Consequences and Correlates of Fire in Wetlands. 01-1-3-09. David Brownlie, Gordon A. Fox and Louis Provencher.

Problem: Wetlands accumulate organic soils which can sustain ecological effects when fire results in extensive smoldering burns. Prolonged drought and historic ditching in the SE USA have resulted in unusually dry conditions in wetlands. There was a need to describe the conditions that affect the loss of organic soils and changes in ecological communities in such areas to help guide decisions on fire prevention and suppression.

Approach: This project investigated the effects resulting from a series of fires that burned across one half of a previously installed network of wetland monitoring transects, water sensors (448 depth-to-water-table piezometers and 44 continuous water level recorders) and organic soil depth sample sites. Pre-fire data was already in place within the established sampling sites. Some additional transects were installed and some existing transects were extended. Data were collected on 104 transects positioned along a topographic gradient within 24 wetland complexes (hydrologic units). Organic soil depth was measured using probes and extension rods every 10 m along each of the 104 transects (2800 sites measured 1996 and 2000). After the fires, data were collected in both burned and unburned areas (2002). Major plant community was recorded for each site. Changes in depth of organic soil were measured in six wetland and four upland community types. Weather data were recorded at 5 weather stations, and TNC's database on fires and their GIS fire layer were used to describe fire history along each transect. The Keech-Byram Drought Index (KBDI) was used at several spatial scales to examine the relationship between recent weather and soil loss to fire and the utility of recent weather to predict soil loss.

Project Findings: The study did not identify a significant difference between wetlands and uplands in the change in organic soil depth. The study also found that most fires in this area burn in both wetlands and uplands, so it is difficult to attribute the output of large quantities of smoke to wetlands only. During severe drought conditions (1998-2001), most sites, including unburned sites, lost soil as a result of oxidation and low rates of accretion or organic matter. Consequently, the presence or absence of fire itself was not a good predictor of soil loss. Using a drought index such as KBDI predicts soil effects well when measured on a scale of a few km, and is not useful for prediction at larger scales. Plant community type significantly affected the amount of soil loss. Hardwood forests, bay heads, flatwoods, slash pine and wet prairies showed the strongest effects of burning. Soil losses were less on scrubby and shrub communities. Cypress domes, marshes and pastures gained soil during the study. Measurements of depth to water table did not prove to be a good predictor of soil effects in this study because soil moisture content varies considerably over a relatively small scale (due to typically small size of thunderstorms and scale of soil variability) and temporally (due to brief, intense thunderstorm activity and rapid rate of evapotranspiration) in the project area. The study found that there is a significant interaction effect between species richness and the number of years since fire and the season of the burn. Fires during severe drought had significantly different effects on species richness of the vegetative layer than fires at other times.

Deliverables and Technology Transfer: A web site has been developed and is available at http://web1.cas.usf.edu/bio/firestudy. The final report has been posted on the site, but does not appear to be posted to the JFSP web site. Manuscripts are currently in review or about to be submitted.

Project & Technology Transfer Implementation: Data, results and conclusion of this work are to be communicated through a web site hosted by University of South Florida. The final report and PowerPoint files of presentations on the study are located on the website. The study results can not be posted prior to the journal publication. The final report indicates that this research has been presented at the JFSP PI's workshop (2003 and 2004) and at the 2nd International Wildland Fire Ecology and Fire Management Congress (FL, 2003), and that journal articles will be posted to the web site listed above, pending publisher approval. The study shows that using local (small scale) information on wetland soil hydration, weather and plant community type can aid fire managers in determining when it may be appropriate to let fire burn within wetland complexes.