Characterization of Microtopography in the Everglades

Judson W. Harvey, Jessica T. Newlin, and Jungyill Choi[1]

U.S. Geological Survey, Reston, VA

[1] - now at S.S. Papadopulos and Associates, Inc., Bethesda, MD

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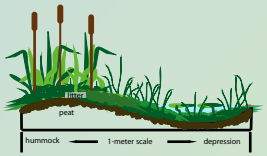
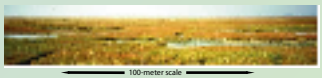
INTRODUCTION

As concerns over how to restore the Everglades intensify, the need to improve capabilities of surface-water flow models becomes increasingly important. One of the physical factors not often considered in surface flow modeling is the microtopography of the wetland surface. Microtopography affects the cross-sectional area of a wetland that is available for surface-water flow. As water levels decline seasonally, the tops of ridges and hummocks become exposed, making flow paths more sinuous, and therefore, increasing the resistance to surface flow. Microtopography also potentially affects the water budget and water quality due to water exchange that occurs between surface water and porewater in sediments.

DEFINITIONS

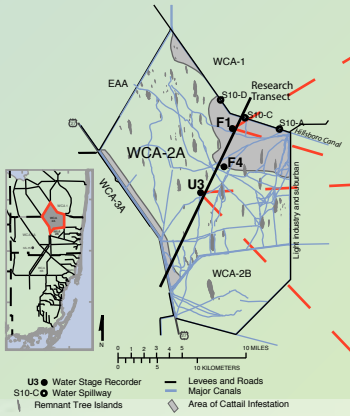
- At **1-meter horizontal scale**, the elevation of the wetland surface undulates between hummocks associated with macrophytes and the depressions between them.
- At **100-meter horizontal scale**, topography varies between the tops of ridges and the bottom of nearby sloughs.





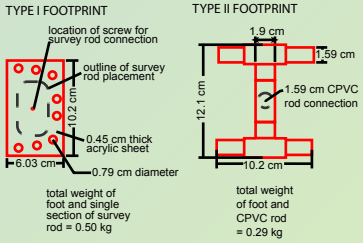
SITE DESCRIPTION

- Microtopography data was collected at sites F1 and U3 in Water Conservation Area 2A (WCA-2A), central Everglades.
- Site F1 is dominated by cattail vegetation, and site U3 is dominated by sawgrass vegetation.
- Surface-water flow direction is generally parallel with the research transect from spillway S10C toward site U3.

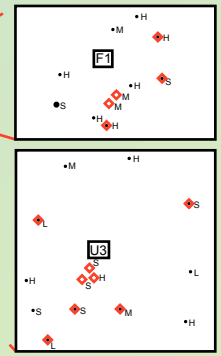


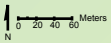
FIELD METHODS

- The **type I tool** did not penetrate the layer of flocculent organic matter, or "floc," that typically rests above the peat. This tool estimated the elevation of the top of the floc layer.
- The **type II tool** penetrated the floc and rested on the peat because of its more open footprint. This tool estimated the elevation of the peat surface.



- Field measurements of microtopography were made near sites F1 and U3. The measurements were distributed so that variability of the wetland surface could be characterized for both 100-meter and 1-meter spatial scales.





F1 Research dock location

- Location of 100-meter scale topographic measurements (1 measurement with type I and type II tools at each site)
- Location of 1-meter scale topographic measurements (10 measurements with type II tool at each site)
- Location of both 100-m and 1-m measurements

Vegetation density at measurement site

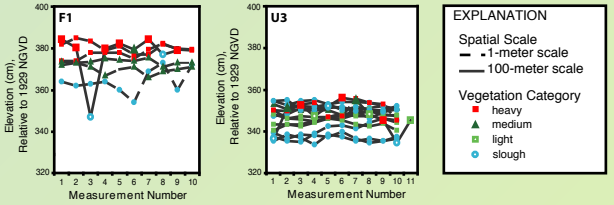
H: heavy vegetation, **M**: medium vegetation, **L**: light vegetation, } Predominantly cattail at F1 and sawgrass at U3

S: slough (spikerush and water lily)

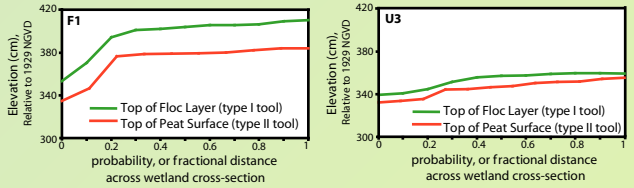
MICROTOPOGRAPHIC VARIABILITY AND DISTRIBUTION

- The elevation of the peat surface varies 3-4 times more at the 100-meter scale compared with the 1-meter scale.

Horizontal Scale of Measurements	2 Standard Deviations of the Peat Surface (cm)	
	F1	U3
1 - meter	6.1	4.3
100 - meter	23	15



- The inverse distribution function is a plot of the elevation of the peat or floc surface versus the probability of the occurrence when sampling at the 100-meter scale. The x-axis can be interpreted as the fraction of wetland cross-section that has an elevation equal to or less than a given elevation. (Kadlec, 1990).



CONCLUSION AND FUTURE WORK

- The average wetland cross-section available for surface flow at a given surface-water level in the Everglades can be estimated from the microtopographic distribution function.
- Ongoing work focuses on using the microtopography data and distributions in a surface-water flow model.
- Microtopography measurements are being used in a modeling study of flow in WCA-2A to identify critical surface-water levels below which the microtopography becomes a dominant flow resistance factor.

REFERENCES

Kadlec, Robert H. 1990. Overland flow in wetlands - vegetation resistance: Journal of Hydraulic Engineering, vol. 116, no. 5, pp. 691-706.

ACKNOWLEDGEMENTS

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