

Quality Assessment Report for Water Quality Monitoring

July – September 2025



Prepared for the
Technical Oversight Committee

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INTRODUCTION

This report is an assessment of the South Florida Water Management District (SFWMD) field sampling and laboratory analysis for total phosphorus (TP) in surface water, primarily for the projects and their associated stations as shown in **Table 1** from July 1, 2025, through September 30, 2025. The analysis reflects the status of the data at the time of downloading and does not account for changes made to the data after December 10, 2025.

Table 1. Projects and associated stations.

Project Name	Project ID	Stations
Everglades National Park Inflows North	PIN	S12A, S12B, S12C, S12D, S333, S333N, S355A, S355B, and S356-334
Everglades National Park Inflows East	PIE	G737, S332DX, S18C, and S328
Everglades Protection Area	EVPA	LOX3, LOX4, LOX5, LOX6, LOX7, LOX8, LOX9, LOX10, LOX11, LOX12, LOX13, LOX14, LOX15, and LOX16

The Water Quality Monitoring Section (WQM) *Field Quality Manual* (SFWMD-FIELD-QM-001) and *Field Sampling Manual* (SFWMD-FIELD-FSM-001) provided the quality system requirements, and the field sampling procedures were followed in field sample collection from July 1, 2025, to September 30, 2025. The Analytical Services Section’s *Chemistry Laboratory Quality Manual* (SFWMD-LAB-QM-001) provides the guidance and requirements for preparing and analyzing laboratory samples, as well as data verification and validation. The *Field Sampling Quality Assessment* and *Laboratory Analysis Quality Assessment* sections in this report provide a comprehensive evaluation and validation of the TP results for surface water samples collected from the locations and timeframe described above.

To prepare this report, a Microsoft Excel workbook named “qa_report_jul_sep_2025_data.xlsx” was also created, containing all TP results obtained from DBHYDRO, SFWMD’s corporate environmental database, for all sampling events. This includes grab samples collected for the projects/stations listed above during the period specified in this report. The Excel workbook will be referred to as the Reference Data Set (RDS) throughout this report and both of the documents are available on the Everglades Technical Oversight Committee (TOC) website (<https://www.sfwmd.gov/our-work/toc>). TP analyses were completed at the SFWMD Analytical Services Chemistry Laboratory (Florida Department of Health Identification # E46077).

If available, TP sample results for biannual laboratory proficiency testing as required by the National Environmental Laboratory Accreditation Program (NELAP) or results from other laboratory performance evaluation studies completed during the period specified in this report will also be included.

FIELD SAMPLING QUALITY ASSESSMENT

SAMPLE COLLECTION

All samples were collected by Water Quality Monitoring (WQM) staff. A total of 48 sampling events were conducted that included collection of samples for the projects/locations and timeframe described in the *Introduction* to this report. A complete list of the laboratory work orders obtained from the Laboratory Information Management System (LIMS) for these sampling events is shown in **Table 2**. The table details the work order identifiers, work order numbers, project codes, and sample collection dates.

Table 2. Sampling events for the reporting period.

Work Order Identifier	Work Order	Project ^a	Date Collected
P159098	95539	PIN	7/1/2025
P159102	95541	PIN	7/8/2025
P159114	95545	PIN	7/15/2025
P159115	95546	PIN	7/29/2025
P159116	95547	PIN	8/12/2025
P159117	95548	PIN	8/26/2025
P159118	95549	PIN	9/9/2025
P159119	95550	PIN	9/23/2025
P159126	95551	PIN	7/22/2025
P159127	95552	PIN	8/5/2025
P159128	95553	PIN	8/19/2025
P159129	95554	PIN	9/2/2025
P159130	95555	PIN	9/16/2025
P159131	95556	PIN	9/30/2025
P159164	95570	PIE	7/1/2025
P159165	95571	PIE	7/15/2025
P159166	95572	PIE	7/29/2025
P159167	95573	PIE	8/12/2025
P159168	95574	PIE	8/26/2025
P159169	95575	PIE	9/9/2025
P159172	95577	PIE	7/8/2025
P159182	95579	PIE	7/22/2025
P159183	95580	PIE	8/5/2025
P159184	95581	PIE	8/19/2025
P159185	95582	PIE	9/2/2025
P159186	95583	PIE	9/16/2025
P159187	95584	PIE	9/30/2025
P159194	95585	PIE	7/1/2025
P159195	95586	PIE	7/15/2025
P159196	95587	PIE	7/29/2025
P159197	95588	PIE	8/12/2025
P159198	95589	PIE	8/26/2025
P159199	95590	PIE	9/9/2025
P159202	95591	PIE	7/8/2025
P159210	95593	PIE	7/22/2025
P159211	95594	PIE	8/5/2025
P159212	95595	PIE	8/19/2025
P159213	95596	PIE	9/2/2025
P159214	95597	PIE	9/16/2025
P159215	95598	PIE	9/30/2025
P159225	95602	EVPA	7/9/2025
P159227	95603	EVPA	7/10/2025
P160220	96108	EVPA	8/5/2025
P160222	96109	EVPA	8/6/2025
P160892	96449	EVPA	9/3/2025
P160894	96451	EVPA	9/4/2025
P160937	96467	PIE	9/23/2025
P160953	96475	PIE	9/23/2025

a. EVPA – Everglades Protection Area; PIE – Everglades National Park Inflows East; and PIN – Everglades National Park Inflows North.

During the 48 sampling events described in **Table 2**, a total of 25 grab sample records for the projects/locations described in the *Introduction* indicate that a sample was not collected in most cases due to dry or ponding conditions, gates closed and/or the site being no flow or too shallow to collect. The grab sample identifiers and reasons these samples were rejected or not collected are shown in **Table 3**.

Table 3. Grab samples rejected or not collected during the reporting period.

Work Order Identifier	Project^a	Sample Identifier	Station	Date	Reason Sample Was Rejected or Not Collected^b
95570005	PIE	P159164-5	G737	7/1/2025	Dry out conditions
95570009	PIE	P159164-9	S18C	7/1/2025	Gates closed. No flow
95572005	PIE	P159166-5	G737	7/29/2025	Too shallow to collect. Gates closed.
95577005	PIE	P159172-5	G737	7/8/2025	Dry conditions, no water present. Gates closed.
95602011	EVPA	P159225-11	LOX6	7/9/2025	Too shallow to collect
95602002	EVPA	P159225-2	LOX5	7/9/2025	Dry out conditions. Helicopter did not land.
95602003	EVPA	P159225-3	LOX10	7/9/2025	Dry out/mud conditions. Helicopter did not land.
95602004	EVPA	P159225-4	LOX9	7/9/2025	Dry out/mud conditions. Helicopter did not land.
95602005	EVPA	P159225-5	LOX8	7/9/2025	Dry out conditions. Helicopter did not land.
95602006	EVPA	P159225-6	LOX7	7/9/2025	Dry out conditions. Helicopter did not land.
95602007	EVPA	P159225-7	LOX11	7/9/2025	Ponding conditions. Helicopter did not land.
95603004	EVPA	P159227-4	LOX4	7/10/2025	Dry conditions, no water present. Helicopter did not land.
95603005	EVPA	P159227-5	LOX3	7/10/2025	Dry conditions, no water present. Helicopter did not land.
95603009	EVPA	P159227-9	LOX13	7/10/2025	Dry conditions, ponding. Helicopter did not land.
96108010	EVPA	P160220-10	LOX14	8/5/2025	Unsafe conditions due to alligator presence.
96108002	EVPA	P160220-2	LOX5	8/5/2025	Dry conditions. Helicopter did not land.
96108003	EVPA	P160220-3	LOX10	8/5/2025	Ponding conditions. Helicopter did not land.
96108004	EVPA	P160220-4	LOX9	8/5/2025	Ponding conditions. Helicopter did not land.
96108005	EVPA	P160220-5	LOX8	8/5/2025	Ponding conditions. Helicopter did not land.
96108006	EVPA	P160220-6	LOX7	8/5/2025	Dry conditions. Helicopter did not land.
96108007	EVPA	P160220-7	LOX11	8/5/2025	Dry conditions. Helicopter did not land.
96109005	EVPA	P160222-5	LOX3	8/6/2025	Dry out conditions. Helicopter did not land.
96109009	EVPA	P160222-9	LOX13	8/6/2025	Ponding/mud conditions. Helicopter did not land.
96449002	EVPA	P160892-2	LOX5	9/3/2025	Too shallow to collect
96451005	EVPA	P160894-5	LOX3	9/4/2025	Too shallow to collect

a. EVPA – Everglades Protection Area; and PIE – Everglades National Park Inflows East.

b. These abbreviated notes do not necessarily convey all the details from the sample comments that can be seen in DBHYDRO.

FIELD QUALITY CONTROL

Field quality control (QC) samples were collected during each sampling event in accordance with the procedures outlined in the *Field Sampling Manual*. These QC samples were used to evaluate the integrity of the sample collection process and were associated with all environmental samples collected during the corresponding sampling day.

If any field QC sample failed to meet the criteria established by the Florida Department of Environmental Protection (DEP) Quality Assurance Rule (Chapter 62-160, Florida Administrative Code [F.A.C.]), appropriate data qualifiers were applied to the affected sample results to indicate potential limitations in data quality.

Field QC samples may include replicate samples (RSs), field quality control blanks, field-generated equipment blanks (EBs), field-cleaned equipment blanks (FCEBs), and field blanks (FBs). It should be noted that the sampling events listed in **Table 2** may include field QC samples collected at locations not specified in **Table 1**.

One grab sample from those stated in **Table 1** received a Project Manager Remark (PMR), however the PMR code was not related to TP data. Three samples (referenced in **Table 4**) received “J” qualifiers, indicating estimated values. These qualifiers were applied because the laboratory analysis was performed on samples collected from a disconnected pool. Five “G” and three “?” qualifiers were assigned to samples (referenced in **Table 4**) due to field quality control blank detection greater than 10 percent (1/10) of sample value for blanks or due to evidence that the sample was not representative of the water column.

Table 4. Results with qualifiers and remark codes during the reporting period for the 48 sample events listed in Table 2.

Work Identifier	Project ^a	Sample Identifier	Station	Collection Date	Qualifier or Remark Code / Reason
95554002	PIN	P159129-2	S356-334	9/2/2025	G: Field QC blank detection greater than 10 percent (1/10) of sample value for blank.
95554024	PIN	P159129-24	S12D	9/2/2025	G: Field QC blank detection greater than 10 percent (1/10) of sample value for blank
95554025	PIN	P159129-25	S12C	9/2/2025	G: Field QC blank detection greater than 10 percent (1/10) of sample value for blank
95554027	PIN	P159129-27	S12B	9/2/2025	G: Field QC blank detection greater than 10 percent (1/10) of sample value for blank
95591010	PIE	P159202-10	S328	7/8/2025	J: Estimated value because of improper laboratory or field protocols
95591008	PIE	P159202-8	S332DX	7/8/2025	G: Field QC blank detection greater than 10 percent (1/10) of sample value for blank
95593007	PIE	P159210-7	S328	7/22/2025	J: Estimated value because of improper laboratory or field protocols.
95594007	PIE	P159211-7	S328	8/5/2025	J: Estimated value because of improper laboratory or field protocols
96449005	EVPA	P160892-5	LOX8	9/3/2025	?: An investigation was performed, and data is being qualified due to evidence that the sample was not representative of the water column at the sampling station.; Data are rejected and should not be used
96449006	EVPA	P160892-6	LOX7	9/3/2025	?: An investigation was performed, and data is being qualified due to evidence that the sample was not representative of the water column at the sampling station.; Data are rejected and should not be used
96449007	EVPA	P160892-7	LOX11	9/3/2025	?: An investigation was performed, and data is being qualified due to evidence that the sample was not representative of the water column at the sampling station.; Data are rejected and should not be used

a. EVPA – Everglades Protection Area; PIE – Everglades National Park Inflows East; and PIN – Everglades National Park Inflows North.

FIELD AUDITS

SFWMD conducted one field audit of the EVPA project in the third quarter of 2025. There was one process improvement (PI - a notation on the audit report indicating a deficiency that does not result in the qualification of data and is not suspected to directly affect the quality of sample and/or field data) noted for EVPA. The PI was to correct the calibration solution logbook.

FIELD PROCEDURE UPDATES

No major procedural updates related to TP sample collection were made during the period specified in this report.

LABORATORY ANALYSIS QUALITY ASSESSMENT

SAMPLE ANALYSES

SFWMD Analytical Services Chemistry Laboratory staff conducted 210 TP analyses for the grab samples collected during the 48 sampling events listed in **Table 2** and detailed in the RDS. Of those 210 TP results, 178 were for grab samples collected from projects/locations listed in **Table 1** (excluding field quality control samples). For reference, a complete set of all 210 grab TP results can be found in the RDS described in **Table 1** with the sample identifiers, sampling locations, collection dates, etc.

LABORATORY QUALITY CONTROL

TP analyses are routinely conducted in the SFWMD Analytical Services Chemistry Laboratory in analytical batches of approximately 100 samples. To assess the quality of the sample results produced during the analyses of these batches, various types of laboratory control samples are included according to the requirements described in the *Chemistry Laboratory Quality Manual* (SFWMD-LAB-QM-001). The results of these laboratory quality control samples are associated with the analyses conducted in each batch, and qualifiers are added to the data as required by the DEP *Quality Assurance Rule* (Chapter 62-160, F.A.C.) (DEP, which is based on the specifications found in the *Chemistry Laboratory Quality Manual* (SFWMD-LAB-QM-001). The types of laboratory quality control samples typically run in a batch include samples with certified concentrations (laboratory control samples), matrix spikes, precision checks (duplicates or matrix spike duplicates), and method blanks. Since the laboratory exhibited no quality control failures for batches associated with the RDS, none of the laboratory operation related qualifiers were added for the 178 TP results of samples collected from projects/locations listed in **Table 1**.

METHOD DETECTION LIMIT AND PRACTICAL QUANTITATION LIMIT

The MDL is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined by the laboratory on an annual basis using the procedure described in the Code of Federal Regulations (CFR), 40 CFR 136, Appendix B. The practical quantitation limit (PQL) is the minimum concentration of an analyte that can be measured with a high degree of confidence that the analyte is present at or above that concentration. However, there is not any universally accepted (or required) method for determining the PQL. In the case of TP analyses, SFWMD's Analytical Services Chemistry Laboratory PQL (0.004 mg/L) is set to the concentration of the lowest standard used for calibration, which is a typical approach among analytical laboratories. Any TP results that are below the MDL (0.002 mg/L) are assigned a "U" qualifier indicating that there is high confidence that the analyte is not present. The reported TP values between the MDL (0.002 mg/L) and the PQL (0.004 mg/L) are assigned an "I" qualifier, indicating that the results are at concentrations that cannot be accurately quantified. Of the 178 TP results reported, no results were below

the MDL, and only four samples had a concentration between the MDL (0.002 mg/L) and the PQL (0.004 mg/L).

ESTIMATION OF ANALYTICAL MEASUREMENT UNCERTAINTY

All measurements are subject to uncertainty, and a measured value is only complete if a statement of the associated uncertainty accompanies it. The definition of uncertainty (of measurement) can be found in the *International Vocabulary of Basic and General Standard Terms in Metrology*: “A parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand” (JCGM 1993). The uncertainty has a probabilistic basis and reflects incomplete knowledge of the quantity. SFWMD’s Analytical Services Chemistry Laboratory provides uncertainty estimates using the nested hierarchical methodology by Ingersoll (2001) in combination with a mathematical model found in Eurachem/CITAC (2012). This quality control-based nested approach uses the statistical quality control data attributed to laboratory measurement activities and does not include uncertainty attributed to field sampling activities. The estimated uncertainty is calculated using the following equation:

$$U(x) = \sqrt{S_0^2 + (S_1^2 x^2)}$$

$U(x)$ is the combined standard uncertainty in the result x at the 95% confidence interval (CI).

S_0 is a constant contribution to the overall uncertainty derived from the procedure to determine the MDL.

S_1 is a proportionality constant derived from nested hierarchical methodology by Ingersoll (2001).

During this reporting period, the uncertainty constants are $S_0 = 0.002$ and $S_1 = 0.068$. Estimated uncertainties are calculated automatically by LIMS using the equation and constants shown above and are provided with all TP results. The percentage measurement uncertainty (95% CI) is 100% at MDL, nearly 30% at PQL, and remains relatively constant at higher concentrations.

PROFICIENCY TESTING AND PERFORMANCE EVALUATION

SFWMD’s Analytical Services Chemistry Laboratory participates in a variety of studies to evaluate the proficiency of the laboratory’s quality system. During the third quarter of 2025, the laboratory received TP results for the WEPAL-QUASIMEME AQ1 and AQ2 nutrients in seawater and nutrients in estuarian and low salinity open water performance evaluation study Round 2025.1. The reported results were evaluated as “acceptable” with calculated Z-scores of ≤ 0.7 .

LABORATORY AUDITS

During this reporting period no quality system laboratory audits were conducted.

PROCEDURE UPDATES

The TP sample preparation (Standard Method 4500-P B (5)-2011, Persulfate Digestion Method) and analytical procedure (Standard Method 4500-P H-2011, Automated Ascorbic Acid Reduction Method) (American Public Health Association 40 CFR Part 136) did not change during this reporting period.

REFERENCES

- American Public Health Association. Standard Methods for the Examination of Water and Wastewater, most recent version promulgated in 40 CFR Part 136.
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- SFWMD. *Field Sampling Manual*. SFWMD-FIELD-FSM-001, most current, effective version. South Florida Water Management District, West Palm Beach, FL.
- SFWMD. *Standard Operating Procedure for the Determination of Total and Dissolved Phosphorus*. SFWMD-LAB-SOP-3140, most current, effective version. South Florida Water Management District, West Palm Beach, FL.

GLOSSARY

Accuracy: The degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components that are due to sampling and analytical operations.

Confidence Interval (CI): A range of values so defined that there is a specified probability that the value of a parameter lies within it.

Equipment Blank (EB): Field quality control sample prepared using sampling equipment that has been brought to the site or processing area precleaned and is collected before the equipment has been used. The results of these blanks are used to monitor the on-site sampling environment, sampling equipment decontamination, sample container cleaning, suitability of sample preservatives and analyte-free water, sample transport and storage conditions, and laboratory process.

Field Blank (FB): FBs are collected by pouring analyte-free water directly into the sample container, preserved, and kept open for the same approximate time and interval as required for collection and/or processing of the routine sample. The results of this blank are used to monitor the on-site sampling environment, sample container cleaning, the suitability of sample preservatives and analyte-free water, sample transport and storage conditions, and laboratory process.

Field Cleaned Equipment Blank (FCEB): Field quality control sample prepared using sampling equipment that has been cleaned in the field or in the processing area. The results of this blank are used to monitor the on-site sampling environment, sampling equipment field decontamination, sample container cleaning, suitability of sample preservatives and analyte-free water, sample transport and storage conditions, and laboratory process.

Measurand: Particular quantity subject to measurement.

Method Detection Limit (MDL): The smallest concentration of an analyte of interest that can be measured and reported with 99% confidence that the concentration is greater than zero. The MDLs are determined from the analysis of a sample in a given matrix, using accepted sampling and analytical preparation procedures, containing the analyte at a specified level. The MDL is determined by the protocol defined in the Code of Federal Regulations (CFR) Section 40 CFR, Part 136, Appendix B, as established by the United States Environmental Protection Agency.

Practical Quantitation Limit (PQL): The smallest concentration of an analyte of interest that can be quantitatively reported with a specific degree of confidence. The PQL is verified for each matrix, technology, and analyte. The validity of the PQL is verified by analysis of a quality control sample containing the analyte of concern.

Precision: The agreement or closeness between two or more results is an indication that the measurement system is operating consistently and is a quantifiable indication of variations introduced by the analytical systems over a given time and field sampling period.

Replicate Sample (RS): An RS is collected by repeating (simultaneously or in rapid succession) the entire sample acquisition technique that was used to obtain the routine sample. A single RS set (e.g., one sample and two RSs) is collected per quarter, per project, at the same station, for the longest parameter list. RS data are compared to routine sample data to evaluate sampling precision.

Uncertainty: The range of values within which the true value is estimated to lie. It is a best estimate of possible inaccuracy due to both random and systematic error.

Z-Score: A measure of the deviation of the result (X_i) from the assigned value (X) for that determinant (calculated as $z = (X_i - X)/\sigma$, where σ is a standard deviation) (Eurachem/CITAC 2012).