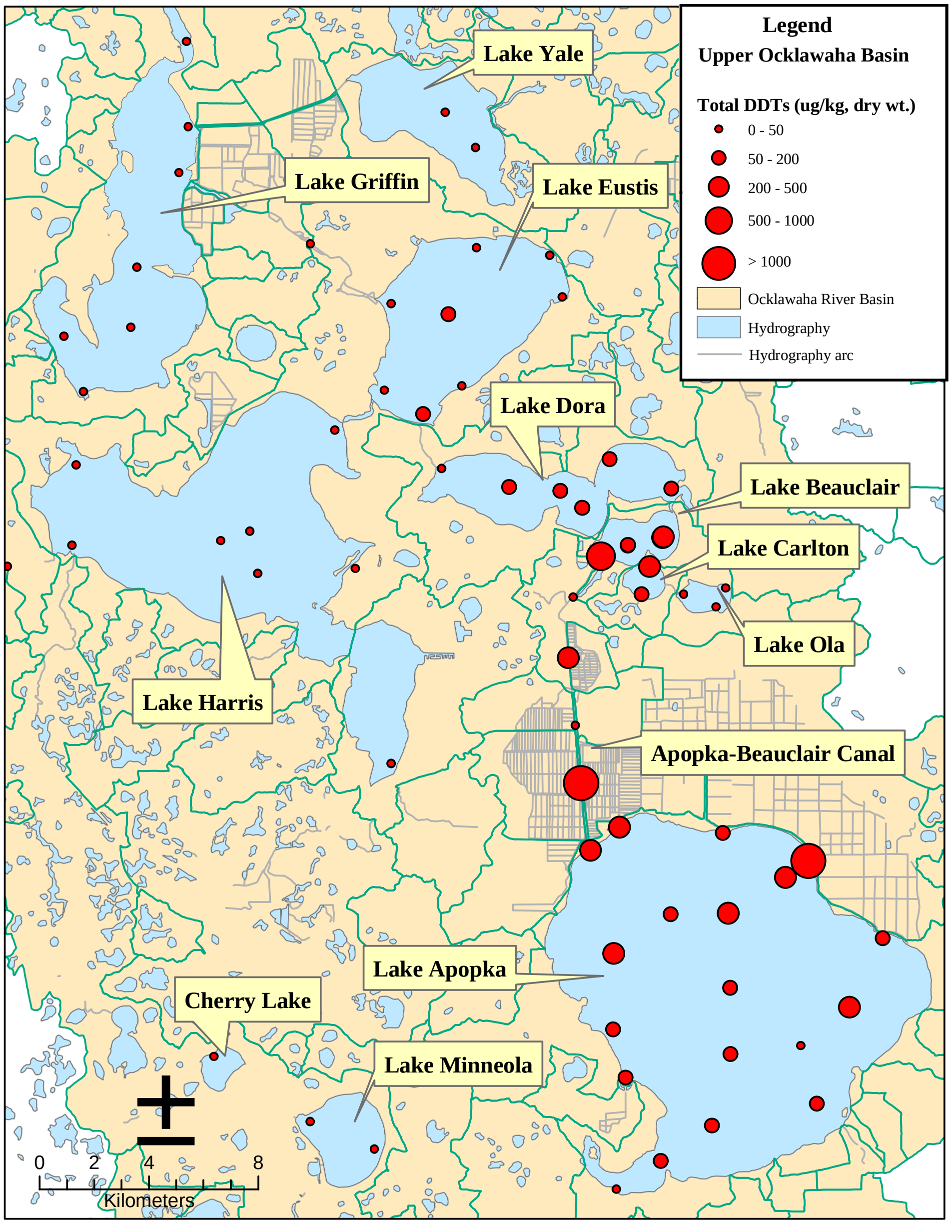


Figure 3-10. Map Representing Total DDT (DDT+DDE+DDD) Concentration in Sediments from Upper Ocklawaha River Chain-of-Lakes Sites (µg/kg, dry weight)

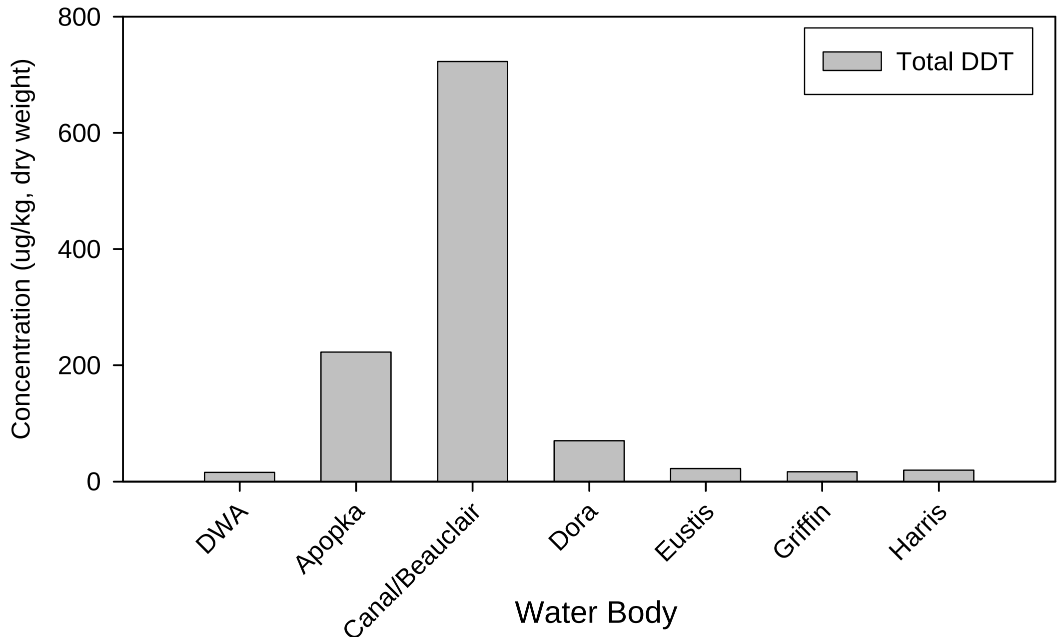


Figure 3-11. Mean Total DDT (DDT+DDE+DDD) Concentration in Sediments from Upper Ocklawaha River Chain-of-Lakes (µg/kg, dry weight)

In addition, three lakes—Lake Dora, Lake Eustis, and Lake Griffin—had elevated concentrations of dieldrin, chlordane, and BHCs. Average dieldrin concentration ranged from ND to 2.82 µg/kg in Lake Dora. Average concentration of dieldrin districtwide was 0.45 µg/kg. Chlordane concentrations were highly variable, ranging from 1.64 µg/kg in Lake Harris to 33.2 µg/kg in the Apopka-Beauclair/Lake Beauclair region. Average districtwide chlordane concentration is 2.05 µg/kg. Total BHCs were also elevated, ranging from ND to 4.8 µg/kg, while the average for the SJRWMD is 0.48 µg/kg.

All sites in the chain-of-lakes area showed a higher TOC content (mean 20.9 to 37.5% for the different lakes) than the districtwide sites as a whole (10.2%). Figure 3-12 shows the percentage of TOC in the chain-of-lakes area. High TOC in these lakes could imply that, despite the high concentration of pesticides, the contaminants may be less bioavailable to benthic organisms than in sediment with a more common TOC content. The grain size in this region shows a high percentage of mud, suggesting that organic matter present in the sediments may mostly be in the form of small particles, colloidal, and humic substances. These forms of TOC tend to readily complex with dissolved nonpolar organic particles, such as DDT, and decrease their bioavailability to animals (Servos *et al*., 1989).

Figure 3-13 is a map representing total DDT concentrations of sediments in Lake Apopka after normalized to TOC content. There is clearly a gradient of DDT concentration from the northeastern shore towards the southwest, suggesting that the primary source of the DDT is towards the northeast. The historical agricultural fields were mainly on the lands on the northeastern side of Lake Apopka, and high concentrations of DDT, toxaphene, and other pesticides have been measured in these soils. The irrigation canals and farm pumps were located near the northeaster shore, and these agricultural activities are likely the source of the majority of the DDT in Lake Apopka, and possibly much of the DDT in the downstream water bodies as well.

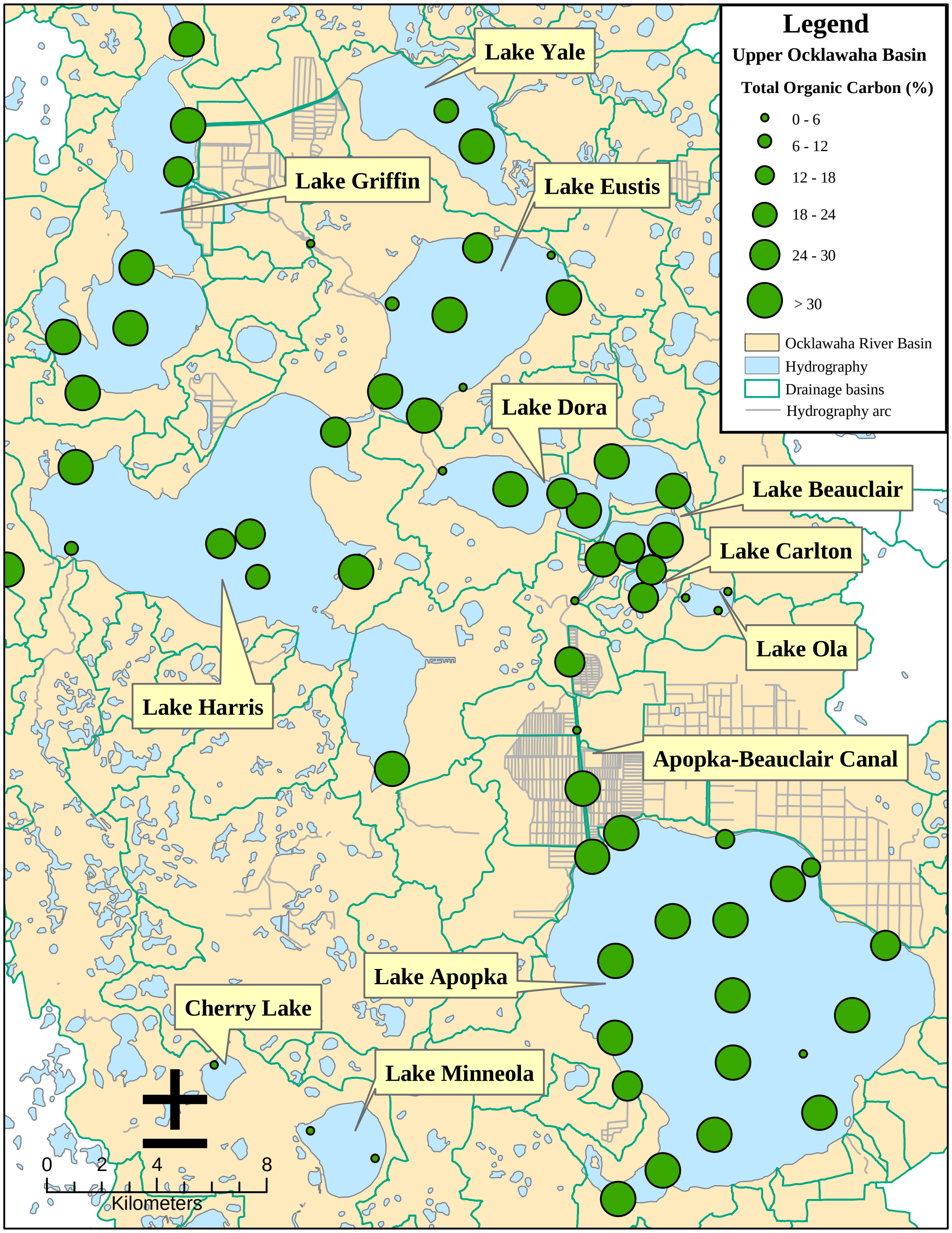


Figure 3-12. Map Representing TOC Content of Sediments from Upper Ocklawaha River Chain-of-Lakes Sites (percent)

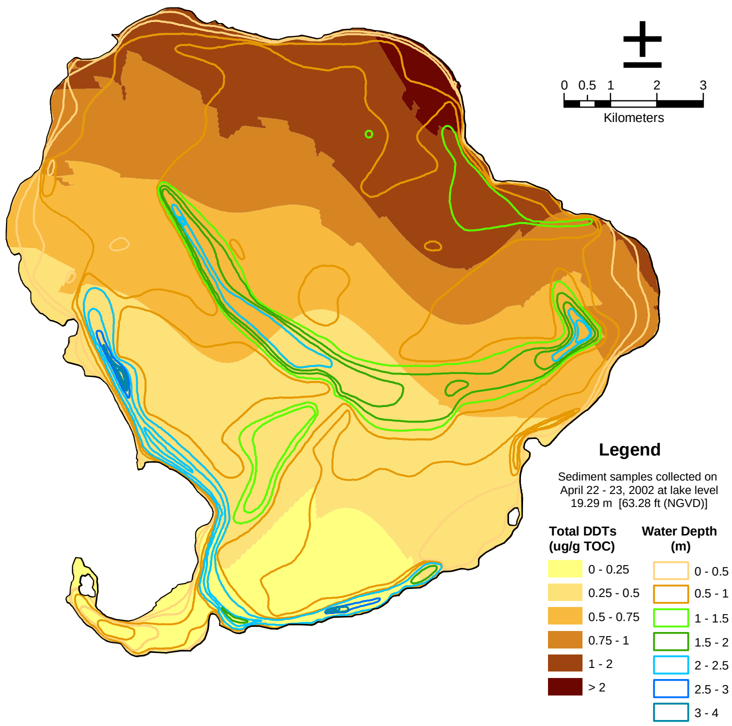


Figure 3-13. Map Representing Total DDT (DDT+DDE+DDD) Concentrations of Sediments in Lake Apopka — Normalized to TOC Content (µg/g TOC)

The chain-of-lakes area was found to have high levels of several of components of DDT, including degradation products. Figure 3-14 is a map of Lake Apopka comparing the results of total DDT with and without the inclusion of the degradation products DDMU and dichlorobenzophenone; most DDT investigations typically only measure DDT, DDD, and DDE. DDMU and dichlorobenzophenone clearly significantly contribute to the total concentration of DDT-related compounds. The degradation product DDE is the dominant DDT component in the sediments in the upper Ocklawaha River chain-of-lakes, as it is in the District as a whole (Figure 3-15). However, a characterization limited to just DDT, DDD, and DDE clearly does not fully represent the DDT-related contamination in Lake Apopka; DDMU comprises 26% of the total DDT and dichlorobenzophenone about 12%. These less commonly characterized DDT degradation products as generally less hydrophobic than DDT, DDD, and DDE, and should therefore bioaccumulate to a lesser degree, but their toxicity and potential to cause other adverse effects is not well understood.

Metals

Several water bodies sampled in the upper Ocklawaha River chain-of-lakes showed elevated levels of arsenic, lead, mercury, and chromium when compared to the districtwide assessment sites. This basin was one of only two basins in the districtwide assessment with elevated levels of arsenic (the other was Lower St. Johns). Median concentration of arsenic in the sediments of the chain-of-lakes region (8.46 and 13 mg/kg in Lake Beauclair/Canal and Lake Dora, respectively) was five to eight times greater than the median concentration (1.56 mg/kg) for the all districtwide sites. Figures 3-16 through 3-18 represent arsenic concentration at the chain-of-lakes sites. The arsenic contamination in Lake Apopka, and the interconnected lakes, is, although elevated, more uniformly distributed than the DDT; the muck soils in the area are naturally higher in arsenic than the mineral soils.

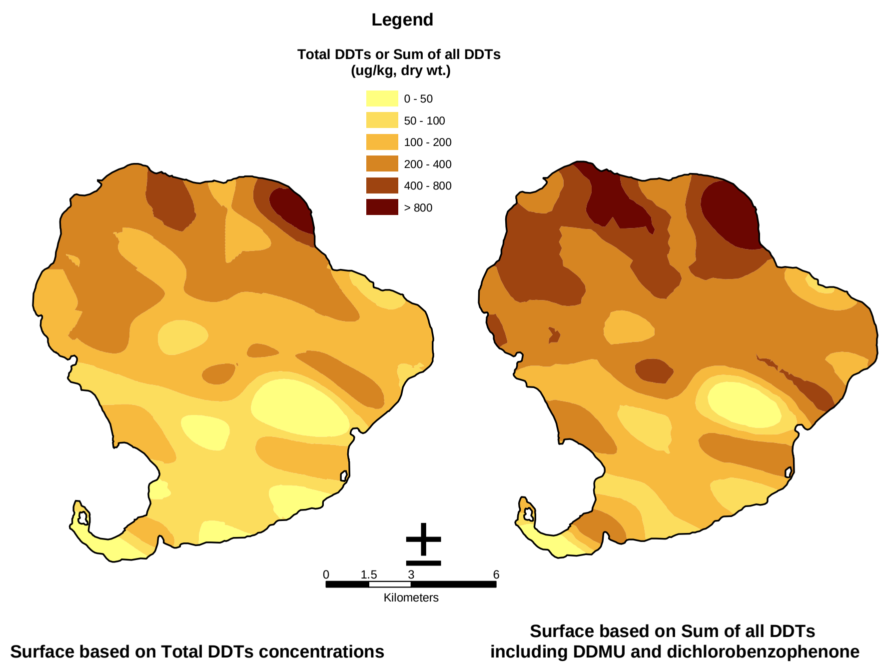


Figure 3-14. Map Representing Total DDT Concentrations of Sediments in Lake Apopka as the Sum of the DDT, DDE, and DDE Compounds and as also including DDMU and Dichlorobenzophenone (μg/kg, dry weight)

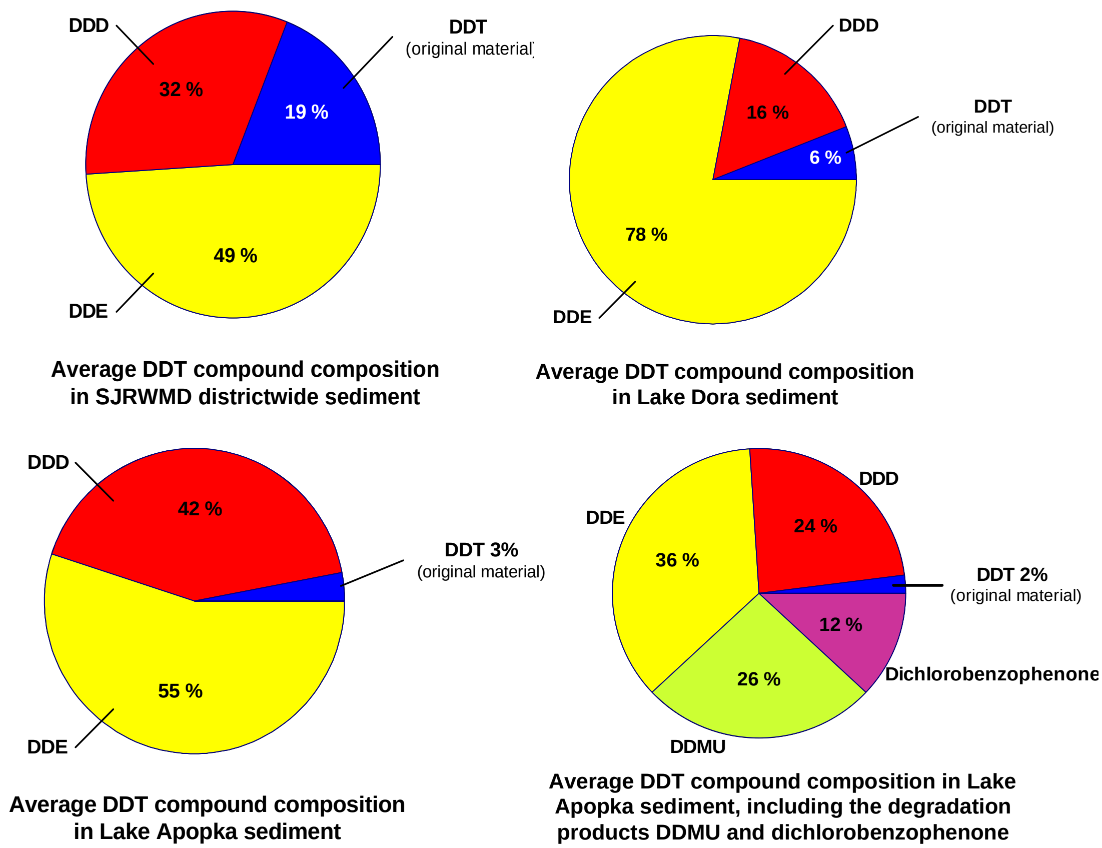


Figure 3-15. Relative Composition of the DDT-Compounds in Sediments from Selected Locations

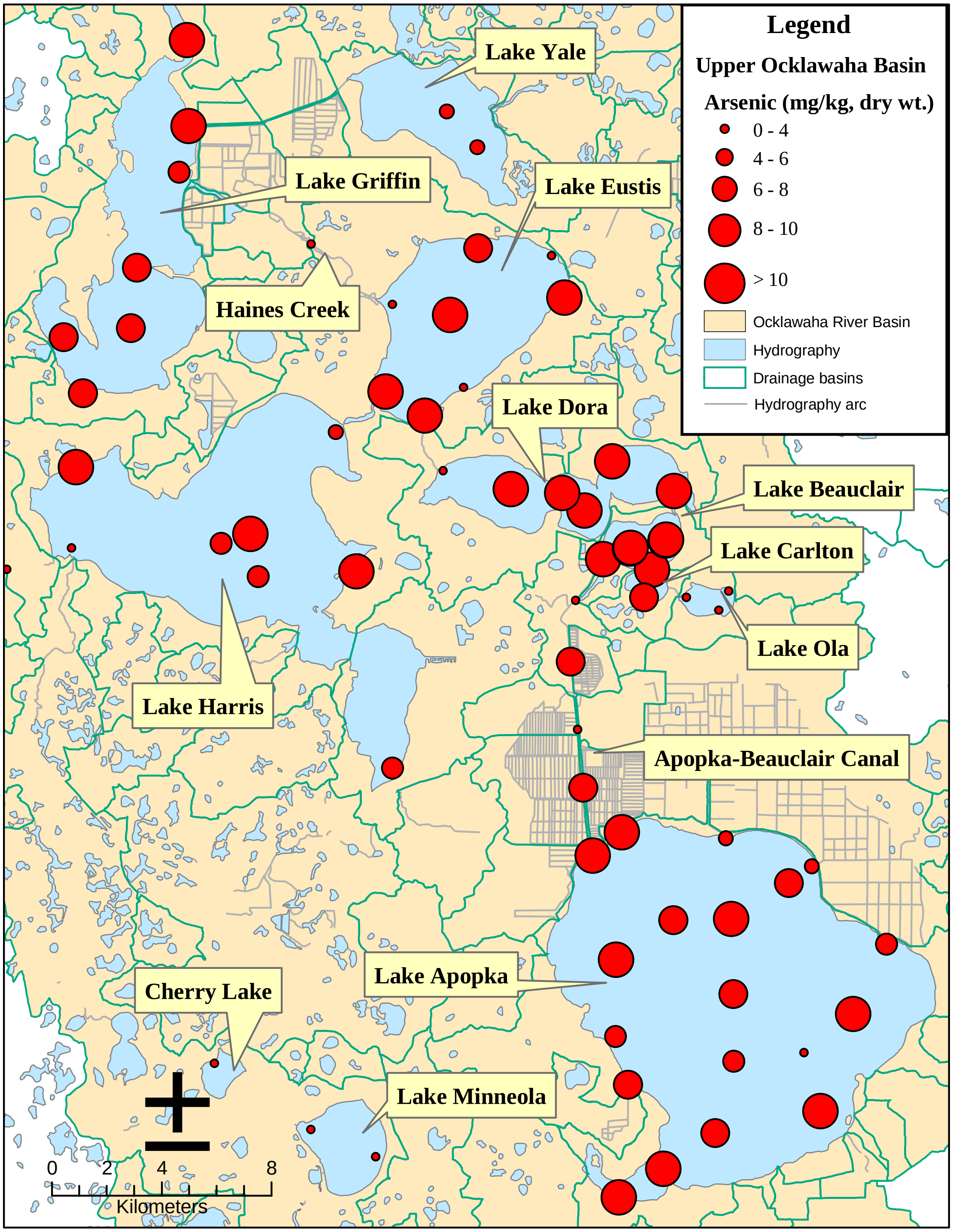


Figure 3-16. Map Representing Arsenic Concentration in Sediments from Upper Ocklawaha River Chain-of-Lakes Sites (mg/kg, dry weight)

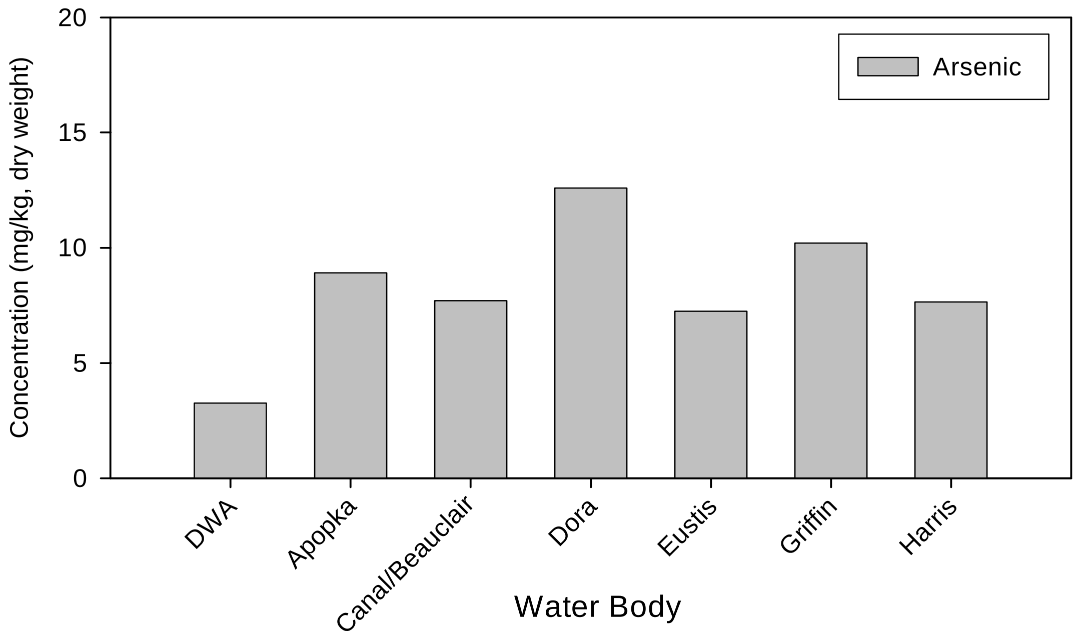


Figure 3-17. Mean Arsenic Concentration in Sediments from Upper Ocklawaha Chain-of-Lakes (mg/kg, dry weight)

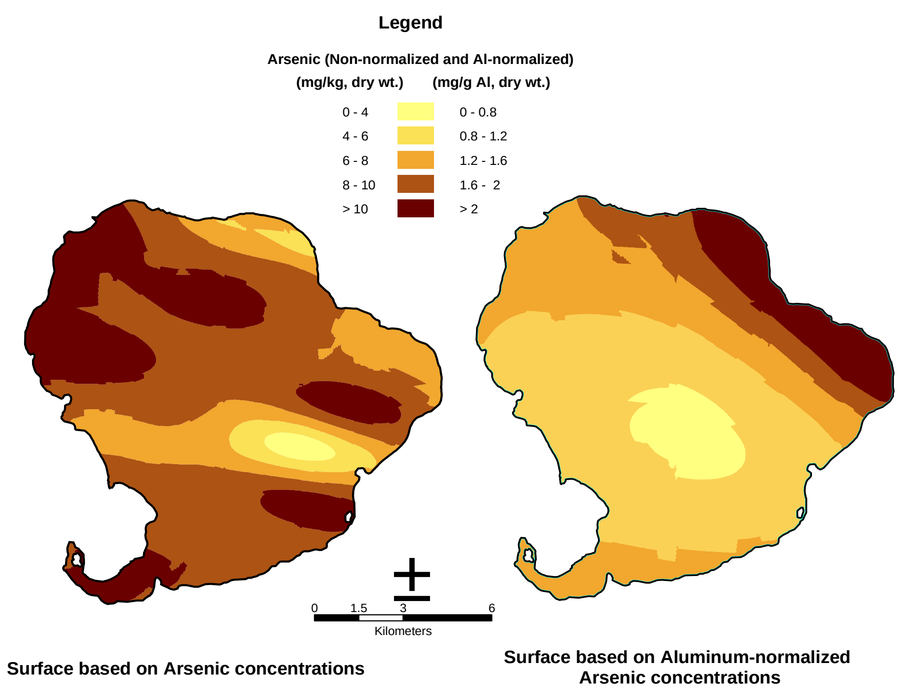


Figure 3-18. Map Representing Arsenic Concentrations of Sediments in Lake Apopka — Non-normalized (mg/kg) and Normalized to Aluminum

Contaminants and Areas of Concern

Using the contaminant-based HQs, both TEC- and PEC-based HQs and HIs were determined for each site in the detailed assessment (Appendix C). Site AB-T_1 in the Apopka Beauclair Canal had the highest TEC-based HQ for DDT with a value of 1,060. Only four sites in the chain-of-lakes region had TEC-based HQs for DDT below 1. These high HQ values for DDT contributed the most to the overall HI for the sites, indicating that DDT is the contaminant of greatest concern in this area.

Of the 50 sites sampled in the upper Ocklawaha River chain-of-lakes region, only 13 sites had TEC-based HIs less than 10. The majority of sites have HIs greater than 10, indicating these sites have a high potential to cause deleterious effects on benthic organisms: 90% of the sites in Lake Apopka had HIs greater than 10, 80% from Lake Dora, and 67% from A-B Canal/Lake Beauclair (Figure 3-19). Table 3-9 summarizes the HIs determined from sediment contaminant concentrations and sediment quality guidelines for all the detailed assessment sites, and also lists the primary contaminants contributing to the HI, in order of contribution. From this table, it is obvious that DDT is the contaminant that contributes the most to the potential impact on sediment-residing organisms in the chain-of-lakes region, based on this HI assessment. Arsenic also contributes notably to the potential for effects in the water bodies, although the arsenic concentrations are more uniform than DDT. It is also clear that Lake Apopka, the Apopka-Beauclair canal, and Lake Beauclair are the most contaminated, and that the overall contamination decreases downstream through the interconnected chain of lakes.

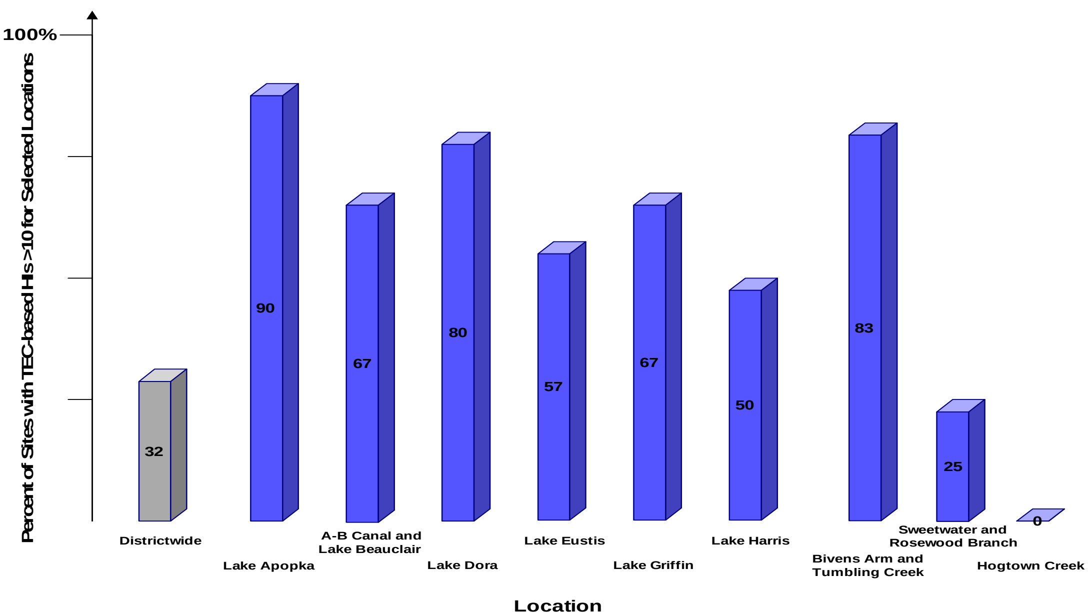


Figure 3-19. Rates of TEC-Based Hazard Index Values >10 for Selected Detailed Assessment Locations and for the Districtwide Sites as a Whole

Table 3-9: Hazard Index (HI) Determined from Sediment Contaminant Concentrations and TEC and PEC Sediment Quality Guidelines. Primary Contaminants Contributing to the HI.

	Mean HI[a]	Median HI	Primary Contaminants in Approximate Order of Contribution (contribute ~5-10% to the HI)
DISTRICTWIDE ASSESSMENT SITES			
TEC-based Evaluation	11.5	5.2	DDTs[b], Lead, Mercury, Chromium (PCB, PAH, Zinc)
PEC-based Evaluation	2.0	0.9	
UPPER OCKLAWAHA RIVER CHAIN-OF-LAKES SITES			
Lake Apopka			
TEC-based Evaluation	64.9	47.6	DDTs (Arsenic)
PEC-based Evaluation	8.7	6.2	
Apopka-Beauclair Canal and Lake Beauclair			
TEC-based Evaluation	191	71.3	DDTs (Chlordane, Arsenic)
PEC-based Evaluation	27.4	8.6	
Lake Dora			
TEC-based Evaluation	31.1	35.9	DDTs, Dieldrin, Chlordane (Arsenic)
PEC-based Evaluation	4.5	5.4	
Lake Eustis			
TEC-based Evaluation	14.5	15.1	DDTs, Dieldrin, Chlordane, BHCs (Lead, Arsenic, Mercury)
PEC-based Evaluation	2.4	2.7	
Lake Griffin			
TEC-based Evaluation	12.1	11.1	DDTs, Mercury, Arsenic, Lead, BHCs (Chlordane)
PEC-based Evaluation	2.4	2.1	
Lake Harris			
TEC-based Evaluation	11.1	10.1	DDTs, Mercury, Arsenic (Lead, BHCs, Chlordane, Chromium)
PEC-based Evaluation	2.0	2.1	
GAINESVILLE AREA SITES			
Bivens Arm and Tumbling Creek			
TEC-based Evaluation	34.6	36.5	PAH, DDTs, Lead, Chlordane (Chromium, Mercury)
PEC-based Evaluation	5.7	5.7	
Sweetwater Branch and Rosewood Branch			
TEC-based Evaluation	11.8	6.7	PAH, Chlordane, DDTs, Lead, Dieldrin (Chromium, PCB, Cadmium, Zinc)
PEC-based Evaluation	2.1	0.9	
Hogtown Creek			
TEC-based Evaluation	5.1	4.8	Chlordane, DDTs (Chromium, PCB, Cadmium, Lead)
PEC-based Evaluation	1.0	1.0	

[a] HIs were calculated using the 10 organic and 9 metals contaminants that were analyzed and for which TEC and PEC SQGs exist (Table 2-3); total PAH was used to represent the PAH compounds and individual values for DDT, DDE, and DDD were used (rather than Total DDT) to represent the DDT contamination.
[b] DDTs: The 6 DDT-related compounds (2,4- and 4,4-isomers of DDT, DDE, and DDD).

Table 3-10 presents the mean HQs and the percentages of sites in the districtwide assessment that have HQs>0.5, using the higher PEC-values (rather than TEC-values) to calculate the HQ. The average PEC or ERM-based HQs are sometimes used as an additional measure to determine the potential for contamination to cause toxic effects on sediment organisms, and benthic ecological response (MacDonald, 2000; Hyland *et al*., 1999; Hyland *et al*., 2003; Long *et al*., 2000). This table shows that approximately 4.7% of sites in the entire SJWRMD had an average HQs greater then 0.5. In Lake Apopka, however, 36.8% of the sites have HQs greater than 0.5, and in the A-B Canal/Lake Beauclair, 66.7% of the sites had HQs greater than 0.5. The DDT concentrations alone result in an average PEC-based HQ>1[2] for Lake Apopka, the Apopka-Beauclair canal, Lake Beauclair, and Lake Dora; again, the PEC is the concentration at which toxic and other ecological effects are *likely* to occur in sediment dwelling organisms. However, and as discussed in Sections 3.1.3 and 3.1.4, the assessment of contamination relative to TEC and PEC SQGs may overestimate the potential for effects, because of the high organic content of the sediments.

Table 3-10: Mean Hazard Quotient (HQ) Determined from Sediment Contaminant Concentrations and PEC Sediment Quality Guideline Values[a].

	PEC-Based SQG Evaluation		
	Mean HQ (PEC quotient)	**% of sites with HQ>0.5**	**Contaminants with average HQ>1** (average HQ value)
Districtwide Assessment Sites	0.13	4.7	None
Upper Ocklawaha River Chain-of-Lakes			
Lake Apopka Sites	0.52	36.8	DDTs[b] (7.4)
Apopka-Beauclair Canal and Lake Beauclair Sites	0.95	66.7	DDTs (24.5) Chlordane (1.9)
Lake Dora Sites	0.33	0	DDTs (2.2)
Gainesville Area			
Bivens Arm and Tumbling Creek Sites	0.47	50.0	Lead (1.2) Total PAH (1.1) DDTs (1.1)
Sweetwater Branch and Rosewood Branch Sites	0.12	0	None

[a] "Mean HQs" and "% of sites with HQ>0.5" were calculated using the PEC values and contaminant concentrations for the 3 organic (Total PAH, Total PCB, and Sum DDE) and 7 metals (arsenic, cadmium, chromium, copper, lead, nickel, and zinc) contaminants determined by MacDonald et. al. (2000) to reliably predict toxicity to sediment dwelling organisms in the dataset he used for his SQG vs sediment toxicity investigation. The "contaminants with average HQ>1" were determined using all 10 organic and 9 metals contaminants that were analyzed and for which PEC SQGs exist (Tables 2-3 and 3-10).
[b] DDTs: DDT-related compounds (DDT, DDE, and DDD).

[2] The overall DDT HQ values were calculated as the sum of the individual HQ values for DDT, DDE, and DDD. The PEC-values for DDT, DDE, and DDD are 62.9, 31.3, and 28.0 µg/kg, respectively.

3.2.3 Gainesville Area Investigation

The Gainesville area sites were divided into three major sub-regions: Bivens Arm and Tumbling Creek, Sweetwater Branch and Rosewood Branch, and Hogtown Creek.

Organic Contaminants

Of the major groups of organic contaminants sampled in the detailed assessment, the PAHs were identified to, generally, be present at the highest concentration in the Gainesville area. This is likely due to the urban location of the water bodies, and possibly caused by stormwater runoff from urban streets or from combined sewer overflows (CSOs). The median concentration of total PAH in the Bivens Arm and Tumbling Creek region was 14,500 µg/kg, compared to 363 µg/kg for all sites in the SJRWMD districtwide assessment. The Sweetwater Branch and Rosewood Branch region had a median concentration of total PAH of 1,820 µg/kg. Pesticide (Figures 3-20 and 3-21) and PCB concentrations were also elevated in the Gainesville area. Both total DDT and total PCB were found in high concentrations in Bivens Arm and Tumbling Creek, but were detected at much lower concentrations in Sweetwater and Rosewood Branch, as well as in Hogtown Creek.

Of the other chlorinated pesticides (chlordane, BHCs, and dieldrin), total chlordane was found in relatively high concentrations in the Gainesville area. Median concentrations ranged from 3.67 µg/kg (Sweetwater Branch and Rosewood Branch) to 5.42 µg/kg (Bivens Arm and Tumbling Creek). This is compared to a median districtwide concentration of 0.3 µg/kg.

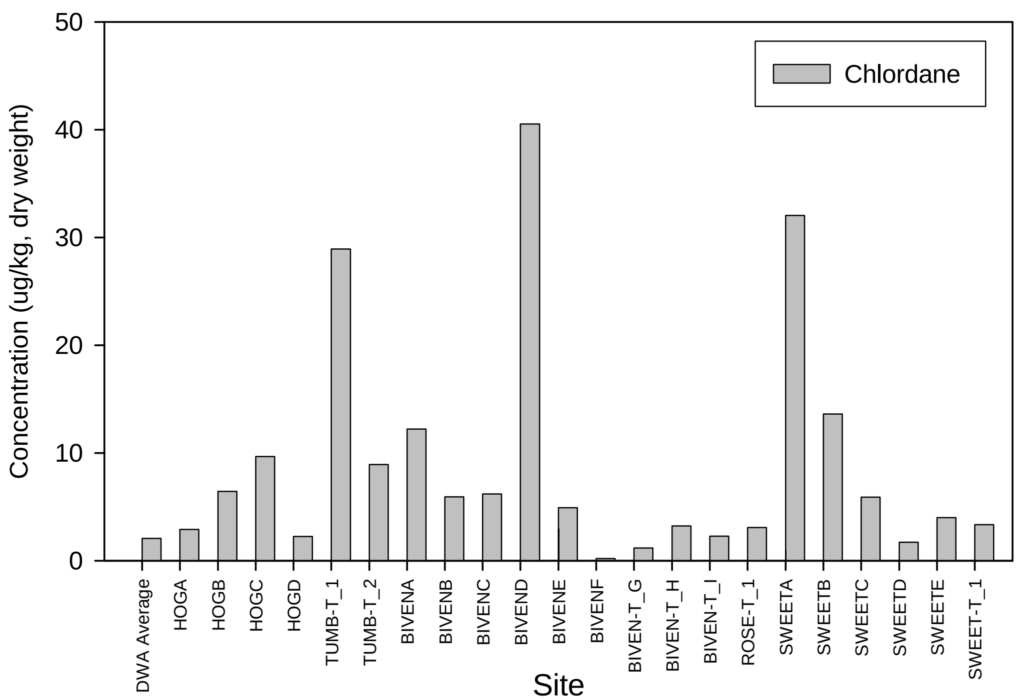


Figure 3-20. Total Chlordane Concentration in Sediments from the Gainesville Area Sites (µg/kg, dry weight)

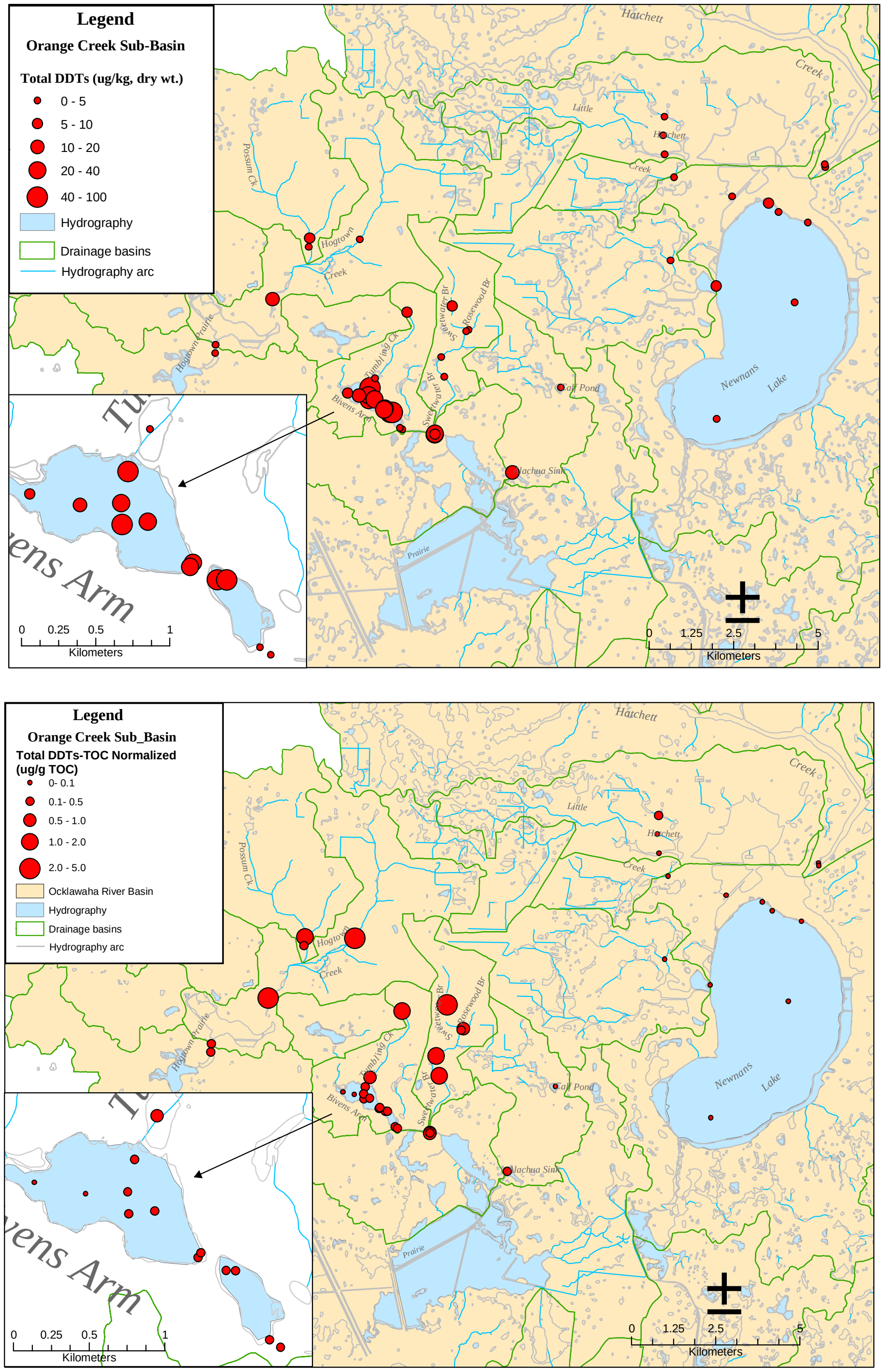


Figure 3-21. Map Illustrating Total DDT Concentration in Sediments from the Gainesville Area Sites— Non-normalized (µg/kg, dry weight) and Normalized to TOC Content (µg/g TOC)

Metals

Overall, the metal found with the most notably elevated concentrations in the Gainesville area was lead, followed by chromium. Figures 3-22 and 3-23 show the concentration of lead in sediments for specific sites in the Gainesville area. The median concentration of lead ranged from 7.07 mg/kg in Hogtown Creek to 155 mg/kg in the Bivens Arm and Tumbling Creek area. Districtwide, median lead concentrations were 13.5 mg/kg. Chromium levels were also elevated in much of the Gainesville area, and ranged from 9.4 mg/kg in Hogtown Creek to 95 mg/kg in the Bivens Arm and Tumbling Creek region. This is compared to a median chromium concentration of 13 mg/kg in the SJRWMD as a whole. Other metals with median concentrations notably higher than the districtwide levels were mercury in Bivens Arm and Tumbling Creek, cadmium and zinc in Sweetwater Branch and Rosewood Branch, and cadmium in Hogtown Creek.

The mean percent TOC in both Hogtown Creek, Sweetwater Branch, and Rosewood Branch (and Tumbling Creek) were less than the mean percent of TOC districtwide, which was indicative of these having proportionately more stream sites than the District as a whole. The TOC content, and the percent fines, tend to be lower in streams with more rapidly moving water than in depositional environments, like many lakes and large rivers. Bivens Arm, however, is a depositional water body and had elevated levels of TOC, averaging in excess of 20%, compared to the mean districtwide TOC of 10%. The contaminants may therefore have reduced bioavailability in Bivens Arm compared to other parts of the Gainesville area, although this is likely offset by the concentrations for many of the contaminants in Bivens Arm.

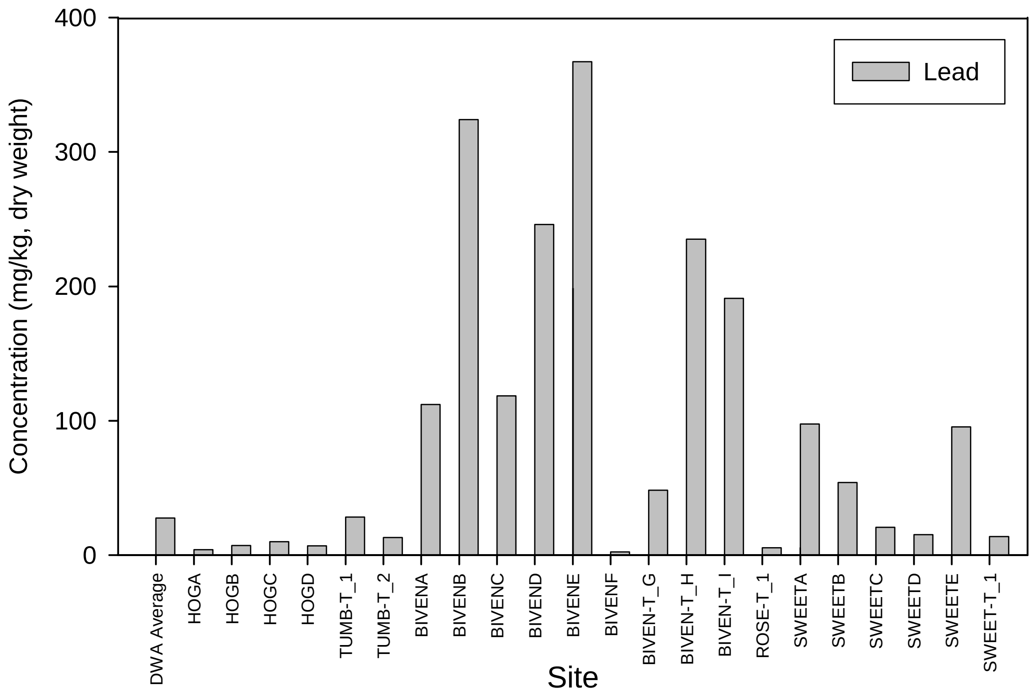


Figure 3-22. Lead Concentration in Sediments from the Gainesville Area Sites (mg/kg, dry weight)

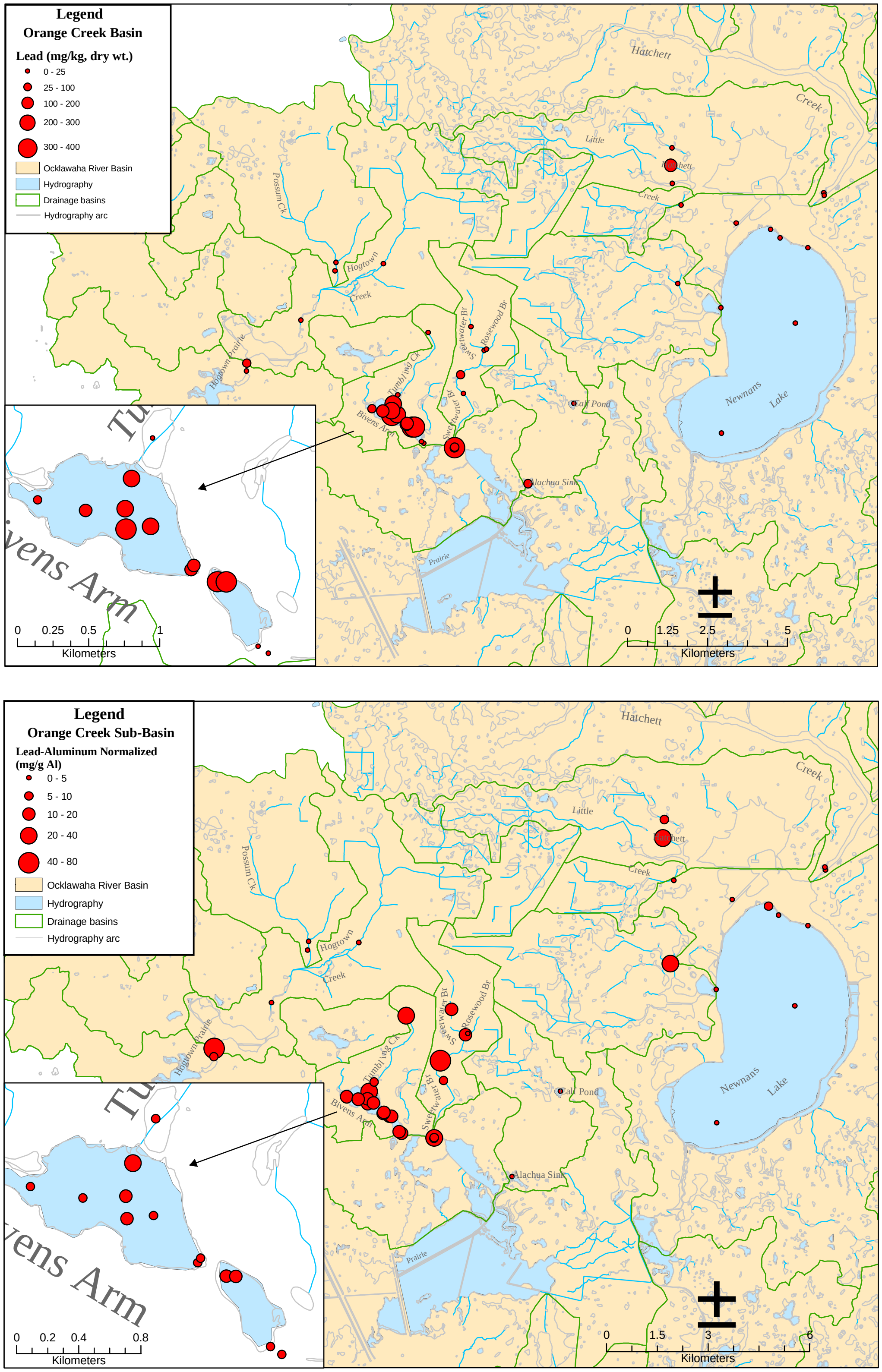


Figure 3-23. Map Illustrating Lead Concentration in Sediments from the Gainesville Area Sites— Non-normalized (mg/kg, dry weight) and Normalized to Aluminum

Contaminants and Areas of Concern

Hazard indices calculated from both TEC- and PEC-based sediment quality guidelines indicate Bivens Arm and Tumbling Creek to be the areas of greatest concern in the Gainesville area (Table 3-9). The median TEC-based HI for Bivens Arm and Tumbling Creek was 36.5, compared to 6.7 for Sweetwater and Rosewood Branch, and 4.8 for Hogtown Creek. Figure 3-19 shows the percentage of sites within each region of the detailed assessment with TEC-based HIs greater than 10. Bivens Arm and Tumbling Creek (83%) is the region with the second highest percentage of sites greater than 10, following Lake Apopka (90%).

Table 3-10 shows the mean HQ from contamination concentrations and PEC-based guidelines. Based on PEC-derived HQ values for the Gainesville area, 50% of the sites in Bivens Arm and Tumbling Creek have HQs greater than 0.5, suggesting those may be of particular concern. The primary contaminants contributing to the sediment-borne risk at these sites include lead, PAH, and DDT. Neither Sweetwater and Rosewood Branch sites, nor Hogtown Creek sites, showed any sites with HQs greater than 0.5, although the downstream, depositional, locations of Sweetwater Branch have clearly elevated contaminant concentrations.

4. SUMMARY AND CONCLUSION

Districtwide Assessment

A review of the data from the 171 sites for the Districtwide Assessment revealed that the organic contaminant and metals data did not broadly point to substantial anthropogenic signals in these samples. Selected sites exhibited elevated concentrations of contaminants when compared to the rest of the sites and key contaminant reference data, and these sites were further investigated in the Detailed Assessment. Overall, however, the quality of the sedimentary environment in the areas surveyed appears to be good, based on the sediment contaminant concentrations and the data assessment that has been performed.

The data for the 171 sites were, however, quite variable, indicating differences in contaminant concentrations and also in the natural composition of the sample matrices. The metals, for instance, generally showed an increase in concentration as the grain size of the sediments decreased, but the nature of these sediments made it difficult to apply standard data normalization procedures. Many of the sediments were very high in organic carbon, but much of this was non-degraded plant debris that is not completely available as an organic source for “binding” contaminants. This plant debris also contributed disproportionately to the coarser fractions in the grain size determinations, and the grain size data, therefore, did not always provide reliable information on the grain size of the mineral component of the sediment.

A review of the data for the districtwide sites, in conjunction with other reference data, assisted in identifying contaminant concerns in certain areas as well as reaffirming that the urbanized areas tend to have higher contaminant concentrations than non-urban areas. Urbanized areas appear to be exerting some influence on the both the contaminant concentrations in the sediments, and the class or type of contaminant present. Most metals, PAH, PCBs, and pesticides are primarily introduced to the environment through point sources or local non-point runoff. Runoff from agricultural areas will generally contain more organochlorine-pesticides than runoff from urban areas, which will contain higher amounts of metals, PAH, and PCBs. In addition, contaminants such as PAH and mercury also have a large atmospheric source component that must be considered. Contaminants with substantial atmospheric sources will tend to be spread more uniformly within a watershed when contrasted to pollutants with more localized sources.

In general, the sediment contamination that was measured for the 171 districtwide sites was of low environmental concern. As a whole, the sites can be considered to be in generally good condition, from a sediment contaminant perspective. A few specific locations and general areas with elevated concentrations of some organic and metal contaminants were identified.

- Elevated concentrations of DDT were found in parts of all basins except for St. Marys and Nassau River Basin. The most significant levels were found in Upper Ocklawaha River Basin, with the majority of those sites exceeding TEC reference values for DDT, indicating the potential for concern.

- Figure 4-1 shows, by basin, rates of exceedances of NOAA’s “high” reference value for sediments within the districtwide assessment. It reveals the major contaminants to be PAH, PCB, DDT, cadmium, lead, and mercury, and identifies the drainage basins with the most contaminated sediments to be Lower St. Johns River and Northern Coastal Basin, Upper Ocklawaha River Basin, and Orange Creek Basin.

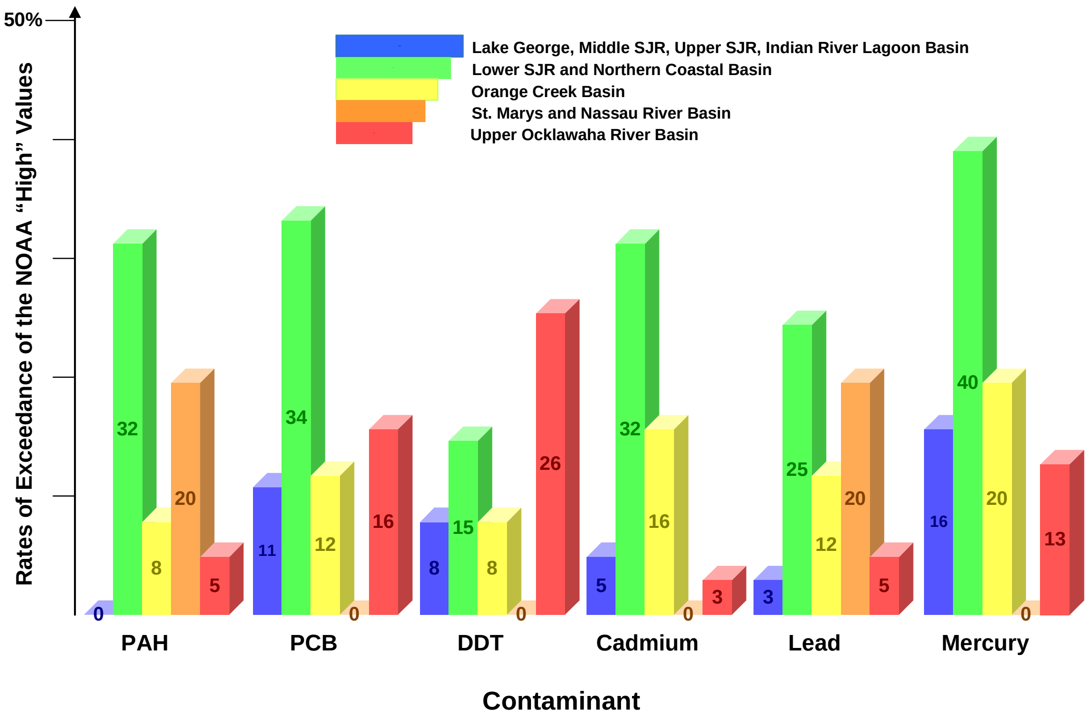


Figure 4-1. Rates of NS&T/MW "High" Value Exceedances for Sediments from Districtwide Assessment Sites, by Basin

- As expected, the Lower St. Johns River and Northern Coastal Basin contained the sediments that were broadly most contaminated with respect to urban/industrial contaminants, such as PAH, PCB, and various metals including lead and mercury. Elevated DDT and chlordane levels were also identified in the Lower St. Johns River. The sediment contamination of the Lower St. Johns River has been studied in detail, and is reported elsewhere (Battelle, 2002; Battelle, 2001).

- Selected areas in the Upper Ocklawaha River Basin (Lake Apopka and the upper Ocklawaha River chain-of-lakes) and Orange Creek Basin (water bodies in and around Gainesville) were identified to have sediment contamination that were potentially of concern, and were studied in more detail in the Detailed Assessment study.

Detailed Assessment

The Detailed Assessment Study helped to determine which of the potential contaminant problems that were identified appear to truly be of notable concern. Extensive sampling of sites located in the upper Ocklawaha River chain-of-lakes indicate varying concentrations of contaminants in the waterbodies sampled (Lake Apopka, Apopka-Beauclair Canal/Lake Beauclair, Lake Griffin, Lake Harris, Lake Eustis, and Lake Dora) although the sediment characteristics (%TOC and % mud) were fairly consistent. The organic contaminant concentrations (most notably DDT, but also chlordane and BHC) were generally highest in Lake Apopka and at the Apopka-Beauclair Canal/Beauclair sites, followed by somewhat lower concentrations in Lake Dora, and lower yet in the lakes further downstream. The upper Ocklawaha River chain-of-lakes also had elevated levels of arsenic, compared to most areas and sediment quality reference values.

The detailed investigation in the Gainesville area revealed that the contaminant concentrations varied substantially due to the varying sediment characteristics, water flow, and sediment depositional characteristics in the area. The organic contaminant concentrations were typically highest in Bivens Arm and Tumbling Creek, followed by Sweetwater and Rosewood Branch sites, and much lower at the Hogtown Creek sites. The sediments collected downstream in the Sweetwater Branch and Bivens Arm locations had PAH, DDT, and chlordane concentrations that were elevated and of potential concern. Much of the organic contamination appeared to be originating upstream, and then being transported and deposited at the downstream locations.

The metal contaminant concentrations were typically highest in the Bivens Arm and Tumbling Creek samples, but also high in the downstream Sweetwater and Rosewood Branch samples. Concentrations of lead, chromium, and zinc were particularly elevated, and potentially pose an environmental concern. The origin of the elevated metals concentrations may be similar to that of the organic compounds, but this was difficult to clearly determine with the existing information. Metal contaminant concentrations were generally low at the Hogtown Creek sites.

Figures 4-2 and 4-3 shows the TEC-based hazard indices and average PEC-based hazard quotients for the districtwide assessment sites as a whole, and the detailed assessment locations. The highest TEC-based hazard index values for major regions within the detailed assessment were observed in the upper Ocklawaha River chain-of-lakes, with the Lake Apopka, Apopka-Beauclair Canal, and Lake Beauclair sites having a mean TEC-based HIs in excess of 50. The Bivens Arm and Tumbling Creek sites had, as a set, the highest HI in the Gainesville area, with a mean HI of 35. The average *PEC*-based hazard quotient was near or above 0.5 for Lake Apopka, the Apopka-Beauclair Canal, Lake Beauclair, and Bivens Arm and Tumbling Creek, indicating a high potential for ecological effects on benthic organisms; Lake Dora also had a relatively high average hazard quotient (0.33).

The contaminants contributing the greatest proportion to the contaminant-based ecological risk of the sediments were DDT, lead, mercury, chromium, PAH, and PCB for the District as a whole, although there were large differences from location-to-location (Figure 4-4). In the Gainesville area PAH contributed the greatest proportion to the overall potential for effects on sediment residing organisms; approximately 30% of the HI was due to the concentrations of PAH. This was followed by DDT, chlordane, and lead. DDT is the primary contaminant of concern in the upper Ocklawaha River chain-of-lakes, contributing, on average, approximately 60% to the HI of those sediments. Most other common contaminants individually contribute about 5%, or less, of the risk in the sediments the upper Ocklawaha River chain-of-lakes.

Overall, the potential for biological impact from the measured contaminants in the District generally appears to be low, and is consistent with the generally low to moderate organic contaminant and metals concentrations measured in most of the sediments. However, a few locations were identified as having sediment contaminant concentrations of potential concern. These areas were sampled more densely in the detailed assessment study, and moderate to high levels of contamination was identified for some locations. Locations in the Bivens Arm and Tumbling Creek, Sweetwater Branch, and the upstream half of the upper Ocklawaha River chain-of-lakes continue to be of concern. Sediments in Bivens Arm, Lake Apopka, the Lake Apopka-Beauclair Canal, and Lake Beauclair appear to be of particular concern, warranting further investigations to determine the true environmental relevance of the measured contamination.

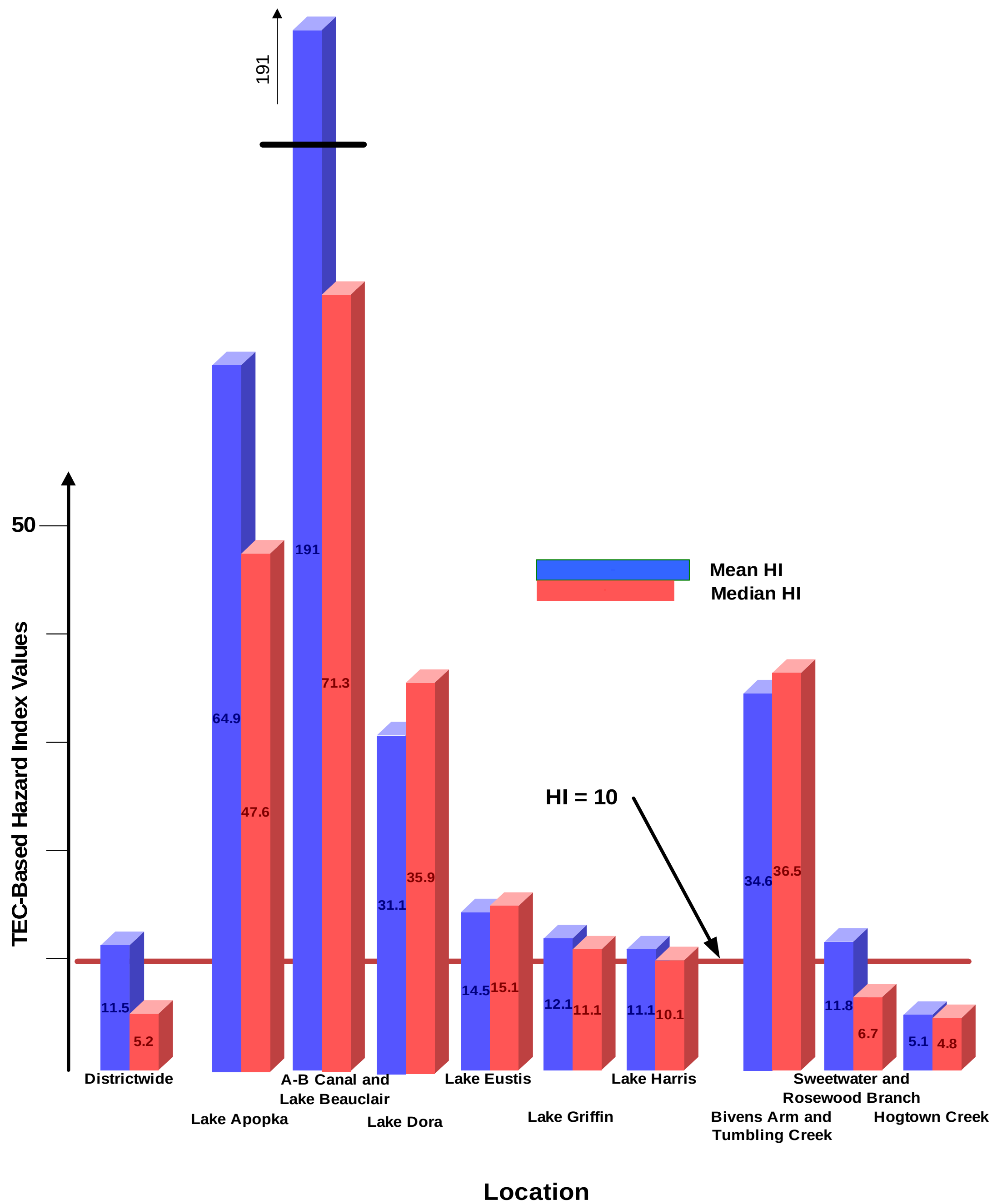


Figure 4-2. TEC-Based Hazard Index Values for Selected Detailed Assessment Locations and for the Districtwide Sites as a Whole

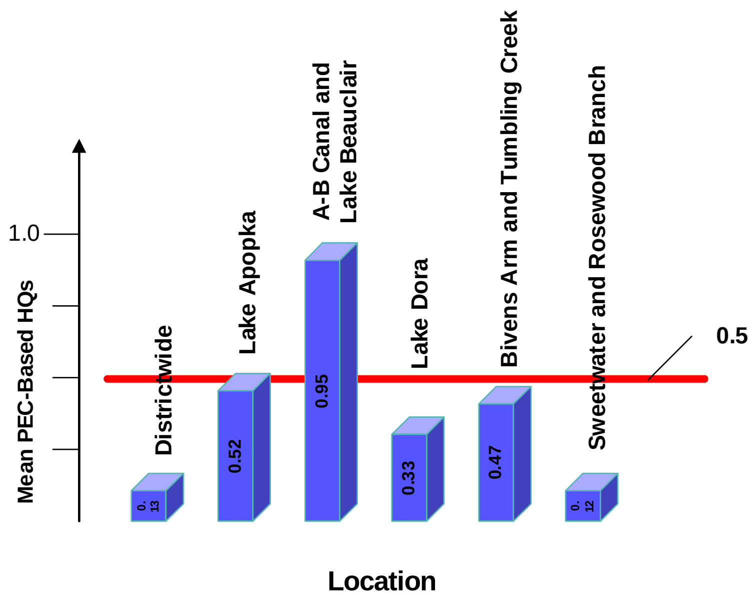


Figure 4-3. Mean PEC-Based Hazard Quotients for Selected Upper Ocklawaha River Chain-of-Lakes and Gainesville Area Locations, and for the Districtwide Sites as a Whole

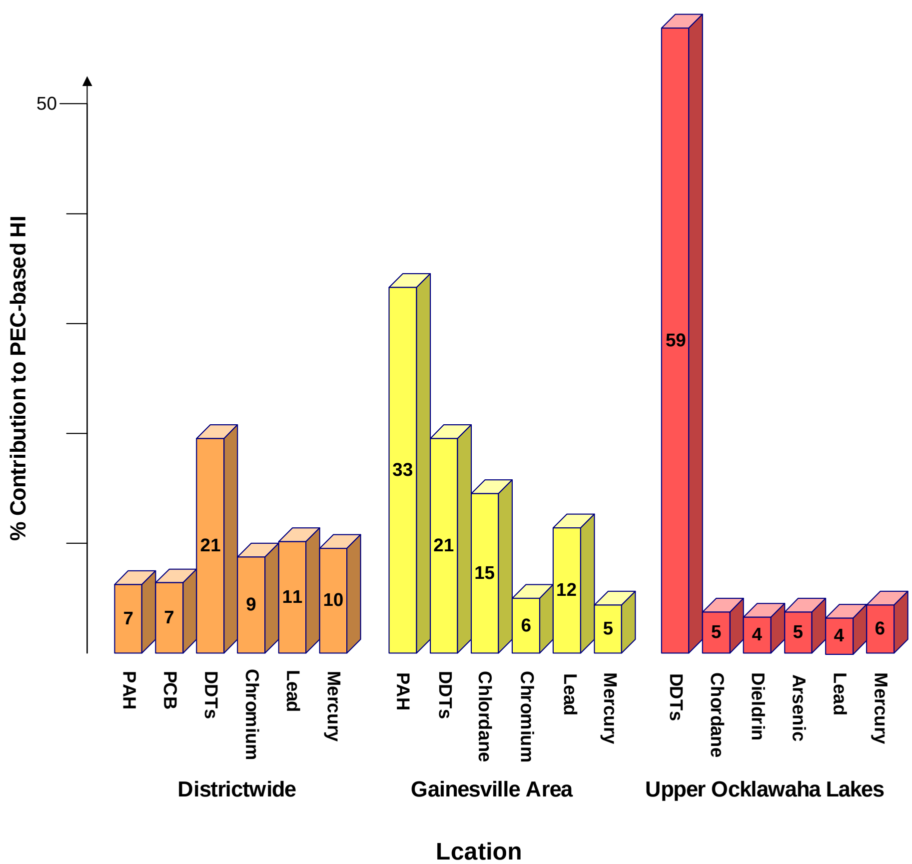


Figure 4-4. Approximate % Contribution of Selected Key Contaminant to the TEC-Based Hazard Index Values for the Upper Ocklawaha River Chain-of-Lakes, Gainesville Area, and for the Districtwide Sites as a Whole

Recommendations

This report provides information on the chemical contamination of sediments in the District, and identifies in Bivens Arm, Lake Apopka, the Lake Apopka-Beauclair Canal, and Lake Beauclair as areas of particular concern that warrant additional investigation to determine the true relevance of the measured contamination, to support informed environmental management action, as needed.

- Additional site-focused studies are warranted at the Gainesville area and upper Ocklawaha River chain-of-lakes. Such work could be focused on providing more definitive information on the magnitude and extent of the contamination, and the sources, by:

  - Determining the hydrodynamics and sediment transport/deposition characteristics of Bivens Arm and Tumbling Creek, Lake Apopka, the Lake Apopka-Beauclair Canal, and Lake Beauclair to provide information for better understanding the observed contaminant patterns, and predicting future contaminant distribution.

  - Performing a more detailed analysis of the land use and point-source and non-point sources of Bivens Arm and Tumbling Creek, Lake Apopka, Lake Apopka-Beauclair Canal, and Lake Beauclair, to better understand the contamination that was observed, and potential sources.

  - With a better understanding of the hydrodynamics, contaminants transport, land uses and potential contaminant sources, it should be possible to determine the primary origins of the contamination, the significance of current inputs versus historic contamination, and develop appropriate source control measures.

  - Perform sediment core sampling and analysis to determine the depth of the contamination for a given concentration of concern, and determine the mass of the critically contaminated sediment in areas where the contamination may warrant consideration of different remediation options (e.g., natural attenuation, capping, removal and disposal, removal-treatment-replacement, etc.). Three-dimensional sub-surface visualization and calculations of the contaminant concentrations, risks, distribution, and mass can conveniently and effectively be performed with data analysis using EarthVision™. Such coring work should also include the determination of the sedimentation rate of the area of interest.

- Additional site-focused studies in the Gainesville area and upper Ocklawaha River chain-of-lakes should include biologically-based determinations of the toxicity and bioavailability of the contaminats, to supplement the chemical contaminant data and better understand the true environmental implications. This could include:

  - Sediment toxicity testing with sediment from selected locations. This can be combined with laboratory-based bioaccumulation testing to determine the bioavailability and accumulation of contaminants in standardized laboratory tests.

  - Detailed benthic community structure analysis to determine impact to this community

  - Sampling of resident fish and freshwater bivalves, and other biota that are key to the local ecology, to determine the potential for on-site contaminant bioaccumulation. Bivalves are an excellent conservative measure of contaminant bioaccumulation because of their limited metabolism. If resident bivalves are not available, it may be possible to deploy cages with bivalves and retrieve them after a period of time to measure contaminant uptake.

  - Simultaneously extracted metals (SEM) and acid-volatile sulfide (AVS) should be determined for the low-oxygen sediment sites where metals contamination may be of concern (e.g., Bivens Arm). The AVS/SEM data allow for predictions of the amount of bioavailable toxic metals.

  - Determine the oxygen conditions at the sediment-water interface, to better understand how this can, independent of contaminant concentrations, impact the ecology at the study site, and also the availability and fate of the contaminants.

  - Evaluate the applicability of the equilibrium partitioning approach (e.g., ESB values), as opposed to the application of empirically derived sediment quality guidelines (e.g., TEC/PEC values), to assess to the potential for toxicity in the organic rich sediments. Due to the close relationship between TOC content and percentage of mud, it may be possible, and more appropriate, to use the equilibrium partitioning approach to estimate potential toxicity. This method, however, is highly site-specific due to various types and sizes of both the sediment and the organic matter. In areas of extremely high organic content comprised of unconsolidated organic matter (e.g., wood chips, plant debris), the organic carbon may partition differently than in more typical sediments. For instance, these sediments may exhibit higher concentrations of chemicals in interstitial water than would be predicted using generic K_{oc} (organic carbon-water partition coefficient) values, making any resultant reference value underprotective. At each individual site, therefore, K_{oc} values should be determined for the chemical of interest in both sediment and pore water. If the measured concentration in pore water is more than twofold greater than that predicted using recommended K_{oc} values, calculation of a site-specific K_{oc} should be considered. The presence of organic carbon in large particles may also affect partitioning and equilibrium, thus large particles should be screened out of the sediment prior to analysis to reduce their influence on sediment chemistry (EPA, 2003).

- Follow-up monitoring to determine the trends in the environmental contaminant loadings at the sites may be very useful to support environmental management. However, sediment contaminants concentrations do not change rapidly (and the rate of change depends on a number of factors, such a rate of deposition, bioturbation etc.), so large-scale follow-up trends monitoring may not be useful until about 5 years after the original sampling.

- This report provides a wealth of quality environmental monitoring and assessment data that could be a valuable resource for environmental planners and scientists around the country. It would therefore be helpful if this information could become more widely distributed and available, such as by publishing the results in technical journals, presenting it at technical and non-technical meetings, and by making it available over the Internet (e.g., though an interactive Web-based database that would include map-based interfaces).

5. REFERENCES

APHA. American Public Health Association, American Water Works Association, and Water Pollution Control Federation. 1989. Standard Methods for the Examination of Water and Wastewater. 17th Edition. Washington, DC.

Battelle. 2002. Chemical Contamination of Sediments in the Cedar-Ortega River Basin. Draft Final Report prepared by G. Durell (Battelle) J. Higman (SJRWMD), J. Seavey Fredrikson (Battelle), and J. Neff (Battelle). Battelle, Duxbury, MA, for the St. Johns River Water Management District. December, 2002.

Battelle. 2001. Sediment Quality of the Lower St. Johns River and Cedar-Ortega River Basin: Chemical Contaminant Characteristics. Final Report prepared by G. Durell (Battelle) J. Higman (SJRWMD), and J. Seavey Fredrikson (Battelle). Battelle, Duxbury, MA, for the St. Johns River Water Management District. May, 2001.

Battelle. 2000a. Sediment Quality in the St. Johns River Water Management District: Physical and Chemical Characterization of New Sites and Detailed Assessment of Previously Sampled Locations. Final Report prepared by G. Durell and J. Seavey Fredrikson. Battelle, Duxbury, MA, for the St. Johns River Water Management District. November, 2000.

Battelle. 2000b. Development of a Metals Data Analysis Method for Districtwide Assessment of Sediment Contamination. Final Report prepared by E. Crecelius (Battelle) and V. Cullinan (Battelle). Battelle, Sequim, WA and Battelle, Duxbury, MA, for the St. Johns River Water Management District. November, 2000.

Battelle. 1997. Presque Isle Bay Sediment Study: Data Review. Final Report prepared by G. Durell and J. Neff, Battelle Ocean Sciences, Duxbury, MA, for U.S. EPA, Region II. April 20, 1997.

Battelle. 1995. Concentrations of Contaminants in Dorchester Bay and Boston Harbor Sediments Collected in 1994 in the Vicinity of CSO Discharges and Comparison to 1990 Concentrations. Final Report prepared by G. Durell, Battelle Ocean Sciences, Duxbury, MA, for Massachusetts Water Resources Authority. December 1, 1995.

Battelle. 1991. Survey of Sediment Toxicity in Long Island Sound. Chemistry Data Report prepared by G. Durell, Battelle Ocean Sciences, Duxbury, MA, for Science Applications International Corporation and the National Oceanic and Atmospheric Administration. December, 1991.

Chapman, P.M., B. Anderson, S. Carr, V. Engle, R. Green, J. Hameedi, M. Harmon, P. Haverland, J. Hyland, C. Ingersoll, E. Long, J. Rodgers, Jr., M. Salazar, P.K. Sibley, P.J. Smith, R.C. Swartz, B. Thompson, and H. Windom. 1997. General Guidelines for Using the Sediment Quality Triad. *Mar. Pollut. Bull*. 34:368-372.

Dames and Moore. 1983. Final Report: Deepwater Ports and Maintenance Dredging Study. Vol. 1. Tallahassee, Fla.

Daskalakis, K.D. and T.P. O'Connor. 1995. Distribution of Chemical Concentrations in US Coastal and Estuarine Sediment. *Mar. Environ. Res.* **40**:381-398.

Delfino, J.J., J.A. Coates, W. M. Davis, K.L. Garcia, M. W. Jacobs, K.J. Marincic, and L. L. Signorella. 1991. Toxic Pollutants in Discharges, Ambient Waters, and Bottom Sediments. Final report. Volume 1. For the Florida Department of Environmental Regulation. Department of Environmental Engineering Sciences. Gainesville, Fla.: University of Florida.

Delfino, J.J., J.A. Coates, K.L. Garcia, and L. L. Signorella. 1993. Toxic Organic Pollutant Content of Sediments Within the SJRWMD non-SWIM Areas. Final report. Contract No. 90D214 for the St. Johns River Water Management District. Department of Environmental Engineering Sciences. Gainesville, Fla.: University of Florida.

DiToro, D.M., J.D. Mahoney, D.J. Hansen, K.J. Scott, A.R. Carlson, and G.T. Ankley. 1992. Acid Volatile Sulfide Predicts the Acute Toxicity of Cadmium and Nickel in Sediments. *Environ. Toxicol. Chem*. **9**: 1487-1502.

Di Toro, D.M., C.S. Zebra, D.J. Hansen, W.J. Berry, R.C. Swartz, C.E. Cowan, S.P. Pavlou, H.E. Allen, N.A. Thomas, and P.R. Paquin. 1991. Technical Basis for Establishing Sediment Quality Criteria for Nonionic Organic Chemicals Using Equilibrium Partitioning. *Environ. Toxicol. Chem*. **10**: 1541-1583.

DiToro, D.M., J.D. Mahoney, D.J. Hansen, K.J. Scott, M.B. Hicks, S.M. Mayr, and M.S. Redmond. 1990. Toxicity of Cadmium in Sediments: The Role of Acid Volatile Sulfide. *Environm. Tox. and Chem*. **9**: 1487-1502.

EPA. 2003. Procedures for the Derivation of Equilibrium Partitioning Benchmarks (ESBs) for the Protection of Benthic Organisms: Dieldrin. Office of Research and Development. EPA-600-R-02-010.

EPA. 1997. The Incidence and Severity of Sediment Contamination in Surface Waters of the United States. Volume 1: National Sediment Quality Survey. United States Environmental Protection Agency, Washington, D.C. EPA-823-R-97-006.

EPA. 1993a. Environmental Monitoring and Assessment Program (EMAP) **-** Estuaries; Virginian Province — Quality Assurance Project Plan. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC, 20460. 1993.

EPA. 1993b. Sediment Quality Criteria for the Protection of Benthic Organisms: Dieldren. United States Environmental Protection Agency, Washington, D.C. EPA-822-R-93-015.

FDEP. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Prepared by D.D. MacDonald, D.E. Smorong, and R.A. Lindskoog, MacDonald Environmental Sciences Ltd.; C.G. Ingersoll, U.S. Geological Survey; and T. Biernacki, Florida Department of Environmental Protection. For the Florida Department of Environmental Protection. January, 2003. Tallahassee, Florida.

FDEP. 2002. Development of an Interpretive Tool for Assessment of Metal Enrichment in Florida Freshwater Sediment. Prepared by A. Carvalho and S.J. Schropp, Taylor Engineering, Inc.; and G.M. Sloane, T.P. Biernacki, and T.L. Seal, Florida Department of Environmental Protection. Prepared for the Florida Department of Environmental Protection. May, 2002. Tallahassee, Florida.

FDER. 1988. Sediment Analysis of the Lower St. Johns River. Unpublished data collected in 1988 by the Florida Department of Environmental Regulation.

Folk, R.L. 1974. Petrology of Sedimentary Rocks. Hemphill Publishing Company. Austin, TX.

Hyland, J.L., W.L. Balthis, V.D. Engle, E.R. Long, J.F. Paul, J.K. Summers, and R.F. Van Dolah. 2003. Incidence of Stress in Benthic Communities Along the U.S. Atlantic and Gulf of Mexico Coasts within Different Ranges of Sediment Contamination from Chemical Mixtures. *Environmental Monitoring & Assessment*, **81**: 149-161.

Hyland, J.L., R.F. Van Dolah, and T.R. Snoots. 1999. Predicting Stress in Benthic Communities of Southeastern U.S. Estuaries in Relation to Chemical Contamination of Sediments. *Environ. Toxicol. and Chem*., **18**: 2557-2564.

Lee, J.-H., P.F. Landrum, L.J. Field, and C.-H. Koh. 2001. Application of ∑PAH Model and a Logistic Regression Model to Sediment Toxicity Data Based on a Species-specific, Water-only LC50 Toxic Unit for *Hyalella azteca*. *Environ. Toxicol. Chem*. **29**: 2102-2113.

Long, E.R., D.D. MacDonald, C.G. Severn, and C.B Hong. 2000. Classifying the Probabilities of Acute Toxicity in Marine Sediments with Empirically-derived Sediment Quality Guidelines. *Environ. Toxicol. and Chem*. **19**: 2598-2601.

Long, E.R., D.D. MacDonald, D. D., S.L. Smith, and F.D. Calder. 1995. Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. *Environmental Management*. **19**, No.1: 81-97.

Long, E.R. and L.G. Morgan. 1990. The Potential for Biological Effects of Sediment-sorbed Contaminants Tested in the National Status and Trends Program, August 1990. NOAA Technical Memorandum NOS OMA 52.

MacDonald, D. D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Arch. Environ. Contam. Toxicol*. **39**: 20-31.

NOAA. 1998. Sampling and Analytical Methods of the National Status and Trends Mussel Watch Project: 1993-1998 Update. NOAA Technical Memorandum NOS/ORCA/CMBAD 130. National Oceanic and Atmospheric Administration, Silver Springs, MD.

Persaud, D., R. Jaagumagi, and A. Hayton. 1992. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Ontario Ministry of the Environment, Water Resources Branch, Toronto, Canada. ISBN 0-7778-9248-7. August, 1993.

Pierce, R.H, L.K. Dikson, and R.C. Brown. 1988. Characterization of Base-line Conditions of the Physical, Chemical, and Microbial Environments in the St. Johns River Estuary. Contract No. SP132. Tallahassee, Fla. Florida Department of Environmental Regulation.

Schroop, S.J., and H.L. Windom. 1987. A Guide to the Interpretation of Metal Concentrations in Estuarine Sediments. Coastal Zone Management. Tallahassee, Fla.: Florida Department of Environmental Regulation.

Swartz, R.C., F.A. Cole, J.O. Lamberson, S.P. Ferraro, D.W. Schultts, W.A. DeBen, H. Lee II, and R.O. Ozretich. 1994. Sediment Toxicity, Contamination, and Amphipod Abundance at a DDT- and Dieldrin Contaminated Site in San Francisco Bay. *Environ. Toxicol. Chem.* **13**: 949-962.

Servos, M.R., D.C.G. Muir, and G.R.B. Webster. 1989. The Effect of Dissolved Organic Matter on the Bioavailability of Polychlorinated Dibenzo-p-dioxins. *Aquat. Toxicol*. **14**: 169-184.

SJRWMD. 1998. Sediment Quality in the St. Johns River Water Management District: Physical and Chemical Characteristics. St. Johns River Water Management District, Palatka, Florida. District Special Publication SJ 98-SP5.

LIST OF APPENDICES

Appendix A. Photographs from Field Sampling and Laboratory Analysis Activities
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Appendix A. Photographs from Field Sampling and Laboratory Analysis Activities

Selected Field Sampling Activities

1.Mud Lake airboat runway; 2 Bivens Arm; 3. Boat on trailer;
4. Boat loaded for Bivens Arm sampling; 5 and 6. Air boat

Selected Field Sampling Activities (cont.)

1. Navigating to Lake Apopka sampling site; 2 Sampling with sediment grab sampler; 3 and 4. Emptying sediment from grab into mixing tray; 5. Sampling in creek near Sweetwater Branch; 6. Sediment in mixing tray before subsampling for lab sample containers.

Selected Field Sampling Activities (cont.)

1 and 2. Subsampling sediment from mixing tray to sample jars; 3. Cleaning mixing tray for field blank sample; 4. Sand/sediment from rinse of sampling equipment for field blank sample; 5. Gathering field blank sample into jar; 6. Packing of coolers with sample jars for shipment to laboratory.

Selected Battelle Laboratory Analysis Activities

1.Sample receipt, measure temperature; 2 Measure temperature blank; 3. Assign Battelle ID; 4. Log in to LIMS; 5. Sample split for other lab (metals shown in the photo); 6. Sample aliquot removed for dry weight determination

Selected Battelle Laboratory Analysis Activities (cont.)

1. Sample weighed prior to extraction for pest/PCB/PAH; 2 Sample with excess moisture is centrifuged; 3. Sample after centrifuge: overlying water is more visible; 4. Sample extract poured into the Erlenmeyer flask; 5. Sodium sulfate added to dry the extract; 6. Sample extract transferred to KD for concentration.

Selected Battelle Laboratory Analysis Activities (cont.)

1. KD concentration step; 2. Concentrated extract; 3. Extract loaded onto the alumina column; 4. Copper treatment after alumina column; 5. Copper treated extracts concentrated by gentle N2 blow down; 6. concentrated extract adjusted to 1.0 ml prior to HPLC/GPC purification;

Selected Battelle Laboratory Analysis Activities (cont.)

1. Extract transferred to the HPLC/GPC vial; 2. Verifying HPLC/GPC collection window; 3. Post-HPLC/GPC extracts concentrated by N2, internal standard spiking of final purified extracts witnessed; 4 Extracts split for GC/MS and GC/ECD analysis. 5. Solvent exchanged to hexane for GC/ECD analysis; 6. Split extracts ready for GC/MS and GC/ECD analysis.

Selected Battelle Laboratory Analysis Activities (cont.)

1, 2 & 3. GC/MS and GC/ECD maintenance prior to analysis;. 4. Hydrogen generator used for GC/ECD carrier gas; 5. Instrument maintenance, degradation check, and sequence is recorded into the instrument log book; 6. GC/MS and GC/ECD data reduction and analysis.

Appendix B. Summary Data from Districtwide Assessment Sampling

Table B-1: Selected Organic Compound Concentrations for Districtwide Assessment Sites (µg/kg, dry weight)

Site	Total PAH	Low PAH	High PAH	Total Phthalates	Total PCB Estimated	Total DDTs	Total Chlordane	Total BHCs	Total Endosulfans	Total Other Chlorinated
02235000	407	50.4	357	256	24.5	1.61	1.17	ND	0.19	1.89
02236000	177	24.2	152	46.0	12.1	1.20	0.15	ND	ND	4.01
02238000	16.8	8.97	7.84	21.1	7.58	1.06	0.19	ND	ND	1.60
02240800	3.55	1.94	1.60	7.01	0.22	ND	ND	ND	ND	0.79
02248000	13.2	3.52	9.67	9.27	0.41	0.03	0.05	ND	0.02	0.97
19010001	1,450	237	1,210	42.9	22.1	2.76	0.43	0.08	ND	1.81
19010006	22.2	8.67	13.5	196	4.94	0.05	ND	ND	ND	2.75
19020002	2,360	2,170	182	291	33.9	0.32	4.44	ND	ND	5.90
20010002	40.7	7.20	33.5	423	7.99	ND	ND	ND	ND	1.32
20010003	685	217	468	26.3	12.7	3.38	0.57	ND	ND	1.80
20010137	1,070	65.1	1,000	64.8	8.18	0.41	2.02	ND	ND	1.23
20020001	115	31.9	82.7	28.2	5.17	2.31	1.11	0.24	ND	3.19
20020012	40.7	4.29	36.4	13.7	2.26	0.16	ND	ND	ND	3.29
20020368	653	153	499	1,530	198	55.2	0.35	2.85	ND	36.5
20020371	297	115	182	1,320	116	15.7	ND	ND	ND	16.7
20020377	116	61.8	54.2	1,400	174	5.26	ND	ND	ND	32.6
20020381	462	113	349	156	150	12.9	1.06	ND	ND	28.0
20020404	4.5	0.71	3.79	8.38	0.20	ND	ND	ND	ND	0.87
20030373	56.7	7.85	48.9	72.2	6.62	0.10	0.16	ND	ND	1.55
20030400	35.4	6.10	29.3	13.0	2.13	1.00	0.33	ND	ND	2.52
20030411	876	81.6	794	197	36.2	8.94	0.82	2.75	ND	15.0
20030412	1,940	311	1,620	84.5	5.61	1.94	0.17	ND	0.43	2.29
27010024	329	29.8	299	57.7	14.7	1.04	0.68	0.35	ND	10.7
27010037	316	21.9	294	63.6	4.45	1.25	0.19	ND	ND	1.48
27010579	30.0	3.06	27.0	13.0	6.94	1.11	0.07	0.28	0.06	1.19
27010875	23.1	6.12	17.0	27.1	5.12	0.13	ND	0.26	ND	2.45
ARL109	4,590	389	4,200	108	105	10.0	4.54	0.66	1.90	1.39
ASH	561	60.6	500	83.6	33.8	28.1	0.78	ND	ND	28.4
BEAR	132	10.9	121	11.6	6.01	1.79	1.05	ND	ND	1.57
BLSPR	3.61	2.83	0.78	60.5	4.60	ND	ND	ND	ND	ND
BROWARD	11.3	2.78	8.50	5.66	0.35	0.30	0.06	ND	0.06	2.15
BUL	11.8	1.24	10.5	10.6	1.21	ND	ND	ND	ND	1.04
BWC44	640	59.4	581	284	42.3	5.59	1.35	0.19	ND	4.42
BWCCPB	535	103	432	232	34.0	11.3	0.11	ND	ND	ND
CALF-T_1	119	9.06	110		ND	0.59	0.85	ND	ND	
CARL-T_1	957	84.5	873		ND	68.0	2.20	ND	ND	
CARL-T_2	1,280	78.9	1,200		ND	419	3.13	ND	ND	
CC03	276	17.6	258	18.6	2.31	0.60	2.32	ND	ND	0.21
CDRC02	913	68.9	844	124	20.9	3.41	0.30	0.24	ND	0.25
CED01D	18,100	864	17,200	1,970	1,470	14.5	23.8	0.11	10.5	10.8
CED062	15,500	1,190	14,300	1,130	789	45.7	28.5	2.09	2.68	3.38
CHARLES	587	78.3	509	341	15.8	24.9	0.94	ND	0.81	0.89
CHERRY	46.9	6.22	40.7	7.02	1.29	5.46	0.37	0.06	0.08	1.16
CLA	544	134	410		ND	143	1.18	ND	ND	
CLD	1,920	119	1,800	124	62.0	114	4.27	ND	2.30	25.4
CLH	801	39.8	762		ND	7.61	ND	ND	ND	
CLW	4.75	1.90	2.85	17.0	1.95	ND	ND	ND	ND	1.55
CRES-T_1	619	38.6	580		ND	1.36	ND	ND	ND	
CRES-T_2	6,100	347	5,750		21.8	23.9	ND	ND	ND	
DALHOUS	18.2	5.12	13.1	7.93	0.54	0.49	0.05	0.04	0.07	1.56
DIAS	198	17.8	181	57.0	6.14	1.56	0.17	0.09	0.67	10.7

Site	Total PAH	Low PAH	High PAH	Total Phthalates	Total PCB Estimated	Total DDTs	Total Chlordane	Total BHCs	Total Endosulfans	Total Other Chlorinated
DMR	61.9	16.3	45.6	403	0.32	ND	ND	ND	ND	0.94
DOR	418	111	307	1,120	139	119	1.49	ND	1.66	34.8
DORR	8.96	2.08	6.88	5.48	0.50	0.50	0.04	0.01	0.03	1.61
DUNN02	614	56.0	558	91.6	ND	ND	ND	0.62	7.63	0.16
GBY01	3,230	389	2,840	80.8	175	13.2	2.42	0.95	1.36	3.12
GBY02	1,010	116	894	37.8	44.8	3.62	1.68	0.23	ND	1.20
GCRB11	488	31.9	456	226	53.0	1.40	0.71	0.74	ND	1.36
GEN	317	34.3	283	135	18.9	2.64	0.90	ND	ND	3.78
HAHA-T_1	26.0	2.96	23.0		ND	0.54	0.03	ND	ND	
HAHA-T_2	17.9	2.09	15.8		ND	0.32	0.02	ND	ND	
HALFMOON	515	129	386	39.7	18.9	26.4	1.12	ND	0.78	23.8
HAR	309	116	192	1,840	170	39.6	0.44	ND	1.59	31.2
HAT26	2.81	1.36	1.45	9.90	ND	ND	ND	ND	ND	ND
HAW	219	12.3	207	35.1	12.9	18.4	0.26	0.55	0.81	5.20
HELENA	581	153	428	273	3.80	3.68	ND	ND	ND	22.3
HOG30	206	20.8	185	53.5	7.44	0.38	0.29	ND	ND	1.28
HOWELL	751	26.5	724	212	84.4	1.07	0.71	0.07	0.49	2.72
INDUSPL	363	51.0	312	77.8	19.4	3.34	1.80	0.83	ND	8.59
JOHNSON	84.1	26.0	58.1	9.07	5.21	2.41	0.47	ND	0.18	3.11
JOHNS-T_1	184	19.7	165		ND	17.2	0.48	ND	ND	
JOHNS-T_2	24.4	4.44	19.9		ND	1.68	0.06	ND	ND	
JUL021	1,550	185	1,360	68.7	88.7	8.28	3.11	1.05	0.81	4.19
KER	203	99.3	104	235	50.1	6.66	ND	2.04	ND	21.9
KERR	12.3	3.34	8.96	5.35	0.05	0.18	ND	0.01	0.02	0.87
LAG	332	17.4	314	503	10.7	2.92	0.71	ND	0.29	6.09
LEO	1,080	45.1	1,040	71.9	67.0	13.5	8.17	8.88	1.35	24.5
LFW01	10,100	724	9,380	876	68.1	44.1	75.0	1.46	5.16	4.42
LHAT26	5.72	1.46	4.26	12.5	ND	ND	ND	ND	ND	0.91
LHATSB	10.9	3.60	7.3	40.8	ND	ND	ND	ND	ND	2.55
LHNBPL	57.8	6.38	51.5	21.0	1.22	0.13	0.17	ND	ND	5.54
LH-T_1	5.09	2.20	2.89		ND	0.26	0.13	ND	ND	
LKWOOD	289	89.4	200	1,320	89.0	8.90	ND	ND	ND	18.3
LMAC	1,800	249	1,550	101	87.4	26.7	3.82	4.32	ND	17.4
LOCCR	5.38	1.92	3.47	16.1	ND	ND	ND	ND	0.17	ND
LOL	806	225	581	526	91.7	25.7	ND	1.27	ND	105
LORANCRK	2.29	1.97	0.32	37.4	ND	ND	ND	ND	ND	ND
LOUISA	335	26.4	309	111	0.68	1.08	0.18	0.08	0.18	1.67
LSJ01	13,800	3,190	10,700	833	385	30.3	4.13	1.08	8.31	7.76
LSJ05	6,830	1,060	5,770	314	133	12.4	3.08	1.47	0.90	48.0
LSJ070	74.6	10.1	64.5	10.5	0.62	0.10	ND	ND	ND	ND
LSJ08	2,880	379	2,510	166	213	10.2	1.56	0.22	2.77	45.9
LSJ087	359	41.5	318	251	18.1	1.54	0.31	ND	0.09	3.26
LSJ099	446	26.5	419	65.3	13.9	0.42	0.32	ND	ND	2.33
LSJ11	2,270	314	1,950	110	175	10.4	1.51	0.79	1.50	55.5
LSJ14	2,070	225	1,840	274	102	9.93	2.27	2.45	2.32	34.4
LSJ17	1,010	103	910	180	35.2	5.00	0.87	2.07	0.65	22.0
LSJ21	438	52.4	386	167	17.0	1.77	1.03	0.97	0.71	24.4
LSJ28	1,240	103	1,140	64.2	80.6	13.9	ND	1.14	1.20	7.94
LSJ32	2,120	217	1,900	89.6	136	11.9	1.22	1.57	2.14	9.42
LSJ35	1,790	222	1,570	708	33.8	6.50	2.32	1.65	1.33	6.15
LSJ40	2,340	177	2,160	152	5.06	4.57	ND	0.95	ND	7.32
LSJ918	458	328	130	36.8	15.2	1.50	ND	ND	ND	4.41
LSJRC06	7,340	2,650	4,680	638	396	18.3	2.59	5.77	13.3	81.7
LSJRC10	3,090	1,010	2,080	504	167	18.9	3.21	3.66	13.4	47.4
LSJRC17	586	89.6	496	56.0	52.1	4.79	0.65	0.11	4.07	35.8

Site	Total PAH	Low PAH	High PAH	Total Phthalates	Total PCB Estimated	Total DDTs	Total Chlordane	Total BHCs	Total Endosulfans	Total Other Chlorinated
LSJRC19	1,430	184	1,250	160	75.9	4.18	1.74	0.51	3.89	104
LYC	211	91.5	120	408	52.0	10.5	ND	ND	ND	40.8
MAITL	1,060	55.1	1,010	25.3	9.35	9.09	6.89	ND	ND	8.17
MAT	868	29.4	838	10.6	3.31	1.38	1.41	ND	0.23	1.42
MBU	8,340	857	7,490	1,570	46.5	8.68	0.33	0.49	2.13	4.38
MCC01	530	79.2	451	105	5.21	3.40	5.05	0.58	ND	2.33
MILLD	25.2	6.10	19.1	8.20	0.21	0.31	0.06	ND	0.03	1.43
MINN-T_1	47.4	4.55	42.9		ND	1.18	ND	ND	ND	
MINN-T_2	238	19.0	219		ND	5.01	0.19	ND	ND	
MON104	8,280	1,400	6,880	659	940	46.9	41.2	1.47	11.8	4.35
MPS	2.68	1.82	0.86	13.6	1.23	ND	ND	ND	ND	2.17
MR312	63.3	10.3	53.1	83.4	8.95	0.03	ND	ND	ND	1.52
MTC	1,360	726	632	108	23.7	31.3	0.58	0.26	ND	3.81
MUD-T_1	191	75.6	115		ND	ND	ND	ND	ND	
MUD-T_2	154	44.6	109		ND	1.17	ND	ND	ND	
NAS01	1,700	221	1,480	129	101	6.66	2.65	0.67	ND	2.50
NBLACK	151	19.7	132	54.1	3.22	ND	0.64	0.23	0.96	3.84
NEWLKA	10.2	2.44	7.77	25.8	0.38	ND	ND	ND	ND	3.15
NEWLKB	15.9	2.34	13.5	17.8	0.63	ND	ND	ND	ND	4.13
NEWLKC	515	71.2	443	585	23.5	4.24	ND	0.50	9.03	12.5
NEWLKD	821	83.7	737	195	7.12	5.03	ND	ND	ND	28.5
NEWLKE	310	51.2	259	239	2.77	1.20	ND	ND	ND	34.4
NEWLKF	523	69.7	454	265	2.20	1.45	ND	ND	ND	36.1
NLA	498	114	384		ND	392	2.30	ND	ND	
NORRIS	888	46.2	842	27.1	25.6	104	1.91	ND	0.41	3.40
NRI	55.3	10.1	45.2	14.1	1.83	ND	ND	ND	ND	2.24
OLA	31.9	4.21	27.6	7.96	2.32	2.09	0.17	0.01	0.10	2.09
OLA-T_1	88.2	9.81	78.4		ND	8.09	0.21	ND	ND	
OLA-T_2	232	22.3	210		ND	11.9	0.82	ND	ND	
OLK	312	75.8	237	659	109	7.28	ND	ND	ND	128
OR908	8,120	506	7,610	1,130	190	29.6	6.69	ND	ND	17.8
ORD	6,180	5,500	673	184	47.6	4.77	ND	1.50	ND	6.33
ORT051	4,210	619	3,590	857	93.6	116	1.20	0.26	2.30	0.48
ORT361	5,680	405	5,280	552	247	28.3	14.5	1.97	5.41	3.17
OW-4	574	93.4	481		ND	9.63	0.72	ND	ND	
OW-6	1,080	81.8	995		ND	18.6	2.05	ND	ND	
PCR-PL	104	37.6	66.3	142	24.4	2.37	6.63	ND	0.25	0.71
PEL	851	131	720	18.9	40.2	45.2	0.43	0.15	0.14	1.84
POSSUM-T_1	1,960	277	1,680		ND	0.76	2.41	ND	ND	
RC051	806	216	590	16.1	55.5	1.60	1.01	1.96	ND	3.41
RIB105	3,710	451	3,260	128	272	21.0	9.91	ND	ND	18.1
RICE02	8,370	3,800	4,580	154	2,890	8.56	ND	9.81	ND	150
SELLERS	15.6	4.03	11.5	6.27	0.34	0.13	0.01	ND	0.01	2.70
SHEEL	7.89	3.76	4.13	54.0	5.89	ND	ND	ND	ND	1.33
SILRV	256	16.0	240	79.2	7.42	1.80	ND	ND	ND	8.20
SIM	2,550	735	1,810	28.9	4.08	0.73	0.2	ND	ND	2.75
SJRJESUP	11.3	2.35	8.92	16.9	ND	ND	ND	ND	ND	1.96
SJRPLTKA	1,070	103	969	163	9.81	1.30	0.27	0.42	0.25	3.90
SLA	510	120	390		ND	119	1.03	ND	ND	
SOUTH	131	55.4	75.2	26.0	3.35	0.56	ND	ND	0.28	1.44
SRS	56.1	11.3	44.8	303	8.87	0.11	ND	ND	ND	2.46
SUNLAND	5.13	2.28	2.84	11.0	ND	ND	ND	ND	ND	ND
SWBPP1	5,050	439	4,610	300	71.0	8.73	9.34	1.08	ND	6.11
TOL	3.59	1.96	1.63	6.08	0.31	0.16	ND	ND	ND	1.20
TRT01	4,950	347	4,610	135	126	9.58	5.37	1.18	ND	1.45

Site	Total PAH	Low PAH	High PAH	Total Phthalates	Total PCB Estimated	Total DDTs	Total Chlordane	Total BHCs	Total Endosulfans	Total Other Chlorinated
TUBPP1	623	67.2	556	318	17.0	0.88	0.39	0.09	ND	2.54
USJ055	282	22.8	259	653	93.4	6.89	1.48	0.74	ND	22.2
USJ918	619	159	459	37.7	14.8	4.21	0.25	0.27	ND	2.82
WASH	292	43.4	249	32.8	16.2	5.68	0.68	ND	0.51	12.0
WEIR-T_1	6.32	2.28	4.05		ND	0.04	ND	ND	ND	
WEIR-T_2	24.7	4.29	20.5		ND	0.20	ND	ND	ND	
WEK021	2,450	194	2,260	289	16.1	9.35	0.32	1.29	ND	1.30
WIN	34.6	7.85	26.7	77.3	8.90	0.96	0.72	ND	ND	2.29
WINN	34.8	6.04	28.8	7.08	1.65	0.78	0.22	ND	0.05	2.89
WIO	16.4	3.84	12.5	52.4	5.15	0.34	ND	ND	0.11	ND

Table B-2: Selected Organic Compound Concentrations for Districtwide Assessment Sites – TOC Normalized (µg/g TOC)

Site	Total PAH	Low PAH	High PAH	Total Phthalates	Total PCB Estimated	Total DDTs	Total Chlordane	Total BHCs	Total Endosulfans	Total Other Chlorinated
02235000	8.83	1.09	7.74	5.55	0.530	0.035	0.025	ND	0.004	0.041
02236000	7.52	1.03	6.49	1.96	0.520	0.051	0.007	ND	ND	0.170
02238000	4.33	2.31	2.02	5.44	1.95	0.270	0.048	ND	ND	0.410
02240800	8.44	4.63	3.82	16.7	0.520	ND	ND	ND	ND	1.88
02248000	15.9	4.24	11.6	11.2	0.490	0.038	0.064	ND	0.021	1.16
19010001	59.8	9.77	50.0	1.76	0.910	0.110	0.018	0.003	ND	0.074
19010006	5.51	2.16	3.35	48.9	1.23	0.012	ND	ND	ND	0.680
19020002	33.6	31.0	2.60	4.15	0.480	0.005	0.063	ND	ND	0.084
20010002	15.0	2.66	12.4	156	2.95	ND	ND	ND	ND	0.490
20010003	33.7	10.7	23.0	1.29	0.620	0.170	0.028	ND	ND	0.089
20010137	1020	62.0	956	61.7	7.79	0.390	1.92	ND	ND	1.17
20020001	6.90	1.92	4.98	1.70	0.310	0.140	0.067	0.015	ND	0.190
20020012	7.19	0.76	6.43	2.43	0.400	0.028	ND	ND	ND	0.580
20020368	1.98	0.46	1.51	4.62	0.600	0.170	0.001	0.009	ND	0.110
20020371	0.96	0.37	0.59	4.29	0.370	0.051	ND	ND	ND	0.054
20020377	0.51	0.27	0.24	6.13	0.760	0.023	ND	ND	ND	0.140
20020381	1.20	0.29	0.91	0.41	0.390	0.034	0.003	ND	ND	0.073
20020404	8.33	1.31	7.01	15.5	0.370	ND	ND	ND	ND	1.61
20030373	6.57	0.91	5.66	8.36	0.770	0.012	0.018	ND	ND	0.180
20030400	1.22	0.21	1.01	0.45	0.073	0.034	0.011	ND	ND	0.086
20030411	3.71	0.35	3.37	0.83	0.150	0.038	0.004	0.012	ND	0.063
20030412	273	43.9	230	11.9	0.790	0.270	0.025	ND	0.061	0.320
27010024	6.38	0.58	5.80	1.12	0.280	0.020	0.013	0.007	ND	0.210
27010037	127	8.79	118	25.5	1.79	0.500	0.075	ND	ND	0.590
27010579	4.01	0.41	3.60	1.74	0.930	0.150	0.009	0.038	0.008	0.160
27010875	2.76	0.73	2.03	3.24	0.610	0.015	ND	0.031	ND	0.290
ARL109	69.7	5.91	63.7	1.64	1.59	0.150	0.069	0.010	0.029	0.021
ASH	2.49	0.27	2.22	0.37	0.150	0.120	0.004	ND	ND	0.130
BEAR	21.3	1.76	19.6	1.88	0.970	0.290	0.170	ND	ND	0.250
BLSPR	2.17	1.70	0.47	36.4	2.77	ND	ND	ND	ND	ND
BROWARD	3.38	0.83	2.54	1.69	0.100	0.090	0.018	ND	0.017	0.640
BUL	1.72	0.18	1.54	1.55	0.180	ND	ND	ND	ND	0.150
BWC44	21.9	2.03	19.9	9.71	1.45	0.190	0.046	0.006	ND	0.150
BWCCPB	18.1	3.50	14.6	7.86	1.15	0.380	0.004	ND	ND	ND
CALF-T_1	10.8	0.82	10.0		ND	0.054	0.077	ND	ND	
CARL-T_1	3.68	0.32	3.36		ND	0.260	0.009	ND	ND	
CARL-T_2	5.12	0.32	4.81		ND	1.68	0.013	ND	ND	
CC03	164	10.5	154	11.1	1.38	0.350	1.38	ND	ND	0.130
CDRC02	4.08	0.31	3.77	0.55	0.093	0.015	0.001	0.001	ND	0.001
CED01D	264	12.6	252	28.7	21.5	0.210	0.350	0.002	0.150	0.160
CED062	111	8.53	102	8.05	5.64	0.330	0.200	0.015	0.019	0.024
CHARLES	1.72	0.23	1.49	1.00	0.046	0.073	0.003	ND	0.002	0.003
CHERRY	2.53	0.34	2.20	0.38	0.070	0.300	0.020	0.003	0.005	0.063
CLA	1.70	0.42	1.28		ND	0.450	0.004	ND	ND	
CLD	8.63	0.54	8.10	0.56	0.280	0.510	0.019	ND	0.010	0.110
CLH	6.16	0.31	5.86		ND	0.059	ND	ND	ND	
CLW	1.85	0.74	1.11	6.65	0.760	ND	ND	ND	ND	0.600
CRES-T_1	5.16	0.32	4.84		ND	0.011	ND	ND	ND	
CRES-T_2	32.1	1.83	30.3		0.110	0.130	ND	ND	ND	
DALHOUS	4.03	1.13	2.90	1.75	0.120	0.110	0.010	0.008	0.016	0.340
DIAS	4.76	0.43	4.33	1.37	0.150	0.037	0.004	0.002	0.016	0.260

Site	Total PAH	Low PAH	High PAH	Total Phthalates	Total PCB Estimated	Total DDTs	Total Chlordane	Total BHCs	Total Endosulfans	Total Other Chlorinated
DMR	59.5	15.6	43.9	387	0.300	ND	ND	ND	ND	0.900
DOR	1.51	0.40	1.11	4.05	0.500	0.430	0.005	ND	0.006	0.130
DORR	3.33	0.77	2.56	2.04	0.180	0.190	0.013	0.004	0.010	0.600
DUNN02	2.47	0.23	2.24	0.37	ND	ND	ND	0.003	0.031	0.001
GBY01	29.6	3.57	26.1	0.74	1.60	0.120	0.022	0.009	0.013	0.029
GBY02	22.8	2.62	20.2	0.85	1.01	0.082	0.038	0.005	ND	0.027
GCRB11	7.81	0.51	7.30	3.63	0.850	0.022	0.011	0.012	ND	0.022
GEN	5.95	0.64	5.31	2.54	0.360	0.050	0.017	ND	ND	0.071
HAHA-T_1	5.52	0.63	4.89		ND	0.110	0.006	ND	ND	
HAHA-T_2	4.46	0.52	3.94		ND	0.080	0.004	ND	ND	
HALFMOON	2.00	0.50	1.50	0.15	0.074	0.100	0.004	ND	0.003	0.093
HAR	1.05	0.39	0.65	6.27	0.580	0.130	0.002	ND	0.005	0.110
HAT26	6.39	3.09	3.29	22.5	ND	ND	ND	ND	ND	ND
HAW	3.88	0.22	3.66	0.62	0.230	0.330	0.005	0.010	0.014	0.092
HELENA	1.71	0.45	1.26	0.80	0.011	0.011	ND	ND	ND	0.066
HOG30	84.0	8.50	75.5	21.8	3.04	0.150	0.120	ND	ND	0.520
HOWELL	69.5	2.45	67.1	19.7	7.82	0.099	0.066	0.006	0.046	0.250
INDUSPL	1.49	0.21	1.28	0.32	0.080	0.014	0.007	0.003	ND	0.035
JOHNSON	3.72	1.15	2.57	0.40	0.230	0.110	0.021	ND	0.008	0.140
JOHNS-T_1	2.53	0.27	2.26		ND	0.240	0.007	ND	ND	
JOHNS-T_2	2.44	0.44	1.99		ND	0.170	0.006	ND	ND	
JUL021	11.1	1.32	9.74	0.49	0.630	0.059	0.022	0.008	0.006	0.030
KER	0.86	0.42	0.44	1.00	0.210	0.028	ND	0.009	ND	0.093
KERR	4.21	1.14	3.07	1.83	0.016	0.062	ND	0.005	0.006	0.300
LAG	2.89	0.15	2.73	4.37	0.093	0.025	0.006	ND	0.003	0.053
LEO	3.15	0.13	3.02	0.21	0.190	0.039	0.024	0.026	0.004	0.071
LFW01	70.8	5.07	65.7	6.13	0.480	0.310	0.530	0.010	0.036	0.031
LHAT26	2.51	0.64	1.87	5.48	ND	ND	ND	ND	ND	0.400
LHATSB	4.31	1.42	2.89	16.1	ND	ND	ND	ND	ND	1.01
LHNBPL	32.5	3.58	28.9	11.8	0.690	0.072	0.093	ND	ND	3.11
LH-T_1	1.24	0.54	0.70		ND	0.063	0.031	ND	ND	
LKWOOD	1.33	0.41	0.92	6.08	0.410	0.041	ND	ND	ND	0.085
LMAC	12.6	1.74	10.8	0.70	0.610	0.190	0.027	0.030	ND	0.120
LOCCR	2.61	0.93	1.68	7.84	ND	ND	ND	ND	0.084	ND
LOL	2.36	0.66	1.70	1.54	0.270	0.075	ND	0.004	ND	0.310
LORANCRK	8.17	7.04	1.13	134	ND	ND	ND	ND	ND	ND
LOUISA	119	9.35	109	39.1	0.240	0.380	0.063	0.030	0.062	0.590
LSJ01	190	43.7	146	11.4	5.27	0.420	0.057	0.015	0.110	0.110
LSJ05	44.4	6.91	37.4	2.04	0.860	0.081	0.020	0.010	0.006	0.310
LSJ070	84.8	11.5	73.3	12.0	0.700	0.110	ND	ND	ND	ND
LSJ08	18.4	2.42	16.0	1.06	1.36	0.065	0.010	0.001	0.018	0.290
LSJ087	14.2	1.64	12.6	9.91	0.720	0.061	0.012	ND	0.004	0.130
LSJ099	47.4	2.82	44.6	6.94	1.48	0.044	0.034	ND	ND	0.250
LSJ11	13.1	1.81	11.2	0.63	1.01	0.060	0.009	0.005	0.009	0.320
LSJ14	11.4	1.25	10.2	1.52	0.570	0.055	0.013	0.014	0.013	0.190
LSJ17	9.44	0.96	8.48	1.68	0.330	0.047	0.008	0.019	0.006	0.200
LSJ21	3.95	0.47	3.47	1.51	0.150	0.016	0.009	0.009	0.006	0.220
LSJ28	9.96	0.83	9.14	0.52	0.650	0.110	ND	0.009	0.010	0.064
LSJ32	14.3	1.46	12.8	0.60	0.910	0.080	0.008	0.011	0.014	0.063
LSJ35	7.13	0.88	6.25	2.81	0.130	0.026	0.009	0.007	0.005	0.024
LSJ40	10.8	0.82	9.98	0.70	0.023	0.021	ND	0.004	ND	0.034
LSJ918	24.5	17.5	6.94	1.97	0.810	0.080	ND	ND	ND	0.240
LSJRC06	18.5	6.70	11.8	1.61	1.00	0.046	0.007	0.015	0.034	0.210
LSJRC10	9.27	3.02	6.24	1.51	0.500	0.057	0.010	0.011	0.040	0.140
LSJRC17	8.11	1.24	6.87	0.78	0.720	0.066	0.009	0.002	0.056	0.500

Site	Total PAH	Low PAH	High PAH	Total Phthalates	Total PCB Estimated	Total DDTs	Total Chlordane	Total BHCs	Total Endosulfans	Total Other Chlorinated
LSJRC19	5.87	0.75	5.11	0.65	0.310	0.017	0.007	0.002	0.016	0.420
LYC	0.98	0.42	0.55	1.89	0.240	0.049	ND	ND	ND	0.190
MAITL	60.6	3.15	57.5	1.45	0.530	0.520	0.390	ND	ND	0.470
MAT	405	13.7	392	4.96	1.55	0.640	0.660	ND	0.110	0.660
MBU	287	29.5	257	54.0	1.60	0.300	0.011	0.017	0.073	0.150
MCC01	5.15	0.77	4.38	1.02	0.051	0.033	0.049	0.006	ND	0.023
MILLD	0.57	0.14	0.43	0.19	0.005	0.007	0.001	ND	0.001	0.032
MINN-T_1	6.88	0.66	6.22		ND	0.170	ND	ND	ND	
MINN-T_2	17.0	1.36	15.7		ND	0.360	0.014	ND	ND	
MON104	71.7	12.1	59.6	5.71	8.14	0.410	0.360	0.013	0.100	0.038
MPS	11.7	7.92	3.75	59.2	5.35	ND	ND	ND	ND	9.430
MR312	8.36	1.35	7.01	11.0	1.18	0.004	ND	ND	ND	0.200
MTC	16.6	8.87	7.72	1.32	0.290	0.380	0.007	0.003	ND	0.047
MUD-T_1	0.52	0.20	0.31		ND	ND	ND	ND	ND	
MUD-T_2	0.47	0.14	0.34		ND	0.004	ND	ND	ND	
NAS01	25.9	3.37	22.6	1.97	1.54	0.100	0.040	0.010	ND	0.038
NBLACK	11.1	1.44	9.61	3.95	0.240	ND	0.047	0.017	0.070	0.280
NEWLKA	3.23	0.77	2.46	8.16	0.120	ND	ND	ND	ND	1.00
NEWLKB	4.68	0.69	3.99	5.25	0.190	ND	ND	ND	ND	1.22
NEWLKC	1.99	0.27	1.71	2.26	0.091	0.016	ND	0.002	0.035	0.048
NEWLKD	2.25	0.23	2.02	0.53	0.020	0.014	ND	ND	ND	0.078
NEWLKE	1.05	0.17	0.87	0.81	0.009	0.004	ND	ND	ND	0.120
NEWLKF	2.05	0.27	1.78	1.04	0.009	0.006	ND	ND	ND	0.140
NLA	1.61	0.37	1.24		ND	1.27	0.007	ND	ND	
NORRIS	3.86	0.20	3.66	0.12	0.110	0.450	0.008	ND	0.002	0.015
NRI	13.6	2.48	11.1	3.46	0.450	ND	ND	ND	ND	0.550
OLA	4.79	0.63	4.16	1.20	0.350	0.310	0.026	0.002	0.014	0.310
OLA-T_1	3.27	0.36	2.90		ND	0.300	0.008	ND	ND	
OLA-T_2	4.56	0.44	4.12		ND	0.230	0.016	ND	ND	
OLK	0.69	0.17	0.52	1.46	0.240	0.016	ND	ND	ND	0.280
OR908	40.4	2.52	37.9	5.60	0.950	0.150	0.033	ND	ND	0.088
ORD	70.7	63.0	7.70	2.11	0.540	0.055	ND	0.017	ND	0.073
ORT051	42.3	6.22	36.0	8.60	0.940	1.17	0.012	0.003	0.023	0.005
ORT361	36.4	2.59	33.8	3.54	1.58	0.180	0.093	0.013	0.035	0.020
OW-4	2.50	0.41	2.09		ND	0.042	0.003	ND	ND	
OW-6	5.67	0.43	5.24		ND	0.098	0.011	ND	ND	
PCR-PL	4.46	1.61	2.85	6.10	1.05	0.100	0.280	ND	0.011	0.030
PEL	40.3	6.21	34.1	0.90	1.91	2.14	0.020	0.007	0.007	0.087
POSSUM-T_1	362	51.3	311		ND	0.140	0.450	ND	ND	
RC051	11.3	3.04	8.28	0.23	0.780	0.022	0.014	0.028	ND	0.048
RIB105	47.6	5.78	41.8	1.64	3.49	0.270	0.130	ND	ND	0.230
RICE02	27.9	12.7	15.3	0.51	9.65	0.029	ND	0.033	ND	0.500
SELLERS	6.65	1.72	4.93	2.68	0.140	0.054	0.004	ND	0.006	1.16
SHEEL	7.44	3.55	3.89	51.0	5.55	ND	ND	ND	ND	1.26
SILRV	3.69	0.23	3.46	1.14	0.110	0.026	ND	ND	ND	0.120
SIM	110	31.8	78.5	1.25	0.180	0.031	0.009	ND	ND	0.120
SJRJESUP	3.98	0.83	3.15	5.98	ND	ND	ND	ND	ND	0.690
SJRPLTKA	33.5	3.20	30.3	5.08	0.310	0.041	0.008	0.013	0.008	0.120
SLA	1.46	0.34	1.11		ND	0.340	0.003	ND	ND	
SOUTH	17.8	7.55	10.2	3.54	0.460	0.076	ND	ND	0.038	0.200
SRS	4.22	0.85	3.37	22.8	0.670	0.008	ND	ND	ND	0.190
SUNLAND	9.49	4.23	5.27	20.5	ND	ND	ND	ND	ND	ND
SWBPP1	153	13.3	140	9.13	2.16	0.270	0.280	0.033	ND	0.190
TOL	3.12	1.71	1.41	5.29	0.270	0.140	ND	ND	ND	1.04

Site	Total PAH	Low PAH	High PAH	Total Phthalates	Total PCB Estimated	Total DDTs	Total Chlordane	Total BHCs	Total Endosulfans	Total Other Chlorinated
TRT01	63.3	4.44	58.8	1.72	1.61	0.120	0.069	0.015	ND	0.018
TUBPP1	84.4	9.11	75.3	43.0	2.30	0.120	0.052	0.013	ND	0.340
USJ055	5.38	0.44	4.95	12.5	1.79	0.130	0.028	0.014	ND	0.430
USJ918	15.6	4.01	11.6	0.95	0.370	0.110	0.006	0.007	ND	0.071
WASH	1.09	0.16	0.93	0.12	0.060	0.021	0.003	ND	0.002	0.045
WEIR-T_1	0.94	0.34	0.60		ND	0.006	ND	ND	ND	
WEIR-T_2	2.78	0.48	2.30		ND	0.022	ND	ND	ND	
WEK021	11.2	0.88	10.3	1.32	0.073	0.043	0.001	0.006	ND	0.006
WIN	2.01	0.46	1.55	4.49	0.520	0.056	0.042	ND	ND	0.130
WINN	6.63	1.15	5.48	1.35	0.310	0.150	0.042	ND	0.010	0.550
WIO	15.6	3.66	11.9	49.9	4.90	0.320	ND	ND	0.110	ND

Table B-3: Metals Concentrations for Districtwide Assessment Sites (mg/kg, dry weight)

Site	Aluminum	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
02235000	5,000	2.52	0.370	13.8	5.33	6,020	14.2	4.18	46.6	0.091	4.00	3.33	0.015	0.630	21.4
02236000	8,040	0.990	0.100	13.3	3.63	4,300	7.99	5.36	101	0.036	2.13	0.63	0.023	0.710	19.5
02238000	568	0.130	0.087	8.53	2.84	2,380	3.14	1.83	121	0.016	0.45	ND	0.006	0.570	7.86
02240800	464	ND	ND	0.90	0.40	111	0.66	1.67	2.72	0.014	0.18	ND	0.009	0.083	0.90
02248000	1,020	0.090	ND	1.38	0.48	433	1.11	1.95	6.11	0.013	0.39	ND	0.012	0.067	3.69
19010001	12,700	1.94	0.130	17.2	4.44	8,250	61.5	8.23	131	0.039	3.26	0.28	0.033	1.85	361
19010006	3,120	0.420	ND	7.26	1.04	1,070	5.74	1.31	41.0	0.008	0.32	ND	0.010	0.830	3.53
19020002	38,700	8.00	0.180	49.3	6.33	21,500	21.6	37.7	343	0.067	11.1	0.56	0.037	1.21	63.7
20010002	764	ND	ND	2.62	0.96	718	1.31	1.91	20.6	0.006	0.50	0.27	0.016	0.220	2.52
20010003	10,300	0.870	0.140	16.1	4.55	6,570	8.62	10.2	77.7	0.041	5.03	0.55	0.051	0.640	12.6
20010137	985	0.110	0.082	1.61	0.76	283	1.47	1.78	8.30	0.032	0.43	ND	ND	0.095	3.85
20020001	4,890	0.440	ND	7.10	2.02	1,710	4.83	2.12	40.0	0.025	1.88	ND	0.018	0.530	6.57
20020012	3,330	0.420	ND	15.3	2.30	2,380	4.59	2.41	90.3	0.023	1.31	0.94	0.028	0.540	7.69
20020368	18,000	14.7	0.400	20.8	15.6	11,000	44.4	9.76	53.5	0.330	8.24	2.84	0.270	1.81	50.2
20020371	16,700	5.41	0.370	22.3	20.5	12,500	43.6	11.1	58.2	0.260	7.09	2.91	0.054	1.48	36.2
20020377	10,900	6.37	0.120	12.6	3.59	6,460	7.96	4.89	46.2	0.140	4.26	2.53	ND	0.370	10.0
20020381	14,400	8.10	0.280	20.9	12.2	8,770	25.9	7.17	79.4	0.220	6.86	2.74	0.170	1.19	31.1
20020404	279	ND	ND	0.51	0.26	117	0.75	1.61	3.25	0.007	0.26	ND	0.006	0.170	1.18
20030373	1,030	0.270	ND	3.90	1.53	1,110	2.70	1.86	46.2	0.015	0.65	0.23	0.098	0.400	5.01
20030400	3,250	0.890	0.110	6.10	2.90	1,440	8.01	1.36	40.7	0.088	1.75	0.71	0.015	0.320	8.36
20030411	37,000	2.55	0.750	54.6	12.3	24,600	29.2	40.5	134	0.240	14.7	1.74	0.078	1.86	74.2
20030412	926	1.37	0.100	3.57	3.68	776	8.96	1.42	24.6	0.023	0.98	ND	0.011	0.810	21.5
27010024	41,500	5.00	0.190	67.3	10.7	29,400	24.1	50.0	197	0.100	13.4	0.84	0.080	1.72	68.6
27010037	7,370	0.630	0.095	9.83	3.13	4,290	8.81	6.20	107	0.03	2.02	0.27	0.064	0.490	16.5
27010579	1,960	0.089	ND	4.25	1.48	1,580	3.51	3.44	49.4	0.017	0.66	ND	0.030	0.260	6.80
27010875	10,600	0.660	0.110	11.1	2.71	4,100	7.77	7.86	96.4	0.021	2.54	0.19	0.034	0.440	9.66
ARL109	40,300	7.35	0.450	59.2	24.5	21,900	51.2	28.8	265	0.260	13.6	1.59	0.480	7.71	122
ASH	41,600	3.38	0.530	48.2	15.0	15,100	33.8	39.2	143	0.270	21.1	4.70	0.100	1.58	50.0
BEAR	2,380	1.20	ND	3.52	2.6	506	11.7	1.15	8.73	ND	0.91	0.26	0.052	0.340	10.5
BLSPR	2,420	0.430	0.350	7.99	1.34	1,950	2.74	1.72	77.0	0.028	1.63	0.20	ND	0.290	5.92
BROWARD	1,810	0.540	ND	4.18	2.02	599	14.0	1.50	27.6	0.010	0.58	0.30	0.100	0.340	10.7
BUL	3,430	0.180	ND	5.28	1.62	2,210	3.71	3.51	64.6	0.017	1.20	ND	0.019	0.390	6.64
BWC44	2,150	0.330	0.220	5.64	3.90	2,360	28.9	2.40	27.0	0.034	1.74	0.34	ND	0.860	84.5
BWCCPB	4,460	0.510	0.230	10.2	2.74	4,010	6.20	4.71	43.4	0.083	2.52	2.96	0.012	0.330	9.61
CALF-T_1	2,590	0.410	0.060	4.39	3.14	1,270	8.09	1.22	14.6	0.028	1.52	ND	0.060	0.310	16.4
CARL-T_1	11,400	9.20	0.270	13.0	17.5	6,140	14.8	5.81	52.3	0.110	5.85	2.18	0.130	0.700	46.7

Site	Aluminum	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
CARL-T_2	25,200	15.1	0.460	22.2	37.8	6,500	36.8	12.3	68.0	0.160	10.8	2.18	0.200	1.47	72.2
CC03	475	0.110	ND	0.84	0.48	310	1.02	2.13	5.50	0.013	0.40	0.27	0.013	0.130	3.03
CDRC02	19,900	5.72	0.300	26.4	11.4	22,100	28.7	13.1	74.4	0.300	9.27	3.00	0.240	2.16	64.0
CED01D	55,000	16.2	2.96	82.5	105	26,000	333	31.7	143	0.560	20.2	1.34	2.18	11.7	966
CED062	60,900	13.7	2.27	80.3	85.1	28,200	197	42.3	175	0.860	20.7	1.64	1.41	8.87	584
CHARLES	10,800	5.32	0.360	12.3	4.91	8620	17.5	1.30	138	0.280	9.29	2.69	0.052	0.380	24.0
CHERRY	2,040	0.630	0.069	2.94	3.63	1020	5.85	2.13	16.9	0.018	1.00	0.43	0.028	0.210	9.47
CLA	8,430	8.45	0.170	13.3	9.74	8,100	11.7	2.59	118	0.140	6.97	3.04	0.110	0.610	26.8
CLD	31,400	2.55	0.480	43.5	9.27	17,200	43.1	26.5	61.5	0.290	14.3	1.99	0.180	1.82	39.1
CLH	50,700	3.83	0.960	67.5	12.9	42,000	31.6	45.1	143	0.250	17.7	1.65	1.71	2.53	69.7
CLW	239	0.220	ND	1.72	0.49	587	1.31	1.83	8.52	0.011	0.32	ND	ND	0.086	1.74
CRES-T_1	12,900	2.85	0.150	25.9	4.91	16,800	9.63	8.66	167	0.098	6.19	1.64	0.230	0.690	23.6
CRES-T_2	34,500	6.61	0.480	47.4	17.9	33,700	33.6	31.6	142	0.340	14.9	1.47	0.490	3.88	109
DALHOUS	2,390	0.520	0.027	7.16	3.08	1,170	7.48	1.34	55.1	ND	0.68	0.35	0.180	0.590	12.2
DIAS	6,680	6.39	0.045	7.06	3.91	5,580	7.06	2.21	86.5	0.040	2.68	1.16	0.073	0.320	16.6
DMR	1,030	ND	0.085	2.62	0.66	1,240	1.37	2.71	18.9	ND	0.39	0.27	0.013	0.200	2.26
DOR	21,200	15.2	0.370	21.5	18.2	13,200	43.8	11.2	77.3	0.250	7.79	2.42	0.180	1.61	50.0
DORR	1,090	0.200	ND	2.55	1.10	343	4.05	0.85	14.0	ND	0.34	0.22	0.055	0.240	5.15
DUNN02	27,800	5.83	0.280	45.4	8.03	26,400	13.9	16.3	88.4	0.190	10.8	5.09	0.300	1.72	22.6
GBY01	50,900	8.19	0.730	83.7	30.5	31,300	57.8	37.7	237	0.320	18.4	2.36	0.620	3.99	148
GBY02	21,100	3.55	0.240	34.4	12.5	12,400	24.2	17.0	98.6	0.110	7.70	1.48	0.270	1.62	63.7
GCRB11	13,800	2.57	0.100	26.9	4.63	10,800	55.1	8.3	109	0.060	5.63	1.88	0.120	0.730	25.9
GEN	21,100	2.72	0.250	13.4	5.85	2,750	31.8	8.63	35.9	0.100	6.00	3.10	0.033	1.03	28.4
HAHA-T_1	824	0.340	0.029	2.92	1.47	548	3.09	ND	13.3	0.029	ND	ND	0.084	0.200	5.56
HAHA-T_2	701	0.270	0.026	1.35	1.35	847	2.84	ND	10.0	0.016	ND	ND	0.026	0.160	3.86
HALFMOON	11,500	5.86	0.450	17.9	11.3	9,590	48.3	5.51	173	0.300	7.58	4.16	0.140	1.14	39.9
HAR	19,900	7.07	0.250	20.4	13.0	9,500	37.6	8.13	53.1	0.200	7.13	28.1	0.020	1.05	30.6
HAT26	757	ND	0.032	1.98	0.39	175	0.79	1.83	7.06	0.014	0.14	ND	0.012	0.160	11.1
HAW	18,700	1.06	0.190	24.1	3.52	7,720	20.3	15.3	60.0	0.092	4.08	0.47	0.037	0.790	19.6
HELENA	1,420	2.19	2.26	11.6	9.73	1,780	8.26	ND	44.0	0.120	9.33	6.26	0.037	0.390	26.7
HOG30	985	0.120	0.075	3.09	1.16	338	35.5	1.87	11.0	0.035	0.70	ND	ND	2.49	3.34
HOWELL	2,770	0.860	0.035	4.88	5.88	681	9.12	1.59	18.1	0.014	1.07	0.30	0.190	0.430	24.0
INDUSPL	5,130	1.51	0.270	8.49	12.8	1,430	128	2.43	17.5	0.120	5.14	0.21	1.55	1.04	27.8
JOHNSON	6,020	0.890	0.065	6.71	4.20	1,320	14.2	3.43	31.4	0.021	2.06	1.16	0.110	0.530	43.0
JOHNS-T_1	7,180	2.80	0.150	10.1	13.9	2,380	12.6	2.85	52.7	0.074	3.91	1.14	0.170	0.550	25.9
JOHNS-T_2	1,200	0.410	0.029	3.51	2.77	694	3.20	ND	22.1	0.022	ND	ND	0.072	0.200	6.92
JUL021	39,500	5.93	0.580	66.6	19.7	24,400	41.1	26.2	207	0.250	16.7	3.13	0.420	2.87	106
KER	21,500	4.32	0.460	28.1	12.1	8,450	13.5	12.9	81.0	0.093	11.0	5.51	0.070	0.930	23.8

Site	Aluminum	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
KERR	2,120	4.80	ND	3.96	1.49	862	10.3	2.66	28.5	ND	0.55	0.35	0.063	0.240	8.45
LAG	4,680	1.32	0.140	12.5	3.47	5,860	4.37	4.08	60.8	0.078	6.24	2.05	0.067	0.460	7.16
LEO	10,500	3.71	0.300	19.7	7.85	9,360	12.3	7.07	162	0.150	9.56	3.30	0.250	0.800	18.5
LFW01	25,700	7.02	0.970	36.5	42.6	14,800	128	18.1	115	0.230	11.5	0.83	0.570	4.16	284
LHAT26	7,070	0.610	0.083	15.1	1.03	1,660	6.61	3.46	13.0	0.022	1.66	ND	0.067	0.460	12.6
LHATSB	1,350	0.470	0.037	2.33	0.80	1,010	1.12	2.46	6.96	0.016	0.38	ND	0.030	0.330	7.39
LHNBPL	3,640	0.400	0.110	4.82	1.09	874	2.61	1.70	12.6	0.016	1.12	ND	0.055	0.320	10.0
LH-T_1	486	0.110	0.028	1.29	0.41	582	0.80	ND	12.7	0.009	ND	ND	0.046	0.075	2.86
LKWOOD	28,400	3.04	0.260	39.4	10.1	17,200	25.9	20.3	104	0.170	12.6	2.74	0.150	1.22	28.9
LMAC	34,700	2.19	0.710	56.9	23.6	24,400	33.0	33.2	116	0.320	17.4	1.52	0.690	2.54	67.2
LOCCR	927	ND	ND	3.13	0.48	172	1.04	1.27	4.55	0.014	0.22	ND	0.044	0.430	8.77
LOL	24,700	4.47	0.540	47.3	13.5	12,200	35.2	14.6	76.5	0.290	11.8	3.44	0.078	1.21	69.5
LORANCRK	1,980	ND	0.180	7.65	1.75	2,620	3.57	4.18	82.2	0.013	0.50	ND	0.140	0.630	58.1
LOUISA	1,670	0.380	ND	3.21	1.96	629	19.1	1.50	16.1	0.006	0.54	0.26	0.075	0.320	6.74
LSJ01	48,400	6.27	0.590	66.4	37.3	24,400	63.0	34.9	364	0.320	16.3	1.21	0.550	2.72	169
LSJ05	42,500	7.52	0.770	62.6	20.3	24,200	35.4	29.7	347	0.260	16.0	2.44	0.550	3.42	109
LSJ070	330	0.062	ND	5.22	1.39	909	3.75	1.33	36.4	0.005	0.31	0.27	0.022	0.390	4.15
LSJ08	40,000	7.08	0.710	55.7	17.4	18,800	39.2	26.0	312	0.340	14.6	2.48	0.690	3.14	95.9
LSJ087	2,070	0.300	0.090	2.99	59.7	1,210	46.7	2.10	35.1	0.160	0.85	0.14	ND	0.710	18.3
LSJ099	3,370	0.240	0.110	5.13	2.54	1,320	35.3	3.43	34.5	0.015	1.06	ND	ND	0.360	29.2
LSJ11	41,200	7.62	0.840	68.7	22.8	23,200	50.6	30.8	425	0.420	17.3	2.77	0.960	4.1	109
LSJ14	41,200	7.90	0.650	63.2	20.8	22,900	43.3	34.8	306	0.310	16.0	2.80	0.510	3.53	110
LSJ17	21,100	10.4	0.200	32.2	8.51	14,300	13.4	17.2	139	0.140	7.05	1.47	0.150	1.31	37.9
LSJ21	20,600	10.5	0.280	25.3	9.79	11,400	15.0	12.8	175	0.170	7.39	1.78	0.150	1.35	47.3
LSJ28	12,700	5.14	0.270	23.3	6.63	14,400	15.8	9.11	91.4	0.230	5.85	2.61	0.090	0.460	34.3
LSJ32	18,600	3.68	0.360	33.9	11.0	14,300	20.7	11.4	96.5	0.240	9.56	2.89	0.140	1.44	42.9
LSJ35	25,300	3.32	0.440	42.0	15.9	17,600	29.1	15.5	87.2	0.170	13.1	3.18	0.210	2.08	52.4
LSJ40	20,700	3.27	0.400	56.9	9.34	17,200	24.7	14.1	131	0.160	8.78	4.74	0.110	1.73	41.8
LSJ918	8,690	0.350	0.080	10.4	1.47	3,600	12.6	6.71	65.3	0.033	1.61	0.14	0.010	0.550	9.84
LSJRC06	22,500	2.56	0.910	35.7	27.1	10,500	24.8	11.7	313	0.440	29.8	2.07	0.220	2.25	162
LSJRC10	16,700	4.05	0.690	30.7	20.0	10,000	19.9	10.6	161	0.340	19.3	2.27	0.180	1.87	101
LSJRC17	8,590	1.45	0.140	14.5	6.66	5,230	9.24	4.49	71.2	0.150	4.27	1.36	0.073	0.840	18.8
LSJRC19	25,400	3.46	0.560	43.3	23.4	16,800	23.0	13.3	87.9	0.310	17.2	3.36	0.210	1.98	64.6
LYC	15,700	4.29	0.170	20.4	6.72	10,700	13.4	11.4	57.0	0.130	6.33	3.01	0.030	0.660	14.6
MAITL	23,500	6.34	0.350	22.6	112	3,070	61.2	9.75	34.4	0.170	7.72	0.94	0.120	1.18	67.2
MAT	8,980	0.530	0.098	12.2	3.36	4,770	7.06	5.10	144	0.018	1.90	ND	0.015	0.470	12.1
MBU	5,560	1.96	0.430	18.9	12.5	3,330	33.7	4.07	68.7	0.056	3.95	0.84	0.130	0.740	48.7
MCC01	18,100	4.16	0.360	23.4	10.3	9,050	12.4	11.4	109	0.110	7.37	1.81	0.350	1.11	45.4

Site	Aluminum	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
MILLD	1,340	0.300	ND	1.45	0.83	63.6	52.9	1.68	12.9	0.005	0.55	0.30	0.046	0.260	14.5
MINN-T_1	1,900	0.480	0.065	2.74	2.51	1,530	5.52	ND	15.3	0.029	ND	ND	0.053	0.230	9.78
MINN-T_2	5,080	1.17	0.100	7.35	6.45	2,610	13.3	2.13	33.0	0.051	2.34	0.36	0.120	0.610	24.7
MON104	48,700	18.3	1.070	87.4	134	28,300	107	35.5	222	0.370	24.9	1.17	0.960	6.80	304
MPS	331	ND	ND	0.92	0.26	201	0.67	2.05	4.86	0.002	0.12	ND	ND	0.100	0.93
MR312	19,600	2.37	0.140	21.9	4.78	9,110	12.4	10.7	233	0.022	4.06	0.31	0.031	0.780	22.1
MTC	6,660	0.036	0.170	9.78	5.55	3,120	26.8	6.65	93.0	0.086	2.43	0.41	0.086	0.800	35.6
MUD-T_1	5,280	3.36	0.250	17.2	3.06	13,300	4.09	1.86	33.0	0.170	4.80	2.77	0.035	0.200	10.8
MUD-T_2	3,600	2.79	0.210	11.4	3.37	13,300	6.74	1.36	43.4	0.150	4.27	2.41	0.043	0.220	14.1
NAS01	38,700	6.43	1.25	66.5	20.5	21,000	48.3	26.7	259	0.280	15.3	1.75	0.770	4.27	106
NBLACK	9,750	1.51	0.190	11.4	2.53	3,470	9.40	4.74	40	0.032	2.05	ND	0.110	0.660	38.8
NEWLKA	650	ND	0.038	1.23	1.53	129	0.61	1.01	1.78	0.012	0.27	ND	0.016	0.160	5.96
NEWLKB	710	ND	0.031	1.39	1.04	153	0.71	1.35	3.24	0.010	0.20	ND	0.021	0.160	6.24
NEWLKC	4,810	1.45	0.220	4.81	3.68	3,950	22.1	1.00	36.3	0.110	2.50	0.51	0.063	0.920	29.3
NEWLKD	16,700	6.45	0.590	22.4	9.89	8,840	26.8	3.95	47.0	0.280	11.3	2.13	0.097	1.32	67.7
NEWLKE	16,900	5.42	0.390	24.6	12.5	10,500	21.3	4.67	51.3	0.230	11.2	2.66	0.090	0.800	47.6
NEWLKF	15,400	6.19	0.360	23.5	8.30	9,950	16.7	4.37	45.0	0.200	10.6	1.98	0.096	0.720	35.7
NLA	7,170	8.70	0.190	12.3	11.3	7,690	17.5	1.59	105	0.160	5.45	2.46	0.130	0.710	34.3
NORRIS	27,400	7.91	0.400	23.4	11.1	30,200	43.1	18.3	216	0.280	14.4	1.85	0.120	1.01	44.1
NRI	5,810	0.300	ND	7.97	1.61	3,230	5.48	2.77	131	0.005	0.86	ND	ND	0.340	7.64
OLA	3,170	1.14	0.025	4.65	5.66	562	6.97	1.71	21.3	0.008	1.35	0.35	0.081	0.410	10.5
OLA-T_1	5,580	1.26	0.090	5.98	10.8	1,360	9.14	2.72	16.6	0.032	3.19	0.43	0.095	0.420	27.9
OLA-T_2	8,810	3.66	0.170	14.6	23.2	2,800	15.8	4.56	94.3	0.057	5.20	0.80	0.200	0.680	63.1
OLK	12,500	4.67	0.400	27.5	9.37	11,400	31.4	5.17	150	0.220	7.58	3.11	ND	0.750	41.7
OR908	27,300	3.26	1.33	139	35.0	9,200	260	16.8	82.9	0.390	17.3	1.09	0.120	6.05	202
ORD	7,160	2.00	0.490	52.7	3.16	4,500	7.86	3.18	41.2	0.070	6.13	2.29	0.062	0.600	12.1
ORT051	50,200	12.0	1.27	67.3	55.1	27,900	85.1	36.8	236	1.12	16.8	1.47	1.15	6.53	186
ORT361	50,400	15.0	1.08	59.1	53.1	28,900	75.6	36.6	190	0.600	16.4	1.20	0.810	4.79	237
OW-4	32,900	4.50	0.310	46.0	40.4	26,200	22.6	21.9	77.5	0.240	15.6	2.30	0.260	1.53	45.2
OW-6	35,400	4.79	0.480	48.7	63.7	29,000	37.0	22.3	51.0	0.330	16.9	2.53	0.350	2.15	62.0
PCR-PL	1,280	0.630	0.260	6.81	2.27	420	6.5	ND	15.3	0.064	2.17	ND	0.071	0.410	21.5
PEL	3,720	0.410	0.120	6.05	2.94	3,050	15.3	4.66	77.7	0.033	1.52	ND	0.055	0.470	13.6
POSSUM-T_1	2,580	0.390	0.180	9.7	1.01	1,220	2.9	0.95	34.3	0.018	1.84	ND	0.075	0.160	10.6
RC051	6,920	1.62	0.120	14.5	7.82	5,180	15.5	3.94	71.3	0.200	6.78	0.99	0.110	1.63	30.0
RIB105	55,000	9.67	1.07	100	83.0	34,700	119	43.0	274	0.350	21.7	2.44	0.690	5.90	244
RICE02	36,200	2.23	1.27	175	134	9,720	73.6	10.4	304	1.23	53.8	1.62	0.610	4.73	286
SELLERS	1,700	0.390	ND	3.90	2.28	960	5.3	1.74	32.1	0.005	0.41	0.27	0.080	0.360	16.0
SHEEL	439	ND	ND	4.59	1.58	1,340	6.89	1.43	62.2	0.024	0.32	0.11	ND	0.600	8.79

Site	Aluminum	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
SILRV	454	1.48	0.430	30.9	1.49	690	2.21	ND	11.9	0.040	4.09	2.64	0.087	0.260	8.68
SIM	3,420	0.630	0.210	7.34	2.22	1,690	7.74	3.65	29.3	0.057	1.18	0.65	ND	0.630	270
SJRJESUP	4,590	0.590	0.076	5.20	0.94	1,520	3.62	2.35	38.9	0.013	0.79	ND	0.068	0.270	14.0
SJRPLTKA	6,790	2.05	0.160	9.98	3.64	3,980	8.86	2.17	61.5	0.044	1.87	0.69	0.120	1.67	25.5
SLA	8,860	10.6	0.230	17.5	13.6	8,300	15.6	3.10	90.9	0.150	6.22	2.94	0.140	0.830	33.5
SOUTH	1,790	1.56	0.023	4.10	1.60	5,020	5.69	1.05	38.1	0.051	2.40	1.41	0.025	0.160	15.2
SRS	17,200	0.370	0.100	21.1	2.51	5,310	8.95	12.8	41.6	0.037	3.52	0.37	0.056	1.10	11.3
SUNLAND	1,180	ND	0.036	2.63	0.61	307	33.6	1.94	9.19	0.011	0.35	ND	0.023	0.310	9.13
SWBPP1	11,800	0.480	0.960	31.2	14.2	4,560	343	7.44	74.3	0.110	6.89	0.80	0.270	8.35	86.4
TOL	2,470	0.410	ND	3.70	0.94	1,370	2.19	2.35	41.7	0.015	0.57	ND	0.013	0.240	4.04
TRT01	50,300	7.66	0.590	73.4	32.5	26,700	68.1	38.1	215	0.200	17.5	1.85	0.400	3.81	175
TUBPP1	1,290	2.39	0.130	3.88	1.98	443	11.7	1.85	25.6	0.035	1.02	0.13	ND	0.250	10.7
USJ055	7,960	0.430	0.160	8.97	3.22	3,300	16.5	10.5	38.7	0.095	2.34	0.62	0.037	0.570	22.7
USJ918	19,500	0.450	0.097	21.0	4.03	7,000	17.8	14.7	72.1	0.140	5.04	1.29	0.021	1.10	15.0
WASH	19,800	0.490	0.250	20.2	8.83	11,800	22.3	8.72	102	0.190	7.41	1.55	0.140	0.790	46.1
WEIR-T_1	234	0.370	0.021	4.98	0.89	1,200	2.96	ND	47.4	0.017	ND	ND	0.130	0.200	47.8
WEIR-T_2	737	0.400	0.030	5.14	1.37	1,250	3.88	ND	40.7	0.012	ND	0.36	0.082	0.240	32.6
WEK021	27,200	7.38	0.400	59.4	10.6	18,400	24.1	15.9	146	0.220	9.63	6.93	0.410	1.78	35.6
WIN	4,460	0.960	0.110	4.31	2.60	923	10.9	2.46	24.3	0.078	1.66	1.12	0.012	0.380	16.9
WINN	3,820	0.670	0.029	3.76	2.15	571	9.75	1.30	20.0	0.013	0.97	0.46	0.039	0.200	9.67
WIO	766	0.059	ND	2.90	0.80	596	2.07	1.43	27.8	0.051	0.38	ND	ND	0.220	6.16

Table B-4: Aluminum-Normalized Metals Concentrations for Districtwide Assessment Sites

Site	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
02235000	5.04E-04	7.38E-05	2.76E-03	1.07E-03	1.20E+00	2.84E-03	8.36E-04	9.32E-03	1.83E-05	8.00E-04	6.66E-04	3.00E-06	1.26E-04	4.28E-03
02236000	1.23E-04	1.24E-05	1.65E-03	4.51E-04	5.35E-01	9.94E-04	6.67E-04	1.26E-02	4.48E-06	2.65E-04	7.84E-05	2.86E-06	8.78E-05	2.43E-03
02238000	2.29E-04	1.52E-04	1.50E-02	5.00E-03	4.19E+00	5.53E-03	3.22E-03	2.13E-01	2.75E-05	7.83E-04	ND	1.06E-05	1.01E-03	1.38E-02
02240800	ND	ND	1.94E-03	8.53E-04	2.39E-01	1.42E-03	3.60E-03	5.86E-03	3.08E-05	3.88E-04	ND	1.94E-05	1.78E-04	1.94E-03
02248000	8.82E-05	ND	1.35E-03	4.71E-04	4.25E-01	1.09E-03	1.91E-03	5.99E-03	1.27E-05	3.82E-04	ND	1.18E-05	6.56E-05	3.62E-03
19010001	1.53E-04	9.84E-06	1.35E-03	3.50E-04	6.50E-01	4.84E-03	6.48E-04	1.03E-02	3.04E-06	2.57E-04	2.20E-05	2.60E-06	1.46E-04	2.84E-02
19010006	1.35E-04	ND	2.33E-03	3.33E-04	3.43E-01	1.84E-03	4.20E-04	1.31E-02	2.56E-06	1.02E-04	ND	3.21E-06	2.67E-04	1.13E-03
19020002	2.07E-04	4.63E-06	1.27E-03	1.64E-04	5.56E-01	5.58E-04	9.74E-04	8.86E-03	1.72E-06	2.87E-04	1.45E-05	9.56E-07	3.13E-05	1.65E-03
20010002	ND	ND	3.43E-03	1.26E-03	9.40E-01	1.71E-03	2.50E-03	2.70E-02	7.46E-06	6.52E-04	3.53E-04	2.09E-05	2.93E-04	3.30E-03
20010003	8.45E-05	1.32E-05	1.56E-03	4.42E-04	6.38E-01	8.37E-04	9.90E-04	7.54E-03	4.00E-06	4.88E-04	5.34E-05	4.95E-06	6.17E-05	1.22E-03
20010137	1.12E-04	8.30E-05	1.63E-03	7.68E-04	2.87E-01	1.49E-03	1.81E-03	8.43E-03	3.28E-05	4.41E-04	ND	ND	9.64E-05	3.91E-03
20020001	9.00E-05	ND	1.45E-03	4.13E-04	3.50E-01	9.88E-04	4.34E-04	8.18E-03	5.19E-06	3.84E-04	ND	3.68E-06	1.09E-04	1.34E-03
20020012	1.26E-04	ND	4.59E-03	6.91E-04	7.15E-01	1.38E-03	7.24E-04	2.71E-02	6.91E-06	3.93E-04	2.82E-04	8.41E-06	1.62E-04	2.31E-03
20020368	8.17E-04	2.19E-05	1.16E-03	8.67E-04	6.11E-01	2.47E-03	5.42E-04	2.97E-03	1.86E-05	4.58E-04	1.58E-04	1.50E-05	1.01E-04	2.79E-03
20020371	3.24E-04	2.22E-05	1.34E-03	1.23E-03	7.49E-01	2.61E-03	6.65E-04	3.49E-03	1.53E-05	4.25E-04	1.74E-04	3.23E-06	8.86E-05	2.17E-03
20020377	5.84E-04	1.10E-05	1.16E-03	3.29E-04	5.93E-01	7.30E-04	4.49E-04	4.24E-03	1.32E-05	3.91E-04	2.32E-04	ND	3.39E-05	9.17E-04
20020381	5.63E-04	1.93E-05	1.45E-03	8.47E-04	6.09E-01	1.80E-03	4.98E-04	5.51E-03	1.49E-05	4.76E-04	1.90E-04	1.18E-05	8.26E-05	2.16E-03
20020404	ND	ND	1.82E-03	9.46E-04	4.19E-01	2.67E-03	5.77E-03	1.16E-02	2.47E-05	9.18E-04	ND	2.15E-05	6.06E-04	4.23E-03
20030373	2.63E-04	ND	3.80E-03	1.49E-03	1.08E+00	2.63E-03	1.81E-03	4.50E-02	1.48E-05	6.29E-04	2.24E-04	9.51E-05	3.89E-04	4.89E-03
20030400	2.74E-04	3.48E-05	1.88E-03	8.92E-04	4.43E-01	2.46E-03	4.18E-04	1.25E-02	2.72E-05	5.38E-04	2.18E-04	4.62E-06	9.82E-05	2.57E-03
20030411	6.89E-05	2.03E-05	1.48E-03	3.32E-04	6.65E-01	7.89E-04	1.09E-03	3.62E-03	6.54E-06	3.97E-04	4.70E-05	2.11E-06	5.03E-05	2.01E-03
20030412	1.47E-03	1.11E-04	3.85E-03	3.97E-03	8.37E-01	9.68E-03	1.53E-03	2.66E-02	2.45E-05	1.05E-03	ND	1.13E-05	8.77E-04	2.32E-02
27010024	1.20E-04	4.58E-06	1.62E-03	2.58E-04	7.08E-01	5.81E-04	1.20E-03	4.75E-03	2.48E-06	3.23E-04	2.02E-05	1.93E-06	4.14E-05	1.65E-03
27010037	8.55E-05	1.28E-05	1.33E-03	4.25E-04	5.82E-01	1.20E-03	8.41E-04	1.45E-02	4.12E-06	2.74E-04	3.66E-05	8.68E-06	6.68E-05	2.24E-03
27010579	4.54E-05	ND	2.17E-03	7.55E-04	8.06E-01	1.79E-03	1.76E-03	2.52E-02	8.72E-06	3.35E-04	ND	1.53E-05	1.32E-04	3.47E-03
27010875	6.23E-05	9.91E-06	1.05E-03	2.56E-04	3.87E-01	7.33E-04	7.42E-04	9.09E-03	1.98E-06	2.40E-04	1.79E-05	3.21E-06	4.14E-05	9.11E-04
ARL109	1.82E-04	1.11E-05	1.47E-03	6.08E-04	5.43E-01	1.27E-03	7.15E-04	6.56E-03	6.54E-06	3.36E-04	3.93E-05	1.19E-05	1.91E-04	3.03E-03
ASH	8.13E-05	1.26E-05	1.16E-03	3.61E-04	3.63E-01	8.13E-04	9.42E-04	3.44E-03	6.54E-06	5.07E-04	1.13E-04	2.40E-06	3.80E-05	1.20E-03
BEAR	5.04E-04	ND	1.48E-03	1.09E-03	2.13E-01	4.92E-03	4.83E-04	3.67E-03	ND	3.82E-04	1.09E-04	2.20E-05	1.42E-04	4.41E-03
BLSPR	1.78E-04	1.45E-04	3.30E-03	5.54E-04	8.06E-01	1.13E-03	7.11E-04	3.18E-02	1.14E-05	6.74E-04	8.26E-05	ND	1.18E-04	2.45E-03
BROWARD	2.98E-04	ND	2.31E-03	1.12E-03	3.31E-01	7.73E-03	8.29E-04	1.52E-02	5.36E-06	3.18E-04	1.65E-04	5.52E-05	1.90E-04	5.91E-03
BUL	5.25E-05	ND	1.54E-03	4.72E-04	6.44E-01	1.08E-03	1.02E-03	1.88E-02	4.90E-06	3.50E-04	ND	5.54E-06	1.13E-04	1.94E-03
BWC44	1.53E-04	1.04E-04	2.62E-03	1.81E-03	1.10E+00	1.34E-02	1.12E-03	1.26E-02	1.59E-05	8.09E-04	1.58E-04	ND	4.01E-04	3.93E-02
BWCCPB	1.14E-04	5.16E-05	2.29E-03	6.14E-04	8.99E-01	1.39E-03	1.06E-03	9.73E-03	1.86E-05	5.65E-04	6.64E-04	2.69E-06	7.31E-05	2.15E-03
CALF-T_1	1.60E-04	2.31E-05	1.69E-03	1.21E-03	4.90E-01	3.12E-03	4.71E-04	5.64E-03	1.08E-05	5.87E-04	ND	2.32E-05	1.20E-04	6.33E-03
CARL-T_1	8.07E-04	2.33E-05	1.14E-03	1.54E-03	5.39E-01	1.30E-03	5.10E-04	4.59E-03	9.26E-06	5.13E-04	1.91E-04	1.16E-05	6.13E-05	4.10E-03

Site	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
CARL-T_2	5.99E-04	1.83E-05	8.81E-04	1.50E-03	2.58E-01	1.46E-03	4.88E-04	2.70E-03	6.42E-06	4.29E-04	8.65E-05	7.94E-06	5.83E-05	2.87E-03
CC03	2.32E-04	ND	1.76E-03	1.01E-03	6.53E-01	2.15E-03	4.48E-03	1.16E-02	2.78E-05	8.40E-04	5.68E-04	2.74E-05	2.63E-04	6.38E-03
CDRC02	2.88E-04	1.52E-05	1.33E-03	5.72E-04	1.11E+00	1.44E-03	6.60E-04	3.75E-03	1.53E-05	4.67E-04	1.51E-04	1.21E-05	1.09E-04	3.22E-03
CED01D	2.94E-04	5.38E-05	1.50E-03	1.91E-03	4.72E-01	6.06E-03	5.77E-04	2.60E-03	1.02E-05	3.67E-04	2.44E-05	3.97E-05	2.12E-04	1.76E-02
CED062	2.25E-04	3.73E-05	1.32E-03	1.40E-03	4.63E-01	3.23E-03	6.94E-04	2.88E-03	1.42E-05	3.39E-04	2.69E-05	2.31E-05	1.46E-04	9.60E-03
CHARLES	4.93E-04	3.31E-05	1.14E-03	4.55E-04	7.98E-01	1.62E-03	1.20E-04	1.28E-02	2.62E-05	8.60E-04	2.49E-04	4.81E-06	3.54E-05	2.22E-03
CHERRY	3.10E-04	3.36E-05	1.44E-03	1.78E-03	5.00E-01	2.87E-03	1.04E-03	8.28E-03	8.77E-06	4.90E-04	2.10E-04	1.39E-05	1.01E-04	4.64E-03
CLA	1.00E-03	2.02E-05	1.57E-03	1.16E-03	9.61E-01	1.38E-03	3.07E-04	1.40E-02	1.66E-05	8.26E-04	3.61E-04	1.32E-05	7.19E-05	3.18E-03
CLD	8.12E-05	1.54E-05	1.39E-03	2.95E-04	5.48E-01	1.37E-03	8.44E-04	1.96E-03	9.30E-06	4.55E-04	6.34E-05	5.73E-06	5.80E-05	1.25E-03
CLH	7.55E-05	1.90E-05	1.33E-03	2.54E-04	8.28E-01	6.23E-04	8.90E-04	2.82E-03	4.83E-06	3.49E-04	3.25E-05	3.37E-05	4.99E-05	1.37E-03
CLW	9.21E-04	ND	7.20E-03	2.05E-03	2.46E+00	5.48E-03	7.66E-03	3.56E-02	4.77E-05	1.33E-03	ND	ND	3.61E-04	7.28E-03
CRES-T_1	2.21E-04	1.18E-05	2.01E-03	3.81E-04	1.30E+00	7.47E-04	6.71E-04	1.29E-02	7.62E-06	4.80E-04	1.27E-04	1.77E-05	5.33E-05	1.83E-03
CRES-T_2	1.92E-04	1.39E-05	1.37E-03	5.19E-04	9.77E-01	9.74E-04	9.16E-04	4.12E-03	9.90E-06	4.32E-04	4.26E-05	1.43E-05	1.12E-04	3.16E-03
DALHOUS	2.16E-04	1.15E-05	3.00E-03	1.29E-03	4.90E-01	3.13E-03	5.61E-04	2.31E-02	ND	2.83E-04	1.45E-04	7.41E-05	2.45E-04	5.10E-03
DIAS	9.57E-04	6.66E-06	1.06E-03	5.85E-04	8.35E-01	1.06E-03	3.31E-04	1.29E-02	5.96E-06	4.01E-04	1.74E-04	1.09E-05	4.75E-05	2.49E-03
DMR	ND	8.23E-05	2.54E-03	6.44E-04	1.20E+00	1.33E-03	2.63E-03	1.83E-02	ND	3.80E-04	2.62E-04	1.26E-05	1.97E-04	2.19E-03
DOR	7.17E-04	1.75E-05	1.01E-03	8.58E-04	6.23E-01	2.07E-03	5.28E-04	3.65E-03	1.17E-05	3.67E-04	1.14E-04	8.49E-06	7.59E-05	2.36E-03
DORR	1.85E-04	ND	2.34E-03	1.01E-03	3.15E-01	3.72E-03	7.77E-04	1.28E-02	ND	3.08E-04	2.04E-04	5.00E-05	2.21E-04	4.72E-03
DUNN02	2.10E-04	1.02E-05	1.63E-03	2.89E-04	9.48E-01	5.00E-04	5.86E-04	3.18E-03	6.82E-06	3.87E-04	1.83E-04	1.08E-05	6.19E-05	8.11E-04
GBY01	1.61E-04	1.43E-05	1.64E-03	5.98E-04	6.15E-01	1.14E-03	7.41E-04	4.65E-03	6.31E-06	3.61E-04	4.63E-05	1.21E-05	7.83E-05	2.91E-03
GBY02	1.69E-04	1.15E-05	1.63E-03	5.94E-04	5.87E-01	1.15E-03	8.08E-04	4.68E-03	5.20E-06	3.66E-04	7.01E-05	1.27E-05	7.70E-05	3.03E-03
GCRB11	1.86E-04	7.22E-06	1.95E-03	3.35E-04	7.86E-01	4.00E-03	6.01E-04	7.86E-03	4.31E-06	4.08E-04	1.36E-04	8.84E-06	5.32E-05	1.88E-03
GEN	1.29E-04	1.17E-05	6.35E-04	2.77E-04	1.30E-01	1.51E-03	4.09E-04	1.70E-03	4.79E-06	2.84E-04	1.47E-04	1.56E-06	4.88E-05	1.35E-03
HAHA-T_1	4.10E-04	3.54E-05	3.54E-03	1.78E-03	6.65E-01	3.75E-03	ND	1.61E-02	3.52E-05	ND	ND	1.02E-04	2.46E-04	6.75E-03
HAHA-T_2	3.81E-04	3.74E-05	1.93E-03	1.93E-03	1.21E+00	4.05E-03	ND	1.43E-02	2.27E-05	ND	ND	3.68E-05	2.21E-04	5.51E-03
HALFMOON	5.10E-04	3.94E-05	1.56E-03	9.83E-04	8.34E-01	4.20E-03	4.79E-04	1.50E-02	2.64E-05	6.59E-04	3.62E-04	1.24E-05	9.91E-05	3.47E-03
HAR	3.55E-04	1.23E-05	1.03E-03	6.53E-04	4.77E-01	1.89E-03	4.09E-04	2.67E-03	1.03E-05	3.58E-04	1.41E-03	1.01E-06	5.28E-05	1.54E-03
HAT26	ND	4.17E-05	2.62E-03	5.20E-04	2.31E-01	1.04E-03	2.42E-03	9.33E-03	1.82E-05	1.80E-04	ND	1.61E-05	2.11E-04	1.47E-02
HAW	5.67E-05	9.89E-06	1.29E-03	1.88E-04	4.13E-01	1.09E-03	8.18E-04	3.21E-03	4.94E-06	2.18E-04	2.51E-05	1.98E-06	4.21E-05	1.05E-03
HELENA	1.54E-03	1.59E-03	8.17E-03	6.85E-03	1.25E+00	5.82E-03	ND	3.10E-02	8.31E-05	6.57E-03	4.41E-03	2.62E-05	2.73E-04	1.88E-02
HOG30	1.22E-04	7.57E-05	3.14E-03	1.18E-03	3.43E-01	3.60E-02	1.90E-03	1.12E-02	3.55E-05	7.11E-04	ND	ND	2.53E-03	3.39E-03
HOWELL	3.09E-04	1.27E-05	1.76E-03	2.12E-03	2.46E-01	3.29E-03	5.74E-04	6.53E-03	4.98E-06	3.86E-04	1.09E-04	6.75E-05	1.56E-04	8.66E-03
INDUSPL	2.94E-04	5.34E-05	1.65E-03	2.50E-03	2.79E-01	2.50E-02	4.74E-04	3.41E-03	2.24E-05	1.00E-03	4.07E-05	3.02E-04	2.03E-04	5.42E-03
JOHNSON	1.48E-04	1.08E-05	1.11E-03	6.98E-04	2.19E-01	2.36E-03	5.70E-04	5.22E-03	3.49E-06	3.42E-04	1.93E-04	1.76E-05	8.80E-05	7.14E-03
JOHNS-T_1	3.90E-04	2.12E-05	1.41E-03	1.94E-03	3.31E-01	1.75E-03	3.97E-04	7.34E-03	1.03E-05	5.45E-04	1.59E-04	2.31E-05	7.60E-05	3.61E-03
JOHNS-T_2	3.44E-04	2.44E-05	2.93E-03	2.31E-03	5.78E-01	2.67E-03	ND	1.84E-02	1.86E-05	ND	ND	6.03E-05	1.68E-04	5.77E-03
JUL021	1.50E-04	1.47E-05	1.69E-03	4.99E-04	6.18E-01	1.04E-03	6.63E-04	5.23E-03	6.44E-06	4.23E-04	7.92E-05	1.06E-05	7.27E-05	2.68E-03
KER	2.01E-04	2.13E-05	1.31E-03	5.63E-04	3.93E-01	6.28E-04	6.00E-04	3.77E-03	4.32E-06	5.12E-04	2.56E-04	3.26E-06	4.34E-05	1.11E-03

Site	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
KERR	2.26E-03	ND	1.87E-03	7.03E-04	4.07E-01	4.86E-03	1.25E-03	1.34E-02	ND	2.58E-04	1.63E-04	2.96E-05	1.13E-04	3.99E-03
LAG	2.82E-04	3.03E-05	2.67E-03	7.41E-04	1.25E+00	9.34E-04	8.72E-04	1.30E-02	1.67E-05	1.33E-03	4.38E-04	1.43E-05	9.72E-05	1.53E-03
LEO	3.53E-04	2.83E-05	1.88E-03	7.48E-04	8.91E-01	1.17E-03	6.73E-04	1.54E-02	1.42E-05	9.10E-04	3.14E-04	2.38E-05	7.59E-05	1.76E-03
LFW01	2.74E-04	3.78E-05	1.42E-03	1.66E-03	5.77E-01	4.97E-03	7.04E-04	4.46E-03	8.77E-06	4.47E-04	3.25E-05	2.22E-05	1.62E-04	1.11E-02
LHAT26	8.63E-05	1.18E-05	2.14E-03	1.46E-04	2.35E-01	9.35E-04	4.89E-04	1.84E-03	3.14E-06	2.35E-04	ND	9.42E-06	6.52E-05	1.78E-03
LHATSB	3.48E-04	2.76E-05	1.73E-03	5.93E-04	7.48E-01	8.30E-04	1.82E-03	5.16E-03	1.21E-05	2.84E-04	ND	2.24E-05	2.41E-04	5.47E-03
LHNBPL	1.10E-04	3.05E-05	1.32E-03	2.99E-04	2.40E-01	7.17E-04	4.67E-04	3.46E-03	4.37E-06	3.08E-04	ND	1.51E-05	8.68E-05	2.75E-03
LH-T_1	2.22E-04	5.72E-05	2.65E-03	8.37E-04	1.20E+00	1.65E-03	ND	2.61E-02	1.75E-05	ND	ND	9.38E-05	1.55E-04	5.88E-03
LKWOOD	1.07E-04	9.15E-06	1.39E-03	3.56E-04	6.07E-01	9.12E-04	7.16E-04	3.67E-03	6.00E-06	4.44E-04	9.66E-05	5.29E-06	4.29E-05	1.02E-03
LMAC	6.31E-05	2.06E-05	1.64E-03	6.80E-04	7.03E-01	9.51E-04	9.57E-04	3.34E-03	9.22E-06	5.01E-04	4.38E-05	1.99E-05	7.32E-05	1.94E-03
LOCCR	ND	ND	3.38E-03	5.12E-04	1.86E-01	1.12E-03	1.37E-03	4.91E-03	1.50E-05	2.36E-04	ND	4.71E-05	4.64E-04	9.46E-03
LOL	1.81E-04	2.19E-05	1.91E-03	5.47E-04	4.92E-01	1.43E-03	5.91E-04	3.10E-03	1.17E-05	4.76E-04	1.39E-04	3.16E-06	4.88E-05	2.81E-03
LORANCRK	ND	8.84E-05	3.86E-03	8.84E-04	1.32E+00	1.80E-03	2.11E-03	4.15E-02	6.46E-06	2.53E-04	ND	7.02E-05	3.20E-04	2.93E-02
LOUISA	2.29E-04	ND	1.92E-03	1.17E-03	3.77E-01	1.14E-02	8.98E-04	9.64E-03	3.59E-06	3.22E-04	1.54E-04	4.47E-05	1.92E-04	4.04E-03
LSJ01	1.29E-04	1.21E-05	1.37E-03	7.70E-04	5.04E-01	1.30E-03	7.20E-04	7.52E-03	6.56E-06	3.37E-04	2.49E-05	1.14E-05	5.63E-05	3.49E-03
LSJ05	1.77E-04	1.80E-05	1.47E-03	4.78E-04	5.69E-01	8.34E-04	7.00E-04	8.17E-03	6.23E-06	3.76E-04	5.75E-05	1.29E-05	8.06E-05	2.56E-03
LSJ070	1.88E-04	ND	1.58E-02	4.21E-03	2.75E+00	1.14E-02	4.03E-03	1.10E-01	1.55E-05	9.52E-04	8.18E-04	6.67E-05	1.18E-03	1.26E-02
LSJ08	1.77E-04	1.77E-05	1.39E-03	4.34E-04	4.69E-01	9.80E-04	6.50E-04	7.80E-03	8.40E-06	3.65E-04	6.21E-05	1.72E-05	7.86E-05	2.40E-03
LSJ087	1.45E-04	4.33E-05	1.44E-03	2.88E-02	5.85E-01	2.26E-02	1.01E-03	1.70E-02	7.63E-05	4.11E-04	6.76E-05	ND	3.42E-04	8.84E-03
LSJ099	7.12E-05	3.29E-05	1.52E-03	7.54E-04	3.92E-01	1.05E-02	1.02E-03	1.02E-02	4.33E-06	3.15E-04	ND	ND	1.08E-04	8.66E-03
LSJ11	1.85E-04	2.05E-05	1.67E-03	5.53E-04	5.63E-01	1.23E-03	7.47E-04	1.03E-02	1.03E-05	4.20E-04	6.72E-05	2.33E-05	9.95E-05	2.64E-03
LSJ14	1.92E-04	1.58E-05	1.53E-03	5.05E-04	5.56E-01	1.05E-03	8.45E-04	7.43E-03	7.49E-06	3.87E-04	6.78E-05	1.23E-05	8.56E-05	2.67E-03
LSJ17	4.95E-04	9.29E-06	1.53E-03	4.04E-04	6.77E-01	6.37E-04	8.17E-04	6.58E-03	6.67E-06	3.35E-04	6.98E-05	6.96E-06	6.22E-05	1.80E-03
LSJ21	5.08E-04	1.35E-05	1.23E-03	4.75E-04	5.53E-01	7.26E-04	6.19E-04	8.47E-03	8.06E-06	3.58E-04	8.62E-05	7.35E-06	6.53E-05	2.29E-03
LSJ28	4.04E-04	2.12E-05	1.83E-03	5.21E-04	1.13E+00	1.24E-03	7.16E-04	7.18E-03	1.82E-05	4.60E-04	2.05E-04	7.09E-06	3.62E-05	2.69E-03
LSJ32	1.98E-04	1.91E-05	1.82E-03	5.89E-04	7.66E-01	1.11E-03	6.13E-04	5.19E-03	1.31E-05	5.14E-04	1.55E-04	7.55E-06	7.72E-05	2.31E-03
LSJ35	1.31E-04	1.74E-05	1.66E-03	6.30E-04	6.95E-01	1.15E-03	6.14E-04	3.45E-03	6.75E-06	5.17E-04	1.26E-04	8.20E-06	8.24E-05	2.07E-03
LSJ40	1.58E-04	1.92E-05	2.75E-03	4.51E-04	8.31E-01	1.19E-03	6.79E-04	6.33E-03	7.78E-06	4.24E-04	2.29E-04	5.24E-06	8.36E-05	2.02E-03
LSJ918	4.03E-05	9.24E-06	1.20E-03	1.69E-04	4.14E-01	1.45E-03	7.72E-04	7.51E-03	3.75E-06	1.85E-04	1.61E-05	1.15E-06	6.27E-05	1.13E-03
LSJRC06	1.14E-04	4.03E-05	1.58E-03	1.20E-03	4.67E-01	1.10E-03	5.18E-04	1.39E-02	1.96E-05	1.32E-03	9.18E-05	9.89E-06	9.98E-05	7.18E-03
LSJRC10	2.43E-04	4.16E-05	1.84E-03	1.20E-03	6.01E-01	1.19E-03	6.34E-04	9.64E-03	2.03E-05	1.16E-03	1.36E-04	1.06E-05	1.12E-04	6.09E-03
LSJRC17	1.68E-04	1.68E-05	1.69E-03	7.76E-04	6.09E-01	1.08E-03	5.23E-04	8.29E-03	1.80E-05	4.97E-04	1.58E-04	8.44E-06	9.78E-05	2.19E-03
LSJRC19	1.36E-04	2.21E-05	1.70E-03	9.19E-04	6.61E-01	9.04E-04	5.22E-04	3.46E-03	1.23E-05	6.75E-04	1.32E-04	8.07E-06	7.80E-05	2.54E-03
LYC	2.73E-04	1.06E-05	1.30E-03	4.28E-04	6.82E-01	8.54E-04	7.26E-04	3.63E-03	8.28E-06	4.03E-04	1.92E-04	1.91E-06	4.18E-05	9.30E-04
MAITL	2.70E-04	1.48E-05	9.62E-04	4.77E-03	1.31E-01	2.60E-03	4.15E-04	1.46E-03	7.32E-06	3.29E-04	4.00E-05	5.06E-06	5.02E-05	2.86E-03
MAT	5.90E-05	1.09E-05	1.36E-03	3.74E-04	5.31E-01	7.86E-04	5.68E-04	1.60E-02	1.97E-06	2.12E-04	ND	1.67E-06	5.28E-05	1.35E-03
MBU	3.53E-04	7.81E-05	3.40E-03	2.25E-03	5.99E-01	6.06E-03	7.32E-04	1.24E-02	1.00E-05	7.10E-04	1.51E-04	2.34E-05	1.33E-04	8.76E-03
MCC01	2.29E-04	1.96E-05	1.29E-03	5.66E-04	4.99E-01	6.83E-04	6.27E-04	6.04E-03	6.09E-06	4.07E-04	9.99E-05	1.94E-05	6.13E-05	2.51E-03

Site	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
MILLD	2.23E-04	ND	1.08E-03	6.22E-04	4.75E-02	3.95E-02	1.25E-03	9.63E-03	3.51E-06	4.13E-04	2.27E-04	3.42E-05	1.91E-04	1.08E-02
MINN-T_1	2.53E-04	3.41E-05	1.44E-03	1.32E-03	8.05E-01	2.91E-03	ND	8.05E-03	1.52E-05	ND	ND	2.80E-05	1.18E-04	5.15E-03
MINN-T_2	2.30E-04	2.05E-05	1.45E-03	1.27E-03	5.14E-01	2.62E-03	4.19E-04	6.50E-03	1.00E-05	4.61E-04	7.17E-05	2.34E-05	1.20E-04	4.86E-03
MON104	3.76E-04	2.19E-05	1.79E-03	2.74E-03	5.81E-01	2.19E-03	7.28E-04	4.56E-03	7.59E-06	5.11E-04	2.40E-05	1.97E-05	1.40E-04	6.23E-03
MPS	ND	ND	2.78E-03	7.73E-04	6.07E-01	2.03E-03	6.19E-03	1.47E-02	6.65E-06	3.72E-04	ND	ND	3.02E-04	2.82E-03
MR312	1.21E-04	6.94E-06	1.12E-03	2.44E-04	4.65E-01	6.33E-04	5.46E-04	1.19E-02	1.14E-06	2.07E-04	1.58E-05	1.58E-06	3.97E-05	1.13E-03
MTC	5.41E-06	2.52E-05	1.47E-03	8.33E-04	4.68E-01	4.02E-03	9.98E-04	1.40E-02	1.29E-05	3.65E-04	6.16E-05	1.29E-05	1.20E-04	5.35E-03
MUD-T_1	6.36E-04	4.77E-05	3.26E-03	5.80E-04	2.52E+00	7.75E-04	3.52E-04	6.25E-03	3.22E-05	9.09E-04	5.25E-04	6.65E-06	3.84E-05	2.05E-03
MUD-T_2	7.76E-04	5.84E-05	3.16E-03	9.37E-04	3.70E+00	1.87E-03	3.78E-04	1.21E-02	4.30E-05	1.19E-03	6.70E-04	1.18E-05	6.20E-05	3.91E-03
NAS01	1.66E-04	3.23E-05	1.72E-03	5.28E-04	5.43E-01	1.25E-03	6.89E-04	6.68E-03	7.22E-06	3.95E-04	4.52E-05	1.98E-05	1.10E-04	2.73E-03
NBLACK	1.55E-04	1.92E-05	1.17E-03	2.59E-04	3.56E-01	9.64E-04	4.86E-04	4.10E-03	3.23E-06	2.10E-04	ND	1.09E-05	6.80E-05	3.98E-03
NEWLKA	ND	5.85E-05	1.89E-03	2.35E-03	1.98E-01	9.38E-04	1.55E-03	2.74E-03	1.80E-05	4.20E-04	ND	2.42E-05	2.38E-04	9.17E-03
NEWLKB	ND	4.41E-05	1.96E-03	1.46E-03	2.15E-01	9.96E-04	1.90E-03	4.56E-03	1.45E-05	2.76E-04	ND	2.90E-05	2.20E-04	8.79E-03
NEWLKC	3.01E-04	4.53E-05	1.00E-03	7.65E-04	8.21E-01	4.59E-03	2.07E-04	7.55E-03	2.18E-05	5.20E-04	1.06E-04	1.31E-05	1.91E-04	6.09E-03
NEWLKD	3.86E-04	3.54E-05	1.34E-03	5.92E-04	5.29E-01	1.60E-03	2.37E-04	2.81E-03	1.65E-05	6.77E-04	1.28E-04	5.80E-06	7.90E-05	4.05E-03
NEWLKE	3.21E-04	2.31E-05	1.46E-03	7.40E-04	6.21E-01	1.26E-03	2.76E-04	3.04E-03	1.38E-05	6.63E-04	1.57E-04	5.34E-06	4.71E-05	2.82E-03
NEWLKF	4.02E-04	2.35E-05	1.53E-03	5.39E-04	6.46E-01	1.08E-03	2.84E-04	2.92E-03	1.29E-05	6.88E-04	1.29E-04	6.26E-06	4.70E-05	2.32E-03
NLA	1.21E-03	2.69E-05	1.72E-03	1.58E-03	1.07E+00	2.44E-03	2.22E-04	1.46E-02	2.17E-05	7.60E-04	3.43E-04	1.76E-05	9.86E-05	4.78E-03
NORRIS	2.89E-04	1.47E-05	8.54E-04	4.05E-04	1.10E+00	1.57E-03	6.68E-04	7.88E-03	1.04E-05	5.26E-04	6.75E-05	4.23E-06	3.69E-05	1.61E-03
NRI	5.16E-05	ND	1.37E-03	2.77E-04	5.56E-01	9.43E-04	4.77E-04	2.25E-02	8.43E-07	1.49E-04	ND	ND	5.83E-05	1.31E-03
OLA	3.60E-04	7.76E-06	1.47E-03	1.79E-03	1.77E-01	2.20E-03	5.39E-04	6.72E-03	2.56E-06	4.26E-04	1.11E-04	2.56E-05	1.28E-04	3.31E-03
OLA-T_1	2.26E-04	1.61E-05	1.07E-03	1.94E-03	2.44E-01	1.64E-03	4.87E-04	2.97E-03	5.81E-06	5.72E-04	7.69E-05	1.71E-05	7.47E-05	5.00E-03
OLA-T_2	4.15E-04	1.94E-05	1.66E-03	2.63E-03	3.18E-01	1.79E-03	5.18E-04	1.07E-02	6.52E-06	5.90E-04	9.07E-05	2.25E-05	7.71E-05	7.16E-03
OLK	3.74E-04	3.20E-05	2.20E-03	7.50E-04	9.12E-01	2.51E-03	4.14E-04	1.20E-02	1.78E-05	6.06E-04	2.49E-04	ND	5.98E-05	3.34E-03
OR908	1.19E-04	4.87E-05	5.09E-03	1.28E-03	3.37E-01	9.52E-03	6.15E-04	3.04E-03	1.42E-05	6.34E-04	3.99E-05	4.40E-06	2.22E-04	7.40E-03
ORD	2.79E-04	6.79E-05	7.36E-03	4.41E-04	6.28E-01	1.10E-03	4.44E-04	5.75E-03	9.79E-06	8.56E-04	3.20E-04	8.66E-06	8.38E-05	1.69E-03
ORT051	2.39E-04	2.52E-05	1.34E-03	1.10E-03	5.56E-01	1.69E-03	7.33E-04	4.69E-03	2.23E-05	3.35E-04	2.93E-05	2.29E-05	1.30E-04	3.71E-03
ORT361	2.98E-04	2.15E-05	1.17E-03	1.05E-03	5.74E-01	1.50E-03	7.26E-04	3.77E-03	1.19E-05	3.26E-04	2.38E-05	1.60E-05	9.50E-05	4.71E-03
OW-4	1.37E-04	9.54E-06	1.40E-03	1.23E-03	7.96E-01	6.87E-04	6.66E-04	2.36E-03	7.36E-06	4.74E-04	6.99E-05	7.96E-06	4.65E-05	1.37E-03
OW-6	1.35E-04	1.36E-05	1.38E-03	1.80E-03	8.19E-01	1.05E-03	6.30E-04	1.44E-03	9.21E-06	4.77E-04	7.15E-05	9.80E-06	6.07E-05	1.75E-03
PCR-PL	4.92E-04	2.05E-04	5.32E-03	1.77E-03	3.28E-01	5.08E-03	ND	1.20E-02	5.02E-05	1.70E-03	ND	5.55E-05	3.18E-04	1.68E-02
PEL	1.10E-04	3.12E-05	1.63E-03	7.90E-04	8.20E-01	4.11E-03	1.25E-03	2.09E-02	8.76E-06	4.09E-04	ND	1.48E-05	1.26E-04	3.66E-03
POSSUM-T_1	1.50E-04	7.09E-05	3.76E-03	3.91E-04	4.73E-01	1.12E-03	3.67E-04	1.33E-02	7.02E-06	7.13E-04	ND	2.90E-05	6.05E-05	4.11E-03
RC051	2.34E-04	1.67E-05	2.10E-03	1.13E-03	7.49E-01	2.24E-03	5.69E-04	1.03E-02	2.90E-05	9.79E-04	1.44E-04	1.55E-05	2.35E-04	4.34E-03
RIB105	1.76E-04	1.95E-05	1.83E-03	1.51E-03	6.31E-01	2.17E-03	7.83E-04	4.98E-03	6.41E-06	3.95E-04	4.44E-05	1.25E-05	1.07E-04	4.44E-03
RICE02	6.15E-05	3.51E-05	4.83E-03	3.70E-03	2.69E-01	2.04E-03	2.88E-04	8.40E-03	3.40E-05	1.49E-03	4.48E-05	1.68E-05	1.31E-04	7.91E-03
SELLERS	2.28E-04	ND	2.29E-03	1.34E-03	5.65E-01	3.12E-03	1.02E-03	1.89E-02	3.12E-06	2.42E-04	1.61E-04	4.68E-05	2.14E-04	9.41E-03
SHEEL	ND	ND	1.05E-02	3.60E-03	3.05E+00	1.57E-02	3.26E-03	1.42E-01	5.35E-05	7.24E-04	2.51E-04	ND	1.37E-03	2.00E-02

Site	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
SILRV	3.26E-03	9.56E-04	6.81E-02	3.28E-03	1.52E+00	4.87E-03	ND	2.62E-02	8.72E-05	9.01E-03	5.81E-03	1.91E-04	5.75E-04	1.91E-02
SIM	1.84E-04	6.17E-05	2.15E-03	6.49E-04	4.94E-01	2.26E-03	1.07E-03	8.57E-03	1.67E-05	3.45E-04	1.90E-04	ND	1.83E-04	7.89E-02
SJRJESUP	1.29E-04	1.66E-05	1.13E-03	2.05E-04	3.31E-01	7.89E-04	5.12E-04	8.47E-03	2.83E-06	1.72E-04	ND	1.47E-05	5.86E-05	3.05E-03
SJRPLTKA	3.02E-04	2.33E-05	1.47E-03	5.36E-04	5.86E-01	1.30E-03	3.20E-04	9.06E-03	6.51E-06	2.75E-04	1.02E-04	1.72E-05	2.46E-04	3.76E-03
SLA	1.20E-03	2.61E-05	1.98E-03	1.53E-03	9.37E-01	1.76E-03	3.50E-04	1.03E-02	1.70E-05	7.02E-04	3.32E-04	1.61E-05	9.32E-05	3.78E-03
SOUTH	8.72E-04	1.26E-05	2.29E-03	8.94E-04	2.80E+00	3.18E-03	5.87E-04	2.13E-02	2.87E-05	1.34E-03	7.88E-04	1.42E-05	9.16E-05	8.49E-03
SRS	2.15E-05	5.87E-06	1.23E-03	1.46E-04	3.09E-01	5.20E-04	7.44E-04	2.42E-03	2.14E-06	2.05E-04	2.15E-05	3.26E-06	6.40E-05	6.57E-04
SUNLAND	ND	3.03E-05	2.23E-03	5.17E-04	2.60E-01	2.85E-02	1.64E-03	7.79E-03	8.98E-06	2.98E-04	ND	1.97E-05	2.60E-04	7.74E-03
SWBPP1	4.07E-05	8.11E-05	2.64E-03	1.20E-03	3.86E-01	2.91E-02	6.31E-04	6.30E-03	9.66E-06	5.84E-04	6.78E-05	2.29E-05	7.08E-04	7.32E-03
TOL	1.66E-04	ND	1.50E-03	3.80E-04	5.55E-01	8.87E-04	9.51E-04	1.69E-02	6.15E-06	2.30E-04	ND	5.26E-06	9.76E-05	1.64E-03
TRT01	1.52E-04	1.18E-05	1.46E-03	6.46E-04	5.30E-01	1.35E-03	7.56E-04	4.27E-03	4.06E-06	3.47E-04	3.67E-05	7.88E-06	7.57E-05	3.47E-03
TUBPP1	1.85E-03	9.69E-05	3.01E-03	1.53E-03	3.43E-01	9.07E-03	1.43E-03	1.98E-02	2.71E-05	7.91E-04	1.01E-04	ND	1.90E-04	8.29E-03
USJ055	5.40E-05	2.01E-05	1.13E-03	4.05E-04	4.15E-01	2.07E-03	1.32E-03	4.86E-03	1.19E-05	2.94E-04	7.79E-05	4.65E-06	7.12E-05	2.85E-03
USJ918	2.31E-05	4.96E-06	1.08E-03	2.07E-04	3.59E-01	9.13E-04	7.54E-04	3.70E-03	7.13E-06	2.58E-04	6.62E-05	1.08E-06	5.64E-05	7.69E-04
WASH	2.47E-05	1.26E-05	1.02E-03	4.46E-04	5.96E-01	1.13E-03	4.40E-04	5.15E-03	9.60E-06	3.74E-04	7.83E-05	7.02E-06	3.98E-05	2.33E-03
WEIR-T_1	1.59E-03	9.15E-05	2.13E-02	3.79E-03	5.13E+00	1.26E-02	ND	2.03E-01	7.26E-05	ND	ND	5.38E-04	8.72E-04	2.04E-01
WEIR-T_2	5.39E-04	4.10E-05	6.97E-03	1.86E-03	1.70E+00	5.26E-03	ND	5.52E-02	1.61E-05	ND	4.87E-04	1.12E-04	3.30E-04	4.42E-02
WEK021	2.71E-04	1.47E-05	2.18E-03	3.90E-04	6.75E-01	8.84E-04	5.85E-04	5.35E-03	8.00E-06	3.54E-04	2.55E-04	1.51E-05	6.54E-05	1.31E-03
WIN	2.15E-04	2.51E-05	9.66E-04	5.83E-04	2.07E-01	2.44E-03	5.52E-04	5.45E-03	1.74E-05	3.72E-04	2.51E-04	2.69E-06	8.48E-05	3.79E-03
WINN	1.76E-04	7.67E-06	9.84E-04	5.63E-04	1.49E-01	2.55E-03	3.40E-04	5.24E-03	3.32E-06	2.55E-04	1.20E-04	1.02E-05	5.21E-05	2.53E-03
WIO	7.70E-05	ND	3.79E-03	1.04E-03	7.78E-01	2.70E-03	1.87E-03	3.63E-02	6.62E-05	4.90E-04	ND	ND	2.83E-04	8.04E-03

Table B-5: Nutrient and Sediment Physical-Chemical Characteristics Data for Districtwide Assessment Sites

Site	TKN (mk/kg)	TP (mk/kg)	OP (mk/kg)	TOC (%)	TS (%)	TVS (%)	Grain Size (% of total wet sediment volume)			
							Sand (%)	Silt (%)	Clay (%)	Mud (%)
02235000	3,310	980	0.42	4.61	35.6	16.6	79.1	18.9	2.0	20.9
02236000	2,400	336	1.04	2.35	38.4	7.2	64.5	32.9	2.6	35.5
02238000	415	34.3	0.18	0.39	67.0	1.5	95.8	3.9	0.3	4.2
02240800	21.9	14.6	0.20	0.04	82.2	0.1	99.5	0.4	0.1	0.5
02248000	75.1	96.1	0.42	0.08	81.2	0.3	98.9	0.8	0.3	1.1
19010001	905	272	0.38	2.43	61.0	4.8	81.5	15.4	3.1	18.5
19010006	195	29.6	0.22	0.40	74.3	0.9	93.4	5.6	1.0	6.6
19020002	3,570	798	3.45	7.02	26.7	13.0	49.9	42.7	7.4	50.1
20010002	263	49.4	0.60	0.27	72.9	0.6	93.1	5.8	1.1	6.9
20010003	1,550	356	1.41	2.03	40.4	4.3	62.7	34.5	2.7	37.2
20010137	77.2	354	1.38	0.11	80.3	0.4	98.8	1.0	0.2	1.2
20020001	1,480	143	0.28	1.66	57.5	3.4	91.7	7.8	0.4	8.2
20020012	561	202	0.37	0.57	67.2	1.6	86.9	11.2	1.9	13.1
20020368	31,400	975	6.00	33.0	4.0	59.6	70.2	29.4	0.4	29.8
20020371	26,200	760	2.00	30.9	5.0	55.6	84.0	15.8	0.2	16.0
20020377	18,100	508	3.44	22.8	6.1	34.7	80.7	19.1	0.2	19.3
20020381	34,500	1,620	39.7	38.5	3.4	61.9	68.4	30.9	0.7	31.6
20020404	60.9	12.7	0.44	0.05	78.8	0.1	99.9	0.1	ND	0.1
20030373	1,100	238	0.81	0.86	60.1	2.1	89.8	9.4	0.9	10.3
20030400	2,010	387	0.96	2.91	54.3	6.8	68.7	26.3	5.0	31.3
20030411	13,500	1,220	3.13	23.6	11.5	40.3	55.5	41.7	2.8	44.5
20030412	658	54.4	0.19	0.71	62.6	1.7	84.1	15.5	0.5	16.0
27010024	3,740	778	17.0	5.16	25.7	11.2	33.9	56.5	9.5	66.0
27010037	302	582	0.65	0.25	74.4	1.1	89.1	7.5	3.4	10.9
27010579	378	85.2	0.33	0.75	72.8	1.6	91.1	6.6	2.4	9.0
27010875	851	250	0.72	0.84	63.9	2.2	80.3	14.7	5.0	19.7
ARL109				6.59	25.1	15.4	39.8	55.1	5.2	60.3
ASH	12,400	1,490	3.05	22.5	17.4	39.6	20.5	66.1	13.4	79.5
BEAR	568	154	0.60	0.62	69.0	1.0	88.4	9.6	2.0	11.6
BLSPR	264	3,350	1.78	0.17	72.4	0.5	97.4	2.1	0.5	2.6
BROWARD	369	58.0	0.50	0.33	73.7	0.9	91.5	6.9	1.6	8.5
BUL	454	394	0.65	0.69	72.4	1.8	91.3	6.8	2.0	8.8
BWC44	3,260	251	0.51	2.92	37.0	9.1	74.0	24.3	1.7	26.0
BWCCPB	3,890	297	1.30	2.95	30.0	20.0	78.1	19.9	2.0	21.9
CALF-T_1	1,300	240	1.00	1.10	66.8	2.3	82.7	16.0	1.3	17.3
CARL-T_1	11,000	1,300	15.0	26.0	7.8	35.0	85.1	14.6	ND	14.6
CARL-T_2	12,000	1,400	18.0	25.0	10.9	41.2	83.4	16.1	0.5	16.6
CC03	71.5	82.2	0.45	0.17	83.9	0.5	99.0	0.8	0.3	1.1
CDRC02				22.4	12.0	41.9	56.1	42.2	1.8	44.0
CED01D				6.84	28.7	14.5	28.7	61.6	9.8	71.3
CED062				14.0	17.5	23.5	26.5	67.6	6.0	73.6
CHARLES	19,600	818	4.50	34.2	13.2	46.6	23.6	66.1	10.4	76.5
CHERRY	1,100	79.0	ND	1.85	68.2	2.6	82.5	15.4	2.1	17.5
CLA	11,000	700	23.0	32.0	5.7	60.6	59.7	39.2	1.1	40.3
CLD	13,300	1,140	2.72	22.2	12.5	38.7	44.8	50.0	5.2	55.2
CLH	5,600	100	21.0	13.0	20.4	14.9	23.1	72.7	4.2	76.9
CLW	331	19.4	0.10	0.26	77.4	0.5	98.6	1.4	0.1	1.5
CRES-T_1	3,500	530	4.60	12.0	27.3	17.9	63.5	34.1	2.4	36.5
CRES-T_2	8,300	1,300	1.50	19.0	11.7	28.8	40.3	57.6	2.1	59.7
DALHOUS	401	55.0	ND	0.45	72.5	0.8	92.5	6.3	1.3	7.6
DIAS	5,110	252	2.00	4.17	27.8	16.0	77.3	21.2	1.5	22.7
DMR	89.4	28.6	0.15	0.10	80.5	0.4	95.5	3.0	1.5	4.5
DOR	26,500	1,470	68.0	27.7	4.9	47.8	64.0	35.1	0.8	35.9
DORR	176	30.0	0.60	0.27	79.5	0.7	96.7	2.5	0.8	3.3
DUNN02				24.9	11.3	44.1	63.1	35.5	1.4	36.9
GBY01				10.9	14.4	24.6	26.3	69.7	4.2	73.8
GBY02				4.42	28.8	10.3	36.5	59.5	4.1	63.5

Site	TKN (mk/kg)	TP (mk/kg)	OP (mk/kg)	TOC (%)	TS (%)	TVS (%)	Grain Size (% of total wet sediment volume)			
							Sand (%)	Silt (%)	Clay (%)	Mud (%)
GCRB11				6.24	32.0	12.5	49.5	47.0	3.6	50.5
GEN	5,880	598	1.00	5.33	37.1	14.6	38.4	52.7	9.0	61.7
HAHA-T_1	210	35.0	0.57	0.47	83.4	0.5	94.0	5.4	0.6	6.0
HAHA-T_2	120	32.0	0.37	0.40	81.0	0.5	95.0	4.3	0.7	5.0
HALFMOON	18,900	759	4.50	25.7	13.7	47.9	32.3	62.4	5.2	67.6
HAR	29,100	1,200	4.25	29.4	4.0	53.7	80.1	19.7	0.1	19.8
HAT26	41.0	14.0	ND	0.04	80.0	ND	100.0	ND	ND	ND
HAW	3,220	232	0.73	5.64	32.7	15.1	83.2	14.5	2.3	16.8
HELENA	23,300	2,730	8.00	34.0	5.5	52.5	81.1	18.3	0.6	18.9
HOG30	233	118	0.74	0.25	73.5	0.7	96.8	2.7	0.6	3.3
HOWELL	900	157	0.90	1.08	59.8	1.5	84.3	14.8	1.0	15.8
INDUSPL	7,350	717	1.90	24.4	24.0	30.9	81.1	17.4	1.5	18.9
JOHNSON	1,960	179	ND	2.26	62.7	4.6	68.1	26.9	5.0	31.9
JOHNS-T_1	2,600	480	9.80	7.30	45.0	12.2	58.8	36.8	4.4	41.2
JOHNS-T_2	300	61.0	1.30	1.00	77.4	1.4	85.1	12.8	2.1	14.9
JUL021	ND	ND	ND	14.0	12.4	30.9	29.0	67.5	3.6	71.0
KER	10,600	457	1.47	23.5	12.9	32.4	48.1	49.6	2.4	52.0
KERR	294	33.0	0.70	0.29	77.9	0.6	96.6	2.6	0.8	3.4
LAG	7,240	1,660	1.65	11.5	28.5	19.9	45.0	49.1	5.9	55.0
LEO	19,000	779	2.57	34.4	13.6	52.4	66.2	30.4	3.5	33.9
LFW01	ND	ND	ND	14.3	23.0	21.0	57.9	39.3	2.8	42.1
LHAT26	262	1,230	3.10	0.23	79.5	0.8	95.1	2.3	2.5	4.8
LHATSB	238	33.0	ND	0.25	72.7	0.8	95.9	3.6	0.5	4.1
LHNBPL	143	2,290	1.50	0.18	79.6	0.5	97.1	2.1	0.9	3.0
LH-T_1	270	46.0	0.67	0.41	74.6	0.7	94.1	5.0	0.9	5.9
LKWOOD	16,200	1,180	3.14	21.7	9.6	34.0	42.8	55.5	1.7	57.2
LMAC	11,800	1,160	18.3	14.3	12.1	26.5	32.1	65.4	2.5	67.9
LOCCR	267	27.0	0.50	0.21	74.6	1.0	96.7	2.8	0.5	3.3
LOL	48,900	3,060	4.14	34.2	3.9	57.8	62.9	36.6	0.6	37.1
LORANCRK	30.0	34.0	ND	0.03	79.8	ND	99.5	ND	ND	ND
LOUISA	217	29.0	ND	0.28	76.4	0.6	96.3	2.6	1.2	3.8
LSJ01				7.30	23.3	14.3	38.6	54.8	6.6	61.4
LSJ05				15.4	15.9	23.7	30.9	63.8	5.3	69.1
LSJ070	34.4	12.3	0.26	0.09	81.3	0.1	99.1	0.7	0.2	0.9
LSJ08				15.7	17.1	21.4	41.7	53.0	5.3	58.3
LSJ087	1,400	108	0.49	2.53	55.4	7.8	84.1	14.3	1.7	16.0
LSJ099	584	101	0.41	0.94	76.2	2.1	84.9	11.9	3.2	15.1
LSJ11				17.4	16.5	22.7	21.2	71.7	7.1	78.8
LSJ14				18.1	14.2	26.3	25.1	68.3	6.6	74.9
LSJ17				10.7	24.7	15.8	37.6	57.6	4.8	62.4
LSJ21				11.1	19.7	18.4	49.3	47.3	3.3	50.6
LSJ28				12.5	21.1	21.6	72.1	26.2	1.7	27.9
LSJ32				14.9	17.2	25.3	48.9	47.7	3.5	51.2
LSJ35				25.2	10.2	40.9	43.2	54.5	2.3	56.8
LSJ40				21.7	13.2	36.8	51.0	46.3	2.8	49.1
LSJ918	1,580	147	0.34	1.87	47.7	7.8	79.4	17.5	3.1	20.6
LSJRC06				39.6	10.9	58.2	56.7	40.0	3.3	43.3
LSJRC10				33.4	12.4	50.5	63.6	34.6	1.8	36.4
LSJRC17				7.22	35.0	10.5	62.7	35.1	2.3	37.4
LSJRC19				24.5	13.8	39.9	70.8	27.6	1.5	29.1
LYC	21,700	361	1.48	21.6	6.1	44.1	79.0	20.7	0.4	21.1
MAITL	2,090	1,260	1.90	1.75	46.3	4.8	74.8	23.6	1.6	25.2
MAT	341	898	0.94	0.21	73.8	1.6	90.6	6.5	2.9	9.4
MBU	3,590	860	0.47	2.91	30.0	9.8	77.9	21.3	0.8	22.1
MCC01				10.3	19.2	21.4	44.9	52.9	2.3	55.2
MILLD	503	39.0	ND	4.41	74.2	1.1	96.8	2.7	0.5	3.2
MINN-T_1	310	78.0	0.70	0.69	81.1	0.9	89.1	10.0	1.0	11.0
MINN-T_2	730	140	0.88	1.40	70.9	2.4	67.5	28.0	4.5	32.5
MON104				11.6	19.6	22.7	45.8	49.6	4.7	54.3

Site	TKN (mk/kg)	TP (mk/kg)	OP (mk/kg)	TOC (%)	TS (%)	TVS (%)	Grain Size (% of total wet sediment volume)			
							Sand (%)	Silt (%)	Clay (%)	Mud (%)
MPS	3.59	3.59	0.10	0.02	83.4	ND	99.9	0.1	ND	0.1
MR312	630	958	1.24	0.76	61.3	2.4	75.8	17.9	6.3	24.2
MTC	4,770	361	1.37	8.18	27.7	21.2	75.4	22.2	2.4	24.6
MUD-T_1	29,000	720	12.0	37.0	2.9	68.5	85.0	14.8	ND	14.8
MUD-T_2	20,000	890	5.10	32.5	3.9	62.3	85.6	14.2	ND	14.2
NAS01				6.56	20.2	17.7	38.4	57.7	4.0	61.6
NBLACK	1,140	457	0.60	1.37	52.3	4.6	73.2	22.9	3.8	26.7
NEWLKA	367	51.0	1.10	0.32	74.3	0.6	98.6	1.2	ND	1.2
NEWLKB	406	45.0	2.50	0.34	75.9	1.2	98.7	1.2	ND	1.2
NEWLKC	11,800	915	2.20	25.9	12.9	50.0	92.0	7.6	ND	7.6
NEWLKD	27,900	4,260	7.80	36.5	5.4	56.8	54.2	44.7	1.0	45.7
NEWLKE	27,400	3,900	6.70	29.6	5.2	46.7	47.7	51.1	1.2	52.3
NEWLKF	22,000	3,520	5.80	25.5	6.4	42.2	51.8	47.1	1.1	48.2
NLA	17,000	660	20.0	31.0	9.0	45.4	59.2	39.6	1.3	40.9
NORRIS	13,300	2,020	4.40	23.0	16.2	32.4	40.8	51.4	7.7	59.1
NRI	273	103	0.74	0.41	66.7	1.3	90.2	7.8	2.0	9.8
OLA	995	63.0	ND	0.67	57.0	2.0	79.1	19.7	1.2	20.9
OLA-T_1	1,600	120	1.70	2.70	55.4	3.7	63.5	34.1	2.4	36.5
OLA-T_2	2,900	300	2.20	5.10	25.5	11.5	64.7	34.1	1.2	35.3
OLK	36,500	1,710	2.62	45.1	4.2	71.2	70.7	28.5	0.8	29.3
OR908	19,200	3,760	29.5	20.1	7.9	35.7	53.6	44.8	1.6	46.4
ORD	5,540	555	3.15	8.73	23.8	16.4	72.6	25.5	1.9	27.4
ORT051				9.96	19.8	18.8	27.5	66.8	5.9	72.6
ORT361				15.6	14.8	29.0	35.2	59.6	5.3	64.9
OW-4	14,000	2,100	170	23.0	5.4	45.7	59.7	39.2	1.1	40.3
OW-6	11,000	1,600	19.0	19.0	8.0	35.1	60.7	38.3	1.0	39.3
PCR-PL	1,630	819	1.10	2.33	51.9	7.9	79.4	16.2	4.4	20.6
PEL	983	102	0.52	2.11	53.8	5.0	82.8	15.4	1.8	17.2
POSSUM-T_1	140	5,000	5.30	0.54	78.3	1.9	88.9	9.4	1.7	11.1
RC051				7.12	36.4	19.4	80.1	18.4	1.6	20.0
RIB105				7.79	22.1	18.9	30.2	61.8	8.1	69.9
RICE02				30.0	12.0	51.6	56.3	40.5	3.3	43.7
SELLERS	281	22.0	0.60	0.23	77.2	0.7	94.7	4.5	0.8	5.3
SHEEL	141	17.1	0.11	0.11	76.0	0.3	98.1	1.6	0.3	1.9
SILRV	3,250	865	0.80	6.95	34.1	8.8	77.7	20.7	1.6	22.3
SIM	1,390	192	0.42	2.31	54.7	7.5	72.2	24.5	3.4	27.9
SJRJESUP	374	212	0.90	0.28	69.0	0.9	88.9	8.8	2.4	11.2
SJRPLTKA	1,860	1,140	1.10	3.20	46.7	5.9	80.5	18.1	1.4	19.5
SLA	17,000	820	30.0	35.0	5.9	57.3	58.0	40.9	1.2	42.1
SOUTH	7,250	409	0.80	0.73	15.4	15.6	80.2	19.5	ND	19.5
SRS	1,350	152	0.33	1.33	54.1	3.7	63.0	28.7	8.3	37.0
SUNLAND	57.0	47.0	1.10	0.05	81.0	ND	99.3	0.5	ND	0.5
SWBPP1	1,810	8,070	3.15	3.29	48.2	7.2	74.3	21.7	4.0	25.7
TOL	84.3	152	0.77	0.12	78.3	0.3	96.2	2.9	0.9	3.8
TRT01				7.83	19.8	18.8	31.8	61.4	7.0	68.4
TUBPP1	1,330	159	2.21	0.74	56.0	4.2	91.8	7.7	0.5	8.2
USJ055	3,460	432	1.09	5.23	37.7	13.0	76.7	21.0	2.2	23.2
USJ918	1,970	625	0.77	3.97	41.6	8.4	64.6	29.5	5.9	35.4
WASH	17,700	729	1.30	26.8	14.4	39.5	45.7	50.0	4.3	54.3
WEIR-T_1	500	26.0	0.24	0.67	75.9	1.0	95.4	4.5	ND	4.5
WEIR-T_2	830	64.0	0.64	0.89	65.3	1.4	83.5	16.1	0.5	16.6
WEK021				22.0	13.2	38.9	53.4	44.4	2.3	46.7
WIN	2,290	282	0.55	1.72	54.2	5.7	68.2	27.7	4.1	31.8
WINN	941	120	0.60	0.53	62.5	2.3	84.0	13.8	2.2	16.0
WIO	137	27.5	0.22	0.11	69.1	0.4	97.5	2.0	0.6	2.6

Table B-6: Estimated Hazard Index (HI) Values Calculated for Districtwide Assessment Sites

Site	HI (TEC-based)	HI (PEC-based)	HI (ERL-based)	HI (ERM-based)
02235000	3.9	0.8	6.9	0.8
02236000	2.0	0.4	2.9	0.4
02238000	1.1	0.2	2.3	0.3
02240800	0.2	0.0	0.2	0.0
02248000	0.3	0.1	0.4	0.1
19010001	8.5	1.9	9.2	1.9
19010006	0.6	0.2	0.7	0.1
19020002	7.8	1.8	18.6	1.9
20010002	0.4	0.1	0.6	0.1
20010003	3.6	0.7	6.3	0.8
20010137	2.1	0.3	5.7	0.3
20020001	1.9	0.4	4.9	0.4
20020012	1.0	0.3	1.0	0.2
20020368	27.1	4.0	42.5	4.8
20020371	12.2	2.1	17.7	2.4
20020377	6.9	1.1	12.8	1.7
20020381	11.6	2.0	19.6	2.4
20020404	0.1	0.0	0.1	0.0
20030373	0.9	0.2	1.1	0.2
20030400	1.7	0.4	2.5	0.3
20030411	11.3	2.7	13.5	2.0
20030412	3.0	0.5	4.1	0.6
27010024	6.1	1.7	7.0	1.2
27010037	1.9	0.4	2.4	0.4
27010579	0.9	0.2	2.0	0.3
27010875	1.3	0.4	1.2	0.2
ARL109	17.7	3.4	31.1	3.7
ASH	15.2	2.9	22.6	2.8
BEAR	2.0	0.4	4.1	0.3
BLSPR	1.1	0.3	1.1	0.2
BROWARD	1.0	0.3	1.0	0.2
BUL	0.5	0.2	0.5	0.1
BWC44	5.2	0.9	11.5	1.4
BWCCPB	5.4	0.7	13.0	1.8
CALF-T_1	1.4	0.3	2.9	0.3
CARL-T_1	25.6	3.4	40.7	3.6
CARL-T_2	118	11.7	341	43.7
CC03	1.3	0.2	5.4	0.2
CDRC02	7.7	1.7	9.3	1.6
CED01D	87.9	14.0	174	19.9
CED062	72.5	12.3	157	15.4
CHARLES	11.9	2.0	19.2	2.2
CHERRY	2.6	0.4	4.1	0.4
CLA	41.1	5.9	74.7	7.1
CLD	40.5	5.9	74.8	7.3
CLH	11.4	2.7	11.8	2.2
CLW	0.2	0.1	0.3	0.1
CRES-T_1	3.5	0.9	3.5	0.7
CRES-T_2	18.1	3.2	25.1	3.8
DALHOUS	1.0	0.3	1.1	0.2
DIAS	2.4	0.6	3.2	0.5
DMR	0.3	0.1	0.3	0.1
DOR	45.5	5.8	72.3	7.0
DORR	0.6	0.1	0.6	0.1
DUNN02	5.2	1.5	4.7	1.0
GBY01	20.8	4.1	33.4	4.7

Site	HI (TEC-based)	HI (PEC-based)	HI (ERL-based)	HI (ERM-based)
GBY02	7.5	1.6	12.3	1.6
GCRB11	6.0	1.4	8.2	1.2
GEN	4.5	1.0	7.0	0.9
HAHA-T_1	0.7	0.2	0.9	0.1
HAHA-T_2	0.5	0.1	0.5	0.1
HALFMOON	14.5	2.5	21.5	2.5
HAR	19.4	2.8	31.5	3.5
HAT26	0.3	0.1	0.3	0.1
HAW	7.3	1.1	19.3	2.7
HELENA	7.9	1.3	6.6	1.0
HOG30	1.9	0.4	2.4	0.3
HOWELL	3.8	0.6	7.3	0.9
INDUSPL	11.8	2.4	12.6	1.8
JOHNSON	2.5	0.5	3.7	0.5
JOHNS-T_1	7.6	1.3	11.4	1.2
JOHNS-T_2	1.1	0.2	1.5	0.2
JUL021	14.8	3.1	24.1	3.1
KER	6.8	1.8	9.0	1.4
KERR	1.1	0.3	1.1	0.2
LAG	3.2	0.6	5.4	0.7
LEO	15.0	3.6	31.3	2.3
LFW01	56.7	9.8	197	8.2
LHAT26	1.2	0.3	0.9	0.2
LHATSB	0.4	0.1	0.4	0.1
LHNBPL	0.9	0.2	1.1	0.2
LH-T_1	0.3	0.1	0.6	0.1
LKWOOD	8.2	1.7	12.5	1.9
LMAC	20.3	4.0	34.0	3.8
LOCCR	0.5	0.1	0.3	0.1
LOL	14.7	2.6	27.6	4.0
LORANCRK	1.4	0.3	1.0	0.3
LOUISA	1.6	0.3	1.9	0.3
LSJ01	35.1	5.3	66.4	8.8
LSJ05	19.0	3.4	32.2	4.2
LSJ070	0.5	0.1	0.4	0.1
LSJ08	17.2	3.2	28.3	4.0
LSJ087	5.4	1.1	6.8	1.0
LSJ099	2.5	0.5	3.2	0.5
LSJ11	18.3	3.6	27.7	4.0
LSJ14	15.8	3.3	23.8	3.2
LSJ17	7.6	1.6	11.0	1.5
LSJ21	6.2	1.4	8.6	1.2
LSJ28	10.3	1.9	15.5	2.1
LSJ32	13.0	2.3	21.8	2.9
LSJ35	11.8	2.4	16.0	2.0
LSJ40	8.0	1.8	9.1	1.6
LSJ918	2.0	0.4	3.0	0.5
LSJRC06	28.8	5.2	52.2	7.4
LSJRC10	20.2	3.7	40.5	5.4
LSJRC17	5.2	0.9	10.1	1.4
LSJRC19	10.7	2.3	16.8	2.4
LYC	6.5	1.2	10.2	1.4
MAITL	14.4	3.0	27.2	2.1
MAT	2.4	0.5	5.1	0.4
MBU	12.3	1.7	18.3	2.8
MCC01	6.7	1.6	16.3	1.2
MILLD	1.9	0.5	1.7	0.3
MINN-T_1	1.1	0.2	1.2	0.2

Site	HI (TEC-based)	HI (PEC-based)	HI (ERL-based)	HI (ERM-based)
MINN-T_2	3.5	0.6	4.4	0.6
MON104	66.2	10.9	172	13.1
MPS	0.1	0.0	0.1	0.0
MR312	2.1	0.6	2.1	0.4
MTC	11.3	1.3	35.7	5.1
MUD-T_1	2.6	0.7	2.7	0.6
MUD-T_2	2.7	0.6	2.9	0.6
NAS01	15.4	3.3	23.7	3.2
NBLACK	2.5	0.6	3.0	0.4
NEWLKA	0.4	0.1	0.3	0.1
NEWLKB	0.5	0.1	0.3	0.1
NEWLKC	4.6	0.8	5.4	0.8
NEWLKD	8.2	1.7	8.5	1.5
NEWLKE	7.9	1.5	5.5	1.1
NEWLKF	7.6	1.4	5.3	1.0
NLA	106	14.4	198	18.4
NORRIS	36.6	5.3	61.1	6.1
NRI	0.6	0.2	0.6	0.1
OLA	1.8	0.3	2.2	0.3
OLA-T_1	4.2	0.7	5.8	0.7
OLA-T_2	7.2	1.3	10.6	1.2
OLK	8.9	1.6	12.7	1.8
OR908	36.8	7.0	56.5	6.8
ORD	9.5	1.6	19.2	3.2
ORT051	57.2	8.6	82.7	9.7
ORT361	36.3	6.5	74.8	7.1
OW-4	9.6	2.2	12.4	1.8
OW-6	15.2	3.0	22.3	2.7
PCR-PL	5.4	0.9	17.7	0.8
PEL	13.8	1.2	49.4	7.0
POSSUM-T_1	3.1	0.5	7.4	0.5
RC051	6.2	1.4	9.6	1.3
RIB105	32.1	6.1	61.6	6.7
RICE02	86.9	13.3	168	24.1
SELLERS	0.7	0.2	0.6	0.1
SHEEL	0.7	0.2	0.7	0.1
SILRV	3.2	0.7	2.9	0.5
SIM	5.5	1.0	6.2	1.3
SJRJESUP	0.9	0.2	0.6	0.1
SJRPLTKA	3.4	0.7	3.9	0.6
SLA	36.5	5.2	63.3	6.0
SOUTH	1.3	0.3	1.6	0.3
SRS	1.7	0.5	1.7	0.3
SUNLAND	1.3	0.3	1.0	0.2
SWBPP1	26.3	5.2	41.1	4.1
TOL	0.4	0.1	0.4	0.1
TRT01	20.1	3.9	34.5	4.1
TUBPP1	2.2	0.4	3.5	0.4
USJ055	5.9	0.9	14.1	1.6
USJ918	4.2	0.8	6.9	1.1
WASH	6.3	1.2	8.4	1.2
WEIR-T_1	0.9	0.2	0.8	0.2
WEIR-T_2	0.8	0.2	0.7	0.2
WEK021	10.4	2.4	12.9	2.0
WIN	2.0	0.4	3.6	0.4
WINN	1.2	0.3	1.6	0.2
WIO	0.7	0.1	0.9	0.2

Table B-7: Estimated Hazard Quotients (HQ) Values for Districtwide Assessment Sites
(HQ: ratio of surface sediment concentrations to TEC SQG values)[a]

Site	PAH	PCB	DDT	Chlor	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn	Total HI
CARL-T_2	0.80	0.00	109	0.97	1.54	0.47	0.51	1.20	1.03	0.90	0.48	0.20	0.60	118
NLA	0.31	0.00	101	0.71	0.89	0.19	0.28	0.36	0.49	0.87	0.24	0.13	0.28	106
CED01D	11.2	29.5	3.86	7.33	1.65	2.98	1.90	3.32	9.30	3.10	0.89	2.18	7.98	87.9
RICE02	5.20	48.4	2.06	0.00	0.23	1.28	4.02	4.23	2.06	6.83	2.37	0.61	2.36	86.9
CED062	9.64	15.8	10.3	8.79	1.40	2.29	1.85	2.69	5.49	4.79	0.91	1.41	4.83	72.5
MON104	5.14	15.7	11.7	12.7	1.87	1.08	2.01	4.22	2.97	2.05	1.10	0.96	2.51	66.2
ORT051	2.61	1.88	34.3	0.37	1.23	1.28	1.55	1.74	2.38	6.22	0.74	1.15	1.54	57.2
LFW01	6.28	1.37	10.5	23.2	0.72	0.98	0.84	1.35	3.56	1.25	0.51	0.57	2.35	56.7
DOR	0.26	2.32	36.0	0.46	1.55	0.37	0.50	0.58	1.22	1.38	0.34	0.18	0.41	45.5
CLA	0.34	0.00	37.0	0.36	0.86	0.17	0.31	0.31	0.33	0.78	0.31	0.11	0.22	41.1
CLD	1.19	1.04	29.7	1.32	0.26	0.49	1.00	0.29	1.20	1.62	0.63	0.18	0.32	40.5
OR908	5.04	3.18	8.55	2.06	0.33	1.34	3.20	1.11	7.26	2.16	0.76	0.12	1.67	36.8
NORRIS	0.55	0.43	28.6	0.59	0.81	0.41	0.54	0.35	1.20	1.58	0.63	0.12	0.36	36.6
SLA	0.32	0.00	31.7	0.32	1.08	0.23	0.40	0.43	0.44	0.84	0.27	0.14	0.28	36.5
ORT361	3.53	4.96	6.63	4.46	1.53	1.09	1.36	1.68	2.11	3.32	0.72	0.81	1.96	36.3
LSJ01	8.60	6.43	7.33	1.27	0.64	0.59	1.53	1.18	1.76	1.76	0.72	0.55	1.40	35.1
RIB105	2.30	4.54	5.46	3.06	0.99	1.08	2.31	2.63	3.32	1.96	0.96	0.69	2.02	32.1
LSJRC06	4.56	6.63	4.10	0.80	0.26	0.92	0.82	0.86	0.69	2.44	1.31	0.22	1.33	28.8
20020368	0.41	3.31	16.3	0.11	1.50	0.40	0.48	0.49	1.24	1.86	0.36	0.27	0.41	27.1
SWBPP1	3.14	1.19	2.20	2.88	0.05	0.97	0.72	0.45	9.58	0.63	0.30	0.27	0.71	26.3
CARL-T_1	0.59	0.00	20.5	0.68	0.94	0.27	0.30	0.55	0.41	0.59	0.26	0.13	0.39	25.6
GBY01	2.01	2.92	3.55	0.75	0.84	0.73	1.93	0.96	1.61	1.78	0.81	0.62	1.22	20.8
LMAC	1.12	1.46	7.43	1.18	0.22	0.72	1.31	0.75	0.92	1.78	0.77	0.69	0.56	20.3
LSJRC10	1.92	2.79	4.48	0.99	0.41	0.70	0.71	0.63	0.55	1.88	0.85	0.18	0.84	20.2
TRT01	3.08	2.11	2.45	1.66	0.78	0.60	1.69	1.03	1.90	1.13	0.77	0.40	1.44	20.1
HAR	0.19	2.85	11.6	0.14	0.72	0.25	0.47	0.41	1.05	1.13	0.31	0.02	0.25	19.4
LSJ05	4.24	2.23	3.27	0.95	0.77	0.77	1.44	0.64	0.99	1.47	0.70	0.55	0.90	19.0
LSJ11	1.41	2.92	2.55	0.47	0.78	0.85	1.58	0.72	1.41	2.35	0.76	0.96	0.90	18.3
CRES-T_2	3.79	0.36	6.22	0.00	0.68	0.48	1.09	0.57	0.94	1.90	0.66	0.49	0.90	18.1
ARL109	2.85	1.75	2.58	1.40	0.75	0.45	1.36	0.78	1.43	1.46	0.60	0.48	1.01	17.7
LSJ08	1.79	3.56	2.67	0.48	0.72	0.71	1.28	0.55	1.09	1.86	0.64	0.69	0.79	17.2
LSJ14	1.28	1.71	2.48	0.70	0.81	0.66	1.46	0.66	1.21	1.71	0.70	0.51	0.91	15.8
NAS01	1.06	1.68	1.74	0.82	0.66	1.26	1.53	0.65	1.35	1.55	0.67	0.77	0.87	15.4
ASH	0.35	0.57	7.66	0.24	0.35	0.53	1.11	0.47	0.94	1.51	0.93	0.10	0.41	15.2
OW-6	0.67	0.00	5.29	0.63	0.49	0.48	1.12	2.02	1.03	1.81	0.74	0.35	0.51	15.2
LEO	0.67	1.12	3.17	2.52	0.38	0.30	0.45	0.25	0.34	0.83	0.42	0.25	0.15	15.0
JUL021	0.96	1.48	2.16	0.96	0.61	0.59	1.53	0.62	1.15	1.41	0.74	0.42	0.87	14.8
LOL	0.50	1.53	6.44	0.00	0.46	0.55	1.09	0.43	0.98	1.60	0.52	0.08	0.57	14.7
HALFMOON	0.32	0.32	7.20	0.35	0.60	0.46	0.41	0.36	1.35	1.69	0.33	0.14	0.33	14.5
MAITL	0.66	0.16	2.67	2.13	0.65	0.35	0.52	3.54	1.71	0.96	0.34	0.12	0.56	14.4
PEL	0.53	0.67	10.9	0.13	0.04	0.12	0.14	0.09	0.43	0.18	0.07	0.06	0.11	13.8
LSJ32	1.32	2.27	3.22	0.38	0.38	0.36	0.78	0.35	0.58	1.36	0.42	0.14	0.35	13.0
MBU	5.18	0.78	2.11	0.10	0.20	0.44	0.44	0.40	0.94	0.31	0.17	0.13	0.40	12.3
20020371	0.18	1.94	4.72	0.00	0.55	0.37	0.51	0.65	1.22	1.42	0.31	0.05	0.30	12.2
CHARLES	0.36	0.26	6.42	0.29	0.54	0.36	0.28	0.16	0.49	1.57	0.41	0.05	0.20	11.9
LSJ35	1.11	0.57	1.57	0.72	0.34	0.44	0.97	0.50	0.81	0.95	0.57	0.21	0.43	11.8
INDUSPL	0.23	0.32	1.06	0.56	0.15	0.28	0.20	0.41	3.58	0.64	0.23	1.55	0.23	11.8
20020381	0.29	2.51	3.84	0.33	0.83	0.28	0.48	0.39	0.72	1.19	0.30	0.17	0.26	11.6
CLH	0.50	0.00	2.30	0.00	0.39	0.97	1.56	0.41	0.88	1.36	0.78	1.71	0.58	11.4
MTC	0.84	0.40	7.64	0.18	0.00	0.17	0.23	0.18	0.75	0.48	0.11	0.09	0.29	11.3
20030411	0.54	0.61	2.54	0.25	0.26	0.76	1.26	0.39	0.82	1.34	0.65	0.08	0.61	11.3
LSJRC19	0.89	1.27	1.05	0.54	0.35	0.57	1.00	0.74	0.64	1.73	0.76	0.21	0.53	10.7
WEK021	1.52	0.27	2.26	0.10	0.75	0.40	1.37	0.34	0.67	1.21	0.42	0.41	0.29	10.4
LSJ28	0.77	1.35	3.60	0.00	0.53	0.27	0.54	0.21	0.44	1.29	0.26	0.09	0.28	10.3
OW-4	0.36	0.00	2.57	0.22	0.46	0.32	1.06	1.28	0.63	1.35	0.69	0.26	0.37	9.6

Site	PAH	PCB	DDT	Chlor	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn	Total HI
ORD	3.84	0.80	1.11	0.00	0.20	0.49	1.21	0.10	0.22	0.39	0.27	0.06	0.10	9.5
OLK	0.19	1.82	2.30	0.00	0.48	0.40	0.63	0.30	0.88	1.23	0.33	0.00	0.34	8.9
19010001	0.90	0.37	0.63	0.13	0.20	0.13	0.40	0.14	1.72	0.21	0.14	0.03	2.98	8.5
NEWLKD	0.51	0.12	1.59	0.00	0.66	0.60	0.52	0.31	0.75	1.53	0.50	0.10	0.56	8.2
LKWOOD	0.18	1.49	2.12	0.00	0.31	0.26	0.91	0.32	0.72	0.94	0.56	0.15	0.24	8.2
LSJ40	1.45	0.08	1.29	0.00	0.33	0.40	1.31	0.30	0.69	0.89	0.39	0.11	0.35	8.0
NEWLKE	0.19	0.05	0.38	0.00	0.55	0.39	0.57	0.40	0.59	1.29	0.49	0.09	0.39	7.9
HELENA	0.36	0.06	1.16	0.00	0.22	2.28	0.27	0.31	0.23	0.66	0.41	0.04	0.22	7.9
19020002	1.46	0.57	0.08	1.37	0.82	0.18	1.14	0.20	0.60	0.37	0.49	0.04	0.53	7.8
CDRC02	0.57	0.35	1.04	0.09	0.58	0.31	0.61	0.36	0.80	1.69	0.41	0.24	0.53	7.7
JOHNS-T_1	0.11	0.00	4.91	0.15	0.29	0.15	0.23	0.44	0.35	0.41	0.17	0.17	0.21	7.6
NEWLKF	0.33	0.04	0.46	0.00	0.63	0.37	0.54	0.26	0.47	1.11	0.47	0.10	0.30	7.6
LSJ17	0.63	0.59	1.29	0.27	1.06	0.20	0.74	0.27	0.37	0.78	0.31	0.15	0.31	7.6
GBY02	0.63	0.75	0.94	0.52	0.36	0.24	0.79	0.40	0.68	0.61	0.34	0.27	0.53	7.5
HAW	0.14	0.22	4.45	0.08	0.11	0.19	0.56	0.11	0.57	0.51	0.18	0.04	0.16	7.3
OLA-T_2	0.14	0.00	3.52	0.25	0.37	0.17	0.34	0.73	0.44	0.32	0.23	0.20	0.52	7.2
20020377	0.07	2.91	1.40	0.00	0.65	0.12	0.29	0.11	0.22	0.80	0.19	0.00	0.08	6.9
KER	0.13	0.84	1.44	0.00	0.44	0.46	0.65	0.38	0.38	0.52	0.48	0.07	0.20	6.8
MCC01	0.33	0.09	0.88	1.56	0.42	0.36	0.54	0.32	0.35	0.61	0.32	0.35	0.38	6.7
LYC	0.13	0.87	2.67	0.00	0.44	0.17	0.47	0.21	0.37	0.72	0.28	0.03	0.12	6.5
WASH	0.18	0.27	1.63	0.21	0.05	0.25	0.47	0.28	0.62	1.06	0.33	0.14	0.38	6.3
LSJ21	0.27	0.28	0.46	0.32	1.07	0.28	0.58	0.31	0.42	0.92	0.33	0.15	0.39	6.2
RC051	0.50	0.93	0.41	0.31	0.17	0.12	0.33	0.25	0.43	1.11	0.30	0.11	0.25	6.2
27010024	0.20	0.25	0.33	0.21	0.51	0.19	1.55	0.34	0.67	0.57	0.59	0.08	0.57	6.1
GCRB11	0.30	0.89	0.38	0.22	0.26	0.10	0.62	0.15	1.54	0.33	0.25	0.12	0.21	6.0
USJ055	0.17	1.56	1.90	0.46	0.04	0.16	0.21	0.10	0.46	0.53	0.10	0.04	0.19	5.9
SIM	1.58	0.07	0.15	0.06	0.06	0.21	0.17	0.07	0.22	0.32	0.05	0.00	2.23	5.5
BWCCPB	0.33	0.57	2.78	0.03	0.05	0.23	0.24	0.09	0.17	0.46	0.11	0.01	0.08	5.4
LSJ087	0.22	0.30	0.33	0.10	0.03	0.09	0.07	1.89	1.30	0.88	0.04	0.00	0.15	5.4
PCR-PL	0.06	0.41	0.57	2.05	0.06	0.26	0.16	0.07	0.18	0.36	0.10	0.07	0.18	5.4
LSJRC17	0.36	0.87	1.14	0.20	0.15	0.15	0.33	0.21	0.26	0.86	0.19	0.07	0.16	5.2
DUNN02	0.38	0.00	0.00	0.00	0.59	0.29	1.05	0.25	0.39	1.05	0.47	0.30	0.19	5.2
BWC44	0.40	0.71	1.38	0.42	0.03	0.23	0.13	0.12	0.81	0.19	0.08	0.00	0.70	5.2
NEWLKC	0.32	0.39	1.34	0.00	0.15	0.22	0.11	0.12	0.62	0.58	0.11	0.06	0.24	4.6
GEN	0.20	0.32	0.73	0.28	0.28	0.25	0.31	0.19	0.89	0.56	0.26	0.03	0.23	4.5
USJ918	0.38	0.25	1.11	0.08	0.05	0.10	0.48	0.13	0.50	0.77	0.22	0.02	0.12	4.2
OLA-T_1	0.05	0.00	2.43	0.07	0.13	0.09	0.14	0.34	0.26	0.18	0.14	0.10	0.23	4.2
02235000	0.25	0.41	0.42	0.36	0.26	0.37	0.32	0.17	0.40	0.51	0.18	0.02	0.18	3.9
HOWELL	0.47	1.41	0.29	0.22	0.09	0.04	0.11	0.19	0.25	0.08	0.05	0.19	0.20	3.8
20010003	0.43	0.21	0.89	0.18	0.09	0.14	0.37	0.14	0.24	0.23	0.22	0.05	0.10	3.6
MINN-T_2	0.15	0.00	1.59	0.06	0.12	0.11	0.17	0.20	0.37	0.28	0.10	0.12	0.20	3.5
CRES-T_1	0.38	0.00	0.37	0.00	0.29	0.15	0.60	0.16	0.27	0.55	0.27	0.23	0.20	3.5
SJRPLTKA	0.67	0.16	0.39	0.08	0.21	0.16	0.23	0.12	0.25	0.25	0.08	0.12	0.21	3.4
SILRV	0.16	0.12	0.57	0.00	0.15	0.44	0.71	0.05	0.06	0.22	0.18	0.09	0.07	3.2
LAG	0.21	0.18	0.70	0.22	0.13	0.14	0.29	0.11	0.12	0.43	0.27	0.07	0.06	3.2
POSSUM-T_1	1.21	0.00	0.21	0.74	0.04	0.18	0.22	0.03	0.08	0.10	0.08	0.07	0.09	3.1
20030412	1.20	0.09	0.42	0.05	0.14	0.10	0.08	0.12	0.25	0.13	0.04	0.01	0.18	3.0
MUD-T_2	0.10	0.00	0.37	0.00	0.28	0.21	0.26	0.11	0.19	0.86	0.19	0.04	0.12	2.7
CHERRY	0.03	0.02	1.56	0.12	0.06	0.07	0.07	0.11	0.16	0.10	0.04	0.03	0.08	2.6
MUD-T_1	0.12	0.00	0.00	0.00	0.34	0.25	0.40	0.10	0.11	0.94	0.21	0.04	0.09	2.6
JOHNSON	0.05	0.09	0.60	0.14	0.09	0.07	0.15	0.13	0.40	0.12	0.09	0.11	0.36	2.5
NBLACK	0.09	0.05	0.00	0.20	0.15	0.19	0.26	0.08	0.26	0.18	0.09	0.11	0.32	2.5
LSJ099	0.28	0.23	0.09	0.10	0.02	0.11	0.12	0.08	0.99	0.08	0.05	0.00	0.24	2.5
DIAS	0.12	0.10	0.43	0.05	0.65	0.04	0.16	0.12	0.20	0.22	0.12	0.07	0.14	2.4
MAT	0.54	0.06	0.32	0.44	0.05	0.10	0.28	0.11	0.20	0.10	0.08	0.02	0.10	2.4
TUBPP1	0.39	0.28	0.26	0.12	0.24	0.13	0.09	0.06	0.33	0.19	0.04	0.00	0.09	2.2
MR312	0.04	0.15	0.01	0.00	0.24	0.14	0.50	0.15	0.35	0.12	0.18	0.03	0.18	2.1
20010137	0.66	0.14	0.08	0.62	0.01	0.08	0.04	0.02	0.04	0.18	0.02	0.00	0.03	2.1
WIN	0.02	0.15	0.26	0.22	0.10	0.11	0.10	0.08	0.30	0.43	0.07	0.01	0.14	2.0

Site	PAH	PCB	DDT	Chlor	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn	Total HI
BEAR	0.08	0.10	0.51	0.33	0.12	0.00	0.08	0.08	0.33	0.00	0.04	0.05	0.09	2.0
02236000	0.11	0.20	0.30	0.05	0.10	0.10	0.31	0.11	0.22	0.20	0.09	0.02	0.16	2.0
LSJ918	0.28	0.25	0.35	0.00	0.04	0.08	0.24	0.05	0.35	0.18	0.07	0.01	0.08	2.0
MILLD	0.02	0.00	0.08	0.02	0.03	0.00	0.03	0.03	1.48	0.03	0.02	0.05	0.12	1.9
27010037	0.20	0.07	0.36	0.06	0.06	0.10	0.23	0.10	0.25	0.17	0.09	0.06	0.14	1.9
HOG30	0.13	0.12	0.10	0.09	0.01	0.08	0.07	0.04	0.99	0.19	0.03	0.00	0.03	1.9
20020001	0.07	0.09	0.59	0.34	0.04	0.00	0.16	0.06	0.13	0.14	0.08	0.02	0.05	1.9
OLA	0.02	0.04	0.62	0.05	0.12	0.02	0.11	0.18	0.19	0.05	0.06	0.08	0.09	1.8
20030400	0.02	0.04	0.26	0.10	0.09	0.11	0.14	0.09	0.22	0.49	0.08	0.02	0.07	1.7
SRS	0.03	0.15	0.02	0.00	0.04	0.10	0.49	0.08	0.25	0.20	0.16	0.06	0.09	1.7
LOUISA	0.21	0.01	0.31	0.05	0.04	0.00	0.07	0.06	0.53	0.03	0.02	0.07	0.06	1.6
CALF-T_1	0.07	0.00	0.16	0.26	0.04	0.06	0.10	0.10	0.23	0.16	0.07	0.06	0.14	1.4
LORANCRK	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.06	0.10	0.07	0.02	0.14	0.48	1.4
SOUTH	0.08	0.06	0.18	0.00	0.16	0.02	0.09	0.05	0.16	0.29	0.11	0.03	0.13	1.3
SUNLAND	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.02	0.94	0.06	0.02	0.02	0.08	1.3
CC03	0.17	0.04	0.17	0.72	0.01	0.00	0.02	0.02	0.03	0.07	0.02	0.01	0.03	1.3
27010875	0.01	0.09	0.03	0.00	0.07	0.11	0.26	0.09	0.22	0.12	0.11	0.03	0.08	1.3
WINN	0.02	0.03	0.22	0.07	0.07	0.03	0.09	0.07	0.27	0.07	0.04	0.04	0.08	1.2
LHAT26	0.00	0.00	0.00	0.00	0.06	0.08	0.35	0.03	0.18	0.12	0.07	0.07	0.10	1.2
KERR	0.01	0.00	0.05	0.00	0.49	0.00	0.09	0.05	0.29	0.00	0.02	0.06	0.07	1.1
JOHNS-T_2	0.02	0.00	0.50	0.02	0.04	0.03	0.08	0.09	0.09	0.12	0.00	0.07	0.06	1.1
MINN-T_1	0.03	0.00	0.37	0.00	0.05	0.07	0.06	0.08	0.15	0.16	0.00	0.05	0.08	1.1
02238000	0.01	0.13	0.26	0.06	0.01	0.09	0.20	0.09	0.09	0.09	0.02	0.01	0.06	1.1
BLSPR	0.00	0.08	0.00	0.00	0.04	0.35	0.18	0.04	0.08	0.15	0.07	0.00	0.05	1.1
DALHOUS	0.01	0.01	0.14	0.01	0.05	0.03	0.16	0.10	0.21	0.00	0.03	0.18	0.10	1.0
BROWARD	0.01	0.01	0.08	0.02	0.06	0.00	0.10	0.06	0.39	0.05	0.03	0.10	0.09	1.0
20020012	0.03	0.04	0.04	0.00	0.04	0.00	0.35	0.07	0.13	0.13	0.06	0.03	0.06	1.0
WEIR-T_1	0.00	0.00	0.01	0.00	0.04	0.02	0.11	0.03	0.08	0.09	0.00	0.13	0.40	0.9
LHNBPL	0.04	0.02	0.04	0.05	0.04	0.11	0.11	0.03	0.07	0.09	0.05	0.06	0.08	0.9
27010579	0.02	0.12	0.27	0.02	0.01	0.00	0.10	0.05	0.10	0.10	0.03	0.03	0.06	0.9
20030373	0.04	0.11	0.03	0.05	0.03	0.00	0.09	0.05	0.08	0.08	0.03	0.10	0.04	0.9
SJRJESUP	0.01	0.00	0.00	0.00	0.06	0.08	0.12	0.03	0.10	0.07	0.03	0.07	0.12	0.9
WEIR-T_2	0.02	0.00	0.06	0.00	0.04	0.03	0.12	0.04	0.11	0.07	0.00	0.08	0.27	0.8
HAHA-T_1	0.02	0.00	0.16	0.01	0.03	0.03	0.07	0.05	0.09	0.16	0.00	0.08	0.05	0.7
WIO	0.01	0.09	0.08	0.00	0.01	0.00	0.07	0.03	0.06	0.28	0.02	0.00	0.05	0.7
SHEEL	0.00	0.10	0.00	0.00	0.00	0.00	0.11	0.05	0.19	0.13	0.01	0.00	0.07	0.7
SELLERS	0.01	0.01	0.03	0.00	0.04	0.00	0.09	0.07	0.15	0.03	0.02	0.08	0.13	0.7
NRI	0.03	0.03	0.00	0.00	0.03	0.00	0.18	0.05	0.15	0.03	0.04	0.00	0.06	0.6
19010006	0.01	0.08	0.01	0.00	0.04	0.00	0.17	0.03	0.16	0.04	0.01	0.01	0.03	0.6
DORR	0.01	0.01	0.14	0.01	0.02	0.00	0.06	0.03	0.11	0.00	0.01	0.05	0.04	0.6
BUL	0.01	0.02	0.00	0.00	0.02	0.00	0.12	0.05	0.10	0.09	0.05	0.02	0.05	0.5
LOCCR	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.02	0.03	0.08	0.01	0.04	0.07	0.5
HAHA-T_2	0.01	0.00	0.10	0.01	0.03	0.03	0.03	0.04	0.08	0.09	0.00	0.03	0.03	0.5
NEWLKB	0.01	0.01	0.00	0.00	0.00	0.03	0.03	0.03	0.02	0.06	0.01	0.02	0.05	0.5
LSJ070	0.05	0.01	0.02	0.00	0.01	0.00	0.12	0.04	0.10	0.03	0.01	0.02	0.03	0.5
NEWLKA	0.01	0.01	0.00	0.00	0.00	0.04	0.03	0.05	0.02	0.07	0.01	0.02	0.05	0.4
TOL	0.00	0.01	0.05	0.00	0.04	0.00	0.09	0.03	0.06	0.08	0.03	0.01	0.03	0.4
LHATSB	0.01	0.00	0.00	0.00	0.05	0.04	0.05	0.03	0.03	0.09	0.02	0.03	0.06	0.4
20010002	0.03	0.13	0.00	0.00	0.00	0.00	0.06	0.03	0.04	0.03	0.02	0.02	0.02	0.4
HAT26	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.01	0.02	0.08	0.01	0.01	0.09	0.3
LH-T_1	0.00	0.00	0.06	0.04	0.01	0.03	0.03	0.01	0.02	0.05	0.00	0.05	0.02	0.3
DMR	0.04	0.01	0.00	0.00	0.00	0.09	0.06	0.02	0.04	0.00	0.02	0.01	0.02	0.3
02248000	0.01	0.01	0.01	0.02	0.01	0.00	0.03	0.02	0.03	0.07	0.02	0.01	0.03	0.3
CLW	0.00	0.03	0.00	0.00	0.02	0.00	0.04	0.02	0.04	0.06	0.01	0.00	0.01	0.2
02240800	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.02	0.08	0.01	0.01	0.01	0.2
20020404	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.01	0.01	0.01	0.1
MPS	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.02	0.01	0.01	0.00	0.01	0.1

[a] The DDT HQ values are the sum of the individual HQ values for DDT, DDE, and DDD. The HI values are the sum of the listed HQs and the HQs of the other parameters for which TEC values exist (Lindane, Dieldrin, Endrin, and Heptachlor epoxide).

Table B-8. Selected Biological Indices and the TEC-Based Hazard Index (HI) Values Calculated for Districtwide Assessment Sites

Site	Water body Type	Biological/Benthic Indices				HI (TEC-based)
		CBSI	Total Number of Taxa	S-W Species Diversity	AFI	
02235000	Stream	10	16	2.651	4	3.9
02236000	Stream	NA[a]	14	2.21	3	2.0
02238000	Stream	1	3	0.739	0	1.1
02240800	Stream	10	11	2.2	2	0.2
02248000	Stream	NA	12	1.864	1	0.3
19010001	Stream	3.70	2	0.848	0	8.5
19010006	Stream	44	23	3.699	11	0.6
19020002	Estuary	3.84	2	0.918		7.8
20010002	Stream	NA	17	3.034	4	0.4
20010003	Stream	NA	14	1.603	2	3.6
20010137	Stream	NA	10	2.272	4	2.1
20020001	Stream	0	1	0	0	1.9
20020012	Stream	10	16	3.253	2	1.0
20020368	Lake					27.1
20020371	Lake	17	7	2.196	5	12.2
20020377	Lake					6.9
20020381	Lake					11.6
20020404	Stream	4	9	2.602	1	0.1
20030373	Stream	NA	9	2.239	2	0.9
20030400	Lake	11	1	0	0	1.7
20030411	Lake	12	8	2.512	2	11.3
20030412	Lake	27	11	1.303	8	3.0
27010024	Estuary	13.62	12	0.809		6.1
27010037	Estuary	19.97	14	2.987		1.9
27010579	Stream	13	15	2.732	3	0.9
27010875	Estuary	15.79	11	2.396		1.3
ARL109	Estuary	16.86	11	2.928		17.7
ASH	Lake	14	6	2.264	4	15.2
BEAR	Lake	35	13	2.378	11	2.0
BLSPR	Spring	NA	12	1.745		1.1
BROWARD	Lake	40	16	3.159	12	1.0
BUL	Estuary	17.61	13	2.304		0.5
BWC44	Stream	0	6	0.889	0	5.2
BWCCPB	Stream	5	6	1.403	1	5.4
CALF-T_1	Lake	NA	17	3.201		1.4
CARL-T_1	Lake	9	5	0.602	2	25.6
CARL-T_2	Lake	9	5	0.673	2	118
CC03	Stream	NA	8	1.592	1	1.3
CDRC02	Stream	NA	7	2.164	3	7.7
CED01D	Stream	3	2	0.235	0	87.9
CED062	Stream	9	7	0.763	0	72.5
CHARLES	Lake	23	3	0.274	10	11.9
CHERRY	Lake	16	8	2.828	4	2.6
CLA	Lake	4	2	0.503	1	41.1
CLD	Lake					40.5
CLH	Lake	12	8	2.707	2	11.4
CLW	Lake	19	11	1.44	4	0.2
CRES-T_1	Lake	17	11	1.917	3	3.5
CRES-T_2	Lake	4	4	1.504	0	18.1
DALHOUS	Lake	58	22	3.174	18	1.0
DIAS	Lake	10	2	0.971	4	2.4
DMR	Stream	11	13	2.998	3	0.3
DOR	Lake					45.5

Site	Water body Type	Biological/Benthic Indices				HI (TEC-based)
		CBSI	Total Number of Taxa	S-W Species Diversity	AFI	
DORR	Lake	14	8	2.417	3	0.6
DUNN02	Stream	1	1	0	0	5.2
GBY01	Estuary	8.07	6	1.034		20.8
GBY02	Estuary	9.71	8	0.855		7.5
GCRB11	Estuary	12.78	8	2.391		6.0
GEN	Lake	29	13	1.647	8	4.5
HAHA-T_1	Lake	28	16	3.128	6	0.7
HAHA-T_2	Lake	20	8	2.709	6	0.5
HALFMOON	Lake	20	8	2.312	6	14.5
HAR	Lake					19.4
HAT26	Stream					0.3
HAW	Stream	4	6	0.697	1	7.3
HELENA	Stream	NA	4	1.847	1	7.9
HOG30	Stream					1.9
HOWELL	Lake	5	5	1.88	0	3.8
INDUSPL	Stream					11.8
JOHNSON	Lake	16	8	1.692	4	2.5
JOHNS-T_1	Lake	17	7	1.308	5	7.6
JOHNS-T_2	Lake	29	13	2.431	8	1.1
JUL021	Estuary	7.29	4	1.647		14.8
KER	Lake					6.8
KERR	Lake	16	8	2.435	4	1.1
LAG	Lake					3.2
LEO	Lake					15.0
LFW01	Estuary	6.48	5	0.74		56.7
LHAT26	Stream					1.2
LHATSB	Stream					0.4
LHNBPL	Stream					0.9
LH-T_1	Lake	16	10	2.199	3	0.3
LKWOOD	Lake	3	3	1.342	0	8.2
LMAC	Lake					20.3
LOCCR	Stream	NA	12	1.375	3	0.5
LOL	Lake	6	6	2.004	0	14.7
LORANCRK	Stream	NA	11	3.029	0	1.4
LOUISA	Lake	12	6	1.88	3	1.6
LSJ01	Estuary					35.1
LSJ05	Estuary					19.0
LSJ070	Stream	11	14	2.909	6	0.5
LSJ08	Estuary					17.2
LSJ087	Stream	9	6	1.368	0	5.4
LSJ099	Stream	18	11	3.265	4	2.5
LSJ11	Estuary					18.3
LSJ14	Estuary					15.8
LSJ17	Estuary					7.6
LSJ21	Stream					6.2
LSJ28	Stream					10.3
LSJ32	Stream					13.0
LSJ35	Stream					11.8
LSJ40	Stream					8.0
LSJ918	Stream	NA	13	2.53	4	2.0
LSJRC06	Stream					28.8
LSJRC10	Stream					20.2
LSJRC17	Stream					5.2
LSJRC19	Stream					10.7
LYC	Lake	12	8	2.31	2	6.5
MAITL	Lake	8	6	1.061	1	14.4

Site	Water body Type	Biological/Benthic Indices				HI (TEC-based)
		CBSI	Total Number of Taxa	S-W Species Diversity	AFI	
MAT	Estuary	10.32	6	2.161		2.4
MBU	Stream	0	1	0	0	12.3
MCC01	Stream	NA	5	2.075	1	6.7
MILLD	Lake	24	8	2.594	8	1.9
MINN-T_1	Lake	23	11	2.984	6	1.1
MINN-T_2	Lake	14	6	2.161	4	3.5
MON104	Estuary	9.30	6	1.651		66.2
MPS	Stream	18	16	3.495	6	0.1
MR312	Estuary	29.27	25	2.135		2.1
MTC	Stream	NA	9	1.743	2	11.3
MUD-T_1	Lake	6	4	0.374	1	2.6
MUD-T_2	Lake	6	4	0.388	1	2.7
NAS01	Estuary	10.58	6	2.289		15.4
NBLACK	Stream	11	19	3.336	1	2.5
NEWLKA	Lake					0.4
NEWLKB	Lake					0.5
NEWLKC	Lake					4.6
NEWLKD	Lake					8.2
NEWLKE	Lake					7.9
NEWLKF	Lake					7.6
NLA	Lake	2	2	0.454	0	106
NORRIS	Lake	7	3	1.459	2	36.6
NRI	Stream	2	3	0.427	2	0.6
OLA	Lake	15	9	1.752	3	1.8
OLA-T_1	Lake	19	15	3.036	2	4.2
OLA-T_2	Lake	35	23	3.182	6	7.2
OLK	Lake	7	7	2.336	0	8.9
OR908	Lake					36.8
ORD	Stream	2	9	2.646	2	9.5
ORT051	Estuary	4.67	3	0.835		57.2
ORT361	Estuary	8.49	6	1.247		36.3
OW-4	Lake	2	2	0.099	0	9.6
OW-6	Lake	4	4	1.685	0	15.2
PCR-PL	Stream					5.4
PEL	Estuary	4	7	1.549		13.8
POSSUM-T_1	Stream	NA	35	3.952	12	3.1
RC051	Stream	9	10	2.057	2	6.2
RIB105	Estuary	10.06	7	1.531		32.1
RICE02	Stream	3	5	1.408	1	86.9
SELLERS	Lake	15	9	1.696	3	0.7
SHEEL	Lake	22	12	2.404	5	0.7
SILRV	Stream	7	8	1.76	5	3.2
SIM	Stream	NA	16	2.934	7	5.5
SJRJESUP	Stream	NA	8	2.176	1	0.9
SJRPLTKA	Stream	NA	10	2.705	3	3.4
SLA	Lake	1	1	0	0	36.5
SOUTH	Lake	5	3	0.56	1	1.3
SRS	Stream	NA	2	0.85	0	1.7
SUNLAND	Stream					1.3
SWBPP1	Stream					26.3
TOL	Estuary	27.77	20	3.886		0.4
TRT01	Estuary	2.21	2	0.107		20.1
TUBPP1	Stream	NA	6	1.909	0	2.2
USJ055	Stream	NA	7	1.834	2	5.9
USJ918	Stream	NA	7	1.616	2	4.2
WASH	Lake	17	7	2.648	5	6.3

Site	Water body Type	Biological/Benthic Indices				HI (TEC-based)
		CBSI	Total Number of Taxa	S-W Species Diversity	AFI	
WEIR-T_1	Lake	43	25	3.42	9	0.9
WEIR-T_2	Lake	32	26	2.99	3	0.8
WEK021	Stream	NA	3	0.869	0	10.4
WIN	Lake					2.0
WINN	Lake	23	11	2.764	6	1.2
WIO	Lake	23	1	0	11	0.7

[a] NA: Sites for which data was insufficient, or sites from groups for which no significant correlation to hazard indices was found.

Appendix C. Summary Data from Detailed Assessment Sampling

Table C-1: Selected Organic Compound Concentrations for Detailed Assessment Sites (µg/kg, dry weight)

Site	Total PAH	Low PAH	High PAH	Total PCB Estimated	Total DDT	DDT	DDD	DDE	DDMU	Dichlorobenzophenone	Sum All DDT Compounds	Total Chlordane	Total BHCs	Total Endosulfans
AB-T_1				ND	4,570	112	3,390	1,060	2,110	384	7,060	241	ND	ND
AB-T_2				ND	24.4	0.56	9.76	14.1	4.90	3.80	33.1	0.86	ND	ND
AB-T_3				ND	429	10.9	186	232	97.2	67.2	593	20.2	ND	ND
AB-T_4				ND	7.82	ND	3.20	4.61	1.48	ND	9.30	0.54	ND	ND
DORAA				1.04	0.22	0.029	0.13	0.07				0.10	0.02	0.04
DORAB				16.9	64.5	4.51	12.4	47.6				4.40	3.48	0.39
DORAC				22.2	78.5	4.03	9.95	64.5				5.69	5.05	ND
DORAD				29.1	93.0	6.02	11.7	75.3				12.8	7.61	0.60
DORAE				45.5	115	7.45	21.9	86.1				16.4	7.83	ND
DORAF				15.2	203	11.8	34.2	157				6.66	4.99	ND
DORAF				ND	249	3.89	27.6	218	46.1	33.0	329	1.90	ND	ND
DORAG				21.9	200	13.1	46.9	140				5.34	3.98	0.44
DORAG				ND	2.14	ND	0.59	1.55	ND	ND	2.14	ND	ND	ND
DORAH				ND	830	35.0	444	351	264	66.4	1,160	22.3	ND	ND
EUSTA				91.8	37.3	5.37	8.55	23.3				20.7	3.9	1.95
EUSTB				3.26	1.10	0.17	0.68	0.25				0.05	0.09	0.11
EUSTC				106	72.3	3.02	10.5	58.7				4.37	3.43	1.77
EUSTD				58.7	22.1	1.99	3.21	16.9				3.59	4.96	0.95
EUSTE				7.67	4.09	0.51	1.02	2.57				1.03	1.07	0.09
EUSTF				29.9	19.6	2.52	5.52	11.6				3.30	4.05	0.36
EUSTG				3.33	0.87	0.11	0.19	0.57				0.27	0.50	ND
GRIFFA				37.7	16.8	2.89	3.96	9.93				2.34	5.40	0.87
GRIFFB				23.9	22.3	1.28	6.28	14.7				1.32	3.11	ND
GRIFFC				5.16	6.35	1.15	ND	5.20				0.46	4.12	ND
GRIFFD				60.2	14.2	6.80	1.87	5.52				3.89	1.60	0.82
GRIFFE				24.3	33.1	ND	11.3	21.8				4.44	3.89	0.37
GRIFFF				8.50	11.1	ND	2.72	8.35				2.54	3.70	0.26
HARA				4.84	13.5	ND	4.39	9.08				0.27	2.17	ND
HARB				36.1	44.8	ND	11.0	33.7				3.18	3.09	ND
HARC				8.66	4.25	0.23	0.99	3.03				0.47	0.84	0.14
HARD				13.7	16.4	1.54	3.49	11.4				1.80	3.16	0.19
HARE				28.0	9.29	ND	2.01	7.28				1.49	2.73	0.61
HARF				14.9	27.4	4.28	3.25	19.9				2.65	5.56	2.09
CLA	544	134	410	ND	143	ND	74.6	68.6	92.8	16.7	253	1.18	ND	ND

Site	Total PAH	Low PAH	High PAH	Total PCB Estimated	Total DDT	DDT	DDD	DDE	DDMU	Dichlorobenzophenone	Sum All DDT Compounds	Total Chlordane	Total BHCs	Total Endosulfans
NLA	498	114	384	ND	392	3.71	204	185	913	65.4	1,370	2.30	ND	ND
SLA	510	120	390	ND	119	ND	53.8	65.5	154	21.4	295	1.03	ND	ND
LA-R_1				ND	212	ND	96.3	115	170	30.8	413	1.66	ND	ND
LA-R_2				ND	203	2.33	53.3	147	95.4	31.7	330	5.62	ND	ND
LA-R_3				ND	58.0	ND	21.3	36.7	9.62	52.9	121	ND	ND	ND
LA-R_4				ND	144	ND	46.7	97.6	79.7	21.4	245	3.36	ND	ND
LA-R_5				ND	245	ND	65.4	179	89.0	31.4	365	6.11	ND	ND
LA-R_6				ND	68.1	ND	17.8	50.3	17.4	18.1	104	ND	ND	ND
LA-R_7				ND	5.51	ND	2.44	3.06	0.92	3.38	9.81	ND	ND	ND
LA-T_1				ND	9.13	ND	5.68	3.46	ND	ND	9.13	ND	ND	ND
LA-T_2				ND	158	ND	63.1	94.8	89.8	17.3	265	ND	ND	ND
LA-T_3				ND	63.8	2.28	37.4	24.1	18.0	10.8	92.6	ND	ND	ND
LA-T_4				ND	1,570	113	795	662	516	72.2	2,160	43.1	ND	ND
LA-T_5				ND	173	5.69	81.3	86.0	25.0	15.5	213	12.0	ND	ND
LA-T_6				ND	204	4.51	44.6	155	104	41.5	349	4.50	ND	ND
LA-T_7				ND	254	12.8	58.1	183	78.9	25.5	359	6.17	ND	ND
LA-T_8				ND	59.3	ND	21.7	37.6	13.1	54.8	127	ND	ND	ND
LA-T_9				ND	153	ND	42.3	111	45.4	51.9	251	ND	ND	ND
BIVENA				112	27.1	2.62	10.5	14.1				12.2	2.23	3.64
BIVENB				150	47.2	3.70	8.35	35.2				5.94	ND	1.82
BIVENC				79.6	15.9	ND	5.76	10.2				6.21	0.38	2.43
BIVEND				223	73.0	3.62	34.8	34.6				40.5	ND	11.6
BIVENE				138	94.3	2.04	12.2	80.1				4.91	1.20	5.04
BIVENE	31,200	1,400	29,800	76.7	63.9	3.28	3.89	56.7	6.06	ND	69.9	2.96	ND	ND
BIVENF				1.07	0.55	ND	0.17	0.39				0.20	0.12	ND
BIVEN-T_G	1,000	70.5	932	9.66	7.82	0.27	0.69	6.86	1.44	ND	9.26	1.19	ND	ND
BIVEN-T_H	13,300	658	12,600	57.8	39.9	2.85	3.34	33.7	4.27	ND	44.1	3.22	ND	ND
BIVEN-T_I	13,900	742	13,200	45.2	27.1	2.02	2.72	22.3	3.21	ND	30.3	2.29	ND	ND
HOGA				11.0	2.12	0.12	1.86	0.14				2.92	0.05	0.58
HOGB				9.75	4.12	ND	3.91	0.21				6.44	0.84	1.72
HOGC				21.0	11.5	0.90	8.26	2.35				9.66	0.40	1.85
HOGD				10.1	2.20	0.09	1.21	0.90				2.24	0.45	0.62
ROSE-T_1	274	16.6	257	4.77	1.60	0.23	0.68	0.69	ND	ND	1.60	3.08	ND	ND
SWEETA				156	39.1	14.8	14.5	9.79				32.0	3.06	5.94
SWEETA	5,890	951	4,940	4.02	2.72	0.47	0.75	1.5	ND	ND	2.72	0.96	ND	ND
SWEETB				109	17.6	2.97	4.84	9.74				13.6	0.89	1.42
SWEETC				25.6	5.83	1.22	3.08	1.53				5.90	0.69	1.15
SWEETD				38.2	2.16	1.02	1.14	ND				1.71	0.022	0.81

Site	Total PAH	Low PAH	High PAH	Total PCB Estimated	Total DDT	DDT	DDD	DDE	DDMU	Dichloroben zophenone	Sum All DDT Compounds	Total Chlordane	Total BHCs	Total Endosulfans
SWEETE				16.7	2.64	1.05	1.20	0.39				4.00	0.10	0.20
SWEET-T_1	1,820	148	1,680	5.00	1.55	ND	0.76	0.78	ND	ND	1.55	3.34	ND	ND
TUMB-T_1	73,100	9,770	63,300	4.47	7.41	ND	2.48	4.93	ND	ND	7.41	28.9	ND	ND
TUMB-T_2	15,000	1,710	13,300	2.89	2.42	ND	0.79	1.63	ND	ND	2.42	8.92	ND	ND
DISSA				2.44	2.40	0.21	0.84	1.35				0.10	0.10	0.20
DISSB				0.20	0.29	ND	0.10	0.19				ND	ND	ND
DISSC				31.3	54.2	2.15	15.8	36.2				1.81	0.87	1.53
DISSD				0.33	0.23	ND	0.09	0.14				ND	ND	ND
DISSE				1.69	0.50	ND	0.29	0.21				ND	ND	0.06
GEORGEA				0.04	ND	ND	ND	ND				0.03	0.05	ND
GEORGEB				11.3	3.13	1.17	0.77	1.19				0.20	1.37	0.39
GEORGEC				8.80	3.53	1.06	0.91	1.56				0.48	0.85	0.41
GEORGED				1.55	0.62	0.24	0.24	0.14				0.08	0.43	0.04
GEORGEE				0.02	ND	ND	ND	ND				0.05	ND	ND
GEORGEF				17.7	7.25	2.58	1.65	3.02				0.83	4.54	0.64
GEORGEG				24.6	6.96	2.60	1.41	2.95				2.21	2.81	0.53
GEORGEH				2.32	0.70	0.26	0.29	0.15				0.44	0.36	0.07
GEORGEI				2.82	1.33	0.31	0.43	0.59				0.21	0.23	0.09
GEORGEJ				16.2	10.4	1.45	2.6	6.35				0.08	0.96	0.43
MONA				15.1	2.00	0.45	0.79	0.75				1.04	0.41	0.23
MONB				64.6	24.0	6.2	8.44	9.41				10.2	1.00	2.41
MONC				32.1	14.9	2.61	4.47	7.79				2.53	1.67	0.46
MOND				2.63	0.88	0.25	0.24	0.39				0.31	0.26	0.10
MONE				31.2	14.8	2.19	3.89	8.73				1.68	4.67	0.27
MONF				4.21	1.40	0.4	0.43	0.57				0.40	0.52	0.11
MONG				13.0	7.05	1.33	2.04	3.68				1.56	0.87	0.10
NORRIS-T_1				ND	50.8	ND	24.8	26.0	13.1	8.51	72.3	ND	ND	ND
NORRIS-T_2				ND	77.4	ND	37.8	39.6	14.5	9.77	102	ND	ND	ND
NORRIS-T_3				ND	49.7	ND	23.3	26.4	11.2	7.67	68.6	ND	ND	ND
NORRIS-T_4				ND	50.1	ND	24.4	25.7	8.41	5.37	63.9	ND	ND	ND
NORRIS-T_5				ND	147	1.58	74.7	70.5	27.3	12.1	186	ND	ND	ND
NORRIS-T_6				ND	26.3	ND	10.3	16.0	3.51	2.05	31.9	ND	ND	ND

Table C-2: Selected Organic Compound Concentrations for Detailed Assessment Sites – TOC Normalized (µg/g TOC)

Site	Total PAH	Low PAH	High PAH	Total PCB Estimated	Total DDT	DDT	DDD	DDE	DDMU	Dichlorobenzophenone	Sum All DDT Compounds	Total Chlordane	Total BHCs	Total Endosulfans
AB-T_1				ND	9.32	0.230	6.92	2.17	4.31	0.780	14.4	0.490	ND	ND
AB-T_2				ND	1.11	0.025	0.440	0.640	0.220	0.170	1.51	0.039	ND	ND
AB-T_3				ND	1.65	0.042	0.710	0.890	0.370	0.260	2.28	0.078	ND	ND
AB-T_4				ND	0.870	ND	0.360	0.510	0.160	ND	1.03	0.060	ND	ND
DORAA				0.730	0.160	0.020	0.090	0.047				0.069	0.014	0.025
DORAB				0.047	0.180	0.013	0.035	0.130				0.012	0.010	0.001
DORAC				0.066	0.230	0.012	0.030	0.190				0.017	0.015	ND
DORAD				0.081	0.260	0.017	0.033	0.210				0.036	0.021	0.002
DORAE				0.110	0.280	0.018	0.054	0.210				0.040	0.019	ND
DORAF				0.039	0.520	0.031	0.088	0.400				0.017	0.013	ND
DORAF				ND	0.660	0.010	0.073	0.570	0.120	0.087	0.860	0.005	ND	ND
DORAG				0.081	0.740	0.049	0.170	0.520				0.020	0.015	0.002
DORAG				ND	0.180	ND	0.049	0.130	ND	ND	0.180	ND	ND	ND
DORAH				ND	1.93	0.081	1.03	0.820	0.610	0.150	2.70	0.052	ND	ND
EUSTA				0.260	0.100	0.015	0.024	0.065				0.058	0.011	0.005
EUSTB				1.96	0.660	0.100	0.410	0.150				0.030	0.052	0.066
EUSTC				0.330	0.220	0.009	0.032	0.180				0.013	0.011	0.005
EUSTD				0.170	0.062	0.006	0.009	0.048				0.010	0.014	0.003
EUSTE				0.067	0.036	0.004	0.009	0.022				0.009	0.009	0.001
EUSTF				0.100	0.067	0.009	0.019	0.039				0.011	0.014	0.001
EUSTG				0.370	0.096	0.012	0.021	0.063				0.030	0.055	ND
GRIFFA				0.095	0.042	0.007	0.010	0.025				0.006	0.014	0.002
GRIFFB				0.073	0.068	0.004	0.019	0.045				0.004	0.009	ND
GRIFFC				0.012	0.015	0.003	ND	0.012				0.001	0.010	ND
GRIFFD				0.230	0.054	0.026	0.007	0.021				0.015	0.006	0.003
GRIFFE				0.061	0.083	ND	0.029	0.055				0.011	0.010	0.001
GRIFFF				0.019	0.025	ND	0.006	0.019				0.006	0.008	0.001
HARA				0.012	0.035	ND	0.011	0.023				0.001	0.006	ND
HARB				0.130	0.160	ND	0.039	0.120				0.011	0.011	ND
HARC				0.098	0.048	0.003	0.011	0.034				0.005	0.010	0.002
HARD				0.041	0.049	0.005	0.010	0.034				0.005	0.009	0.001
HARE				0.110	0.036	ND	0.008	0.028				0.006	0.011	0.002
HARF				0.040	0.074	0.012	0.009	0.054				0.007	0.015	0.006
CLA	1.70	0.42	1.28	ND	0.450	ND	0.230	0.210	0.290	0.052	0.790	0.004	ND	ND

Site	Total PAH	Low PAH	High PAH	Total PCB Estimated	Total DDT	DDT	DDD	DDE	DDMU	Dichlorobenzophenone	Sum All DDT Compounds	Total Chlordane	Total BHCs	Total Endosulfans
NLA	1.61	0.37	1.24	ND	1.27	0.012	0.660	0.600	2.94	0.210	4.42	0.007	ND	ND
SLA	1.46	0.34	1.11	ND	0.340	ND	0.150	0.190	0.440	0.061	0.840	0.003	ND	ND
LA-R_1				ND	0.640	ND	0.290	0.350	0.520	0.093	1.25	0.005	ND	ND
LA-R_2				ND	0.630	0.007	0.170	0.460	0.300	0.099	1.03	0.018	ND	ND
LA-R_3				ND	0.180	ND	0.066	0.110	0.030	0.170	0.380	ND	ND	ND
LA-R_4				ND	0.450	ND	0.150	0.310	0.250	0.067	0.770	0.010	ND	ND
LA-R_5				ND	0.720	ND	0.190	0.530	0.260	0.092	1.07	0.018	ND	ND
LA-R_6				ND	0.210	ND	0.054	0.150	0.053	0.055	0.310	ND	ND	ND
LA-R_7				ND	0.190	ND	0.084	0.110	0.032	0.120	0.340	ND	ND	ND
LA-T_1				ND	0.028	ND	0.017	0.010	ND	ND	0.028	ND	ND	ND
LA-T_2				ND	0.480	ND	0.190	0.290	0.270	0.052	0.800	ND	ND	ND
LA-T_3				ND	0.220	0.008	0.130	0.083	0.062	0.037	0.320	ND	ND	ND
LA-T_4				ND	8.72	0.630	4.42	3.68	2.87	0.400	12.0	0.240	ND	ND
LA-T_5				ND	0.960	0.032	0.450	0.480	0.140	0.086	1.190	0.067	ND	ND
LA-T_6				ND	0.570	0.013	0.120	0.430	0.290	0.120	0.970	0.012	ND	ND
LA-T_7				ND	0.770	0.039	0.180	0.560	0.240	0.077	1.090	0.019	ND	ND
LA-T_8				ND	0.170	ND	0.064	0.110	0.038	0.160	0.370	ND	ND	ND
LA-T_9				ND	0.530	ND	0.150	0.380	0.160	0.180	0.860	ND	ND	ND
BIVENA				0.440	0.110	0.010	0.041	0.055				0.048	0.009	0.014
BIVENB				0.610	0.190	0.015	0.034	0.140				0.024	ND	0.007
BIVENC				0.280	0.055	ND	0.020	0.035				0.022	0.001	0.008
BIVEND				0.770	0.250	0.012	0.120	0.120				0.140	ND	0.040
BIVENE				0.310	0.210	0.005	0.028	0.180				0.011	0.003	0.011
BIVENE	84.4	3.77	80.6	0.210	0.170	0.009	0.011	0.150	0.016	ND	0.190	0.008	ND	ND
BIVENF				0.260	0.130	ND	0.040	0.093				0.049	0.029	ND
BIVEN-T_G	4.36	0.31	4.05	0.042	0.034	0.001	0.003	0.030	0.006	ND	0.040	0.005	ND	ND
BIVEN-T_H	53.0	2.63	50.4	0.230	0.160	0.011	0.013	0.130	0.017	ND	0.180	0.013	ND	ND
BIVEN-T_I	63.4	3.37	60.0	0.210	0.120	0.009	0.012	0.100	0.015	ND	0.140	0.010	ND	ND
HOGA				13.4	2.58	0.140	2.27	0.170				3.56	0.063	0.710
HOGB				2.46	1.040	ND	0.990	0.053				1.63	0.210	0.430
HOGC				6.85	3.76	0.290	2.70	0.770				3.16	0.130	0.600
HOGD				0.710	0.150	0.006	0.084	0.063				0.160	0.031	0.043
ROSE-T_1	119	7.22	112	2.08	0.690	0.098	0.290	0.300	ND	ND	0.690	1.34	ND	ND
SWEETA				2.63	0.660	0.250	0.240	0.170				0.540	0.052	0.100
SWEETA	2,810	453	2,350	1.92	1.30	0.230	0.360	0.710	ND	ND	1.30	0.460	ND	ND
SWEETB				0.840	0.140	0.023	0.037	0.075				0.100	0.007	0.011
SWEETC				13.7	3.12	0.650	1.650	0.820				3.16	0.370	0.620
SWEETD				19.0	1.08	0.510	0.570	ND				0.850	0.011	0.400

Site	Total PAH	Low PAH	High PAH	Total PCB Estimated	Total DDT	DDT	DDD	DDE	DDMU	Dichlorobenzophenone	Sum All DDT Compounds	Total Chlordane	Total BHCs	Total Endosulfans
SWEETE				9.37	1.48	0.590	0.670	0.220				2.25	0.058	0.110
SWEET-T_1	468	38.0	430	1.28	0.400	ND	0.200	0.200	ND	ND	0.400	0.860	ND	ND
TUMB-T_1	12,400	1,660	10,700	0.760	1.26	ND	0.420	0.840	ND	ND	1.26	4.90	ND	ND
TUMB-T_2	4,840	550	4,290	0.930	0.780	ND	0.260	0.530	ND	ND	0.780	2.88	ND	ND
DISSA				0.300	0.290	0.026	0.100	0.170				0.013	0.013	0.025
DISSB				0.047	0.069	ND	0.025	0.045				ND	ND	ND
DISSC				0.140	0.240	0.010	0.070	0.160				0.008	0.004	0.007
DISSD				0.140	0.099	ND	0.039	0.060				ND	ND	ND
DISSE				0.750	0.220	ND	0.130	0.091				ND	ND	0.026
GEORGEA				0.017	ND	ND	ND	ND				0.014	0.024	ND
GEORGEB				0.097	0.027	0.010	0.007	0.010				0.002	0.012	0.003
GEORGEC				0.082	0.033	0.010	0.009	0.015				0.005	0.008	0.004
GEORGED				0.037	0.015	0.006	0.006	0.003				0.002	0.010	0.001
GEORGEE				0.003	ND	ND	ND	ND				0.008	ND	ND
GEORGEF				0.058	0.024	0.009	0.005	0.010				0.003	0.015	0.002
GEORGEG				0.120	0.033	0.012	0.007	0.014				0.011	0.013	0.003
GEORGEH				0.041	0.013	0.005	0.005	0.003				0.008	0.006	0.001
GEORGEI				0.078	0.037	0.009	0.012	0.016				0.006	0.006	0.002
GEORGEJ				0.100	0.065	0.009	0.016	0.039				0.001	0.006	0.003
MONA				0.770	0.100	0.023	0.040	0.038				0.053	0.021	0.012
MONB				0.390	0.150	0.038	0.051	0.057				0.062	0.006	0.015
MONC				0.180	0.084	0.015	0.025	0.044				0.014	0.009	0.003
MOND				0.250	0.082	0.023	0.022	0.037				0.029	0.025	0.009
MONE				0.230	0.110	0.016	0.029	0.065				0.012	0.035	0.002
MONF				0.085	0.028	0.008	0.009	0.011				0.008	0.011	0.002
MONG				0.240	0.130	0.025	0.038	0.069				0.029	0.016	0.002
NORRIS-T_1				ND	0.180	ND	0.085	0.090	0.045	0.029	0.250	ND	ND	ND
NORRIS-T_2				ND	0.290	ND	0.140	0.150	0.054	0.036	0.380	ND	ND	ND
NORRIS-T_3				ND	0.180	ND	0.086	0.098	0.041	0.028	0.250	ND	ND	ND
NORRIS-T_4				ND	0.200	ND	0.098	0.100	0.034	0.021	0.260	ND	ND	ND
NORRIS-T_5				ND	0.490	0.005	0.250	0.230	0.091	0.040	0.620	ND	ND	ND
NORRIS-T_6				ND	0.240	ND	0.094	0.150	0.032	0.019	0.290	ND	ND	ND

Table C-3: Metals Concentrations for Detailed Assessment Sites (mg/kg, dry weight)

Site	Aluminum	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc
AB-T_1	6,030	8.46	0.300	13.4	75.4	12.6	0.130	5.42	0.150	44.2
AB-T_2	4,910	1.22	0.042	8.11	1.58	2.46	0.022	3.53	0.070	5.78
AB-T_3	25,200	8.08	0.250	31.6	23.0	14.5	0.091	10.6	0.210	39.2
AB-T_4	398	0.350	0.021	2.91	1.11	0.84	0.010	ND	0.065	4.52
DORAA	383	ND	ND	0.76	0.40	ND	ND	ND	ND	1.55
DORAB	13,400	12.6	0.230	17.6	13.3	23.4	0.200	6.25	0.140	36.3
DORAC	16,700	21.3	0.390	21.1	28.2	48.7	0.270	8.15	0.240	64.9
DORAD	11,300	15.9	0.400	17.1	33.6	43.5	0.220	7.37	0.150	75.6
DORAE	11,700	13.0	0.430	17.8	35.1	37.2	0.190	7.29	0.140	76.5
DORAF	13,100	14.1	0.350	20.2	31.3	19.4	0.170	7.53	0.160	49.9
DORAF	9,150	11.5	0.220	15.6	19.3	14.3	0.140	6.76	0.120	27.9
DORAG	10,000	10.3	0.240	17.0	26.3	13.8	0.140	5.62	0.130	37.8
DORAG	189	0.850	ND	1.65	0.88	ND	0.012	ND	0.033	2.85
DORAH	8,320	14.4	0.300	18.2	58.3	23.5	0.170	6.08	0.180	49.9
EUSTA	14,100	10.8	0.630	22.2	28.2	93.1	0.330	8.47	0.260	116
EUSTB	300	ND	ND	1.56	0.74	1.46	ND	ND	0.034	1.67
EUSTC	17,700	16.3	0.430	23.3	23.0	60.0	0.300	7.73	0.290	61.8
EUSTD	13,900	11.5	0.350	18.6	19.9	42.9	0.270	7.23	0.180	54.0
EUSTE	2,790	2.88	0.050	4.67	4.63	9.13	0.067	1.58	0.061	12.1
EUSTF	15,000	9.21	0.420	19.5	15.4	35.0	0.270	7.42	0.310	52.4
EUSTG	725	ND	ND	2.05	1.33	2.24	0.016	ND	0.050	3.46
GRIFFA	9,460	8.99	0.490	20.1	27.5	42.8	0.300	7.5	0.68	84.8
GRIFFB	9,640	9.78	0.260	18.8	10.0	16.7	0.190	6.87	0.22	25.2
GRIFFC	8,230	10.0	0.370	16.5	18.4	33.2	0.280	6.82	0.38	49.5
GRIFFD	10,700	6.66	0.150	23.1	8.46	19.6	0.120	4.84	0.15	25.8
GRIFFE	14,500	15.0	0.350	28.7	17.8	46.8	0.260	9.04	0.2	46.6
GRIFFF	7,960	11.0	0.240	16.6	11.7	28.3	0.220	6.53	0.12	25.8
HARA	6,400	7.86	0.220	14.8	8.92	12.8	0.200	4.99	0.057	24.8
HARB	14,800	10.9	0.340	24.4	14.1	33.5	0.250	8.39	0.17	32.0
HARC	2,730	1.51	0.088	5.38	4.67	9.26	0.063	1.72	0.065	9.64
HARD	15,700	10.6	0.430	24.5	21.7	43.6	0.290	9.06	0.13	46.1
HARE	7,070	4.91	0.270	15.1	15.9	28.2	0.170	5.4	0.12	38.8
HARF	8,980	10.1	0.320	16.7	17.4	34.0	0.230	7.01	0.098	37.1
CLA	8,430	8.45	0.170	13.3	9.74	11.7	0.140	6.97	0.11	26.8
NLA	7,170	8.70	0.190	12.3	11.3	17.5	0.160	5.45	0.13	34.3
SLA	8,860	10.6	0.230	17.5	13.6	15.6	0.150	6.22	0.14	33.5
LA-R_1	10,000	11.7	0.250	15.6	17.8	19.5	0.180	8.28	0.13	28.1
LA-R_2	10,100	12.3	0.290	16.1	21.9	33.3	0.180	8.59	0.18	34.3
LA-R_3	8,730	6.56	0.200	13.0	15.2	12.6	0.150	8.13	0.11	23.4
LA-R_4	9,010	10.0	0.240	13.8	18.0	23.0	0.180	8.04	0.14	27.0
LA-R_5	10,700	11.9	0.330	15.6	23.8	30.7	0.190	8.85	0.17	36.2
LA-R_6	9,480	9.16	0.290	15.9	22.8	21.5	0.180	9.12	0.18	33.0
LA-R_7	4,110	1.64	0.071	6.94	2.05	3.57	0.040	10.2	0.074	7.35
LA-T_1	7,070	10.2	0.160	14.2	5.09	3.85	0.077	4.61	0.066	7.09
LA-T_2	9,720	12.0	0.260	16.5	17.4	21.6	0.170	7.34	0.19	30.0
LA-T_3	1,800	7.34	0.064	3.82	3.81	4.59	0.059	4.76	0.074	11.9
LA-T_4	1,640	5.33	0.150	3.04	31.5	10.2	0.100	7.55	0.062	25.8
LA-T_5	2,360	5.94	0.093	5.30	17.4	7.97	0.096	4.73	0.11	20.7
LA-T_6	9,000	11.1	0.300	14.3	26.0	22.7	0.170	8.61	0.14	50.3
LA-T_7	7,320	11.1	0.250	10.6	22.4	22.3	0.160	8.29	0.12	30.5
LA-T_8	8,590	6.85	0.220	13.0	13.5	11.9	0.140	7.59	0.092	21.4
LA-T_9	8,460	8.49	0.270	13.6	19.2	20.7	0.150	6.79	0.13	36.0
BIVENA	12,500	4.02	0.930	93.6	32.9	112	0.260	13.7	0.390	161

Site	Aluminum	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc
BIVENB	22,200	4.12	1.46	187	39.7	324	0.380	19.1	0.640	229
BIVENC	14,300	7.55	0.960	89.4	31.3	118	0.300	13.7	0.360	161
BIVEND	11,800	8.24	1.32	122	42.2	246	0.430	15.3	0.470	279
BIVENE	26,600	12.1	1.65	163	46.0	367	0.420	22.8	0.530	220
BIVENE	24,500	6.13	1.04	96.3	35.8	199	0.290	17.1	0.400	174
BIVENF	277	ND	ND	2.11	0.80	2.38	0.022	ND	0.055	2.43
BIVEN-T_G	5,180	1.74	0.220	18.3	7.41	48.3	0.088	4.18	0.130	28.1
BIVEN-T_H	23,300	5.50	1.14	122	36.9	235	0.330	18.9	0.540	195
BIVEN-T_I	20,100	4.82	1.00	98.5	34.2	191	0.290	17.0	0.470	162
HOGA	1,220	ND	0.240	4.66	1.24	4.15	0.027	1.21	0.06	12.1
HOGB	4,570	ND	0.320	40.4	25.0	7.21	0.030	16.1	0.16	15.1
HOGC	3,630	ND	0.270	13.8	1.51	10.1	0.027	1.84	0.049	16.7
HOGD	1,540	ND	0.075	5.00	2.08	6.92	0.037	1	0.06	10.9
ROSE-T_1	1,640	0.360	0.390	9.51	3.02	5.44	0.022	3.09	0.034	16.5
SWEETA	14,400	4.32	1.92	52.3	27.5	97.6	0.260	13.3	0.95	176
SWEETA	2,710	1.09	0.300	17.0	1.72	5.46	0.020	2.09	0.095	18.4
SWEETB	17,000	3.19	1.16	71.2	21.3	54.0	0.270	10.8	2.35	112
SWEETC	1,650	ND	0.120	4.58	4.03	20.8	0.034	1.52	0.061	28.5
SWEETD	3,500	ND	0.380	11.2	2.46	15.1	0.050	1.96	0.13	22.7
SWEETE	1,430	1.16	0.300	18.9	3.66	95.3	0.040	1.68	0.11	38.1
SWEET-T_1	1,710	0.560	0.160	4.60	3.41	13.8	0.033	1.59	0.06	25.1
TUMB-T_1	1,120	0.470	0.150	6.64	8.52	28.3	0.049	2.53	0.045	30.7
TUMB-T_2	1,790	0.400	0.120	6.06	2.21	13.0	0.023	1.68	0.046	19.2
DISSA										
DISSB										
DISSC										
DISSD										
DISSE										
GEORGEA										
GEORGEB										
GEORGEC										
GEORGED										
GEORGEE										
GEORGEF										
GEORGEG										
GEORGEH										
GEORGEI										
GEORGEJ										
MONA	8,410	1.49	0.120	13.0	11.2	13.0	0.032	3.88	0.16	21.8
MONB	37,200	5.48	0.690	50.3	38.8	43.5	0.310	15	0.87	109
MONC	44,300	7.72	0.610	57.2	24.3	32.3	0.330	18.4	0.67	71.3
MOND	8,810	ND	ND	8.71	3.87	7.71	0.018	1.65	0.12	10.7
MONE	43,000	7.05	0.460	55.6	31.0	35.4	0.280	19.3	0.67	58.5
MONF	9,860	ND	0.061	13.8	6.26	7.22	0.034	2.38	0.22	14.8
MONG	21,500	2.39	0.160	21.8	12.8	15.1	0.092	5.22	0.26	27.1
NORRIS-T_1										
NORRIS-T_2										
NORRIS-T_3										
NORRIS-T_4										
NORRIS-T_5										
NORRIS-T_6										

Table C-4: Aluminum-Normalized Metals Concentrations for Detailed Assessment Sites (unitless)

Site	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc
AB-T_1	1.40E-03	4.91E-05	2.22E-03	1.25E-02	2.09E-03	2.15E-05	8.99E-04	2.44E-05	7.33E-03
AB-T_2	2.48E-04	8.51E-06	1.65E-03	3.22E-04	5.01E-04	4.42E-06	7.19E-04	1.42E-05	1.18E-03
AB-T_3	3.21E-04	9.84E-06	1.25E-03	9.13E-04	5.75E-04	3.62E-06	4.21E-04	8.45E-06	1.56E-03
AB-T_4	8.67E-04	5.28E-05	7.31E-03	2.79E-03	2.10E-03	2.59E-05	ND	1.63E-04	1.14E-02
DORAA	ND	ND	1.98E-03	1.04E-03	ND	ND	ND	ND	4.05E-03
DORAB	9.40E-04	1.72E-05	1.31E-03	9.93E-04	1.75E-03	1.49E-05	4.66E-04	1.07E-05	2.71E-03
DORAC	1.28E-03	2.34E-05	1.26E-03	1.69E-03	2.92E-03	1.63E-05	4.88E-04	1.41E-05	3.89E-03
DORAD	1.41E-03	3.53E-05	1.51E-03	2.96E-03	3.84E-03	1.95E-05	6.50E-04	1.34E-05	6.68E-03
DORAE	1.11E-03	3.68E-05	1.52E-03	3.00E-03	3.18E-03	1.65E-05	6.23E-04	1.21E-05	6.54E-03
DORAF	1.08E-03	2.66E-05	1.54E-03	2.39E-03	1.48E-03	1.27E-05	5.75E-04	1.21E-05	3.81E-03
DORAF	1.26E-03	2.43E-05	1.70E-03	2.11E-03	1.56E-03	1.57E-05	7.39E-04	1.26E-05	3.05E-03
DORAG	1.03E-03	2.39E-05	1.70E-03	2.63E-03	1.38E-03	1.40E-05	5.62E-04	1.25E-05	3.78E-03
DORAG	4.50E-03	ND	8.73E-03	4.65E-03	ND	6.24E-05	ND	1.76E-04	1.51E-02
DORAH	1.73E-03	3.55E-05	2.19E-03	7.01E-03	2.82E-03	1.98E-05	7.31E-04	2.18E-05	6.00E-03
EUSTA	7.66E-04	4.45E-05	1.57E-03	2.00E-03	6.60E-03	2.35E-05	6.01E-04	1.87E-05	8.23E-03
EUSTB	ND	ND	5.20E-03	2.46E-03	4.87E-03	ND	ND	1.12E-04	5.57E-03
EUSTC	9.21E-04	2.42E-05	1.32E-03	1.30E-03	3.39E-03	1.68E-05	4.37E-04	1.63E-05	3.49E-03
EUSTD	8.27E-04	2.50E-05	1.34E-03	1.43E-03	3.09E-03	1.92E-05	5.20E-04	1.32E-05	3.88E-03
EUSTE	1.03E-03	1.79E-05	1.68E-03	1.66E-03	3.28E-03	2.39E-05	5.66E-04	2.20E-05	4.36E-03
EUSTF	6.14E-04	2.77E-05	1.30E-03	1.03E-03	2.33E-03	1.82E-05	4.95E-04	2.09E-05	3.49E-03
EUSTG	ND	ND	2.83E-03	1.83E-03	3.09E-03	2.25E-05	ND	6.84E-05	4.77E-03
GRIFFA	9.51E-04	5.23E-05	2.12E-03	2.90E-03	4.53E-03	3.18E-05	7.93E-04	7.18E-05	8.96E-03
GRIFFB	1.01E-03	2.66E-05	1.95E-03	1.04E-03	1.73E-03	2.00E-05	7.13E-04	2.26E-05	2.61E-03
GRIFFC	1.22E-03	4.51E-05	2.00E-03	2.24E-03	4.03E-03	3.34E-05	8.29E-04	4.62E-05	6.01E-03
GRIFFD	6.22E-04	1.44E-05	2.16E-03	7.91E-04	1.83E-03	1.16E-05	4.52E-04	1.42E-05	2.41E-03
GRIFFE	1.03E-03	2.41E-05	1.98E-03	1.23E-03	3.23E-03	1.79E-05	6.23E-04	1.34E-05	3.21E-03
GRIFFF	1.38E-03	3.00E-05	2.09E-03	1.47E-03	3.56E-03	2.70E-05	8.20E-04	1.55E-05	3.24E-03
HARA	1.23E-03	3.48E-05	2.31E-03	1.39E-03	2.00E-03	3.06E-05	7.80E-04	8.91E-06	3.88E-03
HARB	7.36E-04	2.31E-05	1.65E-03	9.53E-04	2.26E-03	1.72E-05	5.67E-04	1.16E-05	2.16E-03
HARC	5.53E-04	3.23E-05	1.97E-03	1.71E-03	3.39E-03	2.29E-05	6.30E-04	2.38E-05	3.53E-03
HARD	6.74E-04	2.73E-05	1.56E-03	1.38E-03	2.77E-03	1.83E-05	5.76E-04	8.52E-06	2.93E-03
HARE	6.94E-04	3.88E-05	2.14E-03	2.25E-03	3.99E-03	2.35E-05	7.64E-04	1.74E-05	5.49E-03
HARF	1.12E-03	3.61E-05	1.86E-03	1.94E-03	3.79E-03	2.52E-05	7.81E-04	1.09E-05	4.13E-03
CLA	1.00E-03	2.02E-05	1.57E-03	1.16E-03	1.38E-03	1.66E-05	8.26E-04	1.32E-05	3.18E-03
NLA	1.21E-03	2.69E-05	1.72E-03	1.58E-03	2.44E-03	2.17E-05	7.60E-04	1.76E-05	4.78E-03
SLA	1.20E-03	2.61E-05	1.98E-03	1.53E-03	1.76E-03	1.70E-05	7.02E-04	1.61E-05	3.78E-03
LA-R_1	1.17E-03	2.49E-05	1.56E-03	1.78E-03	1.95E-03	1.78E-05	8.28E-04	1.26E-05	2.81E-03
LA-R_2	1.22E-03	2.85E-05	1.59E-03	2.17E-03	3.30E-03	1.78E-05	8.50E-04	1.76E-05	3.40E-03
LA-R_3	7.51E-04	2.34E-05	1.49E-03	1.74E-03	1.44E-03	1.69E-05	9.31E-04	1.24E-05	2.68E-03
LA-R_4	1.11E-03	2.63E-05	1.53E-03	2.00E-03	2.55E-03	1.95E-05	8.92E-04	1.51E-05	3.00E-03
LA-R_5	1.11E-03	3.07E-05	1.46E-03	2.22E-03	2.87E-03	1.74E-05	8.27E-04	1.60E-05	3.38E-03
LA-R_6	9.66E-04	3.09E-05	1.68E-03	2.41E-03	2.27E-03	1.94E-05	9.62E-04	1.85E-05	3.48E-03
LA-R_7	3.99E-04	1.72E-05	1.69E-03	4.99E-04	8.69E-04	9.81E-06	2.48E-03	1.81E-05	1.79E-03
LA-T_1	1.44E-03	2.25E-05	2.01E-03	7.20E-04	5.45E-04	1.09E-05	6.52E-04	9.32E-06	1.00E-03
LA-T_2	1.23E-03	2.62E-05	1.70E-03	1.79E-03	2.22E-03	1.71E-05	7.55E-04	1.95E-05	3.09E-03
LA-T_3	4.08E-03	3.56E-05	2.12E-03	2.12E-03	2.55E-03	3.25E-05	2.64E-03	4.08E-05	6.61E-03
LA-T_4	3.25E-03	9.33E-05	1.85E-03	1.92E-02	6.22E-03	6.38E-05	4.60E-03	3.75E-05	1.57E-02
LA-T_5	2.52E-03	3.95E-05	2.25E-03	7.37E-03	3.38E-03	4.06E-05	2.00E-03	4.70E-05	8.77E-03
LA-T_6	1.23E-03	3.37E-05	1.59E-03	2.89E-03	2.52E-03	1.85E-05	9.57E-04	1.54E-05	5.59E-03
LA-T_7	1.52E-03	3.39E-05	1.45E-03	3.06E-03	3.05E-03	2.13E-05	1.13E-03	1.63E-05	4.17E-03
LA-T_8	7.97E-04	2.50E-05	1.51E-03	1.57E-03	1.39E-03	1.61E-05	8.84E-04	1.07E-05	2.49E-03
LA-T_9	1.00E-03	3.22E-05	1.61E-03	2.27E-03	2.45E-03	1.82E-05	8.03E-04	1.58E-05	4.26E-03
BIVENA	3.22E-04	7.40E-05	7.49E-03	2.63E-03	8.96E-03	2.07E-05	1.10E-03	3.09E-05	1.29E-02

Site	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc
BIVENB	1.86E-04	6.58E-05	8.42E-03	1.79E-03	1.46E-02	1.71E-05	8.60E-04	2.90E-05	1.03E-02
BIVENC	5.27E-04	6.67E-05	6.23E-03	2.19E-03	8.26E-03	2.11E-05	9.53E-04	2.53E-05	1.12E-02
BIVEND	6.98E-04	1.12E-04	1.03E-02	3.58E-03	2.08E-02	3.61E-05	1.30E-03	3.96E-05	2.36E-02
BIVENE	4.55E-04	6.20E-05	6.13E-03	1.73E-03	1.38E-02	1.59E-05	8.57E-04	2.00E-05	8.27E-03
BIVENE	2.51E-04	4.25E-05	3.94E-03	1.46E-03	8.12E-03	1.18E-05	6.99E-04	1.62E-05	7.10E-03
BIVENF	ND	ND	7.62E-03	2.89E-03	8.59E-03	7.76E-05	ND	1.99E-04	8.77E-03
BIVEN-T_G	3.36E-04	4.27E-05	3.53E-03	1.43E-03	9.32E-03	1.70E-05	8.07E-04	2.57E-05	5.42E-03
BIVEN-T_H	2.36E-04	4.89E-05	5.24E-03	1.58E-03	1.01E-02	1.42E-05	8.11E-04	2.33E-05	8.37E-03
BIVEN-T_I	2.40E-04	4.96E-05	4.90E-03	1.70E-03	9.50E-03	1.46E-05	8.46E-04	2.32E-05	8.06E-03
HOGA	ND	1.93E-04	3.82E-03	1.02E-03	3.40E-03	2.18E-05	9.92E-04	4.88E-05	9.92E-03
HOGB	ND	6.96E-05	8.84E-03	5.47E-03	1.58E-03	6.59E-06	3.52E-03	3.46E-05	3.30E-03
HOGC	ND	7.33E-05	3.80E-03	4.16E-04	2.78E-03	7.49E-06	5.07E-04	1.34E-05	4.60E-03
HOGD	ND	4.90E-05	3.25E-03	1.35E-03	4.50E-03	2.43E-05	6.52E-04	3.92E-05	7.07E-03
ROSE-T_1	2.18E-04	2.38E-04	5.80E-03	1.84E-03	3.32E-03	1.34E-05	1.88E-03	2.09E-05	1.01E-02
SWEETA	3.00E-04	1.33E-04	3.63E-03	1.91E-03	6.78E-03	1.80E-05	9.24E-04	6.58E-05	1.22E-02
SWEETA	4.02E-04	1.10E-04	6.27E-03	6.35E-04	2.01E-03	7.42E-06	7.71E-04	3.50E-05	6.79E-03
SWEETB	1.88E-04	6.82E-05	4.19E-03	1.25E-03	3.18E-03	1.61E-05	6.35E-04	1.38E-04	6.59E-03
SWEETC	ND	7.11E-05	2.77E-03	2.43E-03	1.26E-02	2.08E-05	9.17E-04	3.71E-05	1.72E-02
SWEETD	ND	1.10E-04	3.20E-03	7.03E-04	4.31E-03	1.43E-05	5.60E-04	3.60E-05	6.49E-03
SWEETE	8.11E-04	2.10E-04	1.32E-02	2.56E-03	6.66E-02	2.76E-05	1.17E-03	7.41E-05	2.66E-02
SWEET-T_1	3.28E-04	9.53E-05	2.69E-03	1.99E-03	8.07E-03	1.94E-05	9.30E-04	3.52E-05	1.47E-02
TUMB-T_1	4.18E-04	1.32E-04	5.93E-03	7.61E-03	2.53E-02	4.37E-05	2.26E-03	4.04E-05	2.74E-02
TUMB-T_2	2.24E-04	6.48E-05	3.39E-03	1.23E-03	7.26E-03	1.26E-05	9.39E-04	2.58E-05	1.07E-02
DISSA									
DISSB									
DISSC									
DISSD									
DISSE									
GEORGEA									
GEORGEB									
GEORGEC									
GEORGED									
GEORGEE									
GEORGEF									
GEORGEG									
GEORGEH									
GEORGEI									
GEORGEJ									
MONA	1.77E-04	1.39E-05	1.55E-03	1.33E-03	1.55E-03	3.75E-06	4.61E-04	1.88E-05	2.59E-03
MONB	1.47E-04	1.84E-05	1.35E-03	1.04E-03	1.17E-03	8.41E-06	4.03E-04	2.33E-05	2.93E-03
MONC	1.74E-04	1.37E-05	1.29E-03	5.49E-04	7.28E-04	7.46E-06	4.15E-04	1.52E-05	1.61E-03
MOND	ND	ND	9.89E-04	4.39E-04	8.75E-04	2.07E-06	1.87E-04	1.40E-05	1.21E-03
MONE	1.64E-04	1.07E-05	1.29E-03	7.21E-04	8.23E-04	6.40E-06	4.49E-04	1.56E-05	1.36E-03
MONF	ND	6.17E-06	1.40E-03	6.35E-04	7.32E-04	3.42E-06	2.41E-04	2.21E-05	1.50E-03
MONG	1.11E-04	7.63E-06	1.01E-03	5.95E-04	7.02E-04	4.27E-06	2.43E-04	1.22E-05	1.26E-03
NORRIS-T_1									
NORRIS-T_2									
NORRIS-T_3									
NORRIS-T_4									
NORRIS-T_5									
NORRIS-T_6									

Table C-5: Sediment Physical-Chemical Characteristics Data for Detailed Assessment Sites

Site	TOC (%)	TS (%)	TVS (%)	Grain Size (% of total wet sediment volume)			
				Sand (%)	Silt (%)	Clay (%)	Mud (%)
AB-T_1	49.0	10.1	73.3	71.4	27.8	0.8	28.6
AB-T_2	2.20	53.8	3.6	72.4	25.4	2.2	27.6
AB-T_3	26.0	7.9	38.3	68.3	30.5	1.2	31.7
AB-T_4	0.90	74.3	1.7	94.2	5.4	ND	5.4
DORAA	0.14	82.5	ND	99.0	0.9	ND	0.9
DORAB	35.9	4.7	51.4	80.8	18.9	ND	18.9
DORAC	33.5	4.0	58.8	73.1	26.5	0.5	27.0
DORAD	35.9	3.2	56.0	74.0	25.5	0.5	26.0
DORAE	40.8	3.3	60.7	72.5	26.8	0.7	27.5
DORAF	38.7	3.8	59.5	69.0	30.3	0.7	31.0
DORAF	38.0	3.7	65.1	80.9	18.7	ND	18.7
DORAG	27.0	6.6	42.5	67.8	31.3	0.9	32.2
DORAG	1.20	80.6	0.6	95.3	4.6	ND	4.6
DORAH	43.0	9.1	183.0	84.8	14.8	ND	14.8
EUSTA	36.0	4.9	62.0	70.6	28.9	ND	28.9
EUSTB	0.17	82.1	ND	99.0	0.9	ND	0.9
EUSTC	32.6	5.3	50.7	63.1	36.3	0.6	36.9
EUSTD	35.5	5.7	48.5	74.1	25.6	ND	25.6
EUSTE	11.5	19.4	14.4	75.5	24.3	ND	24.3
EUSTF	29.4	4.8	54.6	80.6	19.1	ND	19.1
EUSTG	0.90	58.9	2.1	79.9	19.9	ND	19.9
GRIFFA	39.5	4.2	61.6	66.9	32.4	0.7	33.1
GRIFFB	32.9	4.4	59.5	76.4	23.3	ND	23.3
GRIFFC	42.1	4.7	64.3	64.8	34.5	0.7	35.2
GRIFFD	26.2	15.7	41.5	82.3	16.8	0.9	17.7
GRIFFE	39.7	5.5	60.1	57.7	41.4	1.0	42.4
GRIFFF	44.5	5.9	73.3	58.0	41.0	1.0	42.0
HARA	39.0	4.9	67.8	74.9	24.5	0.6	25.1
HARB	28.4	4.2	55.7	77.0	22.7	ND	22.7
HARC	8.82	24.2	11.6	75.5	24.1	ND	24.1
HARD	33.6	4.4	61.1	77.2	22.4	ND	22.4
HARE	25.9	7.8	35.7	77.3	22.3	ND	22.3
HARF	36.9	4.1	65.5	83.4	16.4	ND	16.4
CLA	32.0	5.7	60.6	59.7	39.2	1.1	40.3
NLA	31.0	9.0	45.4	59.2	39.6	1.3	40.9
SLA	35.0	5.9	57.3	58.0	40.9	1.2	42.1
LA-R_1	33.0	4.9	56.0	61.3	37.7	1.1	38.8
LA-R_2	32.0	4.8	57.2	56.1	42.8	1.2	44.0
LA-R_3	32.0	4.0	58.7	53.7	44.9	1.4	46.3
LA-R_4	32.0	5.6	56.8	62.9	36.1	1.0	37.1
LA-R_5	34.0	4.0	58.3	58.7	40.3	1.0	41.3
LA-R_6	33.0	4.2	58.4	63.0	36.1	1.0	37.1
LA-R_7	2.90	32.7	6.2	84.0	15.1	0.9	16.0
LA-T_1	33.0	6.8	63.1	67.1	32.0	0.9	32.9
LA-T_2	33.0	5.7	53.0	64.7	34.4	0.9	35.3
LA-T_3	29.0	14.4	48.1	88.0	11.5	0.5	12.0
LA-T_4	18.0	31.7	30.7	95.3	4.5	ND	4.5
LA-T_5	18.0	26.5	28.0	91.5	8.1	0.5	8.6
LA-T_6	36.0	3.6	67.0	61.3	37.7	1.1	38.8
LA-T_7	33.0	5.3	55.7	63.4	35.7	1.0	36.7
LA-T_8	34.0	4.1	61.5	59.6	39.2	1.2	40.4
LA-T_9	29.0	5.0	47.2	60.9	38.2	0.9	39.1
BIVENA	25.7	8.1	37.9	57.4	41.1	1.5	42.6

Site	TOC (%)	TS (%)	TVS (%)	Grain Size (% of total wet sediment volume)			
				Sand (%)	Silt (%)	Clay (%)	Mud (%)
BIVENB	24.5	11.6	33.0	49.6	48.6	1.8	50.4
BIVENC	28.9	6.6	37.5	62.1	36.4	1.5	37.9
BIVEND	29.0	10.1	38.4	73.4	25.2	1.4	26.6
BIVENE	44.0	6.2	49.9	64.7	34.0	1.3	35.3
BIVENE	37.0	6.5	58.6	67.2	31.9	1.0	32.9
BIVENF	0.42	77.0	0.5	96.3	3.5	ND	3.5
BIVEN-T_G	23.0	20.1	23.9	74.1	25.2	0.8	26.0
BIVEN-T_H	25.0	7.9	37.3	63.5	35.2	1.3	36.5
BIVEN-T_I	22.0	8.2	34.4	59.8	38.9	1.3	40.2
HOGA	0.08	82.4	ND	98.8	1.0	ND	1.0
HOGB	0.40	75.6	2.8	91.6	6.8	1.7	8.5
HOGC	0.31	78.4	2.3	94.1	4.5	1.3	5.8
HOGD	1.44	68.5	7.4	90.5	8.3	1.3	9.6
ROSE-T_1	0.23	83.6	0.6	98.3	1.4	ND	1.4
SWEETA	5.91	42.0	12.8	68.0	27.7	4.3	32.0
SWEETA	0.21	82.0	0.7	97.3	2.0	0.7	2.7
SWEETB	13.0	22.7	20.0	71.3	26.8	1.9	28.7
SWEETC	0.19	82.5	0.6	98.2	1.3	0.4	1.7
SWEETD	0.20	80.4	0.7	89.1	7.7	3.1	10.8
SWEETE	0.18	80.6	1.0	97.8	1.7	0.6	2.3
SWEET-T_1	0.39	83.0	0.6	94.3	4.5	1.2	5.7
TUMB-T_1	0.59	82.4	1.2	98.3	1.5	ND	1.5
TUMB-T_2	0.31	80.7	1.7	97.0	2.5	0.5	3.0
DISSA	0.82	72.7	1.7	83.9	14.0	2.2	16.2
DISSB	0.42	77.5	1.1	86.8	9.1	4.1	13.2
DISSC	22.6	13.5	33.5	40.0	54.8	5.2	60.0
DISSD	0.23	77.8	0.5	95.3	4.0	0.7	4.7
DISSE	0.23	77.7	0.8	96.9	2.5	0.6	3.1
GEORGEA	0.21	78.6	ND	96.6	3.0	ND	3.0
GEORGEB	11.7	16.2	20.9	41.7	56.8	1.5	58.3
GEORGEC	10.7	17.2	18.7	41.3	57.2	1.5	58.7
GEORGED	4.13	52.7	4.0	69.9	29.1	1.0	30.1
GEORGEE	0.57	78.5	ND	96.6	3.0	0.5	3.5
GEORGEF	30.4	7.6	42.5	38.8	59.8	1.4	61.2
GEORGEG	20.9	13.5	32.3	50.0	47.9	2.1	50.0
GEORGEH	5.61	56.6	5.6	71.5	26.7	1.8	28.5
GEORGEI	3.61	31.5	7.0	47.2	51.5	1.3	52.8
GEORGEJ	16.1	13.9	26.3	40.6	57.7	1.7	59.4
MONA	1.97	55.1	12.4	80.5	18.1	1.4	19.5
MONB	16.5	13.3	27.4	40.9	57.1	2.0	59.1
MONC	17.7	10.6	29.5	34.5	63.7	1.8	65.5
MOND	1.07	58.7	2.6	72.3	25.5	2.2	27.7
MONE	13.5	14.7	22.5	32.4	65.2	2.4	67.6
MONF	4.94	47.0	3.2	66.8	31.4	1.8	33.2
MONG	5.34	26.2	11.2	66.2	32.3	1.5	33.8
NORRIS-T_1	29.0	17.2	44.2	18.4	70.4	11.2	81.6
NORRIS-T_2	27.0	15.6	45.0	40.2	54.1	5.6	59.7
NORRIS-T_3	27.0	16.5	45.2	17.0	72.6	10.5	83.1
NORRIS-T_4	25.0	18.2	41.4	27.3	65.0	7.8	72.8
NORRIS-T_5	30.0	17.0	49.0	23.4	67.4	9.2	76.6
NORRIS-T_6	11.0	35.8	18.2	52.3	41.7	6.0	47.7

Table C-6: Hazard Index (HI) Values Calculated for Detailed Assessment Sites

Site	HI (TEC-based)	HI (PEC-based)	HI (ERL-based)	HI (ERM-based)
AB-T_1	1140	172	2780	230
AB-T_2	7.7	1.1	14.4	1.3
AB-T_3	125	16.7	254	20.6
AB-T_4	2.6	0.4	5.1	0.4
DORAA	0.2	0.0	0.4	0.0
DORAB	27.0	3.9	46.7	4.1
DORAC	35.9	5.4	58.6	5.2
DORAD	42.9	6.3	79.9	5.9
DORAE	49.6	7.2	98.6	7.1
DORAF	71.3	8.6	120	10.4
DORAF	80.4	9.3	125	10.8
DORAG	66.0	8.1	116	10.4
DORAG	0.9	0.1	1.3	0.1
DORAH	224	30.5	467	41.7
EUSTA	30.7	5.2	74.4	4.7
EUSTB	0.6	0.1	1.0	0.1
EUSTC	34.2	5.0	56.0	5.3
EUSTD	16.5	2.9	27.1	2.7
EUSTE	3.7	0.6	6.0	0.6
EUSTF	15.1	2.7	24.2	2.5
EUSTG	0.9	0.1	1.4	0.1
GRIFFA	13.9	2.9	22.8	2.7
GRIFFB	11.7	2.2	19.1	2.1
GRIFFC	8.4	1.9	10.5	1.6
GRIFFD	10.5	1.8	24.0	2.3
GRIFFE	18.5	3.6	32.2	2.9
GRIFFF	9.5	2.1	15.4	1.5
HARA	7.8	1.5	10.7	1.3
HARB	20.6	3.4	34.3	3.2
HARC	2.9	0.6	4.7	0.5
HARD	12.3	2.5	19.0	2.2
HARE	7.9	1.6	12.4	1.3
HARF	14.7	2.6	26.0	2.7
CLA	41.1	5.9	74.7	7.1
NLA	106	14.4	198	18.4
SLA	36.5	5.2	63.3	6.0
LA-R_1	61.4	8.5	109	10.0
LA-R_2	65.2	8.4	113	9.6
LA-R_3	19.5	2.9	30.8	3.1
LA-R_4	46.0	6.2	78.9	6.9
LA-R_5	77.4	9.9	132	11.1
LA-R_6	24.4	3.5	36.5	3.7
LA-R_7	2.8	0.6	4.0	0.6
LA-T_1	4.8	1.0	7.0	0.9
LA-T_2	47.6	6.6	79.3	7.6
LA-T_3	17.7	2.7	33.9	3.5
LA-T_4	419	54.7	901	81.8
LA-T_5	52.1	7.1	112	8.8
LA-T_6	65.6	8.2	111	9.7
LA-T_7	79.5	9.7	142	12.5
LA-T_8	19.7	2.9	31.3	3.2
LA-T_9	48.0	6.2	75.7	7.0
BIVENA	27.4	5.5	53.2	4.4
BIVENB	40.4	8.4	60.1	7.2
BIVENC	19.9	4.5	33.8	3.5
BIVEND	58.8	10.4	144	9.0

Site	HI (TEC-based)	HI (PEC-based)	HI (ERL-based)	HI (ERM-based)
BIVENE	56.4	10.4	80.4	9.1
BIVENE	56.6	7.8	72.8	9.6
BIVENF	0.7	0.1	1.0	0.1
BIVEN-T_G	7.0	1.3	10.2	1.2
BIVEN-T_H	39.8	7.0	51.6	6.9
BIVEN-T_I	33.1	5.7	41.3	5.9
HOGA	2.6	0.5	8.2	0.4
HOGB	7.0	1.7	18.2	1.1
HOGC	8.2	1.4	27.4	1.2
HOGD	2.7	0.5	6.8	0.4
ROSE-T_1	3.2	0.6	8.6	0.4
SWEETA	40.2	6.7	108	6.9
SWEETA	7.1	0.9	9.5	1.3
SWEETB	22.7	4.5	51.3	4.1
SWEETC	6.3	1.0	17.6	0.9
SWEETD	3.8	0.7	8.3	0.8
SWEETE	7.0	1.6	14.0	1.1
SWEET-T_1	4.2	0.7	10.1	0.6
TUMB-T_1	61.2	5.7	118	10.9
TUMB-T_2	14.3	1.6	31.0	2.4
DISSA	0.8	0.1	1.6	0.1
DISSB	0.1	0.0	0.1	0.0
DISSC	16.8	2.1	31.5	2.6
DISSD	0.1	0.0	0.1	0.0
DISSE	0.2	0.0	0.3	0.0
GEORGEA	0.0	0.0	0.1	0.0
GEORGEB	1.3	0.2	3.0	0.3
GEORGEC	1.5	0.3	3.6	0.3
GEORGED	0.3	0.1	0.6	0.1
GEORGEE	0.0	0.0	0.1	0.0
GEORGEF	3.1	0.6	7.2	0.7
GEORGEG	3.8	0.6	10.1	0.7
GEORGEH	0.6	0.1	1.4	0.1
GEORGEI	0.6	0.1	1.3	0.1
GEORGEJ	4.1	0.6	6.5	0.7
MONA	3.3	0.8	5.7	0.6
MONB	21.6	4.1	46.4	4.0
MONC	14.8	3.2	22.7	2.8
MOND	1.5	0.3	2.1	0.3
MONE	15.2	3.6	20.3	2.7
MONF	2.2	0.5	3.1	0.4
MONG	6.0	1.2	10.4	1.1
NORRIS-T_1	13.3	1.7	24.2	2.2
NORRIS-T_2	20.3	2.6	36.9	3.4
NORRIS-T_3	13.1	1.7	23.7	2.1
NORRIS-T_4	13.1	1.7	23.9	2.2
NORRIS-T_5	38.0	4.9	70.9	6.6
NORRIS-T_6	7.2	0.9	12.4	1.1

Table C-7: Estimated Hazard Quotients (HQ) Values for Detailed Assessment Sites
(HQ: ratio of surface sediment concentrations to TEC SQG values)[a]

Site	PAH	PCB	DDT	Chlor	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn	Total HI
AB-T_1		0.00	1060	74.5	0.86	0.30	0.31	2.39	0.35	0.72	0.24	0.15	0.37	1140
LA-T_4		0.00	400	13.3	0.54	0.15	0.07	1.00	0.28	0.58	0.33	0.06	0.21	419
DORAH		0.00	210	6.87	1.47	0.30	0.42	1.84	0.66	0.92	0.27	0.18	0.41	224
AB-T_3		0.00	114	6.23	0.83	0.25	0.73	0.73	0.41	0.51	0.47	0.21	0.32	125
NLA	0.31	0.00	101	0.71	0.89	0.19	0.28	0.36	0.49	0.87	0.24	0.13	0.28	106
DORAF		0.00	75.6	0.59	1.17	0.22	0.36	0.61	0.40	0.80	0.30	0.12	0.23	80.4
LA-T_7		0.00	73.0	1.90	1.13	0.25	0.24	0.71	0.62	0.87	0.37	0.12	0.25	79.5
LA-R_5		0.00	70.1	1.89	1.22	0.33	0.36	0.75	0.86	1.03	0.39	0.17	0.30	77.4
DORAF		0.25	59.4	2.05	1.44	0.35	0.47	0.99	0.54	0.93	0.33	0.16	0.41	71.3
DORAG		0.37	57.1	1.65	1.05	0.24	0.39	0.83	0.39	0.78	0.25	0.13	0.31	66.0
LA-T_6		0.00	59.1	1.39	1.13	0.31	0.33	0.82	0.63	0.93	0.38	0.14	0.42	65.6
LA-R_2		0.00	58.1	1.73	1.26	0.29	0.37	0.69	0.93	1.00	0.38	0.18	0.28	65.2
LA-R_1		0.00	56.2	0.51	1.20	0.25	0.36	0.56	0.54	0.99	0.36	0.13	0.23	61.4
TUMB-T_1	45.4	0.07	2.07	8.92	0.05	0.15	0.15	0.27	0.79	0.27	0.11	0.05	0.25	61.2
BIVEND		3.73	19.0	12.5	0.84	1.33	2.81	1.34	6.87	2.37	0.67	0.47	2.31	58.8
BIVENE	19.4	1.28	19.5	0.92	0.63	1.05	2.22	1.13	5.54	1.61	0.75	0.40	1.43	56.6
BIVENE		2.30	28.4	1.51	1.24	1.67	3.76	1.46	10.3	2.36	1.00	0.53	1.82	56.4
LA-T_5		0.00	45.3	3.70	0.61	0.09	0.12	0.55	0.22	0.53	0.21	0.11	0.17	52.1
DORAE		0.76	33.5	5.05	1.33	0.43	0.41	1.11	1.04	1.07	0.32	0.14	0.63	49.6
LA-T_9		0.00	43.8	0.00	0.87	0.27	0.31	0.61	0.58	0.86	0.30	0.13	0.30	48.0
LA-T_2		0.00	42.9	0.00	1.23	0.26	0.38	0.55	0.60	0.92	0.32	0.19	0.25	47.6
LA-R_4		0.00	40.5	1.04	1.02	0.24	0.32	0.57	0.64	0.97	0.35	0.14	0.22	46.0
DORAD		0.49	27.7	3.96	1.63	0.40	0.39	1.06	1.22	1.23	0.32	0.15	0.63	42.9
CLA	0.34	0.00	37.0	0.36	0.86	0.17	0.31	0.31	0.33	0.78	0.31	0.11	0.22	41.1
BIVENB		2.51	13.7	1.83	0.42	1.47	4.31	1.26	9.05	2.11	0.84	0.64	1.89	40.4
SWEETA		2.60	9.63	9.89	0.44	1.94	1.21	0.87	2.73	1.44	0.59	0.95	1.45	40.2
BIVEN-T_H	8.23	0.97	12.1	0.99	0.56	1.15	2.81	1.17	6.56	1.83	0.83	0.54	1.61	39.8
NORRIS-T_5		0.00	38.0	0.00										38.0
SLA	0.32	0.00	31.8	0.32	1.08	0.23	0.40	0.43	0.44	0.84	0.27	0.14	0.28	36.5
DORAC		0.37	23.4	1.76	2.18	0.39	0.49	0.89	1.36	1.51	0.36	0.24	0.54	35.9
EUSTC		1.78	21.5	1.35	1.66	0.43	0.54	0.73	1.68	1.65	0.34	0.29	0.51	34.2
BIVEN-T_I	8.66	0.76	8.12	0.71	0.49	1.01	2.27	1.08	5.34	1.63	0.75	0.47	1.34	33.1
EUSTA		1.54	10.4	6.40	1.10	0.63	0.51	0.89	2.60	1.84	0.37	0.26	0.96	30.7
BIVENA		1.87	7.23	3.77	0.41	0.93	2.16	1.04	3.13	1.44	0.60	0.39	1.33	27.4
DORAB		0.28	18.7	1.36	1.29	0.23	0.41	0.42	0.65	1.11	0.28	0.14	0.30	27.0
LA-R_6		0.00	19.6	0.00	0.94	0.30	0.37	0.72	0.60	1.02	0.40	0.18	0.27	24.4
SWEETB		1.83	4.79	4.20	0.33	1.17	1.64	0.67	1.51	1.52	0.48	2.35	0.93	22.7
MONB		1.08	6.20	3.16	0.56	0.69	1.16	1.23	1.22	1.74	0.66	0.87	0.90	21.6
HARB		0.60	12.9	0.98	1.11	0.35	0.56	0.45	0.94	1.41	0.37	0.17	0.26	20.6
NORRIS-T_2		0.00	20.3	0.00										20.3
BIVENC		1.33	4.40	1.92	0.77	0.97	2.06	0.99	3.31	1.68	0.60	0.36	1.33	19.9
LA-T_8		0.00	16.3	0.00	0.70	0.22	0.30	0.43	0.33	0.77	0.33	0.09	0.18	19.7
LA-R_3		0.00	16.0	0.00	0.67	0.21	0.30	0.48	0.35	0.82	0.36	0.11	0.19	19.5
GRIFFE		0.41	9.22	1.37	1.53	0.35	0.66	0.56	1.31	1.44	0.40	0.20	0.39	18.5
LA-T_3		0.00	15.8	0.00	0.75	0.06	0.09	0.12	0.13	0.33	0.21	0.07	0.10	17.7
DISSC		0.52	15.2	0.56										16.8
EUSTD		0.98	6.48	1.11	1.17	0.35	0.43	0.63	1.20	1.48	0.32	0.18	0.45	16.5
MONE		0.52	4.09	0.52	0.72	0.46	1.28	0.98	0.99	1.53	0.85	0.67	0.48	15.2
EUSTF		0.50	5.39	1.02	0.94	0.42	0.45	0.49	0.98	1.52	0.33	0.31	0.43	15.1
MONC		0.54	4.01	0.78	0.79	0.61	1.32	0.77	0.90	1.84	0.81	0.67	0.59	14.8
HARF		0.25	8.00	0.82	1.03	0.33	0.38	0.55	0.95	1.26	0.31	0.10	0.31	14.7
TUMB-T_2	9.32	0.05	0.68	2.75	0.04	0.12	0.14	0.07	0.36	0.13	0.07	0.05	0.16	14.3
GRIFFA		0.63	4.65	0.72	0.92	0.50	0.46	0.87	1.20	1.67	0.33	0.68	0.70	13.9
NORRIS-T_1		0.00	13.3	0.00										13.3
NORRIS-T_4		0.00	13.1	0.00										13.1

Site	PAH	PCB	DDT	Chlor	As	Cd	Cr	Cu	Pb	Hg	Ni	Ag	Zn	Total HI
NORRIS-T_3		0.00	13.1	0.00										13.1
HARD		0.23	4.69	0.55	1.08	0.43	0.56	0.69	1.22	1.60	0.40	0.13	0.38	12.3
GRIFFB		0.40	6.25	0.41	1.00	0.26	0.43	0.32	0.47	1.07	0.30	0.22	0.21	11.7
GRIFFD		1.01	3.76	1.20	0.68	0.16	0.53	0.27	0.55	0.69	0.21	0.15	0.21	10.5
GRIFFF		0.14	3.20	0.79	1.12	0.24	0.38	0.37	0.79	1.19	0.29	0.12	0.21	9.5
GRIFFC		0.09	1.92	0.14	1.02	0.37	0.38	0.58	0.93	1.53	0.30	0.38	0.41	8.4
HOGC		0.35	2.65	2.98	0.00	0.27	0.32	0.05	0.28	0.15	0.08	0.05	0.14	8.2
HARE		0.47	2.71	0.46	0.50	0.28	0.35	0.50	0.79	0.92	0.24	0.12	0.32	7.9
HARA		0.08	3.77	0.08	0.80	0.23	0.34	0.28	0.36	1.09	0.22	0.06	0.20	7.8
AB-T_2		0.00	6.60	0.27	0.12	0.04	0.19	0.05	0.07	0.12	0.16	0.07	0.05	7.7
NORRIS-T_6		0.00	7.18	0.00										7.2
SWEETA	3.66	0.07	0.74	0.30	0.11	0.30	0.39	0.05	0.15	0.11	0.09	0.09	0.15	7.1
SWEETE		0.28	0.62	1.23	0.12	0.30	0.44	0.12	2.66	0.22	0.07	0.11	0.31	7.0
BIVEN-T_G	0.62	0.16	2.38	0.37	0.18	0.22	0.42	0.23	1.35	0.49	0.18	0.13	0.23	7.0
HOGB		0.16	0.87	1.99	0.00	0.32	0.93	0.79	0.20	0.17	0.71	0.16	0.12	7.0
SWEETC		0.43	1.41	1.82	0.00	0.12	0.11	0.13	0.58	0.19	0.07	0.06	0.24	6.3
MONG		0.22	1.90	0.48	0.24	0.17	0.50	0.41	0.42	0.51	0.23	0.26	0.22	6.0
LA-T_1		0.00	2.26	0.00	1.04	0.16	0.33	0.16	0.11	0.43	0.20	0.07	0.06	4.8
SWEET-T_1	1.13	0.08	0.40	1.03	0.06	0.16	0.11	0.11	0.39	0.18	0.07	0.06	0.21	4.2
GEORGEJ		0.27	2.89	0.03										4.1
SWEETD		0.64	0.48	0.53	0.00	0.39	0.26	0.08	0.42	0.28	0.09	0.13	0.19	3.8
GEORGEG		0.41	1.85	0.68										3.8
EUSTE		0.13	1.14	0.32	0.29	0.05	0.11	0.15	0.25	0.37	0.07	0.06	0.10	3.7
MONA		0.25	0.51	0.32	0.15	0.12	0.30	0.35	0.36	0.18	0.17	0.16	0.18	3.3
ROSE-T_1	0.17	0.08	0.41	0.95	0.04	0.39	0.22	0.10	0.15	0.12	0.14	0.03	0.14	3.2
GEORGEF		0.30	1.91	0.26										3.1
HARC		0.14	1.22	0.14	0.15	0.09	0.12	0.15	0.26	0.35	0.08	0.07	0.08	2.9
LA-R_7		0.00	1.47	0.00	0.17	0.07	0.16	0.06	0.10	0.22	0.45	0.07	0.06	2.8
HOGD		0.17	0.56	0.69	0.00	0.08	0.12	0.07	0.19	0.21	0.04	0.06	0.09	2.7
HOGA		0.18	0.45	0.90	0.00	0.24	0.11	0.04	0.12	0.15	0.05	0.06	0.10	2.6
AB-T_4		0.00	2.12	0.17	0.04	0.02	0.07	0.04	0.02	0.06	0.00	0.07	0.04	2.6
MONF		0.07	0.36	0.12	0.00	0.06	0.32	0.20	0.20	0.19	0.10	0.22	0.12	2.2
GEORGEC		0.15	0.93	0.15										1.5
MOND		0.04	0.23	0.10	0.00	0.00	0.20	0.12	0.22	0.10	0.07	0.12	0.09	1.5
GEORGEB		0.19	0.81	0.06										1.3
DORAG		0.00	0.61	0.00	0.09	0.00	0.04	0.03	0.00	0.07	0.00	0.03	0.02	0.9
EUSTG		0.06	0.25	0.08	0.00	0.00	0.05	0.04	0.06	0.09	0.00	0.05	0.03	0.9
DISSA		0.04	0.65	0.03										0.8
BIVENF		0.02	0.16	0.06	0.00	0.00	0.05	0.03	0.07	0.12	0.00	0.06	0.02	0.7
EUSTB		0.05	0.26	0.02	0.00	0.00	0.04	0.02	0.04	0.00	0.00	0.03	0.01	0.6
GEORGEH		0.04	0.17	0.13										0.6
GEORGEI		0.05	0.35	0.07										0.6
GEORGED		0.03	0.15	0.02										0.3
DORAA		0.02	0.05	0.03	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.2
DISSE		0.03	0.12	0.00										0.2
DISSD		0.01	0.06	0.00										0.1
DISSB		0.00	0.08	0.00										0.1
GEORGEE		0.00	0.00	0.01										0.0
GEORGEA		0.00	0.00	0.01										0.0

[a] The DDT HQ values are the sum of the individual HQ values for DDT, DDE, and DDD. The HI values are the sum of the listed HQs and the HQs of the other parameters for which TEC values exist (Lindane, Dieldrin, Endrin, and Heptachlor epoxide).

Table C-8. Selected Biological Indices and the TEC-Based Hazard Index (HI) Values Calculated for Districtwide Assessment Sites

Site	Water body Type	Biological/Benthic Indices				HI (TEC-based)
		CBSI	Total Number of Taxa	S-W Species Diversity	AFI	
AB-T_1	Canal	NA[a]	3	1.562		1140
AB-T_2	Canal	NA	9	2.618		7.7
AB-T_3	Canal	NA	9	2.261		125
AB-T_4	Canal	NA	20	2.585		2.6
DORAA	Lake	8	8	1.895	0	0.2
DORAB	Lake	7	7	1.812	0	27.0
DORAC	Lake	3	3	0.462	0	35.9
DORAD	Lake	3	3	0.531	0	42.9
DORAE	Lake	3	3	0.209	0	49.6
DORAF	Lake	2	2	0.302	0	71.3
DORAF	Lake	2	2	0.999	0	80.4
DORAG	Lake	9	9	1.614	0	66.0
DORAG	Lake	3	3	0.764	0	0.9
DORAH	Lake	9	7	1.768	1	224
EUSTA	Lake	4	4	0.497	0	30.7
EUSTB	Lake	11	9	2.076	1	0.6
EUSTC	Lake	7	3	1.063	2	34.2
EUSTD	Lake	3	3	0.443	0	16.5
EUSTE	Lake	4	4	0.765	0	3.7
EUSTF	Lake	7	5	0.79	1	15.1
EUSTG	Lake	7	5	0.457	1	0.9
GRIFFA	Lake	3	3	0.777	0	13.9
GRIFFB	Lake	2	2	0.141	0	11.7
GRIFFC	Lake	4	4	1.074	0	8.4
GRIFFD	Lake	2	2	0.381	0	10.5
GRIFFE	Lake	5	5	1.346	0	18.5
GRIFFF	Lake	3	3	0.371	0	9.5
HARA	Lake	5	5	1.539	0	7.8
HARB	Lake	5	5	1.325	0	20.6
HARC	Lake	9	7	2.2	1	2.9
HARD	Lake	5	5	1.358	0	12.3
HARE	Lake	8	6	1.841	1	7.9
HARF	Lake	8	6	1.983	1	14.7
CLA	Lake	4	2	0.503	1	41.1
NLA	Lake	2	2	0.454	0	106
SLA	Lake	1	1	0	0	36.5
LA-R_1	Lake	1	1	0	0	61.4
LA-R_2	Lake	1	1	0	0	65.2
LA-R_3	Lake	1	1	0	0	19.5
LA-R_4	Lake	1	1	0	0	46.0
LA-R_5	Lake	2	2	0.323	0	77.4
LA-R_6	Lake	2	2	0.75	0	24.4
LA-R_7	Lake	3	3	1.041	0	2.8
LA-T_1	Lake	19	13	1.653	3	4.8
LA-T_2	Lake	4	4	1.15	0	47.6
LA-T_3	Lake	3	3	0.64	0	17.7
LA-T_4	Lake	9	7	1.234	1	419
LA-T_5	Lake	14	12	1.041	1	52.1
LA-T_6	Lake	9	9	2.889	0	65.6
LA-T_7	Lake	10	10	2.87	0	79.5
LA-T_8	Lake	2	2	0.097	0	19.7
LA-T_9	Lake	4	4	1.43	0	48.0
BIVENA	Lake	2	2	0.877	0	27.4

Site	Water body Type	Biological/Benthic Indices				HI (TEC-based)
		CBSI	Total Number of Taxa	S-W Species Diversity	AFI	
BIVENB	Lake	8	6	1.317	1	40.4
BIVENC	Lake	2	2	0.371	0	19.9
BIVEND	Lake	9	5	1.072	2	58.8
BIVENE	Lake	4	2	0.722	1	56.4
BIVENE	Lake	6	6	2.308	0	56.6
BIVENF	Lake	9	9	0.684	0	0.7
BIVEN-T_G	Lake	2	2	0.684	0	7.0
BIVEN-T_H	Lake	0	0	0	0	39.8
BIVEN-T_I	Lake	3	3	1.585	0	33.1
HOGA	Stream	NA	7	1.964	2	2.6
HOGB	Stream	NA	16	3.168	7	7.0
HOGC	Stream	NA	15	1.857	9	8.2
HOGD	Stream	NA	9	2.312	1	2.7
ROSE-T_1	Stream	NA	13	2.616	7	3.2
SWEETA	Stream	NA	5	1.975	13	40.2
SWEETA	Stream	NA	19	2.501	2	7.1
SWEETB	Stream	NA	2	0.544	0	22.7
SWEETC	Stream	NA	9	1.006	2	6.3
SWEETD	Stream	NA	13	2.569	5	3.8
SWEETE	Stream	NA	31	2.832	7	7.0
SWEET-T_1	Stream	NA	20	3.071	3	4.2
TUMB-T_1	Stream	NA	12	2.157	2	61.2
TUMB-T_2	Stream	NA	18	3.321	3	14.3
DISSA	Lake	27	9	2.618	9	0.8
DISSB	Lake	15	7	1.89	4	0.1
DISSC	Lake	14	8	1.526	3	16.8
DISSD	Lake	20	10	2.251	5	0.1
DISSE	Lake	5	5	1.369	0	0.2
GEORGEA	Lake	7	7	2.574	0	0.0
GEORGEB	Lake	12	8	2.085	2	1.3
GEORGEC	Lake	7	5	1.833	1	1.5
GEORGED	Lake	4	4	1.118	0	0.3
GEORGEE	Lake	9	9	1.009	0	0.0
GEORGEF	Lake	3	3	0.956	0	3.1
GEORGEG	Lake	7	5	1.553	1	3.8
GEORGEH	Lake	10	6	1.875	2	0.6
GEORGEI	Lake	5	5	1.76	0	0.6
GEORGEJ	Lake	6	4	0.9	1	4.1
MONA	Lake	8	6	1.918	1	3.3
MONB	Lake	5	5	1.667	0	21.6
MONC	Lake	5	5	2.011	0	14.8
MOND	Lake	14	10	1.582	2	1.5
MONE	Lake	5	3	1.233	1	15.2
MONF	Lake	6	6	1.682	0	2.2
MONG	Lake	6	6	1.908	0	6.0
NORRIS-T_1	Lake	15	5	1.518	5	13.3
NORRIS-T_2	Lake	8	4	1.779	2	20.3
NORRIS-T_3	Lake	15	5	1.966	5	13.1
NORRIS-T_4	Lake	17	7	1.997	5	13.1
NORRIS-T_5	Lake	18	6	1.997	6	38.0
NORRIS-T_6	Lake	21	9	2.082	6	7.2

[a] NA: Sites for which data was insufficient, or sites from groups for which no significant correlation to hazard indices was found.

Appendix D. Detailed Data from 2002 Districtwide and Detailed Assessment Sampling

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8270- MOD - SURROGATE CORRECTED

LOCATION	Bivens Arm	Bivens Arm	Bivens Arm	Bivens Arm	Calf Pond	Lake Carlton	Lake Carlton	Lake Apopka	Lake Harney	Crescent Lake
SITE_ID	BIVEN-T_G	BIVEN-T_H	BIVEN-T_I	BIVENE	CALF-T_1	CARL-T_1	CARL-T_2	CLA	CLH	CRES-T_1
BATCH_ID	02-210	02-210	02-210	02-210	02-209	02-209	02-209	02-210	02-209	02-209
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD
UNIT	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.
Isophorone	1.02	3.85	3.91	5.04	0.41	3.54	4.16	2.02	1.75	0.91
Naphthalene	6.57	31.11	23.11	37.07	1.79	16.35	12.58	18.00	12.05	5.88
2-Methylnaphthalene	2.03	16.03	11.78	15.32	0.64	6.19	5.89	6.41	2.78	1.80
1-Methylnaphthalene	1.59	10.43	8.31	11.44	0.42	4.58	4.01	3.83	1.56	1.30
Biphenyl	0.97	5.40	4.57	5.84	0.30	4.31	3.42	5.61	1.94	1.14
2,6-Dimethylnaphthalene	1.71	10.15	8.48	9.79	0.32	3.60	4.82	4.00	1.13	0.88
2,3,5-Trimethylnaphthalene	1.24	4.81	4.49	7.06	ND	ND	ND	ND	ND	0.63
Acenaphthylene	2.06	22.97	17.71	23.84	0.30	1.93	2.62	1.45	2.55	3.27
Acenaphthene	2.89	20.78	30.52	57.56	0.30	2.18	3.94	1.36	ND	0.57
Fluorene	4.29	31.86	39.90	57.96	0.71	7.81	7.44	16.13	1.72	2.00
Phenanthrene	37.43	396.50	480.96	982.93	3.01	22.06	21.82	52.14	10.25	11.81
Anthracene	5.71	68.36	68.84	100.86	0.76	6.79	6.94	8.63	3.24	4.68
1-Methylphenanthrene	4.05	39.38	42.94	85.42	0.51	8.68	5.40	16.13	2.55	4.65
Fluoranthene	147.82	1859.47	2034.83	4625.49	12.06	81.64	88.07	138.00	50.66	70.14
Pyrene	108.76	1531.33	1638.43	3658.31	10.13	58.74	68.62	74.34	47.22	64.33
Benzo[a]anthracene	38.13	610.82	646.65	1336.10	3.61	18.43	24.00	15.35	17.71	27.88
Chrysene	65.88	1084.74	1144.15	2909.61	7.28	27.52	32.00	16.92	22.26	31.58
Benzo[b]fluoranthene	88.44	1474.40	1532.34	3502.55	11.54	47.84	49.31	31.01	26.57	31.46
Benzo[k]fluoranthene	79.23	1063.68	1205.44	2650.63	8.05	34.02	44.16	29.08	24.36	27.88
Benzo[e]pyrene	64.08	1032.08	1041.99	2376.78	7.99	26.10	30.46	17.44	20.51	22.76
Benzo[a]pyrene	61.96	1063.68	1103.29	2429.74	6.13	29.88	35.61	18.90	23.31	31.58
Perylene	67.26	427.58	347.33	810.69	25.81	478.36	752.79	18.43	480.16	228.79
Indeno[1,2,3-c,d]pyrene	73.72	1190.05	1225.88	2683.36	8.85	34.73	37.48	24.02	22.49	22.28
Dibenz[a,h]anthracene	11.02	204.31	218.61	459.54	1.52	5.45	6.67	2.96	3.31	3.92
Benzo[g,h,i]perylene	126.04	1053.15	1062.43	2376.93	7.20	30.12	32.54	23.81	23.08	17.75
TOTAL PAH	1002.89	13253.07	13943.01	31214.82	119.22	957.30	1280.59	543.95	801.41	618.95
Low PAH	70.54	657.78	741.63	1395.10	9.06	84.48	78.88	133.69	39.78	38.61
High PAH	932.35	12595.29	13201.38	29819.72	110.16	872.82	1201.71	410.26	761.64	580.35

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8270- MOD - SURROGATE CORRECTED

LOCATION	Crescent Lake	Lake Minnehaha	Lake Minnehaha	Johns Lake	Johns Lake	Lake Harney	Lake Minneola	Lake Minneola	Mud Lake	Mud Lake
SITE_ID	CRES-T_2	HAHA-T_1	HAHA-T_2	JOHNS-T_1	JOHNS-T_2	LH-T_1	MINN-T_1	MINN-T_2	MUD-T_1	MUD-T_2
BATCH_ID	02-209	02-210	02-210	02-209	02-209	02-209	02-210	02-210	02-210	02-210
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD
UNIT	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.
Isophorone	2.61	ND	ND	0.57	0.13	ND	0.09	0.12	2.52	2.58
Naphthalene	32.57	0.93	0.64	3.98	1.30	1.19	0.78	2.25	34.41	13.91
2-Methylnaphthalene	10.90	0.29	0.21	1.40	0.41	0.30	0.31	1.08	8.60	4.82
1-Methylnaphthalene	5.92	0.16	0.12	0.75	0.21	0.17	0.19	0.77	4.46	2.47
Biphenyl	4.61	0.15	0.13	1.28	0.32	0.29	0.18	0.42	5.25	2.55
2,6-Dimethylnaphthalene	5.81	0.10	ND	0.63	0.15	ND	0.14	0.57	ND	2.46
2,3,5-Trimethylnaphthalene	2.26	ND	ND	ND	ND	ND	ND	0.29	ND	ND
Acenaphthylene	26.22	0.11	0.09	0.60	0.10	ND	0.24	1.10	ND	ND
Acenaphthene	7.23	ND	ND	0.60	ND	ND	0.09	0.29	ND	0.96
Fluorene	14.63	0.10	0.06	1.56	0.32	ND	0.18	0.62	4.36	3.84
Phenanthrene	155.92	0.79	0.57	5.42	1.17	0.25	1.67	8.32	11.64	8.04
Anthracene	47.33	0.18	0.12	1.58	0.19	ND	0.33	1.63	3.22	3.21
1-Methylphenanthrene	33.94	0.16	0.14	1.88	0.26	ND	0.43	1.66	3.70	2.36
Fluoranthene	848.60	3.41	2.31	35.81	3.63	0.33	6.60	33.27	16.48	13.51
Pyrene	761.67	3.13	2.00	29.76	2.96	0.31	5.68	29.64	11.40	9.82
Benzo[a]anthracene	366.54	0.90	0.60	7.01	0.82	0.10	1.97	10.85	ND	2.04
Chrysene	537.81	2.46	1.71	15.38	1.79	0.22	4.07	20.21	5.13	4.28
Benzo[b]fluoranthene	520.36	2.59	2.04	14.84	2.16	0.30	4.41	23.09	6.78	6.57
Benzo[k]fluoranthene	441.81	1.94	1.24	9.80	1.62	0.16	3.31	17.72	5.21	5.34
Benzo[e]pyrene	352.36	2.17	1.36	9.93	1.53	0.21	3.28	17.12	ND	3.98
Benzo[a]pyrene	438.54	1.48	1.03	8.30	1.35	0.23	2.90	15.73	ND	2.19
Perylene	826.90	0.97	0.62	13.66	0.80	0.55	3.34	14.83	57.36	48.74
Indeno[1,2,3-c,d]pyrene	341.45	1.65	1.23	10.12	1.56	0.21	3.31	17.12	5.11	5.62
Dibenz[a,h]anthracene	70.25	0.33	0.21	1.53	0.27	ND	0.55	2.97	ND	0.58
Benzo[g,h,i]perylene	243.27	1.98	1.43	8.66	1.45	0.26	3.48	16.82	7.57	6.46
TOTAL PAH	6096.91	25.96	17.86	184.48	24.39	5.09	47.45	238.38	190.68	153.74
Low PAH	347.35	2.96	2.09	19.68	4.44	2.20	4.55	19.01	75.63	44.61
High PAH	5749.56	23.00	15.77	164.80	19.95	2.89	42.89	219.37	115.05	109.13

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8270- MOD - SURROGATE CORRECTED

LOCATION	Lake Apopka	Lake Ola	Lake Ola	Lake Jessup	Lake Jessup	Possum Creek	Sweetwater Branch	Lake Apopka	Sweetwater Branch	Sweetwater Branch
SITE_ID	NLA	OLA-T_1	OLA-T_2	OW-4	OW-6	POSSUM-T_1	ROSE-T_1	SLA	SWEET A	SWEET-T_1
BATCH_ID	02-210	02-209	02-209	02-209	02-209	02-209	02-210	02-210	02-210	02-210
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD	8270-MOD
UNIT	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.
Isophorone	1.96	0.54	2.17	2.63	1.98	ND	ND	1.93	ND	ND
Naphthalene	13.24	2.19	4.60	22.89	14.22	2.36	1.06	15.66	33.44	5.40
2-Methylnaphthalene	6.54	0.84	1.80	7.91	5.05	1.02	0.57	5.80	27.20	2.59
1-Methylnaphthalene	3.60	0.55	1.72	6.29	3.41	1.07	ND	3.00	10.66	2.34
Biphenyl	4.73	0.51	0.92	4.28	3.22	0.55	0.17	5.46	5.29	0.63
2,6-Dimethylnaphthalene	5.33	0.31	0.57	4.89	3.14	0.78	0.24	5.12	7.53	1.23
2,3,5-Trimethylnaphthalene	2.25	ND	ND	ND	ND	0.44	ND	ND	2.59	0.72
Acenaphthylene	1.53	0.26	0.94	1.85	3.14	1.06	1.52	1.84	21.43	1.95
Acenaphthene	2.18	0.18	0.27	2.68	1.74	8.59	0.32	1.48	45.66	3.22
Fluorene	13.02	0.72	0.97	10.40	7.31	9.56	0.58	13.66	65.56	5.04
Phenanthrene	42.87	2.88	7.58	21.86	27.62	217.79	9.54	46.14	553.57	106.85
Anthracene	7.72	0.72	1.53	5.86	8.10	23.64	1.59	8.09	128.83	9.87
1-Methylphenanthrene	11.33	0.64	1.38	4.50	4.88	10.20	1.01	14.19	49.62	8.15
Fluoranthene	112.29	12.87	32.50	82.17	135.38	399.72	38.05	121.45	937.50	307.11
Pyrene	67.72	7.77	25.21	64.33	110.62	308.09	37.29	69.87	812.50	248.73
Benzo[a]anthracene	16.77	2.58	8.65	19.94	39.02	115.44	12.65	14.71	426.67	96.37
Chrysene	18.88	5.44	18.60	30.23	56.10	154.61	25.20	13.57	460.00	156.86
Benzo[b]fluoranthene	31.33	7.84	24.88	44.66	82.68	136.05	29.31	30.04	404.76	171.57
Benzo[k]fluoranthene	28.38	4.80	17.65	37.02	66.51	121.62	18.63	25.07	379.05	139.22
Benzo[e]pyrene	17.30	4.55	15.88	36.49	58.47	93.59	21.76	14.81	302.86	119.61
Benzo[a]pyrene	19.41	3.99	15.64	32.35	63.56	121.62	18.82	15.23	422.86	129.41
Perylene	19.52	18.16	15.76	64.07	263.53	37.62	6.67	34.39	116.19	36.76
Indeno[1,2,3-c,d]pyrene	24.79	5.25	17.42	33.10	60.17	96.89	21.76	25.27	318.10	130.39
Dibenz[a,h]anthracene	3.39	0.80	2.95	5.72	9.39	19.69	4.49	2.60	82.86	26.37
Benzo[g,h,i]perylene	24.37	4.35	14.93	30.97	49.99	73.59	22.45	22.89	279.05	113.73
TOTAL PAH	498.48	88.21	232.32	574.46	1077.26	1955.58	273.70	510.34	5893.75	1824.14
Low PAH	114.33	9.81	22.27	93.40	81.84	277.06	16.61	120.44	951.37	148.01
High PAH	384.14	78.40	210.05	481.05	995.42	1678.52	257.09	389.89	4942.38	1676.13

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8270- MOD - SURROGATE CORRECTED

LOCATION	Bivens Arm	Bivens Arm	Lake Weir	Lake Weir
SITE_ID	TUMB-T_1	TUMB-T_2	WEIR-T_1	WEIR-T_2
BATCH_ID	02-210	02-210	02-209	02-209
MATRIX	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8270-MOD	8270-MOD	8270-MOD	8270-MOD
UNIT	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.	ug/kg. dry wt.
Isophorone	ND	ND	ND	0.07
Naphthalene	102.93	7.59	1.00	1.20
2-Methylnaphthalene	39.98	3.59	0.26	0.43
1-Methylnaphthalene	34.35	4.17	0.21	0.29
Biphenyl	17.84	1.84	0.22	0.25
2,6-Dimethylnaphthalene	22.11	3.12	0.08	0.08
2,3,5-Trimethylnaphthalene	11.26	2.60	ND	ND
Acenaphthylene	40.95	6.79	ND	0.10
Acenaphthene	385.68	50.89	ND	0.10
Fluorene	427.14	61.83	ND	0.21
Phenanthrene	7336.68	1348.60	0.30	1.12
Anthracene	1012.56	136.13	0.07	0.22
1-Methylphenanthrene	340.45	77.99	0.12	0.28
Fluoranthene	15577.89	3257.00	0.69	3.83
Pyrene	11507.54	2417.30	0.53	2.66
Benzo[a]anthracene	4519.23	952.83	0.19	1.00
Chrysene	5721.15	1245.28	0.32	1.69
Benzo[b]fluoranthene	5134.62	1075.47	0.42	2.33
Benzo[k]fluoranthene	4634.62	1000.00	0.31	1.80
Benzo[e]pyrene	3548.08	748.11	0.31	1.42
Benzo[a]pyrene	4317.31	903.77	0.32	1.46
Perylene	1192.31	238.68	0.15	0.61
Indeno[1,2,3-c,d]pyrene	3480.77	702.83	0.31	1.86
Dibenz[a,h]anthracene	672.12	139.62	0.09	0.31
Benzo[g,h,i]perylene	3038.46	616.04	0.39	1.49
TOTAL PAH	73116.02	15002.09	6.32	24.74
Low PAH	9771.93	1705.15	2.28	4.29
High PAH	63344.08	13296.94	4.05	20.46

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8180- MOD - SURROGATE CORRECTED

LOCATION	A-B Canal	A-B Canal	A-B Canal	A-B Canal	Bivens Arm	Bivens Arm	Bivens Arm
SITE_ID	AB-T_1	AB-T_2	AB-T_3	AB-T_4	BIVEN-T_G	BIVEN-T_H	BIVEN-T_I
BATCH_ID	02-226	02-226	02-226	02-226	02-210	02-210	02-210
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD
UNIT	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Hexachlorobenzene	1.50	0.08	ND	ND	ND	ND	ND
2,4-DDD	954.71	2.50	52.59	0.79	ND	ND	ND
4,4-DDD	2435.74	7.26	133.00	2.41	0.69	3.34	2.72
2,4-DDE	40.13	0.39	7.87	ND	ND	ND	ND
4,4-DDE	1023.26	13.71	224.14	4.61	6.86	33.68	22.35
2,4-DDT	33.17	ND	ND	ND	ND	ND	ND
4,4-DDT	78.95	0.56	10.91	ND	0.27	2.85	2.02
Aldrin	ND	ND	ND	ND	ND	ND	ND
a-BHC	ND	ND	ND	ND	ND	ND	ND
b-BHC	ND	ND	ND	ND	ND	ND	ND
d-BHC	ND	ND	ND	ND	ND	ND	ND
g-BHC	ND	ND	ND	ND	ND	ND	ND
Cis-chlordane	70.33	0.51	9.68	0.54	0.29	2.10	1.54
g-Chlordane	84.57	ND	7.66	ND	0.81	ND	ND
Cis-nonachlor	22.28	0.23	ND	ND	ND	ND	ND
Dieldrin	8.16	ND	ND	ND	ND	1.03	1.01
Endosulfan I	ND	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND	ND	ND
Trans-nonachlor	64.19	0.13	2.85	ND	0.10	1.12	0.75
4,4-DDMU	2114.35	4.90	97.16	1.48	1.44	4.27	3.21
4,4-dichlorobenzophenone	384.03	3.80	67.18	ND	ND	ND	ND
Chlorobenzilate	ND	ND	ND	ND	ND	ND	ND
Dicofol	ND	ND	ND	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND	ND	ND	ND
Cl2(08)	ND	ND	ND	ND	ND	ND	ND
Cl3(18)	ND	ND	ND	ND	ND	ND	ND
Cl3(28)	ND	ND	ND	ND	ND	ND	ND
Cl4(44)	ND	ND	ND	ND	ND	ND	ND
Cl4(52)	ND	ND	ND	ND	0.29	ND	ND
Cl4(66)	ND	ND	ND	ND	0.24	1.83	1.90
Cl4(77)	ND	ND	ND	ND	ND	ND	ND
Cl5(101)	ND	ND	ND	ND	ND	ND	ND
Cl5(105)	ND	ND	ND	ND	0.33	1.74	1.50
Cl5(110)	ND	ND	ND	ND	ND	ND	ND
Cl5(118)	ND	ND	ND	ND	0.67	3.94	3.00
Cl5(126)	ND	ND	ND	ND	ND	ND	ND
Cl6(128)	ND	ND	ND	ND	0.50	3.04	2.49
Cl6(129)	ND	ND	ND	ND	ND	ND	ND
Cl6(138)	ND	ND	ND	ND	ND	ND	ND
Cl6(153)	ND	ND	ND	ND	1.87	12.79	9.89
Cl7(170)	ND	ND	ND	ND	ND	ND	ND
Cl7(180)	ND	ND	ND	ND	0.92	5.59	3.82
Cl7(187)	ND	ND	ND	ND	ND	ND	ND
Cl8(195)	ND	ND	ND	ND	ND	ND	ND
Cl9(206)	ND	ND	ND	ND	ND	ND	ND
Cl10(209)	ND	ND	ND	ND	ND	ND	ND
DDT	112.12	0.56	10.91	ND	0.27	2.85	2.02
DDD	3390.45	9.76	185.59	3.20	0.69	3.34	2.72
DDE	1063.39	14.10	232.01	4.61	6.86	33.68	22.35
TOTAL DDTs	4565.96	24.42	428.51	7.82	7.82	39.87	27.09
TOTAL BHCs	ND	ND	ND	ND	ND	ND	ND
TOTAL CHLORDANES (sum of 5)	241.37	0.86	20.19	0.54	1.19	3.22	2.29
TOTAL CHLORDANES (sum of 3)	154.91	0.51	17.34	0.54	1.10	2.10	1.54
ENDOSULFANS	ND	ND	ND	ND	ND	ND	ND
SUM OF PCB CONGENERS	ND	ND	ND	ND	4.83	28.92	22.60
TOTAL PCB-ESTIMATED	ND	ND	ND	ND	9.66	57.84	45.19

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8180- MOD - SURROGATE CORRECTED

LOCATION	Bivens Arm	Calf Pond	Lake Carlton	Lake Carlton	Lake Apopka	Lake Harney	Crescent Lake
SITE_ID	BIVENE	CALF-T_1	CARL-T_1	CARL-T_2	CLA	CLH	CRES-T_1
BATCH_ID	02-210	02-209	02-209	02-209	02-210	02-209	02-209
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD
UNIT	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Hexachlorobenzene	ND	ND	ND	ND	ND	ND	ND
2,4-DDD	ND	0.08	3.22	4.73	25.81	ND	0.53
4,4-DDD	3.89	0.15	4.77	42.84	48.80	0.97	ND
2,4-DDE	ND	ND	ND	ND	ND	ND	ND
4,4-DDE	56.70	0.36	58.88	125.49	68.58	6.64	0.83
2,4-DDT	ND	ND	ND	ND	ND	ND	ND
4,4-DDT	3.28	ND	1.10	246.08	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND	ND
a-BHC	ND	ND	ND	ND	ND	ND	ND
b-BHC	ND	ND	ND	ND	ND	ND	ND
d-BHC	ND	ND	ND	ND	ND	ND	ND
g-BHC	ND	ND	ND	ND	ND	ND	ND
Cis-chlordane	1.81	0.17	0.93	1.64	1.10	ND	ND
g-Chlordane	ND	0.33	ND	ND	ND	ND	ND
Cis-nonachlor	ND	0.20	0.88	1.03	ND	ND	ND
Dieldrin	1.37	ND	ND	1.08	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND	ND	ND
Trans-nonachlor	1.12	0.14	0.39	0.47	ND	ND	ND
4,4-DDMU	6.06	ND	8.28	27.36	92.78	0.85	ND
4,4-dichlorobenzophenone	ND				16.71		
Chlorobenzilate	ND				ND		
Dicofol	ND				ND		
Toxaphene	ND			ND	ND		
Cl2(08)	ND	ND	ND	ND	ND	ND	ND
Cl3(18)	ND	ND	ND	ND	ND	ND	ND
Cl3(28)	ND	ND	ND	ND	ND	ND	ND
Cl4(44)	ND	ND	ND	ND	ND	ND	ND
Cl4(52)	1.76	ND	ND	ND	ND	ND	ND
Cl4(66)	2.25	ND	ND	ND	ND	ND	ND
Cl4(77)	ND	ND	ND	ND	ND	ND	ND
Cl5(101)	ND	ND	ND	ND	ND	ND	ND
Cl5(105)	2.27	ND	ND	ND	ND	ND	ND
Cl5(110)	ND	ND	ND	ND	ND	ND	ND
Cl5(118)	5.26	ND	ND	ND	ND	ND	ND
Cl5(126)	ND	ND	ND	ND	ND	ND	ND
Cl6(128)	3.66	ND	ND	ND	ND	ND	ND
Cl6(129)	ND	ND	ND	ND	ND	ND	ND
Cl6(138)	ND	ND	ND	ND	ND	ND	ND
Cl6(153)	13.93	ND	ND	ND	ND	ND	ND
Cl7(170)	ND	ND	ND	ND	ND	ND	ND
Cl7(180)	8.29	ND	ND	ND	ND	ND	ND
Cl7(187)	ND	ND	ND	ND	ND	ND	ND
Cl8(195)	ND	ND	ND	ND	ND	ND	ND
Cl9(206)	ND	ND	ND	ND	ND	ND	ND
Cl10(209)	ND	ND	ND	ND	ND	ND	ND
DDT	3.28	ND	1.10	246.08	ND	ND	ND
DDD	3.89	0.23	8.00	47.57	74.61	0.97	0.53
DDE	56.70	0.36	58.88	125.49	68.58	6.64	0.83
TOTAL DDTs	63.86	0.59	67.98	419.14	143.19	7.61	1.36
TOTAL BHCs	ND	ND	ND	ND	ND	ND	ND
TOTAL CHLORDANES (sum of 5)	2.93	0.85	2.20	3.13	1.10	ND	ND
TOTAL CHLORDANES (sum of 3)	1.81	0.50	0.93	1.64	1.10	ND	ND
ENDOSULFANS	ND	ND	ND	ND	ND	ND	ND
SUM OF PCB CONGENERS	37.41	ND	ND	ND	ND	ND	ND
TOTAL PCB-ESTIMATED	74.82	ND	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8180- MOD - SURROGATE CORRECTED

LOCATION	Crescent Lake	Lake Beauclair	Lake Beauclair	Lake Beauclair	Lake Minnehaha	Lake Minnehaha
SITE_ID	CRES-T_2	DORAF	DORAG	DORAH	HAHA-T-1	HAHA-T-2
BATCH_ID	02-209	02-226	02-226	02-226	02-210	02-210
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD
UNIT	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Hexachlorobenzene	ND	1.49	ND	2.30	ND	ND
2,4-DDD	3.13	8.46	ND	107.08	ND	ND
4,4-DDD	6.84	19.17	0.59	336.43	0.14	ND
2,4-DDE	ND	9.38	ND	13.48	ND	ND
4,4-DDE	11.04	208.60	1.55	337.59	0.40	0.32
2,4-DDT	ND	ND	ND	9.39	ND	ND
4,4-DDT	2.85	3.89	ND	25.64	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND
a-BHC	ND	ND	ND	ND	ND	ND
b-BHC	ND	ND	ND	ND	ND	ND
d-BHC	ND	ND	ND	ND	ND	ND
g-BHC	ND	ND	ND	ND	ND	ND
Cis-chlordane	ND	1.90	ND	12.90	ND	ND
g-Chlordane	ND	ND	ND	ND	ND	ND
Cis-nonachlor	ND	ND	ND	7.25	0.03	0.02
Dieldrin	ND	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND	ND
Trans-nonachlor	ND	ND	ND	2.11	ND	ND
4,4-DDMU	3.77	46.06	ND	263.77	ND	ND
4,4-dichlorobenzophenone		32.97	ND	66.35	ND	ND
Chlorobenzilate		ND	ND	ND	ND	ND
Dicofol		ND	ND	ND	ND	ND
Toxaphene		ND	ND	ND	ND	ND
Cl2(08)	ND	ND	ND	ND	ND	ND
Cl3(18)	ND	ND	ND	ND	ND	ND
Cl3(28)	ND	ND	ND	ND	ND	ND
Cl4(44)	ND	ND	ND	ND	ND	ND
Cl4(52)	4.22	ND	ND	ND	ND	ND
Cl4(66)	ND	ND	ND	ND	ND	ND
Cl4(77)	ND	ND	ND	ND	ND	ND
Cl5(101)	ND	ND	ND	ND	ND	ND
Cl5(105)	ND	ND	ND	ND	ND	ND
Cl5(110)	ND	ND	ND	ND	ND	ND
Cl5(118)	6.67	ND	ND	ND	ND	ND
Cl5(126)	ND	ND	ND	ND	ND	ND
Cl6(128)	ND	ND	ND	ND	ND	ND
Cl6(129)	ND	ND	ND	ND	ND	ND
Cl6(138)	ND	ND	ND	ND	ND	ND
Cl6(153)	ND	ND	ND	ND	ND	ND
Cl7(170)	ND	ND	ND	ND	ND	ND
Cl7(180)	ND	ND	ND	ND	ND	ND
Cl7(187)	ND	ND	ND	ND	ND	ND
Cl8(195)	ND	ND	ND	ND	ND	ND
Cl9(206)	ND	ND	ND	ND	ND	ND
Cl10(209)	ND	ND	ND	ND	ND	ND
DDT	2.85	3.89	ND	35.02	ND	ND
DDD	9.97	27.63	0.59	443.50	0.14	ND
DDE	11.04	217.99	1.55	351.07	0.40	0.32
TOTAL DDTs	23.86	249.50	2.14	829.60	0.54	0.32
TOTAL BHCs	ND	ND	ND	ND	ND	ND
TOTAL CHLORDANES (sum of 5)	ND	1.90	ND	22.26	0.03	0.02
TOTAL CHLORDANES (sum of 3)	ND	1.90	ND	12.90	ND	ND
ENDOSULFANS	ND	ND	ND	ND	ND	ND
SUM OF PCB CONGENERS	10.89	ND	ND	ND	ND	ND
TOTAL PCB-ESTIMATED	21.78	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8180- MOD - SURROGATE CORRECTED

LOCATION	Johns Lake	Johns Lake	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka
SITE_ID	JOHNS-T_1	JOHNS-T_2	LA-R_1	LA-R_2	LA-R_3	LA-R_4
BATCH_ID	02-209	02-209	02-225	02-225	02-225	02-225
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD
UNIT	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Hexachlorobenzene	ND	ND	0.90	ND	0.98	ND
2,4-DDD	1.35	ND	27.37	20.97	7.22	17.42
4,4-DDD	3.41	0.25	68.89	32.33	14.05	29.32
2,4-DDE	ND	ND	6.77	8.70	ND	6.27
4,4-DDE	12.43	1.44	108.54	138.58	36.73	91.35
2,4-DDT	ND	ND	ND	ND	ND	ND
4,4-DDT	ND	ND	ND	2.33	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND
a-BHC	ND	ND	ND	ND	ND	ND
b-BHC	ND	ND	ND	ND	ND	ND
d-BHC	ND	ND	ND	ND	ND	ND
g-BHC	ND	ND	ND	ND	ND	ND
Cis-chlordane	0.31	0.03	1.66	3.53	ND	2.08
g-Chlordane	ND	ND	ND	ND	ND	ND
Cis-nonachlor	0.17	0.03	ND	2.08	ND	1.28
Dieldrin	ND	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND	ND
Trans-nonachlor	ND	ND	ND	ND	ND	ND
4,4-DDMU	5.63	0.08	170.24	95.37	9.62	79.69
4,4-dichlorobenzophenone			30.77	31.67	52.90	21.39
Chlorobenzilate			ND	ND	ND	ND
Dicofol			ND	ND	ND	ND
Toxaphene			ND	ND	ND	ND
Cl2(08)	ND	ND	ND	ND	ND	ND
Cl3(18)	ND	ND	ND	ND	ND	ND
Cl3(28)	ND	ND	ND	ND	ND	ND
Cl4(44)	ND	ND	ND	ND	ND	ND
Cl4(52)	ND	ND	ND	ND	ND	ND
Cl4(66)	ND	ND	ND	ND	ND	ND
Cl4(77)	ND	ND	ND	ND	ND	ND
Cl5(101)	ND	ND	ND	ND	ND	ND
Cl5(105)	ND	ND	ND	ND	ND	ND
Cl5(110)	ND	ND	ND	ND	ND	ND
Cl5(118)	ND	ND	ND	ND	ND	ND
Cl5(126)	ND	ND	ND	ND	ND	ND
Cl6(128)	ND	ND	ND	ND	ND	ND
Cl6(129)	ND	ND	ND	ND	ND	ND
Cl6(138)	ND	ND	ND	ND	ND	ND
Cl6(153)	ND	ND	ND	ND	ND	ND
Cl7(170)	ND	ND	ND	ND	ND	ND
Cl7(180)	ND	ND	ND	ND	ND	ND
Cl7(187)	ND	ND	ND	ND	ND	ND
Cl8(195)	ND	ND	ND	ND	ND	ND
Cl9(206)	ND	ND	ND	ND	ND	ND
Cl10(209)	ND	ND	ND	ND	ND	ND
DDT	ND	ND	ND	2.33	ND	ND
DDD	4.76	0.25	96.26	53.31	21.26	46.74
DDE	12.43	1.44	115.32	147.27	36.73	97.63
TOTAL DDTs	17.19	1.68	211.58	202.92	57.99	144.37
TOTAL BHCs	ND	ND	ND	ND	ND	ND
TOTAL CHLORDANES (sum of 5)	0.48	0.06	1.66	5.62	ND	3.36
TOTAL CHLORDANES (sum of 3)	0.31	0.03	1.66	3.53	ND	2.08
ENDOSULFANS	ND	ND	ND	ND	ND	ND
SUM OF PCB CONGENERS	ND	ND	ND	ND	ND	ND
TOTAL PCB-ESTIMATED	ND	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8180- MOD - SURROGATE CORRECTED

LOCATION	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka
SITE_ID	LA-R_5	LA-R_6	LA-R_7	LA-T_1	LA-T_2	LA-T_3
BATCH_ID	02-225	02-225	02-225	02-225	02-225	02-225
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD
UNIT	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Hexachlorobenzene	ND	ND	0.23	ND	0.86	0.44
2,4-DDD	24.59	7.83	0.64	2.63	21.02	11.22
4,4-DDD	40.86	9.95	1.80	3.04	42.04	26.19
2,4-DDE	11.37	ND	ND	ND	ND	ND
4,4-DDE	167.72	50.31	3.06	3.46	94.78	24.10
2,4-DDT	ND	ND	ND	ND	ND	ND
4,4-DDT	ND	ND	ND	ND	ND	2.28
Aldrin	ND	ND	ND	ND	ND	ND
a-BHC	ND	ND	ND	ND	ND	ND
b-BHC	ND	ND	ND	ND	ND	ND
d-BHC	ND	ND	ND	ND	ND	ND
g-BHC	ND	ND	ND	ND	ND	ND
Cis-chlordane	3.39	ND	ND	ND	ND	ND
g-Chlordane	ND	ND	ND	ND	ND	ND
Cis-nonachlor	2.72	ND	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND	ND
Trans-nonachlor	ND	ND	ND	ND	ND	ND
4,4-DDMU	88.96	17.44	0.92	ND	89.76	17.99
4,4-dichlorobenzophenone	31.41	18.07	3.38	ND	17.32	10.79
Chlorobenzilate	ND	ND	ND	ND	ND	ND
Dicofol	ND	ND	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND	ND	ND
Cl2(08)	ND	ND	ND	ND	ND	ND
Cl3(18)	ND	ND	ND	ND	ND	ND
Cl3(28)	ND	ND	ND	ND	ND	ND
Cl4(44)	ND	ND	ND	ND	ND	ND
Cl4(52)	ND	ND	ND	ND	ND	ND
Cl4(66)	ND	ND	ND	ND	ND	ND
Cl4(77)	ND	ND	ND	ND	ND	ND
Cl5(101)	ND	ND	ND	ND	ND	ND
Cl5(105)	ND	ND	ND	ND	ND	ND
Cl5(110)	ND	ND	ND	ND	ND	ND
Cl5(118)	ND	ND	ND	ND	ND	ND
Cl5(126)	ND	ND	ND	ND	ND	ND
Cl6(128)	ND	ND	ND	ND	ND	ND
Cl6(129)	ND	ND	ND	ND	ND	ND
Cl6(138)	ND	ND	ND	ND	ND	ND
Cl6(153)	ND	ND	ND	ND	ND	ND
Cl7(170)	ND	ND	ND	ND	ND	ND
Cl7(180)	ND	ND	ND	ND	ND	ND
Cl7(187)	ND	ND	ND	ND	ND	ND
Cl8(195)	ND	ND	ND	ND	ND	ND
Cl9(206)	ND	ND	ND	ND	ND	ND
Cl10(209)	ND	ND	ND	ND	ND	ND
DDT	ND	ND	ND	ND	ND	2.28
DDD	65.45	17.78	2.44	5.68	63.06	37.40
DDE	179.09	50.31	3.06	3.46	94.78	24.10
TOTAL DDTs	244.54	68.09	5.51	9.13	157.83	63.79
TOTAL BHCs	ND	ND	ND	ND	ND	ND
TOTAL CHLORDANES (sum of 5)	6.11	ND	ND	ND	ND	ND
TOTAL CHLORDANES (sum of 3)	3.39	ND	ND	ND	ND	ND
ENDOSULFANS	ND	ND	ND	ND	ND	ND
SUM OF PCB CONGENERS	ND	ND	ND	ND	ND	ND
TOTAL PCB-ESTIMATED	ND	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8180- MOD - SURROGATE CORRECTED

LOCATION	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka	Lake Harney
SITE_ID	LA-T_4	LA-T_5	LA-T_6	LA-T_7	LA-T_8	LA-T_9	LH-T_1
BATCH_ID	02-225	02-225	02-225	02-225	02-225	02-225	02-209
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD
UNIT	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Hexachlorobenzene	0.28	0.21	ND	ND	ND	ND	ND
2,4-DDD	262.30	23.49	15.89	17.96	6.31	12.74	ND
4,4-DDD	532.79	57.77	28.68	40.15	15.37	29.52	0.19
2,4-DDE	15.90	ND	8.57	10.03	ND	6.55	ND
4,4-DDE	646.17	86.00	145.99	173.32	37.58	104.42	0.07
2,4-DDT	26.64	ND	ND	ND	ND	ND	ND
4,4-DDT	86.34	5.69	4.51	12.84	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND	ND
a-BHC	ND	ND	ND	ND	ND	ND	ND
b-BHC	ND	ND	ND	ND	ND	ND	ND
d-BHC	ND	ND	ND	ND	ND	ND	ND
g-BHC	ND	ND	ND	ND	ND	ND	ND
Cis-chlordane	12.99	5.40	3.21	3.78	ND	ND	0.04
g-Chlordane	20.02	3.80	ND	ND	ND	ND	ND
Cis-nonachlor	4.71	2.19	1.29	2.39	ND	ND	0.06
Dieldrin	5.03	0.97	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND	ND	ND
Trans-nonachlor	5.33	0.61	ND	ND	ND	ND	0.03
4,4-DDMU	515.78	25.03	104.23	78.88	13.05	45.42	ND
4,4-dichlorobenzophenone	72.21	15.47	41.54	25.50	54.82	51.94	
Chlorobenzilate	ND	ND	ND	ND	ND	ND	
Dicofol	ND	ND	ND	ND	ND	ND	
Toxaphene	ND	ND	ND	ND	ND	ND	
Cl2(08)	ND	ND	ND	ND	ND	ND	ND
Cl3(18)	ND	ND	ND	ND	ND	ND	ND
Cl3(28)	ND	ND	ND	ND	ND	ND	ND
Cl4(44)	ND	ND	ND	ND	ND	ND	ND
Cl4(52)	ND	ND	ND	ND	ND	ND	ND
Cl4(66)	ND	ND	ND	ND	ND	ND	ND
Cl4(77)	ND	ND	ND	ND	ND	ND	ND
Cl5(101)	ND	ND	ND	ND	ND	ND	ND
Cl5(105)	ND	ND	ND	ND	ND	ND	ND
Cl5(110)	ND	ND	ND	ND	ND	ND	ND
Cl5(118)	ND	ND	ND	ND	ND	ND	ND
Cl5(126)	ND	ND	ND	ND	ND	ND	ND
Cl6(128)	ND	ND	ND	ND	ND	ND	ND
Cl6(129)	ND	ND	ND	ND	ND	ND	ND
Cl6(138)	ND	ND	ND	ND	ND	ND	ND
Cl6(153)	ND	ND	ND	ND	ND	ND	ND
Cl7(170)	ND	ND	ND	ND	ND	ND	ND
Cl7(180)	ND	ND	ND	ND	ND	ND	ND
Cl7(187)	ND	ND	ND	ND	ND	ND	ND
Cl8(195)	ND	ND	ND	ND	ND	ND	ND
Cl9(206)	ND	ND	ND	ND	ND	ND	ND
Cl10(209)	ND	ND	ND	ND	ND	ND	ND
DDT	112.98	5.69	4.51	12.84	ND	ND	ND
DDD	795.08	81.26	44.57	58.10	21.68	42.26	0.19
DDE	662.07	86.00	154.56	183.34	37.58	110.97	0.07
TOTAL DDTs	1570.13	172.95	203.65	254.29	59.26	153.23	0.26
TOTAL BHCs	ND	ND	ND	ND	ND	ND	ND
TOTAL CHLORDANES (sum of 5)	43.05	12.00	4.50	6.17	ND	ND	0.13
TOTAL CHLORDANES (sum of 3)	33.01	9.20	3.21	3.78	ND	ND	0.04
ENDOSULFANS	ND	ND	ND	ND	ND	ND	ND
SUM OF PCB CONGENERS	ND	ND	ND	ND	ND	ND	ND
TOTAL PCB-ESTIMATED	ND	ND	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8180- MOD - SURROGATE CORRECTED

LOCATION	Lake Minneola	Lake Minneola	Mud Lake	Mud Lake	Lake Apopka	Lake Norris
SITE_ID	MINN-T-1	MINN-T-2	MUDD-T-1	MUDD-T-2	NLA	NORRIS-T_1
BATCH_ID	02-210	02-210	02-210	02-210	02-210	02-226
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD
UNIT	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Hexachlorobenzene	ND	ND	ND	ND	ND	ND
2,4-DDD	ND	ND	ND	ND	79.19	1.97
4,4-DDD	ND	ND	ND	ND	124.87	22.82
2,4-DDE	ND	ND	ND	ND	ND	1.13
4,4-DDE	1.18	5.01	ND	1.17	184.63	24.83
2,4-DDT	ND	ND	ND	ND	ND	ND
4,4-DDT	ND	ND	ND	ND	3.71	ND
Aldrin	ND	ND	ND	ND	ND	ND
a-BHC	ND	ND	ND	ND	ND	ND
b-BHC	ND	ND	ND	ND	ND	ND
d-BHC	ND	ND	ND	ND	ND	ND
g-BHC	ND	ND	ND	ND	ND	ND
Cis-chlordane	ND	0.06	ND	ND	2.30	ND
g-Chlordane	ND	ND	ND	ND	ND	ND
Cis-nonachlor	ND	0.09	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND	ND
Trans-nonachlor	ND	0.04	ND	ND	ND	ND
4,4-DDMU	0.16	0.50	ND	ND	912.53	13.06
4,4-dichlorobenzophenone	ND	ND	ND	ND	65.37	8.51
Chlorobenzilate	ND	ND	ND	ND	ND	ND
Dicofol	ND	ND	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND	ND	ND
Cl2(08)	ND	ND	ND	ND	ND	ND
Cl3(18)	ND	ND	ND	ND	ND	ND
Cl3(28)	ND	ND	ND	ND	ND	ND
Cl4(44)	ND	ND	ND	ND	ND	ND
Cl4(52)	ND	ND	ND	ND	ND	ND
Cl4(66)	ND	ND	ND	ND	ND	ND
Cl4(77)	ND	ND	ND	ND	ND	ND
Cl5(101)	ND	ND	ND	ND	ND	ND
Cl5(105)	ND	ND	ND	ND	ND	ND
Cl5(110)	ND	ND	ND	ND	ND	ND
Cl5(118)	ND	ND	ND	ND	ND	ND
Cl5(126)	ND	ND	ND	ND	ND	ND
Cl6(128)	ND	ND	ND	ND	ND	ND
Cl6(129)	ND	ND	ND	ND	ND	ND
Cl6(138)	ND	ND	ND	ND	ND	ND
Cl6(153)	ND	ND	ND	ND	ND	ND
Cl7(170)	ND	ND	ND	ND	ND	ND
Cl7(180)	ND	ND	ND	ND	ND	ND
Cl7(187)	ND	ND	ND	ND	ND	ND
Cl8(195)	ND	ND	ND	ND	ND	ND
Cl9(206)	ND	ND	ND	ND	ND	ND
Cl10(209)	ND	ND	ND	ND	ND	ND
DDT	ND	ND	ND	ND	3.71	ND
DDD	ND	ND	ND	ND	204.06	24.79
DDE	1.18	5.01	ND	1.17	184.63	25.96
TOTAL DDTs	1.18	5.01	ND	1.17	392.40	50.75
TOTAL BHCs	ND	ND	ND	ND	ND	ND
TOTAL CHLORDANES (sum of 5)	ND	0.19	ND	ND	2.30	ND
TOTAL CHLORDANES (sum of 3)	ND	0.06	ND	ND	2.30	ND
ENDOSULFANS	ND	ND	ND	ND	ND	ND
SUM OF PCB CONGENERS	ND	ND	ND	ND	ND	ND
TOTAL PCB-ESTIMATED	ND	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8180- MOD - SURROGATE CORRECTED

LOCATION	Lake Norris	Lake Norris	Lake Norris	Lake Norris	Lake Norris	Lake Ola
SITE_ID	NORRIS-T_2	NORRIS-T_3	NORRIS-T_4	NORRIS-T_5	NORRIS-T_6	OLA-T_1
BATCH_ID	02-226	02-226	02-226	02-226	02-226	02-209
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD
UNIT	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Hexachlorobenzene	ND	1.25	ND	ND	ND	ND
2,4-DDD	2.25	2.17	2.38	4.76	0.49	0.23
4,4-DDD	35.55	21.17	22.05	69.90	9.81	0.82
2,4-DDE	1.52	ND	1.16	2.91	0.51	ND
4,4-DDE	38.09	26.36	24.52	67.54	15.52	6.86
2,4-DDT	ND	ND	ND	ND	ND	ND
4,4-DDT	ND	ND	ND	1.58	ND	0.18
Aldrin	ND	ND	ND	ND	ND	ND
a-BHC	ND	ND	ND	ND	ND	ND
b-BHC	ND	ND	ND	ND	ND	ND
d-BHC	ND	ND	ND	ND	ND	ND
g-BHC	ND	ND	ND	ND	ND	ND
Cis-chlordane	ND	ND	ND	ND	ND	0.08
g-Chlordane	ND	ND	ND	ND	ND	ND
Cis-nonachlor	ND	ND	ND	ND	ND	0.09
Dieldrin	ND	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND	ND
Trans-nonachlor	ND	ND	ND	ND	ND	0.04
4,4-DDMU	14.50	11.20	8.41	27.26	3.51	1.80
4,4-dichlorobenzophenone	9.77	7.67	5.37	12.14	2.05	
Chlorobenzilate	ND	ND	ND	ND	ND	
Dicofol	ND	ND	ND	ND	ND	
Toxaphene	ND	ND	ND	ND	ND	
Cl2(08)	ND	ND	ND	ND	ND	ND
Cl3(18)	ND	ND	ND	ND	ND	ND
Cl3(28)	ND	ND	ND	ND	ND	ND
Cl4(44)	ND	ND	ND	ND	ND	ND
Cl4(52)	ND	ND	ND	ND	ND	ND
Cl4(66)	ND	ND	ND	ND	ND	ND
Cl4(77)	ND	ND	ND	ND	ND	ND
Cl5(101)	ND	ND	ND	ND	ND	ND
Cl5(105)	ND	ND	ND	ND	ND	ND
Cl5(110)	ND	ND	ND	ND	ND	ND
Cl5(118)	ND	ND	ND	ND	ND	ND
Cl5(126)	ND	ND	ND	ND	ND	ND
Cl6(128)	ND	ND	ND	ND	ND	ND
Cl6(129)	ND	ND	ND	ND	ND	ND
Cl6(138)	ND	ND	ND	ND	ND	ND
Cl6(153)	ND	ND	ND	ND	ND	ND
Cl7(170)	ND	ND	ND	ND	ND	ND
Cl7(180)	ND	ND	ND	ND	ND	ND
Cl7(187)	ND	ND	ND	ND	ND	ND
Cl8(195)	ND	ND	ND	ND	ND	ND
Cl9(206)	ND	ND	ND	ND	ND	ND
Cl10(209)	ND	ND	ND	ND	ND	ND
DDT	ND	ND	ND	1.58	ND	0.18
DDD	37.80	23.34	24.44	74.66	10.30	1.05
DDE	39.61	26.36	25.68	70.45	16.03	6.86
TOTAL DDTs	77.41	49.71	50.12	146.70	26.33	8.09
TOTAL BHCs	ND	ND	ND	ND	ND	ND
TOTAL CHLORDANES (sum of 5)	ND	ND	ND	ND	ND	0.21
TOTAL CHLORDANES (sum of 3)	ND	ND	ND	ND	ND	0.08
ENDOSULFANS	ND	ND	ND	ND	ND	ND
SUM OF PCB CONGENERS	ND	ND	ND	ND	ND	ND
TOTAL PCB-ESTIMATED	ND	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8180- MOD - SURROGATE CORRECTED

LOCATION	Lake Ola	Lake Jessup	Lake Jessup	Possum Creek	Sweetwater Branch	Lake Apopka
SITE_ID	OLA-T_2	OW-4	OW-6	POSSUM-T_1	ROSE-T_1	SLA
BATCH_ID	02-209	02-209	02-209	02-209	02-210	02-210
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD
UNIT	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Hexachlorobenzene	ND	ND	ND	ND	ND	ND
2,4-DDD	0.36	2.83	2.86	0.31	ND	18.21
4,4-DDD	1.54	1.43	1.57	ND	0.68	35.63
2,4-DDE	ND	ND	ND	ND	ND	ND
4,4-DDE	9.58	5.37	12.78	0.46	0.69	65.54
2,4-DDT	ND	ND	ND	ND	ND	ND
4,4-DDT	0.43	ND	1.41	ND	0.23	ND
Aldrin	ND	ND	ND	ND	ND	ND
a-BHC	ND	ND	ND	ND	ND	ND
b-BHC	ND	ND	ND	ND	ND	ND
d-BHC	ND	ND	ND	ND	ND	ND
g-BHC	ND	ND	ND	ND	ND	ND
Cis-chlordane	0.30	0.45	0.64	0.69	0.62	1.03
g-Chlordane	ND	ND	ND	ND	1.28	ND
Cis-nonachlor	0.27	ND	0.95	0.52	0.37	ND
Dieldrin	ND	ND	ND	0.13	0.48	ND
Endosulfan I	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND	ND
Trans-nonachlor	0.24	0.27	0.45	1.19	0.81	ND
4,4-DDMU	0.80	ND	1.13	ND	ND	154.24
4,4-dichlorobenzophenone					ND	21.37
Chlorobenzilate					ND	ND
Dicofol					ND	ND
Toxaphene		ND			ND	ND
Cl2(08)	ND	ND	ND	ND	ND	ND
Cl3(18)	ND	ND	ND	ND	0.30	ND
Cl3(28)	ND	ND	ND	ND	0.29	ND
Cl4(44)	ND	ND	ND	ND	ND	ND
Cl4(52)	ND	ND	ND	ND	0.34	ND
Cl4(66)	ND	ND	ND	ND	0.08	ND
Cl4(77)	ND	ND	ND	ND	ND	ND
Cl5(101)	ND	ND	ND	ND	ND	ND
Cl5(105)	ND	ND	ND	ND	0.11	ND
Cl5(110)	ND	ND	ND	ND	ND	ND
Cl5(118)	ND	ND	ND	ND	0.26	ND
Cl5(126)	ND	ND	ND	ND	ND	ND
Cl6(128)	ND	ND	ND	ND	0.19	ND
Cl6(129)	ND	ND	ND	ND	ND	ND
Cl6(138)	ND	ND	ND	ND	ND	ND
Cl6(153)	ND	ND	ND	ND	0.56	ND
Cl7(170)	ND	ND	ND	ND	ND	ND
Cl7(180)	ND	ND	ND	ND	0.26	ND
Cl7(187)	ND	ND	ND	ND	ND	ND
Cl8(195)	ND	ND	ND	ND	ND	ND
Cl9(206)	ND	ND	ND	ND	ND	ND
Cl10(209)	ND	ND	ND	ND	ND	ND
DDT	0.43	ND	1.41	ND	0.23	ND
DDD	1.90	4.26	4.43	0.31	0.68	53.84
DDE	9.58	5.37	12.78	0.46	0.69	65.54
TOTAL DDTs	11.91	9.63	18.63	0.76	1.60	119.38
TOTAL BHCs	ND	ND	ND	ND	ND	ND
TOTAL CHLORDANES (sum of 5)	0.82	0.72	2.05	2.41	3.08	1.03
TOTAL CHLORDANES (sum of 3)	0.30	0.45	0.64	0.69	1.90	1.03
ENDOSULFANS	ND	ND	ND	ND	ND	ND
SUM OF PCB CONGENERS	ND	ND	ND	ND	2.39	ND
TOTAL PCB-ESTIMATED	ND	ND	ND	ND	4.77	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA
8180- MOD - SURROGATE CORRECTED

LOCATION	Sweetwater Branch	Sweetwater Branch	Bivens Arm	Bivens Arm	Lake Weir	Lake Weir
SITE_ID	SWEET A	SWEET-T_1	TUMB-T_1	TUMB-T_2	WEIR-T_1	WEIR-T_2
BATCH_ID	02-210	02-210	02-210	02-210	02-209	02-209
MATRIX	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
ANAL_MET	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD	8081-MOD
UNIT	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Hexachlorobenzene	10.10	ND	ND	ND	ND	ND
2,4-DDD	ND	ND	ND	ND	ND	ND
4,4-DDD	0.75	0.76	2.48	0.79	ND	ND
2,4-DDE	ND	ND	ND	ND	ND	ND
4,4-DDE	1.50	0.78	4.93	1.63	0.04	0.20
2,4-DDT	ND	ND	ND	ND	ND	ND
4,4-DDT	0.47	ND	ND	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND
a-BHC	ND	ND	ND	ND	ND	ND
b-BHC	ND	ND	ND	ND	ND	ND
d-BHC	ND	ND	ND	ND	ND	ND
g-BHC	ND	ND	ND	ND	ND	ND
Cis-chlordane	0.48	0.48	1.64	0.74	ND	ND
g-Chlordane	ND	1.98	25.93	7.34	ND	ND
Cis-nonachlor	ND	0.29	ND	ND	ND	ND
Dieldrin	1.60	0.45	5.00	0.77	ND	ND
Endosulfan I	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND	ND
Trans-nonachlor	0.48	0.60	1.35	0.84	ND	ND
4,4-DDMU	ND	ND	ND	ND	ND	ND
4,4-dichlorobenzophenone	ND	ND	ND	ND		
Chlorobenzilate	ND	ND	ND	ND		
Dicofol	ND	ND	ND	ND		
Toxaphene	ND	ND	ND	ND		
Cl2(08)	ND	ND	ND	ND	ND	ND
Cl3(18)	ND	ND	ND	ND	ND	ND
Cl3(28)	ND	0.22	ND	ND	ND	ND
Cl4(44)	ND	ND	ND	ND	ND	ND
Cl4(52)	0.24	0.25	ND	ND	ND	ND
Cl4(66)	0.08	0.12	ND	ND	ND	ND
Cl4(77)	ND	ND	ND	ND	ND	ND
Cl5(101)	ND	ND	ND	ND	ND	ND
Cl5(105)	0.13	0.14	0.18	0.12	ND	ND
Cl5(110)	ND	ND	ND	ND	ND	ND
Cl5(118)	0.22	0.31	0.20	0.14	ND	ND
Cl5(126)	ND	ND	ND	ND	ND	ND
Cl6(128)	0.91	0.25	ND	0.52	ND	ND
Cl6(129)	ND	ND	ND	ND	ND	ND
Cl6(138)	ND	ND	ND	ND	ND	ND
Cl6(153)	0.43	0.67	0.65	0.39	ND	ND
Cl7(170)	ND	ND	ND	ND	ND	ND
Cl7(180)	ND	0.52	1.21	0.27	ND	ND
Cl7(187)	ND	ND	ND	ND	ND	ND
Cl8(195)	ND	ND	ND	ND	ND	ND
Cl9(206)	ND	ND	ND	ND	ND	ND
Cl10(209)	ND	ND	ND	ND	ND	ND
DDT	0.47	ND	ND	ND	ND	ND
DDD	0.75	0.76	2.48	0.79	ND	ND
DDE	1.50	0.78	4.93	1.63	0.04	0.20
TOTAL DDTs	2.72	1.55	7.41	2.42	0.04	0.20
TOTAL BHCs	ND	ND	ND	ND	ND	ND
TOTAL CHLORDANES (sum of 5)	0.96	3.34	28.92	8.92	ND	ND
TOTAL CHLORDANES (sum of 3)	0.48	2.46	27.56	8.08	ND	ND
ENDOSULFANS	ND	ND	ND	ND	ND	ND
SUM OF PCB CONGENERS	2.01	2.50	2.23	1.45	ND	ND
TOTAL PCB-ESTIMATED	4.02	5.00	4.47	2.89	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA

MG/KG DRY WT.

200.8-MOD, 200.9-MOD & 245.5

LOCATION	**SITE_ID**	Aluminum	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
A-B Canal	AB-T_1	6030	8.460	0.296	13.4	75.4		12.6			0.130	5.42		0.147		44.2
A-B Canal	AB-T_2	4910	1.220	0.042	8.1	1.6		2.5			0.022	3.53		0.070		5.8
A-B Canal	AB-T_3	25200	8.080	0.248	31.6	23.0		14.5			0.091	10.60		0.213		39.2
A-B Canal	AB-T_4	398	0.345	0.021	2.9	1.1		0.8			0.010	ND		0.065		4.5
Bivens Arm	BIVEN-T_G	5180	1.740	0.221	18.3	7.4		48.3			0.088	4.18		0.133		28.1
Bivens Arm	BIVEN-T_H	23300	5.500	1.140	122.0	36.9		235.0			0.330	18.90		0.542		195.0
Bivens Arm	BIVEN-T_I	20100	4.820	0.997	98.5	34.2		191.0			0.294	17.00		0.467		162.0
Bivens Arm	BIVENE	24450	6.130	1.040	96.3	35.8		198.5			0.289	17.10		0.397		173.5
Calf Pond	CALF-T_1	2590	0.414	0.060	4.4	3.1	1270	8.1	1.22	14.6	0.028	1.52	ND	0.060	0.311	16.4
Lake Carlton	CARL-T_1	11400	9.200	0.266	13.0	17.5	6140	14.8	5.81	52.3	0.106	5.85	2.18	0.132	0.699	46.7
Lake Carlton	CARL-T_2	25200	15.100	0.461	22.2	37.8	6500	36.8	12.30	68.0	0.162	10.80	2.18	0.200	1.470	72.2
Lake Apopka	CLA	8430	8.445	0.170	13.3	9.7	8100	11.7	2.59	118.0	0.140	6.97	3.04	0.111	0.607	26.8
Lake Harney	CLH	50700	3.830	0.963	67.5	12.9	42000	31.6	45.10	143.0	0.245	17.70	1.65	1.710	2.530	69.7
Crescent Lake	CRES-T_1	12900	2.850	0.152	25.9	4.9	16800	9.6	8.66	167.0	0.098	6.19	1.64	0.228	0.687	23.6
Crescent Lake	CRES-T_2	34500	6.610	0.479	47.4	17.9	33700	33.6	31.60	142.0	0.342	14.90	1.47	0.492	3.880	109.0
Lake Beauclair	DORAF	9150	11.500	0.222	15.6	19.3		14.3			0.143	6.76		0.115		27.9
Lake Beauclair	DORAG	189	0.851	ND	1.7	0.9		ND			0.012	ND		0.033		2.9
Lake Beauclair	DORAH	8320	14.400	0.295	18.2	58.3		23.5			0.165	6.08		0.181		49.9
Lake Minnehaha	HAHA-T_1	824	0.338	0.029	2.9	1.5	548	3.1	ND	13.3	0.029	ND	ND	0.084	0.203	5.6
Lake Minnehaha	HAHA-T_2	701	0.267	0.026	1.4	1.4	847	2.8	ND	10.0	0.016	ND	ND	0.026	0.155	3.9
Johns Lake	JOHNS-T_1	7180	2.800	0.152	10.1	13.9	2380	12.6	2.85	52.7	0.074	3.91	1.14	0.166	0.546	25.9
Johns Lake	JOHNS-T_2	1200	0.413	0.029	3.5	2.8	694	3.2	ND	22.1	0.022	ND	ND	0.072	0.201	6.9
Lake Apopka	LA-R_1	10000	11.700	0.249	15.6	17.8		19.5			0.178	8.28		0.126		28.1
Lake Apopka	LA-R_2	10100	12.300	0.288	16.1	21.9		33.3			0.180	8.59		0.178		34.3
Lake Apopka	LA-R_3	8730	6.560	0.204	13.0	15.2		12.6			0.147	8.13		0.108		23.4
Lake Apopka	LA-R_4	9010	10.000	0.237	13.8	18.0		23.0			0.175	8.04		0.136		27.0
Lake Apopka	LA-R_5	10700	11.900	0.328	15.6	23.8		30.7			0.186	8.85		0.171		36.2
Lake Apopka	LA-R_6	9480	9.160	0.293	15.9	22.8		21.5			0.184	9.12		0.175		33.0
Lake Apopka	LA-R_7	4110	1.640	0.071	6.9	2.1		3.6			0.040	10.20		0.074		7.4
Lake Apopka	LA-T_1	7070	10.200	0.159	14.2	5.1		3.9			0.077	4.61		0.066		7.1
Lake Apopka	LA-T_2	9720	12.000	0.255	16.5	17.4		21.6			0.166	7.34		0.190		30.0
Lake Apopka	LA-T_3	1800	7.340	0.064	3.8	3.8		4.6			0.059	4.76		0.074		11.9
Lake Apopka	LA-T_4	1640	5.330	0.153	3.0	31.5		10.2			0.105	7.55		0.062		25.8
Lake Apopka	LA-T_5	2360	5.940	0.093	5.3	17.4		8.0			0.096	4.73		0.111		20.7
Lake Apopka	LA-T_6	9000	11.100	0.303	14.3	26.0		22.7			0.167	8.61		0.139		50.3
Lake Apopka	LA-T_7	7320	11.100	0.248	10.6	22.4		22.3			0.156	8.29		0.119		30.5
Lake Apopka	LA-T_8	8590	6.850	0.215	13.0	13.5		11.9			0.138	7.59		0.092		21.4
Lake Apopka	LA-T_9	8460	8.490	0.272	13.6	19.2		20.7			0.154	6.79		0.134		36.0
Lake Harney	LH-T_1	486	0.108	0.028	1.3	0.4	582	0.8	ND	12.7	0.009	ND	ND	0.046	0.075	2.9
Lake Minneola	MINN-T_1	1900	0.481	0.065	2.7	2.5	1530	5.5	ND	15.3	0.029	ND	ND	0.053	0.225	9.8
Lake Minneola	MINN-T_2	5080	1.170	0.104	7.4	6.5	2610	13.3	2.13	33.0	0.051	2.34	0.36	0.119	0.608	24.7
Mud Lake	MUD-T_1	5280	3.360	0.252	17.2	3.1	13300	4.1	1.86	33.0	0.170	4.80	2.77	0.035	0.203	10.8
Mud Lake	MUD-T_2	3595	2.790	0.210	11.4	3.4	13300	6.7	1.36	43.4	0.155	4.27	2.41	0.043	0.223	14.1
Lake Apopka	NLA	7170	8.700	0.193	12.3	11.3	7690	17.5	1.59	105.0	0.156	5.45	2.46	0.126	0.707	34.3
Lake Ola	OLA-T_1	5580	1.260	0.090	6.0	10.8	1360	9.1	2.72	16.6	0.032	3.19	0.43	0.095	0.417	27.9

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
FIELD SAMPLE DATA

MG/KG DRY WT.

200.8-MOD, 200.9-MOD & 245.5

LOCATION	SITE_ID	Aluminum	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Lithium	Manganese	Mercury	Nickel	Selenium	Silver	Tin	Zinc
Lake Ola	OLA-T_2	8810	3.660	0.171	14.6	23.2	2800	15.8	4.56	94.3	0.057	5.20	0.80	0.198	0.679	63.1
Lake Jessup	OW_4	32900	4.500	0.314	46.0	40.4	26200	22.6	21.90	77.5	0.242	15.60	2.30	0.262	1.530	45.2
Lake Jessup	OW_6	35400	4.790	0.480	48.7	63.7	29000	37.0	22.30	51.0	0.326	16.90	2.53	0.347	2.150	62.0
Possum Creek	POSSUM-T_1	2580	0.386	0.183	9.7	1.0	1220	2.9	0.95	34.3	0.018	1.84	ND	0.075	0.156	10.6
Sweetwater Branch	ROSE-T_1	1640	0.358	0.391	9.5	3.0		5.4			0.022	3.09		0.034		16.5
Lake Apopka	SLA	8860	10.600	0.231	17.5	13.6	8300	15.6	3.10	90.9	0.150	6.22	2.94	0.143	0.826	33.5
Sweetwater Branch	SWEET A	2710	1.090	0.298	17.0	1.7		5.5			0.020	2.09		0.095		18.4
Sweetwater Branch	SWEET-T_1	1710	0.561	0.163	4.6	3.4		13.8			0.033	1.59		0.060		25.1
Bivens Arm	TUMB-T_1	1120	0.468	0.148	6.6	8.5		28.3			0.049	2.53		0.045		30.7
Bivens Arm	TUMB-T_2	1790	0.401	0.116	6.1	2.2		13.0			0.023	1.68		0.046		19.2
Lake Weir	WEIR-T_1	234	0.372	0.021	5.0	0.9	1200	3.0	ND	47.4	0.017	ND	ND	0.126	0.204	47.8
Lake Weir	WEIR-T_2	737	0.397	0.030	5.1	1.4	1250	3.9	ND	40.7	0.012	ND	0.36	0.082	0.243	32.6

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
ANCILLARY MEASUREMENTS - SEDIMENT
(FIELD DATA)

		LOCATION	A-B Canal	A-B Canal	A-B Canal	A-B Canal	Bivens Arm	Bivens Arm	Bivens Arm	Bivens Arm	Calf Pond	Lake Carlton
		SITE_ID	AB-T_1	AB-T_2	AB-T_3	AB-T_4	BIVEN-T_G	BIVEN-T_H	BIVEN-T_I	BIVENE	CALF-T_1	CARL-T_1
ANAL_MET	**UNIT**	**PARAMETER**	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
SM17 2540G	% of wet weight	PERCENT MOISTURE	89.9	46.2	92.1	25.7	79.9	92.1	91.8	93.5	33.2	92.2
SM17 2540G	% of wet weight	TOTAL SOLIDS	10.1	53.8	7.9	74.3	20.1	7.9	8.2	6.5	66.8	7.8
SM17 2540G	% of dry weight	TOTAL VOLATILE SOLIDS	73.3	3.6	38.3	1.7	23.9	37.3	34.4	58.6	2.3	35.0
SW9060	mg/kg dw	TOC	490000	22000	260000	9000	230000	250000	220000	370000	11000	260000
Folk 1974	% of tot.wet sed.vol.	PERCENT SAND	71.4	72.4	68.3	94.2	74.1	63.5	59.8	67.2	82.7	85.1
Folk 1974	% of tot.wet sed.vol.	PERCENT SILT	27.8	25.4	30.5	5.4	25.2	35.2	38.9	31.9	16.0	14.6
Folk 1974	% of tot.wet sed.vol.	PERCENT CLAY	0.8	2.2	1.2	ND	0.8	1.3	1.3	1.0	1.3	ND
		PERCENT MUD	28.6	27.6	31.7	5.4	26.0	36.5	40.2	32.8	17.3	14.6
CE-81-1	mg/kg dw	SOLUBLE REACTIVE PHOSPHATE									1.0	15.0
CE-81-1	mg/kg dw	TOTAL KJELDAHL NITROGEN									1300	11000
CE-81-1	mg/kg dw	TOTAL PHOSPHORUS									240	1300
Coulter 1994	um	MEAN	168	134	101	315	168	82	68	141	203	173
Coulter 1994	um	MEDIAN	151	191	103	365	171	82	75	149	310	209
Coulter 1994	um	MODE	2380	296	106	391	88	88	88	582	356	324
Coulter 1994	um	STDDEV	4.68	4.30	3.30	2.39	4.28	3.27	2.71	4.82	3.76	2.68
Coulter 1994	-	SKEWNESS	-0.11	-0.83	-0.33	-2.49	-0.33	-0.09	-0.66	-0.25	-1.45	-0.99
Coulter 1994	-	KURTOSIS	-0.48	0.58	1.14	8.55	-0.29	1.58	2.93	-0.63	1.70	1.19
Coulter 1994	% of tot.wet sed.vol.	VOL% 0-0.49 um	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.49-0.69 um	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.69-0.98 um	ND	0.3	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.98-1.38 um	ND	0.3	ND	ND	ND	0.2	0.2	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.38-1.95 um	ND	0.4	0.2	ND	ND	0.2	0.2	ND	0.2	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.95-2.76 um	ND	0.5	0.2	ND	ND	0.2	0.2	0.1	0.3	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2.76-3.91 um	0.2	0.6	0.3	ND	0.2	0.3	0.3	0.4	0.5	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 3.91-5.52 um	0.4	0.8	0.5	0.2	0.4	0.5	0.5	0.7	0.8	0.2
Coulter 1994	% of tot.wet sed.vol.	VOL% 5.52-7.81 um	0.6	1.2	0.7	0.3	0.7	0.9	0.9	1.2	1.2	0.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 7.81-11.0 um	1.1	1.7	1.1	0.4	1.2	1.6	1.6	2.0	1.6	0.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 11.0-15.6 um	2.0	2.7	1.9	0.6	2.0	2.6	2.7	3.4	2.2	0.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 15.6-22.1 um	3.5	4.0	3.3	0.9	3.2	4.0	4.2	5.1	2.7	1.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 22.1-31.0 um	5.2	4.9	5.2	1.0	4.4	5.4	5.9	6.1	2.7	2.5
Coulter 1994	% of tot.wet sed.vol.	VOL% 31.0-44.0 um	7.0	5.1	7.6	1.0	5.8	7.9	8.9	6.7	2.5	3.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 44.0-62.5 um	8.1	5.0	10.3	1.0	7.4	12.3	14.3	6.9	2.4	5.0
Coulter 1994	% of tot.wet sed.vol.	VOL% 62.5-88.0 um	8.4	5.2	12.4	1.0	8.2	17.2	19.3	6.9	2.5	6.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 88.0-125 um	8.6	6.4	13.6	1.2	8.5	17.5	18.6	6.9	3.2	9.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 125-177 um	7.8	8.6	12.7	3.0	8.1	10.8	11.2	7.1	5.2	12.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 177-250 um	6.6	11.6	9.8	11.2	7.6	4.6	4.6	7.1	10.7	14.5
Coulter 1994	% of tot.wet sed.vol.	VOL% 250-350 um	6.0	13.8	6.8	24.2	7.4	2.8	2.3	6.8	18.6	16.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 350-500 um	6.0	11.9	4.5	29.4	7.6	2.6	1.6	6.7	21.4	15.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 500-710 um	5.7	6.2	2.7	15.8	6.7	2.1	0.7	6.3	12.9	8.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 710-1000 um	5.8	3.8	2.2	6.1	6.5	2.1	0.6	6.6	5.6	2.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 1000-1410 um	5.8	3.0	2.0	2.3	6.8	2.1	0.6	6.7	2.3	0.2
Coulter 1994	% of tot.wet sed.vol.	VOL% 1410-2000 um	5.4	2.0	1.5	ND	6.6	1.7	0.3	6.3	0.3	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2000-2830 um	5.2	ND	ND	ND	ND	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
ANCILLARY MEASUREMENTS - SEDIMENT
(FIELD DATA)

		LOCATION	Lake Carlton	Lake Apopka	Lake Harney	Crescent Lake	Crescent Lake	Lake Beauclair	Lake Beauclair	Lake Beauclair
		SITE_ID	CARL-T_2	CLA	CLH	CRES-T_1	CRES-T_2	DORAF	DORAG	DORAH
ANAL_MET	**UNIT**	**PARAMETER**	Value	Value	Value	Value	Value	Value	Value	Value
SM17 2540G	% of wet weight	PERCENT MOISTURE	89.1	94.4	79.6	72.7	88.3	96.3	19.4	90.9
SM17 2540G	% of wet weight	TOTAL SOLIDS	10.9	5.7	20.4	27.3	11.7	3.7	80.6	9.1
SM17 2540G	% of dry weight	TOTAL VOLATILE SOLIDS	41.2	60.6	14.9	17.9	28.8	65.1	0.6	183.0
SW9060	mg/kg dw	TOC	250000	320000	130000	120000	190000	380000	12000	430000
Folk 1974	% of tot.wet sed.vol.	PERCENT SAND	83.4	59.7	23.1	63.5	40.3	80.9	95.3	84.8
Folk 1974	% of tot.wet sed.vol.	PERCENT SILT	16.1	39.2	72.7	34.1	57.6	18.7	4.6	14.8
Folk 1974	% of tot.wet sed.vol.	PERCENT CLAY	0.5	1.1	4.2	2.4	2.1	ND	ND	ND
		PERCENT MUD	16.6	40.3	76.9	36.5	59.7	18.7	4.6	14.8
CE-81-1	mg/kg dw	SOLUBLE REACTIVE PHOSPHATE	18.0	23.0	21.0	4.6	1.5			
CE-81-1	mg/kg dw	TOTAL KJELDAHL NITROGEN	12000	11000	5600	3500	8300			
CE-81-1	mg/kg dw	TOTAL PHOSPHORUS	1400	700	100	530	1300			
Coulter 1994	um	MEAN	229	71	29	96	47	144	350	299
Coulter 1994	um	MEDIAN	206	78	27	106	45	158	388	400
Coulter 1994	um	MODE	2380	101	24	106	35	356	391	905
Coulter 1994	um	STDDEV	4.21	2.71	3.42	4.85	3.49	2.73	2.20	3.90
Coulter 1994	-	SKEWNESS	-0.09	-0.73	0.12	-0.32	-0.04	-0.82	-1.84	-0.84
Coulter 1994	-	KURTOSIS	-0.11	2.06	0.33	-0.36	0.10	1.07	5.57	0.28
Coulter 1994	% of tot.wet sed.vol.	VOL% 0-0.49 um	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.49-0.69 um	ND	ND	0.2	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.69-0.98 um	ND	ND	0.4	0.2	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.98-1.38 um	ND	ND	0.4	0.3	0.2	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.38-1.95 um	ND	ND	0.5	0.4	0.3	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.95-2.76 um	ND	0.1	0.9	0.5	0.5	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2.76-3.91 um	ND	0.3	1.7	0.9	0.9	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 3.91-5.52 um	0.3	0.5	3.1	1.5	1.7	0.2	ND	0.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 5.52-7.81 um	0.4	0.9	5.1	2.4	2.9	0.4	ND	0.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 7.81-11.0 um	0.7	1.5	7.5	3.4	4.5	0.6	ND	0.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 11.0-15.6 um	1.1	2.7	10.4	4.6	6.7	1.0	0.3	1.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 15.6-22.1 um	1.8	4.6	12.6	5.6	9.1	1.8	0.5	1.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 22.1-31.0 um	2.6	6.8	12.7	5.7	10.8	3.0	0.8	2.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 31.0-44.0 um	3.8	9.7	11.7	5.3	11.6	4.7	1.1	3.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 44.0-62.5 um	5.4	12.7	9.6	5.7	10.3	7.0	1.5	4.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 62.5-88.0 um	7.4	15.1	6.5	8.1	8.7	9.7	1.6	4.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 88.0-125 um	9.9	16.3	4.0	10.0	8.3	12.5	1.7	5.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 125-177 um	11.2	13.5	3.1	8.8	8.2	12.7	3.0	5.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 177-250 um	11.0	8.0	3.2	7.2	6.4	11.8	9.8	6.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 250-350 um	9.6	3.8	3.6	6.7	3.6	12.8	21.4	8.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 350-500 um	7.4	1.7	2.0	6.7	2.1	13.5	27.1	10.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 500-710 um	4.6	0.5	0.3	5.3	1.2	6.9	17.4	11.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 710-1000 um	3.4	0.5	ND	4.4	1.0	1.0	9.4	11.2
Coulter 1994	% of tot.wet sed.vol.	VOL% 1000-1410 um	2.8	0.4	0.2	3.8	0.7	ND	3.9	10.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 1410-2000 um	2.3	ND	ND	2.6	ND	ND	ND	10.0
Coulter 1994	% of tot.wet sed.vol.	VOL% 2000-2830 um	13.7	ND	ND	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
ANCILLARY MEASUREMENTS - SEDIMENT
(FIELD DATA)

		LOCATION	Lake Minnehaha	Lake Minnehaha	Johns Lake	Johns Lake	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka
		SITE_ID	HAHA-T_1	HAHA-T_2	JOHNS-T_1	JOHNS-T_2	LA-R_1	LA-R_2	LA-R_3	LA-R_4	LA-R_5
ANAL_MET	**UNIT**	**PARAMETER**	Value	Value	Value	Value	Value	Value	Value	Value	Value
SM17 2540G	% of wet weight	PERCENT MOISTURE	16.6	19.0	55.0	22.6	95.1	95.2	96.0	94.4	96.0
SM17 2540G	% of wet weight	TOTAL SOLIDS	83.4	81.0	45.0	77.4	4.9	4.8	4.0	5.6	4.0
SM17 2540G	% of dry weight	TOTAL VOLATILE SOLIDS	0.5	0.5	12.2	1.4	56.0	57.2	58.7	56.8	58.3
SW9060	mg/kg dw	TOC	4700	4000	73000	10000	330000	320000	320000	320000	340000
Folk 1974	% of tot.wet sed.vol.	PERCENT SAND	94.0	95.0	58.8	85.1	61.3	56.1	53.7	62.9	58.7
Folk 1974	% of tot.wet sed.vol.	PERCENT SILT	5.4	4.3	36.8	12.8	37.7	42.8	44.9	36.1	40.3
Folk 1974	% of tot.wet sed.vol.	PERCENT CLAY	0.6	0.7	4.4	2.1	1.1	1.2	1.4	1.0	1.0
		PERCENT MUD	6.0	5.0	41.2	14.9	38.8	44.0	46.3	37.1	41.3
CE-81-1	mg/kg dw	SOLUBLE REACTIVE PHOSPHATE	0.6	0.4	9.8	1.3					
CE-81-1	mg/kg dw	TOTAL KJELDAHL NITROGEN	210	120	2600	300					
CE-81-1	mg/kg dw	TOTAL PHOSPHORUS	35	32	480	61					
Coulter 1994	um	MEAN	383	304	79	172	76	66	62	79	68
Coulter 1994	um	MEDIAN	421	337	100	260	82	72	68	85	75
Coulter 1994	um	MODE	324	324	140	296	97	80	73	97	88
Coulter 1994	um	STDDEV	3.08	2.60	5.45	3.59	2.83	2.74	2.64	2.83	2.57
Coulter 1994	-	SKEWNESS	-1.74	-2.53	-0.34	-1.86	-0.50	-0.60	-0.86	-0.56	-0.79
Coulter 1994	-	KURTOSIS	4.54	8.75	-0.57	2.81	1.89	2.09	2.52	1.72	2.47
Coulter 1994	% of tot.wet sed.vol.	VOL% 0-0.49 um	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.49-0.69 um	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.69-0.98 um	ND	ND	0.3	ND	ND	ND	0.2	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.98-1.38 um	ND	ND	0.4	ND	ND	0.2	0.2	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.38-1.95 um	ND	ND	0.7	0.3	ND	ND	0.2	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.95-2.76 um	ND	0.2	1.1	0.6	ND	ND	0.3	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2.76-3.91 um	0.3	0.3	1.7	0.9	0.2	0.2	0.3	0.2	0.2
Coulter 1994	% of tot.wet sed.vol.	VOL% 3.91-5.52 um	0.4	0.5	2.6	1.3	0.4	0.4	0.5	0.4	0.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 5.52-7.81 um	0.6	0.7	3.6	1.7	0.8	0.9	0.9	0.8	0.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 7.81-11.0 um	0.8	0.8	4.4	2.0	1.4	1.6	1.6	1.4	1.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 11.0-15.6 um	1.0	0.8	5.1	2.2	2.5	3.0	2.8	2.4	2.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 15.6-22.1 um	1.0	0.7	5.4	2.0	4.3	5.1	5.0	4.2	4.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 22.1-31.0 um	0.7	0.4	5.1	1.5	6.5	7.5	7.7	6.2	6.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 31.0-44.0 um	0.5	0.2	5.1	1.1	9.3	10.5	11.4	8.9	10.0
Coulter 1994	% of tot.wet sed.vol.	VOL% 44.0-62.5 um	0.4	0.2	5.6	0.9	12.5	13.7	15.1	12.0	13.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 62.5-88.0 um	0.3	0.3	6.2	1.1	14.8	15.6	16.4	14.5	16.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 88.0-125 um	1.2	1.2	7.7	3.1	15.8	15.4	15.1	15.7	17.2
Coulter 1994	% of tot.wet sed.vol.	VOL% 125-177 um	5.4	5.2	8.7	9.1	13.2	11.7	11.0	13.3	12.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 177-250 um	12.2	16.2	7.9	19.2	8.2	6.9	6.3	8.5	6.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 250-350 um	16.1	25.0	8.1	25.4	4.2	3.5	3.0	4.9	3.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 350-500 um	16.3	22.6	7.1	19.9	2.1	1.5	1.1	2.9	1.2
Coulter 1994	% of tot.wet sed.vol.	VOL% 500-710 um	13.3	13.0	4.3	6.2	1.1	0.4	0.2	1.4	0.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 710-1000 um	11.5	8.0	3.5	0.9	0.9	0.4	0.2	0.9	0.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 1000-1410 um	9.8	3.6	3.4	ND	0.7	0.5	0.2	0.6	0.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 1410-2000 um	7.8	ND	2.1	ND	0.3	0.2	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2000-2830 um	ND	ND	ND	ND	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
ANCILLARY MEASUREMENTS - SEDIMENT
(FIELD DATA)

		LOCATION	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka	Lake Apopka
		SITE_ID	LA-R_6	LA-R_7	LA-T_1	LA-T_2	LA-T_3	LA-T_4	LA-T_5	LA-T_6	LA-T_7
ANAL_MET	**UNIT**	**PARAMETER**	Value	Value	Value	Value	Value	Value	Value	Value	Value
SM17 2540G	% of wet weight	PERCENT MOISTURE	95.8	67.3	93.2	94.3	85.6	68.3	73.5	96.4	94.7
SM17 2540G	% of wet weight	TOTAL SOLIDS	4.2	32.7	6.8	5.7	14.4	31.7	26.5	3.6	5.3
SM17 2540G	% of dry weight	TOTAL VOLATILE SOLIDS	58.4	6.2	63.1	53.0	48.1	30.7	28.0	67.0	55.7
SW9060	mg/kg dw	TOC	330000	29000	330000	330000	290000	180000	180000	360000	330000
Folk 1974	% of tot.wet sed.vol.	PERCENT SAND	63.0	84.0	67.1	64.7	88.0	95.3	91.5	61.3	63.4
Folk 1974	% of tot.wet sed.vol.	PERCENT SILT	36.1	15.1	32.0	34.4	11.5	4.5	8.1	37.7	35.7
Folk 1974	% of tot.wet sed.vol.	PERCENT CLAY	1.0	0.9	0.9	0.9	0.5	ND	0.5	1.1	1.0
		PERCENT MUD	37.1	16.0	32.9	35.3	12.0	4.5	8.6	38.8	36.7
CE-81-1	mg/kg dw	SOLUBLE REACTIVE PHOSPHATE									
CE-81-1	mg/kg dw	TOTAL KJELDAHL NITROGEN									
CE-81-1	mg/kg dw	TOTAL PHOSPHORUS									
Coulter 1994	um	MEAN	76	658	110	89	399	762	466	84	98
Coulter 1994	um	MEDIAN	83	2070	105	89	523	1160	626	83	87
Coulter 1994	um	MODE	97	2380	106	97	2380	2380	2380	88	80
Coulter 1994	um	STDDEV	2.63	6.10	3.73	3.27	4.41	3.28	3.87	3.31	3.69
Coulter 1994	-	SKEWNESS	-0.79	-1.15	-0.09	0.21	-0.83	-1.66	-1.12	-0.04	0.15
Coulter 1994	-	KURTOSIS	2.37	0.17	0.23	1.90	0.23	2.98	1.29	1.12	0.56
Coulter 1994	% of tot.wet sed.vol.	VOL% 0-0.49 um	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.49-0.69 um	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.69-0.98 um	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.98-1.38 um	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.38-1.95 um	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.95-2.76 um	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2.76-3.91 um	ND	0.2	0.3	0.2	0.2	ND	ND	0.3	0.2
Coulter 1994	% of tot.wet sed.vol.	VOL% 3.91-5.52 um	0.3	0.3	0.5	0.4	0.3	ND	0.3	0.5	0.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 5.52-7.81 um	0.7	0.4	0.8	0.7	0.5	0.2	0.4	0.8	0.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 7.81-11.0 um	1.2	0.6	1.4	1.2	0.8	0.3	0.5	1.5	1.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 11.0-15.6 um	2.3	1.0	2.4	2.2	1.1	0.4	0.8	2.7	2.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 15.6-22.1 um	4.0	1.8	3.9	3.8	1.6	0.7	1.1	4.5	4.0
Coulter 1994	% of tot.wet sed.vol.	VOL% 22.1-31.0 um	6.0	2.7	5.6	5.8	2.0	0.8	1.4	6.7	6.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 31.0-44.0 um	9.0	3.8	7.7	8.5	2.3	0.9	1.6	9.2	9.0
Coulter 1994	% of tot.wet sed.vol.	VOL% 44.0-62.5 um	12.6	4.5	9.7	11.8	2.9	1.1	2.0	11.8	11.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 62.5-88.0 um	15.6	4.3	11.2	14.5	3.9	1.6	2.7	13.6	13.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 88.0-125 um	17.1	3.7	12.1	15.8	5.3	2.6	4.1	14.1	13.5
Coulter 1994	% of tot.wet sed.vol.	VOL% 125-177 um	14.1	3.1	10.8	13.2	6.3	3.4	5.8	11.5	10.2
Coulter 1994	% of tot.wet sed.vol.	VOL% 177-250 um	8.5	2.4	8.1	8.2	6.9	3.6	7.2	7.5	6.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 250-350 um	4.3	1.8	6.2	4.5	7.1	4.5	7.9	4.6	3.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 350-500 um	1.9	1.4	4.9	2.1	7.6	6.0	8.5	2.7	2.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 500-710 um	0.6	1.2	3.8	0.8	7.7	7.1	8.3	1.6	2.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 710-1000 um	0.4	2.0	3.8	0.8	8.8	10.0	9.7	1.8	3.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 1000-1410 um	0.3	4.0	3.5	0.9	10.3	17.4	13.0	2.0	3.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 1410-2000 um	ND	5.7	2.9	0.6	11.1	25.5	16.3	2.0	3.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 2000-2830 um	ND	54.4	ND	3.3	13.1	13.7	7.9	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
ANCILLARY MEASUREMENTS - SEDIMENT
(FIELD DATA)

		LOCATION	Lake Apopka	Lake Apopka	Lake Harney	Lake Minneola	Lake Minneola	Mud Lake	Mud Lake	Lake Apopka	Lake Norris
		SITE_ID	LA-T_8	LA-T_9	LH-T_1	MINN-T_1	MINN-T_2	MUD-T_1	MUD-T_2	NLA	NORRIS-T_1
ANAL_MET	**UNIT**	**PARAMETER**	Value	Value	Value	Value	Value	Value	Value	Value	Value
SM17 2540G	% of wet weight	PERCENT MOISTURE	95.9	95.0	25.4	18.9	29.1	97.1	96.1	91.0	82.8
SM17 2540G	% of wet weight	TOTAL SOLIDS	4.1	5.0	74.6	81.1	70.9	2.9	3.9	9.0	17.2
SM17 2540G	% of dry weight	TOTAL VOLATILE SOLIDS	61.5	47.2	0.7	0.9	2.4	68.5	62.3	45.4	44.2
SW9060	mg/kg dw	TOC	340000	290000	4100	6900	14000	370000	325000	310000	290000
Folk 1974	% of tot.wet sed.vol.	PERCENT SAND	59.6	60.9	94.1	89.1	67.5	85.0	85.6	59.2	18.4
Folk 1974	% of tot.wet sed.vol.	PERCENT SILT	39.2	38.2	5.0	10.0	28.0	14.8	14.2	39.6	70.4
Folk 1974	% of tot.wet sed.vol.	PERCENT CLAY	1.2	0.9	0.9	1.0	4.5	ND	ND	1.3	11.2
		PERCENT MUD	40.4	39.1	5.9	11.0	32.5	14.8	14.2	40.9	81.6
CE-81-1	mg/kg dw	SOLUBLE REACTIVE PHOSPHATE			0.7	0.7	0.9	12.0	5.1	20.0	
CE-81-1	mg/kg dw	TOTAL KJELDAHL NITROGEN			270	310	730	29000	20000	17000	
CE-81-1	mg/kg dw	TOTAL PHOSPHORUS			46	78	140	720	890	660	
Coulter 1994	um	MEAN	71	78	148	261	100	163	186	86	19
Coulter 1994	um	MEDIAN	77	81	168	347	209	198	201	82	18
Coulter 1994	um	MODE	80	88	169	356	269	269	245	80	14
Coulter 1994	um	STDDEV	2.67	2.91	2.04	3.33	5.48	2.50	2.95	3.72	3.80
Coulter 1994	-	SKEWNESS	-0.75	-0.21	-3.48	-1.93	-0.80	-1.06	-0.47	-0.01	0.15
Coulter 1994	-	KURTOSIS	2.43	1.67	15.10	3.60	-0.53	1.47	0.79	0.44	0.24
Coulter 1994	% of tot.wet sed.vol.	VOL% 0-0.49 um	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.49-0.69 um	ND	ND	ND	ND	ND	ND	ND	ND	0.5
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.69-0.98 um	ND	ND	ND	ND	0.2	ND	ND	ND	0.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.98-1.38 um	ND	ND	ND	ND	0.4	ND	ND	ND	1.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.38-1.95 um	0.2	ND	0.2	ND	0.7	ND	ND	0.2	1.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.95-2.76 um	0.2	ND	0.2	0.3	1.1	ND	ND	0.2	2.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 2.76-3.91 um	0.3	0.2	0.3	0.5	1.9	ND	ND	0.3	4.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 3.91-5.52 um	0.4	0.4	0.3	0.8	2.9	ND	ND	0.6	6.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 5.52-7.81 um	0.7	0.7	0.4	1.2	4.0	0.3	0.3	1.1	8.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 7.81-11.0 um	1.2	1.3	0.6	1.5	4.6	0.5	0.5	1.8	9.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 11.0-15.6 um	2.2	2.4	0.8	1.8	4.8	0.8	0.9	3.2	10.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 15.6-22.1 um	4.0	4.3	0.8	1.8	4.3	1.5	1.5	5.2	10.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 22.1-31.0 um	6.5	6.6	0.7	1.3	3.1	2.4	2.3	7.2	8.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 31.0-44.0 um	10.1	9.6	0.6	0.9	2.3	3.8	3.5	9.4	8.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 44.0-62.5 um	13.9	12.8	0.8	0.7	2.1	5.4	5.2	11.1	8.2
Coulter 1994	% of tot.wet sed.vol.	VOL% 62.5-88.0 um	16.0	14.8	1.7	0.7	1.9	7.0	7.4	11.9	6.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 88.0-125 um	15.8	15.2	12.1	1.4	2.3	9.4	10.2	11.9	4.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 125-177 um	12.6	12.4	37.0	4.9	6.8	13.3	12.9	9.8	3.2
Coulter 1994	% of tot.wet sed.vol.	VOL% 177-250 um	8.0	7.9	33.4	12.6	16.1	17.9	15.1	6.7	1.5
Coulter 1994	% of tot.wet sed.vol.	VOL% 250-350 um	4.1	4.2	9.4	20.2	18.2	18.2	14.0	4.6	0.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 350-500 um	1.6	2.1	0.5	22.5	11.8	13.3	10.3	3.7	0.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 500-710 um	0.5	1.1	ND	15.5	4.9	5.1	5.8	3.1	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 710-1000 um	0.4	1.1	ND	8.1	3.3	0.9	3.9	2.9	0.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 1000-1410 um	0.4	1.1	ND	3.1	2.2	ND	3.2	2.6	0.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 1410-2000 um	ND	0.9	ND	ND	ND	ND	2.9	2.2	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2000-2830 um	ND	ND	ND	ND	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
ANCILLARY MEASUREMENTS - SEDIMENT
(FIELD DATA)

		LOCATION	Lake Norris	Lake Norris	Lake Norris	Lake Norris	Lake Norris	Lake Ola	Lake Ola	Lake Jessup	Lake Jessup
		SITE_ID	NORRIS-T_2	NORRIS-T_3	NORRIS-T_4	NORRIS-T_5	NORRIS-T_6	OLA-T_1	OLA-T_2	OW_4	OW_6
ANAL_MET	**UNIT**	**PARAMETER**	Value	Value	Value	Value	Value	Value	Value	Value	Value
SM17 2540G	% of wet weight	PERCENT MOISTURE	84.4	83.5	81.8	83.0	64.2	44.6	74.5	94.6	92.0
SM17 2540G	% of wet weight	TOTAL SOLIDS	15.6	16.5	18.2	17.0	35.8	55.4	25.5	5.4	8.0
SM17 2540G	% of dry weight	TOTAL VOLATILE SOLIDS	45.0	45.2	41.4	49.0	18.2	3.7	11.5	45.7	35.1
SW9060	mg/kg dw	TOC	270000	270000	250000	300000	110000	27000	51000	230000	190000
Folk 1974	% of tot.wet sed.vol.	PERCENT SAND	40.2	17.0	27.3	23.4	52.3	63.5	64.7	59.7	60.7
Folk 1974	% of tot.wet sed.vol.	PERCENT SILT	54.1	72.6	65.0	67.4	41.7	34.1	34.1	39.2	38.3
Folk 1974	% of tot.wet sed.vol.	PERCENT CLAY	5.6	10.5	7.8	9.2	6.0	2.4	1.2	1.1	1.0
		PERCENT MUD	59.7	83.1	72.8	76.6	47.7	36.5	35.3	40.3	39.3
CE-81-1	mg/kg dw	SOLUBLE REACTIVE PHOSPHATE						1.7	2.2	170.0	19.0
CE-81-1	mg/kg dw	TOTAL KJELDAHL NITROGEN						1600	2900	14000	11000
CE-81-1	mg/kg dw	TOTAL PHOSPHORUS						120	300	2100	1600
Coulter 1994	um	MEAN	43	18	26	23	81	80	86	60	65
Coulter 1994	um	MEDIAN	42	18	27	23	74	117	100	74	76
Coulter 1994	um	MODE	61	14	55	18	1090	204	140	88	97
Coulter 1994	um	STDDEV	4.94	3.42	3.80	3.79	7.77	3.69	3.22	2.25	2.49
Coulter 1994	-	SKEWNESS	0.18	-0.13	-0.11	-0.05	-0.07	-0.84	-0.46	-1.65	-0.99
Coulter 1994	-	KURTOSIS	-0.21	-0.29	-0.06	-0.07	-1.16	0.31	0.95	4.11	2.83
Coulter 1994	% of tot.wet sed.vol.	VOL% 0-0.49 um	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.49-0.69 um	0.2	0.5	0.4	0.4	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.69-0.98 um	0.4	0.7	0.6	0.7	0.3	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.98-1.38 um	0.5	1.0	0.8	0.9	0.5	0.3	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.38-1.95 um	0.8	1.5	1.1	1.3	0.9	0.4	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.95-2.76 um	1.4	2.5	1.8	2.2	1.5	0.6	0.3	0.2	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2.76-3.91 um	2.3	4.2	3.0	3.6	2.5	0.9	0.4	0.3	0.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 3.91-5.52 um	3.5	6.2	4.5	5.3	3.6	1.4	0.7	0.6	0.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 5.52-7.81 um	4.9	8.4	6.3	7.1	4.9	2.2	1.1	1.0	1.0
Coulter 1994	% of tot.wet sed.vol.	VOL% 7.81-11.0 um	6.1	10.0	7.8	8.4	5.7	3.0	1.8	1.5	1.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 11.0-15.6 um	7.2	11.0	9.0	9.4	6.2	4.0	2.9	2.5	2.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 15.6-22.1 um	7.8	10.8	9.4	9.5	6.0	5.0	4.4	4.1	4.5
Coulter 1994	% of tot.wet sed.vol.	VOL% 22.1-31.0 um	7.7	9.4	8.9	8.9	5.3	5.4	6.0	6.0	6.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 31.0-44.0 um	8.1	8.7	9.2	9.1	5.0	6.1	7.8	8.9	8.5
Coulter 1994	% of tot.wet sed.vol.	VOL% 44.0-62.5 um	8.8	8.1	9.8	9.5	5.0	7.0	9.4	14.6	13.0
Coulter 1994	% of tot.wet sed.vol.	VOL% 62.5-88.0 um	8.5	6.2	8.9	8.1	4.4	7.1	10.4	22.1	19.5
Coulter 1994	% of tot.wet sed.vol.	VOL% 88.0-125 um	7.9	4.8	7.1	6.1	4.1	8.2	13.2	23.8	21.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 125-177 um	6.4	3.7	5.0	4.1	5.0	13.2	14.9	12.3	12.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 177-250 um	4.2	1.8	2.7	2.1	4.9	16.9	11.7	1.5	3.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 250-350 um	2.9	0.5	1.5	1.2	3.7	12.1	6.9	ND	1.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 350-500 um	2.2	ND	0.8	0.6	2.8	4.3	2.9	ND	0.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 500-710 um	1.6	ND	0.4	0.3	3.7	0.5	1.1	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 710-1000 um	2.0	ND	0.5	0.4	7.6	0.6	1.4	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1000-1410 um	2.5	ND	0.4	0.3	9.0	0.6	1.4	ND	0.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 1410-2000 um	2.1	ND	ND	ND	7.2	ND	0.8	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2000-2830 um	ND	ND	ND	ND	ND	ND	ND	ND	ND

DISTRICT WIDE AND DETAILED ASSESSMENT - ADDITIONAL STUDIES IN 2002
ANCILLARY MEASUREMENTS - SEDIMENT
(FIELD DATA)

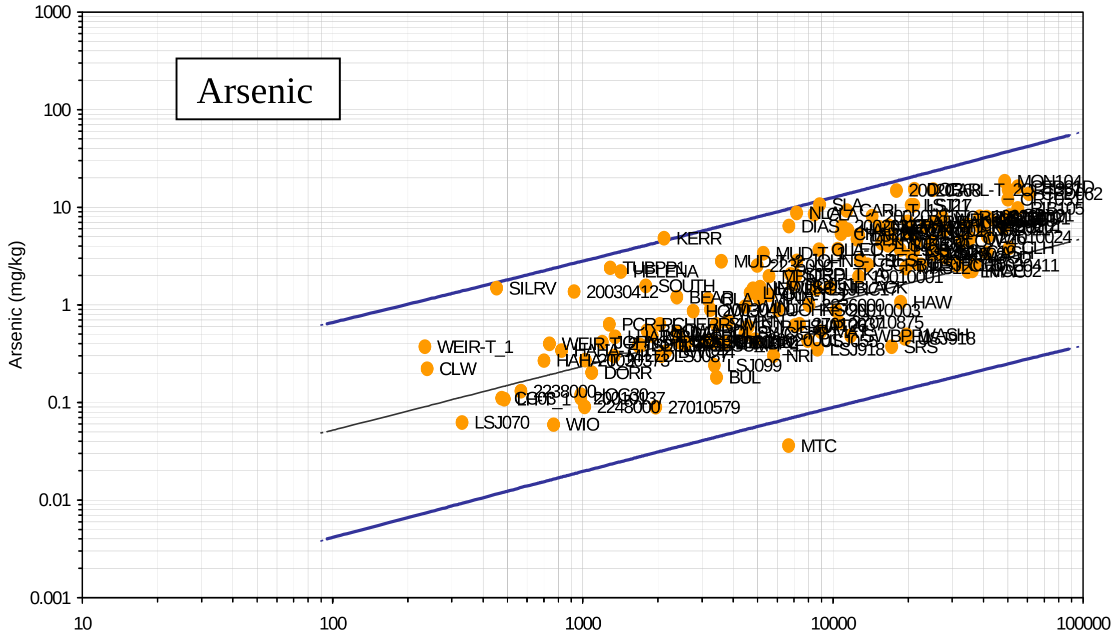
		LOCATION	Possum Creek	Sweetwater Branch	Lake Apopka	Sweetwater Branch	Sweetwater Branch	Bivens Arm	Bivens Arm	Lake Weir
		SITE_ID	POSSUM-T_1	ROSE-T_1	SLA	SWEET A	SWEET-T_1	TUMB-T_1	TUMB-T_2	WEIR-T_1
ANAL_MET	**UNIT**	**PARAMETER**	Value	Value	Value	Value	Value	Value	Value	Value
SM17 2540G	% of wet weight	PERCENT MOISTURE	21.7	16.4	94.1	18.0	17.0	17.6	19.3	24.1
SM17 2540G	% of wet weight	TOTAL SOLIDS	78.3	83.6	5.9	82.0	83.0	82.4	80.7	75.9
SM17 2540G	% of dry weight	TOTAL VOLATILE SOLIDS	1.9	0.6	57.3	0.7	0.6	1.2	1.7	1.0
SW9060	mg/kg dw	TOC	5400	2300	350000	2100	3900	5900	3100	6700
Folk 1974	% of tot.wet sed.vol.	PERCENT SAND	88.9	98.3	58.0	97.3	94.3	98.3	97.0	95.4
Folk 1974	% of tot.wet sed.vol.	PERCENT SILT	9.4	1.4	40.9	2.0	4.5	1.5	2.5	4.5
Folk 1974	% of tot.wet sed.vol.	PERCENT CLAY	1.7	ND	1.2	0.7	1.2	ND	0.5	ND
		PERCENT MUD	11.1	1.4	42.1	2.7	5.7	1.5	3.0	4.5
CE-81-1	mg/kg dw	SOLUBLE REACTIVE PHOSPHATE	5.3		30.0					0.2
CE-81-1	mg/kg dw	TOTAL KJELDAHL NITROGEN	140		17000					500
CE-81-1	mg/kg dw	TOTAL PHOSPHORUS	5000		820					26
Coulter 1994	um	MEAN	187	465	79	357	240	424	332	317
Coulter 1994	um	MEDIAN	224	478	78	383	286	417	362	355
Coulter 1994	um	MODE	223	429	80	391	324	391	356	391
Coulter 1994	um	STDDEV	3.20	2.03	3.46	2.20	2.56	2.10	2.13	2.12
Coulter 1994	-	SKEWNESS	-1.80	-2.85	-0.06	-3.47	-2.89	-1.63	-3.31	-2.06
Coulter 1994	-	KURTOSIS	4.51	17.50	0.74	18.60	10.80	11.10	16.80	7.00
Coulter 1994	% of tot.wet sed.vol.	VOL% 0-0.49 um	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.49-0.69 um	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.69-0.98 um	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.98-1.38 um	ND	ND	ND	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.38-1.95 um	0.3	ND	ND	ND	0.2	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.95-2.76 um	0.4	ND	0.2	ND	0.3	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2.76-3.91 um	0.6	ND	0.3	0.2	0.4	ND	0.2	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 3.91-5.52 um	0.8	ND	0.6	0.2	0.5	ND	0.2	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 5.52-7.81 um	1.0	ND	1.1	0.2	0.5	ND	0.3	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 7.81-11.0 um	1.1	ND	1.9	0.3	0.6	ND	0.3	0.2
Coulter 1994	% of tot.wet sed.vol.	VOL% 11.0-15.6 um	1.4	ND	3.3	0.3	0.6	0.2	0.3	0.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 15.6-22.1 um	1.4	0.2	5.4	0.3	0.7	0.2	0.4	0.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 22.1-31.0 um	1.3	ND	7.4	0.2	0.5	ND	0.3	0.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 31.0-44.0 um	1.2	ND	9.7	0.2	0.5	ND	0.3	1.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 44.0-62.5 um	1.2	ND	11.5	0.2	0.6	0.2	0.3	1.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 62.5-88.0 um	1.2	ND	12.1	0.3	1.1	0.3	0.4	1.0
Coulter 1994	% of tot.wet sed.vol.	VOL% 88.0-125 um	4.5	0.4	12.2	0.8	2.9	0.7	0.9	1.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 125-177 um	16.2	1.1	10.7	2.4	8.5	2.0	3.0	4.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 177-250 um	25.3	5.0	7.6	9.9	20.3	7.9	11.4	13.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 250-350 um	19.8	16.6	5.0	25.3	29.9	21.8	27.9	23.6
Coulter 1994	% of tot.wet sed.vol.	VOL% 350-500 um	10.8	28.9	3.2	31.5	22.6	30.8	32.8	28.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 500-710 um	4.8	24.2	1.8	16.6	5.8	18.7	13.9	16.0
Coulter 1994	% of tot.wet sed.vol.	VOL% 710-1000 um	2.8	13.9	1.7	7.1	2.3	8.2	4.5	5.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 1000-1410 um	2.1	6.1	1.9	3.4	1.0	3.2	2.2	1.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 1410-2000 um	1.4	0.5	1.7	ND	ND	ND	ND	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2000-2830 um	ND	1.4	ND	ND	ND	4.5	ND	0.2

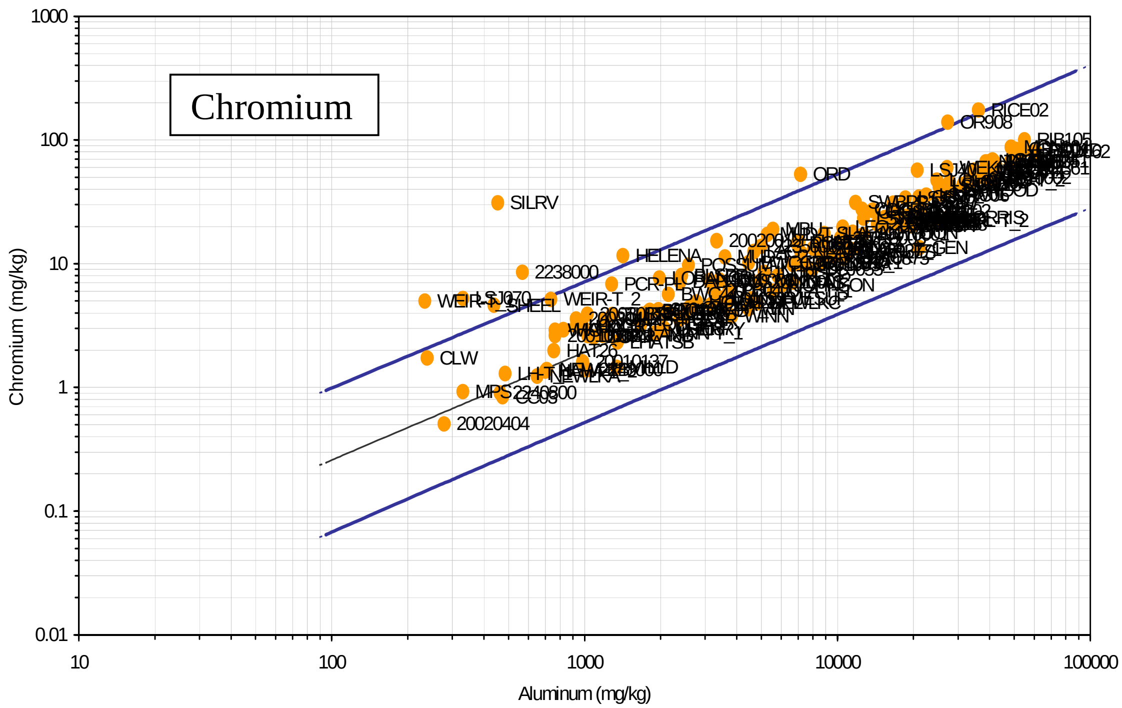
		LOCATION	Lake Weir
		SITE_ID	WEIR-T_2
ANAL_MET	**UNIT**	**PARAMETER**	Value
SM17 2540G	% of wet weight	PERCENT MOISTURE	34.7
SM17 2540G	% of wet weight	TOTAL SOLIDS	65.3
SM17 2540G	% of dry weight	TOTAL VOLATILE SOLIDS	1.4
SW9060	mg/kg dw	TOC	8900
Folk 1974	% of tot.wet sed.vol.	PERCENT SAND	83.5
Folk 1974	% of tot.wet sed.vol.	PERCENT SILT	16.1
Folk 1974	% of tot.wet sed.vol.	PERCENT CLAY	0.5
		PERCENT MUD	16.6
CE-81-1	mg/kg dw	SOLUBLE REACTIVE PHOSPHATE	0.6
CE-81-1	mg/kg dw	TOTAL KJELDAHL NITROGEN	830
CE-81-1	mg/kg dw	TOTAL PHOSPHORUS	64
Coulter 1994	um	MEAN	180
Coulter 1994	um	MEDIAN	234
Coulter 1994	um	MODE	269
Coulter 1994	um	STDDEV	2.83
Coulter 1994	-	SKEWNESS	-1.11
Coulter 1994	-	KURTOSIS	1.69
Coulter 1994	% of tot.wet sed.vol.	VOL% 0-0.49 um	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.49-0.69 um	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.69-0.98 um	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 0.98-1.38 um	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.38-1.95 um	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 1.95-2.76 um	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2.76-3.91 um	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 3.91-5.52 um	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 5.52-7.81 um	0.3
Coulter 1994	% of tot.wet sed.vol.	VOL% 7.81-11.0 um	0.5
Coulter 1994	% of tot.wet sed.vol.	VOL% 11.0-15.6 um	1.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 15.6-22.1 um	1.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 22.1-31.0 um	2.9
Coulter 1994	% of tot.wet sed.vol.	VOL% 31.0-44.0 um	4.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 44.0-62.5 um	5.0
Coulter 1994	% of tot.wet sed.vol.	VOL% 62.5-88.0 um	5.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 88.0-125 um	4.8
Coulter 1994	% of tot.wet sed.vol.	VOL% 125-177 um	8.5
Coulter 1994	% of tot.wet sed.vol.	VOL% 177-250 um	19.7
Coulter 1994	% of tot.wet sed.vol.	VOL% 250-350 um	22.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 350-500 um	13.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 500-710 um	4.5
Coulter 1994	% of tot.wet sed.vol.	VOL% 710-1000 um	3.4
Coulter 1994	% of tot.wet sed.vol.	VOL% 1000-1410 um	2.1
Coulter 1994	% of tot.wet sed.vol.	VOL% 1410-2000 um	ND
Coulter 1994	% of tot.wet sed.vol.	VOL% 2000-2830 um	ND

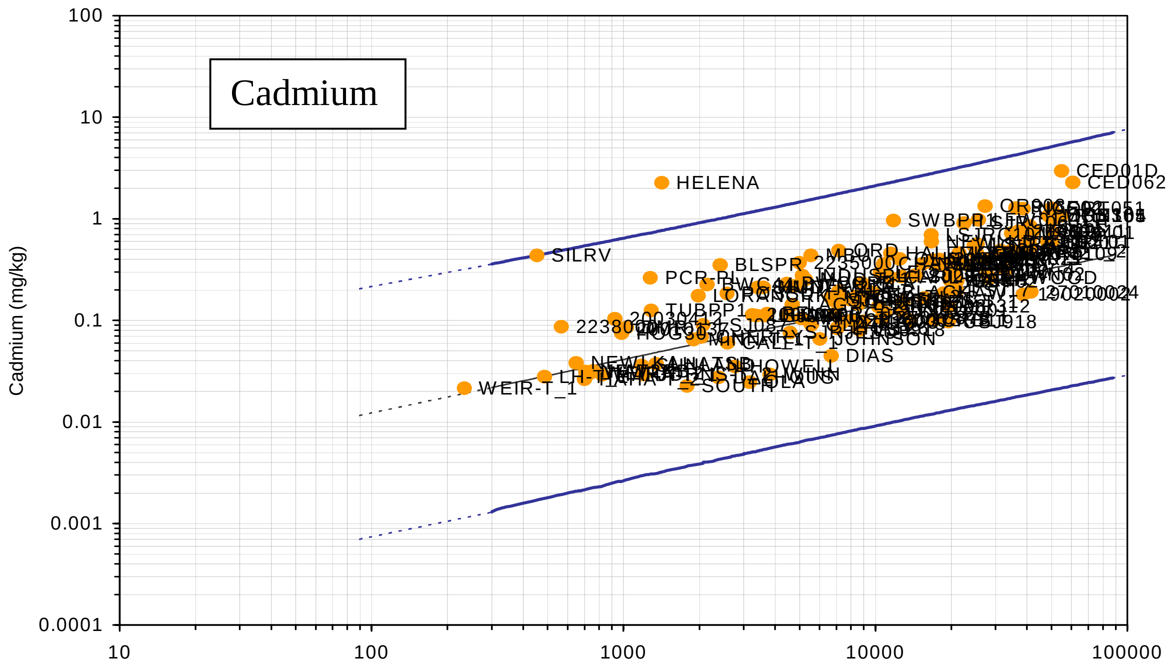
Appendix E. Results from Application of FDEP and Battelle Metals Data Interpretation Tools

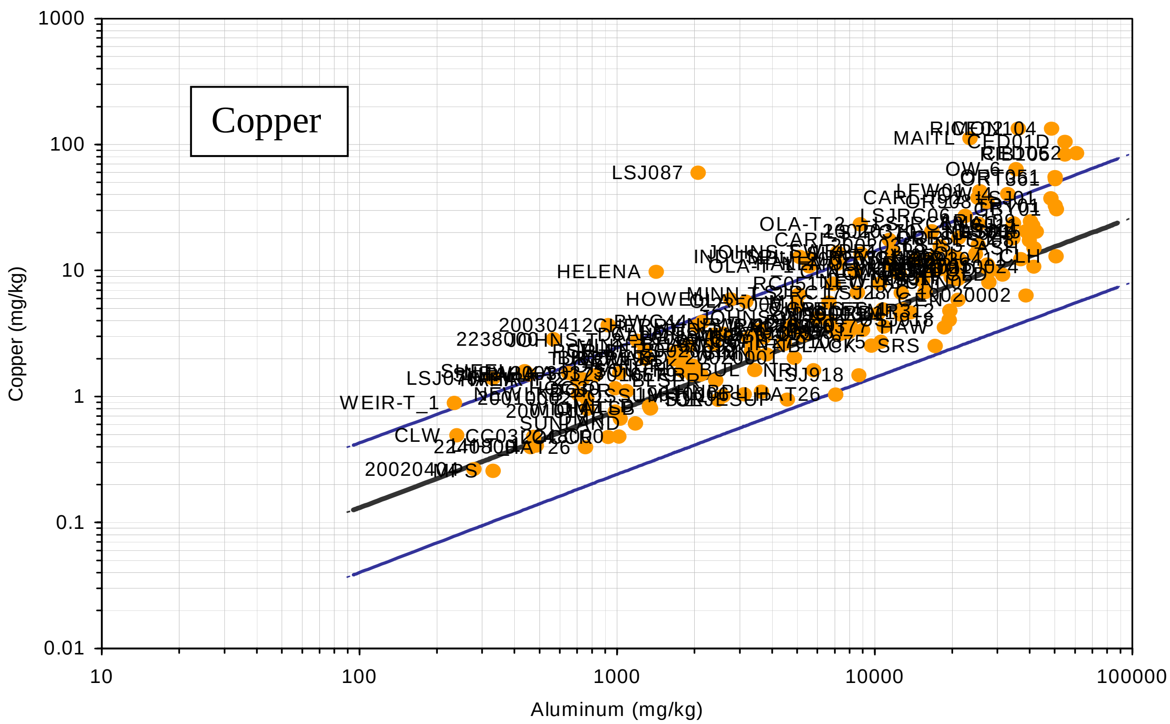
Districtwide Assessment Sites Identified as Potentially Contaminated with Metals Based on FDEP Metals Interpretation Tool

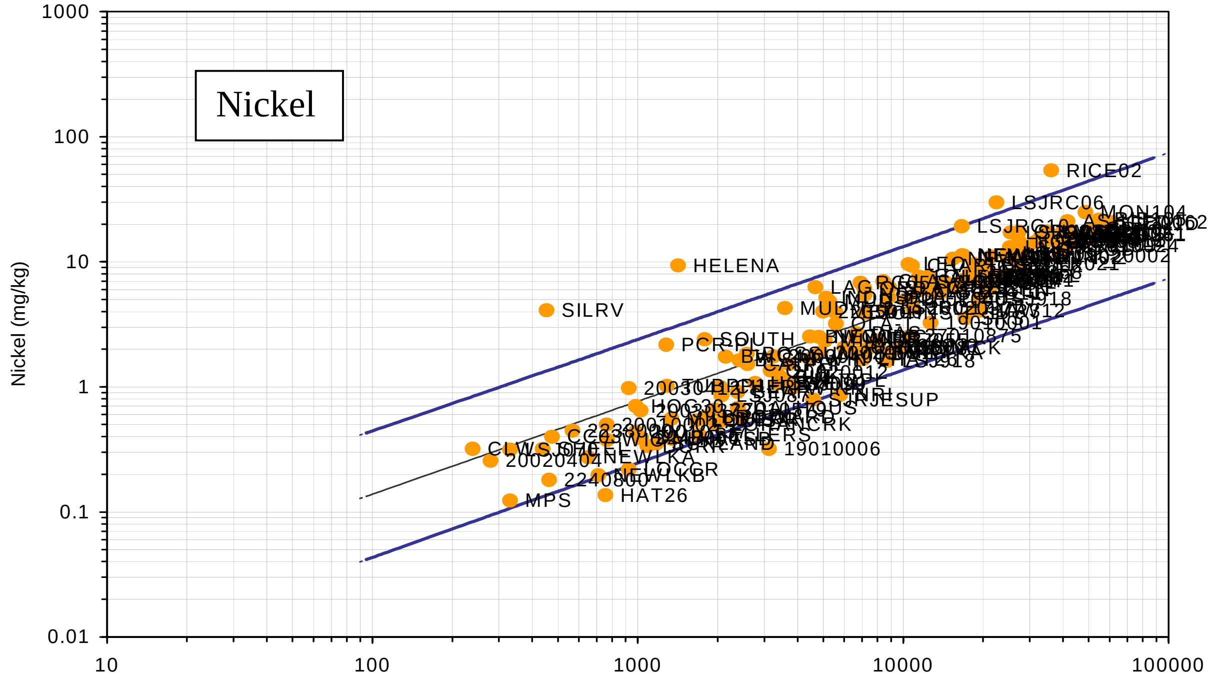
Sites Falling Above the Upper Limit Line are Potentially Enriched with the Listed Metal

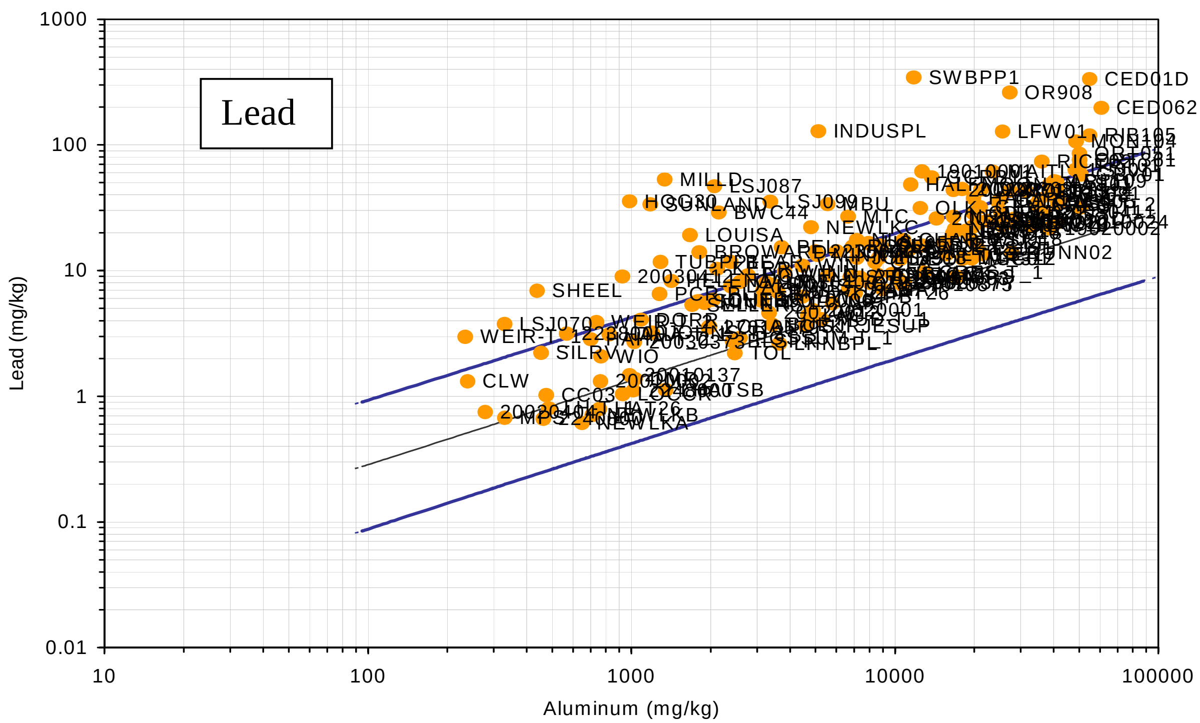


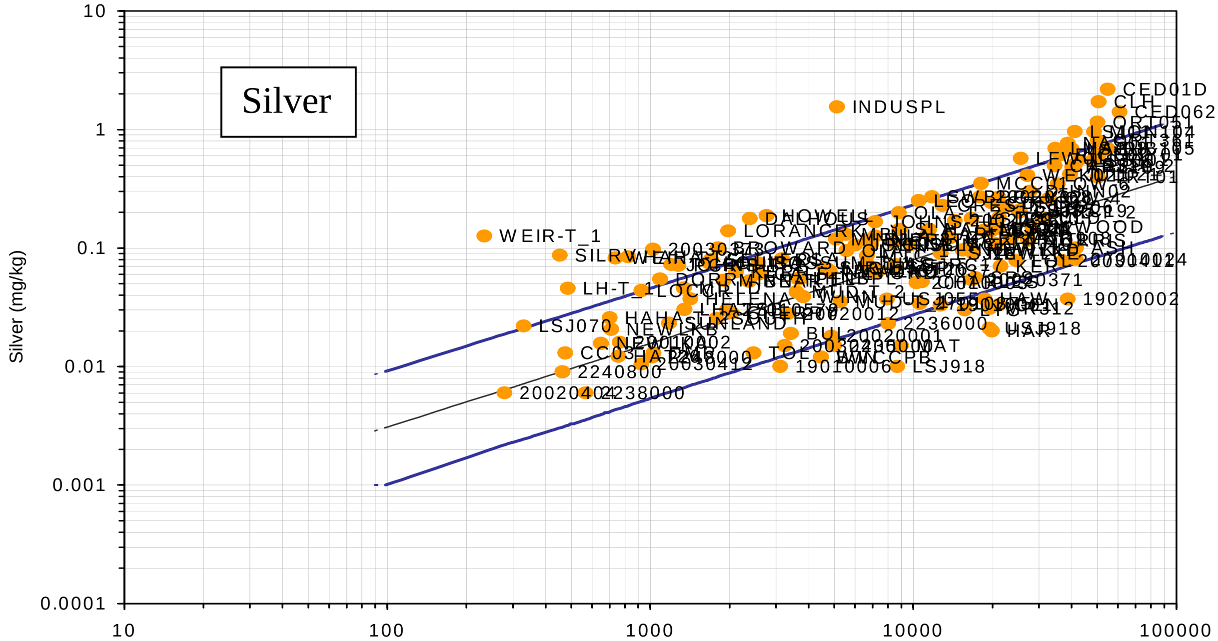


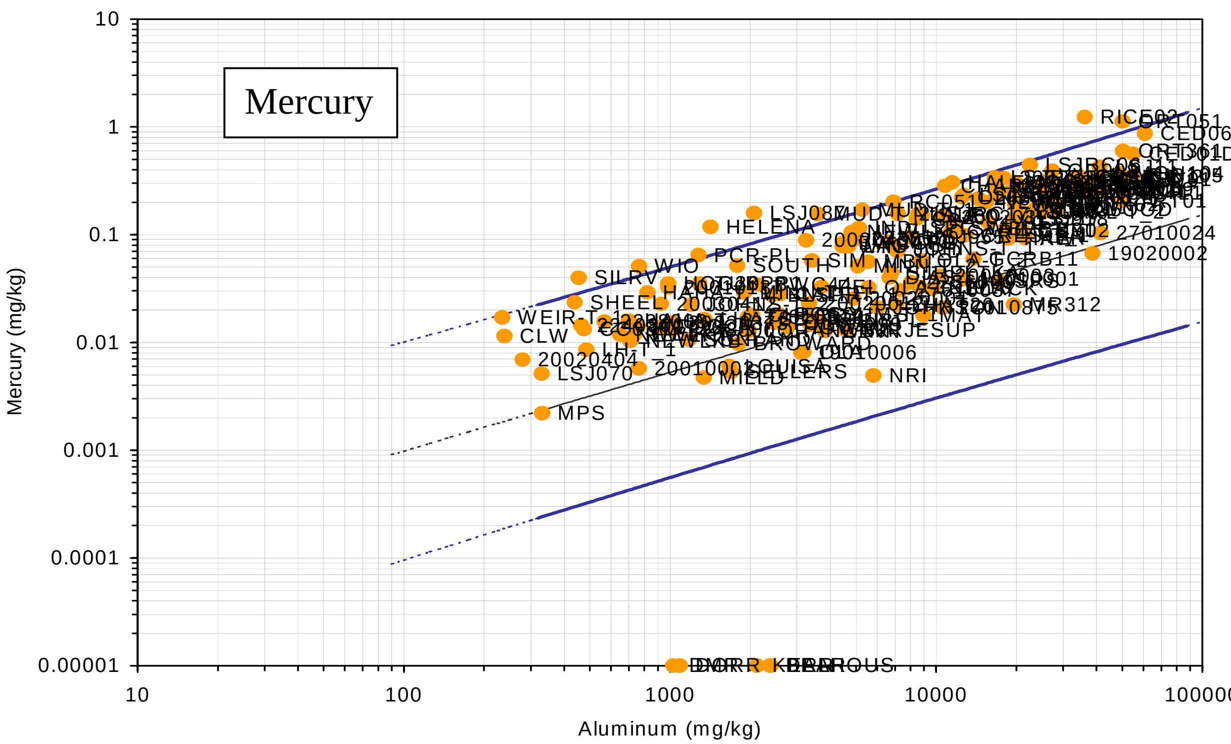

Cadmium
Cadmium (mg/kg)
100
10
1
0.1
0.01
0.001
0.0001
10
100
1000
10000
100000
HELENA
CED01D
CED062
SILRV
BLSPR
PCR-BL
LORANGRV
TUBBP1
DIAS
JOHNSON
WEIR-T_1
SOUTH
SWBPR1
LSJ918

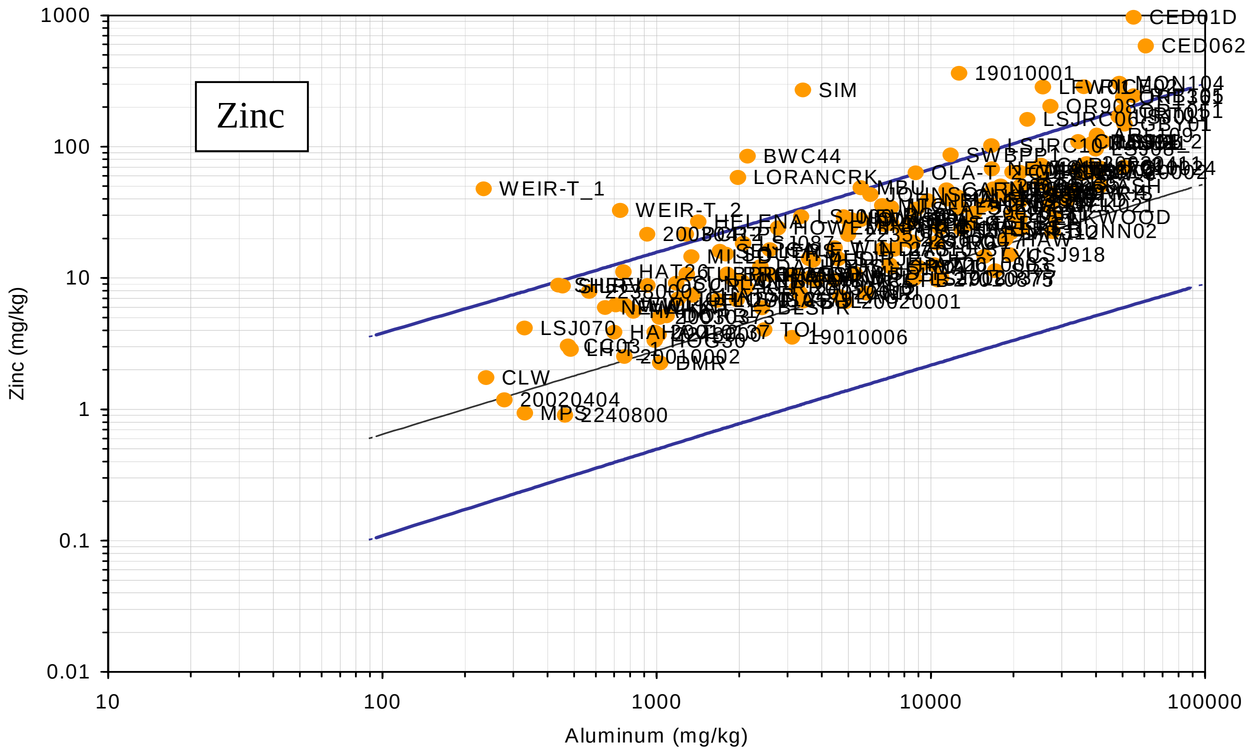

Copper
Copper (mg/kg)
1000
100
10
1
0.1
0.01
10
100
1000
10000
100000
Aluminum (mg/kg)
LSJ087
HELENA
MAITL
CED01D
CED062
OW-6
ORT051
WEIR-T_1
CLW
SRS
LSJ918
HAT26
20020002


Nickel
Nickel (mg/kg)
1000
100
10
1
0.1
0.01
10
100
1000
10000
100000
RICE02
LSJRC06
HELENA
SILRV
19010006
MPS
HAT26


Lead
Lead (mg/kg)
Aluminum (mg/kg)
1000
100
10
1
0.1
0.01
10
100
1000
10000
100000
SWBPP1
CED01D
OR908
CED062
INDUSPL
LFW01
MILLD
SHEEL
CLW
SILRV


Silver
Silver (mg/kg)
10
1
0.1
0.01
0.001
0.0001
10
100
1000
10000
100000
INDUSPL
CED01D
WEIR-T_1
LSJ070
19020002


Mercury
Mercury (mg/kg)
10
1
0.1
0.01
0.001
0.0001
0.00001
10
100
1000
10000
100000
Aluminum (mg/kg)
RICE02
HELENA
MPS
NRI
19020002


Zinc
Zinc (mg/kg)
Aluminum (mg/kg)
1000
100
10
1
0.1
0.01
10
100
1000
10000
100000
CED01D
CED062
19010001
SIM
BWC44
LORANCRK
WEIR-T_1
WEIR-T_2
HAT26
LSJ070
CLW
20020404
19010006
TOL
BMR
20020001

SJRWMD Sediment Discrimination Worksheet Based on Five Clusters

Version 1.1 **April 2001 by V.I. Cullinan**

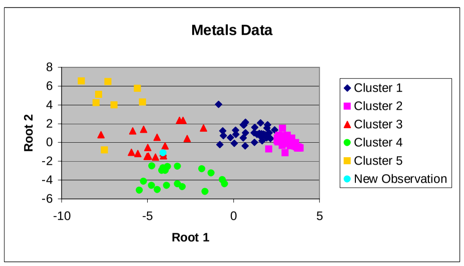
This workbook was prepared as a product for the St. Johns River Water Management District as a spreadsheet calculator to be used as indicated in the report "Development of a Metals Data Analysis Method for District-Wide Assessment of Sediment Contamination" prepared by E.A. Crecelius and V.I. Cullinan. The authors are not responsible for uses of this calculator beyond the specific intentions stated in this report.

Site: OR908

Instructions:

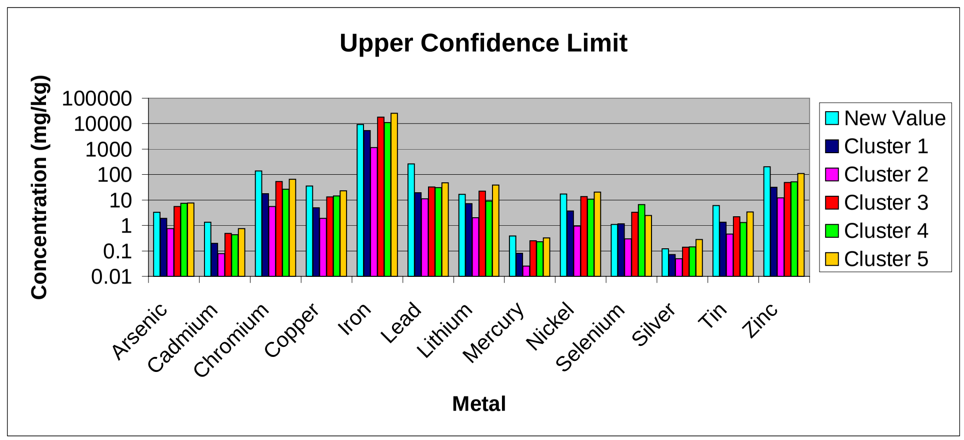
Fill in yellow cells for both cluster determination (B10:B13) and determination of potential contamination (B35:B47). Concentrations are mg/kg dry weight except for percent mud. You may paste the values in from another spreadsheet or type the values individually. All other cells are locked. Use the plot of Root 2 against Root 1 as a visual assessment of cluster membership. A warning will appear if the minimum distance to a cluster centroid is greater than 20 suggesting that the new observation was not represented by the variability in the original Metals Data. New observations are compared to the designated cluster's 95% UCL to determine if the observation suggests potential contamination. A plot of the new observation and each cluster's 95% UCL is provided for visual comparison.

Variable	New Value	Standardized Value	Root 1	Root 2	Distance 1	Distance 2	Distance 3	Distance 4	Distance 5	Cluster
TOC	201000	0.898111638	-4.10028	-1.09109	15.330738	27.302421	0.726707728	3.9632864	20.034765	3
ALUMINUM	27300	1.37628692								
MANGANES	82.9	0.07360157			Minimum Distance					
MUD%	46.4	0.982645403			0.7267077					



95% Upper Confidence Limit (UCL)

Variable	New Value	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Potentially Contaminated
Arsenic	3.26	1.9	0.746	5.58	7.37	7.75	NO
Cadmium	1.33	0.198	0.0793	0.48	0.435	0.758	YES
Chromium	139	17.5	5.6	52.8	26.7	66.2	YES
Copper	35	5.01	1.89	13.1	14.6	23.2	YES
Iron	9200	5376	1144	17832	10945	25514	NO
Lead	260	19.5	11.1	32.5	30.7	47.4	YES
Lithium	16.8	7.26	2.04	22.5	9	39.2	NO
Mercury	0.389	0.0814	0.0251	0.247	0.23	0.325	YES
Nickel	17.3	3.75	0.951	13.6	10.8	20.6	YES
Selenium	1.09	1.15	0.296	3.31	6.61	2.49	NO
Silver	0.12	0.0719	0.0492	0.141	0.145	0.277	NO
Tin	6.05	1.33	0.454	2.19	1.31	3.42	YES
Zinc	202	31.5	12.1	49.1	51.2	110	YES



SJRWMD Sediment Discrimination Worksheet Based on Five Clusters

Version 1.1 April 2001 by V.I. Cullinan

This workbook was prepared as a product for the St. Johns River Water Management District as a spreadsheet calculator to be used as indicated in the report "Development of a Metals Data Analysis Method for District-Wide Assessment of Sediment Contamination" prepared by E.A. Crecelius and V.I. Cullinan. The authors are not responsible for uses of this calculator beyond the specific intentions stated in this report.

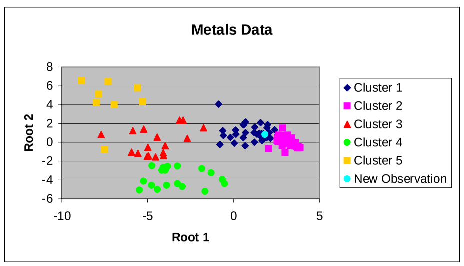
Site: WINN

Instructions:

Fill in yellow cells for both cluster determination (B10:B13) and determination of potential contamination (B35:B47). Concentrations are mg/kg dry weight except for percent mud. You may paste the values in from another spreadsheet or type the values individually. All other cells are locked. Use the plot of Root 2 against Root 1 as a visual assessment of cluster membership. A warning will appear if the minimum distance to a cluster centroid is greater than 20 suggesting that the new observation was not represented by the variability in the original Metals Data.

New observations are compared to the designated cluster's 95% UCL to determine if the observation suggests potential contamination. A plot of the new observation and each cluster's 95% UCL is provided for visual comparison.

Variable	New Value	Standardized Value	Root 1	Root 2	Distance 1	Distance 2	Distance 3	Distance 4	Distance 5	Cluster
TOC	17200	-0.63087929	1.840425	0.838444	0.3534763	1.3172839	20.58531976	24.150235	47.040787	1
ALUMINUM	4460	-0.55113924								
MANGANES	24.3	-0.64524043			Minimum Distance					
MUD%	31.8	0.297842402			0.3534763					



95% Upper Confidence Limit (UCL)

Variable	New Value	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Potentially Contaminated
Arsenic	0.96	1.9	0.746	5.58	7.37	7.75	NO
Cadmium	0.112	0.198	0.0793	0.48	0.435	0.758	NO
Chromium	4.31	17.5	5.6	52.8	26.7	66.2	NO
Copper	2.6	5.01	1.89	13.1	14.6	23.2	NO
Iron	923	5376	1144	17832	10945	25514	NO
Lead	10.9	19.5	11.1	32.5	30.7	47.4	NO
Lithium	2.46	7.26	2.04	22.5	9	39.2	NO
Mercury	0.0778	0.0814	0.0251	0.247	0.23	0.325	NO
Nickel	1.66	3.75	0.951	13.6	10.8	20.6	NO
Selenium	1.12	1.15	0.296	3.31	6.61	2.49	NO
Silver	0.012	0.0719	0.0492	0.141	0.145	0.277	NO
Tin	0.378	1.33	0.454	2.19	1.31	3.42	NO
Zinc	16.9	31.5	12.1	49.1	51.2	110	NO