SOUTH FLORIDA WATER MANAGEMENT DISTRICT

LANDSCAPE BUDGET OF WATER, SEDIMENT, AND SEDIMENT-P ACROSS THE L67C CANAL-BACKFILL TREATMENT AREAS

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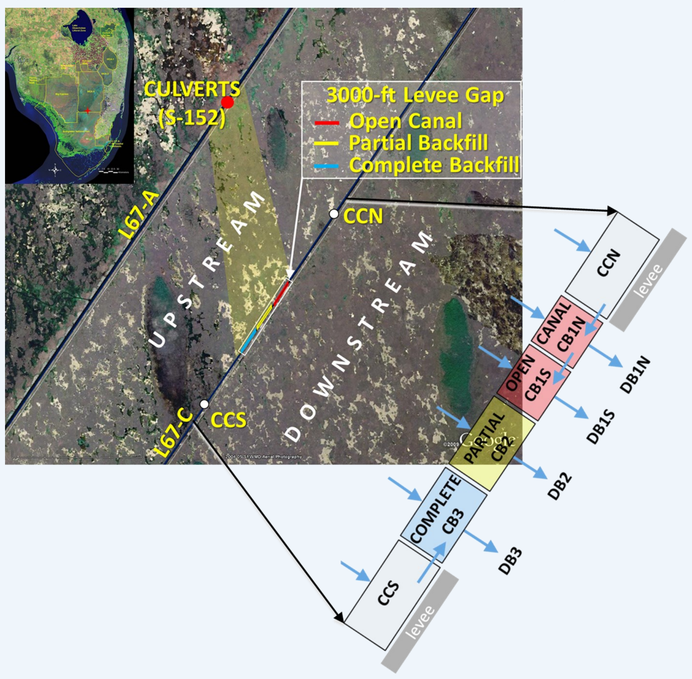
1. INTRODUCTION

The Decompartmentalization Physical Model-DPM project is a landscape experiment evaluating the impacts of restoring natural sheet flow and the removal of barriers (e.g. levees) between WCA3A and WCA3B.

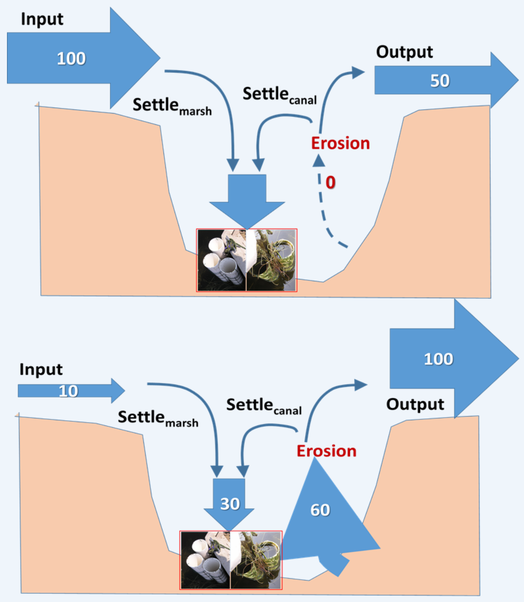
The objective of the poster is to track the movement of water, sediments, and P nutrient enrichment and to determine the effects and benefits of canal backfilling downstream the L67C canal. We evaluate those benefits using budget models for low and high flow conditions.

2. STUDY AREA/METHODS

The DPM project is located between the L67A and L67C canal/levee features known as "the pocket". The S152 structure has 10 gated culverts that generates sheet flow discharges into the pocket. A 3000-ft gap was constructed on L67C levee and for the purposes of this study, three ~1,000-ft backfill areas were created on the adjacent canal: COMPLETE (blue), PARTIAL (yellow) , and OPEN CANAL (red) treatments.



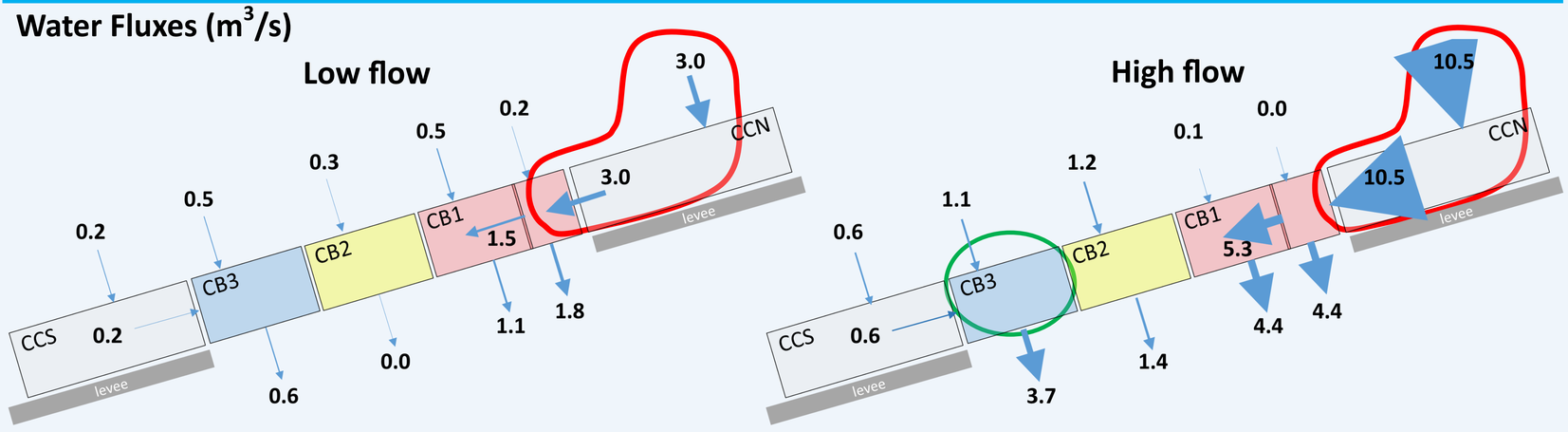
- These budgets models include fluxes from: the marsh (pocket-side) into six canal sections, among segments of the canal, and from the canal backfilling areas over the levee gap and into the downstream marshes in WCA-3B.
- Water fluxes were calculated for low and high flow periods (S152 close/open, respectively) in each of the conceptual sections, by multiplying mid-water velocities by water cross-sectional area of each in/output boundary.



- Sediment fluxes were estimated from flow directions, velocities, and suspended sediment concentrations. Total settling of sediments was calculated from trap accumulation in each section.
- Particulate Phosphorous (PP) fluxes were evaluated from sediment deposited in traps and measured in the lab. Sediment and PP erosion are indirectly estimated as Erosion=[Settling] - [In - Out].

3. RESULTS

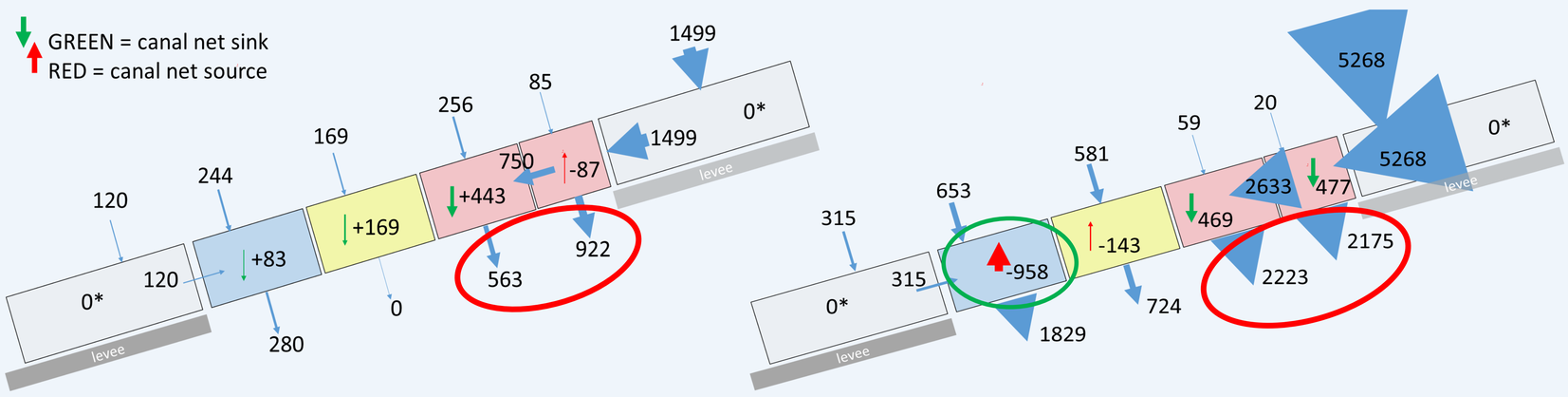
Water Fluxes (m^3/s)



Things to notice

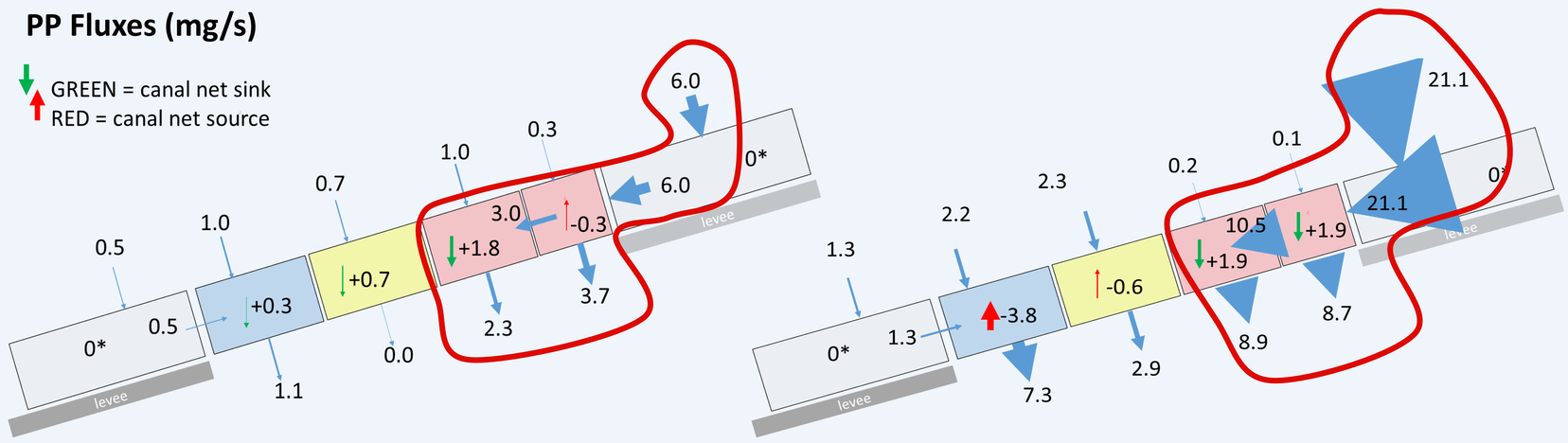
- The primary source of water entering the backfill treatment area (CB1 + CB2 + CB3) is from the L-67C canal itself (**circled in red**), entering the open canal treatment (CB1) from the northern control (CCN).
- Imbalances in the budget (e.g., CB3 during high flow, **circled in green**) will be corrected with additional DPM monitoring.

Sediment Fluxes (mg/s)



- Sediment exported from the open canal treatment (CB1, **circled**) is higher than both canal fill treatments combined.
- The complete fill treatment (CB3) becomes a sediment source during high flow (indicating erosion, **green circle**); however, this likely reflects the imbalanced water budget at CB3 during high-flow (see Water Fluxes).

PP Fluxes (mg/s)



Section	High Flow Period (November – December 2014)			
	In - Out (vel x TPP) (mg/s)	Settling (vertical traps) (mg/s)	Erosion (calculated) (mg/s)	Downstream Floc TP (mg/kg)
CCN	0.0	4.5	4.5	
CB1N	1.9	0.2	Non-detect	Not available
CB1S	1.9	0.6	Non-detect	855
CB2	-0.6	0.1	0.7	394
CB3	-3.8	0.0	3.8	383
CCS	0.0	0.2	0.2	

- Under high-flow, erosion of PP is high in the northern control (CCN, **red**) and in the complete fill treatment (CB3).
- Because of the flow of water and sediments from the canal control (CCN) to the open canal treatment (CB1) and the downstream marsh (DB1), PP eroded in CCN is ultimately transported to DB1.
- High loading of canal-derived PP at DB1 site appears to be driving the increased floc TP observed at that site.
- High erosion at CB3 (**green**) does not appear to be increasing floc TP downstream; however, erosion may be an artefact of the water flux imbalance.

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