# Quality System Report

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## Introduction

This Quality Systems Report (QSR) provides a summary of activities conducted by the Water Quality Treatment Technologies Section (WQTT) related to maintaining or improving the quality system for sample collection and data, specifically for Restoration Strategies Science Plan studies (RSSP).This report consist of all sampling activities conducted to support the RSSP studies from May 1, 2020 through April 30, 2021. This QSR contains information about sample collection and field measurement activities in accordance to their relevant Standard Operating Procedures (SOPs). WQTT is responsible for assuring that data collected for the RSSP are of acceptable quality and that the records for the entire process are traceable. This responsibility extends to collection of data for the RSSP from contractors, partners, other agencies, and institutions.

## Quality System Documents

WQTT's quality system is described in the Research Quality Assurance Plan (SFWMD, 2020) for Restoration Strategies Science Plan Implementation. There are currently 31 active SOPs describing the methods for data collection and measurement. These SOPs are updated annually or when findings from audits necessitate. These documents are available to anyone with an SFWMD email account on WQTT's SharePoint page. <https://sfwmdoffice.sharepoint.com/sites/collab/wqtt/Controlled%20Documents/Forms/AllItems.aspx> WQTT is one of four sections within the Applied Sciences Bureau (ASB). Data generated within ASB are reported annually in the Quality Systems Annual Report (QSAR). The QSAR is a high-level review of ASB data that resides within two predominant ASB databases, ERDP and MORPHO. Most but not all data generated by RSSP studies reside in ERDP or MORPHO and will be covered in the QSAR. Although RSSP data in ERDP and MORPHO will be included in both the ASB QSAR and the WQTT QSR, there is little redundancy between these reports. The QASR is an overview of ASB data and the QSR details quality system activities of RSSP studies at a more granular level. To date, the QSR includes only RSSP data that have been loaded into ERDP and DBHYDRO. Data not included in either database are not readily accessible for efficient systematic evaluation and therefore, are not included in the QSR.

## Quality System Audits

In WY21 the Faunal Abundance study was audited for 3 different sampling methods Table 1. All findings have been sufficiently addressed with the appropriate quality improvement / process improvement plans.

| Table 1: Studies and Methods Audited | | |
| --- | --- | --- |
| **Study** | **Method** | **Number of Findings** |
| Faunal Abundance | Electrofishing | 4 |
| Faunal Abundance | Excretion | 13 |
| Faunal Abundance | Throw Trapping | 5 |

## Data Quality Objectives

For the RSSP, 10 studies are complete, 9 studies are ongoing. Study status and location of data by method are found in Table 2. Each study may include multiple methods for collecting data, and differing levels of data quality may be required depending on the objectives of the study. One goal of this report is to quantify the quality of data collected under the RSSP by method and study. Towards this goal, this report will provide systematic data quality metrics which can be used to evaluate and improve the overall quality system and help study leads determine the usability of their data. To conduct this analysis, data quality objectives (DQOs) were developed for every method in active or recently completed studies. In this section studies are evaluated to see if they meet their method DQOs (Tables 3 and 4). This is an ongoing evaluation process, and only studies with water quality or soils data in ERDP or DBHYDRO have been evaluated to date. Additional studies and methods will be added to future quality system reports when their data have been evaluated. Adding data to databases improves traceability, organization, and fidelity of the data and should be a high priority in improving the overall quality system.

| Table 2: Study Metadata Overview | | | | |
| --- | --- | --- | --- | --- |
| **Title** | **Status** | **WQ Grab** | **WQ Auto** | **Soils** |
| Evaluation of Rooted Floating Aquatic Vegetation (rFAV) | Complete | Not in DB | Not in DB | Not in DB |
| Development of Operational Guidance for FEB and STA | Complete | NA | NA | NA |
| Influence of Canal Conveyance and Features on STA and FEB Inflow Outflow P | Complete | NA | NA | NA |
| Evaluation of Sampling Methods for TP (REST) | Complete | ERDP | ERDP | NA |
| Investigation of STA-3/4 Periphyton-based STA Technology (PSTA) | Complete | ERDP | NA | NA |
| Evaluation of P Sources, Forms, Flux, and Transformations in STAs (PFLUX) | Complete | ERDP | ERDP | ERDP |
| STA Water and P Budget Improvements | Complete | NA | NA | NA |
| Linking Sources of Particulate Organic Matter and P in STAs (PFLUX substudy) | Complete | NA | NA | NA |
| Preservation Time Study | Complete | ERDP | None | None |
| Evaluation of Inundation Depth and Duration Threshold for Cattail Sustainability (Cattail) | Complete | ERDP | NA | ERDP |
| Use of Soil Amendments and/or Management to Control P Flux | Active | ERDP | NA | ERDP |
| Evaluation of Factors Contributing to the Formation of Floating Tussocks in the STAs (Tussock) | Active | Not in DB | Not in DB | Not in DB |
| Improving Resilience of SAV in the STAs | Active | ERDP | NA | ERDP |
| Investigation of the Effects of Abundant Faunal Species on P Cycling in the STAs | Active | ERDP | NA | NA |
| Periphyton and Phytoplankton P Uptake and Release | Active | ERDP | NA | NA |
| L-8 FEB Operational Guidance (L8FEBOG) | Active | DBHYDRO | DBHYDRO | Not in DB |
| Phosphorus Removal Performance of Ecotopes in the STAs (ECOTOPE) | Active | ERDP | NA | Not in DB |
| Phosphorus dynamics of the STAS (PDYNAMICS) | Active | ERDP | NA | ERDP |
| Marl Study | Active | ERDP | NA | ERDP |

### Water Quality Grab Method DQOs

The DQOs for Water Quality Grab Sampling (SFWMD, 2019a) are completeness, precision, and accuracy. The completeness objective requires that at least 5% of samples collected are blanks which include three blank types, equipment blanks, field blanks, and field clean equipment blanks. The accuracy objective requires that concentrations in blank sample are lower than the method detection limit (MDL) or less than 10% sample concentrations from same trip. Samples with associated blanks that do not meet these criteria are considered to have "blank hits"" and are qualified in the database. These DQOs are reported as an average of all analytes measured by study in the body of the report. No replicate samples were collected in WY21 so the precision DQO could not be measured. A more detailed reporting of WQ DQOs by parameter and study is documented in Appendix A.

| Table 3: Study Data Quality Objectives- WQ Grab Completeness | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SUBSTUDY** | **Collection Agency** | **Samples** | **FCEB** | **FD** | **FB** | **RS** | **EB** | **Total Blanks** | **Blank %** |
| L8FEBOG | NA | 360 | 19 | 0 | 0 | 0 | 0 | 19 | 5% |
| STA CELL | NA | 1508 | 0 | 0 | 0 | 0 | 182 | 182 | 12% |
| Total Blanks = EB+FB+FCEB, |  |  |  |  |  |  |  |  |  |
| Blank % = Total Blanks/Samples |  |  |  |  |  |  |  |  |  |
| Equipment Blank (EB), Field Blank (FB), Field Clean Equipment Blank (FCEB), Field Duplicate (FD), Replicate Sample (RS) |  |  |  |  |  |  |  |  |  |

| Table 4: Study Data Quality Objectives- WQ Grab Accuracy | | | | |
| --- | --- | --- | --- | --- |
| **SUBSTUDY** | **Collection Agency** | **Total Samples** | **Total Blank Hits** | **Total Blank Hits (%)** |
| L8FEBOG | NA | 579 | 166 | 29% |
| STA CELL | NA | 1508 | 7 | 0% |

### Water Quality Autosampler Method DQOs

DQOs for Water Quality Grab Autosampler (SFWMD, 2019b) are completeness and accuracy. The completeness objective requires that at least 5% of samples collected are blanks which include three blank types, equipment blanks, field blanks, and field clean equipment blanks. The accuracy objective requires that concentrations in blank sample are lower than the method detection limit (MDL) or less than 10% sample concentrations from same trip. Samples with associated blanks that do not meet this criteria are considered to have "blank hits" and are qualified in the database. These DQOs are reported as an average of all analytes measured by project in the body of the report. A more detailed reporting of DQOs by analyte and study are documented in Appendix B.

## References

SFWMD 2019a, (South Florida Water Management District), Water Quality Treatment Technologies, Water Quality Grab Sampling, SFWMD-RSSP-FLD-SOP-0013-01

SFWMD 2019b, (South Florida Water Management District), Water Quality Treatment Technologies, Water Quality Autosampler, SFWMD-RSSP-FLD-SOP-0014-01

SFWMD 2019c, (South Florida Water Management District), Water Quality Treatment Technologies, Field Soil Sampling (push core),SFWMD RSSP-FLD-SOP-0005-01

SFWMD 2019d, (South Florida Water Management District), Water Quality Treatment Technologies, Field Measurements,SFWMD-RSSP-FLD-SOP-0008-01

SFWMD 2020, (South Florida Water Management District), Water Quality Treatment Technologies, Research Quality Assurance Plan for Restoration Strategies Science Plan Implementation, SFWMD-RSSP-QAP-001

### Appendix A: Water Quality Grab Sampling Expanded Data Quality Objective Table

| Study Data Quality Objectives: Completeness by Parameter | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SUBSTUDY** | **Collection Agency** | **PARAMETER** | **Samples** | **FCEB** | **FD** | **FB** | **RS** | **EB** | **Total Blanks** | **Blank %** |
| L8FEBOG | NA | CHLOROPHYLL A | 40 | 2 | 0 | 0 | 0 | 0 | 2 | 5% |
| L8FEBOG | NA | OPO4 | 40 | 2 | 0 | 0 | 0 | 0 | 2 | 5% |
| L8FEBOG | NA | PHEOPHYTIN A | 40 | 2 | 0 | 0 | 0 | 0 | 2 | 5% |
| L8FEBOG | NA | TDPO4 | 40 | 2 | 0 | 0 | 0 | 0 | 2 | 5% |
| L8FEBOG | NA | TPO4 | 40 | 3 | 0 | 0 | 0 | 0 | 3 | 8% |
| L8FEBOG | NA | TSS | 40 | 2 | 0 | 0 | 0 | 0 | 2 | 5% |
| L8FEBOG | NA | Turbidity | 40 | 2 | 0 | 0 | 0 | 0 | 2 | 5% |
| L8FEBOG | NA | VSS | 40 | 2 | 0 | 0 | 0 | 0 | 2 | 5% |
| L8FEBOG | NA | NA | 40 | 2 | 0 | 0 | 0 | 0 | 2 | 5% |
| STA CELL | NA | ALKA | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | APA | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | CA | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | CHLOROPHYLL A | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | CHLOROPHYLL B | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | CL | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | COLOR | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | DOC | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | HARDNESS | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | K | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | MG | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | NH4 | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | NOX | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | OPO4 | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | PHEOPHYTIN A | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | SO4 | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | TDPO4 | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | TDS | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | TDSAL | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | TDSFE | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | TN | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | TOC | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | TOT AL | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | TOTFE | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | TPO4 | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |
| STA CELL | NA | TSS | 58 | 0 | 0 | 0 | 0 | 7 | 7 | 12% |

| Study Data Quality Objectives: Accuracy by Parameter | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SUBSTUDY** | **Collection Agency** | **PARAMETER** | **Samples** | **Blanks** | **Blank > MDL** | **Value < Blank 10x** | **Blank Hits** | **% Blank Hits** |
| L8FEBOG | NA | CHLOROPHYLL A | 40 | 2 | 40 | 0 | 0 | 0% |
| L8FEBOG | NA | No Bottle | 2 | 0 | NA | 0 | 0 | 0% |
| L8FEBOG | NA | OPO4 | 40 | 2 | 32 | 16 | 8 | 20% |
| L8FEBOG | NA | PHEOPHYTIN A | 40 | 2 | 40 | 0 | 0 | 0% |
| L8FEBOG | NA | TDPO4 | 40 | 2 | 40 | 13 | 13 | 32% |
| L8FEBOG | NA | TPO4 | 257 | 7 | 257 | 108 | 108 | 42% |
| L8FEBOG | NA | TSS | 40 | 2 | 26 | 39 | 25 | 62% |
| L8FEBOG | NA | Turbidity | 40 | 2 | 40 | 0 | 0 | 0% |
| L8FEBOG | NA | VSS | 40 | 2 | 11 | 40 | 11 | 28% |
| L8FEBOG | NA | NA | 40 | 2 | 40 | 1 | 1 | 2% |
| STA CELL | NA | ALKA | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | APA | 58 | 7 | 0 | 50 | 0 | 0% |
| STA CELL | NA | CA | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | CHLOROPHYLL A | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | CHLOROPHYLL B | 58 | 7 | 0 | 9 | 0 | 0% |
| STA CELL | NA | CL | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | COLOR | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | DOC | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | HARDNESS | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | K | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | MG | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | NH4 | 58 | 7 | 0 | 49 | 0 | 0% |
| STA CELL | NA | NOX | 58 | 7 | 7 | 58 | 7 | 12% |
| STA CELL | NA | OPO4 | 58 | 7 | 0 | 50 | 0 | 0% |
| STA CELL | NA | PHEOPHYTIN A | 58 | 7 | 0 | 1 | 0 | 0% |
| STA CELL | NA | SO4 | 58 | 7 | 0 | 5 | 0 | 0% |
| STA CELL | NA | TDPO4 | 58 | 7 | 0 | 44 | 0 | 0% |
| STA CELL | NA | TDS | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | TDSAL | 58 | 7 | 0 | 58 | 0 | 0% |
| STA CELL | NA | TDSFE | 58 | 7 | 0 | 19 | 0 | 0% |
| STA CELL | NA | TN | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | TOC | 58 | 7 | 0 | 0 | 0 | 0% |
| STA CELL | NA | TOT AL | 58 | 7 | 0 | 54 | 0 | 0% |
| STA CELL | NA | TOTFE | 58 | 7 | 0 | 13 | 0 | 0% |
| STA CELL | NA | TPO4 | 58 | 7 | 0 | 16 | 0 | 0% |
| STA CELL | NA | TSS | 58 | 7 | 0 | 58 | 0 | 0% |

### Appendix B: Autosampler Sampling Expanded Data Quality Objective Tables

| Study Data Quality Objectives: Completeness by Parameter | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SUBSTUDY** | **Collection Agency** | **PARAMETER** | **Autosamples** | **FCEB** | **FD** | **FB** | **RS** | **EB** | **Total Blanks** | **Blank %** |
| L8FEBOG | WMD | No Bottle | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0% |
| L8FEBOG | WMD | TPO4 | 193 | 3 | 0 | 1 | 0 | 0 | 4 | 2% |

| Study Data Quality Objectives: Accuracy by Parameter | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SUBSTUDY** | **Collection Agency** | **PARAMETER** | **Samples** | **Blanks** | **Blank > MDL** | **Value < Blank 10x** | **Blank Hits** | **% Blank Hits** |
| L8FEBOG | WMD | PHOSPHATE, TOTAL AS P | 165 | 6 | 165 | 140 | 140 | 85% |