Active management in support of ecosystem restoration

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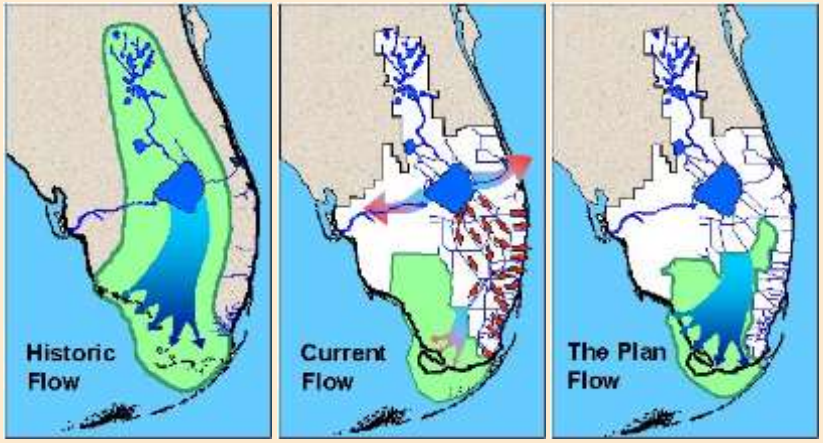
Active Management

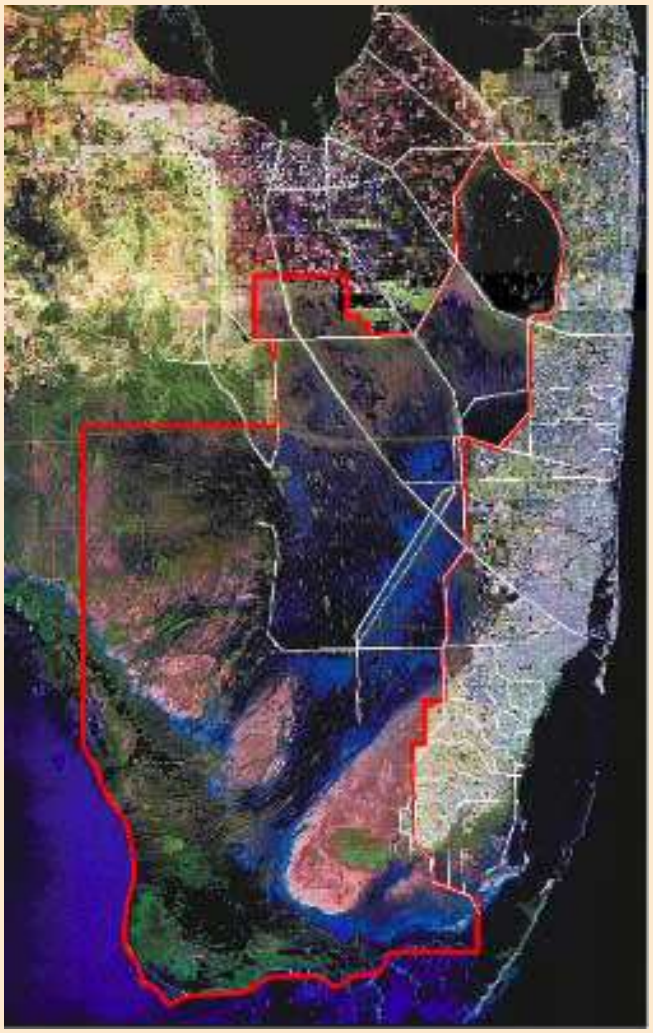
- The Everglades has undergone drastic changes from pre-disturbance conditions
- Indirect restoration may not suffice
- Loss of:
  - Topography
  - Landscape pattern
  - Ecosystem engineers
  - Ecological drivers (disturbance, natural periodicity, etc.)

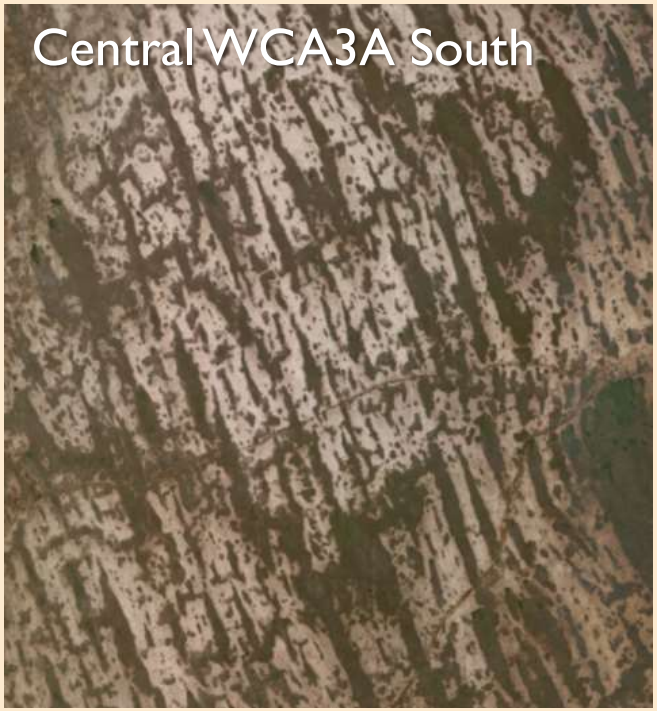


Active Management

History of active management in Everglades

- Invasives
  - Plant—large scale eradication of Melaleuca, Brazilian pepper, Lygodium
  - Animals—pythons and other reptiles
- Pattern restoration
  - Fire programs
  - Tree island plantings
  - Cattail Habitat Improvement Project/Active Marsh Improvement (CHIP/AMI)

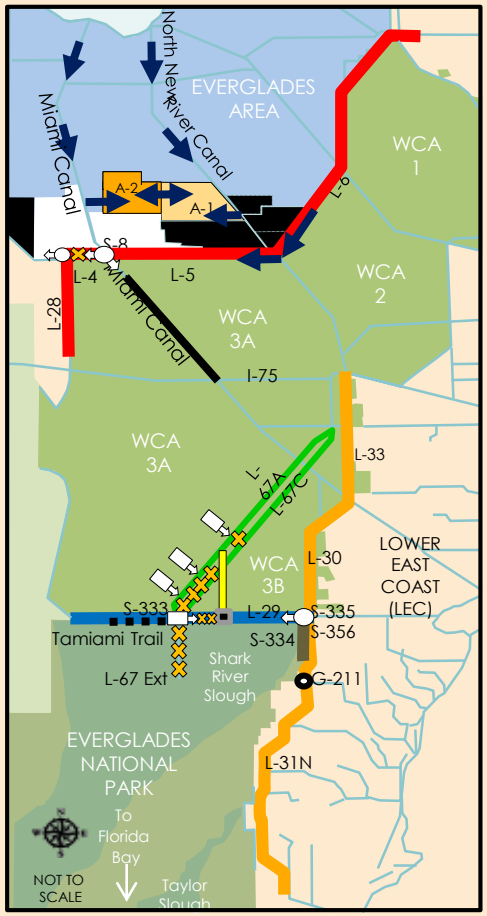


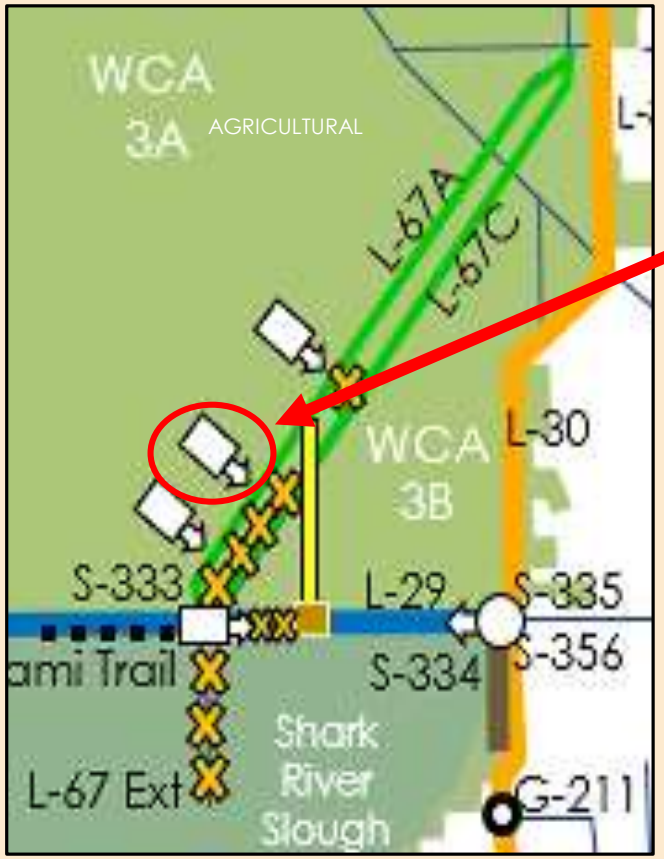

Central WCA3A South


Impounded


Over-drained

CEPP/DECOMP

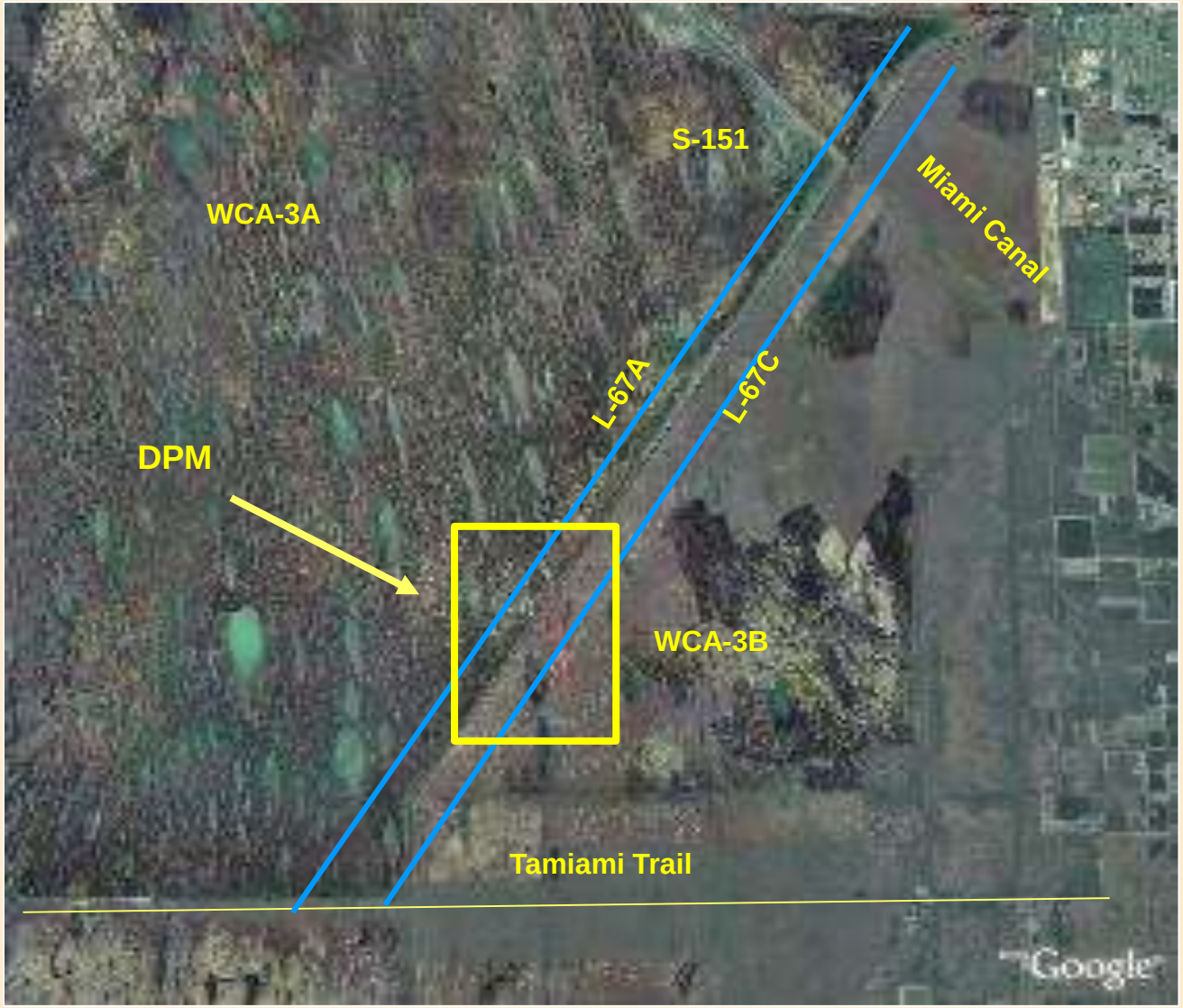




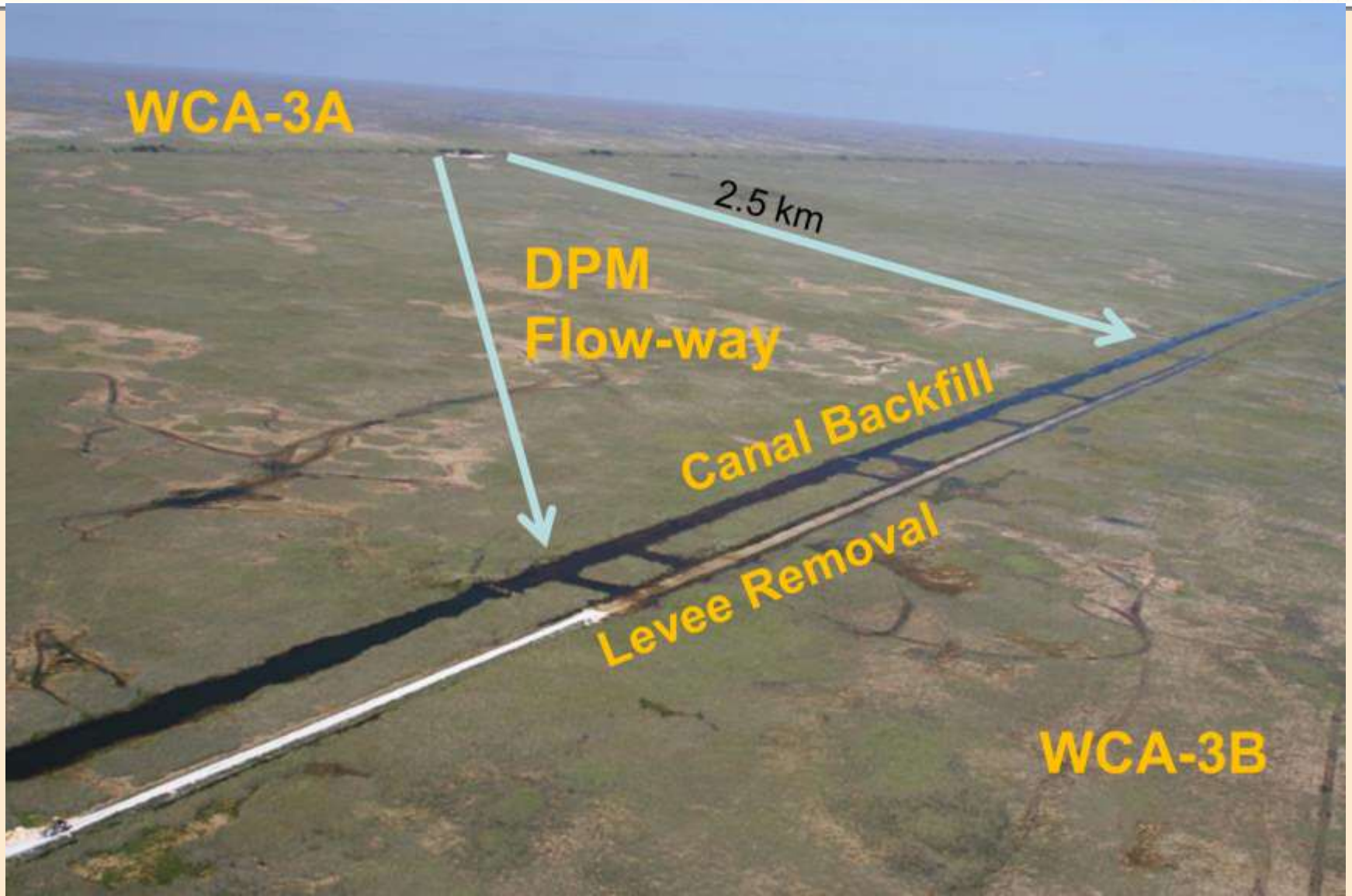
Decomp Physical Model

- Extent of canal backfilling and levee removal required to maintain sheetflow
- Surface water flow velocity required for creating and maintaining ridge and slough habitat and landscape

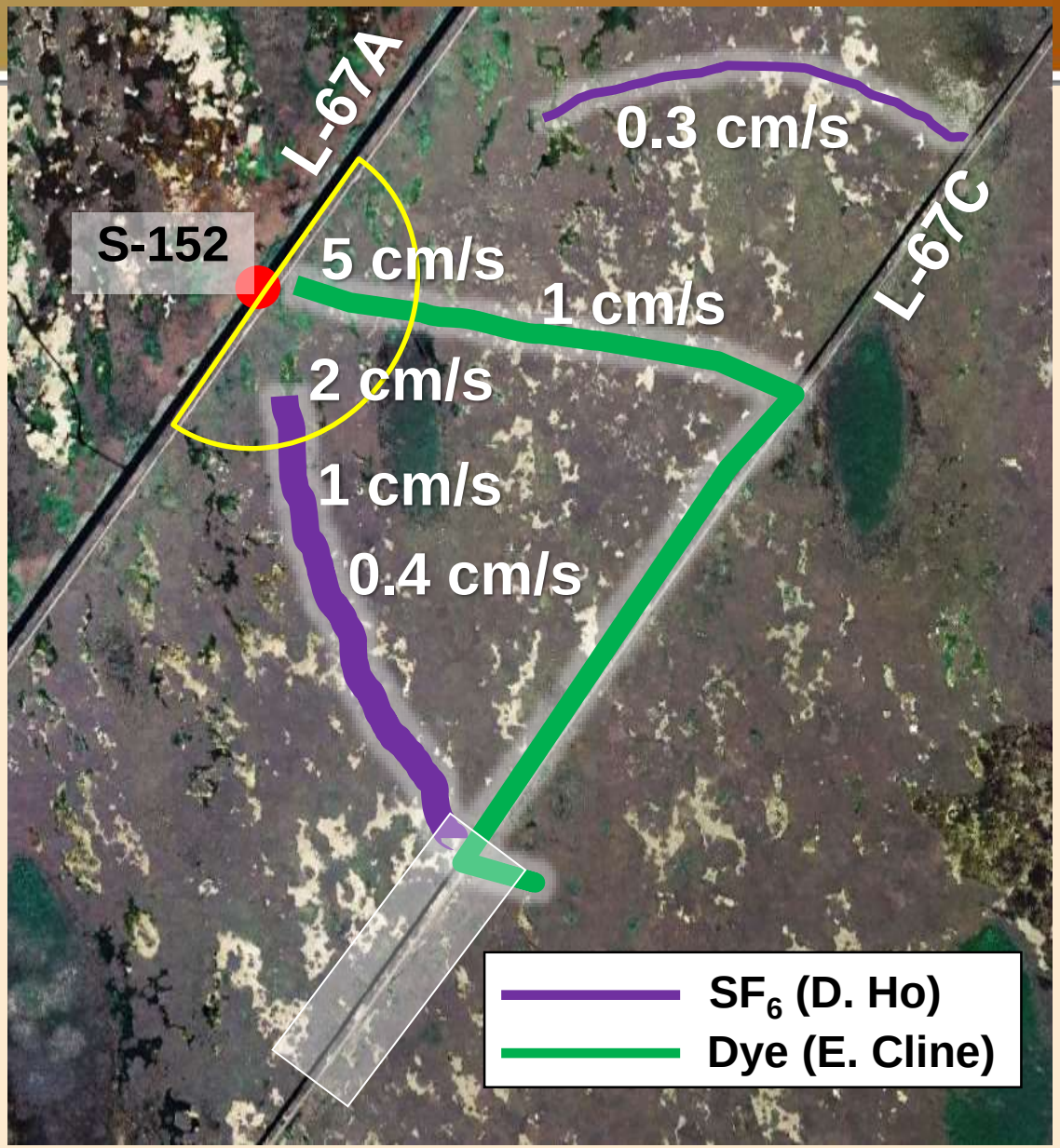
Decomp Physical Model



Decomp Physical Model flow way



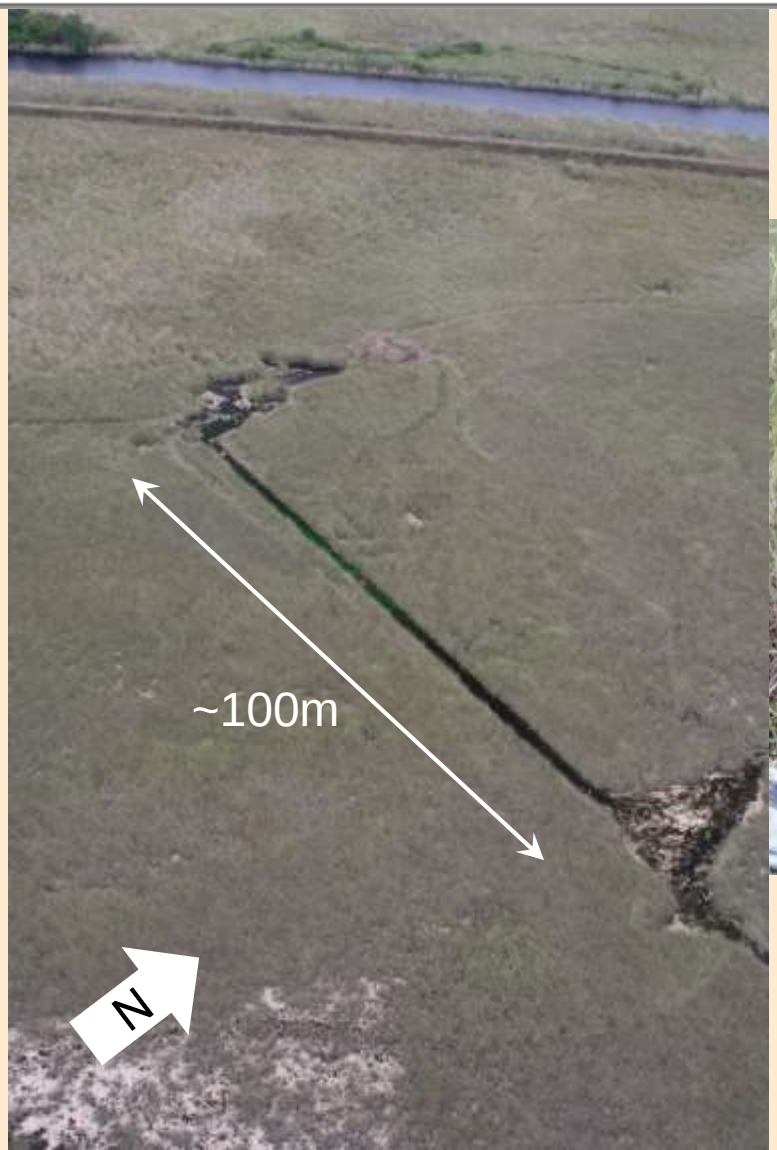
Flows in DPM


L-67A
L-67C
S-152
0.3 cm/s
5 cm/s
1 cm/s
2 cm/s
1 cm/s
0.4 cm/s
SF6 (D. Ho)
Dye (E. Cline)

What can we do?

- Active management experiment or “Brute Force Science”
  - Can we change direction of flow?
  - Can we increase flow speeds and propagate it further into the DPM footprint?
  - Can we create microtopography?
  - Can we create differential flow (ridge vs. slough)?
  - What is the best option for active management of an over-drained ridge and slough landscape, particularly at a large scale?

Phase 1: “Zweig slough”—cut

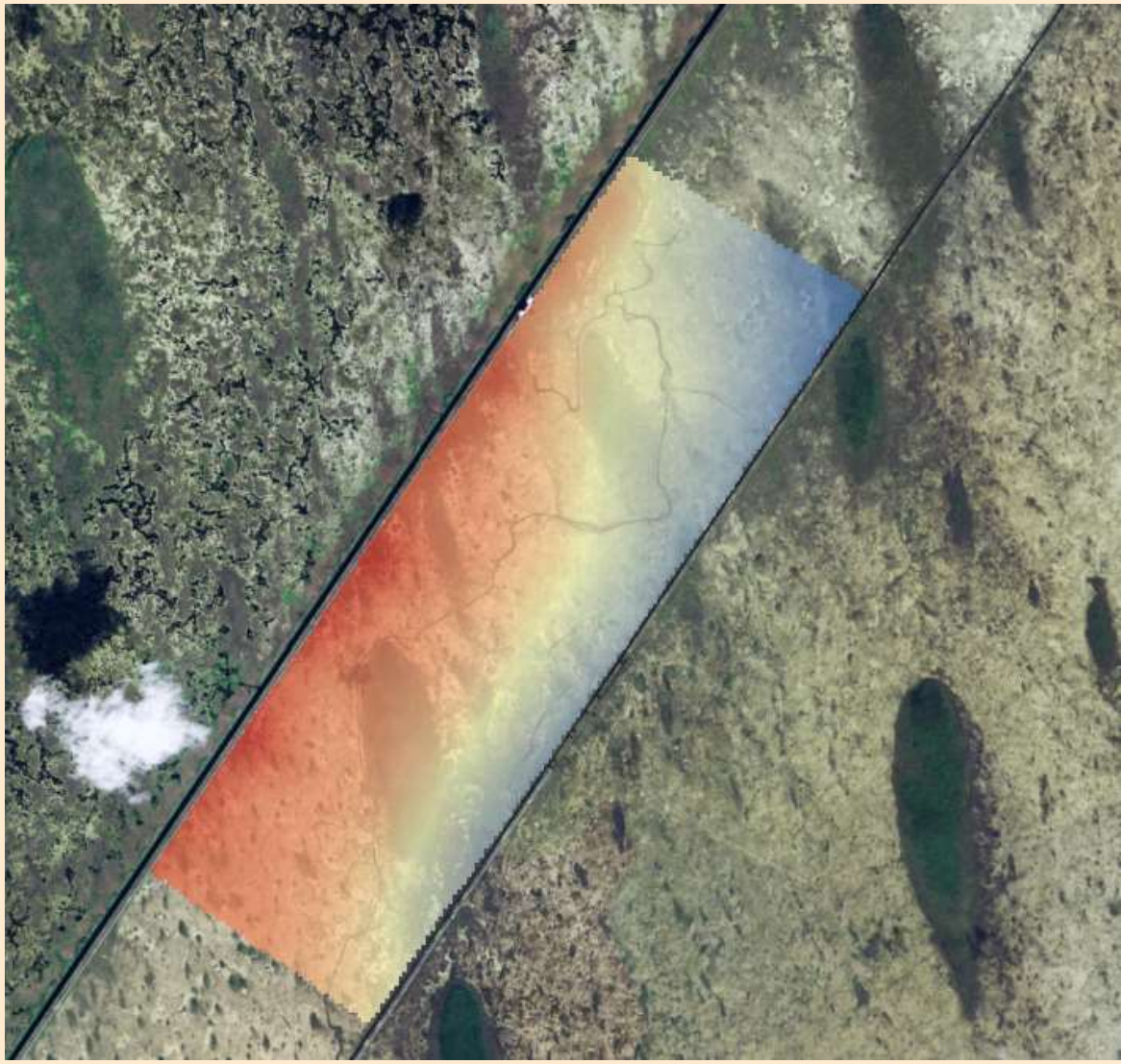



N

Phase 2: “Smash” slough

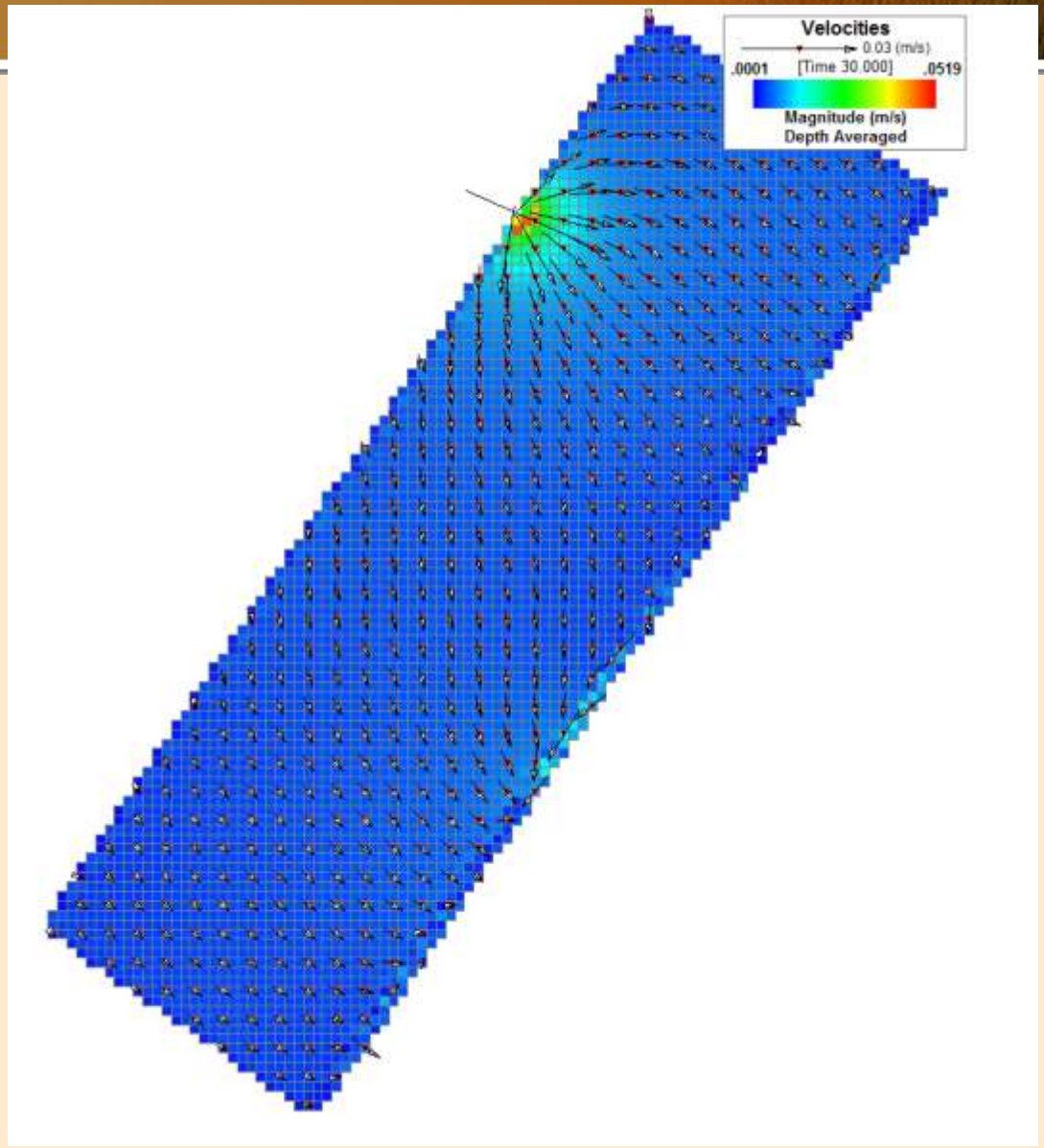
Flows in DPM


S-151
WCA-3A
Miami Canal
L-67A
L-67C
DPM
WCA-3B
Tamiami Trail
Google



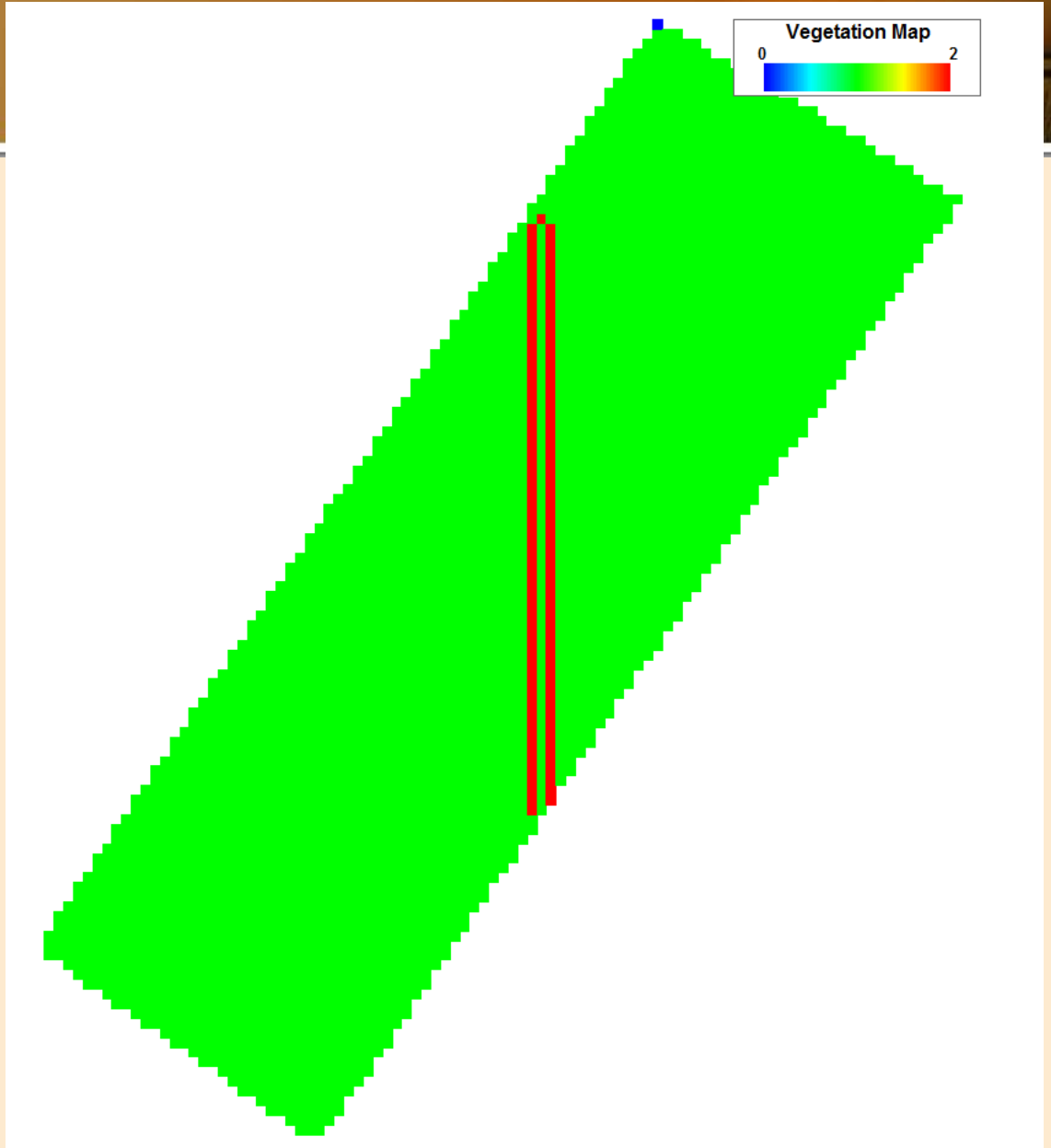
Environment Fluid Dynamics Code (EFDC) Model

Flow velocity and direction pre-active management



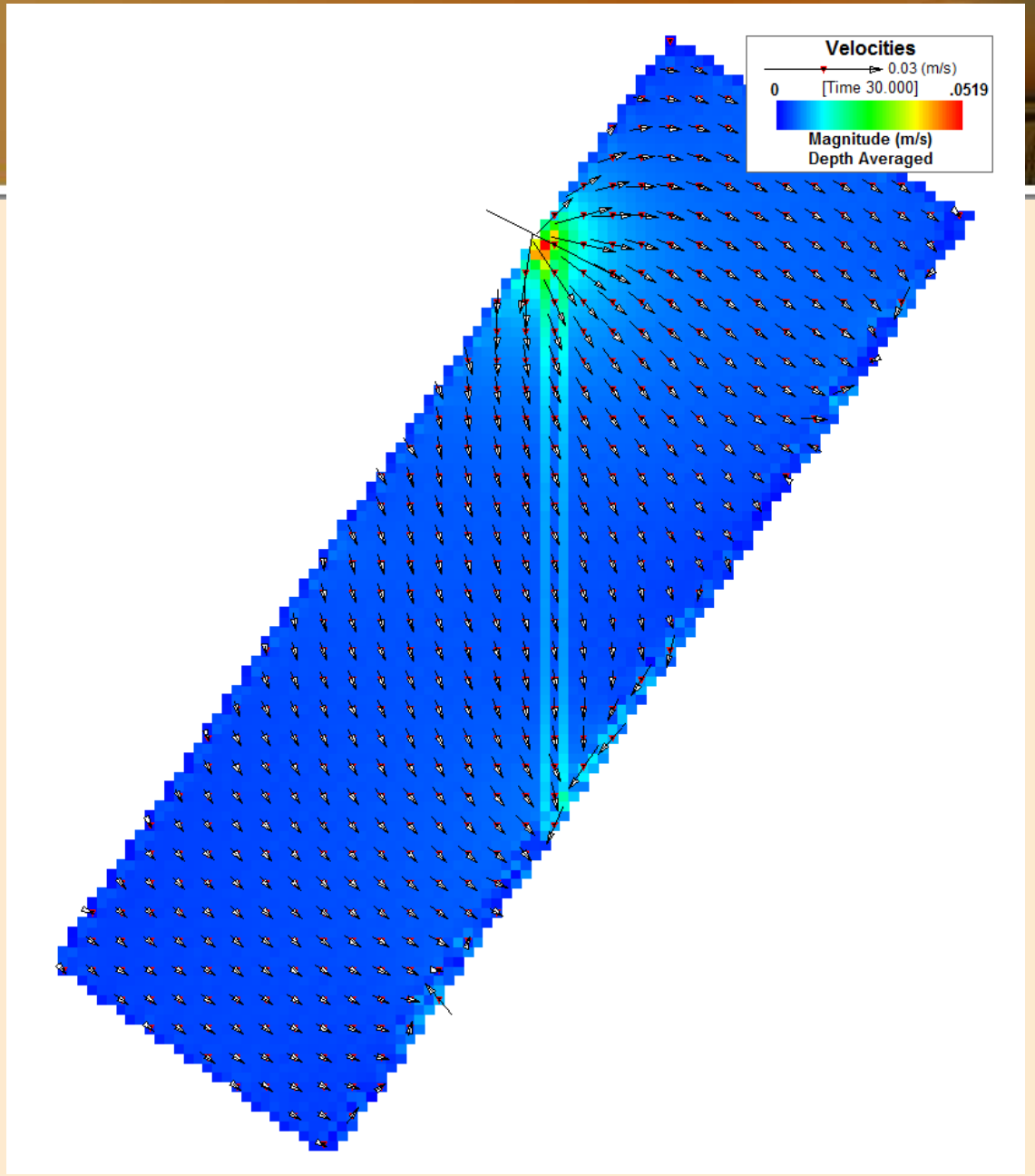
EFDC Model

Active management—removed vegetation and decreased drag for flow

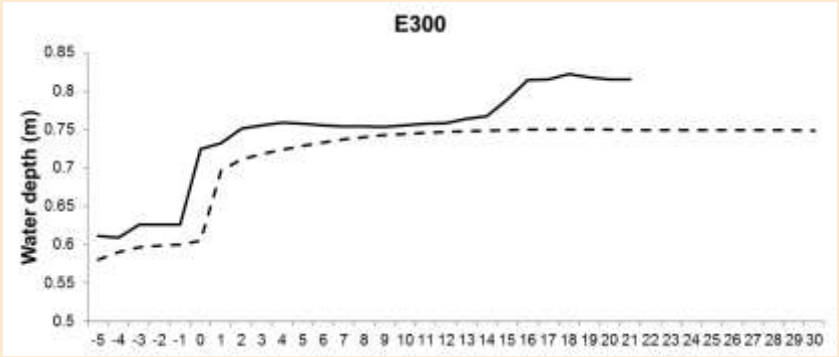


EFDC Model

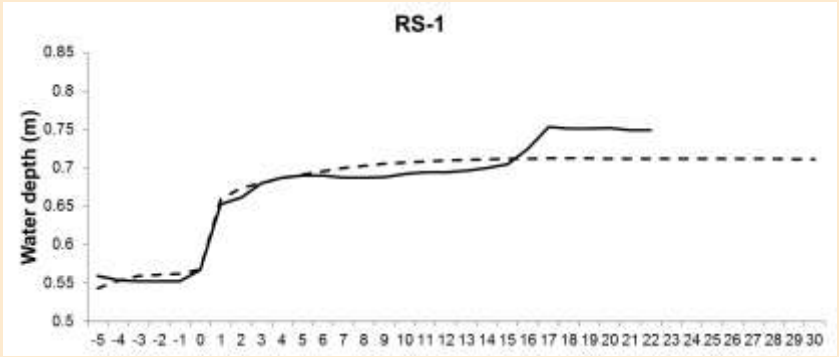
Flow velocity and direction post-active management



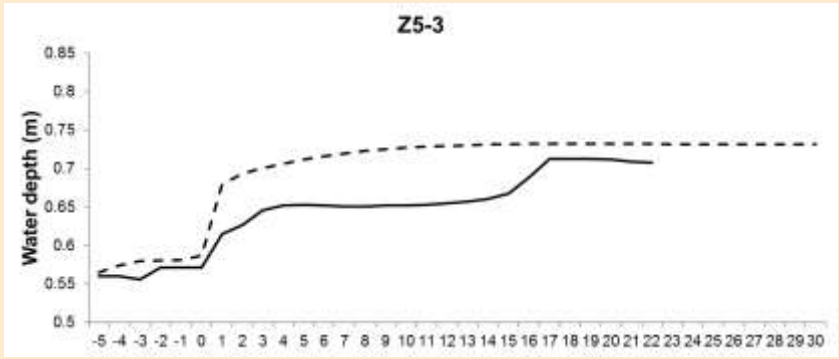
EFDC Model Validation



270 m from structure

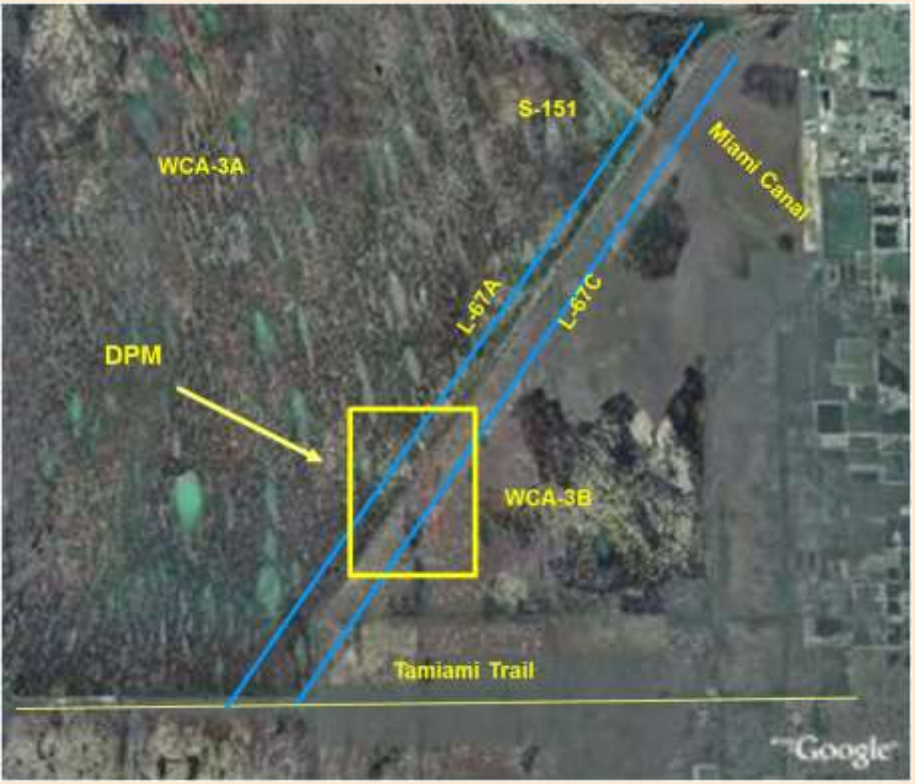


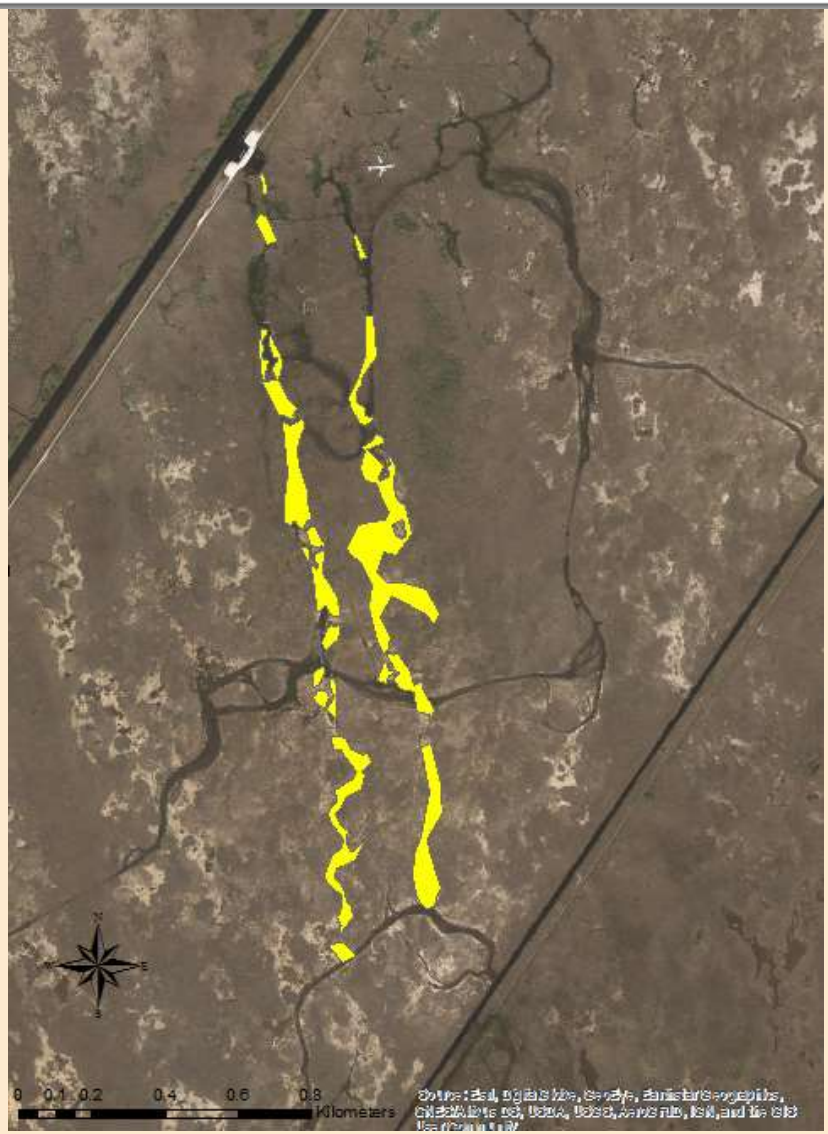
360 m from structure



700 m from structure

Landscape level AM



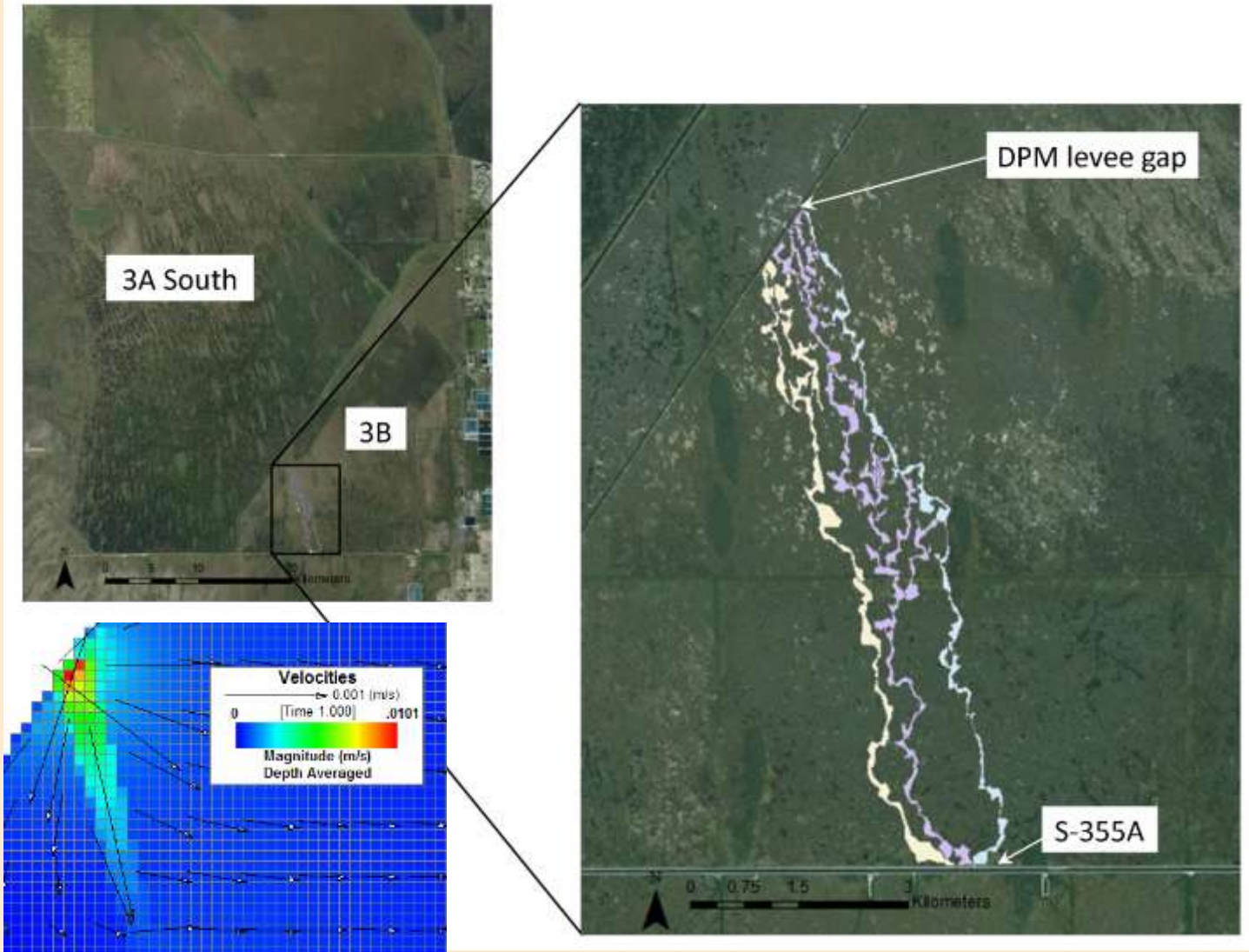



S-152
Increasing blood flow and **physically removing the plaque** is expected to "**jump start**" ridge and slough restoration

What did we learn?

Question	Landscape	Smash	Cut
Can we change direction of flow?	Model Y	N	Y
Can we increase flow speeds and propagate it further into the DPM footprint?	Model Y	?	?
Can we create microtopography?	Not in model	NY	Y
Can we create differential flow (ridge vs. slough)?	Model Y	Y	Y
What is the best option for active management of an over-drained ridge and slough landscape?	Herbicide Herb/Fire?	? Fire?	?

CEPP and WCA 3B



Acknowledgements

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Click to add title

Look Mom! I'm on Google Earth!

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EFDC Model

- Elevation DEM from HAED data
- Overall landscape flow vectors (dye, SF6 tracer, Flowtracker data)
- Depths and velocity data at certain points in the system (Flowtracker)
- Inputs through S-152
- Outputs through the levee gap
- Estimates of seepage from Flowtracker measurements near levee
- Grid and time steps were estimated from courant number equations
- Domain is a georeferenced polygon from the footprint of DPM
- Drag coefficient for sawgrass from literature