

# Predicting the Impact of CERP on Wet Prairie Vegetation Communities located on Marl Soils

Quan Dong1, Jed Redwine2, Mike Ross3, and Jay Sah3, and, Andrew Gottlieb4 Doug Donalson5  
 1 Center for Quantitative Ecology, Miami, Florida, USA  
 2 Everglades Project Joint Venture, Jacksonville, Florida, USA  
 3 Florida International University, Miami, Florida, USA  
 4 South Florida Water Management District, West Palm Beach, Florida, USA  
 5 Everglades National Park, Miami, Florida, USA



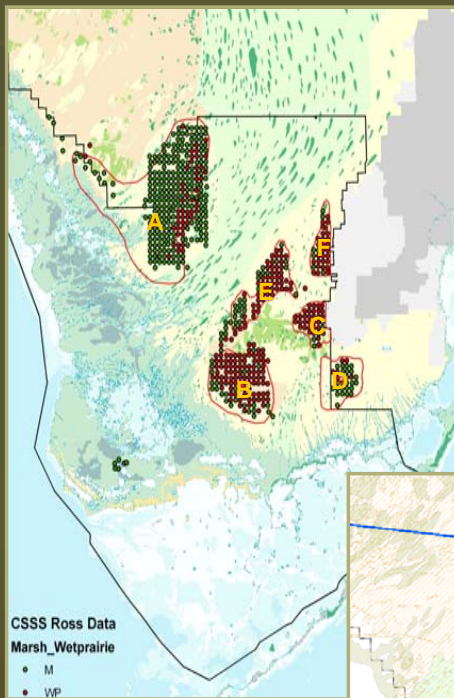
## Introduction

The key contributions of this evaluation tool for Everglades restoration include:

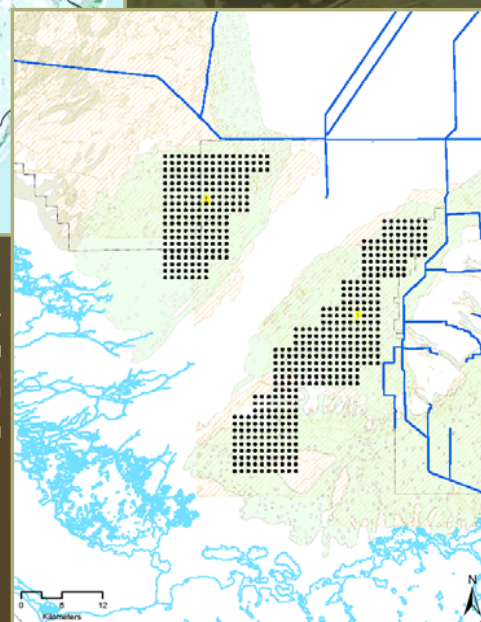
- Wet Prairie are ecotonal plant communities between sloughs and upland pine forests throughout Everglades National Park
- The most diverse wetland plant community in the region, whose species composition shifts rapidly based on inter-annual water levels
- The first Greater Everglades ecological Performance Measure derived from an empirical target with predictive capabilities for CERP
- Target conditions are based on spatially explicit monitoring data; a corresponding MAP monitoring component supports field assessment of the Wet Prairie Vegetation PM
- Spatially explicit summary graphics that are intuitive and communicate effects of projects to both scientists and non-scientists

## Methods

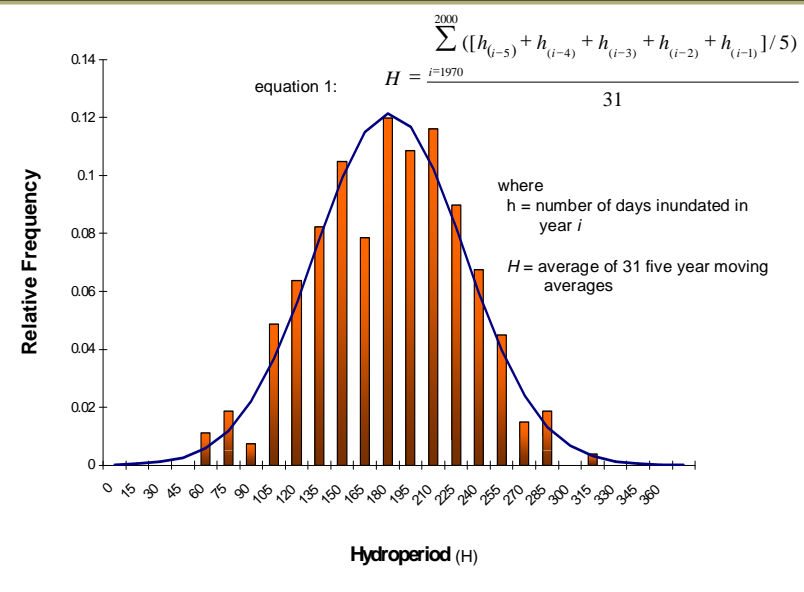
The Wet Prairie Performance Measure functions by extracting the daily\_stage\_minus\_1sl bin file from the South Florida Water Management Model output. These daily estimates of water depth across the domain of the SFWMM are used to develop a finer scale (500m x 500m) of resolution estimate of water depth for each of the 13,148 days of the SFWMM period of record. Thirty six annual hydroperiod estimates (h) are calculated for each unique 500 x 500 m cell (Figure 2) and these estimates are then used to develop the cumulative hydroperiod (H) (equation 1, Figure 3) for each cell in the Wet Prairie PM domain. The frequency distribution of H across potential Wet Prairie communities is compared to the Ross-Sah target distribution (Figure 2) and the alternative that most closely resembles the target distribution as determined by the SSD index (equation 2) is identified as the preferred alternative.



**Figure 1**  
The distribution of two different vegetation types is based on a quantitative field survey. The red dots are indicator sites of wet prairies, while green dots indicate marsh habitat.



**Figure 2**  
Stratified lattice of points where Wet Prairie vegetation is potentially found and where the South Florida Water Management Model (SFWMM) provides high quality information. Marl soils are shaded in green.



**Figure 3**  
The Ross-Sah frequency distribution of hydroperiod in wet prairies. This frequency distribution was obtained from the field data sites colored red in Figure 1. The blue line indicates the normalized frequency distribution.

An index score for each alternative model run is calculated as:

$$SSD = \sum (fs_i - fd_i)^2 \quad \text{Equation 2}$$

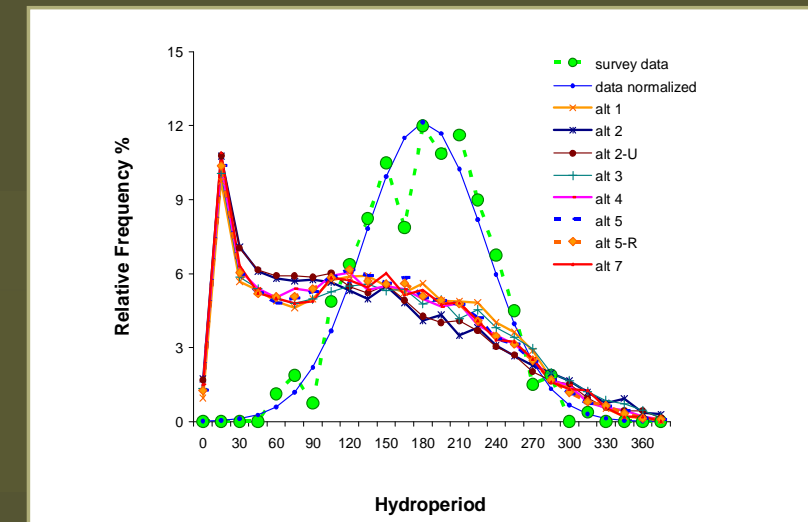
where SSD is the sum of the squared differences in relative frequency of each 15 day hydroperiod bin.

For more information, contact:

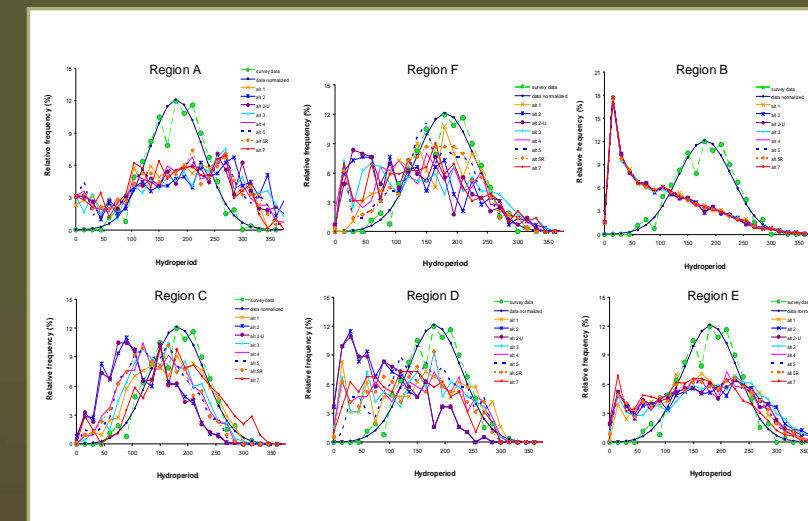
Jed Redwine, PBS&J/EP JV  
 701 San Marco Boulevard, Suite 1201, Jacksonville, Florida 32207  
 Office: 904.232.1181 Cell: 904.253.0213 Fax: 904.232.1056  
 E-Mail: jed.redwine@usace.army.mil

## Results

Preliminary applications of the Performance Measure demonstrate an ability of the metric to differentiate among alternatives for CSOP (Figure 4), where alternative 1 provided the most similar hydrologic conditions in support of a spatially expansive Wet Prairie plant community (as indicated in Figure 1). Since the Wet Prairie Performance Measure is based on a target derived from field observations occurs over such a large area of the landscape the target can be applied to sub-regions to orient evaluators as to the general condition of the region (figure 5) or can be adapted to hydrologic models that emulate the hydrologic conditions at a more local scale (such as MODBRANCH or other models).



**Figure 4**  
Sample results of Wet Prairie Performance Measure. From this set of alternatives, alternative one (alt 1) scored best for Wet Prairies.



**Figure 5**  
Results of Wet Prairie Performance Measure applied at a sub-regional scale (defined in Figure 1). From this set of alternatives, alternative one (alt 1) scored best for Wet Prairies.

## Conclusions

- Performance measure effectively differentiates between alternatives
- Final scale regional analysis provides the opportunity to differentiate global and local effects
- This level of informational content can be used to discuss tradeoffs for the system and to contextualize the restoration program
- Empirical target basis allows for flexible application of the Performance Measure to regional or highly localized scales of resolution