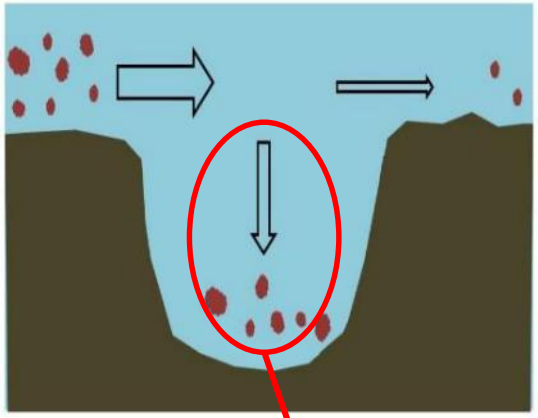
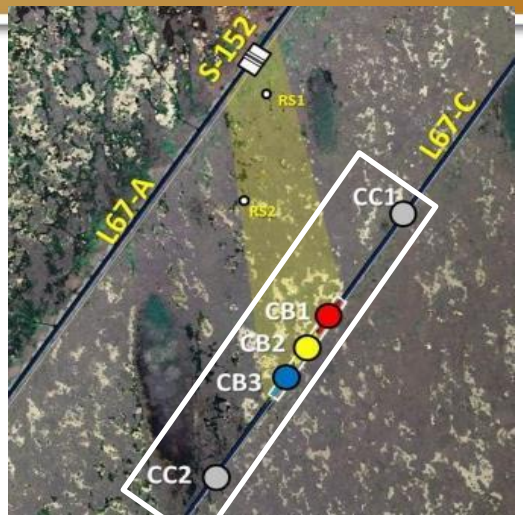
Part Three – Canal Results

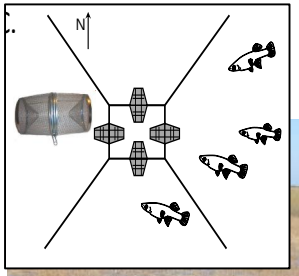
Colin Saunders
South Florida Water Management District

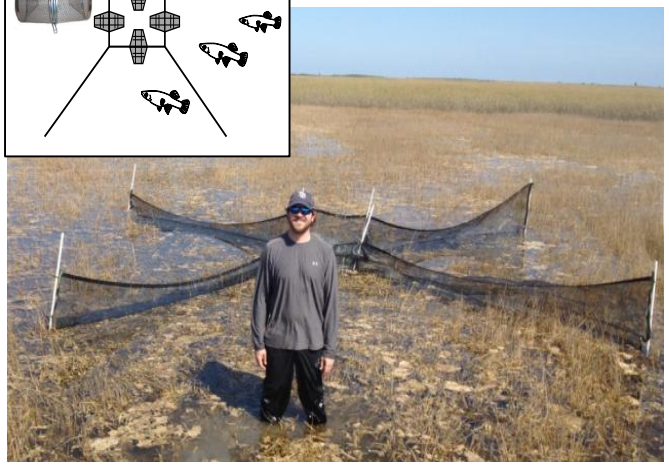
Is the Canal a Sediment Sink or Source? Role of Backfilling?



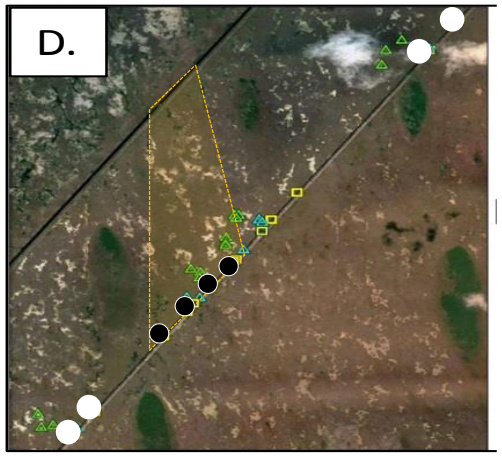


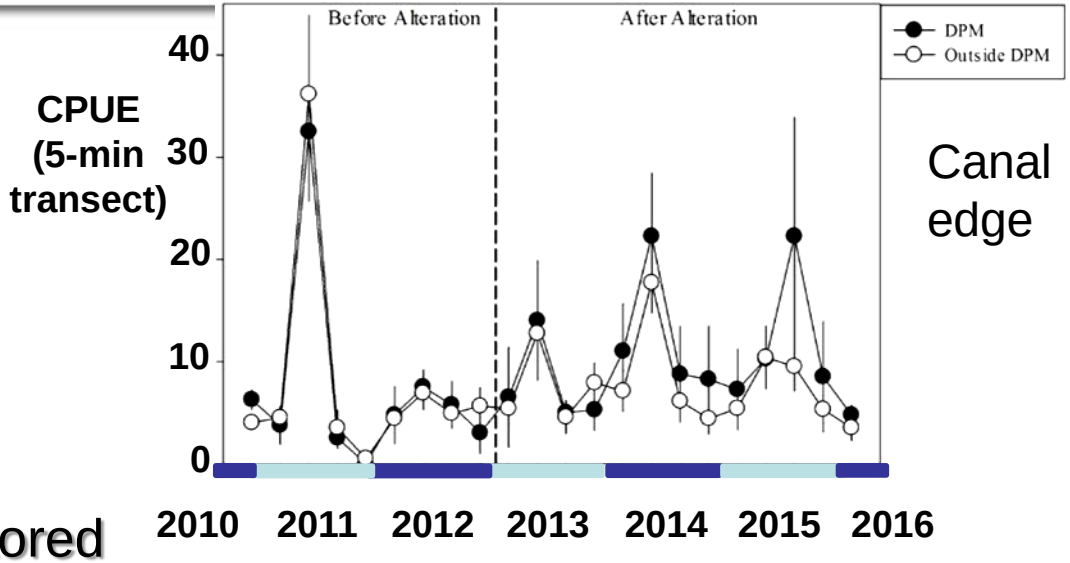
- Canal velocimeters
- Dye tracers
- Vertical sediment traps
- Molecular Biomarkers
- Sediment Chemistry (CNP, LOI)
- Fish sampling





Monitoring Large Fish in L67C Canal





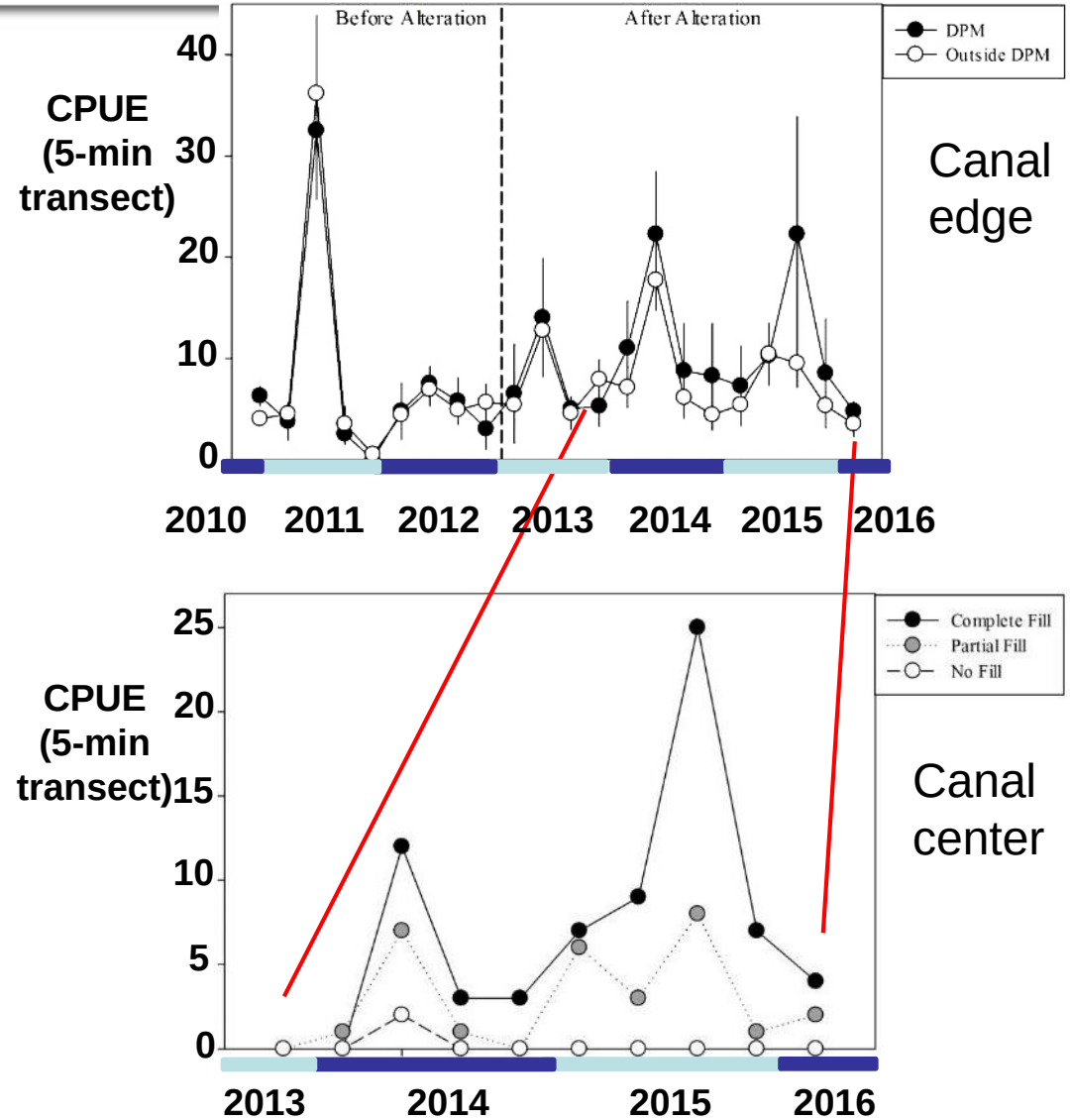
Canal edge

- Starting in 2010, CPUE monitored five times per year
- Electrofishing catch per 5-min.
- Initial sampling focused on canal edges (vegetated littoral zone) - fish seldom observed in canal center

Data from J.Trexler (FIU)

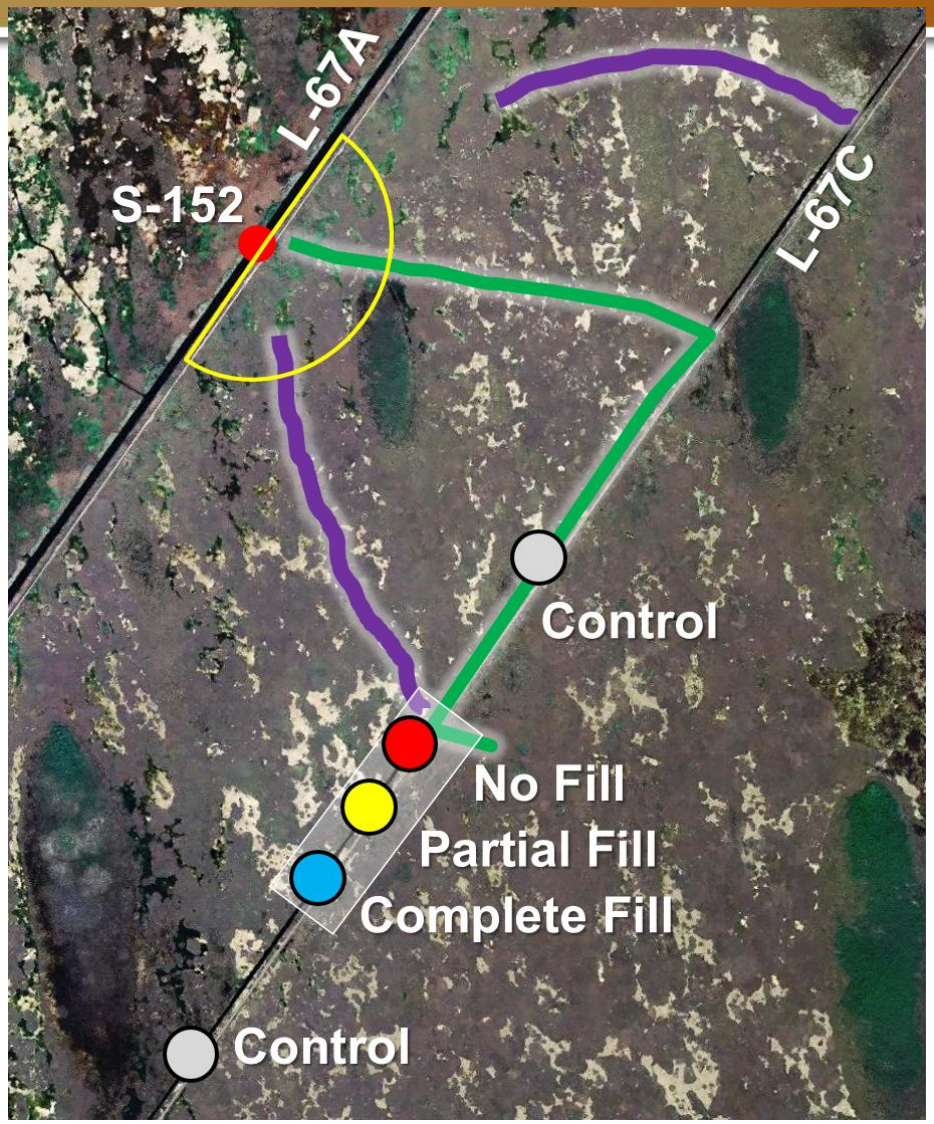
Large Fish Increase in Backfilled Areas

- After construction (started Jan 2013) sampling started in canal center
- Partial & Complete Fill areas attained similar CPUE to canal edges
- Backfill treatments have created more high-quality fish habitat by increasing vegetated areas similar to canal edges



Data from J.Trexler (FIU)

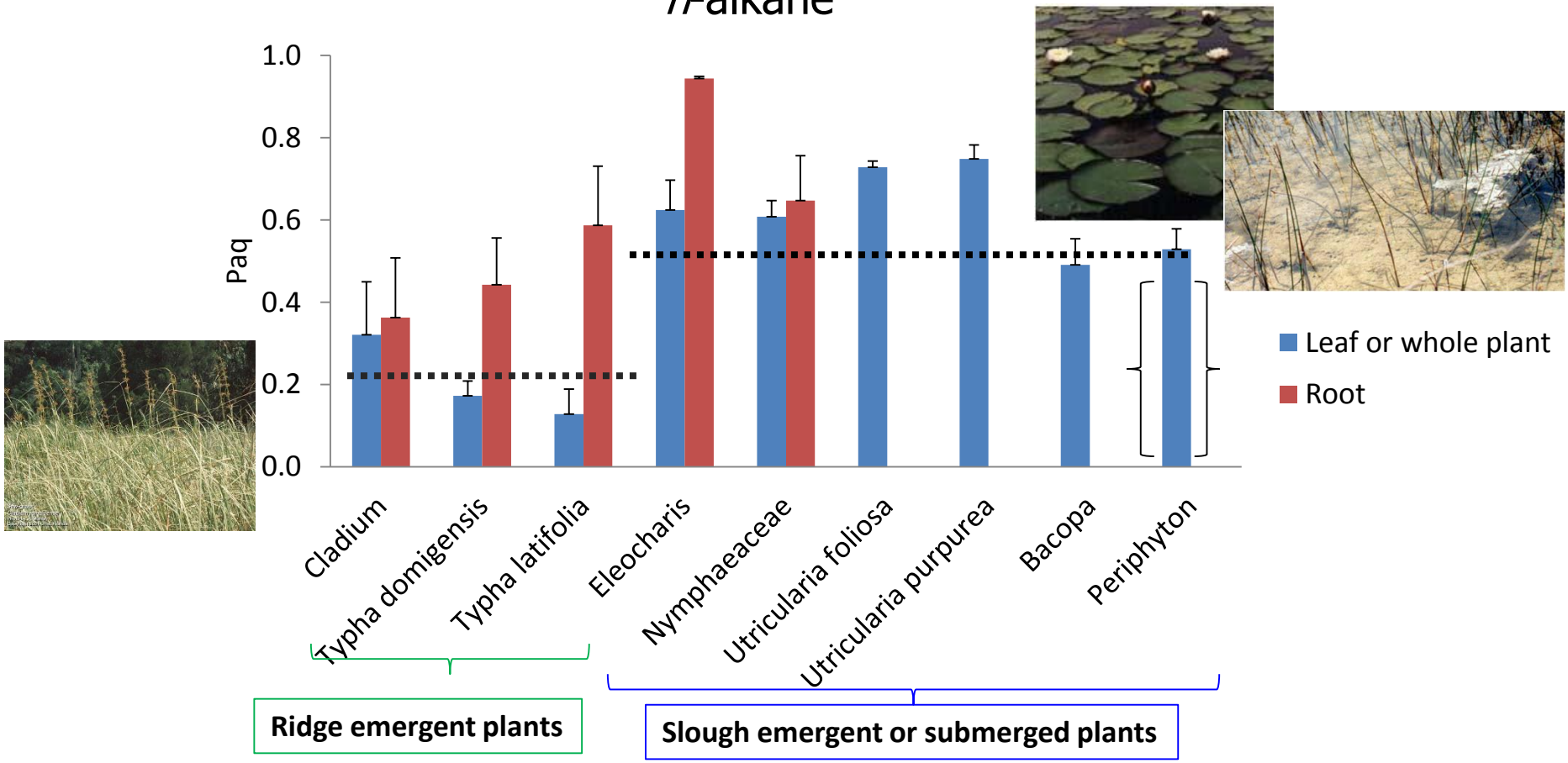
Canal sediment dynamics



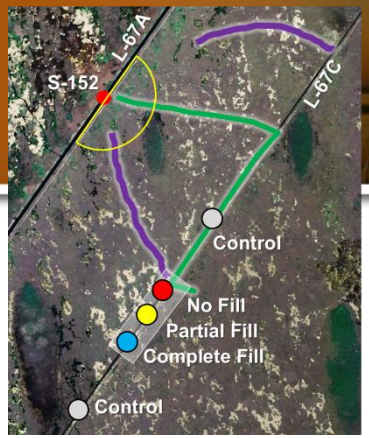
Paq – Biomarker for Slough vs Ridge Organic Matter

$$\mathbf{P}\boldsymbol{aq} = (C_{23}+C_{25})/(C_{23}+C_{25}+C_{29}+C_{31})$$

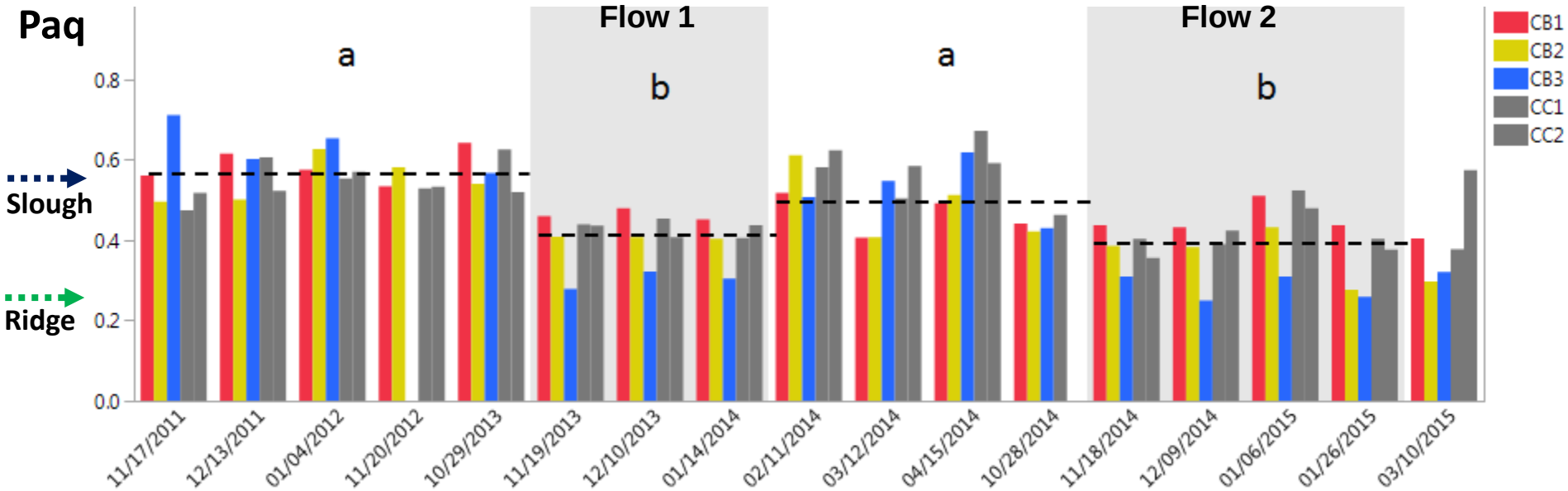
n-alkane



Flow altered canal sediment chemistry at all canal sites

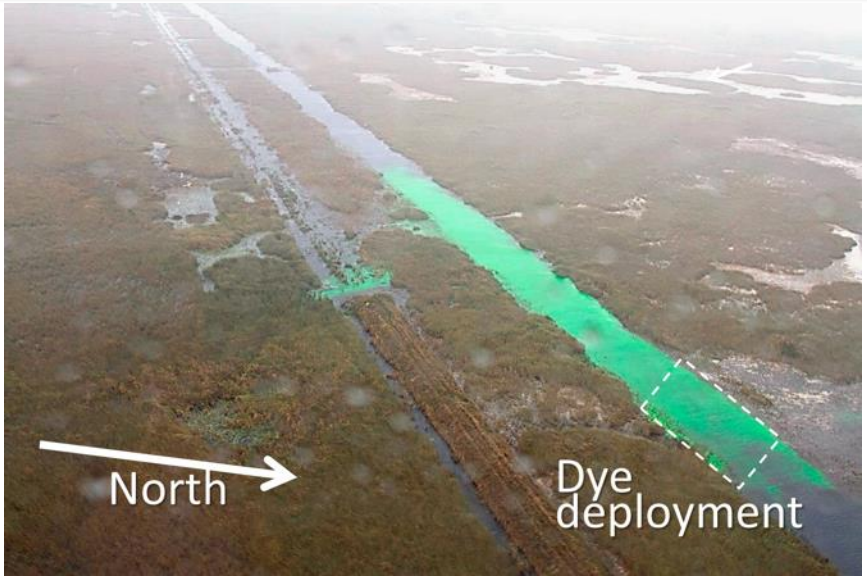


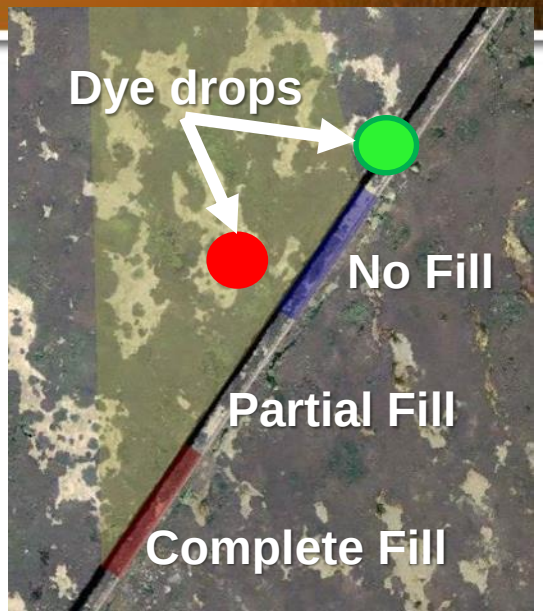
Paq – Slough Macrophyte Indicator

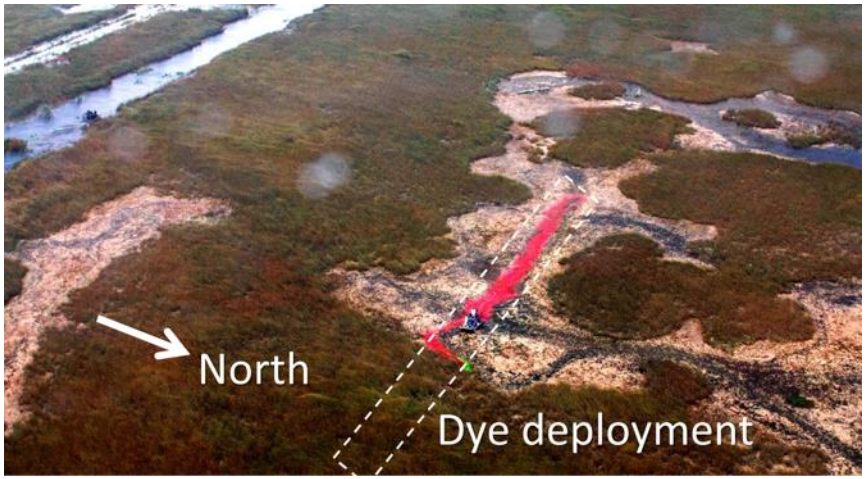


Data from R. Jaffe, P. Regier, and D. He (FIU)

Flow intended for the backfill area is re-routed by the L67C canal

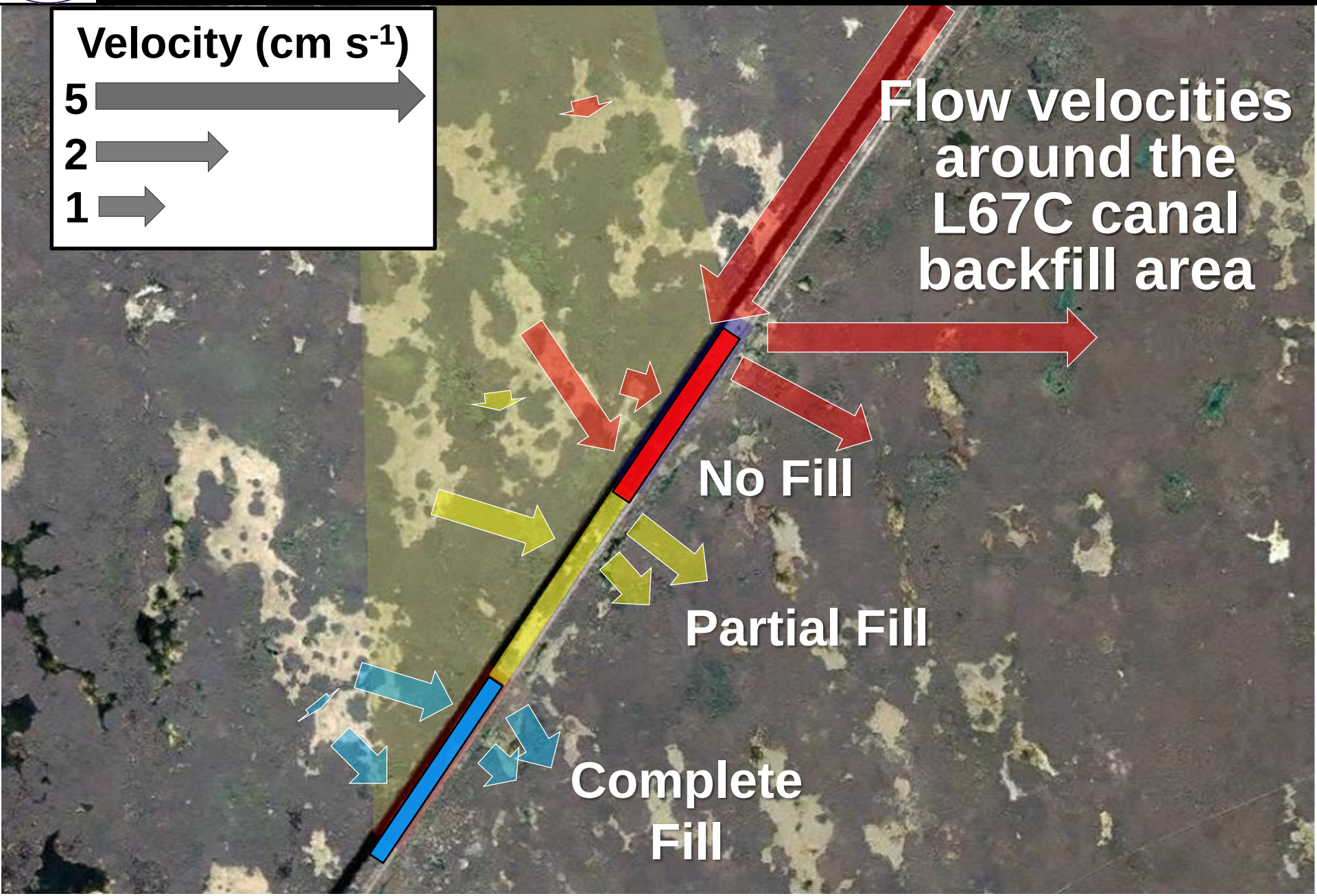






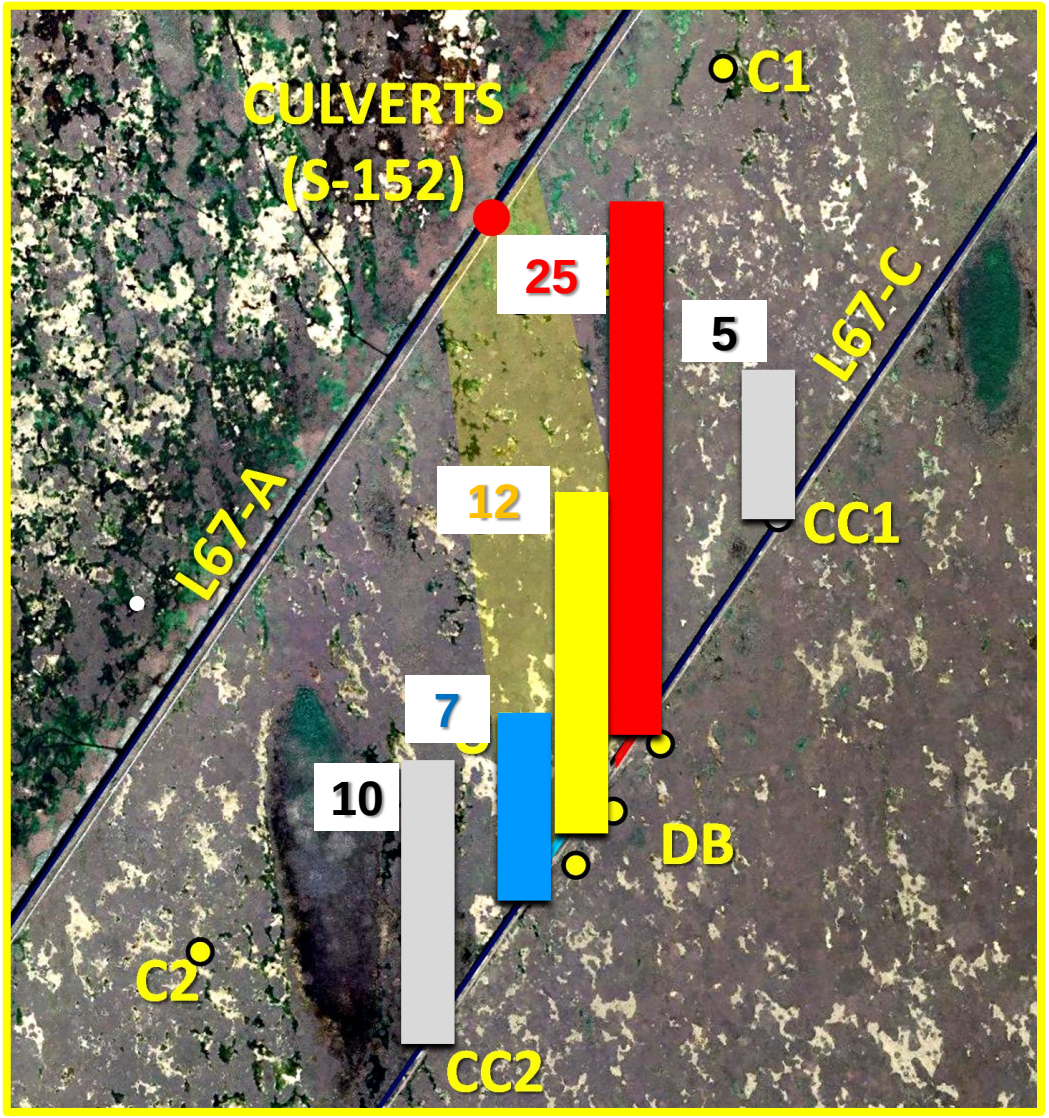
- Dye from the canal moved across the levee gap within an hour (3-4 cm/s)
- Dye from the marsh moved into canal within 12-24 hours (0.1 cm/s)

from E. Cline, C. Madden and M. Cook (SFWMD)



Data from J. Trexler (FIU), J.Harvey (USGS), C.Coronado (SFWMD), E.Cline (SFWMD)

Canal Sediment Accumulation under High Flow (g m^{-2} d^{-1})

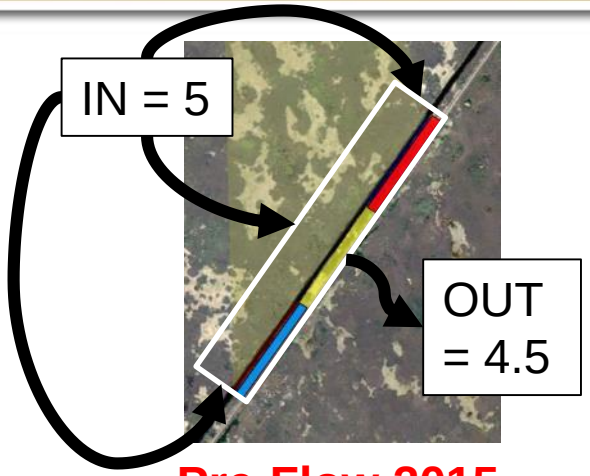


- Re-routing of flow down the canal
- Sediments concentrate and settle at the No-Fill site
- This creates a "hotspot" of sediment accumulation

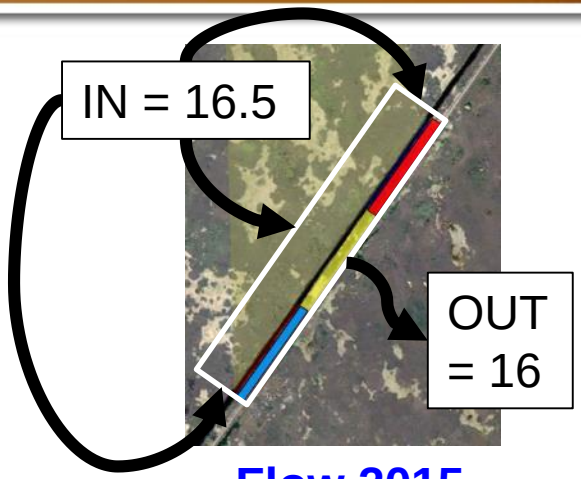
Data from C. Coronado-Molina (SFWMD)

Water, Sediment and P Budgets across the L67C Backfill Areas

Water Budget (m^3/s)



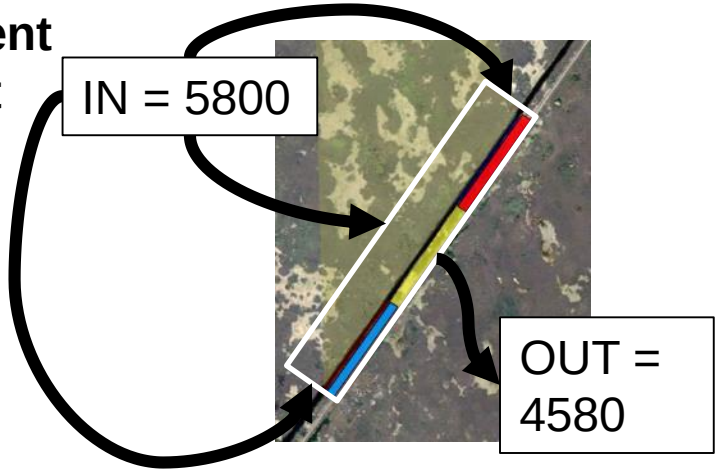
Pre-Flow 2015



Flow 2015

Data from J. Harvey and J. Lewis - USGS

Sediment Budget (mg/s)



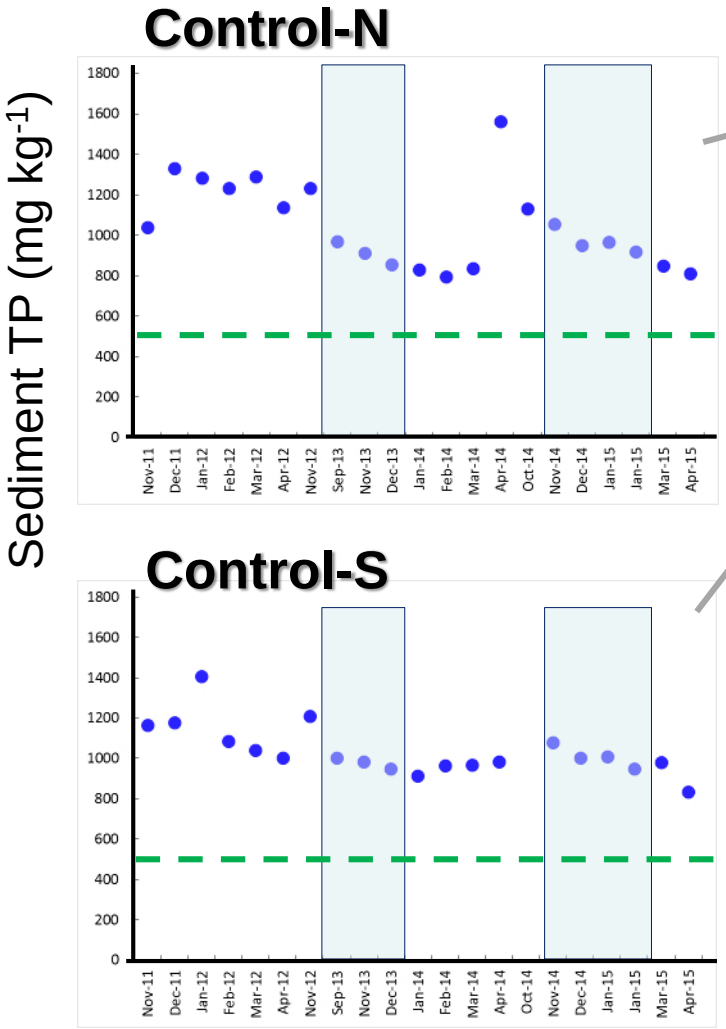
Accumulation = 1200

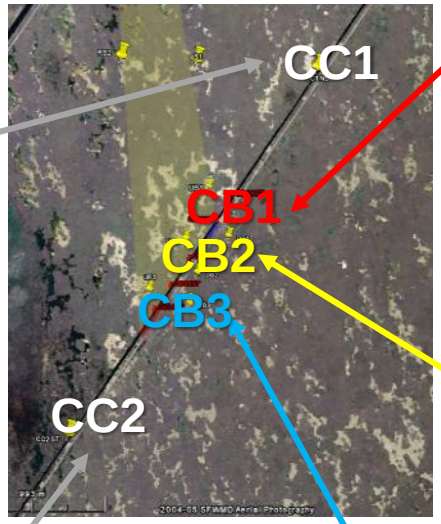
*** traps = 570-1000 (flows #1, 2)*

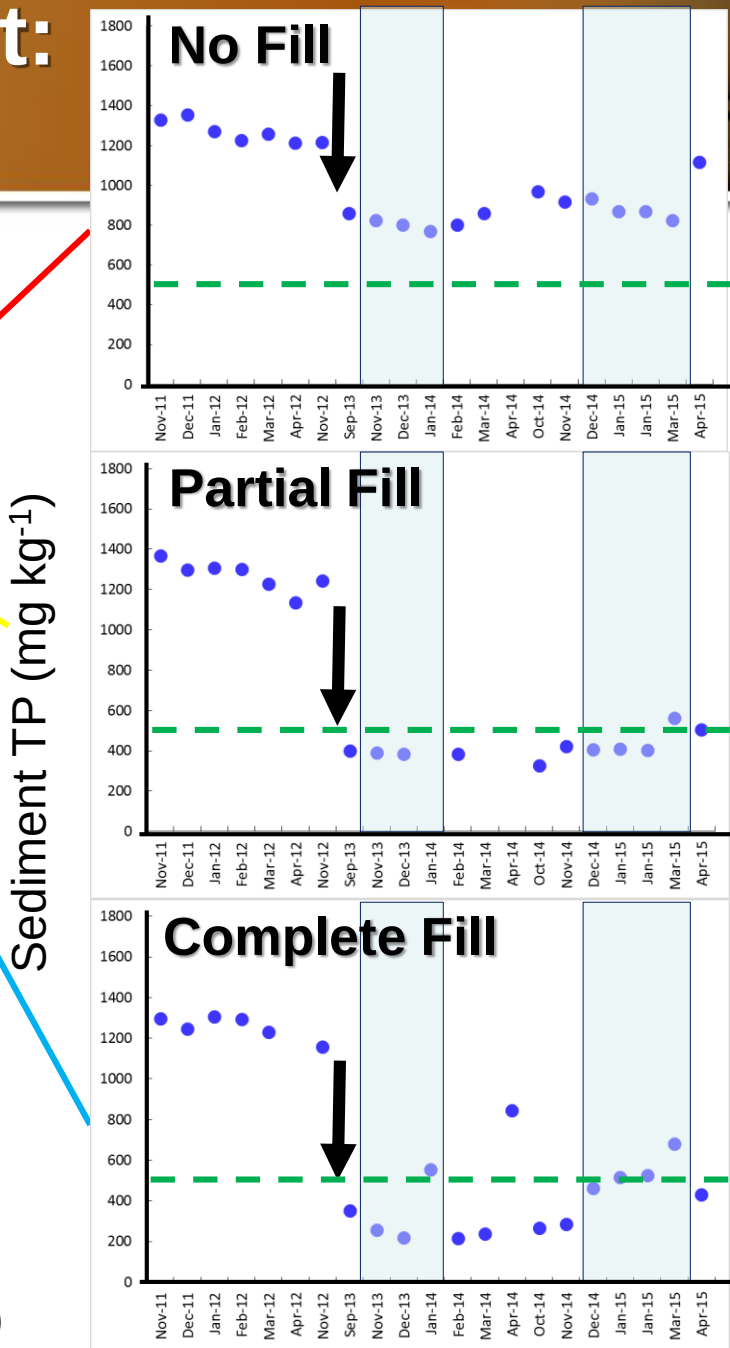
Accumulation = 390

*** traps = 900-1500 (flows #1, 2)*

Canal backfilling benefit: decreased sediment TP







Data from C.Coronado (SFWMD)

Conclusions - Effects of Flow & Backfilling on Canal Sediment Dynamics

- Backfill treatments do improve habitat for large fish, but recovery from disturbance and re-vegetation are ongoing
- Flow affected all canal sites due to preferential flow east, mobilizing sediments from the canal edge or the canal itself
- Re-routing of flow and sediments down the canal creates a “hotspot” of high-P sediment accumulation in the No-Fill area
- It also generates a preferential flowpath over the north end of the levee gap
- Backfill treatments appear to reduce sediment TP, but they are still recovering from construction disturbance and re-vegetation