TENACIOUS TREE ISLANDS OF FLORIDA'S SOUTHERN COASTAL SWAMP

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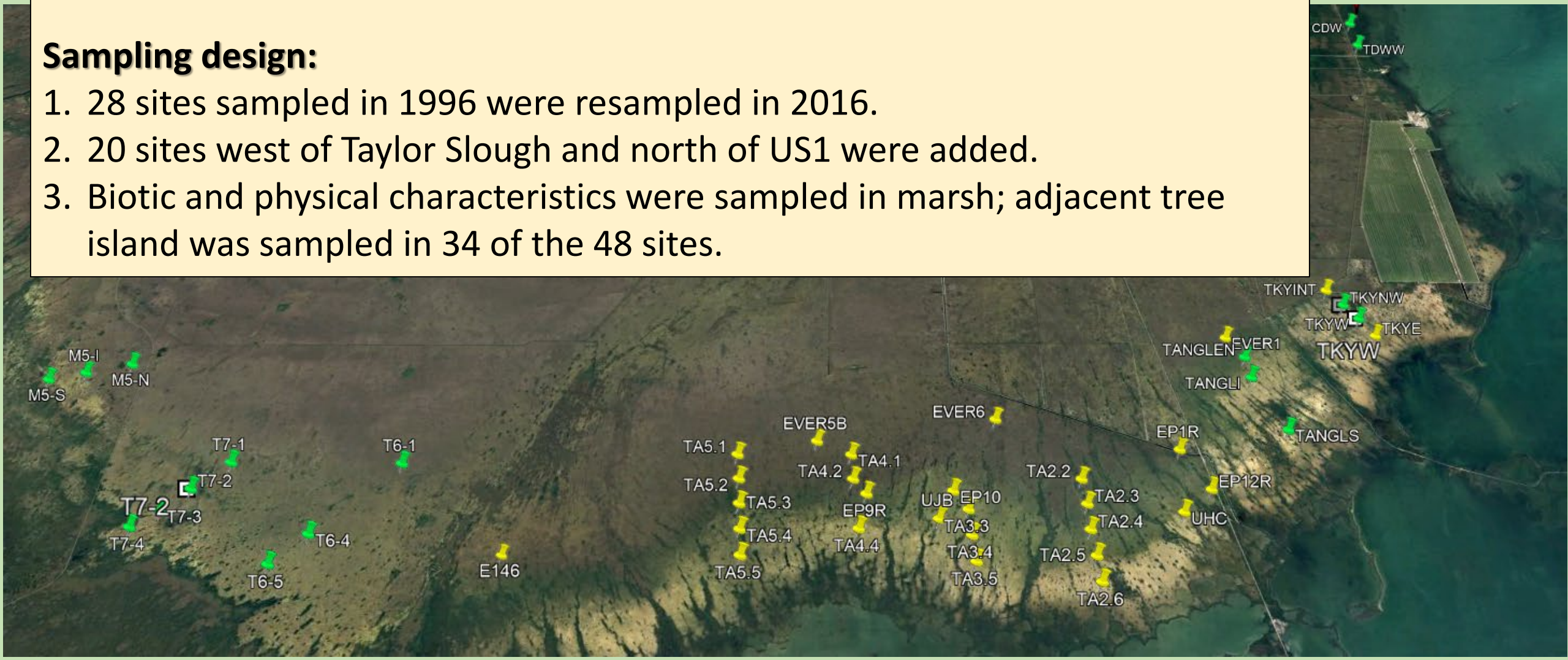
Questions

1. How have coastal Everglades ecosystems changed in last two decades?
2. What environmental driver are most important in determining spatial and temporal change?

Sampling design:

1. 28 sites sampled in 1996 were resampled in 2016.
2. 20 sites west of Taylor Slough and north of US1 were added.
3. Biotic and physical characteristics were sampled in marsh; adjacent tree island was sampled in 34 of the 48 sites.



Sampling Methods

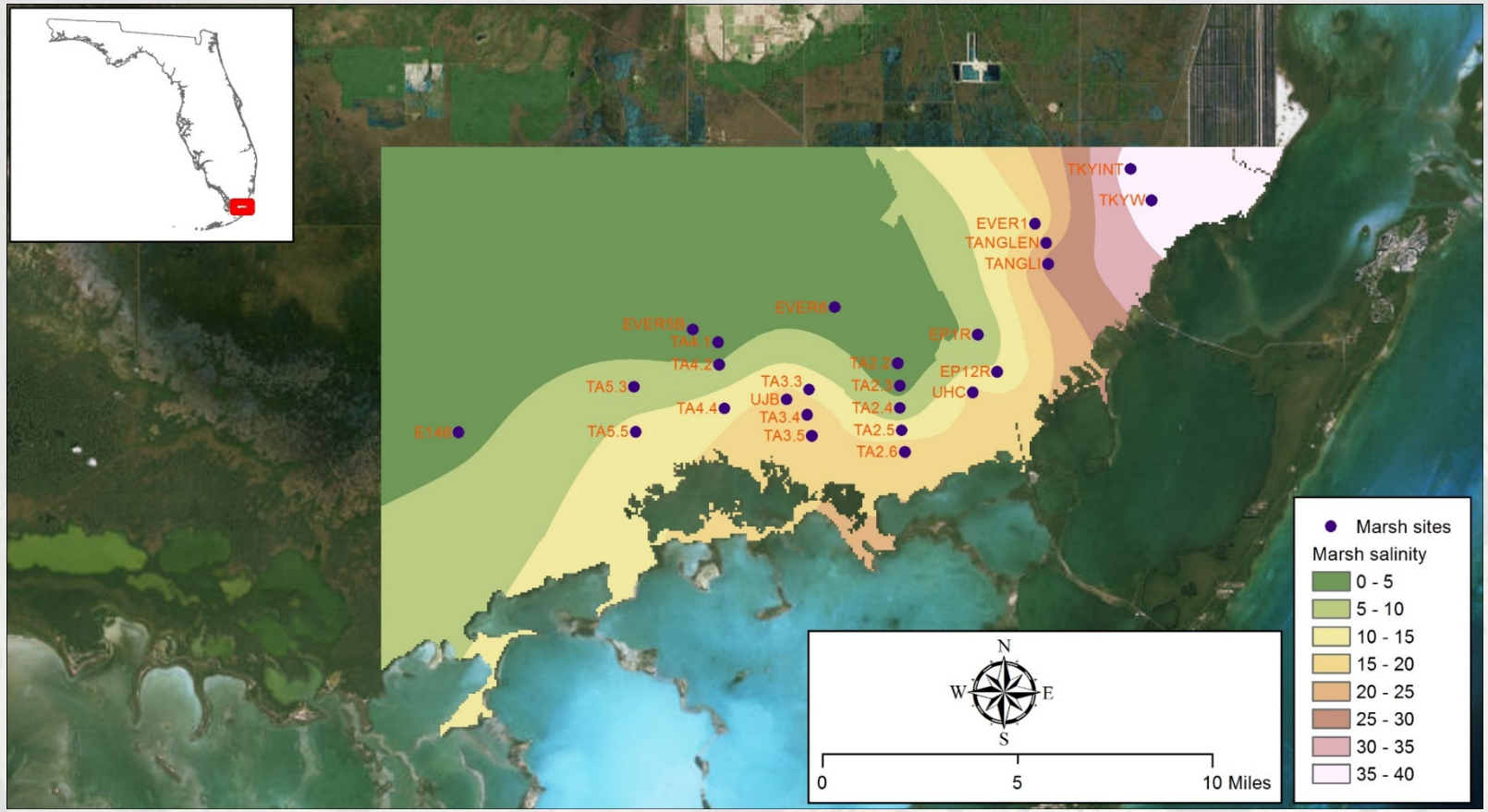
Marsh:

1. Soils/Environment
    a. Soil core collected at plot center, analyzed by stratum for chemical & physical characters within top 30 cm
    b. Pore water salinity determined at peak dry season, late April 2018
    c. Mollusk composition and soil accretion rates determined at 1 cm intervals
2. Biota
    1. Vegetation composition/structure sampled in 30 1 m^2 plots
    2. Samples collect for leaf chemistry of *Rhizophora mangle*

Tree Islands:

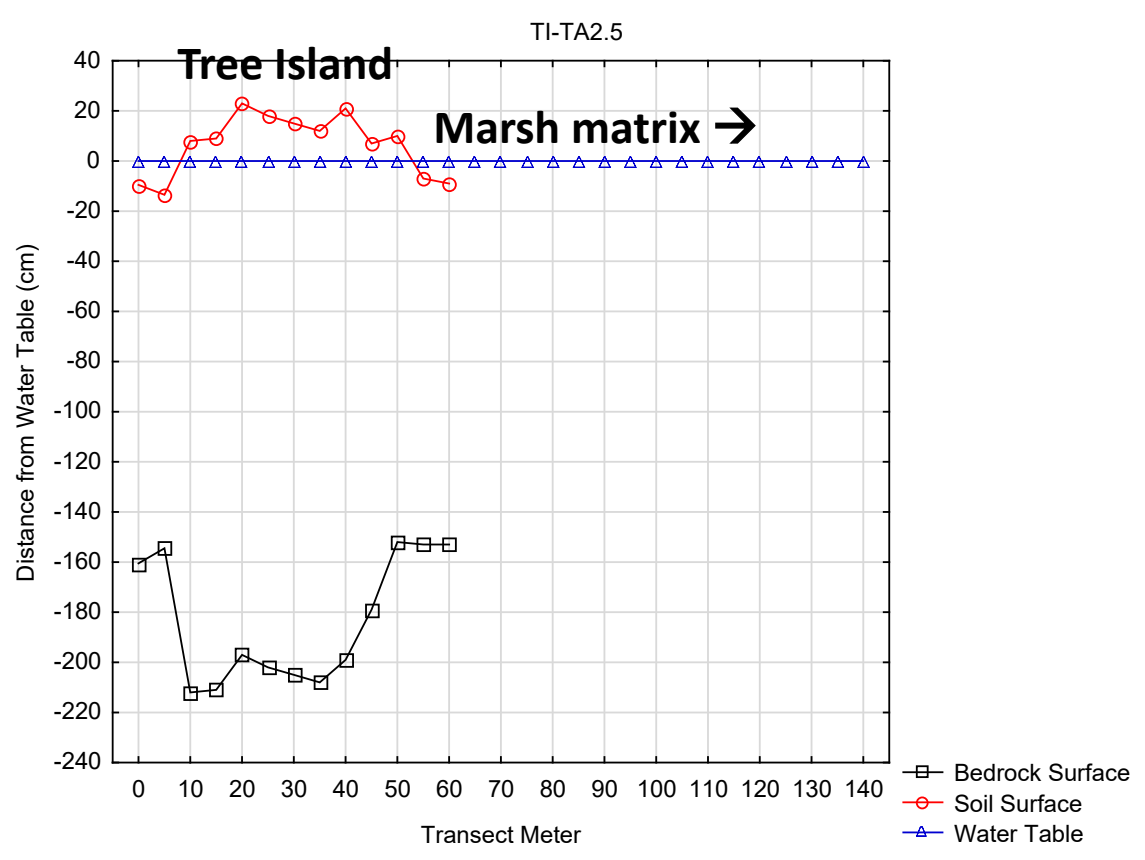
1. Soils/Environment
    a. Elevation of soil surface, water table, and bedrock determined along cross-island transect
    b. Soil core collected at plot center, analyzed by stratum for chemical & physical characters within top 30 cm
    c. Pore water salinity determined in late April 2018
2. Vegetation
    a. Assessed rank abundance of tree species throughout island
    b. Samples collect for leaf chemistry of *Rhizophora mangle*

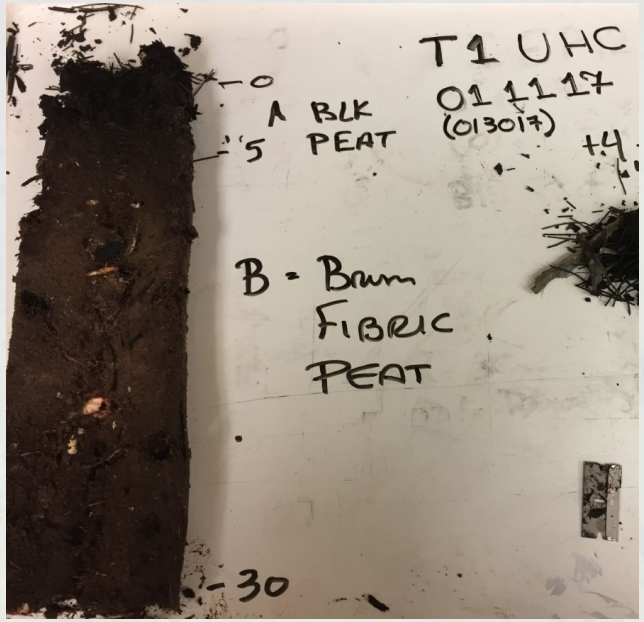
Patterns of coastal influence within the regional wetlands

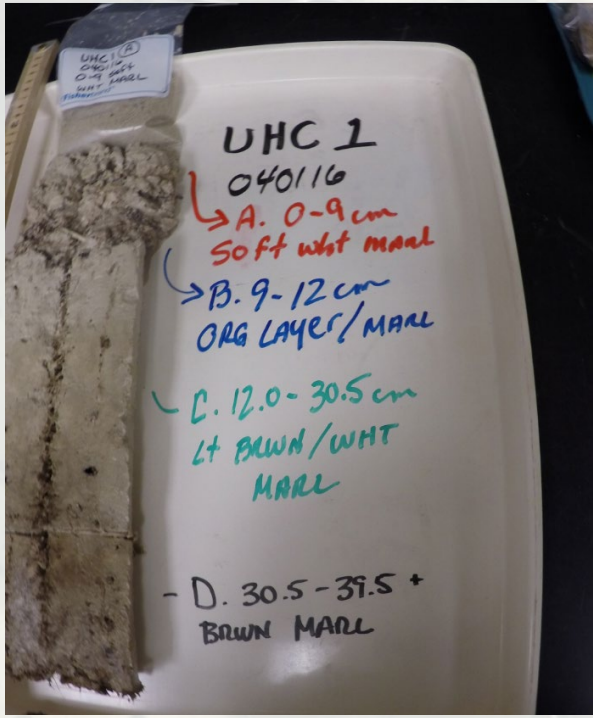


1. Based on peak dry season (April 2018) marsh pore water salinity (above), a strong east-west gradient accompanies the expected coast-interior gradient in the Southeast Saline Everglades.
2. While our data indicate that fresh water wetlands extend farther south to the west of Taylor Slough, our coverage doesn't allow delineation of the coastal gradient in that area.

Local patterns in production/composition – tree island v marsh





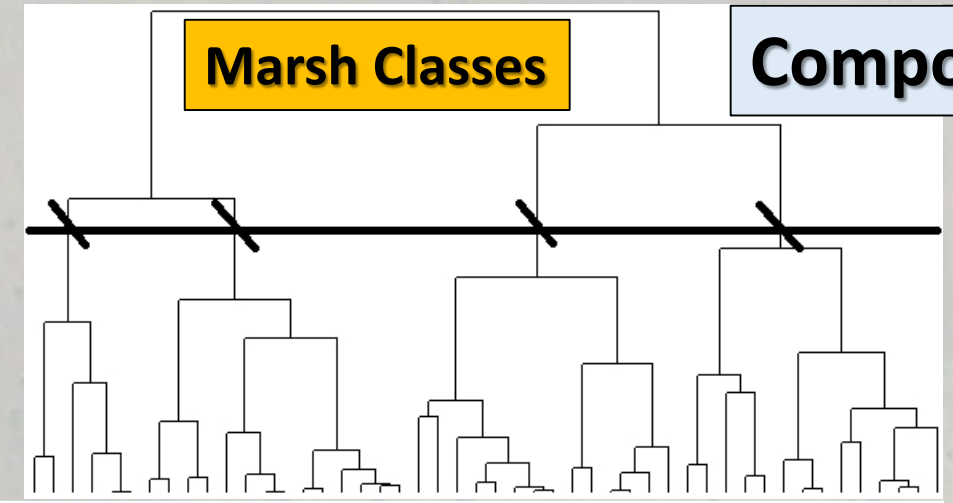


TI surfaces are usually elevated. Some occur in bedrock depressions; most have very irregular bedrock surfaces

1. **Trees in coastal tree islands are 4-10 m tall, while plant height in adjacent marsh is usually 2 m or less.**
2. **Tree island soils are peaty, while marsh soils are carbonate muds (marls), sometimes with peat layer(s) at the surface or mid-profile.**

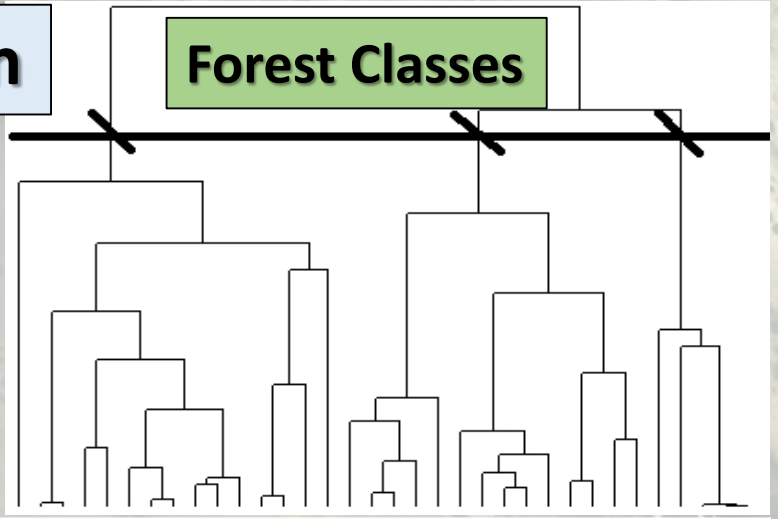
Compositional Classification

Marsh Classes



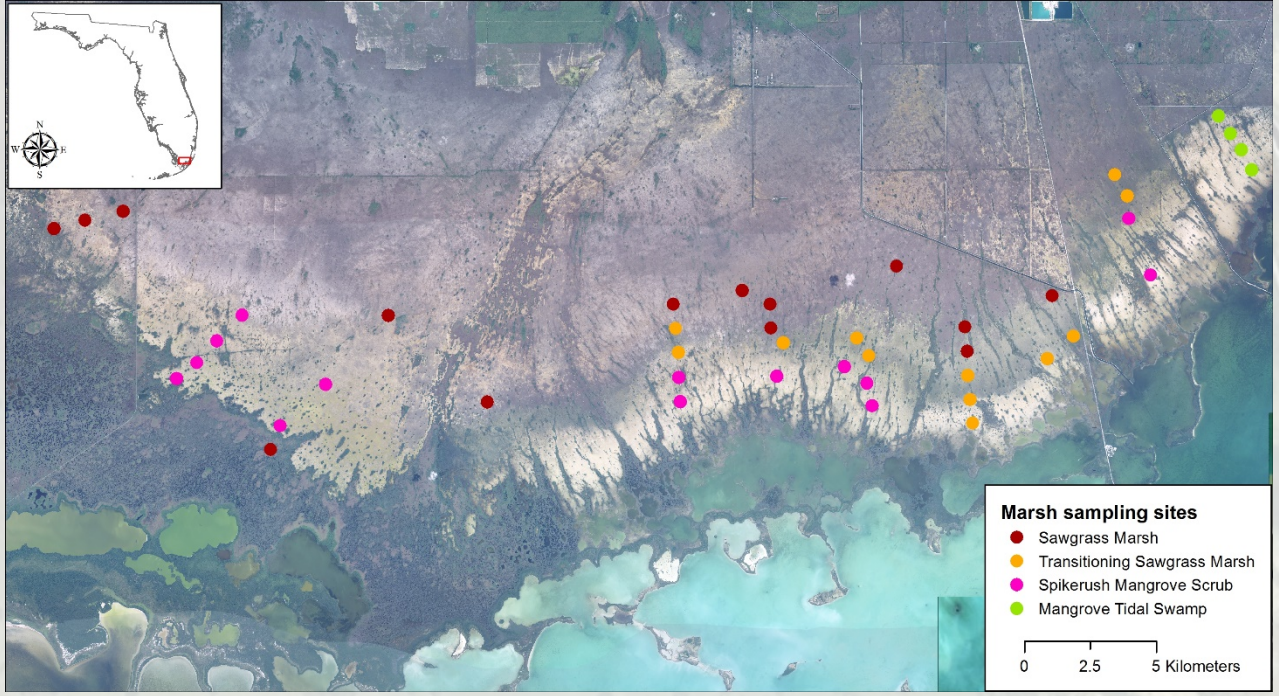
Species	Mangrove Tidal Swamp	Transitioning Sawgrass Marsh	Spikerush Mangrove Scrub	Sawgrass Marsh
CLAJAM		8	38	95
ELECEL	10	92	32	60
RHIMAN	96	49	89	31
CASFIL				22
RHYTRA		15		15
CRIAME				9
OXYFIL				8
SAGLAN		3		5
BACCAR				3
TILFLE		1	1	2
UTRFOL		9	1	1
TILPAU		2	3	1
MORCER		1		1
UTRPUR		5	9	1
TILSPP			1	
RUPMAR	18	3		
JUNROE	19		1	
AVIGER	53			
LAGRAC	66		1	

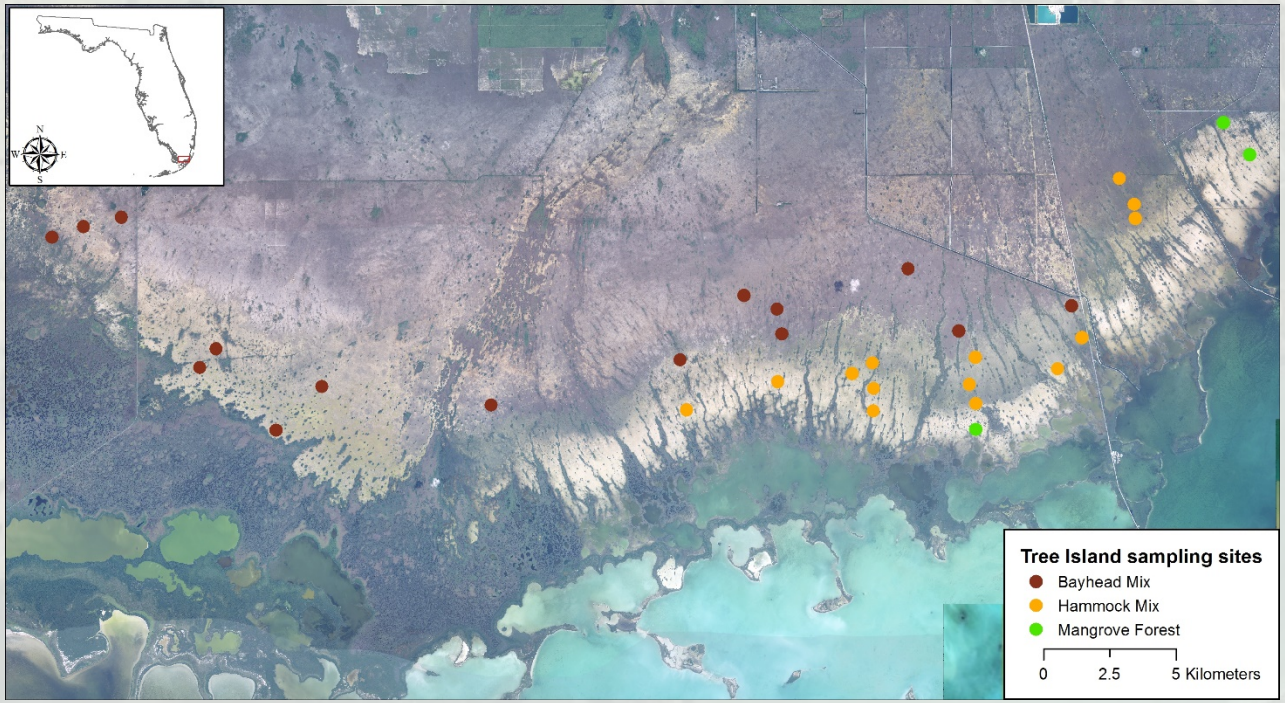
Forest Classes

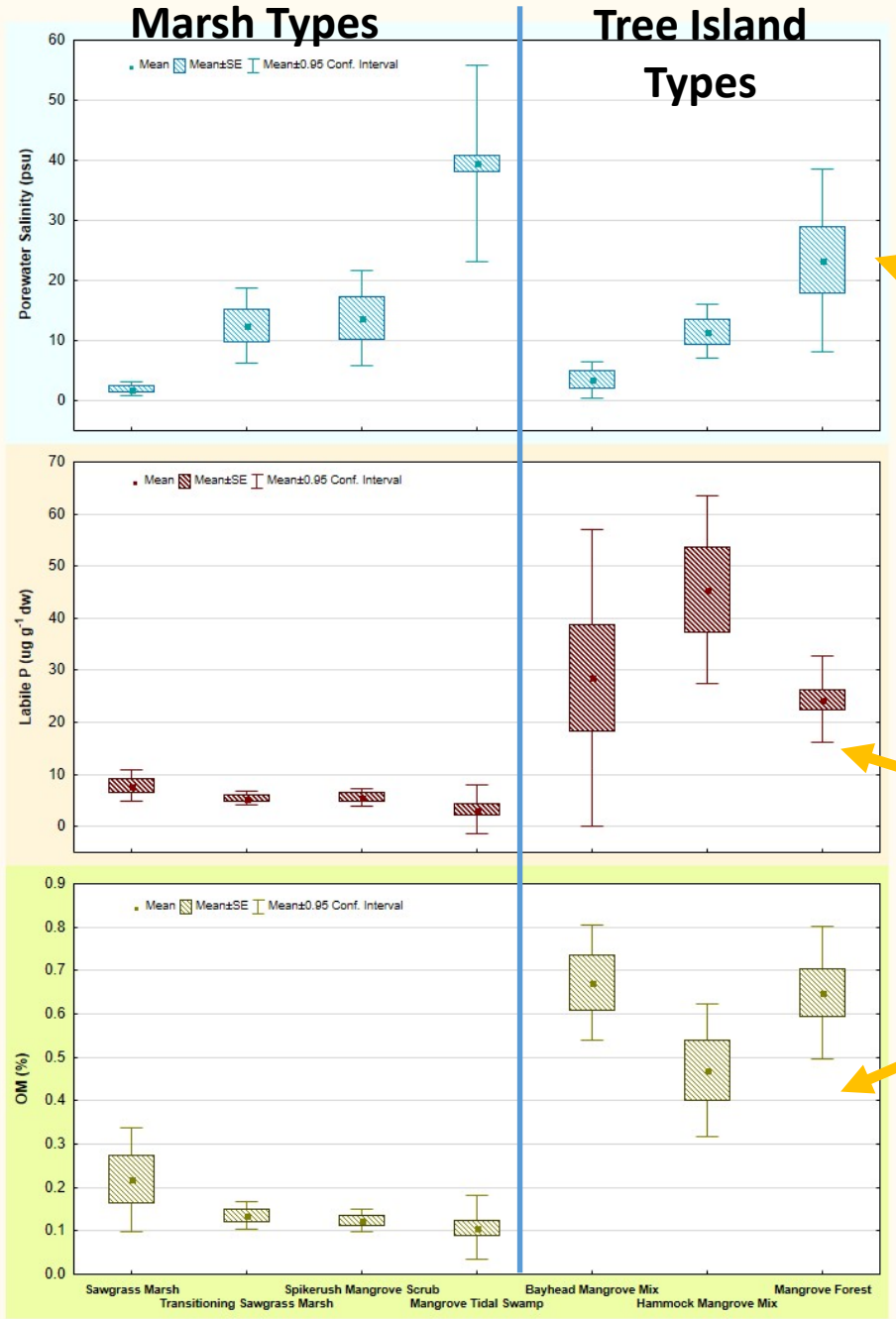


Species	Bayhead Mix	Hammock Mix	Mangrove Forest
CHRICA	90	15	
METTOX	80	93	
MORCER	73	42	
RHIMAN	58	100	100
CONERE	55	93	80
PERBOR	51	6	
MYRFLO	33	37	
ILECAS	25	3	
COCDIV	20	23	
ACOWRI	15		
EUGAXI	10	10	
CALPAL	10	31	
SWIMAH	1	22	
RANACU	1	26	10
CASEQU		28	
SCHTER		16	
COCUVI		29	
EUGFOE		38	
SIDCEL		28	10
AVIGER		4	60
LAGRAC		22	100

The distribution of both tree island and marsh community types across the landscape are zonal, i.e, exhibit coast-to-interior compositional gradient



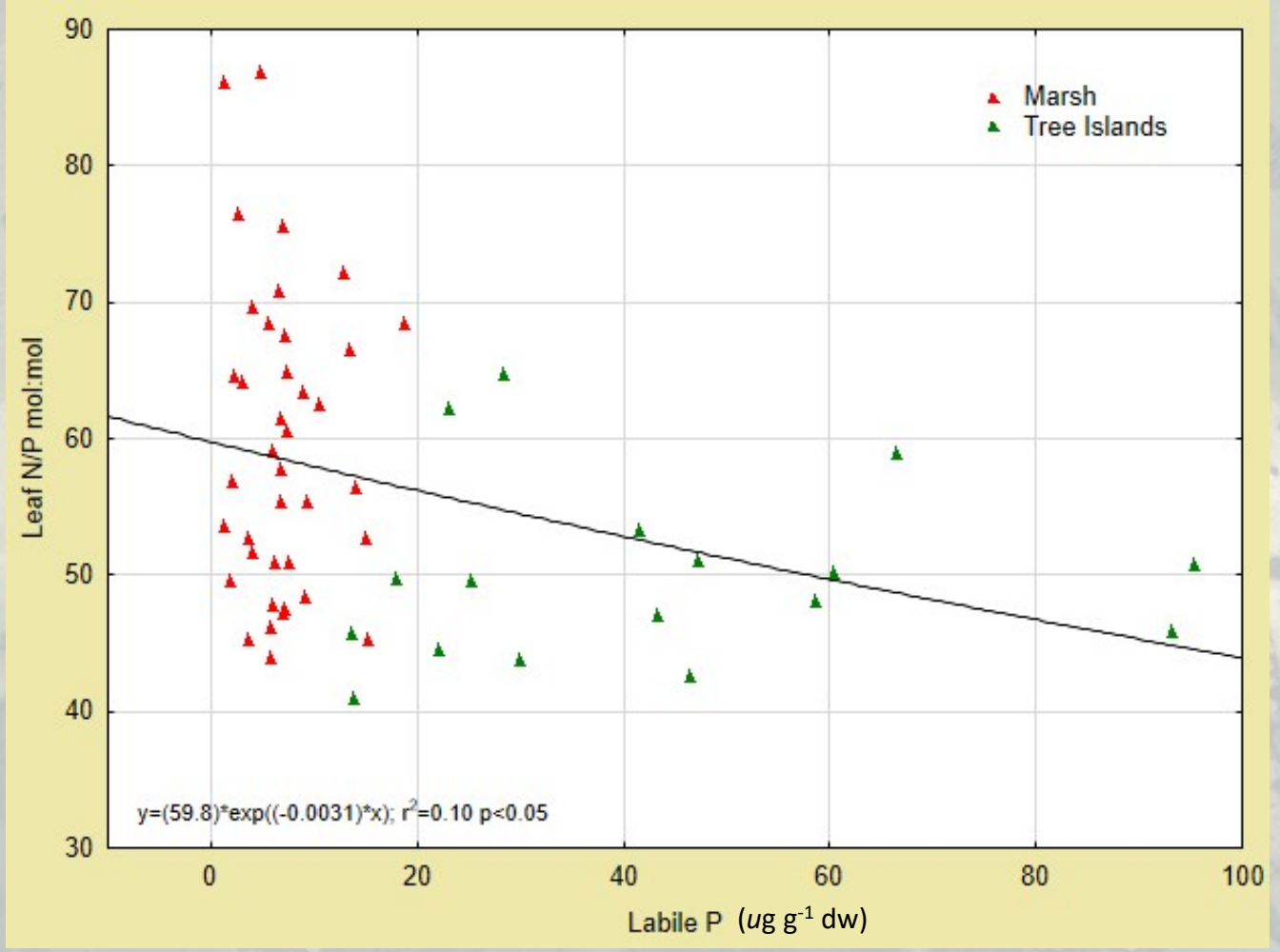


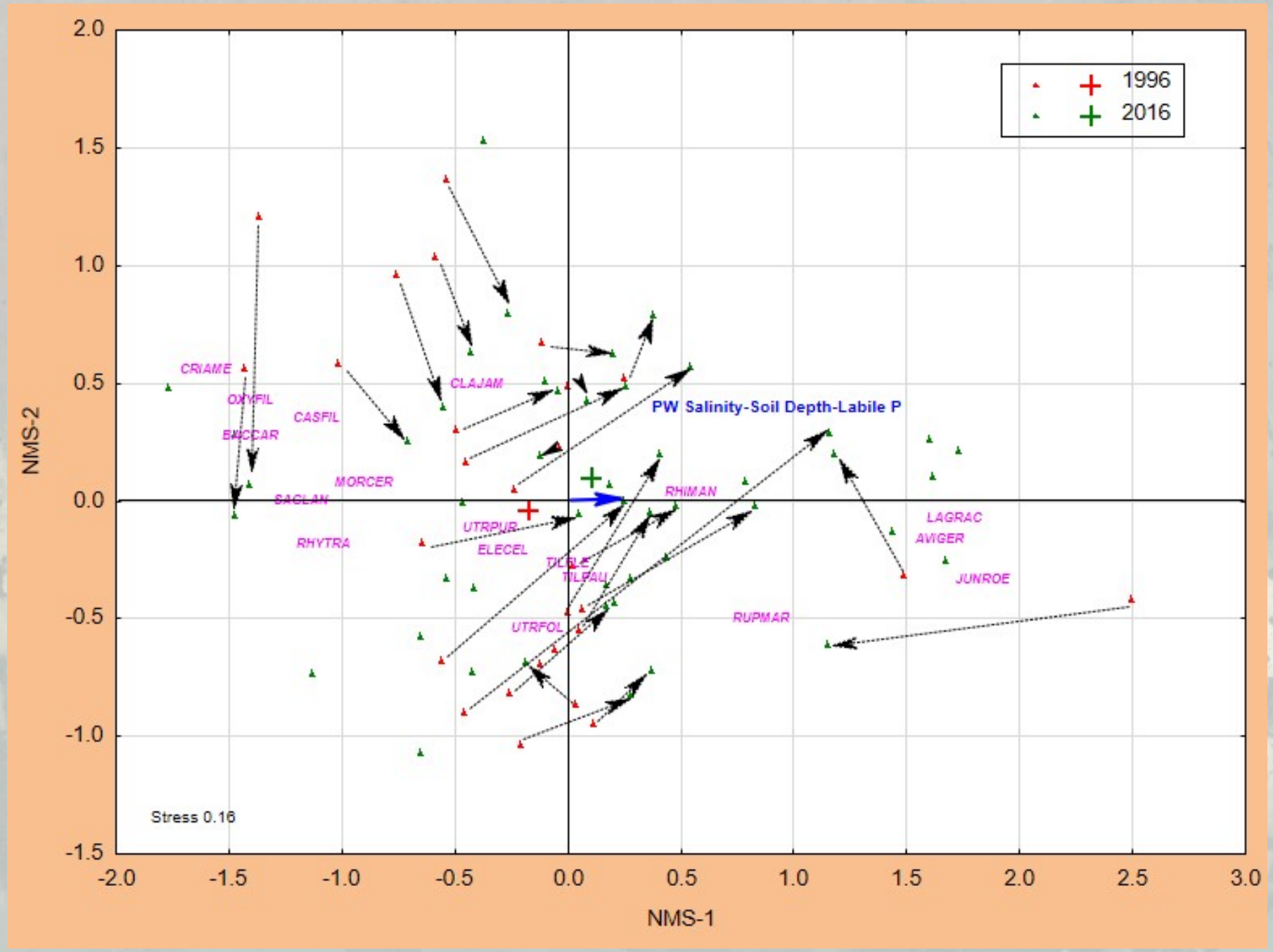


Among these 3 environmental variables, the gradual increase in pore water salinity from one type to another within marsh and tree island reflects this coastal zonation, but not much difference between the two groups.

However, there is little sign of similar zonation in two soil variables, labile phosphorus and organic matter content, which exhibit primarily a sharp contrast between all marsh types and all tree island types

While a spatial gradient in soil P availability is not evident across the coastal zone, variation in available soil P within local landscapes is reflected in intra-specific leaf N:P ratios (marsh v. tree island) for *R. mangle*

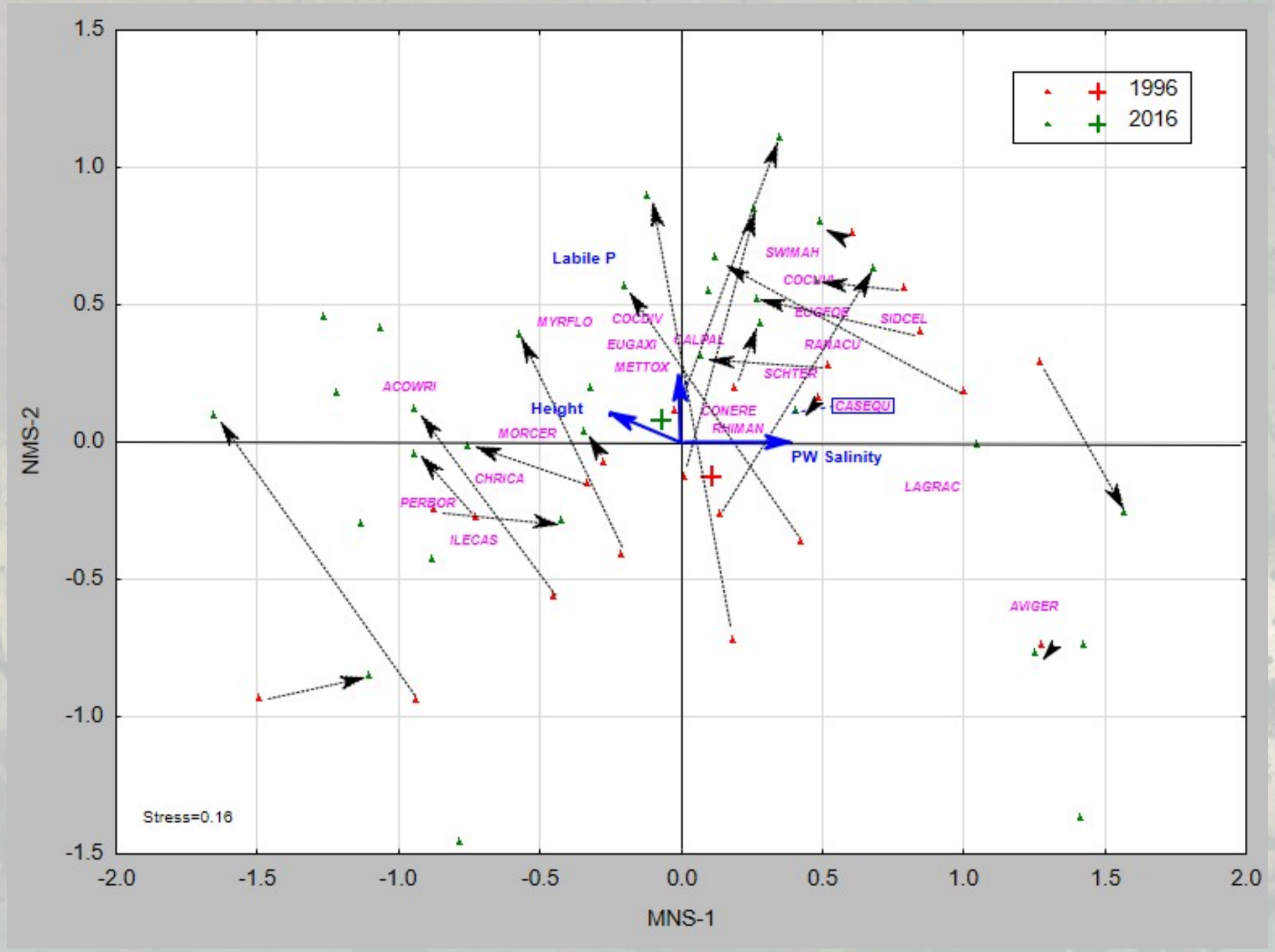




Marsh dynamics

1. **Significant compositional shift over last two decades.**

2. **Movement is primarily toward more halophytic communities.**



Tree Island dynamics

1. Significant compositional shift over last two decades.

2. Change is not toward halophytes, but rather toward mesophytic environment favoring several tropical hardwoods.

Conclusion

1. The South Florida coastal zone is undergoing changes in physical drivers that are reflected hierarchically in vegetation at the regional scale and within landscapes.

2. Changes in the marsh have been driven by salt water encroachment, while forest composition seem to have responded to [currently unknown] local factors that preserve the elevated tree island landform.

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