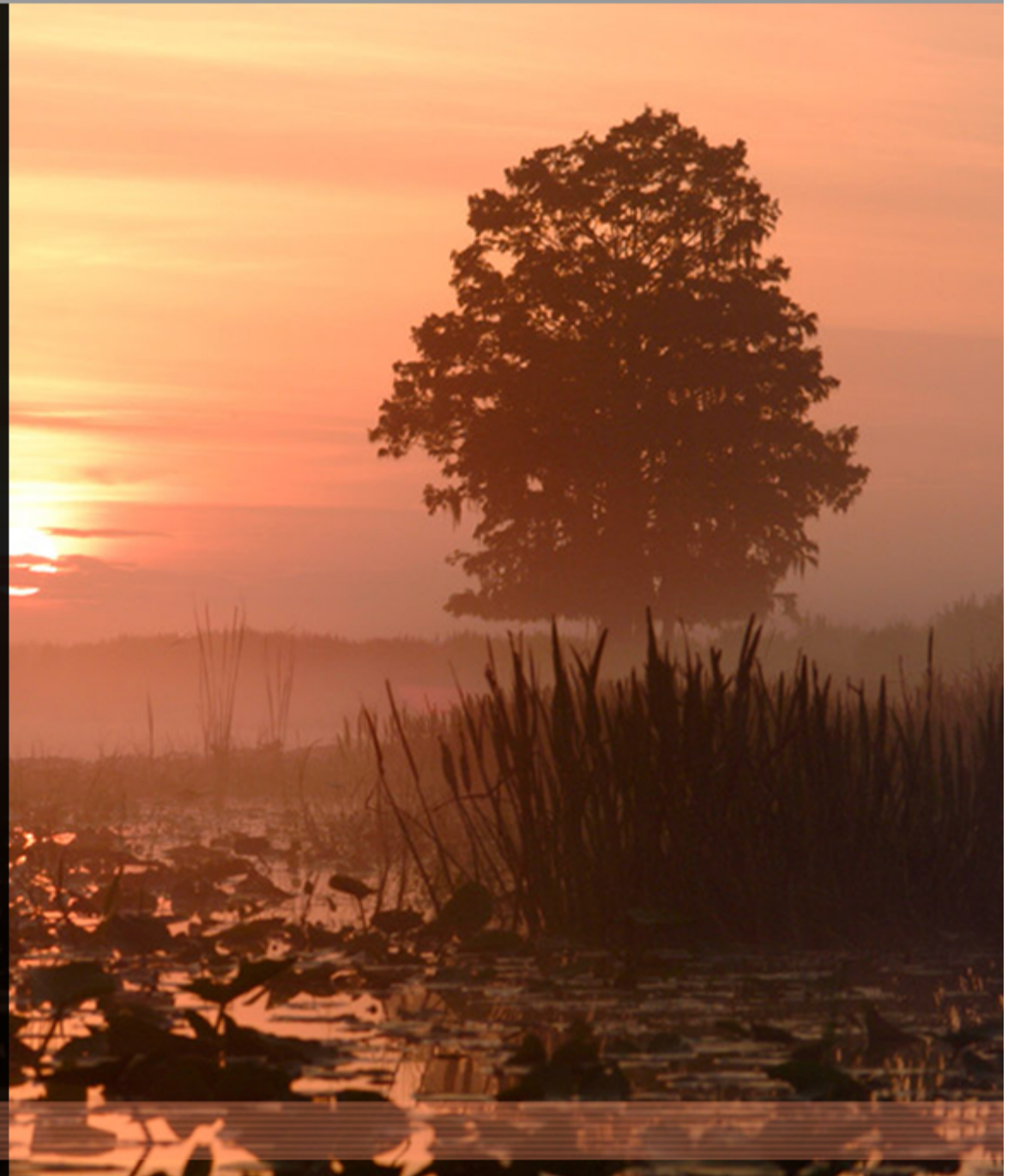


Water Conservation
Area 1- A Case
Study of Hydrology,
Nutrient and
Mineral Influences
on Biogeochemical
Processes

Sue Newman
Scot Hagerthey
Paul McCormick



Greatest Carbon Storage

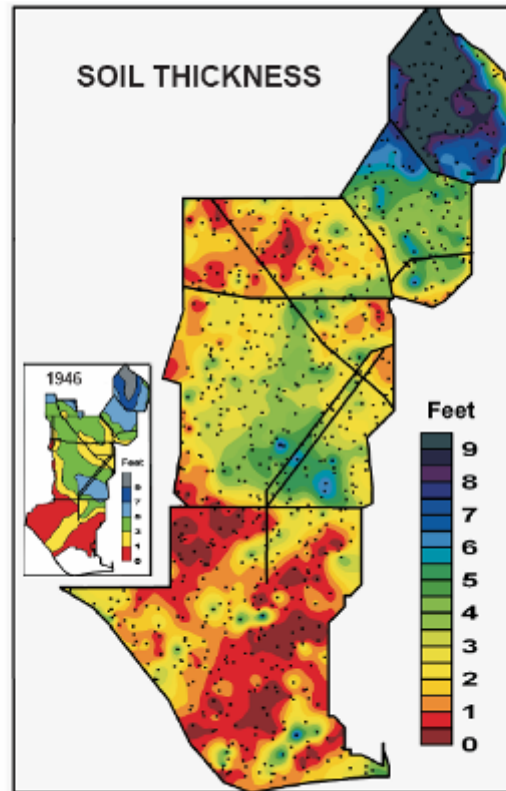
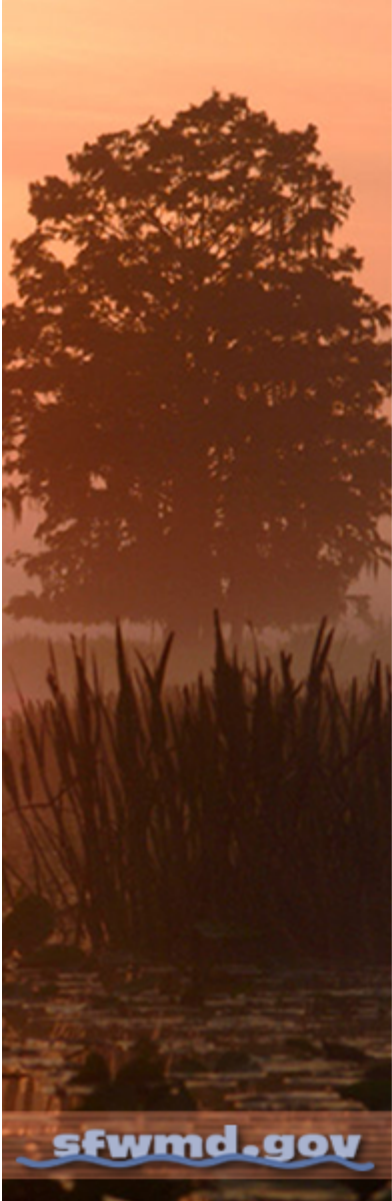
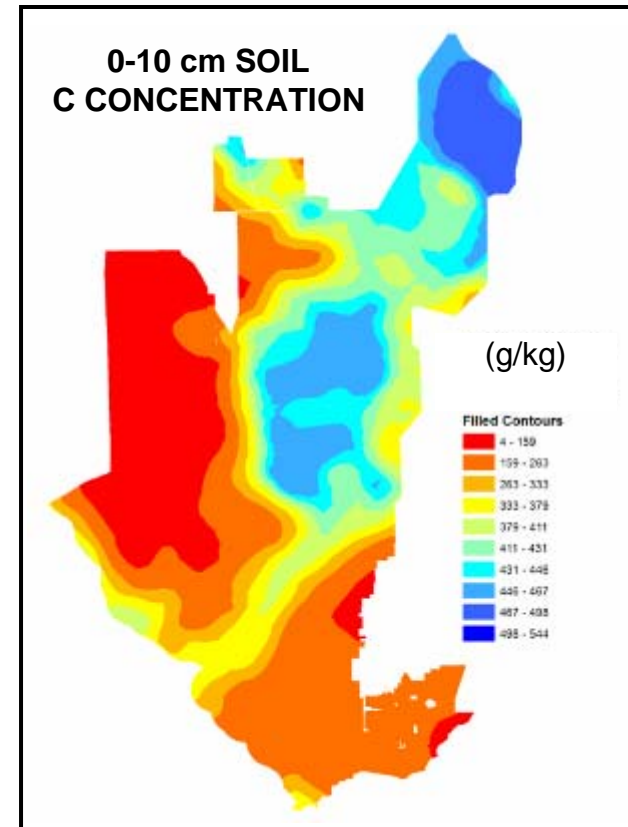


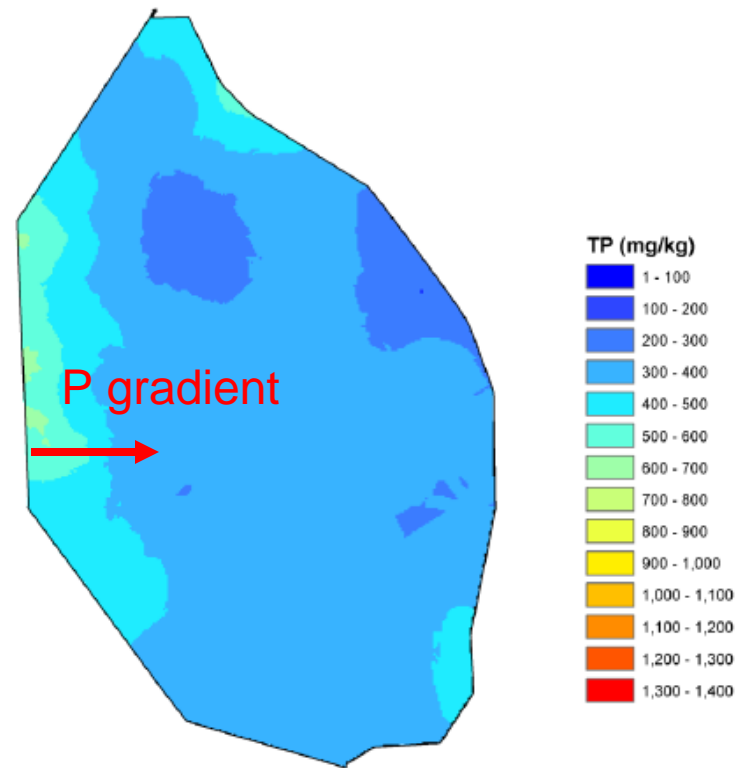
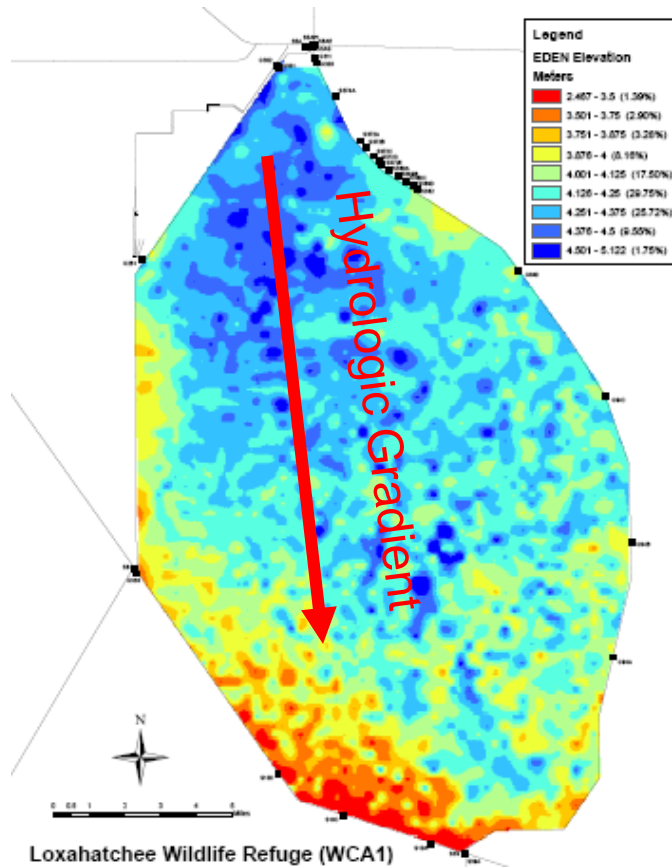
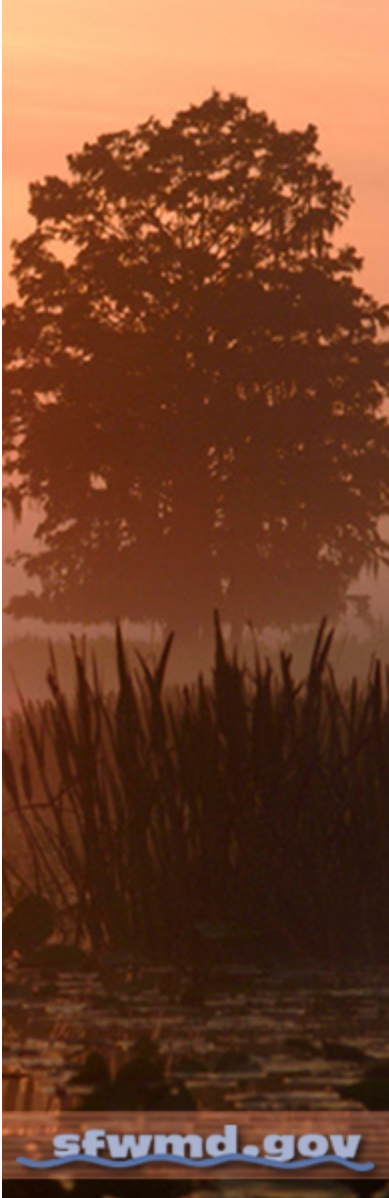
FIGURE 37. Soil thickness measured at 667 locations during R-EMAP Phases I, II and III from 1995-2005. The inset shows soil thickness as reported in 1946.²⁰



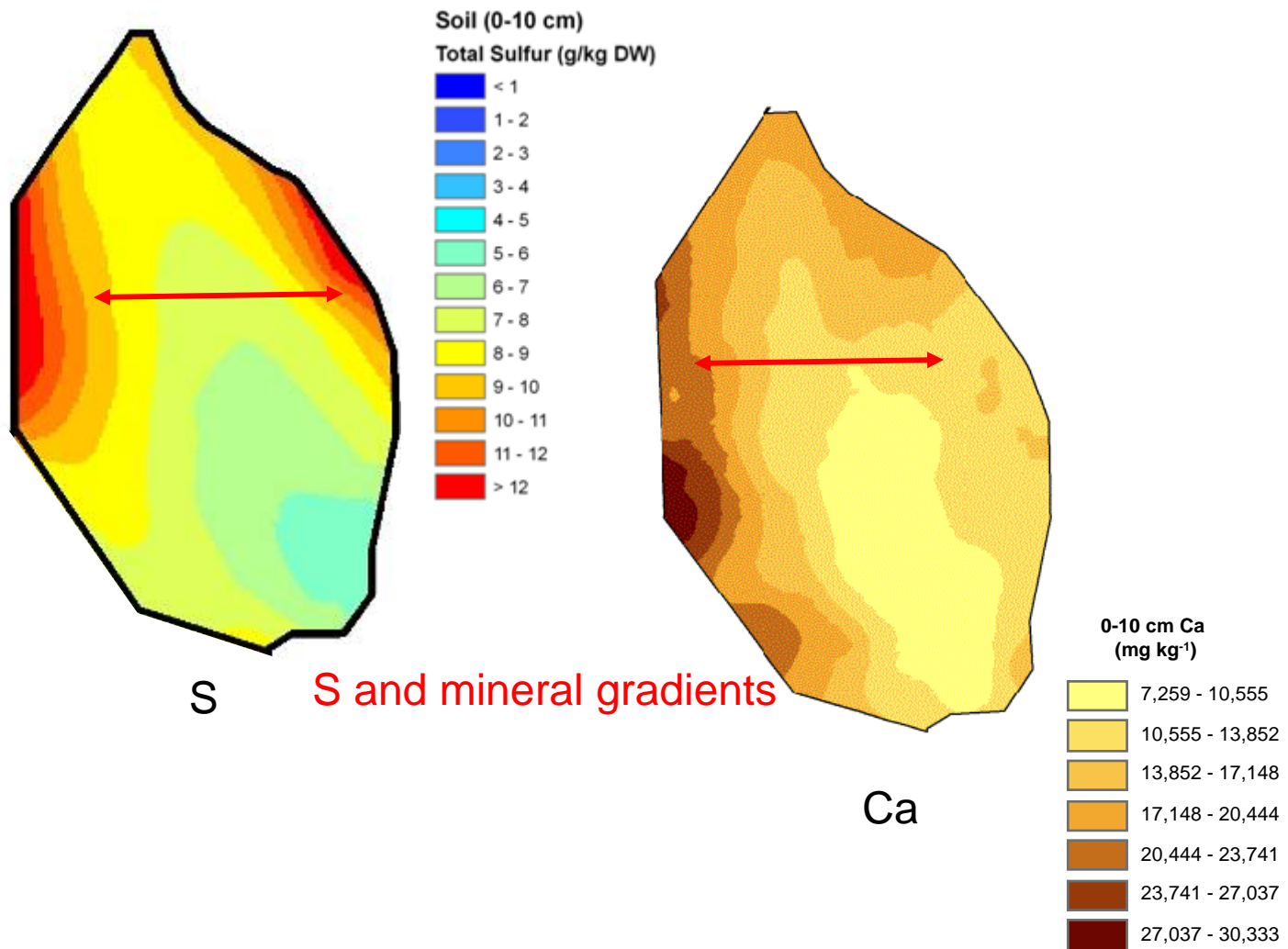
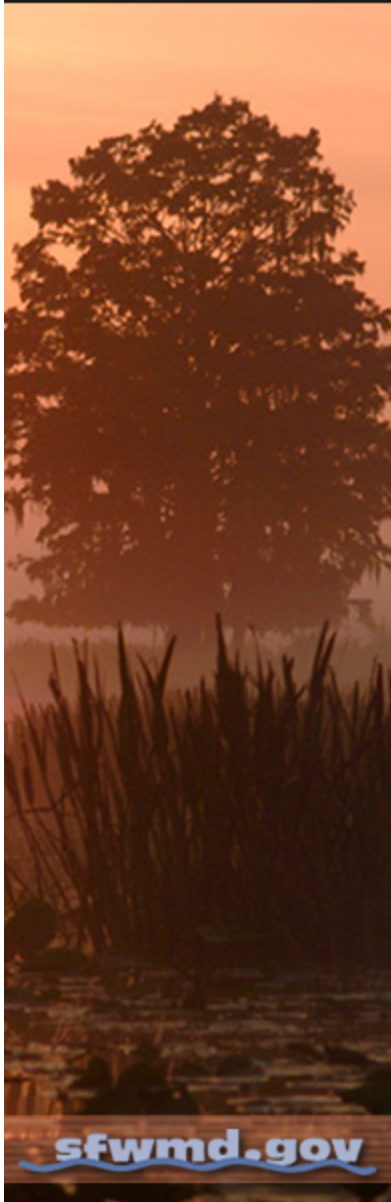
Source: Newman et al., in prep.

Source: Scheidt and Kalla. 2007. USEPA


Environmental Gradients



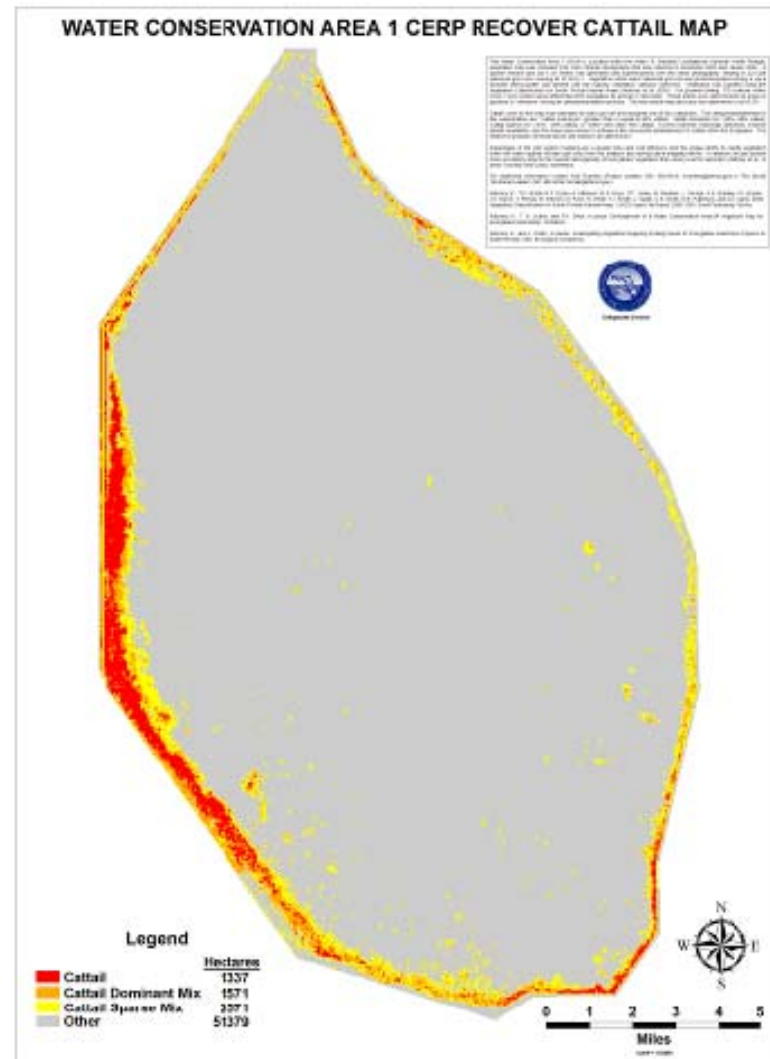
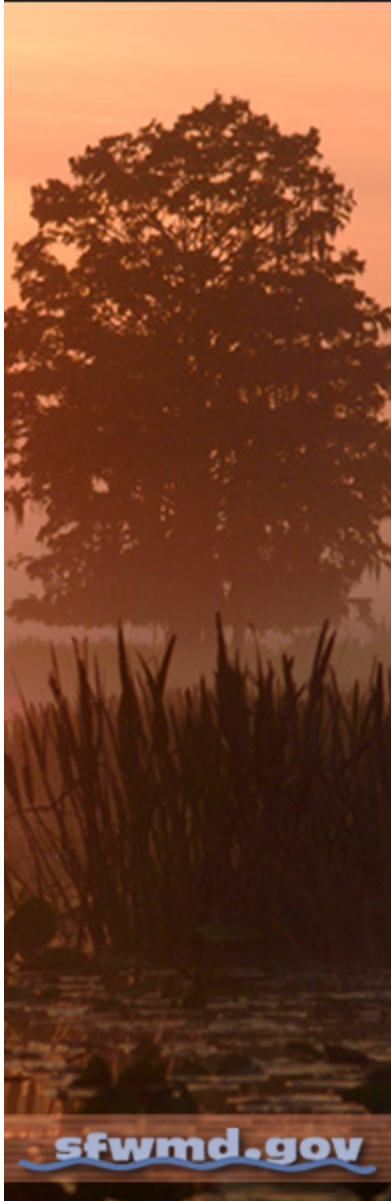
Mineral Enrichment in Surface Soils 2003



Talk Specifics

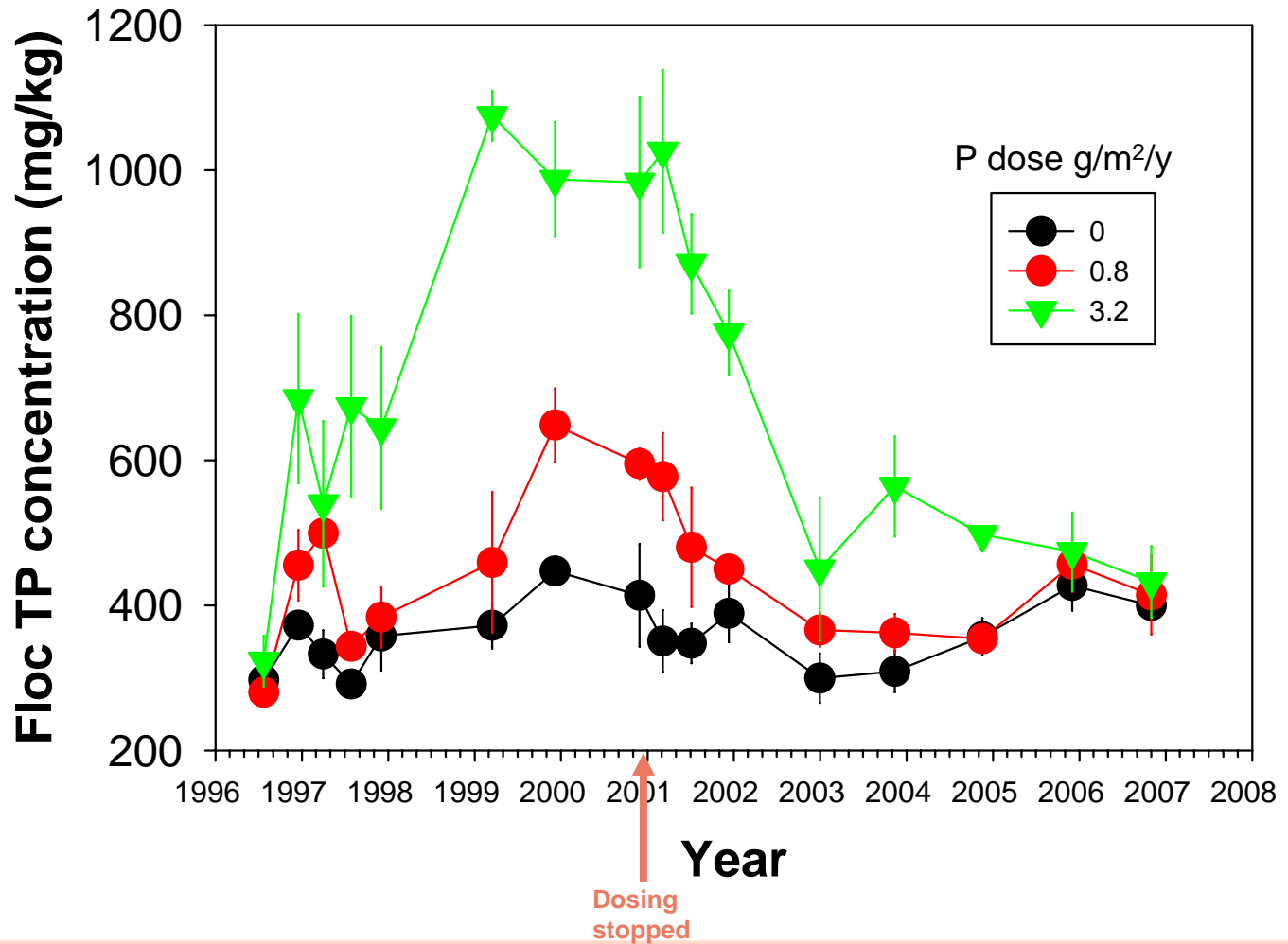
- 
- **Hydrologic and Mineral Changes in the Everglades** (McCormick Mon)
 - **Phosphorus Effects within WCA1**
 - Influence on C and nutrient cycling
 - **Mineral Effects on Biogeochemistry**
 - Influence on C cycling and P availability.

Phosphorus Effects in WCA1

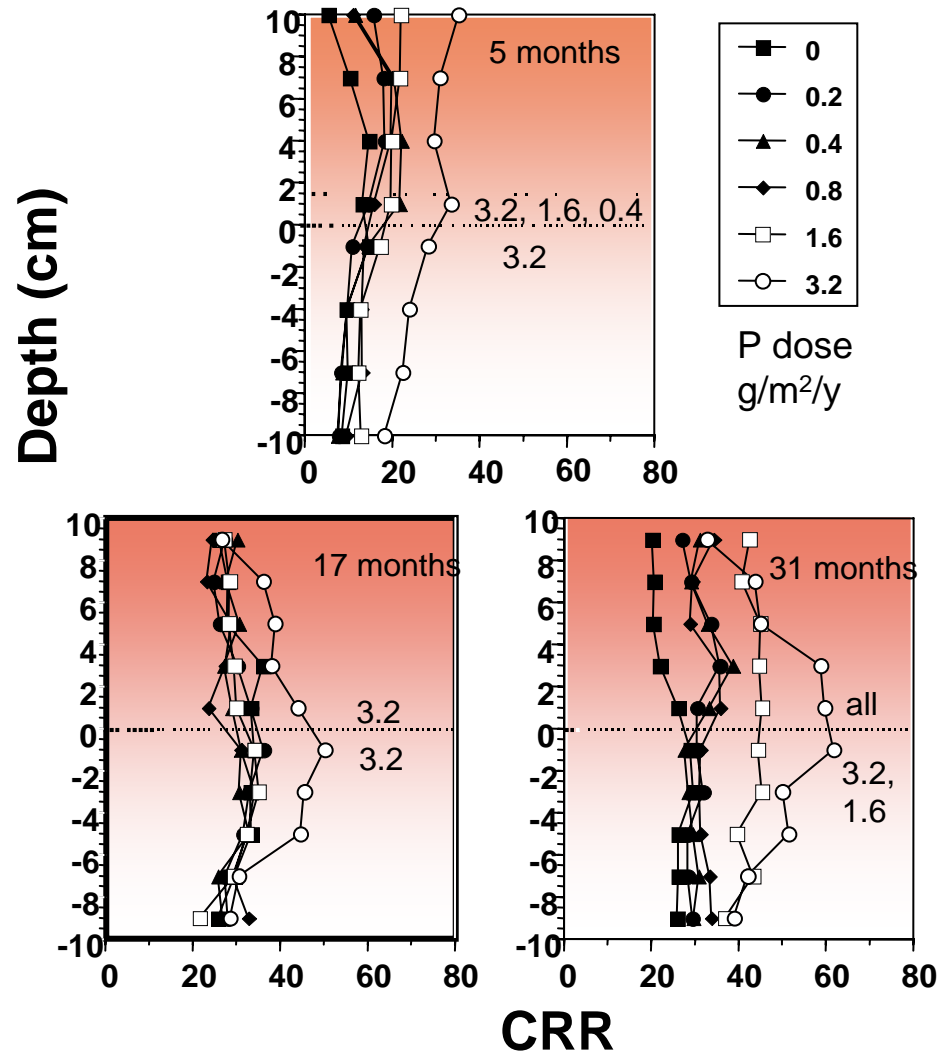
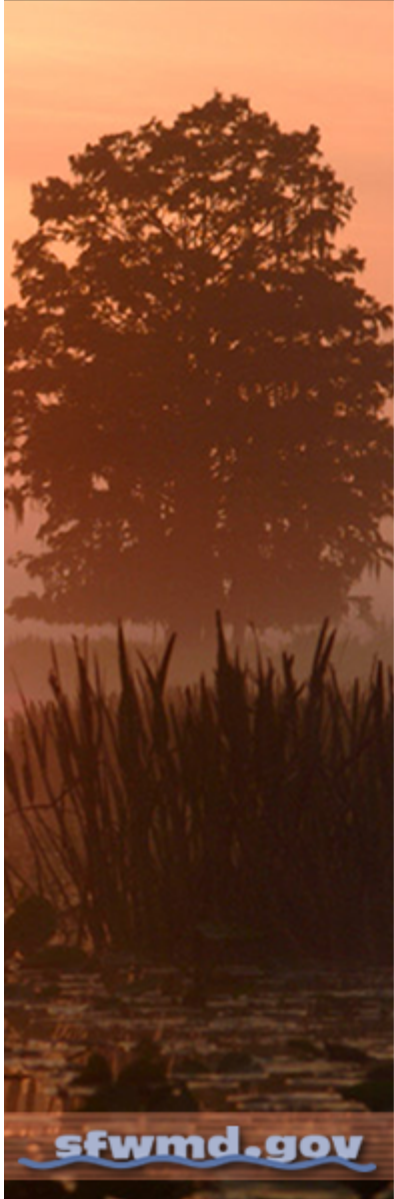


Source: Rutchey et al. Unpublished data

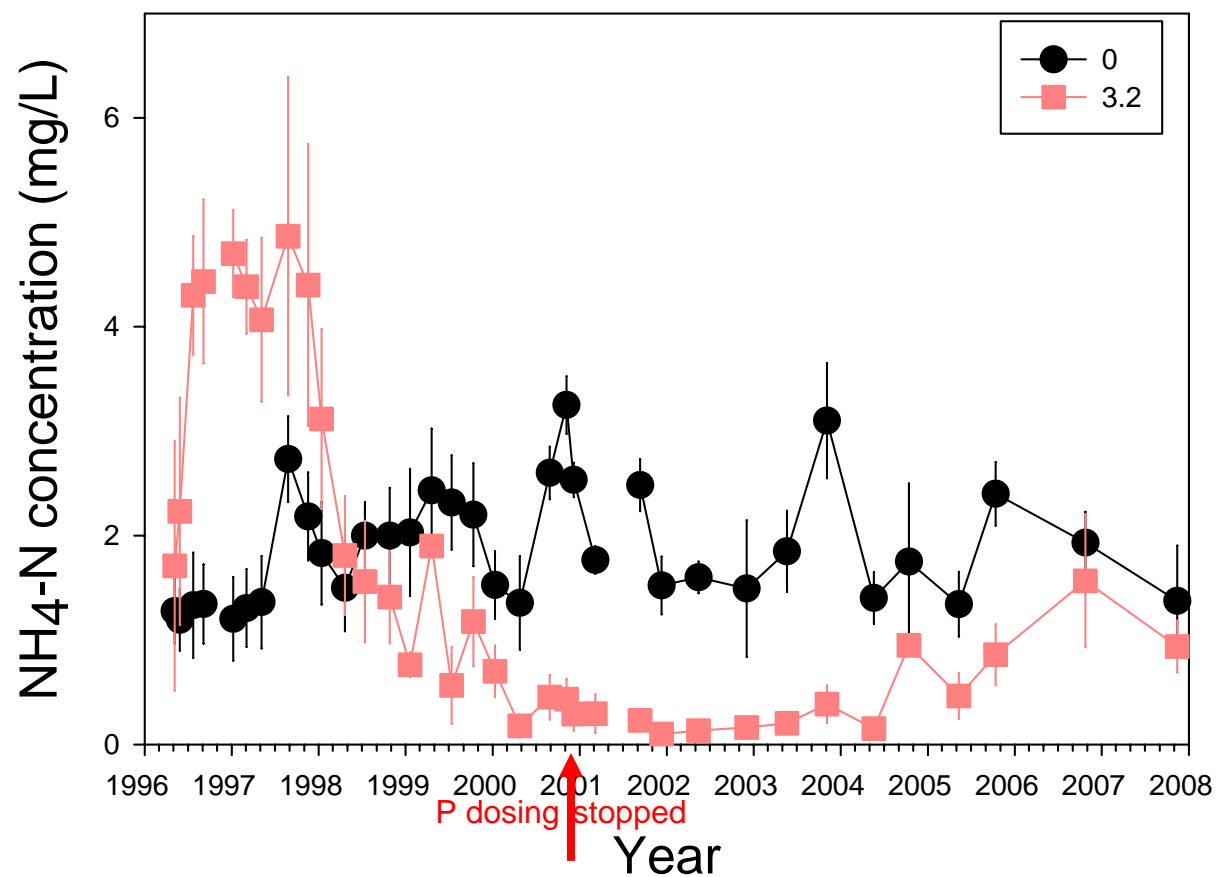
Effect of P is a Function of Load and Duration- Mesocosm Studies



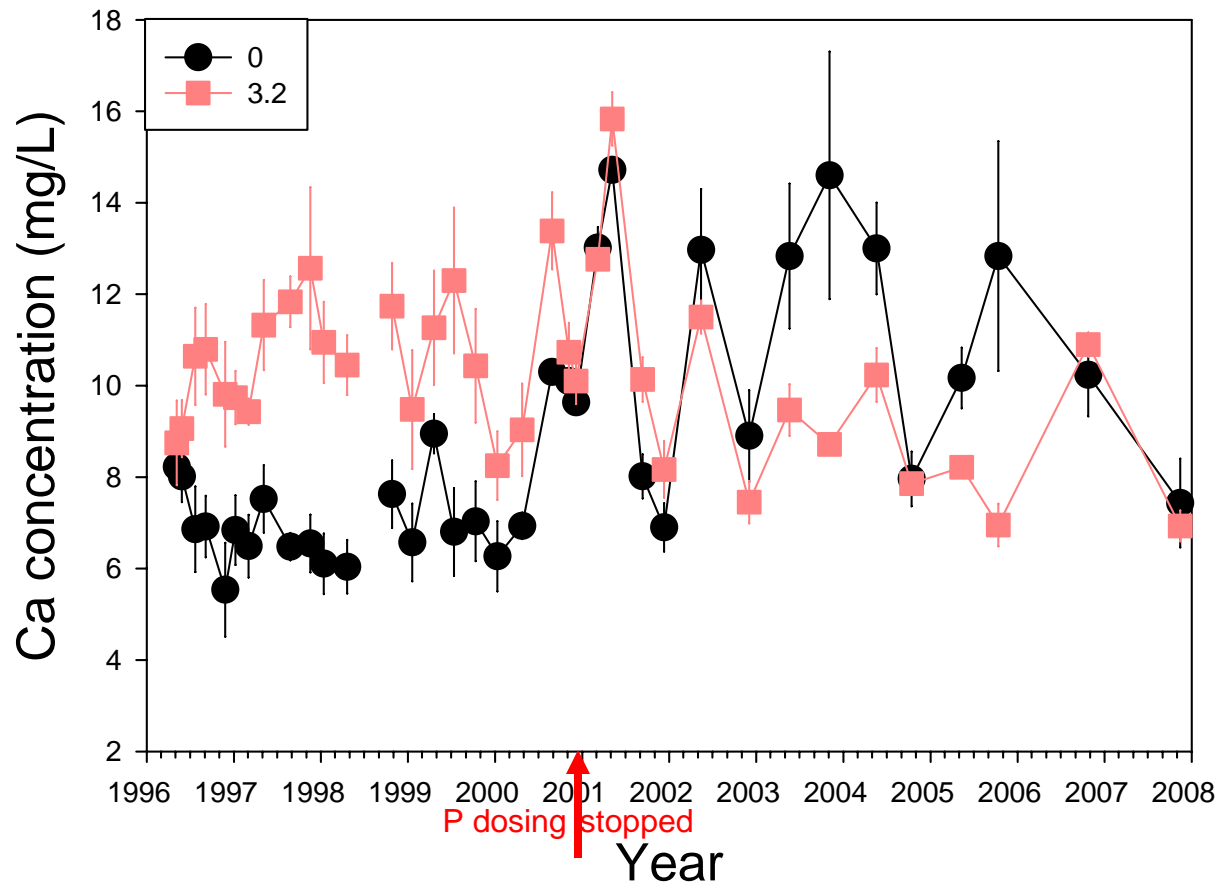
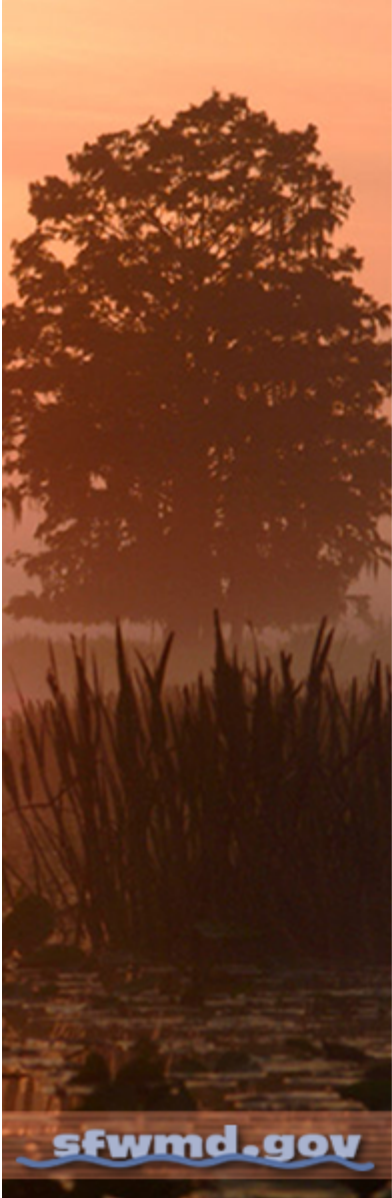
Phosphorus Effects on Decomposition



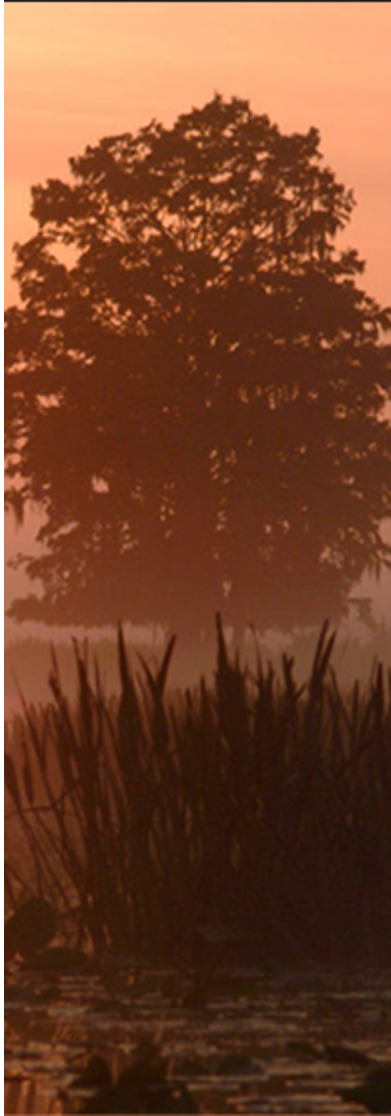
Phosphorus Effects –N Cycling



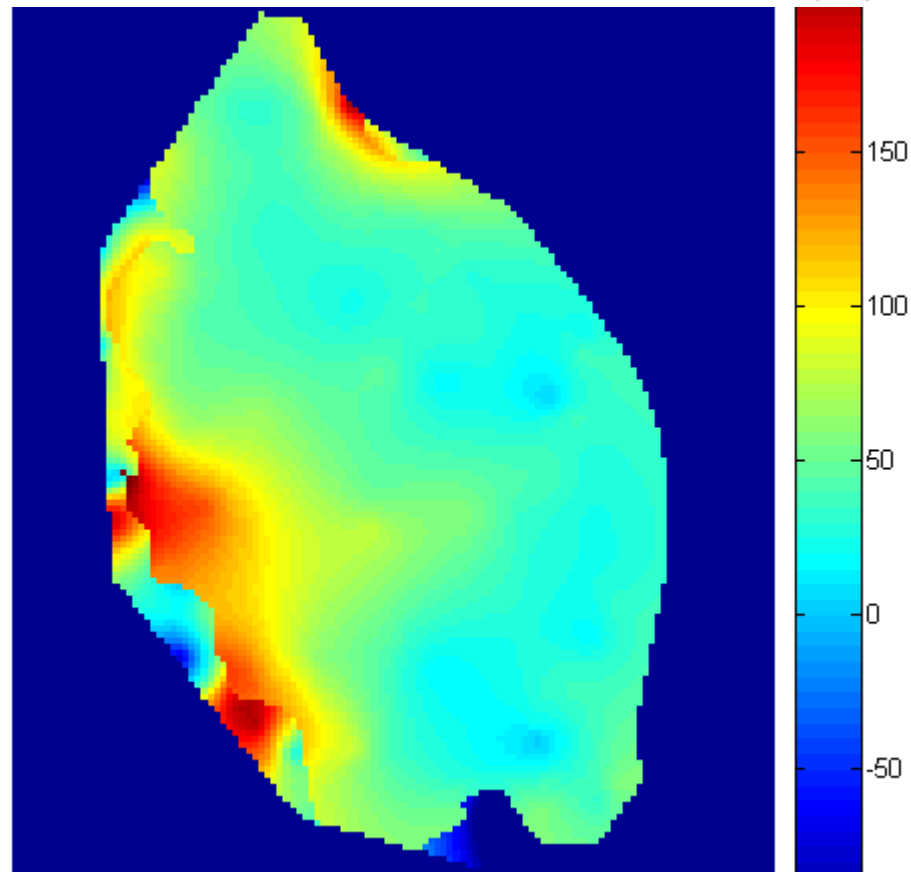
Phosphorus Enrichment- Mineral Release



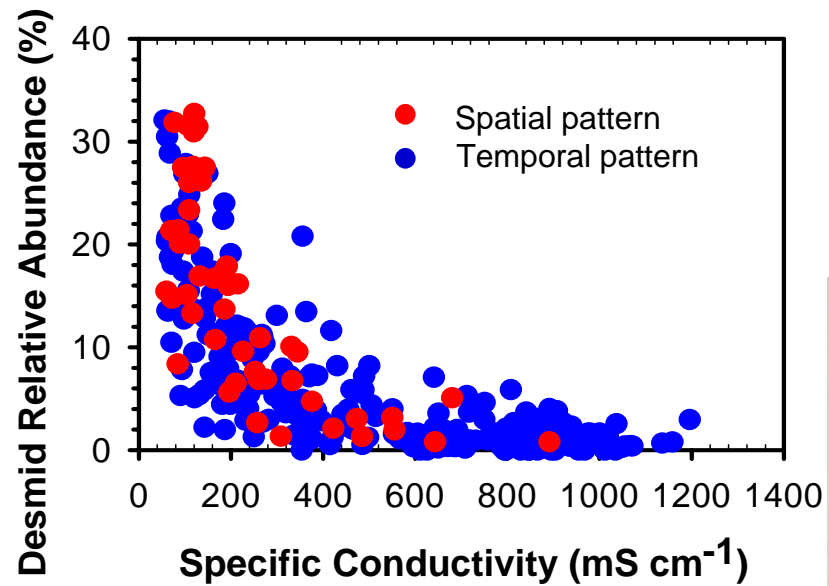
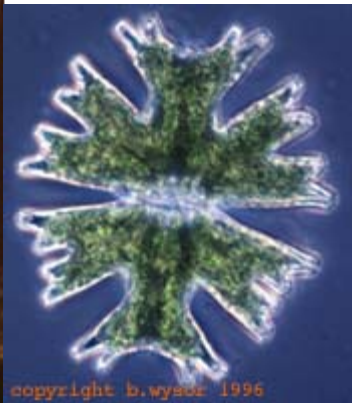
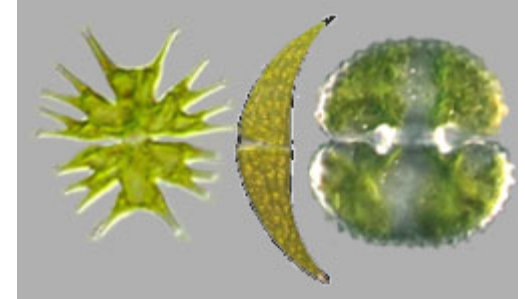
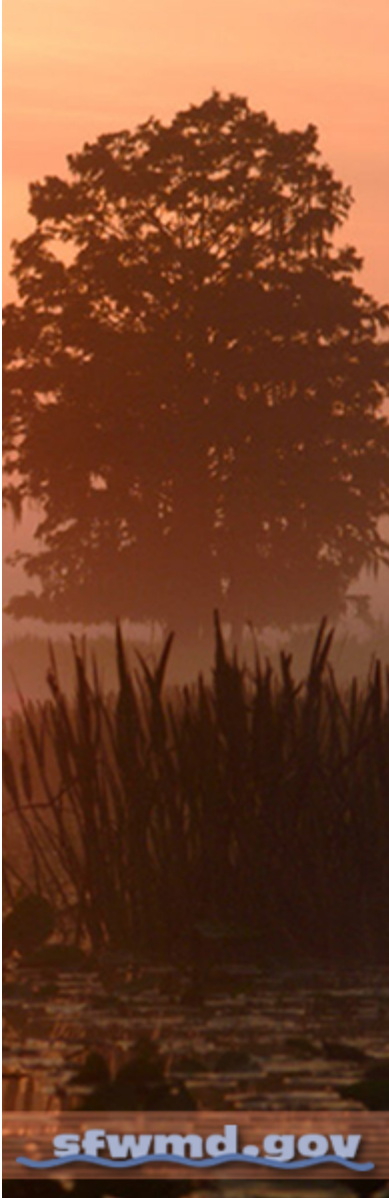
Western Soil TP Boundary Increased from 1991-2003



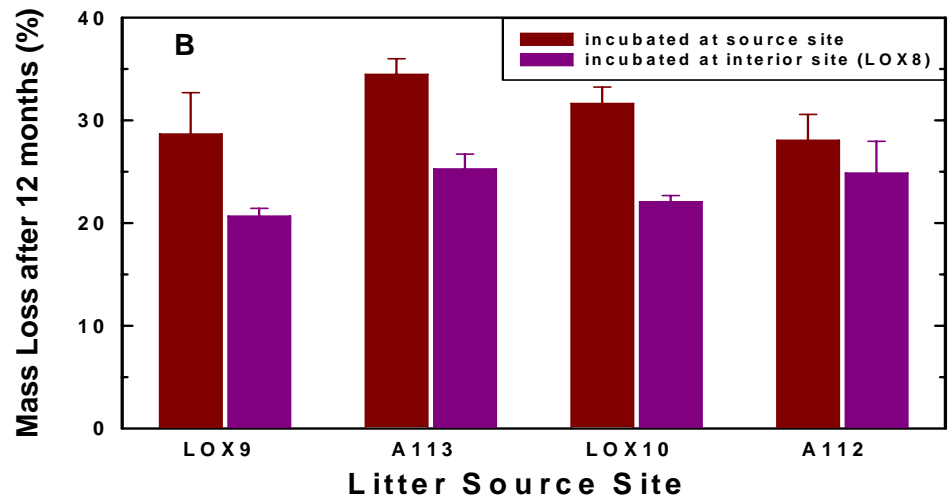
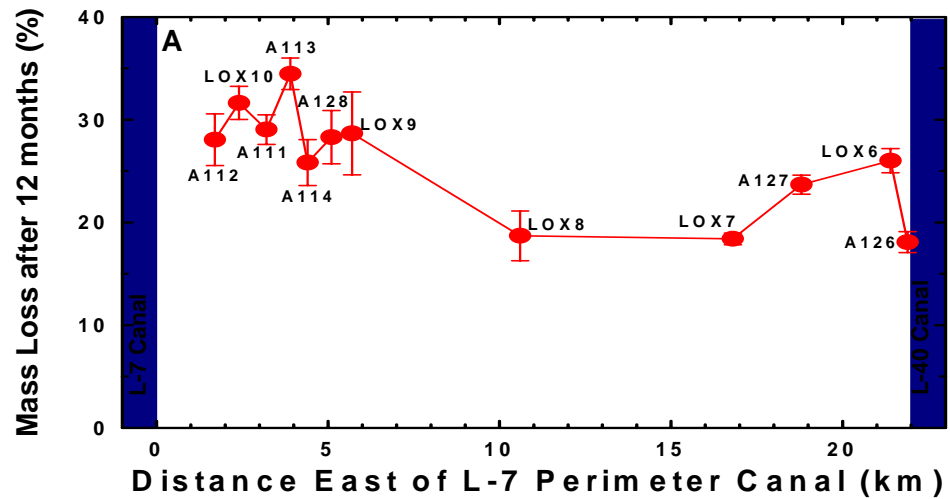
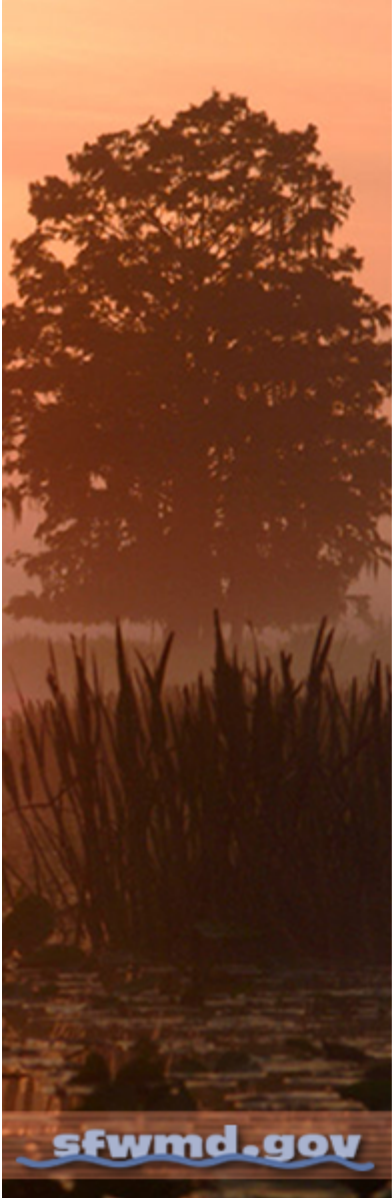
Change in TP concentration
mg/kg



Mineral Enrichment Effects in WCA1

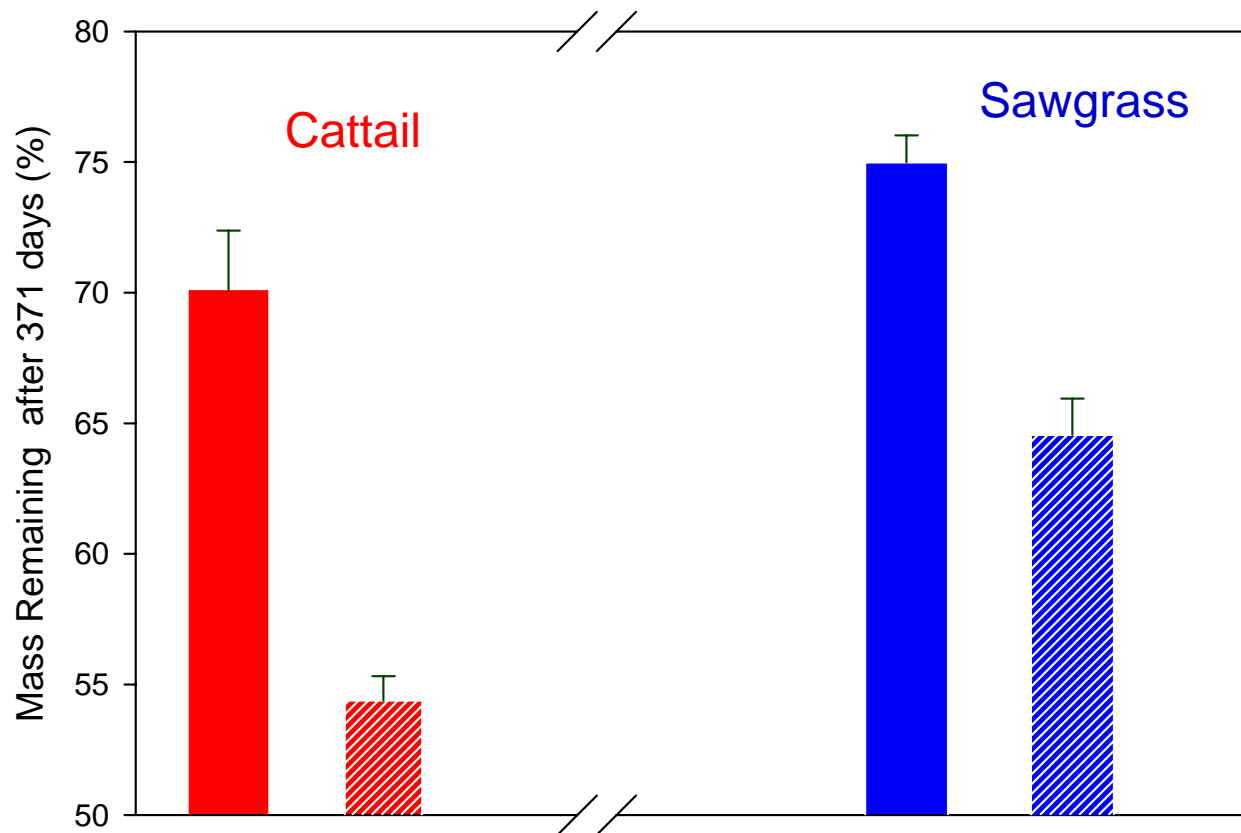


Mineral Influences on Decomposition




Mineral Enrichment Influences on Decomposition

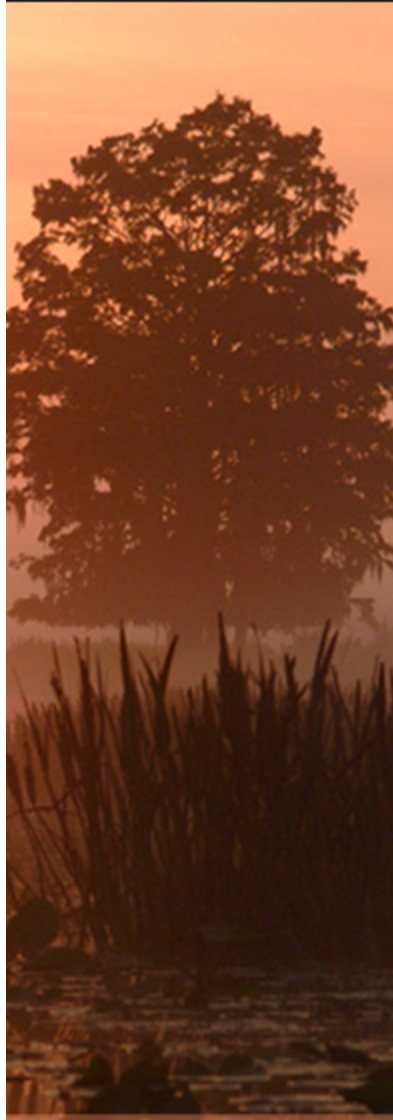
Solid Bars litter packs deployed in WCA1, hatched bars packs deployed in interior WCA2A. Litter Material Collected from WCA1.



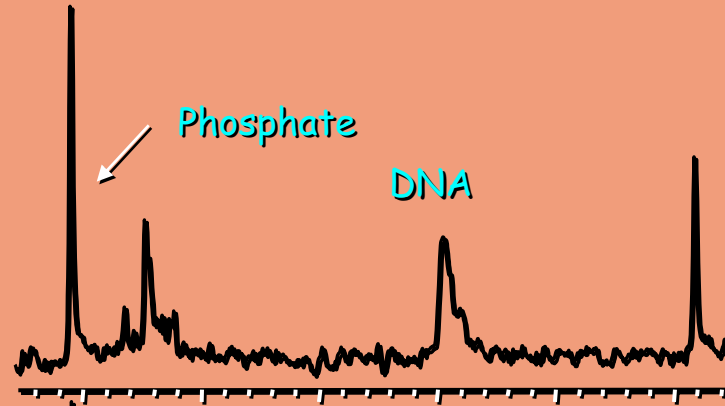
Potential Mechanisms Controlling Mineral Enrichment Effects on Decomposition

- 
- **Quality of Substrate**
 - **Limited literature to suggest Ca poor plant material has lower substrate quality**
 - **Effect on Microbial Community**
 - **Ca-P binding making P more limited**
 - **Ca-Organic Matter Binding Alleviating Enzyme Inactivation**
 - **Divalent Cations Required for Optimum Hydrolysis**

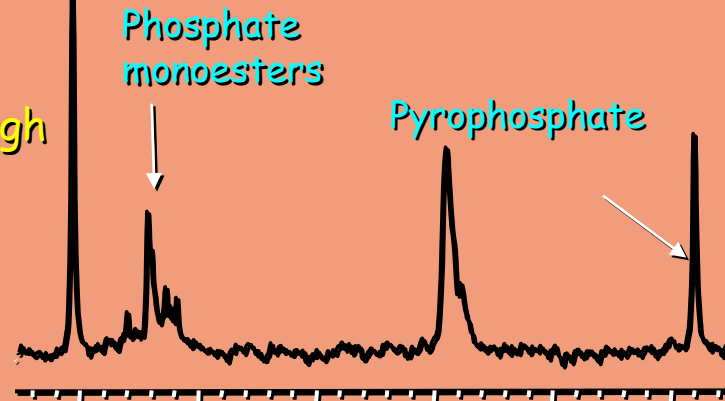
Phosphorus Storage in Benthic Floc - Similar Across Nutrient & Mineral Gradient.



Unenriched sawgrass (X4)



Unenriched slough (Mesocosm)

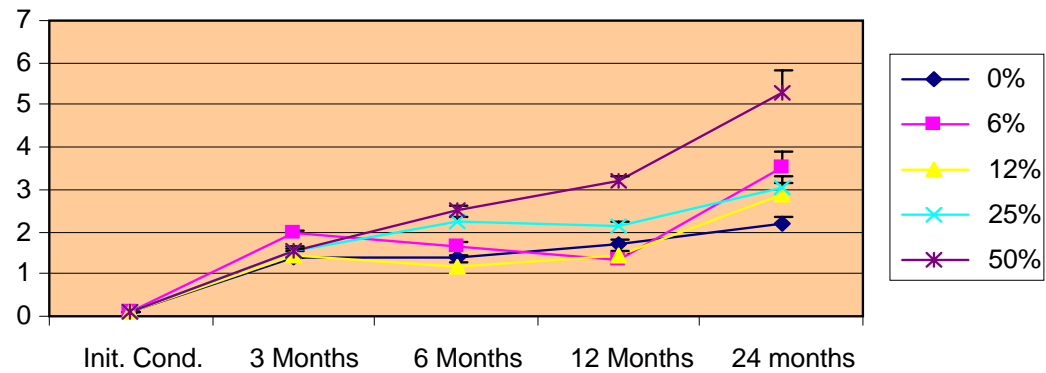


6 4 2 0 -2 -4

Chemical shift (ppm)

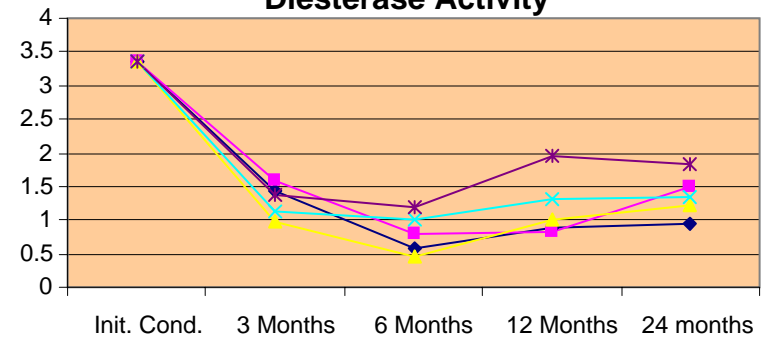
Enzyme Activity – Decreased P limitation

Phosphatase Activity



Enzyme Activity
(umols/h/g AFDM)

Diesterase Activity



Decomposition Duration

Summary and Conclusions

- **Biogeochemical cycles in WCA1 are driven by hydrologic, nutrient and mineral gradients.**
- **The P enrichment boundary expanded during the last decade.**
- **Mineral enrichment will significantly alter C cycling in WCA1.**
- **Natural biogeochemical cycles in WCA1 require low P & low mineral waters.**

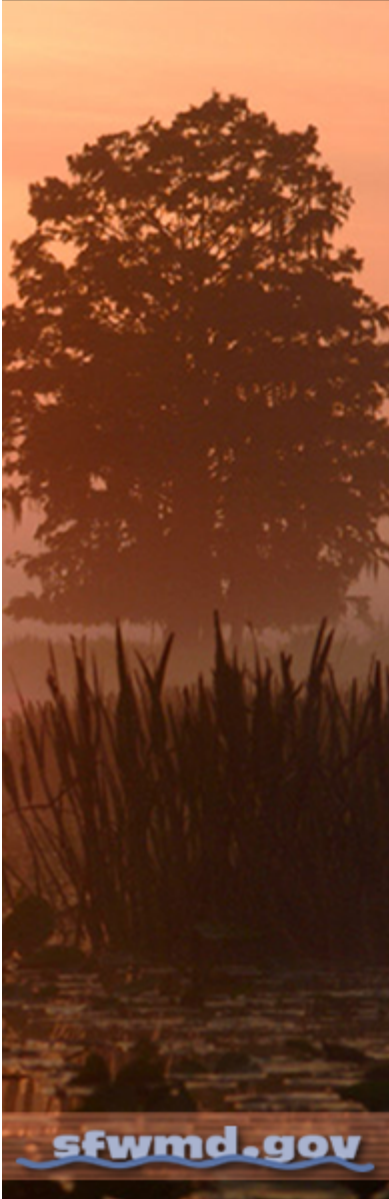




Photo credit: Joel M. Curzon

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