Central Florida Water Initiative

WATER FOR TOMORROW

DRAFT

SCOPE OF WORK

ENVIRONMENTAL MEASURES TEAM

January 11, 2019

INTRODUCTION/BACKGROUND

The Environmental Measures Team (EMT), a subteam of the Water Resources Assessment Team (WRAT), is a technical support group consisting of scientists from three water management districts – South Florida Water Management District (SFWMD), St. Johns River Water Management District (SJRWMD), and Southwest Florida Water Management District (SWFWMD) – and public supply utility representatives, which performs environmental assessments of wetlands and surface waters and other related work in support of determining sustainable groundwater withdrawals in the Central Florida Water Initiative (CFWI) planning area. The EMT currently consists of the following members:

- Kym Rouse Holzwart – EMT Chair and SWFWMD representative
- David MacIntyre – EMT Co-Chair and environmental consultant (AquaSciTech Consulting) representing St. Cloud, TOHO Water Authority, Orange County, Polk County, and Reedy Creek Improvement District (STOPR)
- Shirley Denton – Environmental consultant (Cardno) representing Orlando Utilities Commission (OUC)
- Kristian Holmberg – SJRMWD Representative
- Lisa Prather – SFWMD Representative
- Kevin Rodberg – SFWMD Representative

In preparation for the 2020 update to the CFWI Regional Water Supply Plan (RWSP), the WRAT requested that the EMT develop a Scope of Work (SOW) describing the tasks that will be implemented by the EMT to assess the impacts of future groundwater withdrawals in the CFWI planning area on wetlands and lakes; the majority of these lakes and wetlands do not have established minimum flows and levels (MFLs). This document describes tasks that have already been conducted in support of developing the methodology, as well as tasks that will be conducted in support of the 2020 update to the CFWI RWSP. In addition, once the 2020 RWSP update has been completed, the EMT will continue to meet to work together to develop a new methodology to improve the assessment of impacts of future groundwater withdrawals in the CFWI planning area on wetlands and lakes.

For the 2015 CFWI RWSP, the EMT's evaluation of wetlands and lakes within the CFWI planning area was an integral component. The EMT was tasked with determining the current status of isolated wetlands and lakes with respect to hydrologic stress and alteration and to develop tools to evaluate modeled future wetland conditions within the CFWI planning area. The method used to evaluate wetlands under future modeled water level conditions was based on evaluations of primarily isolated lake and wetland systems, which are generally considered to be inherently more vulnerable to impacts from lowered groundwater levels. The recent stress condition of a select group of assessed wetlands was examined. The methodology was based on a statistical assessment of the probability of future environmental stress in each wetland within and near the CFWI planning area based upon the relationship between observed ecologic and hydrologic conditions of 44 Class 1 wetlands (wetlands were studied in detail, had known hydrologic conditions, and

had been assessed to determine whether they were currently stressed or not stressed). The water level data from the Class 1 wetlands were used to compute a statistical relationship between observed stress and observed water level variations. The statistical relationship was used to estimate the probability (or risk) of future changes in wetland stress occurring, based on modeled water level changes between the reference condition and a future groundwater withdrawal scenario. This risk assessment was applied separately to primarily isolated wetlands in plains and ridges physiographic settings because wetland hydrologic conditions and responses in these wetland types are, in general, substantially different. Statistical analyses were performed, which indicated that the characteristics of the Class 1 wetlands were adequately representative of all isolated wetlands in the CFWI region and that the data used were appropriate for their application. This set of tools was used by the Groundwater Availability Team (GAT) to predict likely effects of future groundwater withdrawals, as predicted by modeled water levels, on wetland resources.

Once the 2015 CFWI RWSP was completed, the EMT became inactive. However, it was reactivated in late 2016 to provide support for the 2020 update to the 2015 CFWI RWSP as it relates to non-MFL isolated wetlands and lakes. Described below are the tasks that have already been conducted in support of developing the methodology, as well as the tasks that will be conducted in support of the 2020 update to the CFWI RWSP.

TASK 1: CLASS 2 WETLANDS STATISTICAL ANALYSIS – COMPLETED

As a first step, the EMT was asked by the WRAT to develop a scope of work to re-evaluate a statistically valid subset of the approximately 200 Class 2 wetlands to determine if their environmental conditions had changed since the original evaluation. The EMT received approval in early 2017 to conduct the first phase of the work, which was to perform a statistical power analysis to determine the number of wetlands that would need to be re-evaluated to obtain a statistically significant determination of any change in the number of stressed wetlands within the CFWI planning area. Based on the recent experience of examining wetlands in the CFWI planning area, EMT wetland scientists estimated that there might be a shift towards a smaller percentage of wetlands being stressed, but that the change in percentage of stressed wetlands over the last five years was not large (probably measured in single digit percentages). The results of the statistical power analysis, which were presented to the WRAT in May 2017, indicated that a population greater than the original sample pool of Class 2 wetlands would need to be evaluated to provide a statistically significant conclusion at a 90% or 95% confidence level on whether a change on the order of 10% of wetlands had changed stress status since the last survey of Class 2 wetlands.

TASK 2: METHODOLOGY OPTIONS FOR WETLANDS AND LAKES ANALYSIS IN SUPPORT OF THE 2020 RWSP – COMPLETED

When the results of Task 1 were presented in May 2017, the WRAT requested that the EMT develop options for determining the current status of isolated wetlands and lakes with respect to hydrological stress and to evaluate modeled future wetlands conditions in

support of the 2020 CFWI RWSP. The EMT presented various options to the WRAT in late 2017 and in January 2018. The options approved by the WRAT and Management Oversight Committee (MOC) and presented to the Steering Committee included:

- Field visits to assess the current stress status of the original 44 Class 1 wetlands using primarily the same methodology that was used for the 2015 CFWI RWSP.
- Addition of new wetlands to the Class 1 wetland dataset. Eleven new Class 1 wetlands had been identified when the various options were presented to the WRAT. After field work was conducted to evaluate the stress status of the 11 new wetlands, five additional wetlands were identified. Additional field work was conducted to evaluate the stress status of the five new wetlands.
- Use the same methodology to conduct the wetlands analysis that was used for the 2015 CFWI RWSP with the expanded Class 1 wetlands dataset and updated ECFTX model.

TASK 3: 2018 ASSESSMENT OF CLASS 1 WETLANDS – COMPLETED

Field work assessing 55 new and original Class 1 wetlands was completed on June 4, 2018. The EMT District wetland scientists met on June 12, 2018 to finalize the results of the stress status assessments by reviewing the field forms, photographs, water level data, a time series of aerial photographs, and previous assessment results. Discussion during the June 12th meeting focused on sites for which the stress status changed since the original assessment; however, sites that remain unchanged were also discussed for consensus. Stress status assessments were conducted at five additional new Class 1 wetlands in August and September 2018, and data for these sites were also reviewed. The expanded Class 1 wetland dataset includes 41 of the original 44 sites and 15 new sites. A report summarizing the results of the 2018 stress status assessments of the Class 1 wetlands is currently under development.

TASK 4: DETERMINATION OF CLASS 1 WETLANDS WATER LEVEL DATA PERIOD OF RECORD FOR WETLANDS ANALYSIS – COMPLETED

The previous analysis of Class 1 wetlands used water level data with a period of record of six years (2006-2011), and the EMT wanted to expand the period of record for the analysis that will be conducted in support of the 2020 update to the CFWI RWSP. To determine the period of record without causing the data set to become non-representative, some calculations were required. Listed below are the steps required to complete this task.

- Obtain and organize the water level data from 2006 through 2011 for each Class 1 wetland in a spreadsheet. Review the data and remove any obviously incorrect observations. If a wetland has more than one measuring device (e.g., multiple wells and staff gages), review the available records and select or combine data as necessary to create the most representative long-term record that can be achieved with the available data.

- For each Class 1 wetland, add new years of data (2012, 2013, 2014, 2015, 2016, and 2017) to the spreadsheet. After each year of data is added, calculate the P50 and P80 to determine how much change has occurred as a result of adding in the additional year.
- Summarize the results and present to the EMT.

The EMT reviewed the results and selected a period of record from 2009 through 2017 for the wetlands analysis in support of the 2020 RSWP.

TASK 5: GIS TASKS IN SUPPORT OF WETLANDS ANALYSIS – COMPLETED

In order to complete Task 6 described below, GIS support was necessary to be able to calculate the probable stressed and unstressed acreage of Class 1, Class 2, and Class 3 wetlands for each ECFTX model cell for each scenario. Specifically:

- For Class 1 wetlands: GIS processing was conducted to create a single polygon of each site by merging the polygons of different wetland types.
- Since Class 2 wetlands were not re-evaluated and no new Class 2 wetlands were added to the dataset, the GIS layer used for the analysis in support of the 2015 CFWI RWSP could be used for the current analysis.
- For Class 3 wetlands: GIS processing was conducted to calculate the acreage of Class 3 wetlands in the western portion of the CFWI planning area not included in the previous modeling effort.
- The acreages of Class 1, Class 2, and Class 3 stressed and unstressed plain and ridge wetlands in each ECFTX model cell was calculated.

TASK 6: WETLANDS ANALYSIS

For the 2015 CFWI RWSP, the EMT's analysis of the potential impacts of future groundwater withdrawals on wetlands included two steps based on the dataset from the Class 1 wetlands:

1. An analysis of water level data from the Class 1 wetlands to compute a statistical relationship between observed stress and observed P80 water level variations was conducted. The statistical relationship was used to estimate the probability (or risk) of future changes in wetland stress occurring, based on modeled water level changes between the reference condition and a future groundwater withdrawal scenario. This risk assessment was applied separately to primarily isolated wetlands in plains and ridges physiographic settings because wetland hydrologic conditions in these wetlands, in general, are substantially different. Statistical analyses were performed, which indicated that the characteristics of the Class 1 wetlands were representative of all isolated wetlands in the CFWI planning area and that the data used were appropriate for their application.
2. An assessment of modeled future water level changes at all known wetland sites in the CFWI planning area was performed, and the risk for wetland stress occurrence at each location was calculated. The probability of change in wetland

stress status (from unstressed to stressed, or the reverse) was calculated for each wetland location, based on the risk function calculated in Step 1. The expected total area of stressed wetlands was calculated for the whole CFWI planning area by summing the effects of water level changes and recorded wetland areas throughout the CFWI planning area. This set of tools was used by the GAT to predict likely effects of groundwater withdrawals, as predicted by modeled water levels, on wetland resources.

As was approved in Task 2, the methodology described above will also be used to assess the potential impacts of future groundwater withdrawals on isolated wetlands and lakes for the 2020 update to the CFWI RWSP. The processes required to perform the analysis are described below.

- Calculate a P80 water level (for the selected period of record, 2009 through 2017) for each of the Class 1 wetlands.
- Update the Class 1 wetland statistics (mean, standard deviation of P80 water levels) for each wetland group (stressed and unstressed) and each physiographic province (Plain and Ridge).
- Determine if the data are normally distributed.
- Revise risk analysis equations for Plain and Ridge wetland systems in order to conduct the wetland stress analysis.
- Modify the stress risk algorithm that was developed for post-processing of the ECFT model results to incorporate the updated statistical risk equations and for compatibility with the ECFTX model output files.
- Post-process the ECFTX model runs:
    - Calculate the probable stressed and unstressed wetland acreage for each ECFTX model cell in the reference condition (2014) and calculate the probable change in stressed and unstressed wetland acreage for each ECFTX model cell under the simulated future conditions (2030 and 2040 conditions).
    - Calculate the probable change in total stressed wetland acreage for each model scenario, and prepare tables and maps showing the geographic distribution of projected stressed wetland acreage.
    - Provide tables and maps of results for each model scenario to the GAT.

TASK 7: REPORT AND CHAPTER PREPARATION

The EMT will develop a report that includes the methodology and results of Tasks 1 through 6. This report will be a supporting document for the 2020 RWSP (e.g., will be an appendix). In addition, the EMT anticipates that, along with portions of this report, summaries of the EMT results and findings will be drafted by the EMT and will be included in the planning document.

Task 8: Evaluation of Methodology to Improve Assessment of Impacts of Future Groundwater Withdrawals on Wetlands and Surface Waters in the CFWI Planning Area

Once the 2020 RWSP update has been completed, the EMT will continue to meet to work together to evaluate the methodology to improve the assessment of impacts of future groundwater withdrawals on wetlands and surface waters in the CFWI planning area. Improvements will include using data resulting from the long-term wetland monitoring program being established by the Data, Monitoring and Investigations Team (DMIT) and will be used for analyses performed in support of the 2025 update to the RSWP. Development of the methodology will be completed before work begins in support of the 2025 RSWP, and the methodology will be revised as necessary for future RSWPs.

Task 9: Future of the EMT

The EMT will continue to be an active subteam of the WRAT once the 2020 CFWI RWSP is completed. In addition to completing Task 8, the EMT will continue to meet on a regular basis into the future so that it is in position to complete analyses for future five-year updates of the RWSP and to evaluate and provide recommendations on any needed enhancements related to wetland data collection or assessment methodology. In addition, the EMT will be available for future environmental assessments of wetlands and surface waters and other related work assignments in support of determining sustainable groundwater withdrawals in the CFWI planning area. Its work will be documented so that knowledge is maintained by the EMT through time. The individuals on the EMT will change over time but will consist of the following representation, as appropriate:

- One SWFWMD wetland scientist representative
- One SJRWMD wetland scientist representative
- One SFWMD wetland scientist representative
- Other water management district representatives with statistical, geospatial, hydrological, and geological expertise
- Representatives of major public supply utilities within the CFWI planning area
- Representatives from other agencies, including counties within the CFWI planning area (e.g., Lake, Orange, Osceola, Seminole, and Polk), cities, the Florida Department of Environmental Protection, and the Florida Department of Agriculture and Consumer Services

Schedule

Task	Start Date	Stop Date
1. Class 2 Wetlands Statistical Analysis	1/1/17	5/31/17
2. Methodology Options for Wetlands and Lakes Analysis in Support of the 2020 RWSP	6/1/17	1/31/18
3. 2018 Assessment of Class 1 Wetlands	2/1/18	12/31/18

4. Determination of Class 1 Wetlands Water Level Data Period of Record for Wetland Analysis	2/1/18	10/1/18
5. GIS Tasks in Support of Wetlands Analysis	10/1/18	12/21/18
6. Wetlands Analysis	2/1/18	4/30/19
7. Report and Chapter Preparation	2/1/18	4/30/19
8. Evaluation of Methodology to Improve Assessment of Impacts of Future Groundwater Withdrawals on Wetlands and Surface Waters in the CFWI Planning Area	4/30/19	12/31/20
9. Future of the EMT	4/30/19	Ongoing