Application of the Blue Shanty Flowway Model to Achieve CEPP Restorative Flow Targets

Greater Everglades Ecosystem Restoration
April 2025

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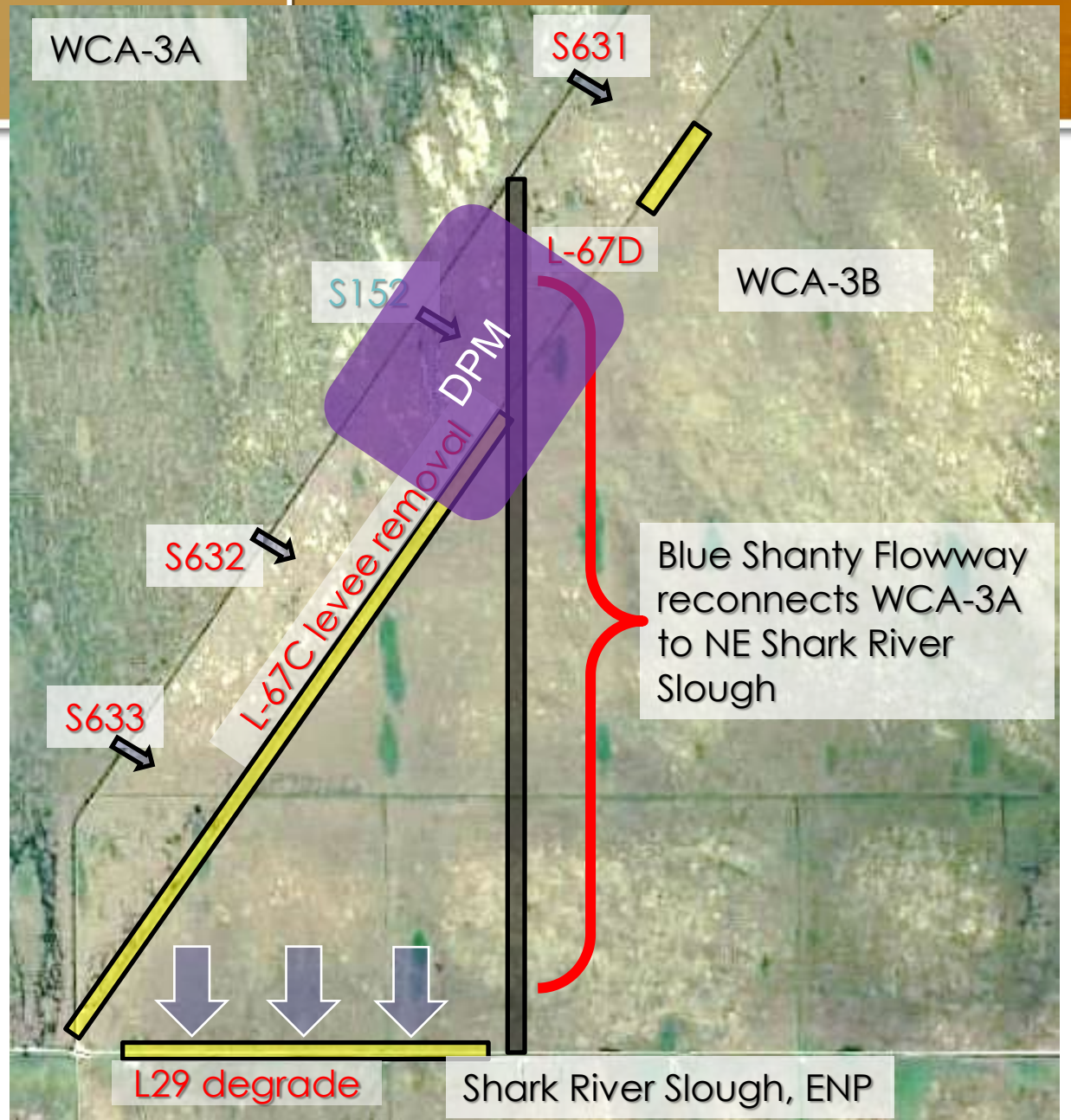
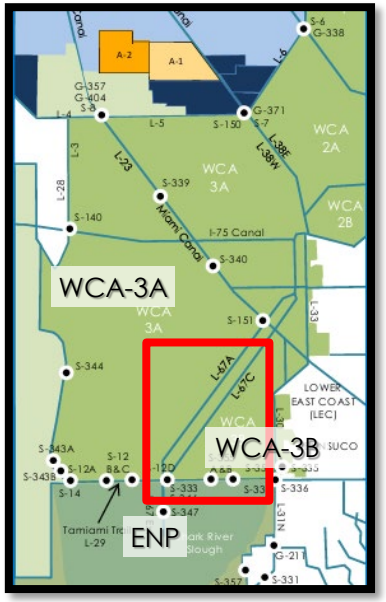
* USGS science for a changing world

CEPP-S Project Components

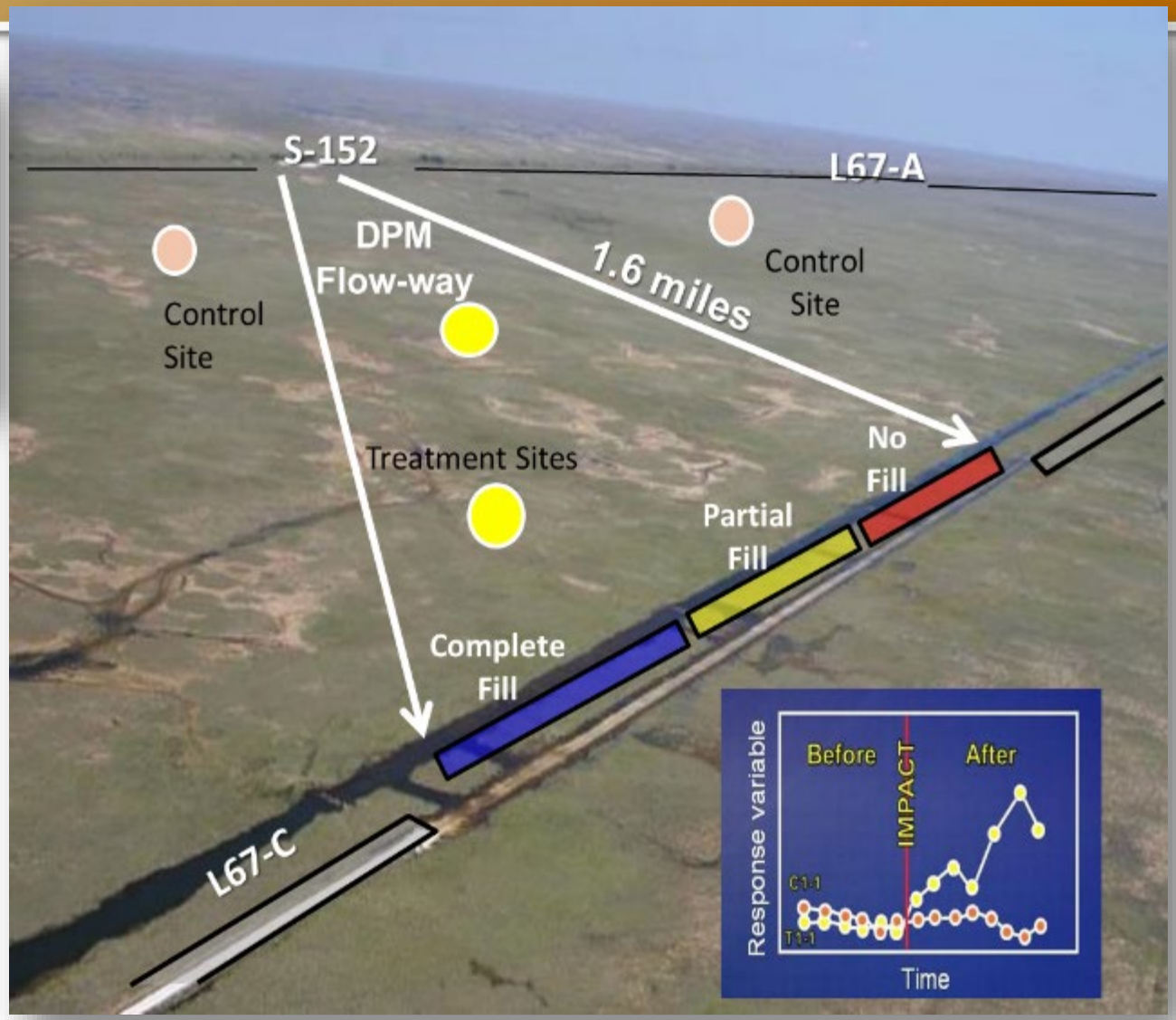
- 3 gated culverts
- L-67C levee removal
- L-29 levee removal
- *New* L-67D levee
- Blue Shanty Flowway (BSF)

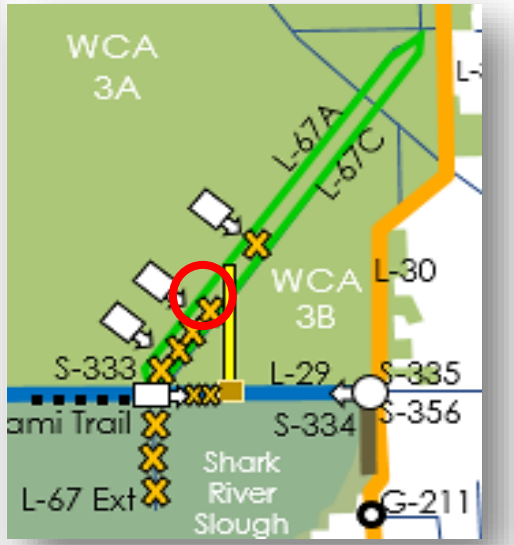




The Decomp Physical Model (DPM)

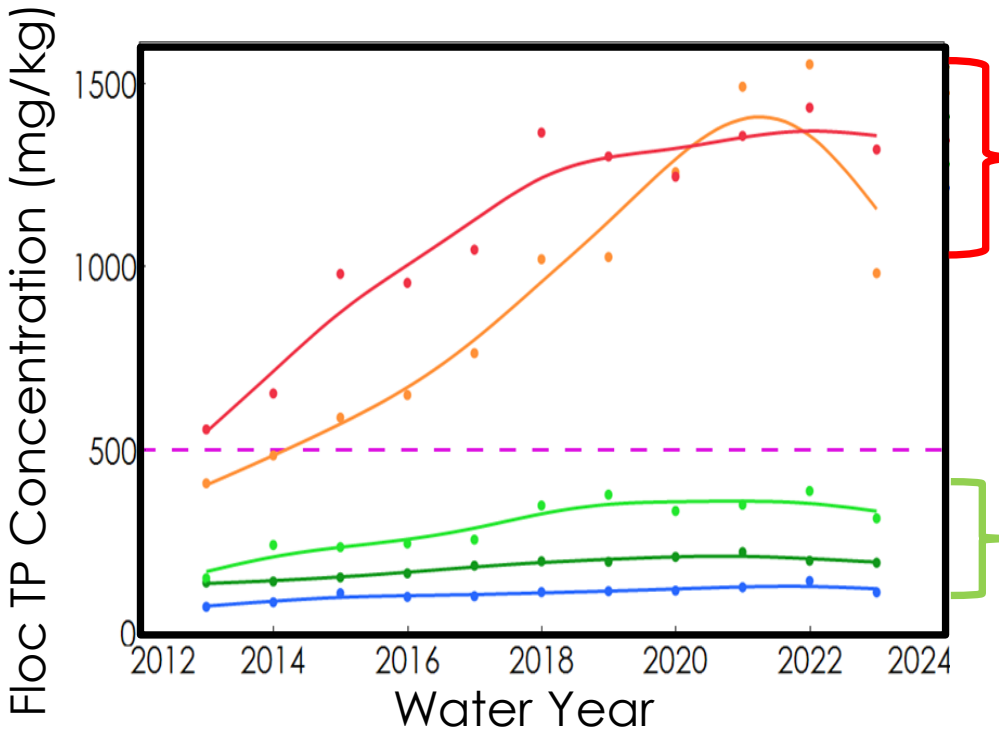
- S-152 - gated culverts
- Inflow geometric TP≤10ppb
- L67-C canal – 3000-ft levee gap & 3 backfill treatments
- Before-After-Control-Impact (BACI) design

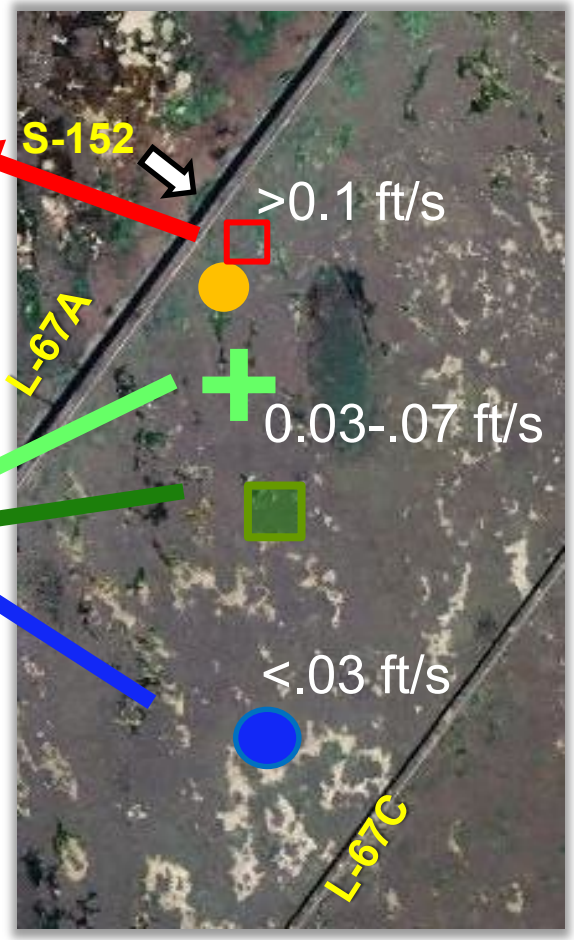




Photos (L to R) – S. Hohner, SFWMD; B. Rosen, USGS

Impacts of Extreme Flows > 0.1 ft/s





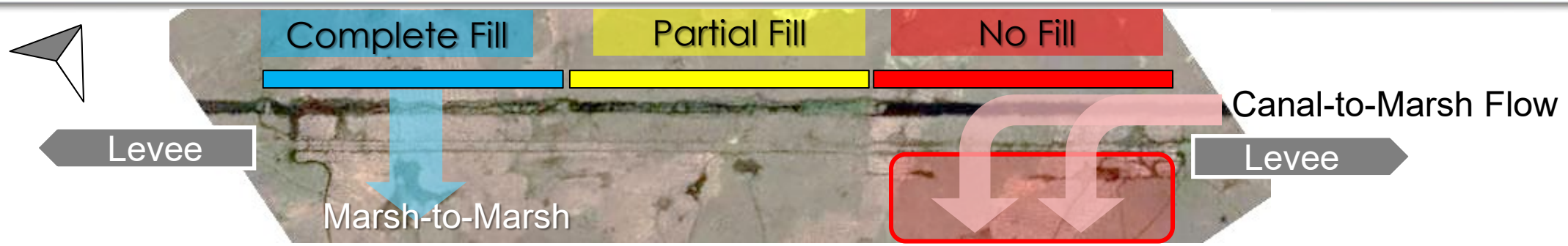
Invasion of slough by cattails

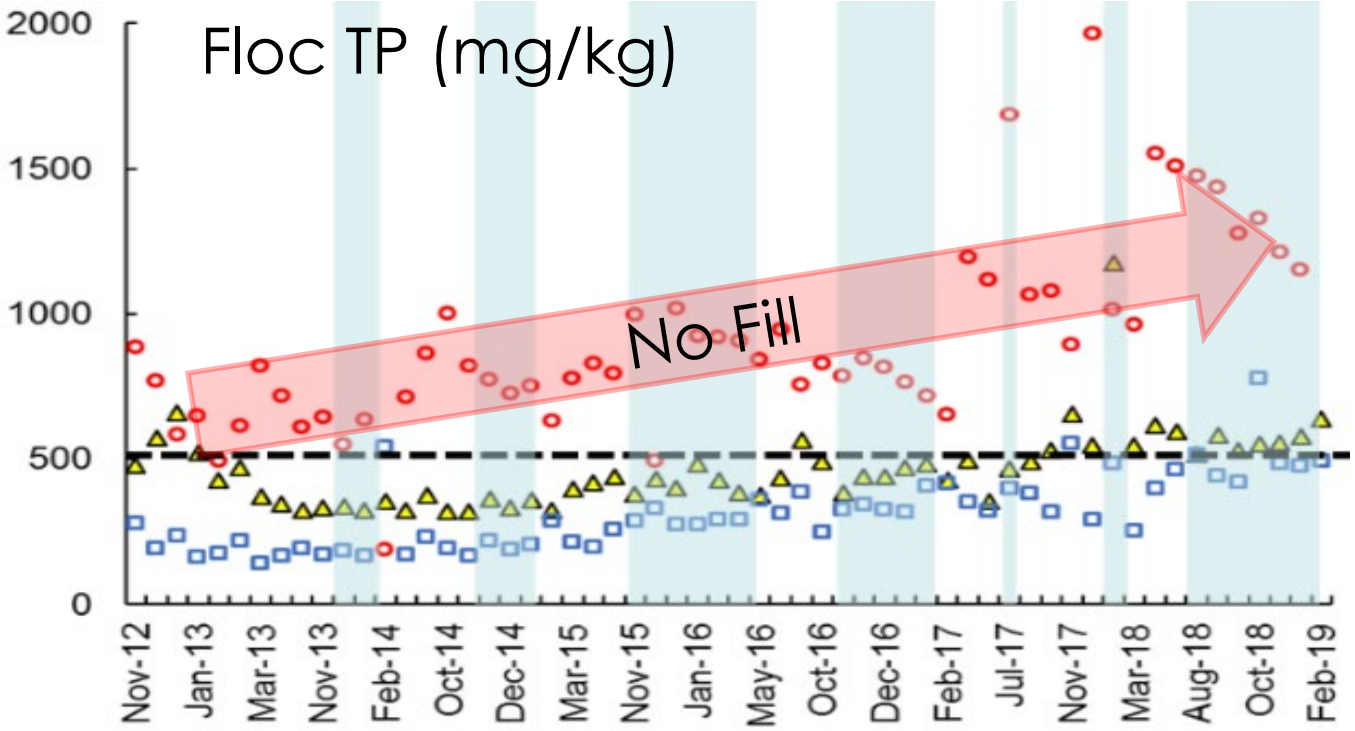
Photos – C. Hansen (top), L. Jackson (bot), SFWMD

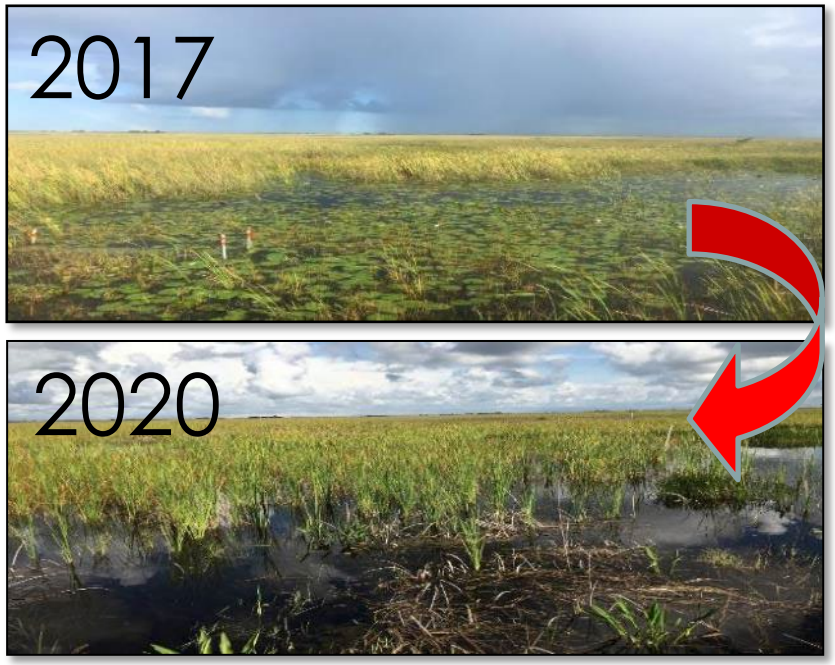
Phosphorus enrichment front advances ~100 meters per year (m/y)

**Jackson: Poster Session One
** Newman: Session Two, 10:50

Impacts of Canal-to-Marsh Connectivity Downstream of the Unfilled Canal



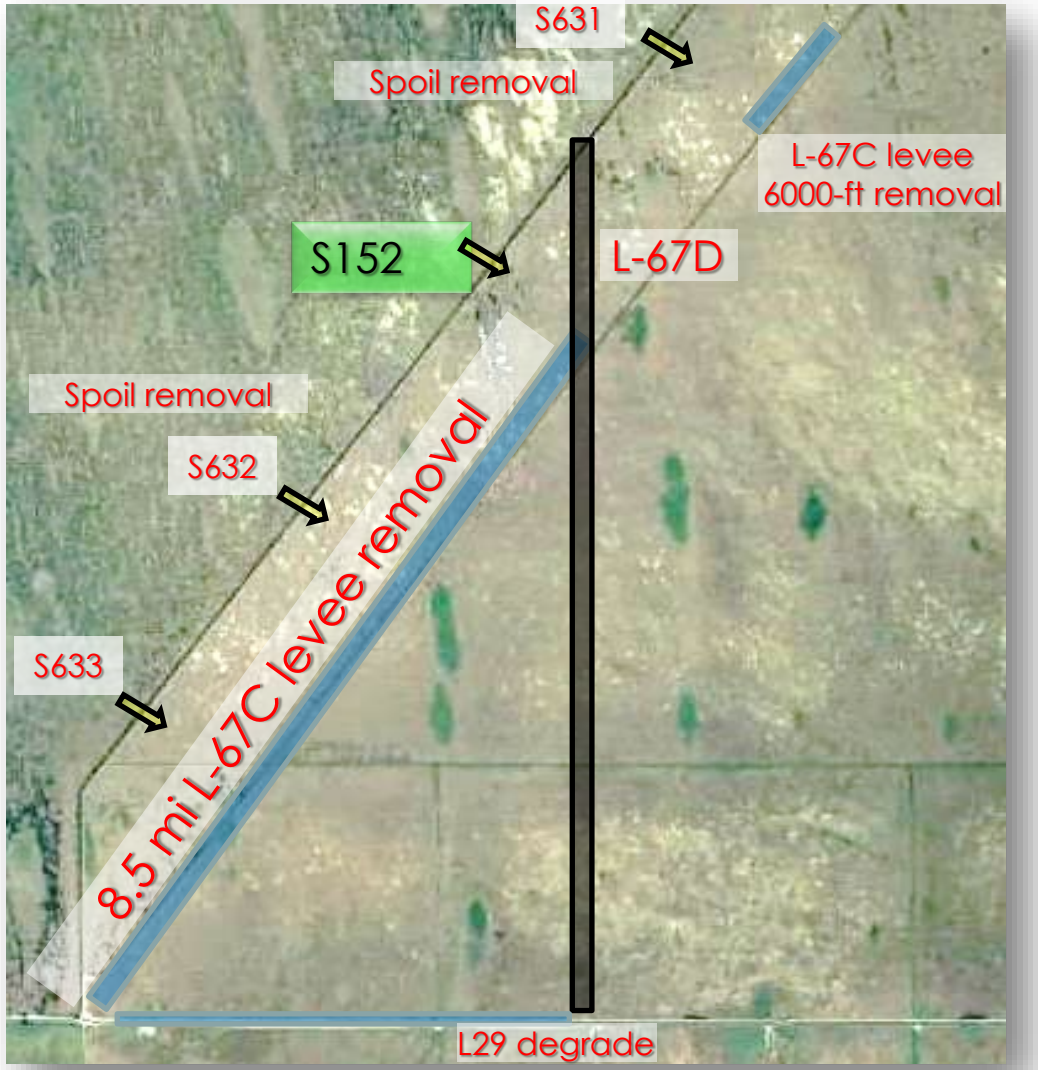




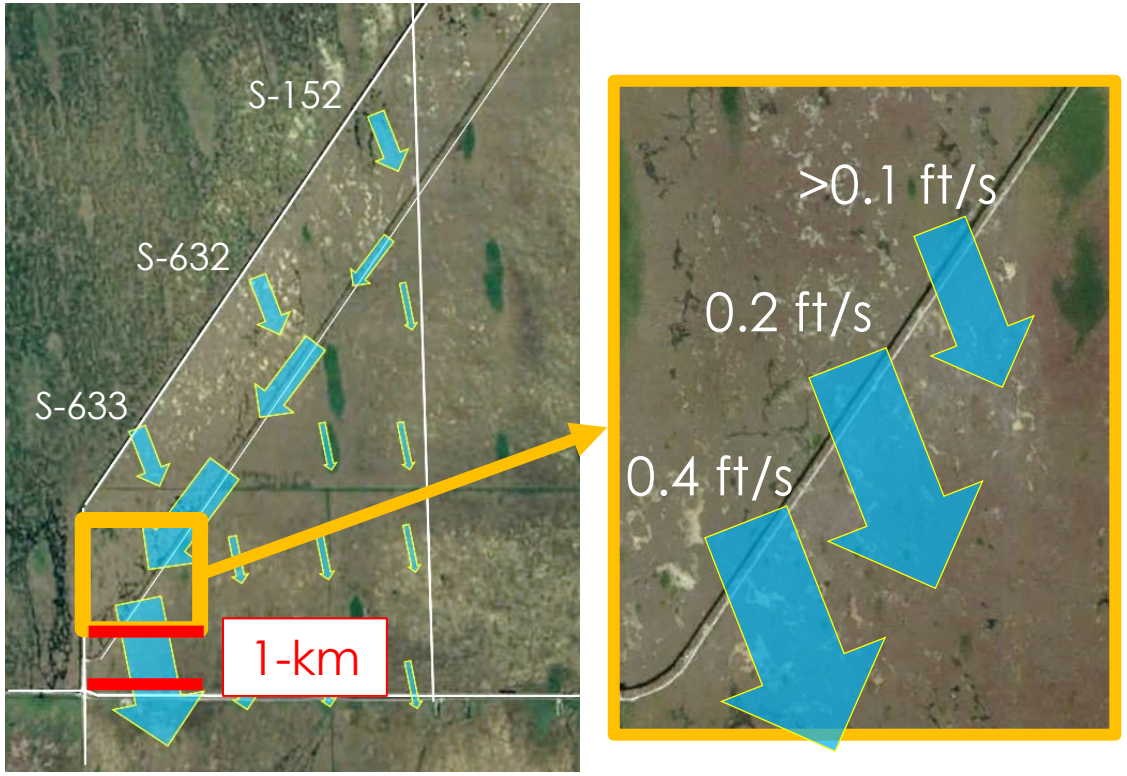
Invasion of slough by cattails

Photos – L. Jackson, SFWMD

Look-Ahead: Canal-to-Marsh Connectivity in CEPP-S

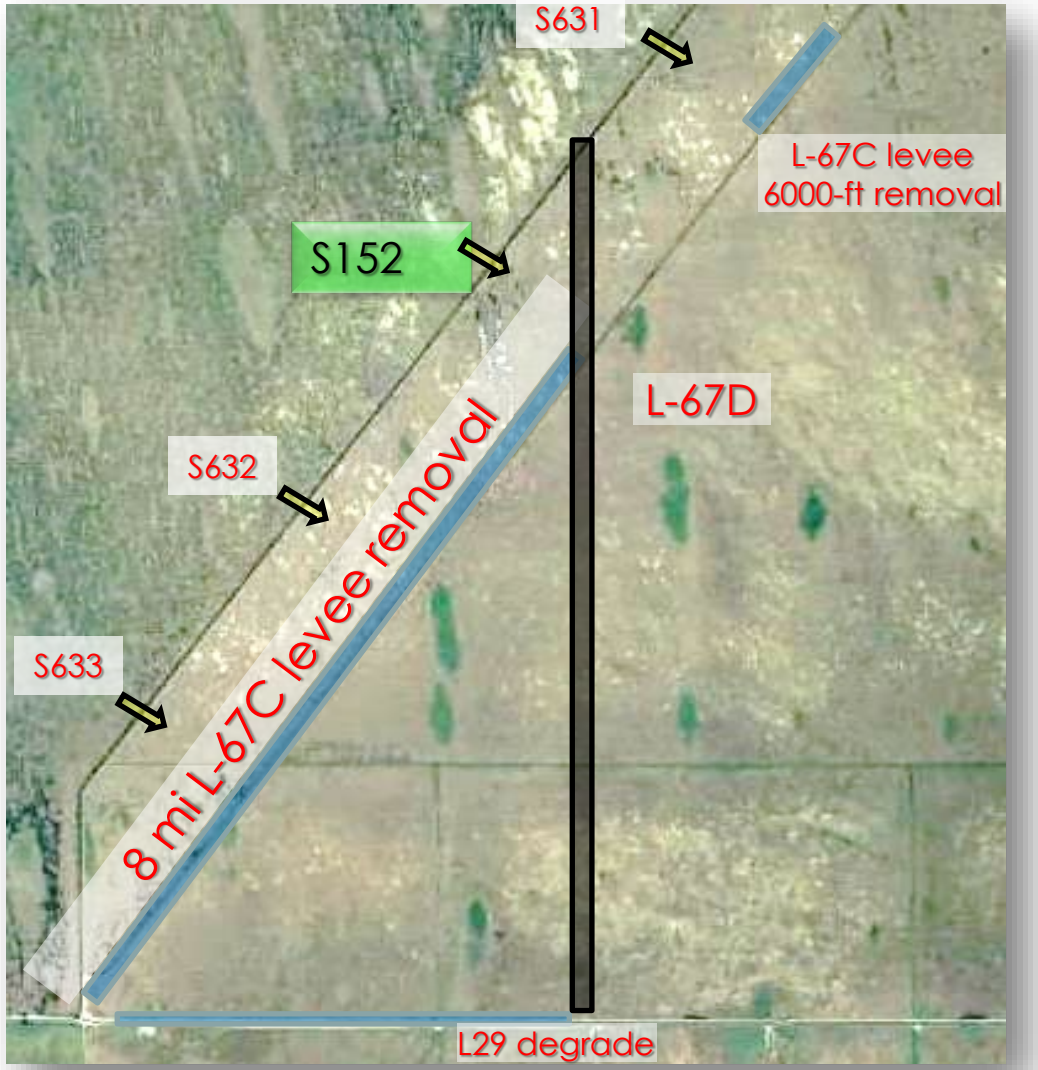


Without Canal Plugs and/or Fill

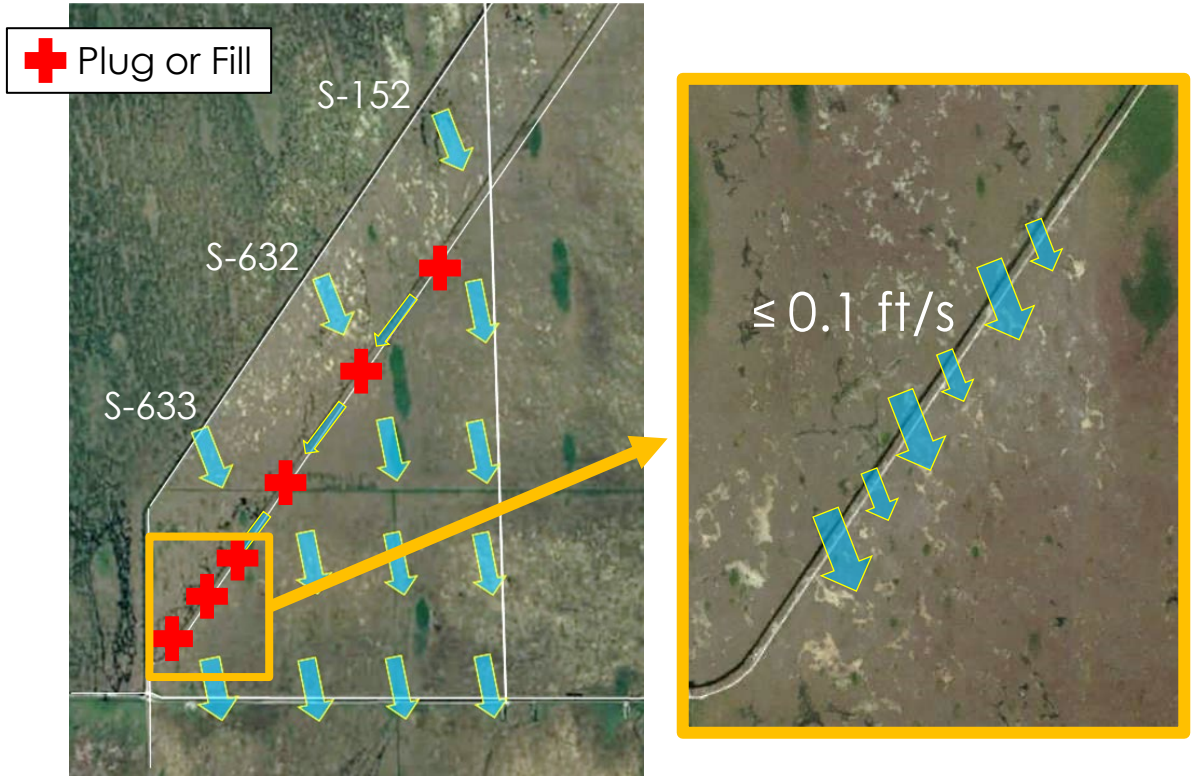


- P-enrichment reaches ENP within a decade

Blue Shanty Flowway Model (BSFM) Objective: Minimize Canal-to-Marsh Impacts



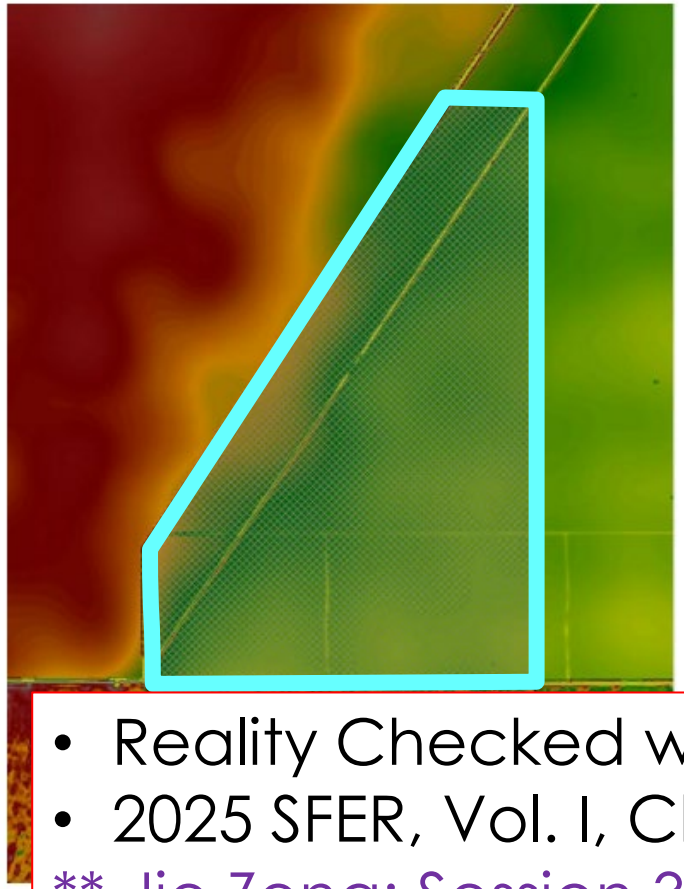
With Canal Plugs and/or Fill



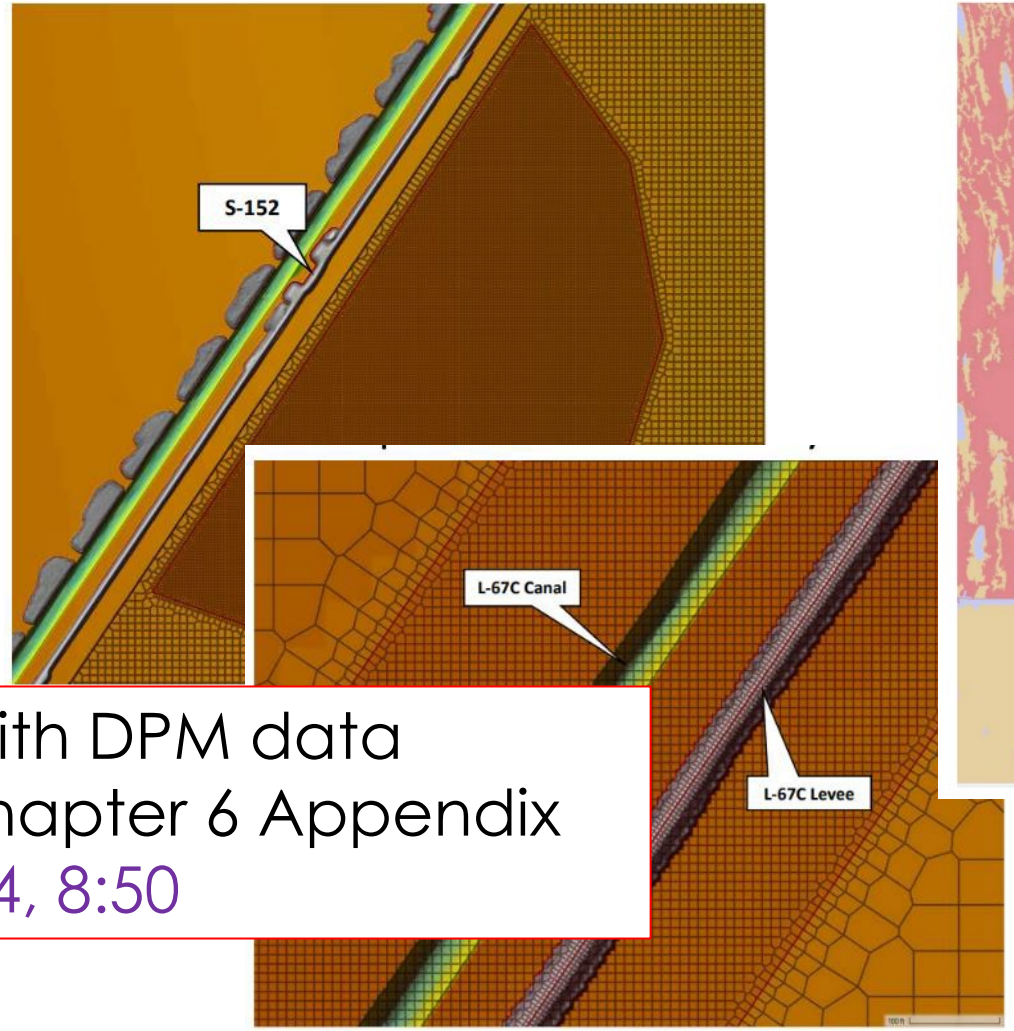
- Evenly distributed sheetflow
- Marsh-to-marsh connectivity

Blue Shanty Flow way (BSF) model: HEC-RAS 2D unsteady-flow routing model

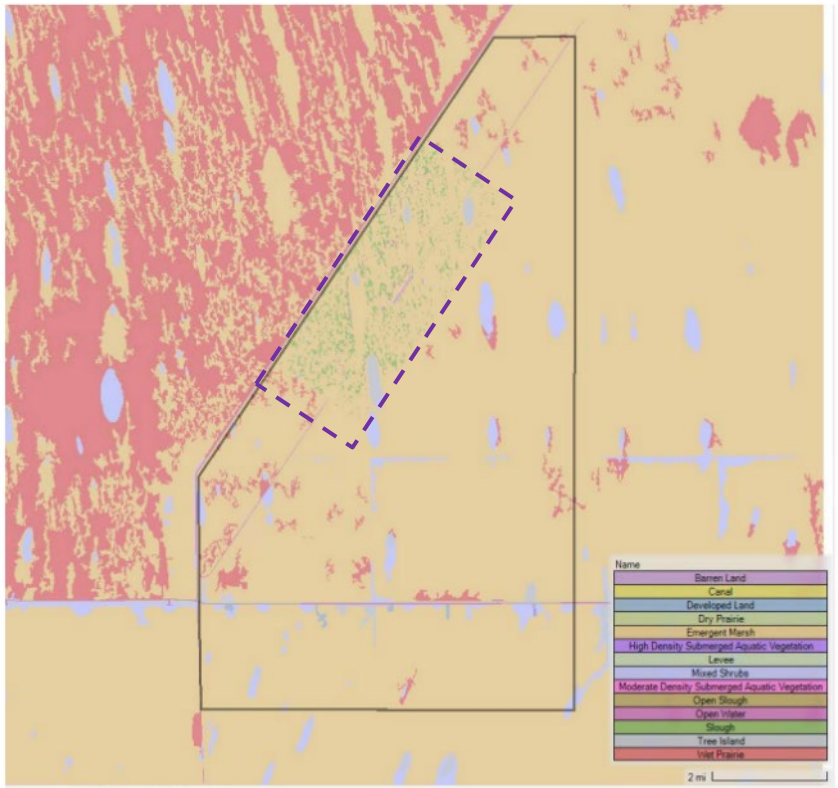
Bathymetry (USGS HAED)



Finer grid around culverts, canal/levee



Vegetation Types

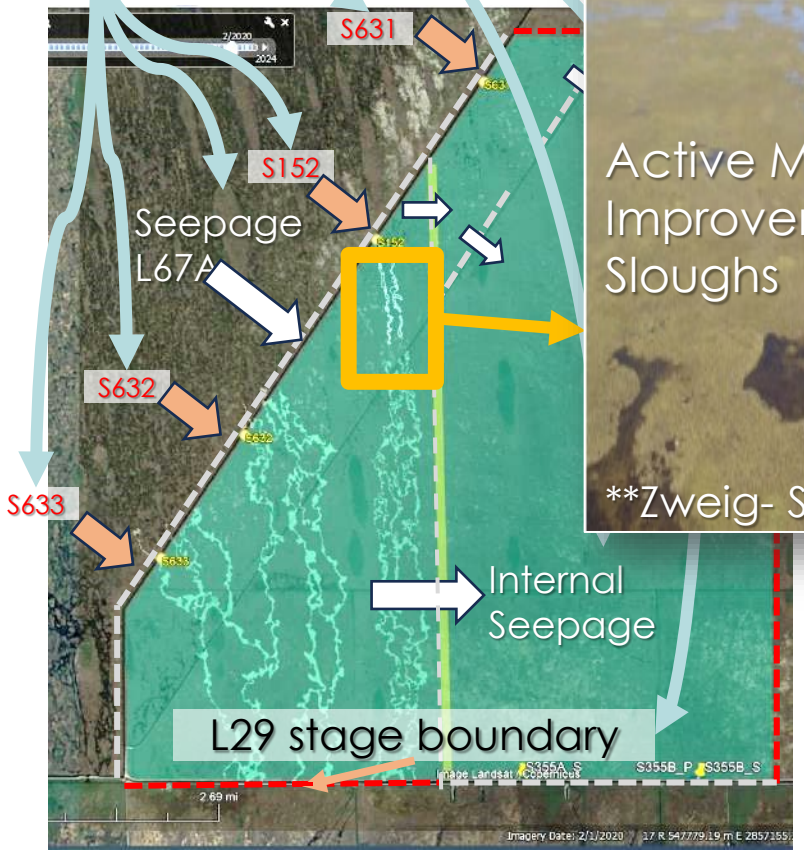


- Reality Checked with DPM data
- 2025 SFER, Vol. I, Chapter 6 Appendix

** Jie Zeng: Session 34, 8:50

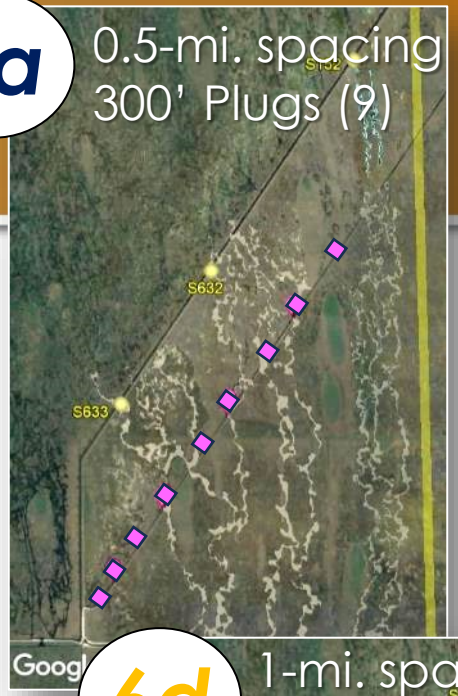
Boundary Conditions & Scenarios

RSM-GL*



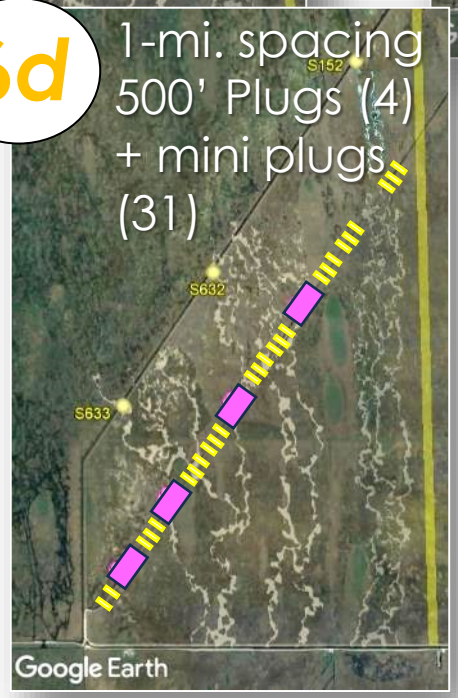
M. Manna, SFWMD

1a 0.5-mi. spacing 300' Plugs (9)

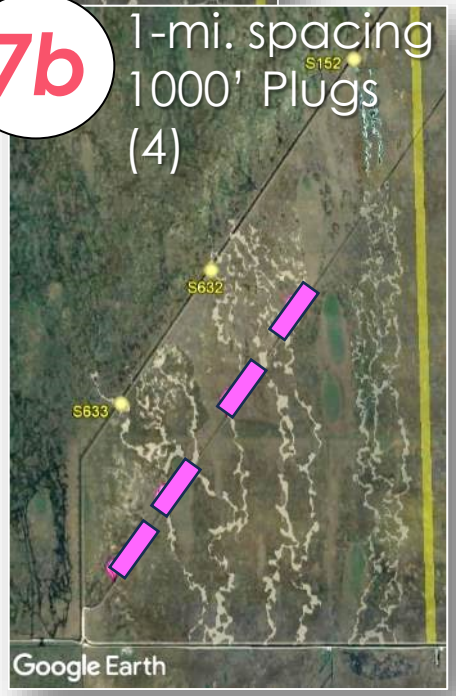


6b 1-mi. spacing 500' Plugs (4)

6d 1-mi. spacing 500' Plugs (4) + mini plugs (31)



7b 1-mi. spacing 1000' Plugs (4)

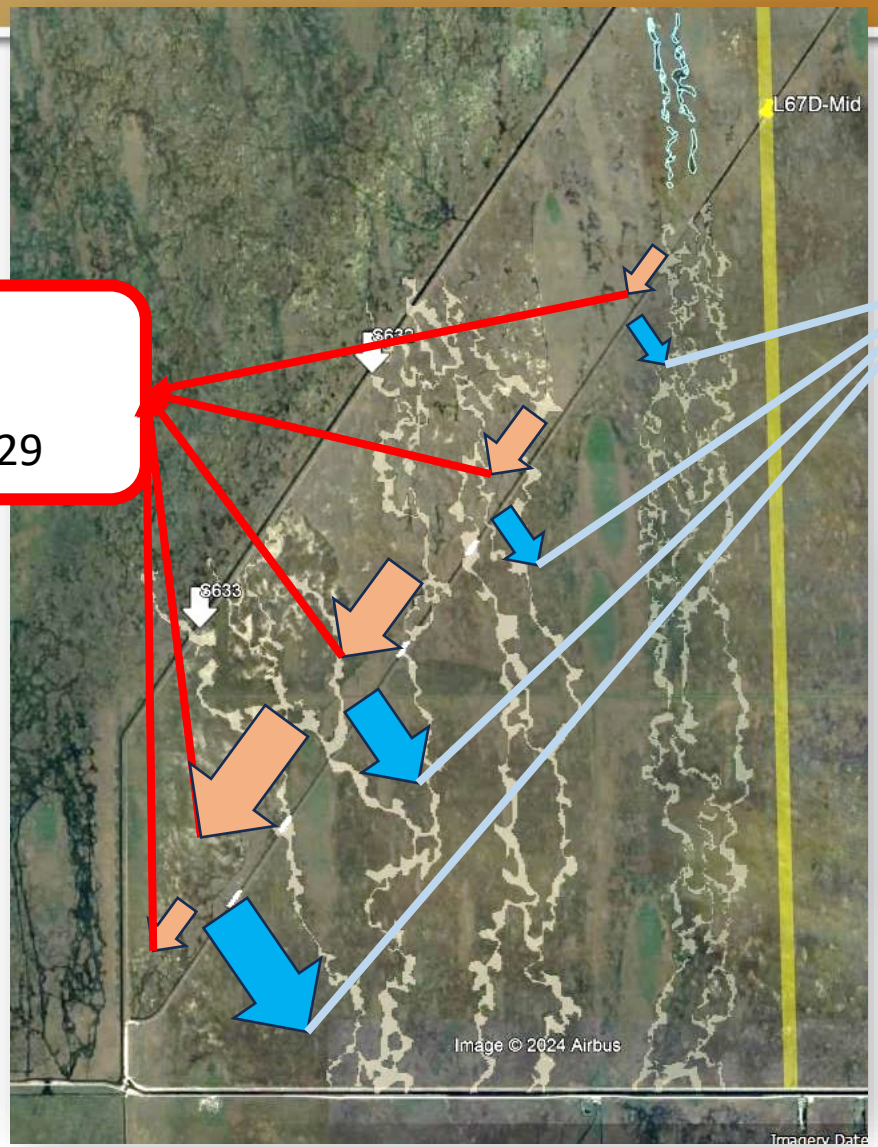


** Regional Systems Model-GL BBSEER FWO*

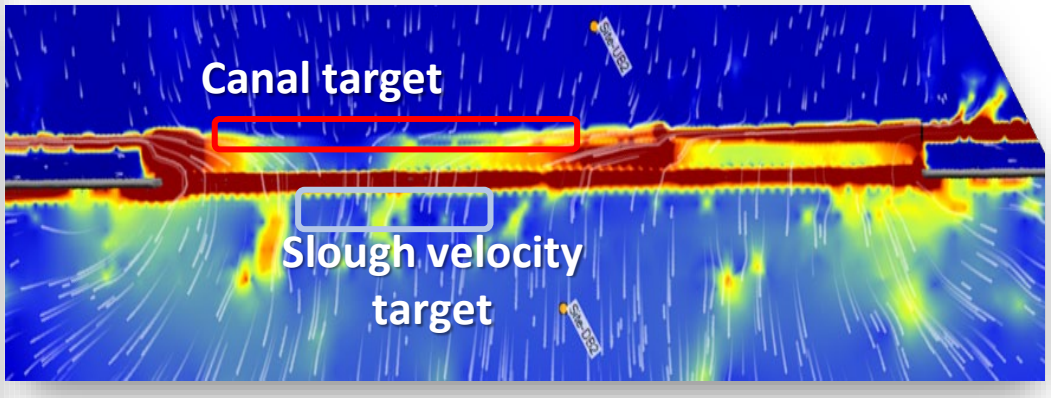
sfwmd.gov

Performance Targets: Canal Discharge & Slough Velocity

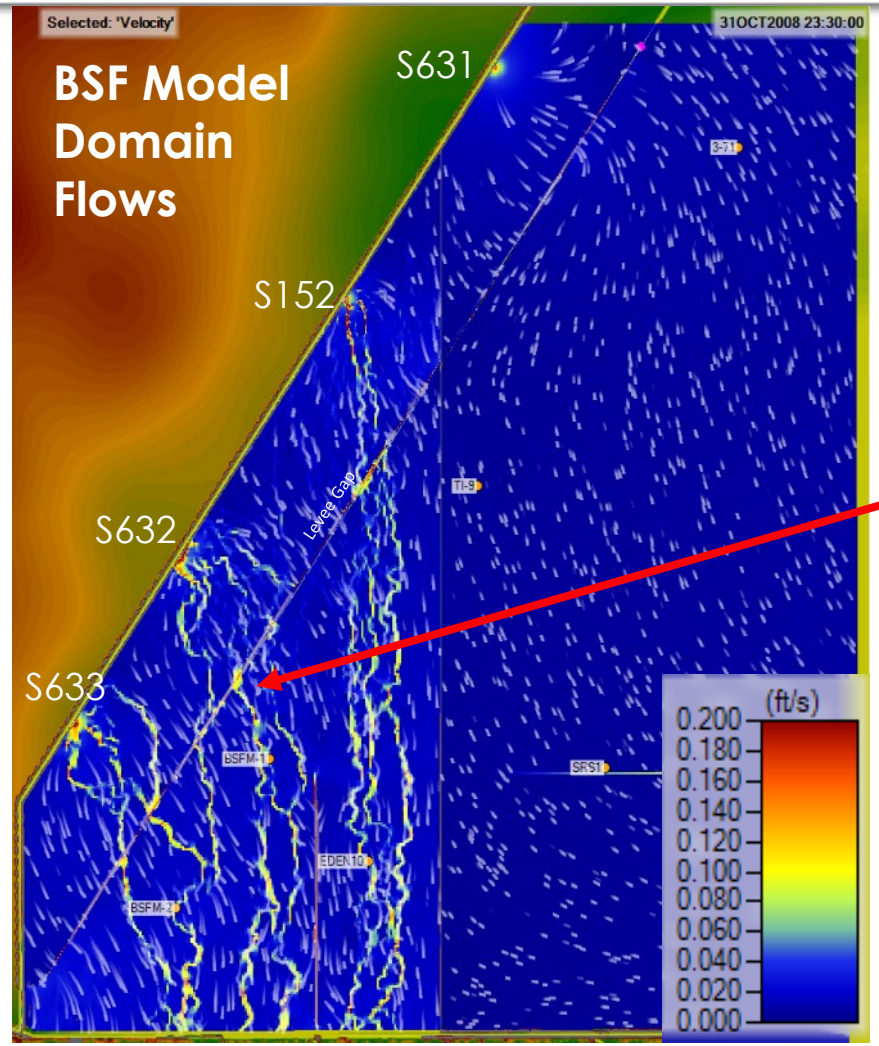
Canal Discharge Target
- Discharge ≤ 20 cfs
- Weighting by proximity to L29

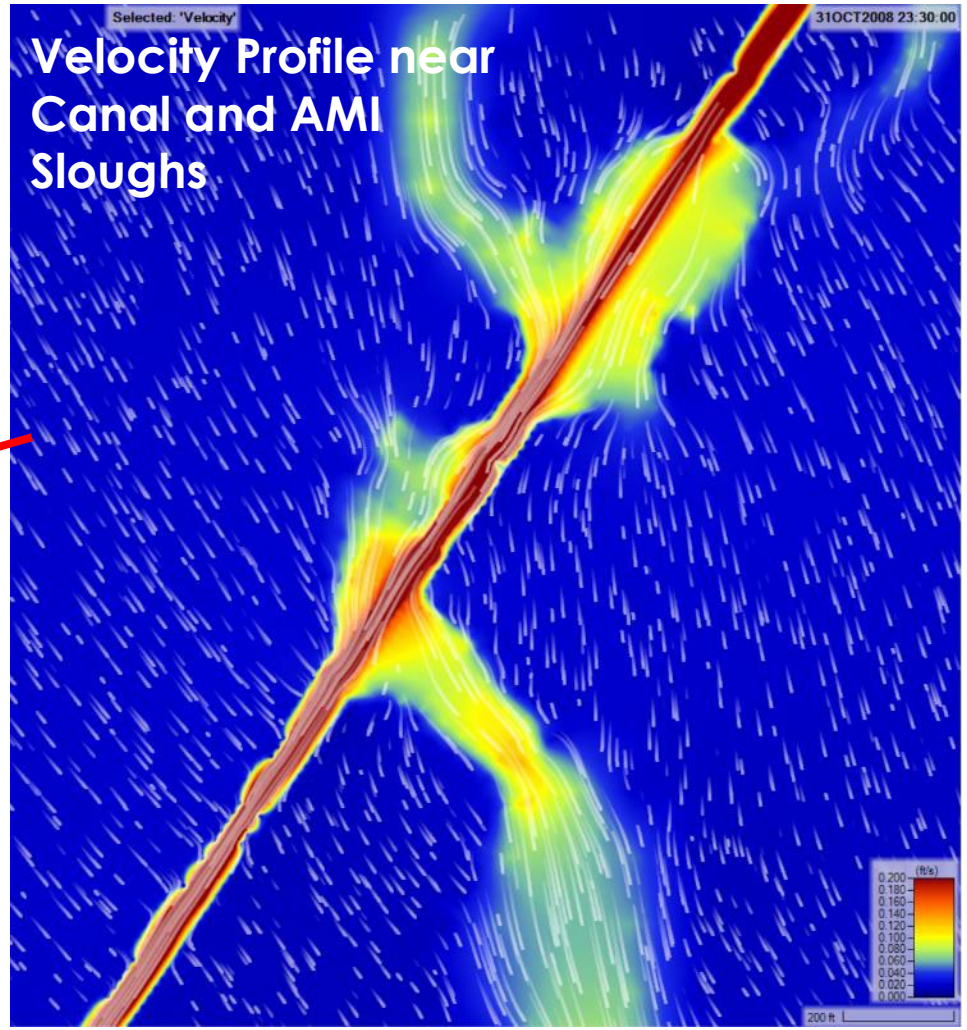


Slough Velocity Target
- Slough velocity ≤ 0.1 ft/s
- Weighting by proximity to L29



Simulated flows (Baseline)

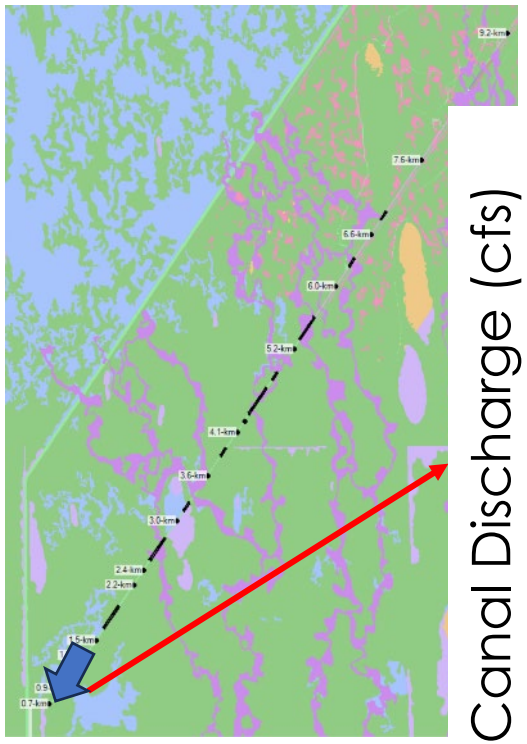


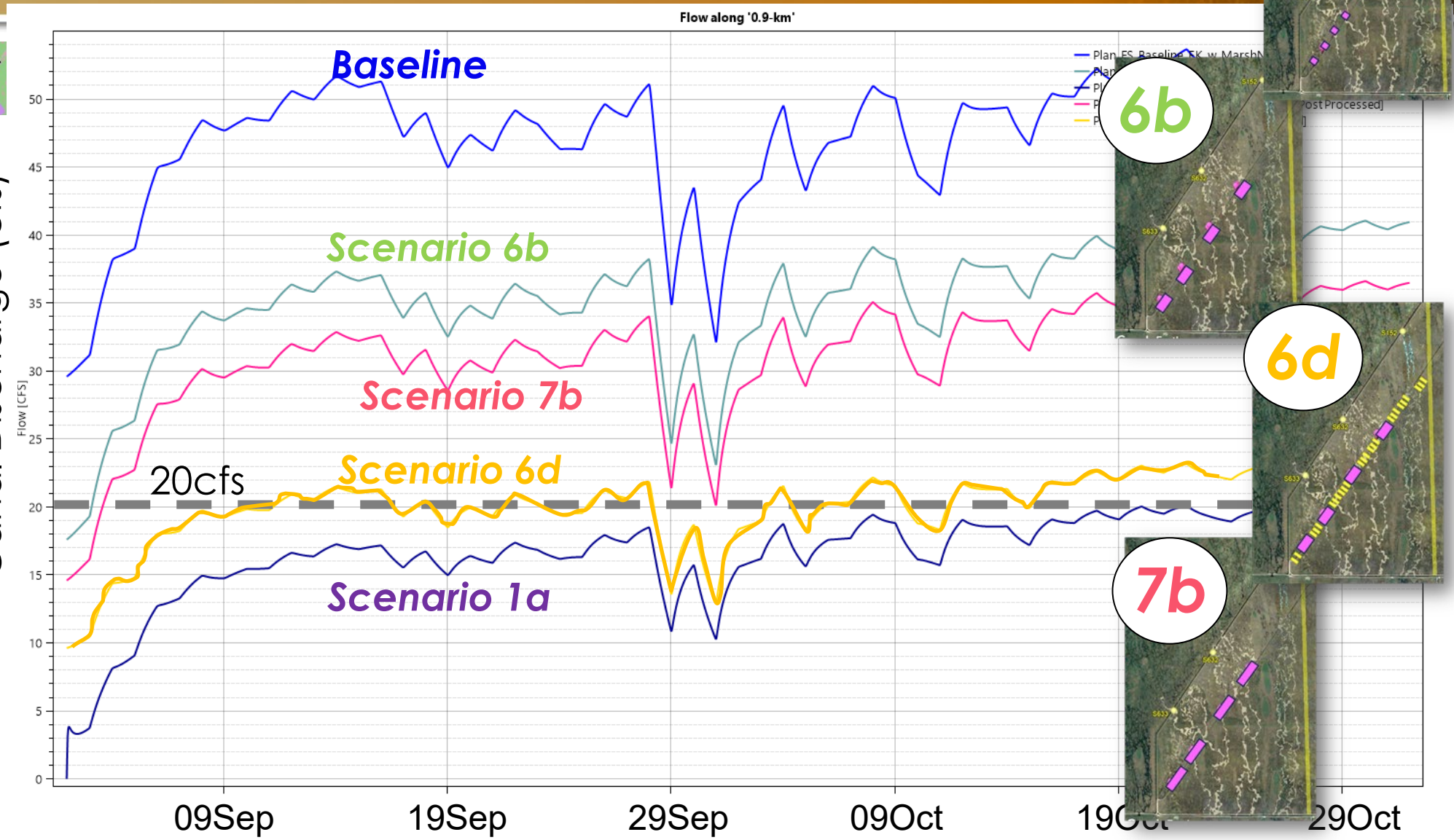


Without plugs, canal discharge is not reduced by AMI sloughs

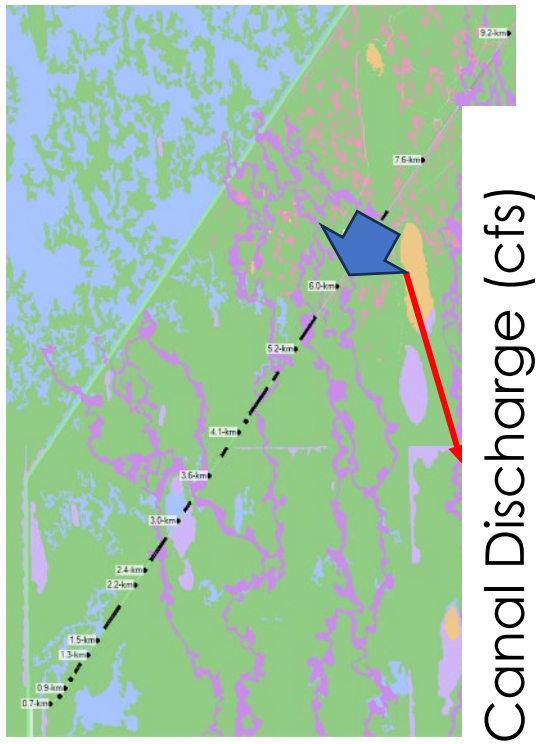
Confirms that plugs are needed to minimize canal discharge

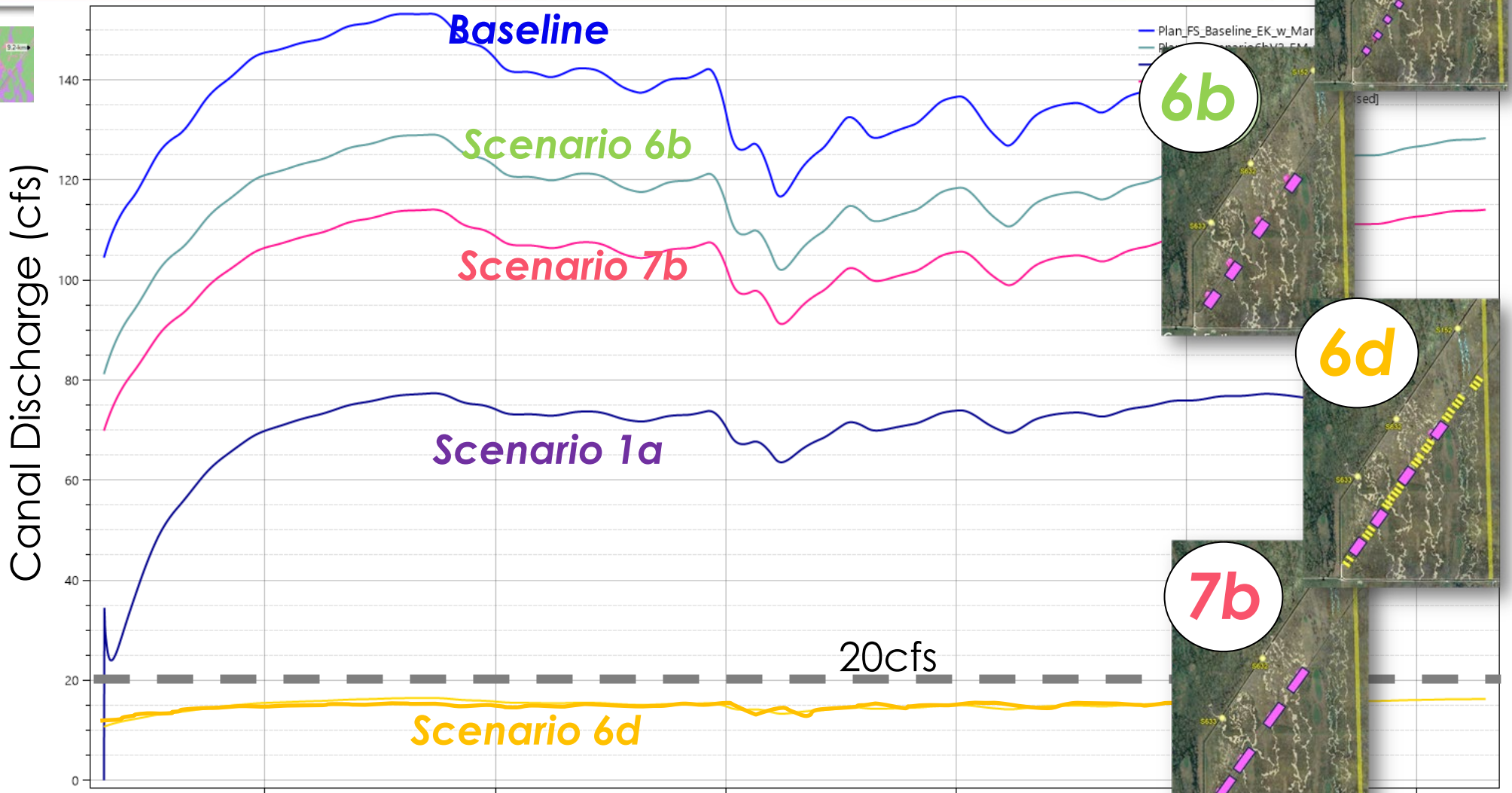
L-67C Canal Flow (cfs) at 0.9-km



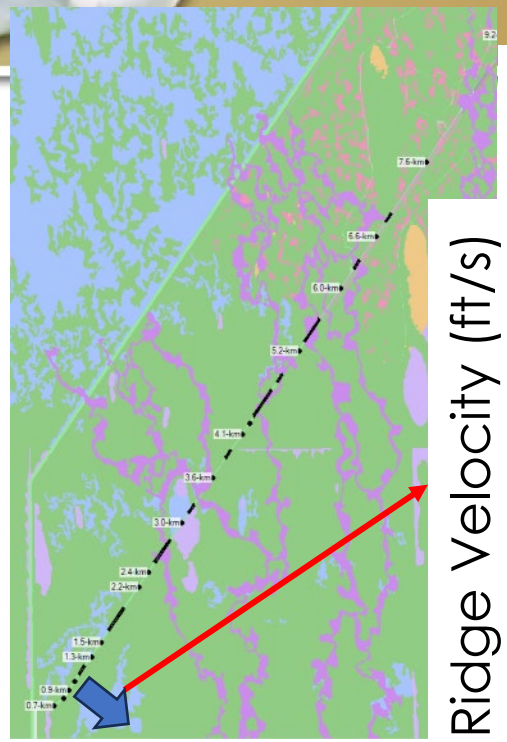


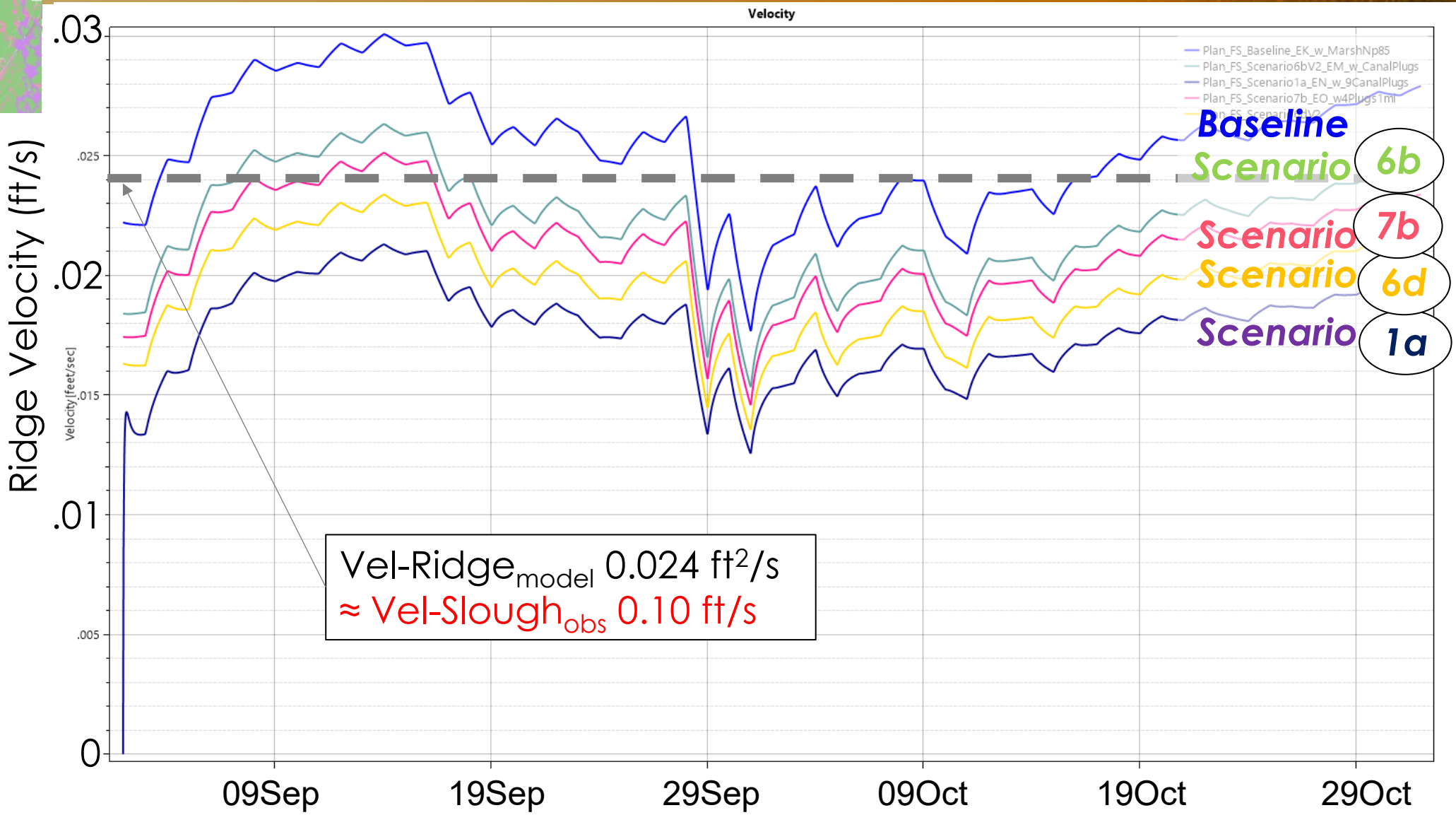
L-67C Canal Flow (cfs) at 6-km



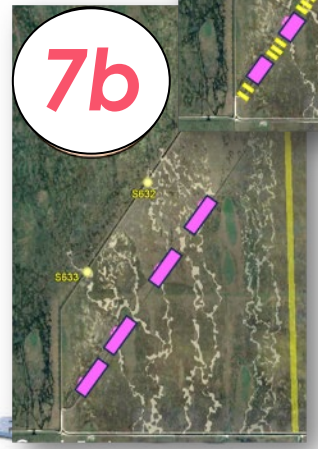


Slough velocity at 0.9-km



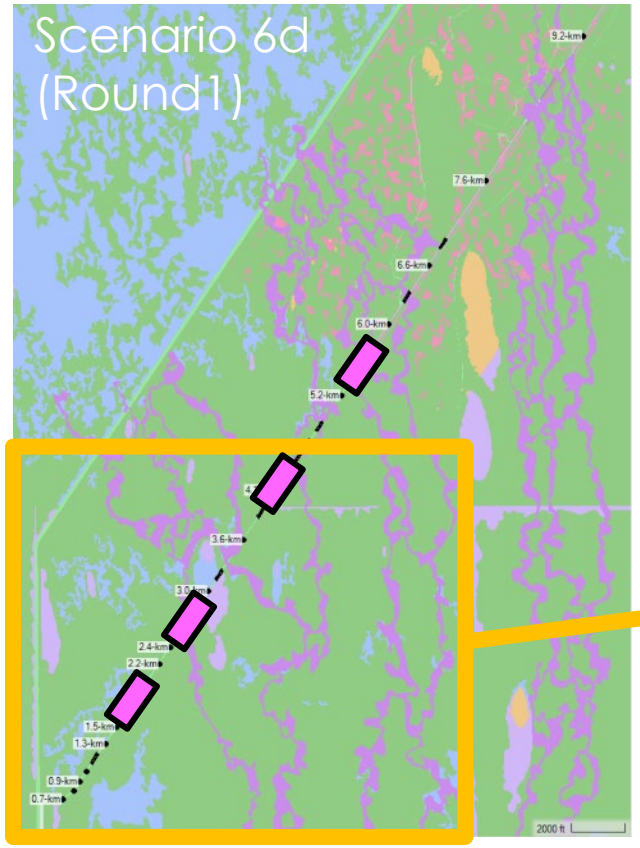


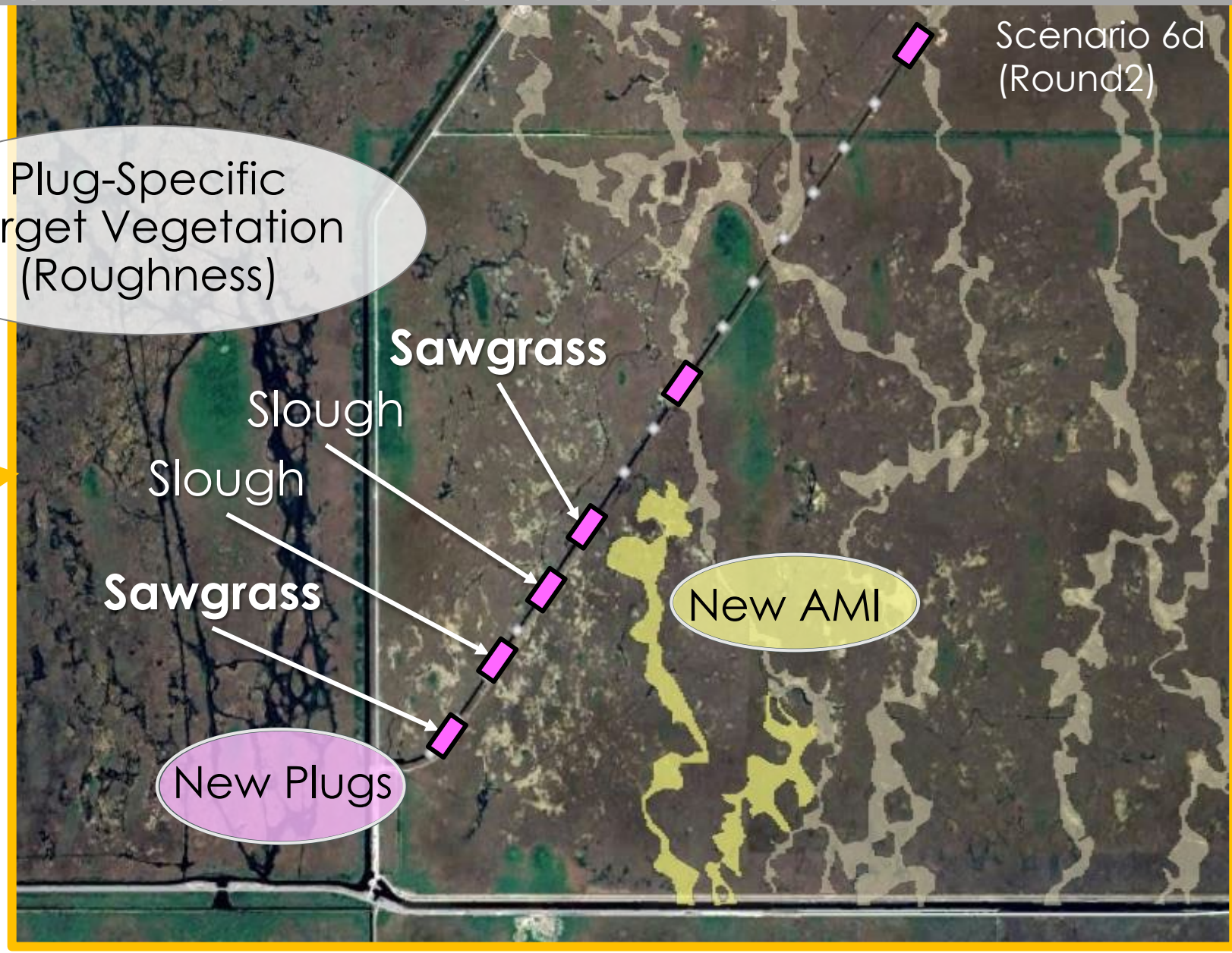
Performance Summary – Round1



Scenario	Volume (cubic yards)	Plug Fill Length (ft)	Plug Spacing (miles)	Canal Discharge <20 cfs			Slough Velocity <0.1 ft/s
				South	Middle	North	South
Baseline	-	-	-	No	No	No	No
1a	**74,034**	300	0.5	Yes	No	No	Yes
6b	**55,170**	500	1.0	No	No	No	Y/N
6d	**83,829**	500	1.0 + mini-plugs	Y/N	Y/N	Yes	Yes
7b	**100,552**	1000	1.0	No	No	No	Y/N

Round 2 Refinements to Scenario 6d
Additional Plugs, Target Vegetation (Roughness), and AMI





Summary

Without plugs or fill, the L-67C canal will disrupt sheetflow and enrich areas downstream of the levee degrade

- Canal plugs are needed to minimize canal sediment mobilization and canal-to-marsh impacts
- The combination of four 500-ft plugs and "speed bumps" achieved most flow targets
- Additional plugs and AMI sloughs needed to achieve all targets in southwest terminus of L-67C

View of L-67C in WCA-3B, looking southwest, Everglades National Park in background

Photo – Lisa Jackson, SFWMD

Thank you

Sunset Over DPM (photo - Erik Tate-Boldt)