

Session: 6G Geospatial Workflow, Discovery, Modeling, and Data Fusion

Talk: 6G[3]

Abstract Title: Geospatial Time Series Model for Wetland Hydroperiod Analysis: Evaluation of Environmental Hydrologic Criteria in Response to Changing Conditions

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ABSTRACT: We developed a geospatial time series model to help evaluate environmental hydrologic goals for a wetland conservation area and to evaluate strategies to increase hydroperiods. Modeling wetland inundation was accomplished for a 3,000 hectare portion of the St Johns Marsh Conservation Area (SJMCA) in Central Florida for a period of five years (daily time step) using a custom extension to ArcMap dubbed the “Hydroperiod Tool” (HT) which was designed to assess wetland hydroperiod using ArcGIS, Spatial Analyst, Tracking Analyst and Model Builder. An updated version of the tool programmed in VB.net was used for this study.

The HT creates an interpolated water surface raster from daily stage data and subtracts terrain elevation (DEM), producing a series of rasters of ponded water depth. Automation of these functions provides the opportunity to assess temporal patterns, and produce annual and seasonal statistics for wetland ponded depth and duration. Modifications to the stage data simulates alternative management scenarios. Modifications to the DEM (in separate runs) represents the response of the wetland to insufficient inundation (oxidation of organic soils) resulting in loss of elevation. Field and remotely sensed data were used to validate the HT for wetland inundation status.

Environmental hydrologic goals designed to protect wetland habitats within the SJMCA are currently under development. An example of useful criterion for this purpose is to determine on an annual basis the areal extent of wetlands within the SJMCA that were inundated for at least 60% of the year.

During the study period, the SJMCA was subjected to both extreme flood and drought. Using the HT the area meeting this 60% annual inundation target ranged from 600 hectares in 2007 to 2970 hectares in 2005 (mean = 1380 hectares). Various management alternatives designed to increase the area of wetlands inundated for at least 60% of the year were evaluated.