Central Florida Water Initiative

WATER FOR TOMORROW

DRAFT

SCOPE OF WORK (SOW)

ENVIRONMENTAL MEASURES TEAM

Revision 0.5

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Purpose

The Water Resources Assessment Team (WRAT) has requested that the Environmental Measures Team (EMT) conduct a comparative evaluation of current wetland stress for the population of Class II isolated wetlands utilized by the EMT for the development of the CFWI 2015 Regional Water Supply Plan (RWSP). Using a CFCA study of approximately 357 wetlands initiated around 2008, the EMT identified 192 isolated wetlands that were "non-confounded" and were suitable for inclusion in the EMT analysis (44 Class 1 Wetlands and 148 Class 2 Wetlands). For many of the Class 2 wetlands within the EMT data set, significant time has elapsed since data collection and the evaluation of stressed or non-stressed occurred. It is possible that conditions may have changed within these original wetlands which could result in a determination of stress other than that originally noted. In preparation for the 2020 update of the RWSP, the CFWI working groups are expanding the East-Central Florida Transient Groundwater Model and anticipate utilization of the tools and data set developed by the EMT. Therefore, it is necessary to determine the validity of the current data set to ascertain whether previous findings of wetland stress have remained constant or have changed.

Revision History

Revision Date	Version	Changes
10-20-16	0.1	First draft provided for consideration and change
10-27-16	0.2	First revisions made
11-1-16	0.3	Second revisions made
1-11-17	0.3a	WRAT discussion and revisions
1-18-17	0.4	EMT follow up revisions
2-8-17	0.5	Final draft

Introduction/Background

For development of the 2015 Regional Water Supply Plan, the CFWI Steering Committee tasked the EMT with using the available wetland information to develop a risk-based predictive tool to estimate future occurrence of wetland stress in response to predictions of ground water level alterations from the ECFT model. Given that the groundwater model is best able to predict changes in hydrology in isolated wetlands, the EMT focused on assessing the relationship between changing water levels and the occurrence of stress in isolated wetlands.

Wetlands were identified as being stressed if they were observed to have any one of the following characteristics:

- A multi-decadal trend of decreasing water levels seen on historic aerial photography. Trends were: a downslope migration of upland vegetation, a decrease in the aerial extent of the wetland, a shift from emergent vegetation (obligate wetland species) to long-lived woody vegetation (facultative species), diffusion of the transitional zone between upland

and wetland plant communities, and the establishment of upland trees in historic wetland area.
- Absence of hydrologic indicators observed during field assessments in wetlands where hydrologic indicators should be present (e.g., lichen lines that extend to the soil surface).
- Evidence of permanently reduced wetland water levels or invasion/establishment of species from drier communities.
- Soil oxidation or loss (due to reduced water levels) observed during the field assessment in wetlands that had organic soils. In forested systems, this was typically linked with an excessive number of leaning or falling trees.

The term "stress" as defined by the EMT should not be confused with ecological "stressors". For example, periodic extreme hydrologic conditions driven by climate (drought and flooding events) are stressors that act to shape the ecological characteristics of wetlands. Transient stress resulting from extreme or prolonged drought can lead to the invasion of upland vegetation into wetlands (particularly herbaceous species such as dog fennel) and the establishment of a new age class of tree seedlings and saplings. Extreme drought also limits the upslope extent of hydric organic soils by oxidation and compaction processes. Nevertheless, these changes are largely reversible over several years and are considered as a natural aspect of wetland ecology. In fact, periodic extreme droughts are necessary for many important wetland trees and shrubs, allowing periodic recruitment of seedlings into the population. In addition, periodic extreme flooding events, such as those associated with tropical cyclone events, tends to eliminate transient upland vegetation from the wetland footprint. All wetlands undergo these subtle shifts in vegetation with climatic variability.

Roughly 357 wetlands were considered by the EMT. Two general wetland classifications were made at that time. The wetlands were 1) Stressed; or 2) Non-stressed. Confounded wetlands and contiguous wetlands were excluded from further consideration. Following the initial data collection, the EMT produced a Final Report (Development of Environmental Measures for Assessing Effects of Water Level Changes on Lakes and Wetlands in the Central Florida Water Initiative Area, November 2013) summarizing the results of the data and predictive extrapolations of potential wetland stress as a result of hypothetical groundwater level changes.

The EMT sorted wetland sites into three broad classes, based on the types of information available at each site, as shown in the below table.

- Class 1 includes 44 wetlands that were studied in detail, have known hydrologic conditions (water level variability and wetland edge elevation), and have been assessed to determine whether they are currently stressed or non-stressed.
- Class 2 consists of 313 sites where the environmental condition of the wetland is known, but there is insufficient water level data to classify their hydrologic conditions.
- For most of the remaining thousands of isolated and hydrologically unaltered wetlands in the region (Class 3), neither the water levels nor the stress conditions were known.

Wetland Data Class	Data Class Characteristics		
	Wetland Type	**Current Stress Condition**	**Water Level Hydrograph**
Class 1	Known	Known	Known
Class 2	Known	Known	Unknown
Class 3	Known	Unknown	Unknown

Using the Class 1 data set of 44 wetlands, statistical analyses were performed to develop a relationship for the likelihood of stress as a function of water levels. The ECFT groundwater model was used to assess the likely amount of future change in groundwater levels under various model scenarios. The statistical relationship for risk of wetland stress as a function of water levels was then used to estimate the probability that any given wetland would change stress status as a result of future projected changes in groundwater levels.

For the Class 1 wetlands, it was possible to estimate a site-specific probability that a wetland would change stress status based on its own site-specific history of water levels and projected future changes in those levels. For Class 2 wetlands, the historical range of water levels at each wetland was unknown, but the current stress status was known. It was thus possible to calculate a population-weighted average risk of stress status change by assuming that the statistical distribution of historical water levels can be estimated from those observed in Class 1 wetlands.

SCOPE OF WORK/SCOPE STATEMENT

The EMT will compare the original determination of wetland stress within Class 2 Wetlands, which was defined approximately 5 to 10 years ago, to current findings of wetland stress to ascertain if there has been change. A statistical power analysis will be developed and utilized to determine a valid sample pool consisting of Stressed and Non-stressed wetlands from the population of Class 2 wetlands utilized in the original EMT study. Given the differences in the plains and ridge wetlands, sample size will be considered for each. All wetlands involved in the stress analysis are part of the CFCA dataset and no new wetlands will be added to the study.

It should be noted that not all of the originally identified wetlands may be available for inclusion into this study. Instances of precluded access or development pressures may prohibit current or future access and may therefore necessitate flexibility in wetland selection. A GIS screening-level analysis will be used to determine if the selected wetlands are available for additional consideration.

Specific measures were developed for classifying wetlands and it is the intent to employ the same measures to evaluate current wetland stress including review of available aerial photos. EMT members will visit selected wetlands and the criteria previously used to ascertain wetland stress applied. Data collection forms will be used by team members to record observations for each wetland visited. Through the application of the original wetland stress criteria, a determination will be made as to the current wetland stress, which will result in a finding of Stressed or Non-stressed.

Coordination meetings involving EMT personnel and other interested parties will be scheduled prior to field work and as the project progresses for information dissemination. Information gathered for the project will be summarized and reports generated to document findings.

It is possible there may be changes from the original field observation findings of Stressed or Non-stressed. In addition to a determination of appropriate sample size, the statistical power analysis will provide criteria which will assist in the evaluation of whether there is substantive (either as a percent of total population or concentrated groupings) change in wetland stress in the population of Class 2 Wetlands. Based on the results of this evaluation, the EMT and WRAT can convene to make a determination as to the current validity of the EMT data set.

KEY PROJECT ACTIVITIES

Project Initiation/Planning:

- Ascertain technical support requests poised by other CFWI teams.
- Develop SOW relative to support needs

Design Phase:

- Determine a statistically valid sample pool for each of the ridge and plains settings for both stressed and non-stressed classifications of wetlands
- Coordinate with WRAT/MOC for verification/approval of proposed sample size
- Conduct GIS screening-level analysis for availability/suitability of Class II wetlands

Implementation Phase:

- Schedule joint meetings of EMT members and participants
- Schedule joint field work by District EMT members
- Determine if statistically significant change has occurred between previously established wetland stress and current determination
- Develop preliminary reports documenting findings

Transition and Close:

- Consolidate data findings and develop report for consideration

SCHEDULE/MILESTONES

Milestones	End Date
SOW Release	February 8 2017
Power Analysis*	March 15 2017
GIS Analysis/Sample Selection	April 15 2017
Field Data Collection	June 15 2017
Preliminary Report	July 1 2017
Data Summarization, Report Generation	August 15 2017
Project Closure	September 1 2017

*** the remaining schedule is predicated on the completion of the Power Analysis and allocation of resources based on resulting sample size.**