Compliance Monitoring Plan

For

Lake Okeechobee Inflow/Outflow Structures Water Quality Monitoring Program (LOOP Permit)
(PROJECT X)

AGENCY: FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

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Water Quality Monitoring Section
Water Quality Bureau, Water Resources Division
South Florida Water Management District

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1.0 Project Organization

Overall project organization and responsibilities are detailed in the South Florida Water Management District (SFWMD or District) Water Quality Bureau (WQB) Quality Management Plan (QMP). Field activity responsibilities are detailed in the Water Quality Monitoring (WQM) Section's Field Quality Manual (QM) and Field Sampling Manual (FSM). Laboratory analysis and data validation responsibilities are detailed in the Analytical Services Section's Chemistry Laboratory (District Lab) Quality Manual (CLQM). These documents define the procedures used by WQB personnel to meet the Florida Department of Environmental Protection's (FDEP) Quality Assurance (QA) Rule, Florida Administrative Code (F.A.C.) 62-160. Refer to these documents for details on key personnel and relevant responsibilities.

2.0 Project Introduction and Background

This document serves as a reference for surface water quality monitoring for the Lake Okeechobee Inflow/Outflow Monitoring Program (PROJECT X). Samples and/or data are collected to satisfy the mandated monitoring requirements in accordance with the permit(s) to which this document is attached.

This plan details permit mandated monitoring requirements. Modifications to this sampling may be requested in response to any future design changes, and/or changes to project objectives. Monitoring reductions may also be requested to stations, frequencies, and/or analytes if monitoring demonstrates that specific parameters are not present or if found consistently in compliance with regulatory standards. This plan will be reviewed and/or modified as needed to reflect necessary changes. At a minimum, this plan will be reviewed when the permit is renewed.

Compliance monitoring was initiated in 1973 and will continue for the life of the permit. Lake Okeechobee is the most dominant hydrologic feature of southern Florida. The lake is surrounded by a 140-mile levee system intercepted by a network of canals that are entirely controlled (with the exception of Fisheating Creek) by a system of pump stations and spillways. The canals can function as inflows or outflows to the lake depending upon lake stage, gate openings, irrigation needs, or flood control requirements. The major structures are either operated by the District or the U.S. Army Corps of Engineers (USACE). This system allows for the lake's hydrologic regulation and dictates flood control management in the southern portion of the state. Lake Okeechobee is a Class I primary drinking water source for cities around the lake, as well as a secondary source for the southeastern coast. It sustains prominent commercial and recreational fisheries and it is essential to the irrigation of crop industries in south Florida. It is also the primary source of fresh water for the St. Lucie and Caloosahatchee River estuaries.

2.1 Water Quality Performance Measures

The monitoring sites described in this document were established to satisfy requirements of the demand for premium water quality data as it applies to compliance, load calculations, and management plans within the Lake Okeechobee watershed. Project X was originally established to provide a water quality database to measure the chemical loadings from discharges of major inflows to and outflows from the lake. Over the last three decades, this program has emerged as a pivotal source of information that is vital to lake research initiatives and supplies data that are utilized to uphold District directives concerning Lake Okeechobee.

3.0 Geographic Location

Project X sites span across Okeechobee, Martin, Palm Beach, Hendry and Glades Counties in the region surrounding Lake Okeechobee (Figure 1). A total of **34** mandated monitoring stations will be sampled for this project. All station locations and descriptions are listed in Table 1 with locations also depicted in Figure 1.

Table 1: PROJECT X Surface Water Monitoring Stations and GPS Coordinates

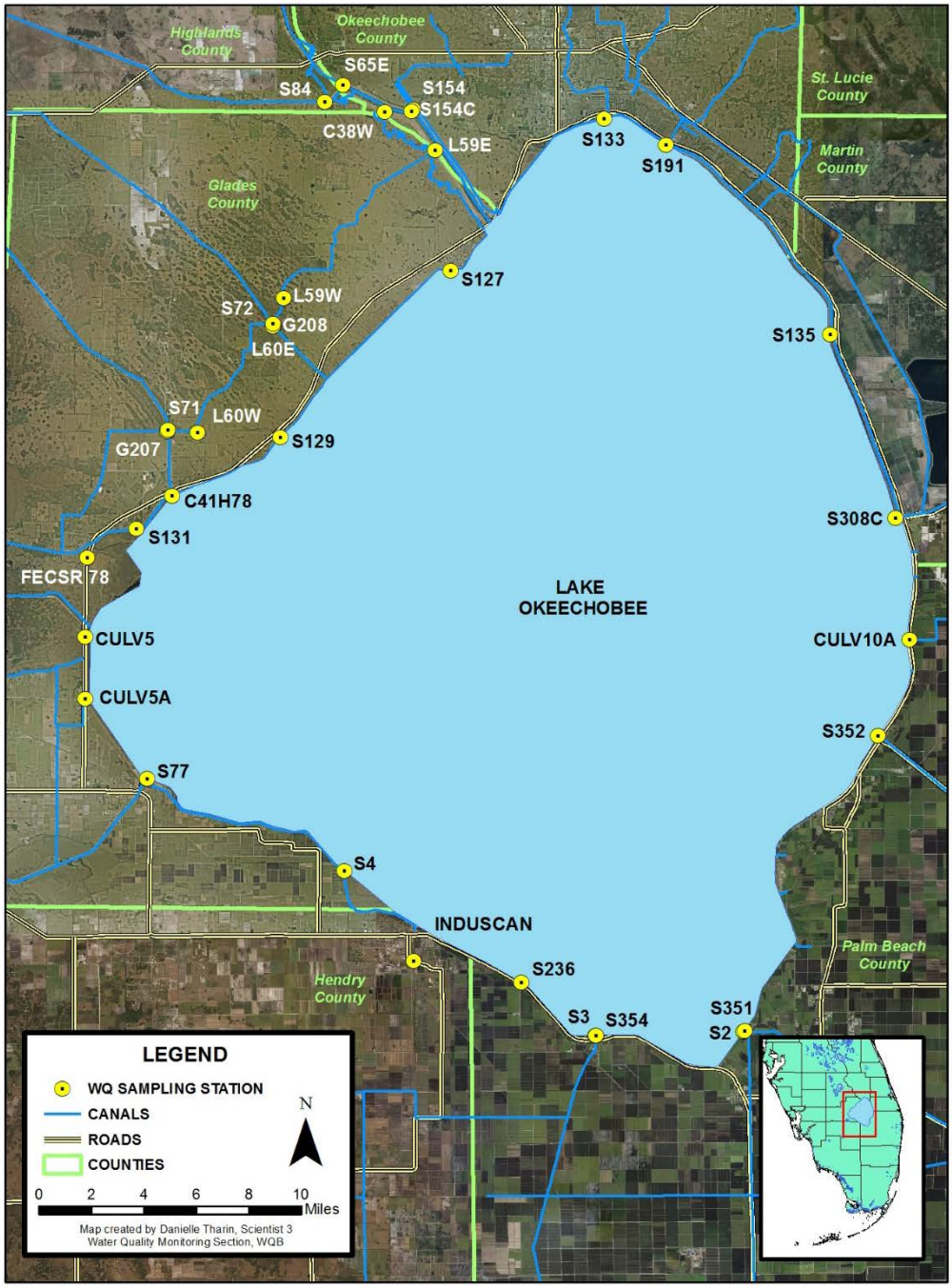
Station	Latitude	Longitude	Description
C38W	271237.74	805612.89	A gated structure located on the west side of the Kissimmee River (C38), three miles south of S65E.
C41H78	265951.52	810405.91	Platform located near the northwest side of Lake Okeechobee on Harney Pond Canal (C41) about 0.5 miles south of State Road 78. Represents the downstream wq monitoring site for L61E, HP 7 and Inflows 1, 2 and 3.
CULV10A	265502.294	803646.3	A culvert located on the east central side of Lake Okeechobee, at the western terminus of the L8 canal.
CULV5	265510.208	810718.234	A culvert and flap gate located on the west side of Lake Okeechobee on State Road 78, south of Fisheating Creek.
CULV5A*	265306.214	810719.235	A culvert and flap gate located on the west side of Lake Okeechobee on State Road 78, south of Fisheating Creek.
FECSR78*	265748.073	810714.127	Fisheating Creek is a natural, free flowing water source that discharges into Lake Okeechobee. Sampling location is at the State Road 78 bridge over the creek.
G207	270200.191	810416.228	In 1989 a pump station **(G207)** was built by the SFWMD to pump water from Lake Okeechobee northward via C41 to the Lake Istokpoga drainage basin.
G208	270534.181	810020.223	A pump station was built by the SFWMD in 1989 to pump water from Lake Okeechobee northward via C40 to the Lake Istokpoga drainage basin. Representative wq site for S72 Weir Auxiliary.
INDUSCAN	264423.73	805508.28	A free flowing canal that drains a portion of the agricultural area north of the L1 canal and terminates at the Clewiston Locks (S310) at Lake Okeechobee.
L59E	271120.37	805420.08	A gated structure located at the east end of the L59 canal where it meets the Kissimmee River (C38).
L59W	270626.179	805957.222	A culvert located at the west end of L59, near S72, on the Indian Prairie canal. Water generally flows from the L59 canal into the Indian Prairie Canal, immediately below S72.

L60E	270505.183	810127.224	A culvert located at the east end of L60, near S72, on the Indian Prairie canal.
L60W	270158.19	810309.227	A culvert located at the west end of L60, near S71, on the Harney Pond Canal.
S127	270721.28	805345.54	A SFWMD-operated pump station located on the northwest side of Lake Okeechobee between the Indian Prairie Canal (C40) and the Kissimmee River (C38).
S129	270148.19	810005.223	A SFWMD-operated pump station located on the northwest side of Lake Okeechobee between C41 and Indian Prairie Canal (C40).
S131	265845.22	810525.03	A SFWMD-operated pump station located on the west side of Lake Okeechobee, between Fisheating Creek and Harney Pond Canal.
S133	271223.28	804803.67	A SFWMD-operated pump station located on the north side of Lake Okeechobee, immediately west of Taylor Creek and lock S193.
S135	270511.88	803940.16	A SFWMD-operated pump station and lock located on the northeast side of Lake Okeechobee.
S154	271242.30	805508.74	A culvert gate type structure located on the east side of the Kissimmee River about four miles south of S65E.
S154C	271238.88	805512.08	A gated structure located on the east side of C38, immediately northwest of S154.
S191	271131.168	804545.201	A spillway gate structure located at the terminus of Nubbin Slough (L67), on the north side of Lake Okeechobee.
S2	264202.08	804257.63	A SFWMD operated pump station located on the south side of Lake Okeechobee near Belle Glade. It is situated at the confluence of the Hillsboro and North New River Canals and pumps canal water into Lake Okeechobee.
S236	264340.415	805110.124	A pump station on Lake Okeechobee between Lake Harbor and Clewiston that is operated by the SFWMD and South Florida Conservancy District.
S3	264154.51	804826.46	A SFWMD-operated pump station located on the south side of Lake Okeechobee at Lake Harbor. Water is pumped from the Miami Canal into Lake Okeechobee.
S308C*	265905.61	803717.14	A spillway gate structure located on the east side of Lake Okeechobee at the western terminus of the St. Lucie Canal (C44) in Port Mayaca.
S351	264203.48	804254.97	This structure is a reinforced concrete, gated spillway, with three vertical lift gates, located in the perimeter dike of Lake Okeechobee, at the north end of the Hillsboro and North New River Canals.
S352	265150.64	803756.55	A spillway gate structure operated by the US Army Corps of Engineers (USACE) on the southeast side of Lake Okeechobee. Located at the western terminus of the West Palm Beach Canal at Canal Point.
S354	264154.81	804823.95	This structure is a reinforced concrete, gated spillway, with two vertical lift gates, located in the perimeter dike of Lake Okeechobee, at the north end of the Miami Canal at Lake Harbor.
S4	264723.29	805743.17	A SFWMD-operated pump station on Lake Okeechobee that pumps water into the lake via C-20.
S65E	271331.164	805745.217	The southernmost spillway and lock structure on the Kissimmee River (C38), located 8.5 miles northwest of Lake Okeechobee.
S71	270203.19	810415.228	A spillway gate structure located near the northwest side of Lake Okeechobee on Harney Pond Canal (C41) about 1.5 miles north of State Road 78.

S72	270535.181	810021.223	A spillway structure located near the northwest side of Lake Okeechobee, on the Indian Prairie Canal (C40) about two miles northwest of State Road 78. Representative wq site for S72 Weir Auxiliary.
S77*	265026.82	810500.68	A spillway gate structure operated by the USACE that is located on Lake Okeechobee at the head of the Caloosahatchee River (C-43).
S84	271257.06	805825.23	A spillway gate structure on C41A, one half mile west of the Kissimmee River (C38).

The standard positional goal for site coordinates is detailed in the Establishing & Verifying WQ Monitoring Station Coordinates SOP (QS-SOP-009). The coordinates are relative to NAD83 HARN horizontal datum.

***** These locations are mandated to the District for water quality monitoring only. No operational requirements are listed in the permit for these sites.



2015 Okeechobee and Glades, 2014 Hendry, Highlands and St. Lucie and 2013 Martin County Natural Color Aerial Photography

Figure 1: PROJECT X Site Location Map

4.0 Sample Collection Procedures

All surface water quality samples are collected on the upstream side of all structures at a depth of 0.5 m unless vegetation and/or other conditions inhibit the collection of a representative sample upstream. Samples, including field testing and field quality control samples will be collected in accordance with the FDEP Quality Assurance Rule, 62-160 F.A.C. and the current version of the FSM. Applicable sections of the FSM include, but are not limited to, field sample collection procedures, decontamination procedures, field testing and quality control requirements. All water quality samples required for collection are depicted in Table 2.

4.1 Field Testing Procedures

Field testing procedures follow the procedures and requirements found in the FSM. Table 2 below describes the field parameters collected for this project. Table 3 describes the requirements when special event sampling is needed for S2 and/or S3 back-pumping activities.

Table 2: PROJECT X Station Frequency and Parameter ACODES

Station		Collection Method	Frequency	Parameter ACODES
C38W CULV10A CULV5 FECSR78 INDUSCAN L59E L59W L60E L60W S127 S129 S131 S133	S135 S154 S154C S191 S2 S236 S3 S352 S4 S65E S71 S72 S84	GRAB (G)	BIWEEKLY WITH RECORDED FLOW, OTHERWISE MONTHLY	AMMONIA (NH4), NITRATE+NITRITE (NOx), TOTAL NITROGEN (TN), TOTAL SUSPENDED SOLIDS (TSS), TOTAL PHOSPHORUS (TP04), TURBIDITY (TURB)
				DISSOLVED OXYGEN (DO), PH, SPECIFIC CONDUCTANCE (SCOND), TEMPERATURE (TEMP)
			QUARTERLY (Q)	TOTAL IRON (TOTFE)
C41H78		G	BIWEEKLY (BW)	NH4, NOx, TN, TSS, TP04, TURB
				DO, PH, SCOND, TEMP
			Q	TOTFE
S308C S77		G	BIWEEKLY WITH RECORDED FLOW, OTHERWISE MONTHLY	NH4, CHLOROPHYLL-A (CHL-N), NOx, TP04, TN, TSS, TURB, TOTAL ORGANIC CARBON (TOC)
				DO, PH, TEMP, SCOND
			Q	TOTFE
G207 G208		G	WEEKLY WITH RECORDED FLOW	TPO4, TN

S351 S352 S354	ACF (FLOW PROPORTIONAL COMPOSITE AUTOSAMPLER)	WEEKLY (W)	TPO4, TN

Table 3: PROJECT X Sample Sites, Duration, and Parameters for Back-Pumping at S2 and S3

Station	Collection Method	Frequency	Parameter ACODES
S2 S3	ACF	EVENT DURATION*	TPO4, TN
	GRAB	EVENT DURATION <72 HOURS: COLLECT ONE SAMPLE WITHIN 24 HOURS OF INITIATION OF PUMPING OPERATIONS.	ALKALINITY (ALK), NH4, NOx, TPO4, TN, ORTHO PHOSPHORUS (OPO4), TSS, TURB
			DO, PH, SCOND, TEMP
		EVENT DURATION >72 HOURS: AFTER COLLECTION OF INITIAL SAMPLE DURING THE FIRST 24 HOURS, COLLECT ONE SAMPLE EVERY 72 HOURS.	ALK, NH4, NOx, TPO4, TN, OPO4, TSS, TURB
			DO, PH, SCOND, TEMP

* An event is defined as continuous or intermittent pumping activity separated by a cessation of 72 hours or greater.

4.2 Field Quality Control and Sample Submission Requirements

Field quality control requirements shall follow the procedures found in the Field Quality Control Measurements and Requirements Section of the FSM.

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 FSM. If samples are submitted to a laboratory other than the District Lab, it must be District Lab approved.

5.0 Data Quality Objectives (DQOs)

5.1 Data Usage

The data from this project are compiled and reported in accordance with the conditions outlined in the permit or mandate. Typically the data are reported in the District's Annual South Florida Environmental Report (SFER; www.sfwmd.gov/sfer/), or in some cases is reported in a standalone mandated report, such as the quarterly Everglades Settlement Agreement Report.

5.2 Data Quality

All monitoring described herein shall meet the requirements conveyed in the FDEP's Quality Assurance Rule, 62-160 F.A.C. 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).

The DQOs of the field testing parameters for this project are covered by the table entitled Field Quality Assurance Objectives found in the field testing section of the FSM. This manual is updated regularly, and therefore, the most recent version of the FSM details the specific field testing DQOs 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 District's CLQM. This manual is updated regularly, and therefore, the most recent version of the District's CLQM details DQOs for this project at the time of sample collection for each specific laboratory analysis. Data are qualified in accordance with the FSM, CLQM and applicable data validation SOPs.

5.3 Completeness Target

The completeness target (i.e., the number of samples successfully collected and analyzed) shall be set at 95% annually for this project. Sampling attempts shall be included in the completeness target. At times samples will not be able to be collected because of no flow or low water conditions, unsafe station conditions, equipment malfunction, site maintenance, tropical storms/hurricanes or other unforeseen problems that might affect sample collection and/or quality. If samples cannot be collected on an attempt, collectors shall document "no bottle" (NOB) to indicate an attempt was made and/or the sample could not be collected for the documented reasons.

6.0 Data and Records Management

The District laboratory evaluates data in accordance with the data quality objectives stated in the District's FSM and CLQM. All data submittals shall conform to existing District

guidelines.

6.1 Contract Deliverables

There are no contract deliverables associated with this project.

6.2 Data and Record Storage

The District maintains master copies of all data, and field and laboratory generated records in NuGenesis. All documentation archives are kept for a minimum of 5 years after the date of generation or completion of the records as specified in 62-160 F.A.C. (see SFWMD-FIELD-SOP-022). All analytical data and specified metadata are sent to the DBHYDRO database for long-term storage and retrieval.

The District maintains both records of current and historical methodologies, and SOPs so that at any given time the conditions that were applied to a sampling event can be evaluated.

Records are maintained following the WQM SOP for Archive Records Storage and Retention (SFWMD-FIELD-SOP-022). Corrections of data and/or records follow applicable WQB SOPs, CLQM, and/or FSM.

7.0 References

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

Florida Department of Environmental Protection. Florida Department of Environmental Protection Table as Required By Rule 62-4.246(4) Testing Methods for Discharges to Surface Water. April 25, 2006.

South Florida Water Management District. Chemistry Laboratory Quality Manual (CLQM), SFWMD-LAB-QM-2020 or most current effective version. Analytical Services Section, West Palm Beach, FL.

South Florida Water Management District. Field Quality Manual (QM), SFWMD-FIELD-QM-001. Water Quality Monitoring Section. West Palm Beach, FL.

South Florida Water Management District. Field Sampling Manual (FSM), SFWMD-FIELD-FSM-001. Water Quality Monitoring Section. West Palm Beach, FL.

South Florida Water Management District. Quality Management Plan, SFWMD-QA-QM-001. Water Quality Bureau, West Palm Beach, FL.

8.0 Revisions and Modifications

Version	Date	Section/Page	Change/Reason
01	12/07/2016	All	Format changed to comply with an agreement reached by FDEP and the District in 2011 regarding the use of compliance monitoring plans.
01	12/07/2016	Table 1/pg. 5	Updated table to reflect most current list of permit mandated sampling names and updated descriptions. Eliminated L61W.
01	12/07/2016	Figure 1/pg. 7	Updated map to show most current permit mandated sampling locations and names (eliminated L61W and fixed S354 label).
01	12/07/2016	Table 2/pg. 8	Updated table to reflect most current list of permit mandated parameters and ACODES. Eliminated Alkalinity and OPO4 from permit table but will continue to sample these parameters for operational purposes. Eliminated TKN to reflect use of new direct analysis of TN, as approved by FDEP. Eliminated autosamplers at C41H78, G207 and G208.
01	12/07/2016	Table 3/pg. 9	Updated back pumping table with more precise language for sample collection time frames and updated parameter list to include TN direct analysis method.
02	08/27/2020	All	Update to conform to new CMP template requirements.
02	08/27/2020	Table 2	Update monitoring requirements for site C41H78 from biweekly with recorded flow, otherwise monthly to biweekly grab regardless of flow.
02	09/09/2020	Header	Update plan version number to conform with updated SFWMD numbering.