Application of Synthetic Floc to Evaluate Sediment Transport within the Everglades Ridge and Slough Landscape as Part of the Decompartmentalization Physical Model Project

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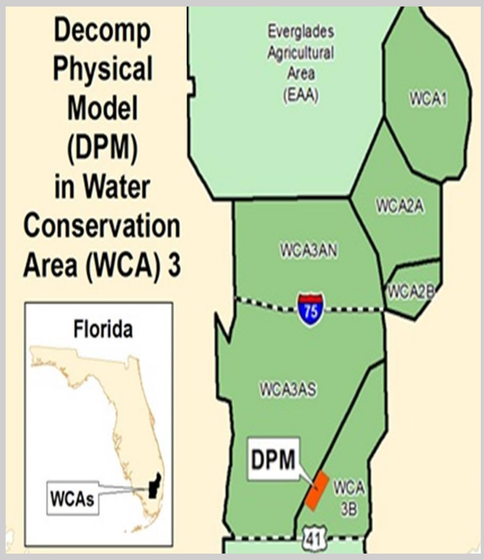
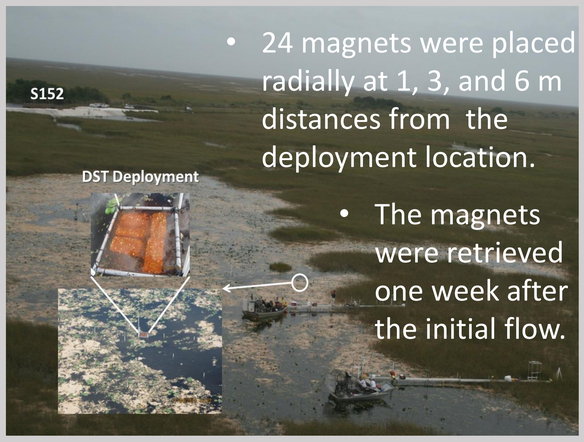
Introduction

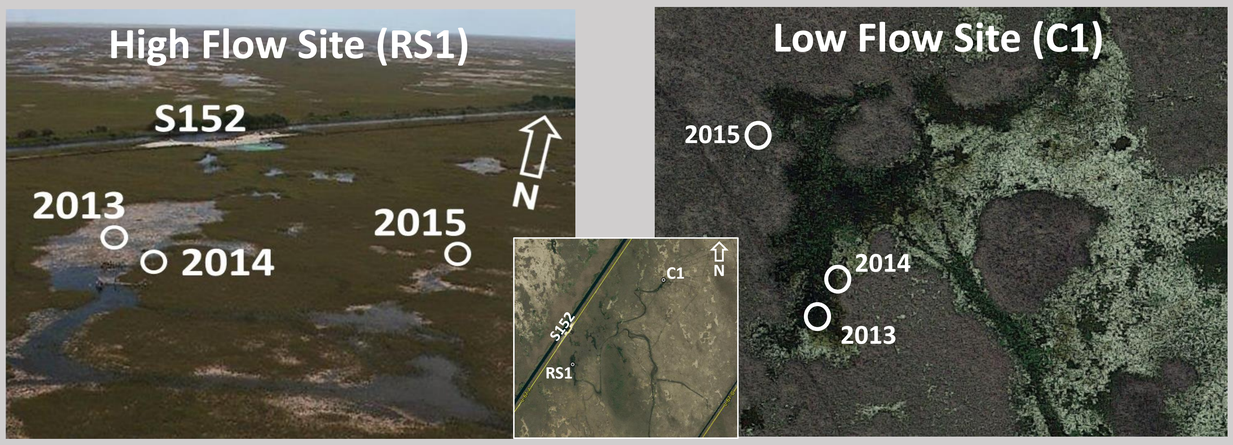


The **Decompartmentalization Physical Model (DPM)** is a landscape-level field test to reduce uncertainties associated with sheet-flow, sediment redistribution and the resulting characteristic patterning and microtopography. Particle transport is considered essential for the development and maintenance of the Everglades ridge and slough landscape by redistributing entrained sediments. We hypothesized that increased sheet-flow would entrain and transport sediments in slough habitats, where velocities are highest, and deposit sediments in sawgrass ridges, characterized by denser vegetation and slower water velocities.

Methods

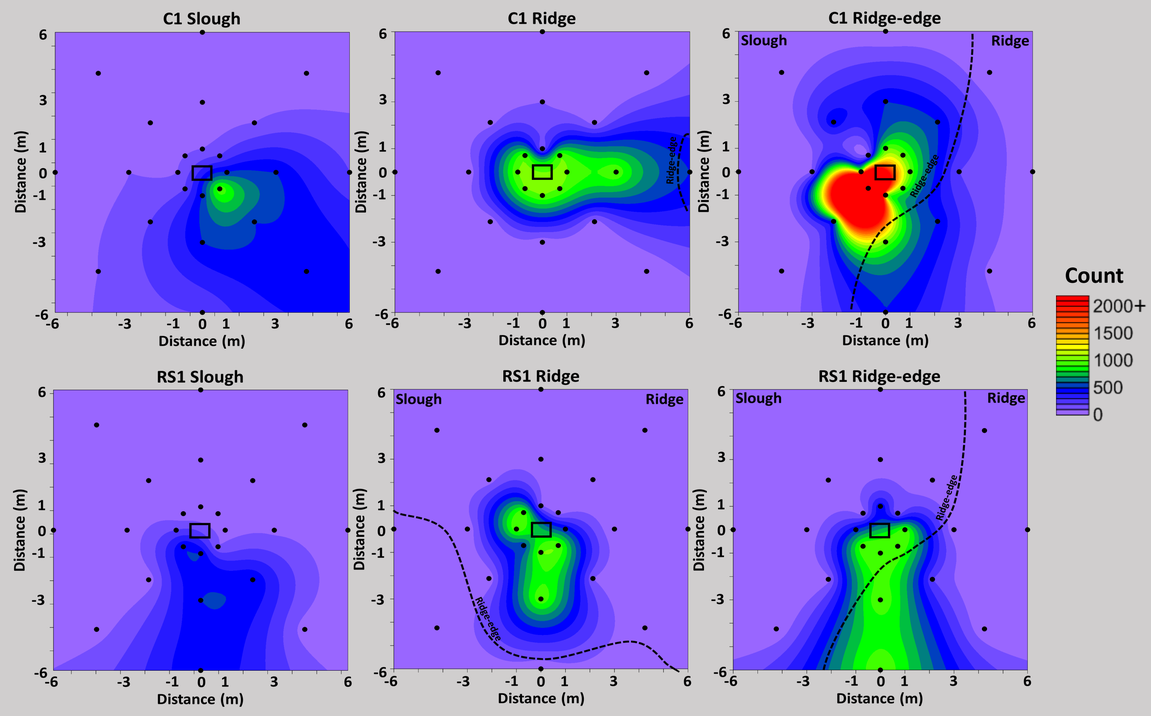
- The synthetic floc is an inert magnetic and fluorescent tracer hydraulically matched to particle size and settling velocity of Everglades floc.
- The Dual Signature Tracer (DST) is manufactured by Partrac, Ltd., Glasgow, UK.



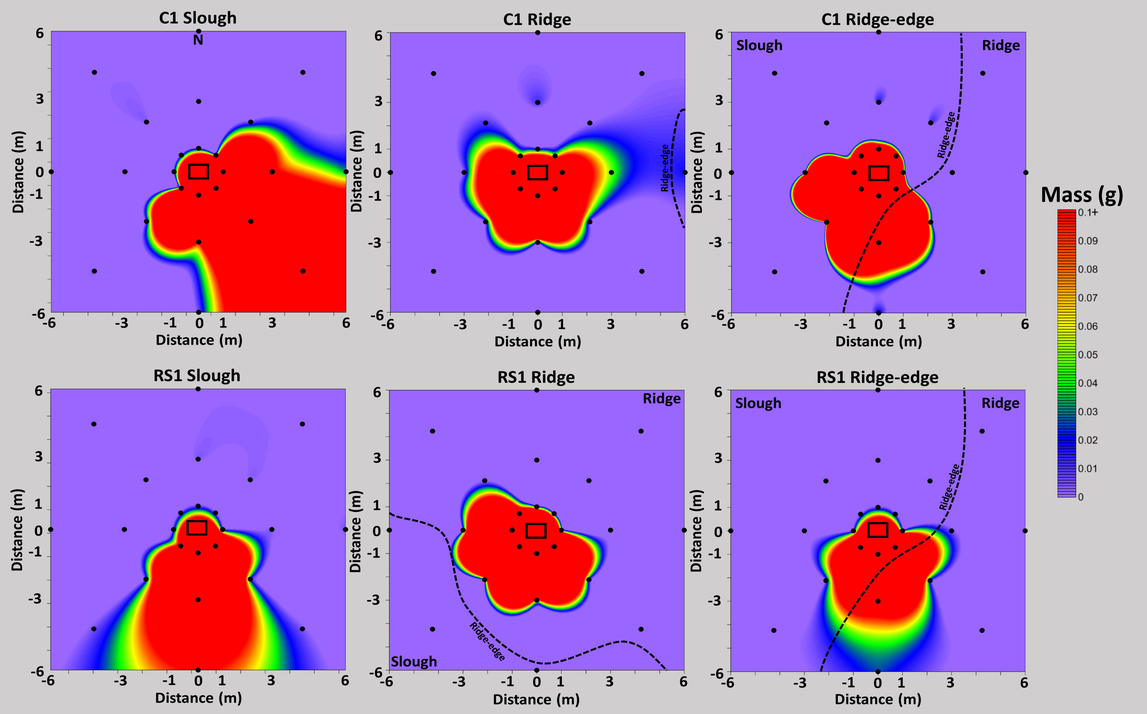


- An inflow structure (S-152) consisting of 10 gated culverts on the L67A to provides high flow velocities into an area between the L67A and L67C levees known as the pocket.
- DST was deployed during the 2013 (slough), 2014 (ridge-edge), and 2015 (ridge) DPM flow events at low flow and high flow sites.

Particle Count Per Magnet



Particle Mass Per Magnet



- Both the low flow and high flow sites show directionality in particulate movement, but more under high flow.
- The DST count and mass data show more particulate movement in the sloughs; while in the ridges, the DST does not move far past the 3 m locations.
- The mass data were less sensitive than the DST counts to low DST amounts at the 3 and 6 m locations.

Conclusions

- DST was entrained under high flows created by the S152 structure.
- DST travelled mainly east, at the low flow, and south at the high flow.
- Sediment moves unimpeded through the slough while ridge movement is moderated by decreased velocity caused by emergent plants.
- Sediment moved at most 10 meters into the ridge under high flow.
- These results confirm the importance of sheet-flow in redistributing sediment from sloughs to ridges, a critical mechanism for rebuilding topography and patterning of the landscape.

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