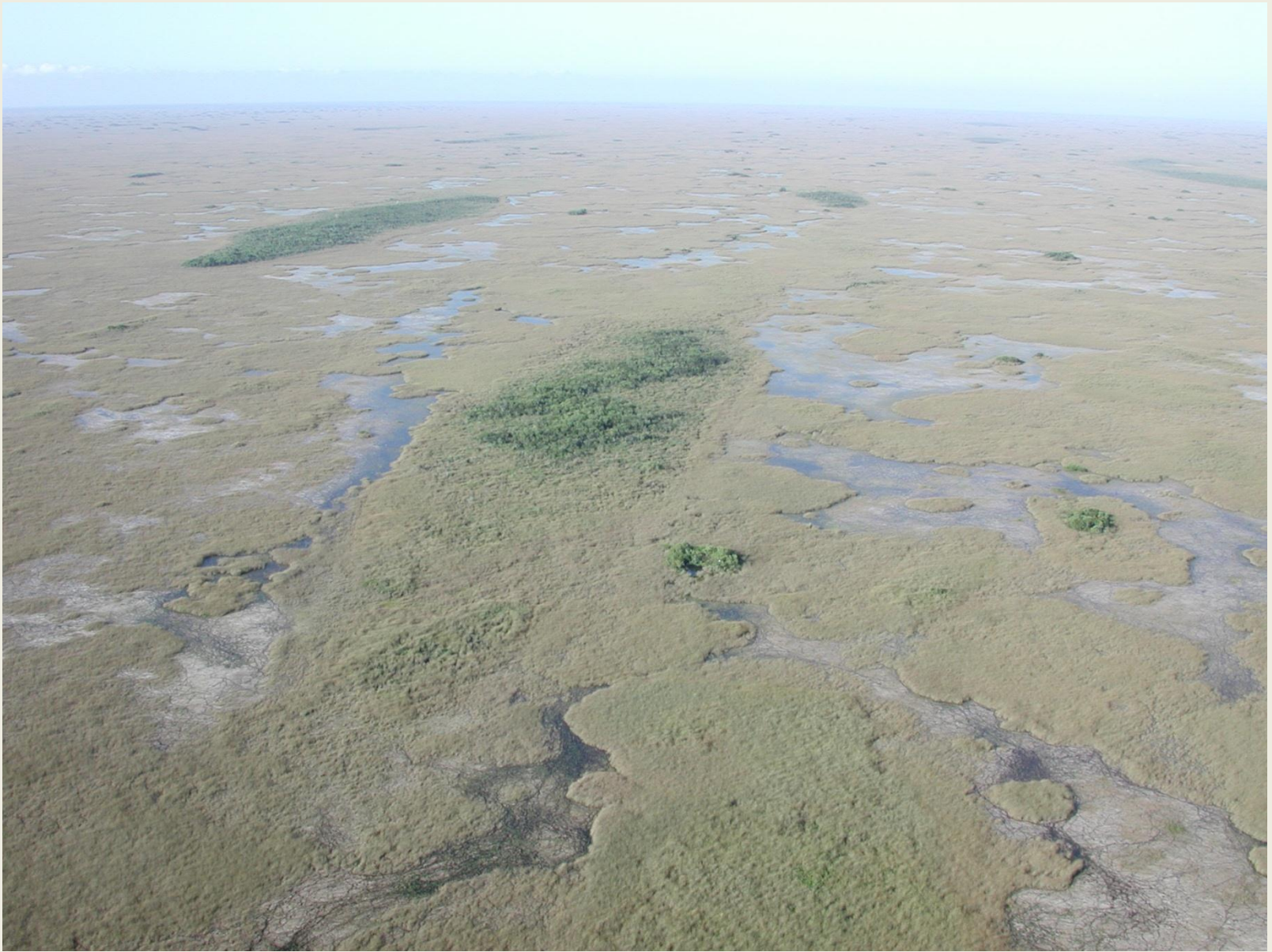


Biogeography of tree islands in the southern Everglades: evidence for self-organization?

MS Ross, JP Sah, PL Ruiz & A Spitzig



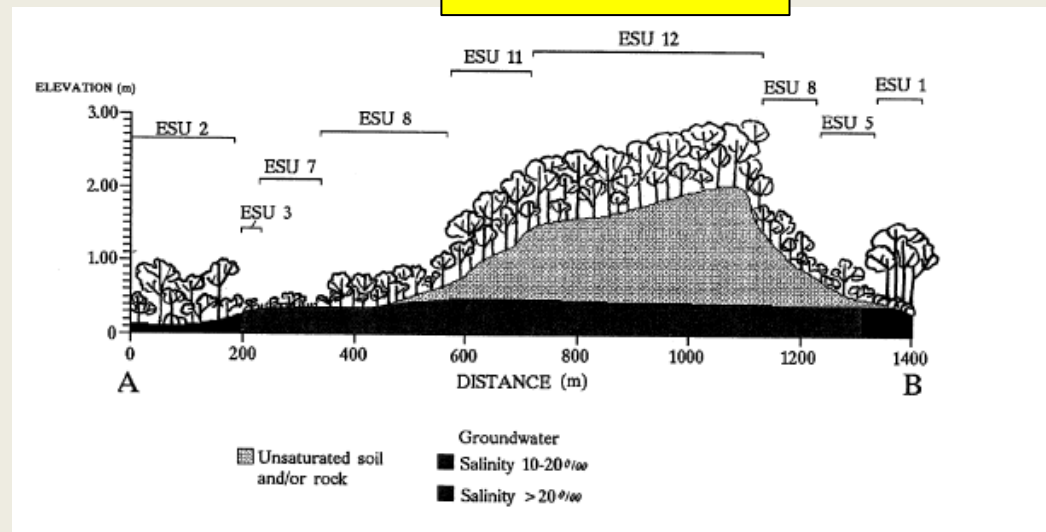


(1) Bayheads in the southern 'glades, with and without sawgrass tails

(2) Tropical hardwood “hammocks” in the Keys



!<-Hammock->!



(3 & 4) Hardwood forests embedded in mainland pine forests and marl prairies



A mesophytic tree island embedded in Everglades National Park pine forest



Tree islands in a seasonally flooded, East Everglades prairie. Islands vary from mesophytic to hydrophytic in species composition

A complex Ridge and Slough (R&S) tree island in interior Everglades peatland ...

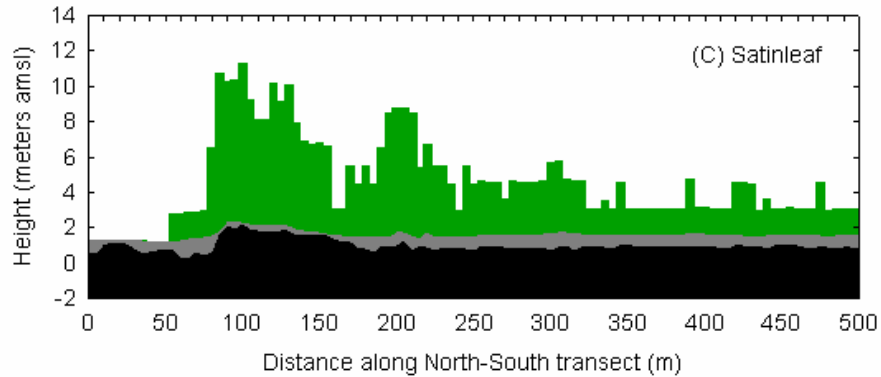


Figure 6-7. Canopy height, soil depth, and bedrock elevation along the long axis of Black Hammock, Gumbo Limbo and Satinleaf tree islands.



... (5) small upland forest at the head, surrounded by extensive swamp forest oriented in the direction of water flow...



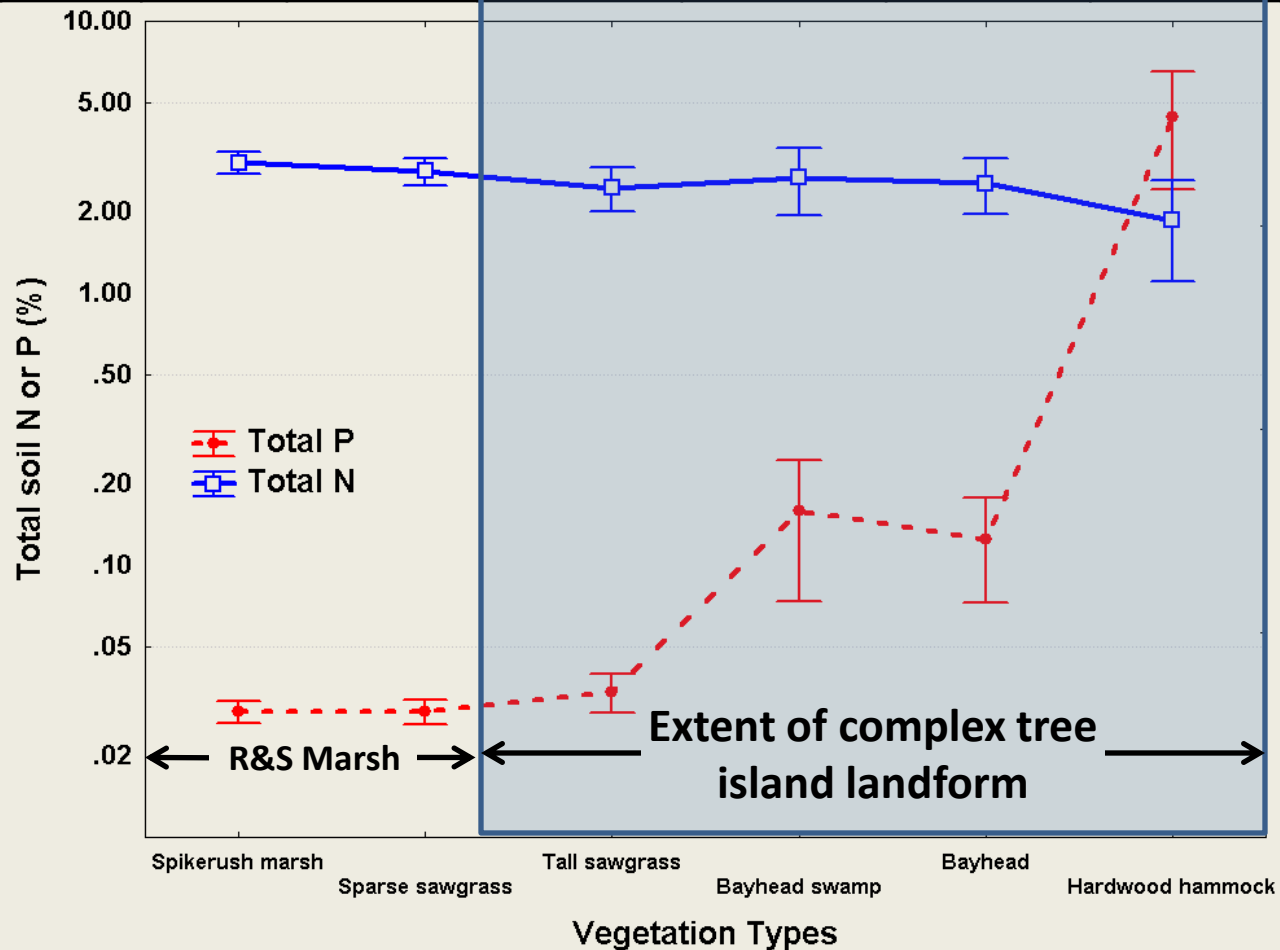


Flooding depth & duration

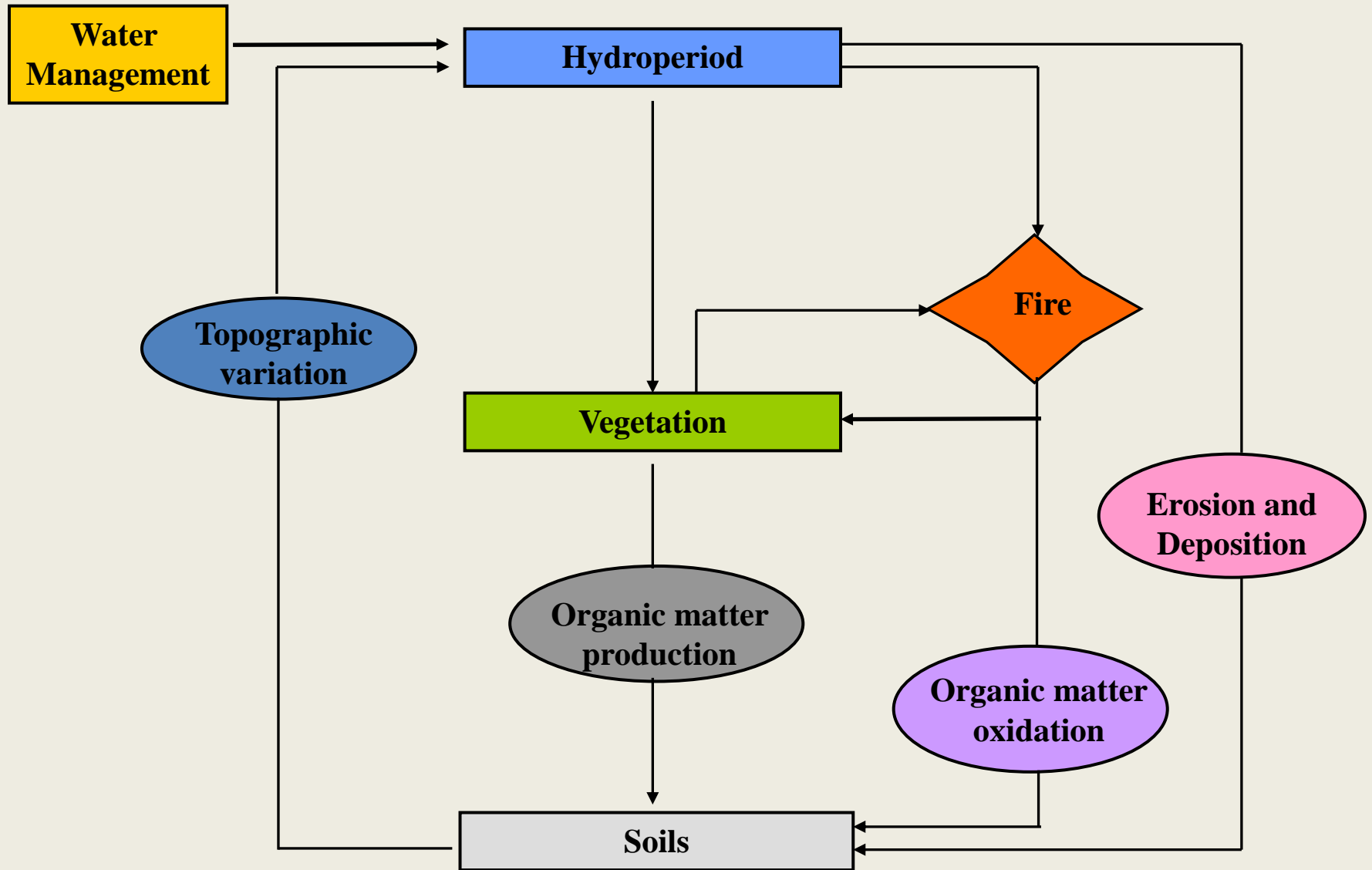


Sharp changes in physical and chemical nature of soils within complex islands

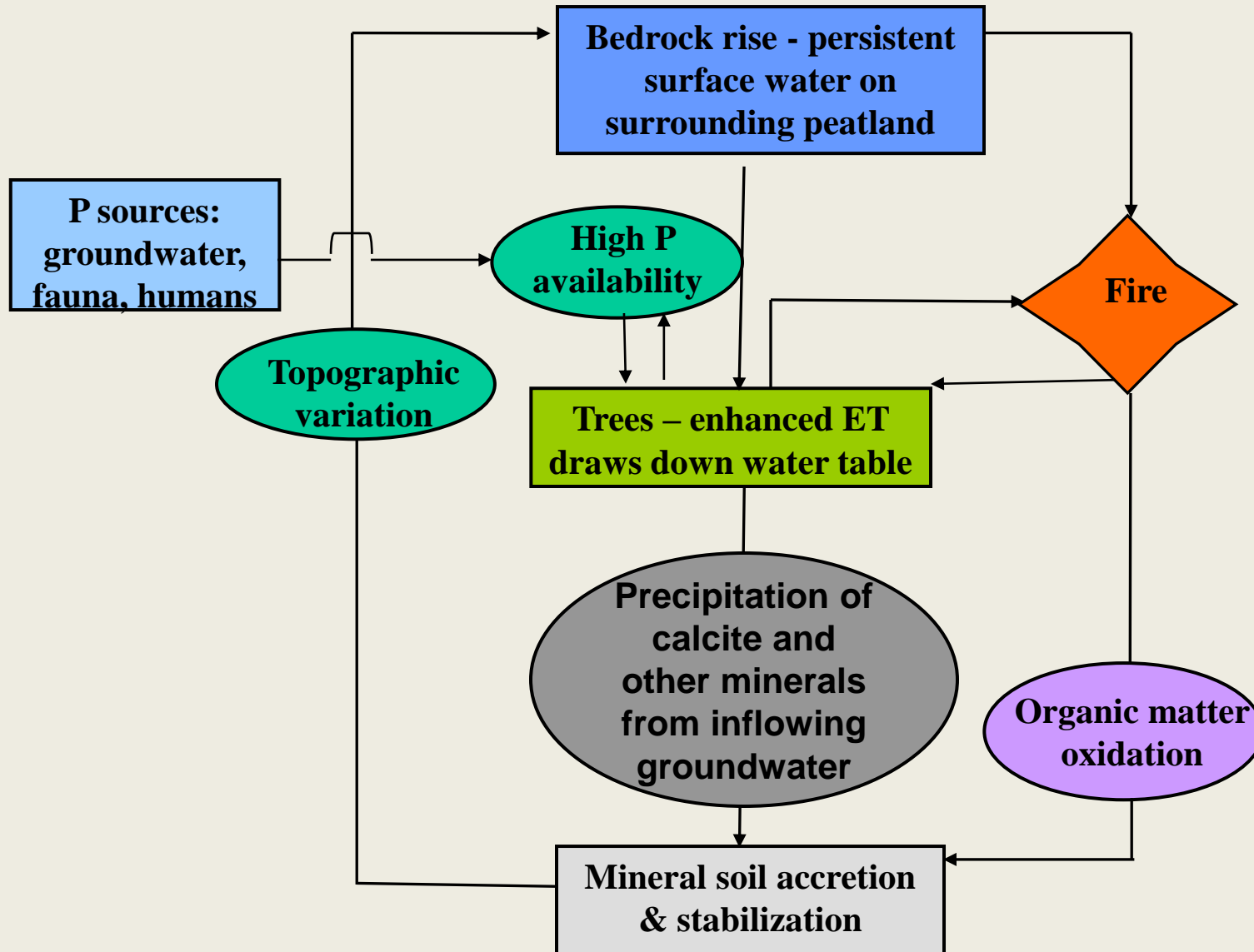
| Dominant plants | Herbs | Herbs | Herbs | Mixed | Woody | Woody |
|-----------------|---------|---------|---------|---------|---------|-------------------|
| Soil | organic | organic | organic | organic | organic | Mineral (Ca-rich) |



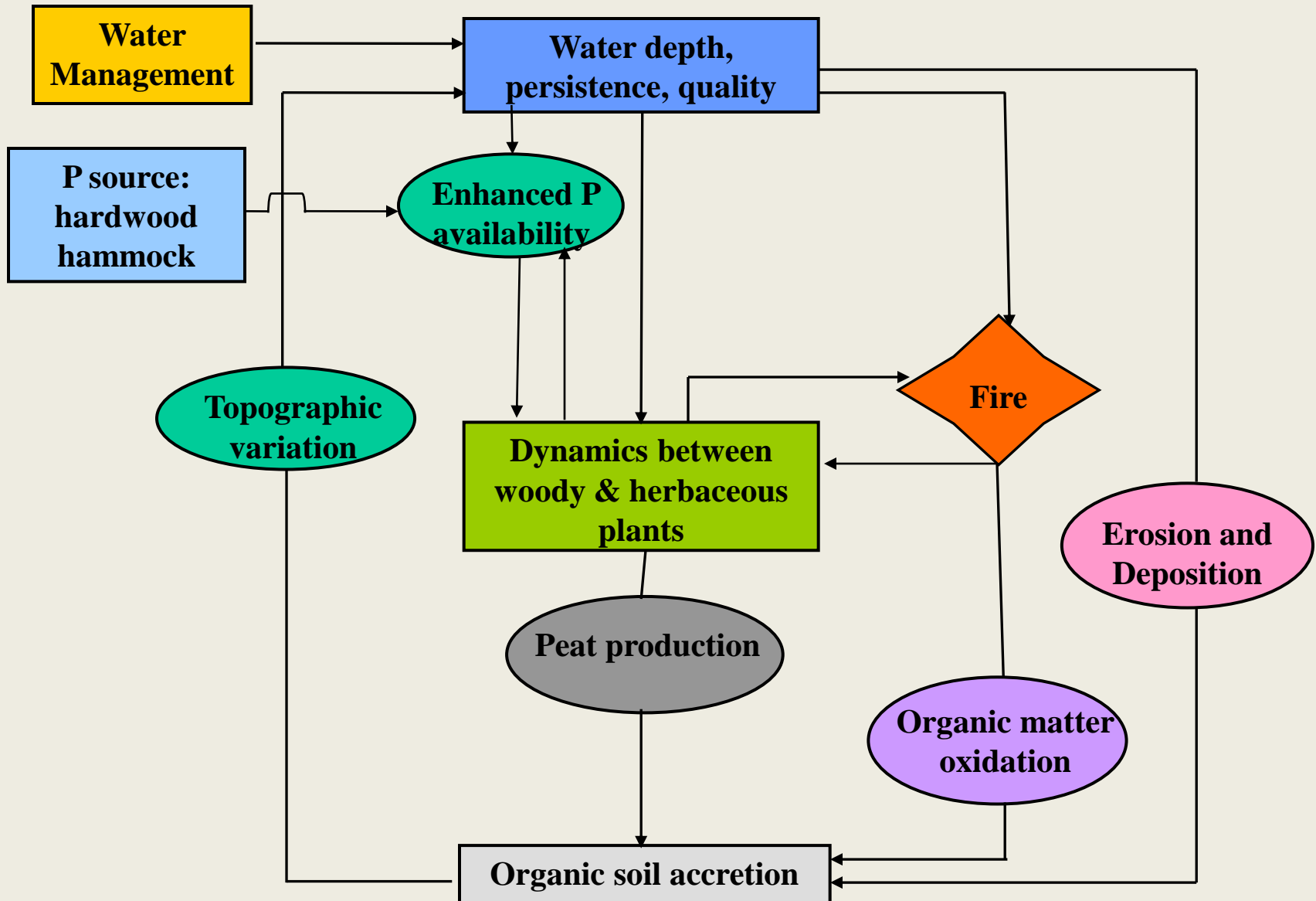
Initial conceptual model of Ridge & Slough landscape



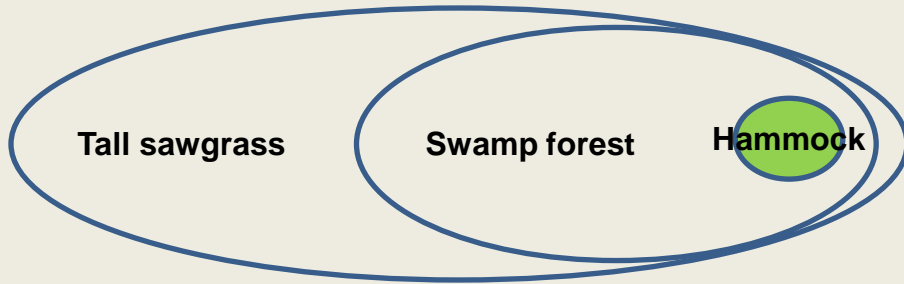
1. Self organization in complex tree island landforms – tropical hardwood hammocks



2. Self-organization in complex tree island landforms: swamp forests

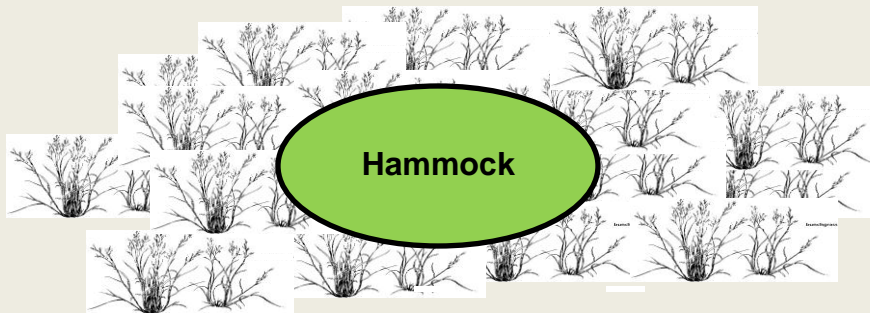


3. Self-organization in metacommunity structure (?): southern Everglades hardwood hammocks



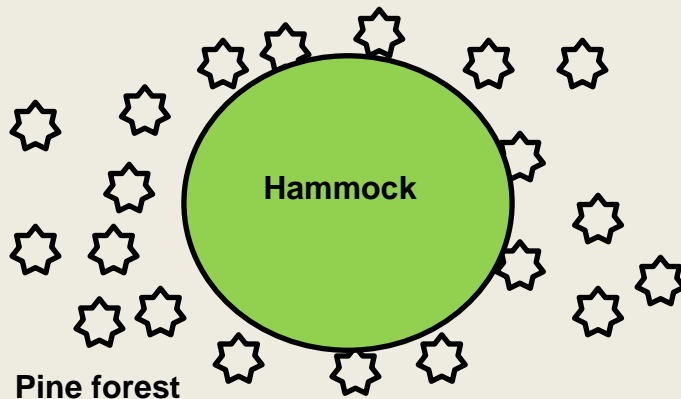
Ridge & Slough Hammock

Low density. Embedded in R&S matrix, but surrounded directly by swamp forest.



Marl Prairie Hammock

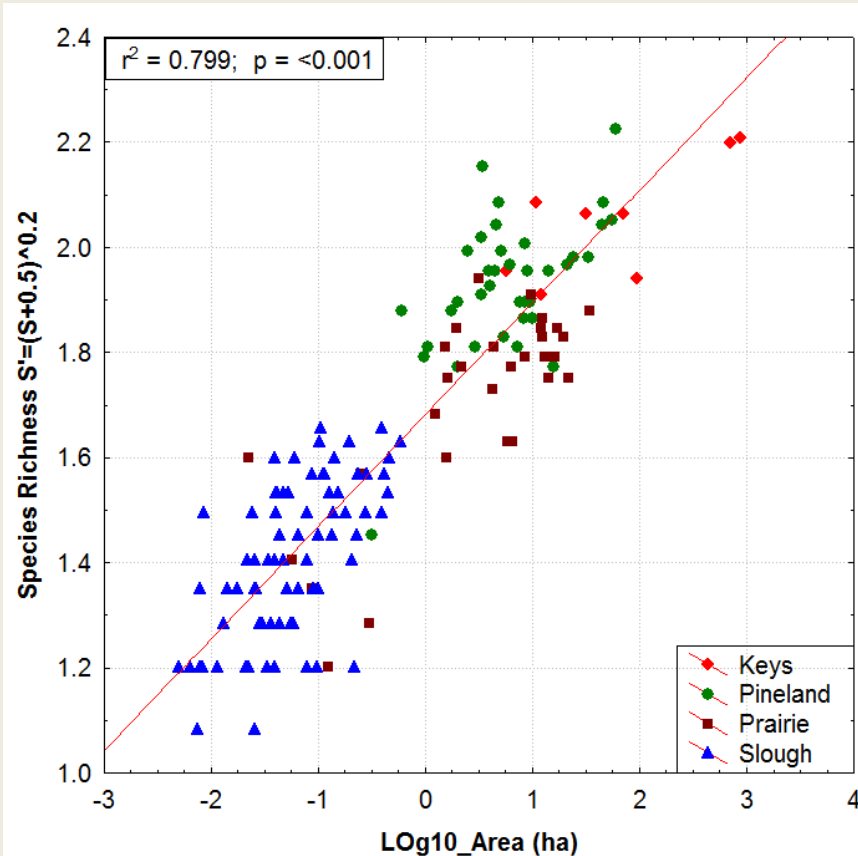
Moderate density. Embedded directly in prairie matrix.



Pine Rockland Hammock

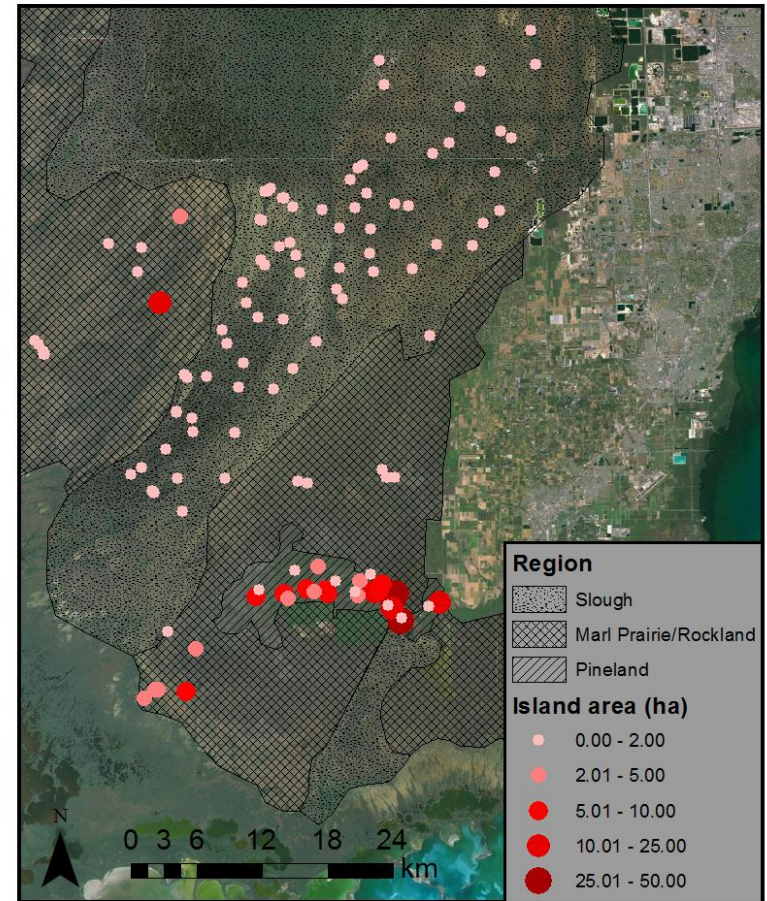
Moderate density. Embedded directly in pine forest matrix.

Effect of hammock area on species richness



Hammock area explains about 80% of the variation in tree species richness

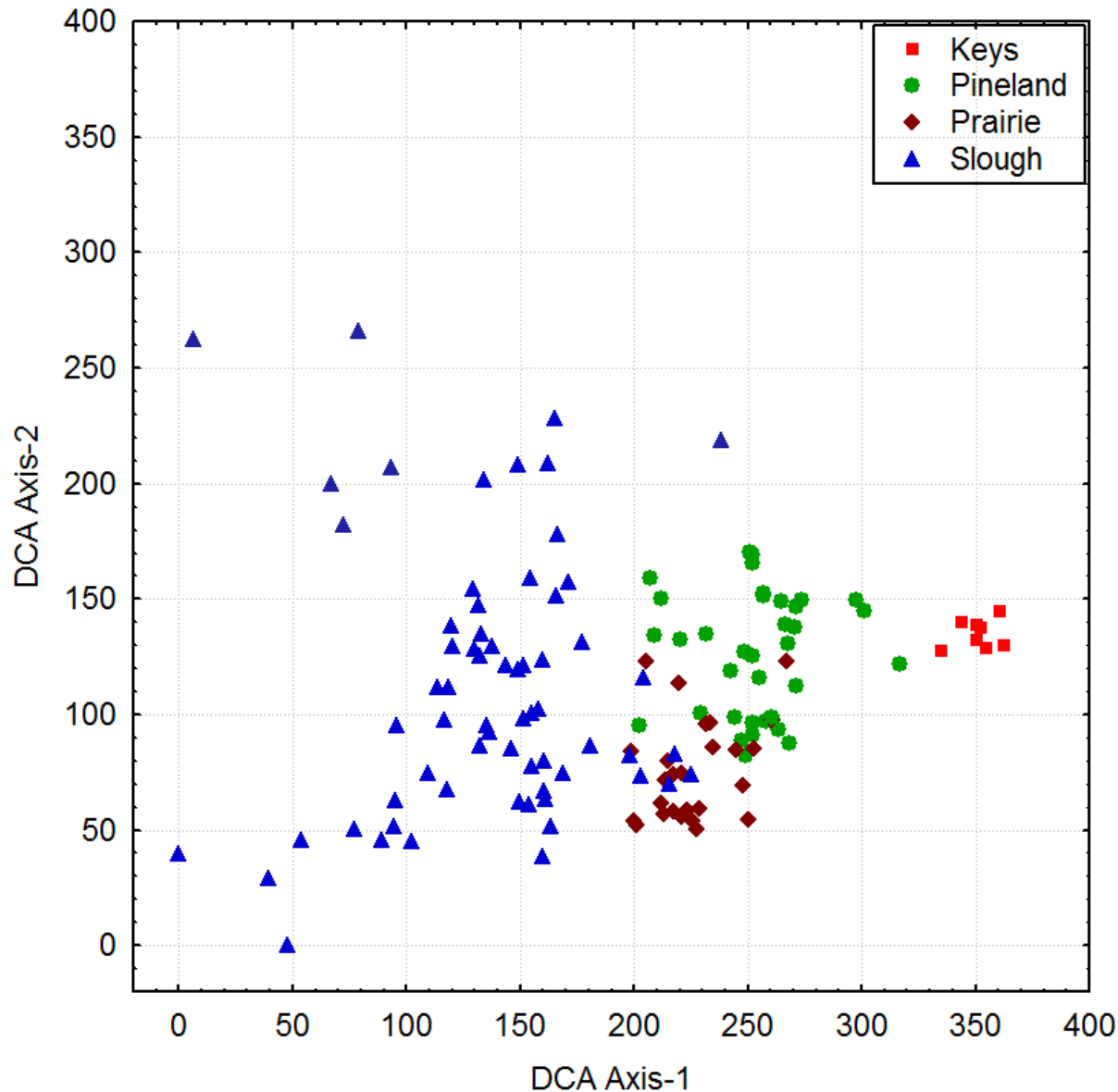
South Florida Tree Islands



Adam Spitzig - Florida International University | NAD 1983 UTM Zone 17N | May 22, 2012

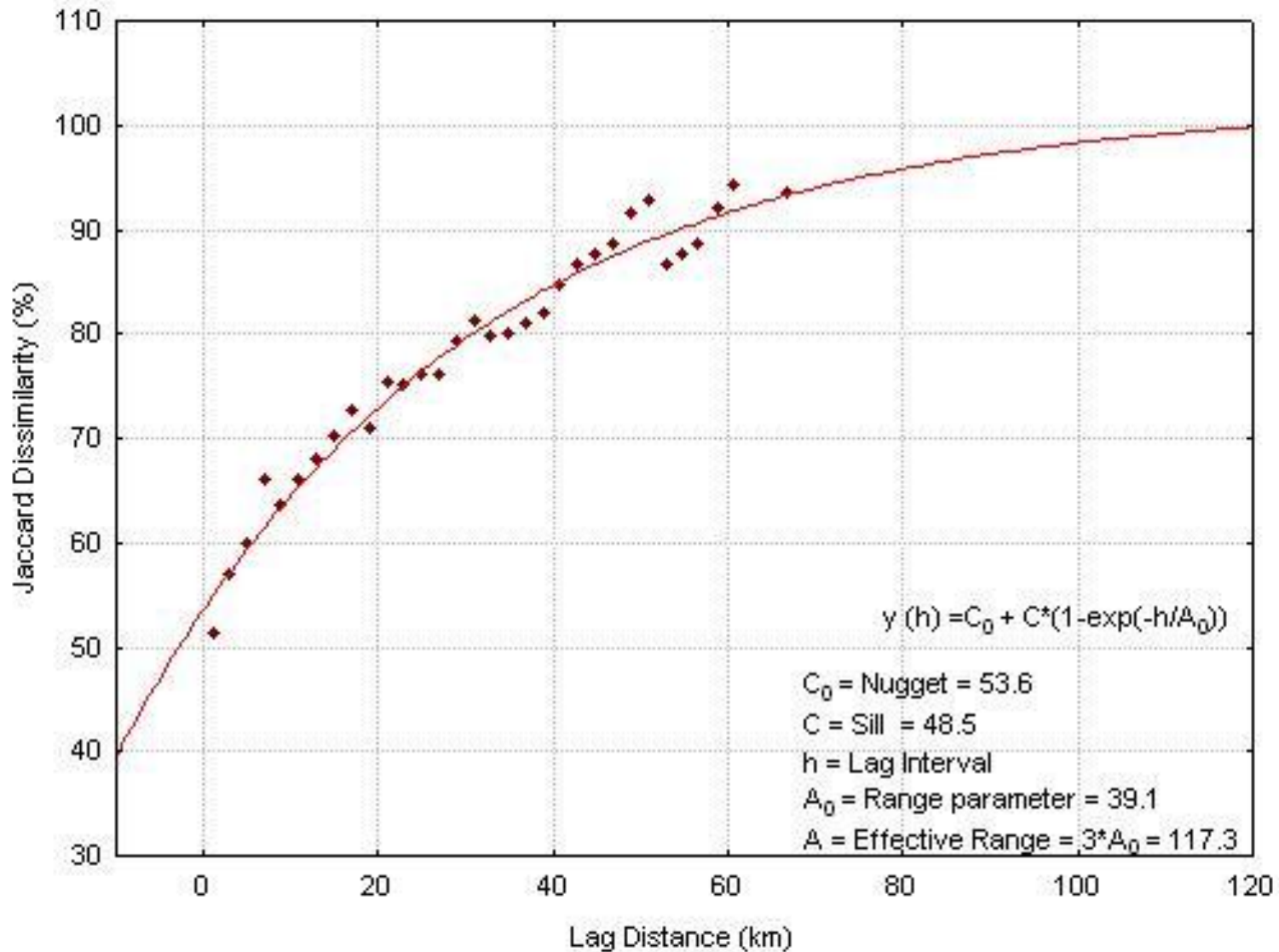
Smallest hammocks are in the interior of the Everglades (almost all 1 ha or less).

Indirect gradient analysis of tree species composition in South Florida hammocks



**...primary axis
arranges
forests
regionally,
from Keys,
through
pinelands
and
prairies, to
interior
Everglades
peatland.**

Strong spatial structure in the composition of southern Everglades tree islands

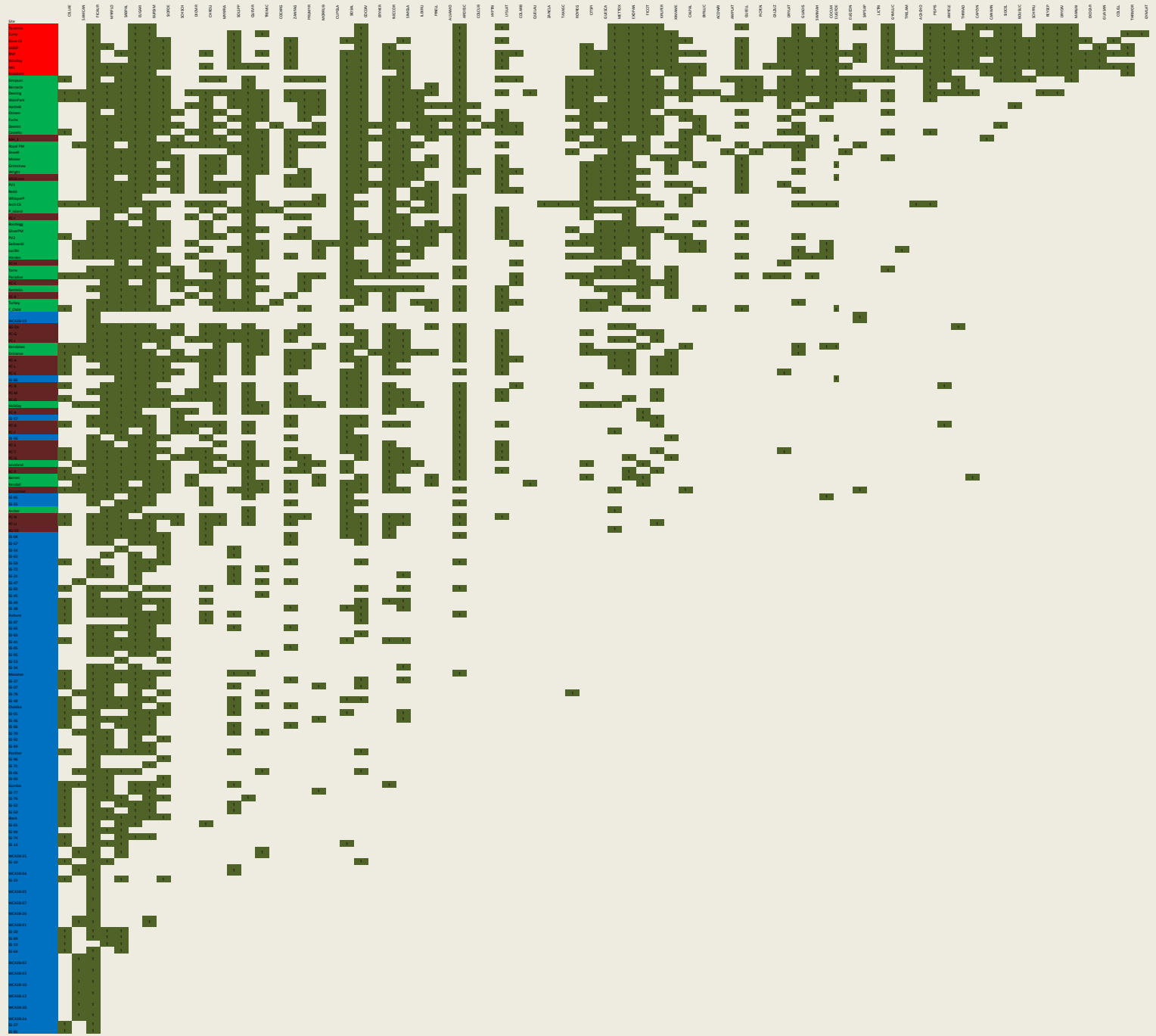


Keys

Pineland

Prairie

Slough



Question: Is intra-regional variation in hammock species composition self-organized?

All of the factors listed here have potential to affect species comp in R&S hammocks in some way.

Likelihood:

unlikely

possible

likely

Potential Ecological Filters on Ridge & Slough Species Composition

| Potential Ecological Filter | Pine Rockland Hammocks | Marl Prairie Hammocks | Ridge & Slough Hammocks |
|-----------------------------|------------------------|-----------------------|-------------------------|
| Minimum temperature | Total range: 1-2°C | | |
| Water table position | Low | High | Intermediate |
| Matrix flammability | High | High | Low |
| Fertility (P availability) | Low | Low | High |
| Intensity of past human use | Intermediate | Low | High |
| Dispersal limitation | Low | Intermediate | High |

Conclusions

1. Current Everglades science indicates that Ridge & Slough hardwood hammocks and the swamp forests that surround them are self-organized landforms, though dependent on underlying geology and historical water conditions.
2. Evidence that self-organization extends to influence hammock metacommunity structure is weak, but should be more thoroughly tested.