LAKE OKEECHOBEE WATERSHED WETLAND SOILS NUTRIENT CRITERIA DEVELOPMENT PROJECT

Mandate:

Comprehensive Everglades Restoration Plan (CERP),
Lake Okeechobee Watershed Protection Program (LOWPP)

Background:

Different parameters related to soil P sorption capacity or to measurements of labile P pools have been used to predict environmental P losses in upland soils. This project will use the same approach in an attempt to define a threshold phosphorus saturation ratio (PSR) that can be used to predict P release from wetland soils. Preliminary evaluation of this concept using soil P data from southeastern United States suggests that the threshold PSR might be a practical indicator of nutrient enrichment in wetland soil systems.
PSR is the molar ratio of extractable P to the sum of extractable iron (Fe) and aluminum (Al) in the soil.

$$PSR = (P/31)/[(Fe/56) + (Al/27)] \quad \text{[Equation 1]}$$

When water soluble P of the soil is plotted against the soil's PSR, there is a point in the graph when P concentration in the soil solution abruptly increases (Fig. 1). This is called "change point" or threshold PSR, the point at which a soil becomes a P source to the environment.

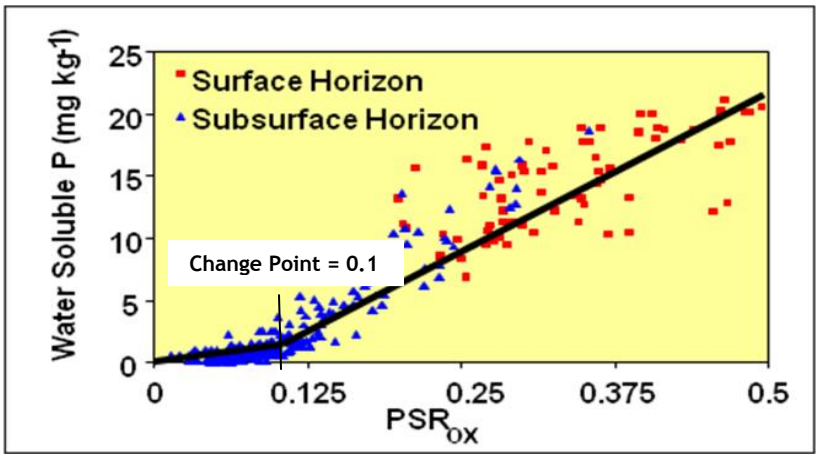

Figure 1. Relationship between water soluble P and oxalate based PSR for a manure impacted soil (Source: Nair et al., 2004).

Project Overview:

In this study, PSRs of wetland soils in the Lake Okeechobee watershed will be evaluated using Mehlich-1, Mehlich-3 and ammonium oxalate extractions. Relationships between water soluble P and each method of PSR calculation will be evaluated. A threshold PSR using any of three

methods of calculation will be established.

The threshold PSR will then be used to determine the soil phosphorus storage capacity (SPSC) of the soil, which refers to the amount of P that can be safely stored within a given volume or mass of soil before that soil becomes an environmental risk.

Application of the Results:

Using the threshold PSR value of 0.1 for upland surface horizon of soils, SPSC can be calculated as follows:

SPSC = (0.10 – soil PSR) * [(oxalate-Fe/56) + (oxalate-Al/27)] *31 [Equation2]

When SPSC is positive, the soil does not pose an environmental risk, but the risk increases with increasing negative SPSC.