



Spatial Distribution in Everglades Nutrient Budgets and Their Effects on Biogeochemical Processes

Leonard J. Scinto

Alexandra Serna, Diana N. Johnson, Jennifer H. Richards

Florida International University

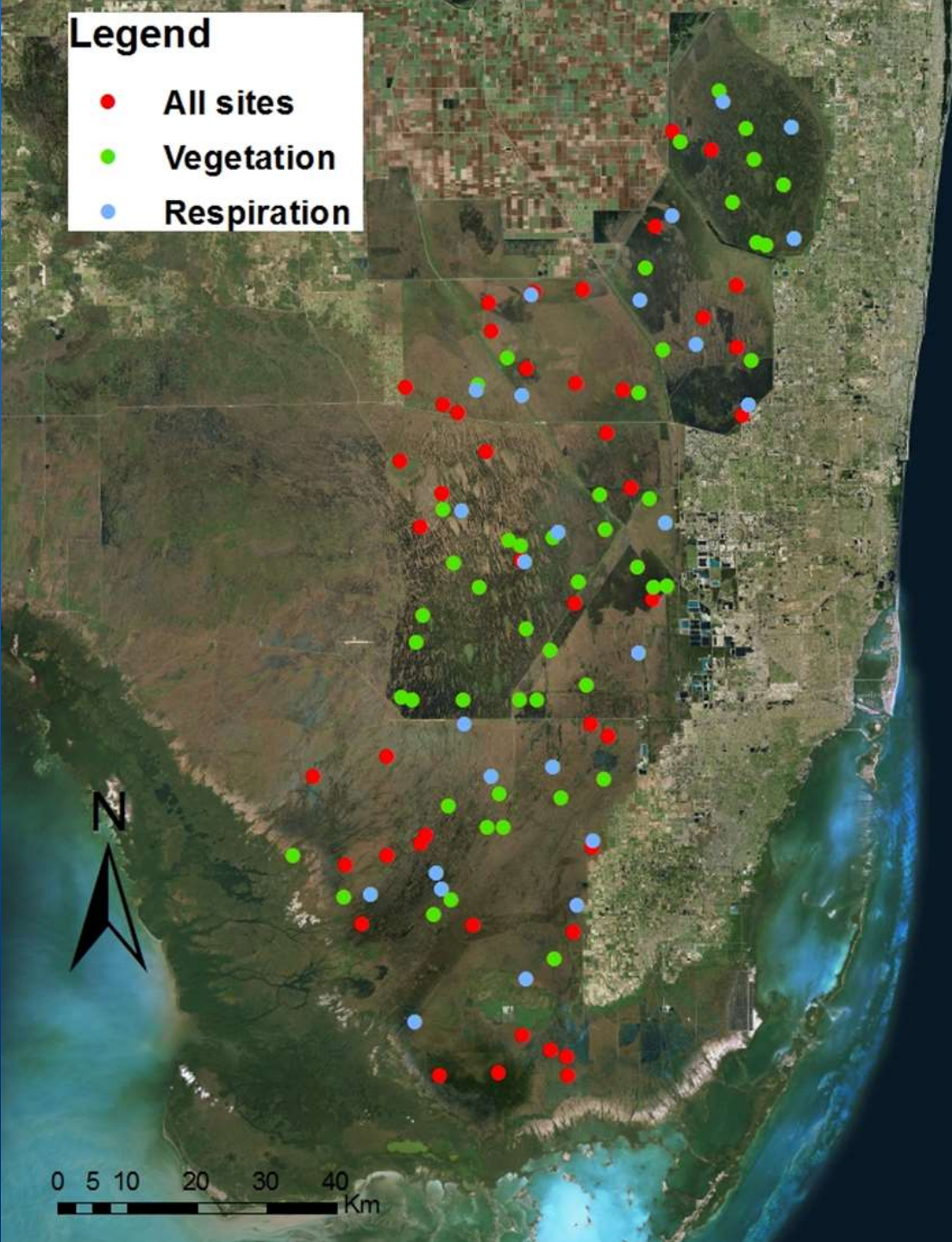
scintol@fiu.edu

Peter I. Kalla and Daniel J. Scheidt

USEPA Region 4

Legend

- All sites
- Vegetation
- Respiration



Fall 2014 REMAP

- 119 sites across Greater Everglades Ecosystem (GEE)
- Sampled most ecosystem compartments including Soil (0-10 cm), flocculent detrital organic matter (Floc), Water, Periphyton, Vegetation, and Fish.
- Subset (65) sites also estimates of Cladium above ground biomass.
- Further subset (25) sites semi-randomly selected for respiration assay.

Soil dynamics, storage, and change in the Everglades has been well-studied and has been a major focus of the R-EMAP program.

- **Importance of soils to overall chemical cycling in wetlands.**
- **Importance of peat and soil C storage in the global carbon cycle**
- **Past loss of Everglades soil**
- **Potential effects of restored hydrology on soil dynamics, including preservation and accretion.**



Circa 1988



- Approximately 30 cm Soil loss
- Almost 30 years later

March 2016



Subsidence Post UF FLORIDA IRIS

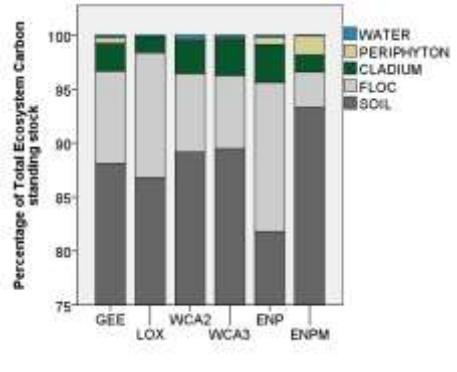
In 1986, this 8-foot concrete post was driven to bottom. The top of the post was set level with the soil surface.

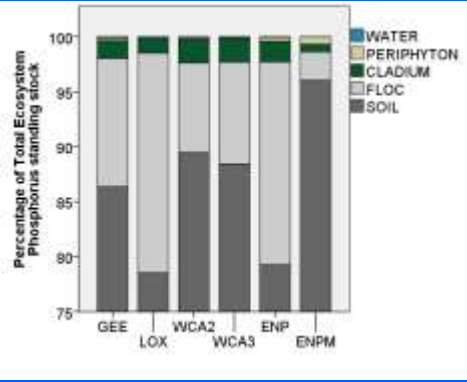
In 2016, a photogram revealed 58 inches of visible post, indicating approximately 8 inch of subsidence per year.

The top of the post was 72 inches above ground in March of 2006, indicating 8 feet of soil subsidence in the past 24 years.

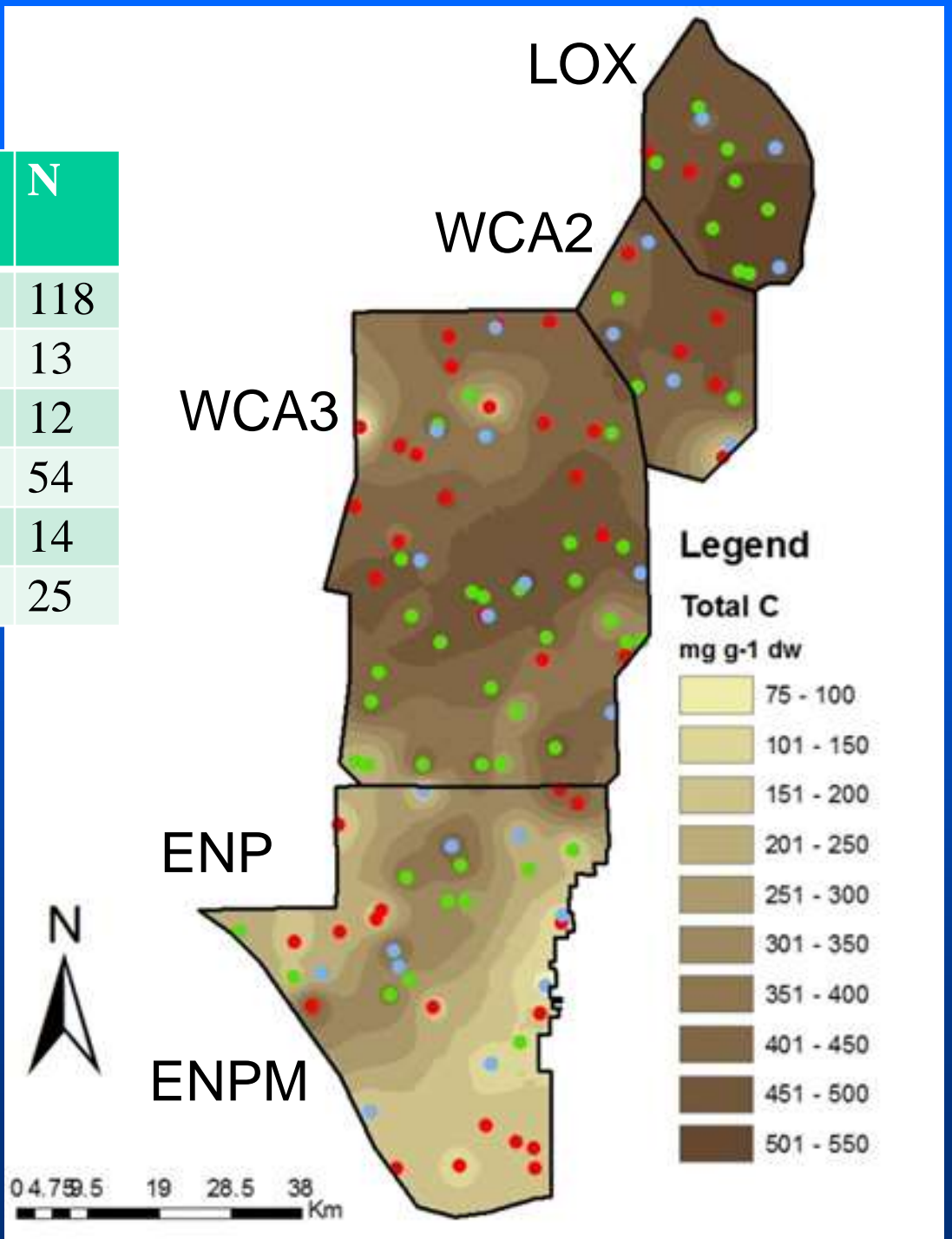
Annual subsidence rates have declined from approximately 3 inch per year to approximately 1/3 inch per year. This decrease has been partially attributed to Best Management Practices implemented by local growers.

...and about 40+ lbs

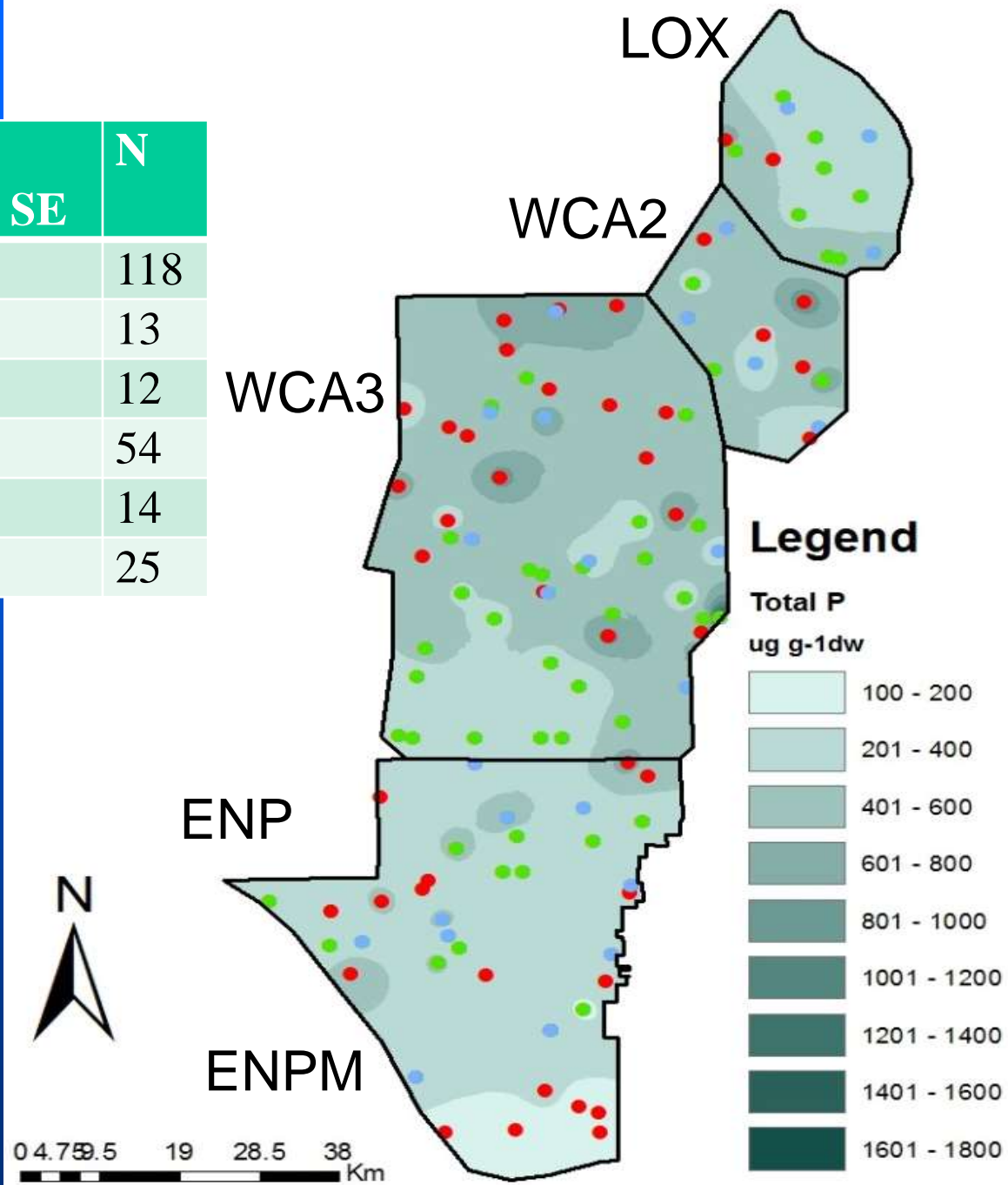




REGION	TOTAL SOIL C mg g ⁻¹ dw, Mean ± SE	N
GEE	358 ± 13	118
LOX	495 ± 32 a	13
WCA2	405 ± 108 ab	12
WCA3	406 ± 96 b	54
ENP	340 ± 105 b	14
ENPM	171 ± 70 c	25



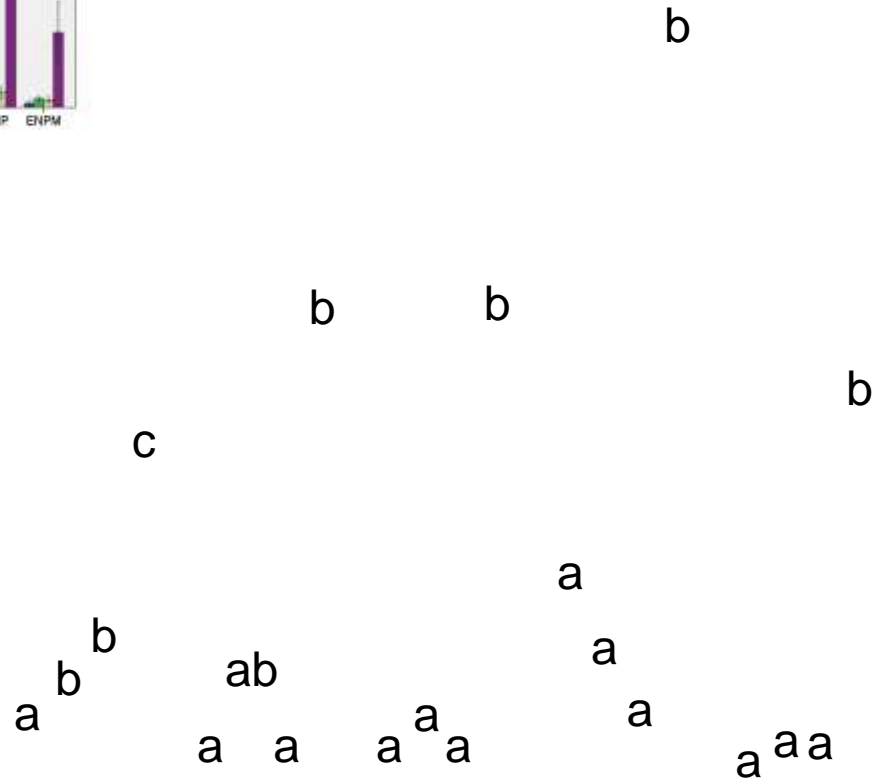
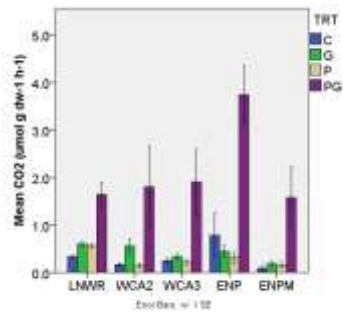
REGION	TOTAL SOIL P $\mu\text{g g}^{-1}$ dw, Mean \pm SE	N
GEE	416 \pm 19	118
LOX	382 \pm 54 ab	13
WCA2	465 \pm 56 a	12
WCA3	489 \pm 27 a	54
ENP	381 \pm 52 ab	14
ENPW	275 \pm 39 b	25



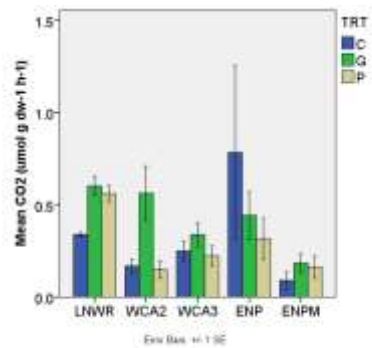
Soil Organic Matter Respiration Assay

Soil OM respiration can be dependent on several factors including hydrology, nutrient availability, and the lability of OM.

- Soil from 25 semi-randomly selected sites (distributed to sample each of the 5 regions).
- Determine the influence of P-limitation by amending with 0.4 mmole P (KH_2PO_4) g^{-1} dw soil.
- Determine lack of labile substrate by amending with 1.2 mmole C (glucose) g^{-1} dw soil.
- Combination of the two.
- Nominal 96 h incubation in dark at room temperature.
- Headspace analyzed for CO_2 ($\mu\text{mol CO}_2 \text{g}^{-1} \text{dw h}^{-1}$) by GC with FID and methanizer.



Significantly different at $p < 0.05$. Shapiro-Wilk and Kolmogorov-Smirnov tests of normality. Either Tukey's or log transform then Tukey's. SPSS 23.0



ns

b

b

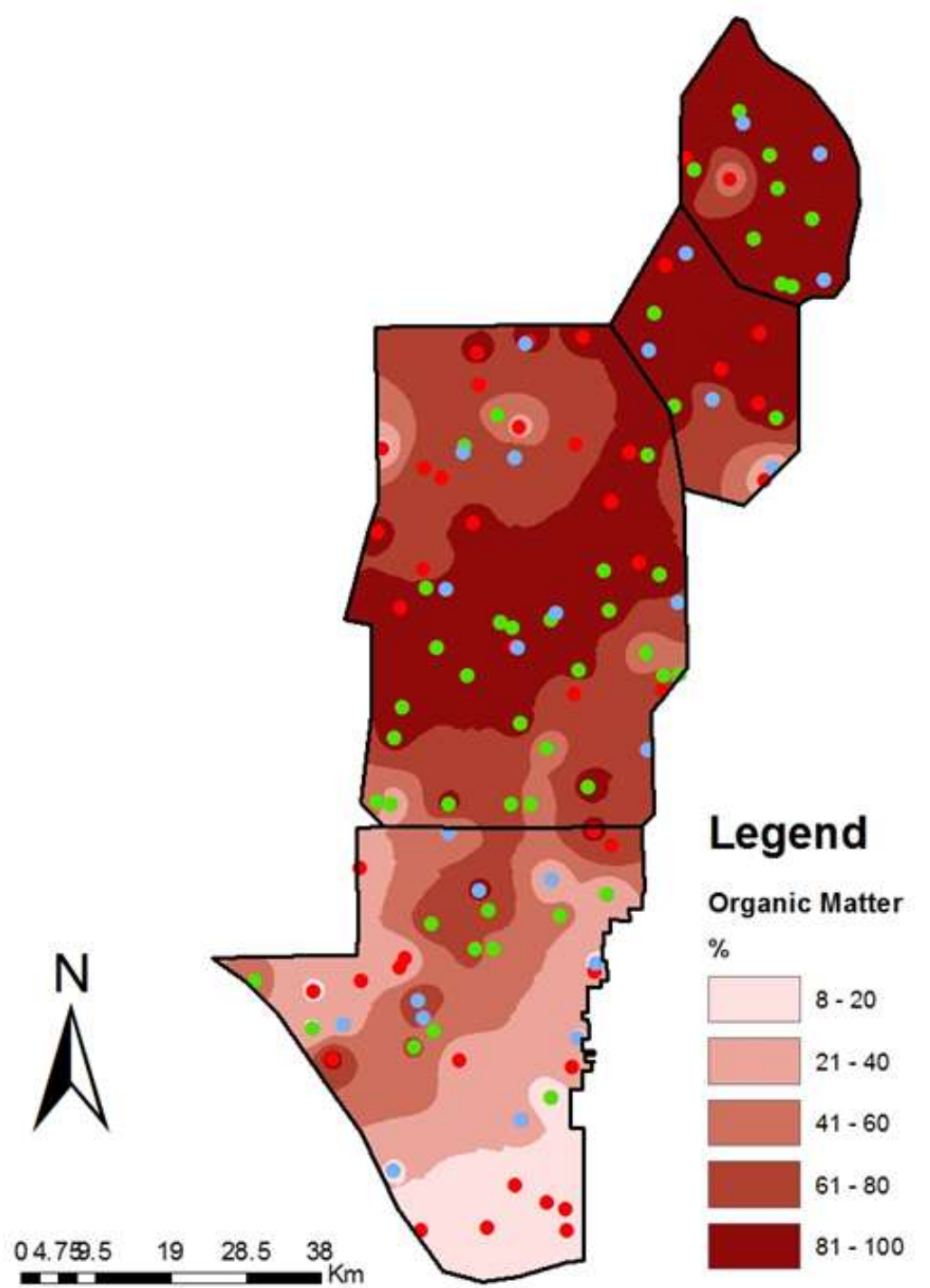
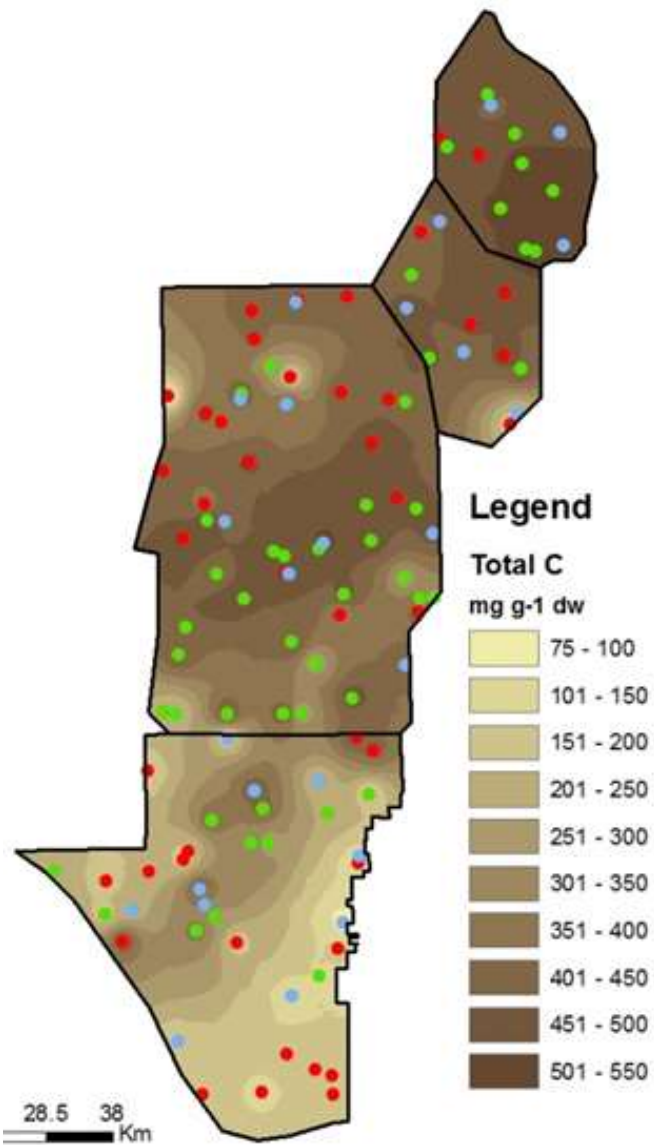
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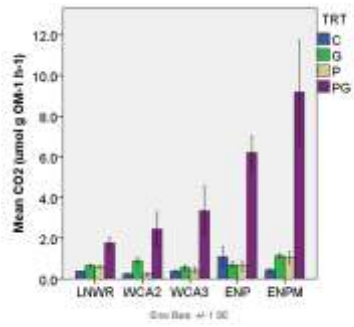
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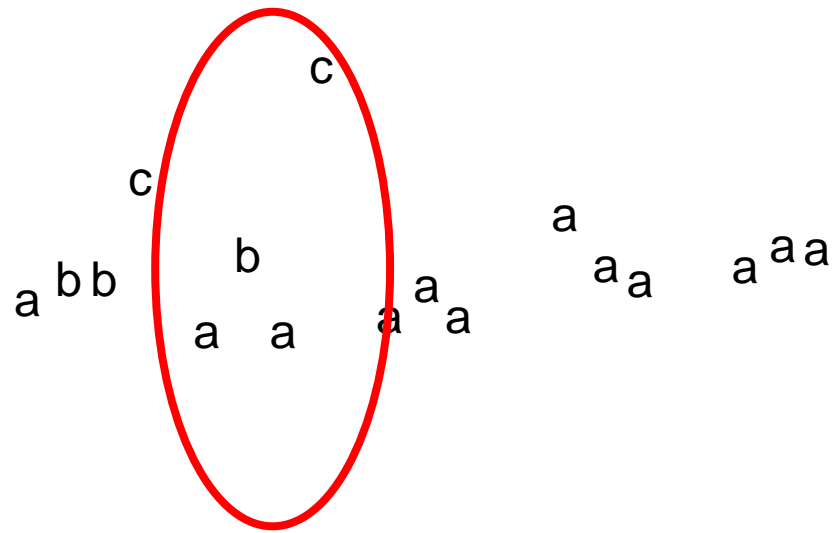




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Conclusions

Despite spatial differences in C and P across the GEE there was not a significant affect on nutrient mechanisms controlling respiration.

- Phosphorus amendments only significantly effected respiration of soil from LOX.
- All soils responded to “priming” by the combination of amendments.
- WCA2 soils responded to Glucose only amendments despite having high soil C.
- The “low P” ENPM soils did not respond to added P.