

Monitoring Plan
for
Everglades National Park Inflows East
(PIE)

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Water Quality Monitoring Division
Environmental Resource Assessment Department
South Florida Water Management District

SFWMD-FIELD-MP-035-02

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1.0 Glossary

ACF	Autosampler Compositing Flow
ADT	Autosampler Discrete Time
CERP	Comprehensive Everglades Restoration Plan
CERPRA	Comprehensive Everglades Restoration Plan Regulation Act
CLQM	Clinical Laboratory Quality Manual
DBHYDRO	South Florida Water Management District Environmental Database
DQOs	Data Quality Objectives
ENP	Everglades National Park
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FSQM	Field Sampling Quality Manual
GPS	Global Positioning System
LIMS	Laboratory Information Management System
NECP	Non-Everglades Construction Project
PIE	Everglades National Park Inflows East
SFWMD	South Florida Water Management District
TOC	Technical Oversight Committee

2.0 Project Organization

This South Florida Water Management District (SFWMD or District) project follows the Organization and Responsibility Section of the District's *Field Sampling Quality Manual* (FSQM). Refer to this document for details on key personnel and relevant responsibilities.

3.0 Project Description

3.1 Introduction and Background

This document serves as a reference for Project PIE (Park Inflows East), which monitors surface water quality in Everglades National Park (ENP). Approved by the Technical Oversight Committee (TOC) in 2006, Project PIE is a comprehensive surface water monitoring plan for the eastern edge of Everglades National Park from the S331 structure south to the S197 structure. The creation of a comprehensive monitoring plan for the area was made necessary by the existence of multiple overlapping projects with duplicative or conflicting requirements.

3.2 Active Mandates and Permits

Project PIE fulfills mandated monitoring required under the Non-Everglades Construction Project Permit (NECP), the Settlement Agreement, and the Army Corps of Engineers' C111D Emergency Order. In August of 2009 the requirements of the CERPRA permit for the C111 Western Features Project were added to this document. There is significant overlap of stations involved in these mandates that is addressed in Appendix 1.

3.3 Project Objectives

The primary purpose for creating Project PIE was to meet the varied mandated monitoring requirements in a cost effective manner by reducing redundant monitoring. A secondary objective of Project PIE is to provide a framework that will incorporate the monitoring associated with future infrastructure changes planned under various Comprehensive Everglades Restoration Plan (CERP) and Expedited (formerly Acceler8) projects.

3.4 Duration

3.4.1 Initiation Conditions

This project was initiated in early 2007 with a phased transition that was designed to be completed by late 2007.

3.4.2 Modification or Termination Conditions

The mandated monitoring described in this document will be continued indefinitely in response to the Settlement Agreement, the Non-Everglades Construction Project (NECP) permit, the C111D Emergency Order and the CERPRA permit.

4.0 Geographic Location

4.1 Regional Area

Project PIE is located on the eastern edge of Everglades National Park in the western portion of Miami-Dade County. Project boundaries include structure S331 in the north and structure S197 in the south.

4.2 Sampling Locations

Eleven (11) monitoring stations are included in this plan. Their locations are depicted in **Figures 1 and 2** with exact locations described in **Table 1**.

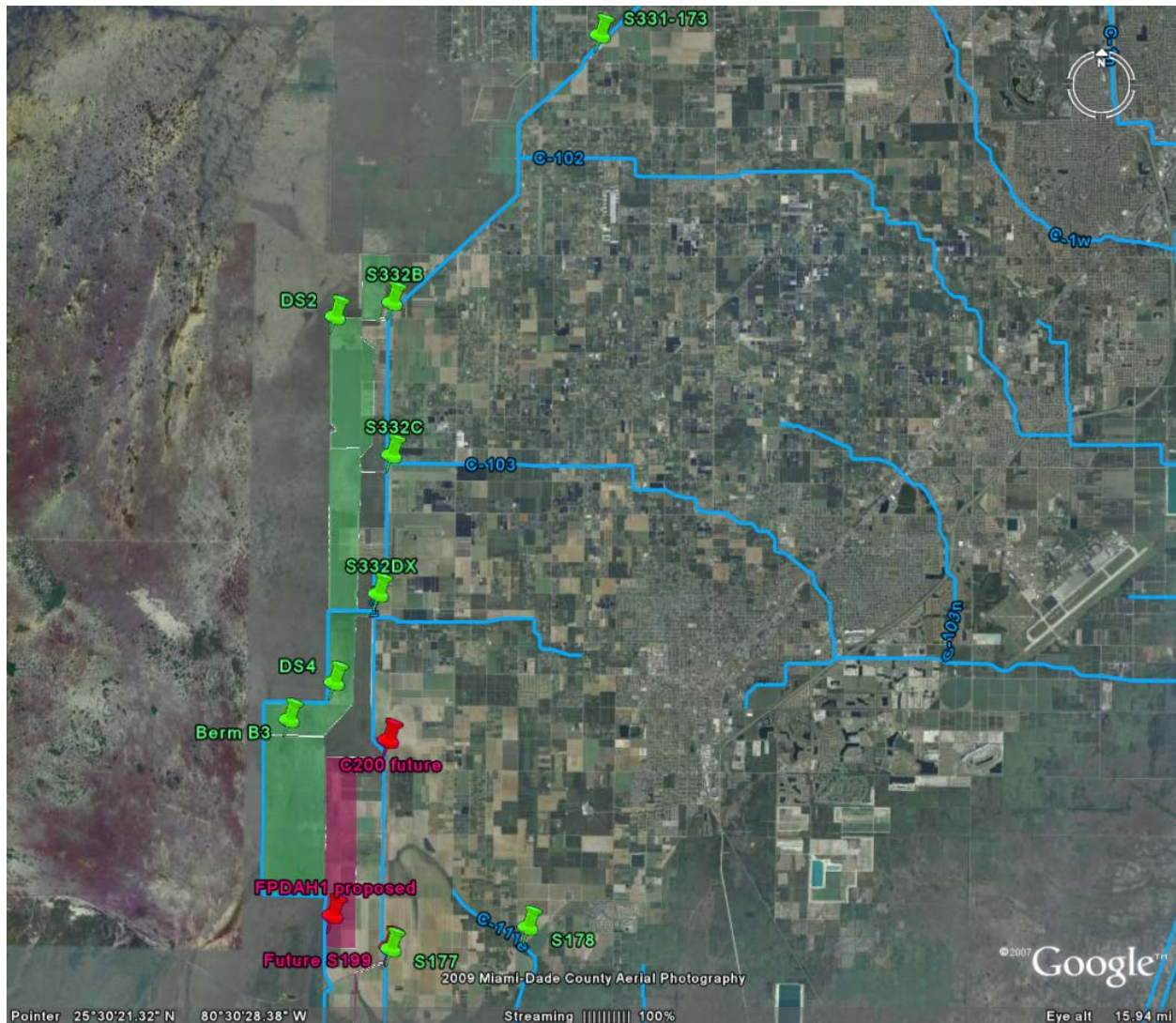


Figure 1: PIE Monitoring Stations, East Central Side of ENP

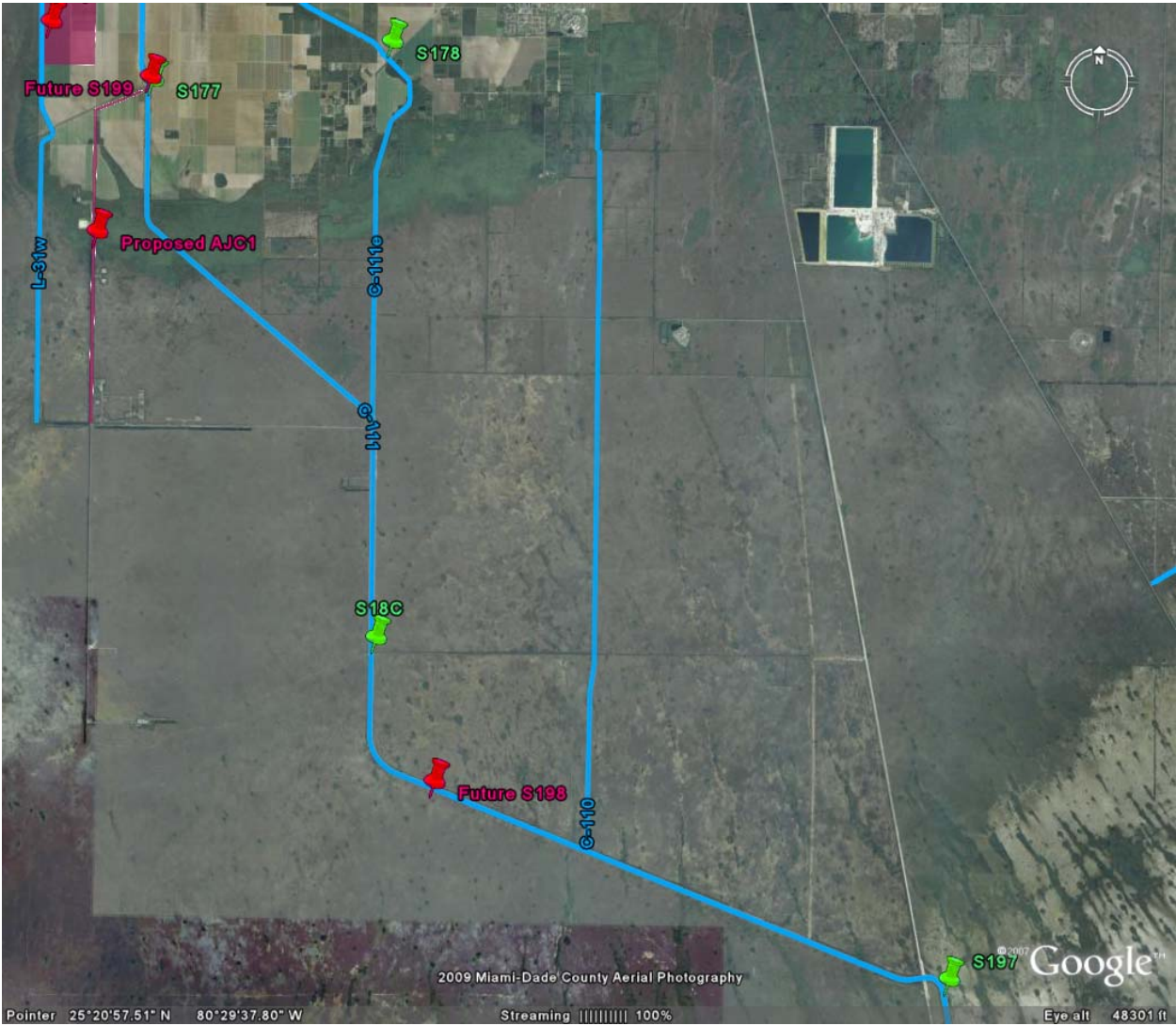


Figure 2: PIE Monitoring Stations, Southeast Side of ENP

Table 1: PIE Water Quality Monitoring Sites and GPS Coordinates

Site Name	Location and Comment	GPS Latitude**	GPS Longitude**
S331-173	At the northern end of the land between S331 and G173	253641.8	803032.601
S332B	At the S332B pump station	253258.4	803338.229
S332C	At the S332C pump station	253054.705	803336.841
S332DX	At the eastern end of the land in front of S332D	TBA	TBA
DS2	On the border between ENP and the detention area west of S332B	253246.197	803429.276
DS4	On the border between ENP and the detention area just north of berm B2	252747.777	803425.262
Berm B3	On the northwestern side of the concrete berm designated Berm B3 in the C111D detention area	252716.321	803505.671
S177	At the S177 and S199 structure	252410.412	803330.215
S178	At the S178 structure	252429.411	803126.212
S18C	At the S18C structure	251950.421	803130.215
S197	At the S197 structure	251714.147	802629.386
S200	At the S200 structure	TBD	TBD
AJC1	In the Aerojet Canal south of the fish farm	TBD	TBD
FPDAH1	In the Frog Pond Detention Area header canal	TBD	TBD
S175	On the L31W levee north of CR 9336	25253.63	803425.84
S332	On the L31W levee north and west of S175	252518.72	803524.82

**The standard positional goal for site coordinates is ± 1 meter. This standard can be obtained with a professional grade DGPS system. The coordinates are relative to NAD83 HARN horizontal datum.

4.3 Access and Authority

All sites are located outside the boundaries of Everglades National Park. Entry and sample collection are not regulated. Access requires the appropriate SFWMD gate key.

5.0 Field Activities

5.1 Monitoring Frequencies by Site and Parameters

All samples required for collection by grab sampling are depicted in **Table 2**.

Table 2: PIE Grab Sample Parameters and Frequency

Station	Matrix	Type	Parameters	Frequency
S331-173 S332DX S18C	SW	Grab	DO, pH, CONDUCTIVITY, TEMPERATURE, TSS, TPO ₄ , OPO ₄ , TKN, NO _x , Cl, Ca	Weekly if flowing, otherwise monthly
			Turbidity, SO ₄ , THg, MeHg, Pesticide suite DOC at S331-173 and S332DX	Quarterly
S332B S332C	SW	Grab	DO, pH, CONDUCTIVITY, TEMPERATURE, TSS, TPO ₄ , OPO ₄ , TKN, NO _x , Cl, Ca	Weekly if flowing
S177/(S199) S178	SW	Grab	DO, pH, CONDUCTIVITY, TEMPERATURE, TSS, TPO ₄ , OPO ₄ , TKN, NO _x , Cl, Ca, NH ₄	Weekly if flowing, otherwise monthly
			Turbidity, SO ₄ , Pesticide suite	Quarterly
Berm B3	SW	Grab	DO, pH, CONDUCTIVITY, TEMPERATURE, TSS, TPO ₄ , OPO ₄ , TKN, NO _x , CL, Ca	Biweekly if flowing, otherwise monthly
			Turbidity, SO ₄	Quarterly
S197	SW	Grab	DO, pH, CONDUCTIVITY, TEMPERATURE, TSS, TPO ₄ , OPO ₄ , TKN, NO _x , Cl, Ca	Biweekly if flowing, otherwise quarterly
			Turbidity, SO ₄	Quarterly
DS2 DS4	SW	Grab	DO, pH, CONDUCTIVITY, TEMPERATURE, TSS, TDS, TOC, DOC, Alkalinity, TPO ₄ , OPO ₄ , TKN, NO _x , Cl, Ca, SO ₄ , THg, MeHg, Pesticide suite	Event driven. Sampled only when a discharge event has occurred.
S200	SW	Grab	DO, pH, CONDUCTIVITY, TEMPERATURE, TSS, TPO ₄ , OPO ₄ , TKN, NO _x	Weekly if flowing, otherwise monthly
AJC1	SW	Grab	DO, pH, CONDUCTIVITY, TEMPERATURE, TSS, TPO ₄ , OPO ₄ , TKN, NO _x	Weekly if S199 is flowing, otherwise monthly
			Ca, Mg, Zn, Cu	Quarterly
FPDAH1	SW	Grab	Ca, Mg, Zn, Cu	Quarterly if sufficient water depth to sample
S175 S332	SW	Grab	TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, TP, OPO ₄ , TKN, NO _x	Biweekly if flowing
			Cl, Ca, SO ₄	Quarterly if flowing

5.2 Project Specific Guidelines

S332DX is a sampling point that serves S332D and S176. The determination of the need for a grab sample is based on flow from any one of the three structures. The station did serve as a surrogate for S174 but that structure was demolished in 2008.

DS2 and DS4 are diversion structures that may be used for overflow out of the detention areas and directly into Everglades National Park or the L31W canal. If these structures are used, event-response monitoring is required.

With the addition of S199 adjacent to S177 sampling at the S177 station is triggered by flow from either structure.

Sampling at the FPDAH1 station is predicated on the presence of sufficient quantities of water to actually collect. As guidance waters in the header canal should be both contiguous and at least 10 cm in depth.

Operations of structures S175 and S332 is limited to emergency flood conditions only. Accordingly, monitoring of these structures is only required when either is actually used. Operations is required to notify monitoring staff so that sample collection can be initiated.

5.3 Grab Sampling Procedures

Sample collection for this project shall follow the procedures and requirements found in the Field Sample Collection Procedures Section of the District's FSQM. All samples are collected on the upstream side of the structure.

5.4 Field Testing Procedures

Field testing procedures shall follow the procedures and requirements found in the Field Testing Section of the District's FSQM. The field parameters for this project are described in **Table 3**.

Table 3: Field Analytical Parameters Collection

Parameter	Resolution	Accuracy
DO	0.01 mg/L	0-20 mg/L, +/- 0.2 mg/L
Conductivity	0.001 mS/cm	+/- 0.5% of reading +0.001 mS/cm
Temp	0.01°C	+/- 0.15°C
pH	0.01 unit	+/- 0.2 unit

5.5 Field Quality Control Requirements

Field quality control requirements shall follow the procedures found in the Quality Control section of the District's FSQM.

5.6 Autosamplers

Project PIE includes five autosamplers, three are set for flow proportional composite sampling and two are set for time dependent discrete sampling. **Table 4** presents the details of the autosamplers.

Table 4: PIE Autosampler Parameters and Frequency

Station	Matrix	Type	Parameters	Frequency
S331-173 S332DX	SW	Time proportional discrete autosampler	TPO ₄ , TKN, NO _x	Sampler set to sample every three hours, collected weekly.
S332B S332C S18C	SW	Flow proportional composite autosampler	TPO ₄ , TKN, NO _x	Weekly

5.7 Sample Submission

Following completion of sample collection for each day, the samples are transported in coolers with wet ice at 4° Celsius to the laboratory for analysis. Samples are submitted to the laboratory on the same day as collection or via courier the following day. Samples are submitted according to the requirements outlined in the District’s FSQM. If samples are submitted to a facility other than the District’s in-house laboratory, the laboratory must be District approved.

6.0 Data Quality Objectives

6.1 Data Uses

The data from PIE is compiled and reported in the District’s annual *South Florida Environmental Report* (SFER) and the quarterly *Settlement Agreement Report*.

6.2 Data Quality

While it is recognized that data quality objectives (DQOs) are typically developed separately for each specific monitoring project, all mandated monitoring conducted by the District must meet the objectives conveyed in the FDEP’s Quality Assurance Rule, 62-160 F.A.C. Over the years, the District’s field collection staff and chemistry laboratory, and their contractors, have met or exceeded these data quality objectives, as reflected in their respective quality manuals, for all data generated. As a result, unless otherwise specified, the District has adopted a uniform set of DQOs following criteria detailed within the Analytical Methods and Default QA/QC Targets table of the *Chemistry Laboratory Quality Manual* (CLQM). For those samples analyzed by the FDEP Laboratory, the District has adopted the DQOs within the FDEP *Chemistry Quality Manual*, December 2007.

Surface water samples, including field testing and field quality control samples, are collected in accordance with the FDEP Quality Assurance Rule, 62-160 F.A.C. and the current version of the FSQM. Applicable sections of the FSQM include, but are not limited to, field sample collection procedures, decontamination procedures, field testing, and quality control requirements.

The data quality objectives of the field testing parameters for this project are covered by the Field Quality Assurance Objectives table in the field testing section of the FSQM. This manual is updated annually, and therefore, the most recent version of the District’s FSQM details the specific field testing data quality objectives for this project at the time of sample collection.

Samples are analyzed according to the provisions within the FDEP Rule 62-160 F.A.C. and the FSQM. This manual is updated annually, and therefore, the most recent version of the FSQM details the specific laboratory analyses' DQOs for this project at the time of sample collection.

Data are qualified in accordance with the FSQM and CLQM data validation and reporting sections.

6.3 Completeness Targets

For each project, monitoring parameters and frequencies will be registered in LIMS. This process aids in the creation of header sheet templates, quality assurance, and determining completeness. Completeness targets, meaning the number of samples successfully collected and analyzed, are set at 95 percent annually for this project.

7.0 Data and Records Management

The collecting agency shall maintain records of field notes and copies of all records relative to the chain of custody and analytical data. It is the responsibility of the collection agency to maintain both current and historical methods and operating procedures so that at any given time the conditions that were applied to a sampling event can be evaluated. Upon completion of the project, the collecting agency shall provide all original field notes to the District's WQMD for permanent archival.

Records shall be maintained for the life of the project and five years thereafter, in a manner that will protect the physical condition and integrity of the records. Storage shall follow the District's records storage procedure. Access to archived methods shall be through designated records custodian. Corrections of data or records shall follow District SOPs.

7.1 Data Deliverables

The laboratory data shall be submitted to the District in a DBHYDRO compatible format. The laboratory shall evaluate the data in accordance with the data quality objectives stated in the FSQM. All data submittals shall conform to existing District guidelines or other format as requested by the District.

7.2 Data Storage

After the data validation process, all data are maintained so that end users can retrieve and review all information relative to a sampling event. Field notes are maintained on an internal server either by scanning actual field note pages or by uploading narratives from field computers to the server. All analytical data and metadata are sent to DBHYDRO for long-term storage and retrieval.

8.0 Revisions and Modifications

Date	Sections	Page Number(s)	Change From	Change To	Reason
9/1/2009	3, 4, 5, Appendix 1				Added CERPRA permit and monitoring requirements including stations S199, S200, FPDAH1, AJC1

References

FDEP (Florida Department of Environmental Protection). Quality Assurance Rule, 62-160 Florida Administrative Code (F.A.C.).

SFWMD (South Florida Water Management District), Chemistry Laboratory Quality Manual (CLQM), Revision No. 06-01, July 2006 or a newer version if available.

SFWMD (South Florida Water Management District), Field Sampling Quality Manual (FSQM), Version 3.0, December 2006 or a newer version if available.

Signature Page

Monitoring Plan

For

Project PIE

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APPENDIX 1: Requirements by Mandate for Detention Area Stations

Station	Collection Method	Frequency	Parameters	Mandate
S331-173	ADT	Weekly	TP, TKN, NO _x	PIE Comprehensive plan
	Grab	WF/M	TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, TP, OPO ₄ , TKN, NO _x , Cl, Ca	NECP Permit
		Quarterly	Turbidity, THg, MeHg /SO ₄ Pesticides	NECP Permit
S332B S332C	ACF	Weekly	TP, TKN, NO _x	C111D EO
	Grab	WF	TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, TP, OPO ₄ , TKN, NO _x , Cl, Ca	
S332DX (S176)	ADT	Weekly	TP, TKN, NO _x	C111D EO
	Grab	WF/M	TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, TP, OPO ₄ , TKN, NO _x , Cl, Ca	C111D EO Settlement Agreement NECP Permit
		Q	Turbidity, THg, MeHg /SO ₄ Pesticides	C111D EO Settlement Agreement NECP Permit CERPRA Permit
Berm B3	Grab	BF/M	TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, TP, OPO ₄ , TKN, NO _x , Cl, Ca	C111D EO
		Quarterly	SO ₄ , Turbidity	
S200	Grab	WF/M	TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, TP, OPO ₄ , TKN, NO _x	CERPRA Permit
FPDAH1	Grab	Quarterly	Zn, Cu, Ca, Mg	CERPRA Permit
DS2 DS4	Grab	Event	TEMPERATURE, DO, pH, CONDUCTIVITY TSS, TDS, TOC, DOC, Alkalinity, TP, OPO ₄ , TKN, NO _x , Cl, Ca, SO ₄ , THg, Pesticides	C111D EO
S175 S332	Grab	BWF	TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, TP, OPO ₄ , TKN, NO _x	NECP Permit
		QF	Cl, Ca, SO ₄	

APPENDIX 2: Requirements by Mandate for C111 Canal Stations

Station	Collection Method	Frequency	Parameters	Mandate
S178	Grab	WF/M	TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, TP, OPO ₄ , TKN, NO _x , Cl, Ca	Settlement Agreement
			NH ₄	Supports Florida Bay research
		Quarterly	Turbidity,SO ₄ , Pesticides	Settlement Agreement
S177/S199	Grab	WF/M	TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, TP, OPO ₄ , TKN, NO _x ,	Settlement Agreement NECP Permit CERPRA Permit
			Cl, Ca	Settlement Agreement NECP Permit
			NH ₄	CERPRA Permit
		Quarterly	Turbidity,SO ₄ , Pesticides	Settlement Agreement NECP Permit CERPRA Permit
AJC1	Grab	WF/M	TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, TP, OPO ₄ , TKN, NO _x ,	CERPRA Permit
		Quarterly	Zn, Cu, Ca, Mg	
S18C	ACF	Weekly	TP, TKN, NO _x	Settlement Agreement
	Grab	WF/M	TP	Settlement Agreement NECP Permit CERPRA Permit
			TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, OPO ₄ , TKN, NO _x , Cl, Ca	Settlement Agreement NECP Permit
		Quarterly	Turbidity, THg, MeHg /SO ₄ Pesticides	
S197	Grab	BF	TEMPERATURE, DO, pH, CONDUCTIVITY, TSS, TP,OPO ₄ , TKN, NO _x , Cl, Ca	NECP Permit
		Quarterly	Turbidity, SO ₄	