Fractionation of Phosphorous in Canals Draining to NE Shark River Slough.

Henry O. Briceño, Eduardo Mollinedo, Sandro Stumpf, Dilip Shinde, Piero Gardinali, and Reinaldo Garcia

Florida International University
Southeast Environmental Research Center
Miami, Florida

U.S.D.I, National Park Service
South Florida Natural Resources Center
Everglades National Park
....the problem.....
....the hint.....
....the site.....
identify the sources of the elevated TP at S333
...the conceptual model.....
...selected stations.....
Hints:

Cusum = cumulative sum of standardized values:
+ slope = above average
- slope = below average
S333 TP cusum

Turbidity (NTU)

TP cusum (sd)

1.4 NTU

.....data exploration.....
......phosphorous concentration in canals declines as water level increases, region-wide and independently of land cover/use

......there seems to be a water level threshold, approximately at 8 ft, below which nutrient concentrations increase above average....

......that threshold level seems to be linked to the elevation of the adjacent marsh
.... Focus on sediments and floc...

Modified after Reddy et al. 2011
Phosphorous fractionation in floc and sediments

Fractionation scheme adopted in this research (Katsaounus et al. 2007) entailed:

- Deionized water extraction, corresponding to plant available and water extractable P.
- Sodium bicarbonate extraction, equivalent to weakly-sorbed and bioavailable organic and inorganic P.
- Sodium hydroxide extraction, rendering strongly bound chemisorbed P-potentially bioavailable.
- Hydrochloric acid extraction, equivalent to apatite or Ca-bound, non-bioavailable P.
Substrate and extracting agent

![Graph showing TP (mg/g) for different substrates and extracting agents.]

- 1-H₂O, Floc
- 1-H₂O, Sediment
- 2-NaHCO₃, Floc
- 2-NaHCO₃, Sediment
- 3-NaOH, Floc
- 3-NaOH, Sediment
- 4-HCl, Floc
- 4-HCl, Sediment
Conclusions

.....phosphorous concentration in canals declines as water level increases, region-wide and independently of land cover/use
Conclusions

…… most TP in sediments and floc is in the NaOH and HCl extracted fractions, which are non-bioavailable*

Sequence:

<table>
<thead>
<tr>
<th></th>
<th>Bioavailable</th>
<th>Weakly-sorbed bioavailable</th>
<th>Strongly Bound Chemisorbed</th>
<th>Ca-Bound non-bioavailable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floc</td>
<td>1.3%</td>
<td>9.2%</td>
<td>9.5%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Sediment</td>
<td>2.0%</td>
<td>11.0%</td>
<td>10.4%</td>
<td>76.6%</td>
</tr>
</tbody>
</table>
Special Thanks to:
Dr. Joffre Castro
Dr. Len Scinto
Fractionation of Phosphorous in Canals Draining to NE Shark River Slough.

Henry O. Briceño, Eduardo Mollinedo, Sandro Stumpf, Dilip Shinde, Piero Gardinali, and Reinaldo Garcia

bricenoh@fiu.edu