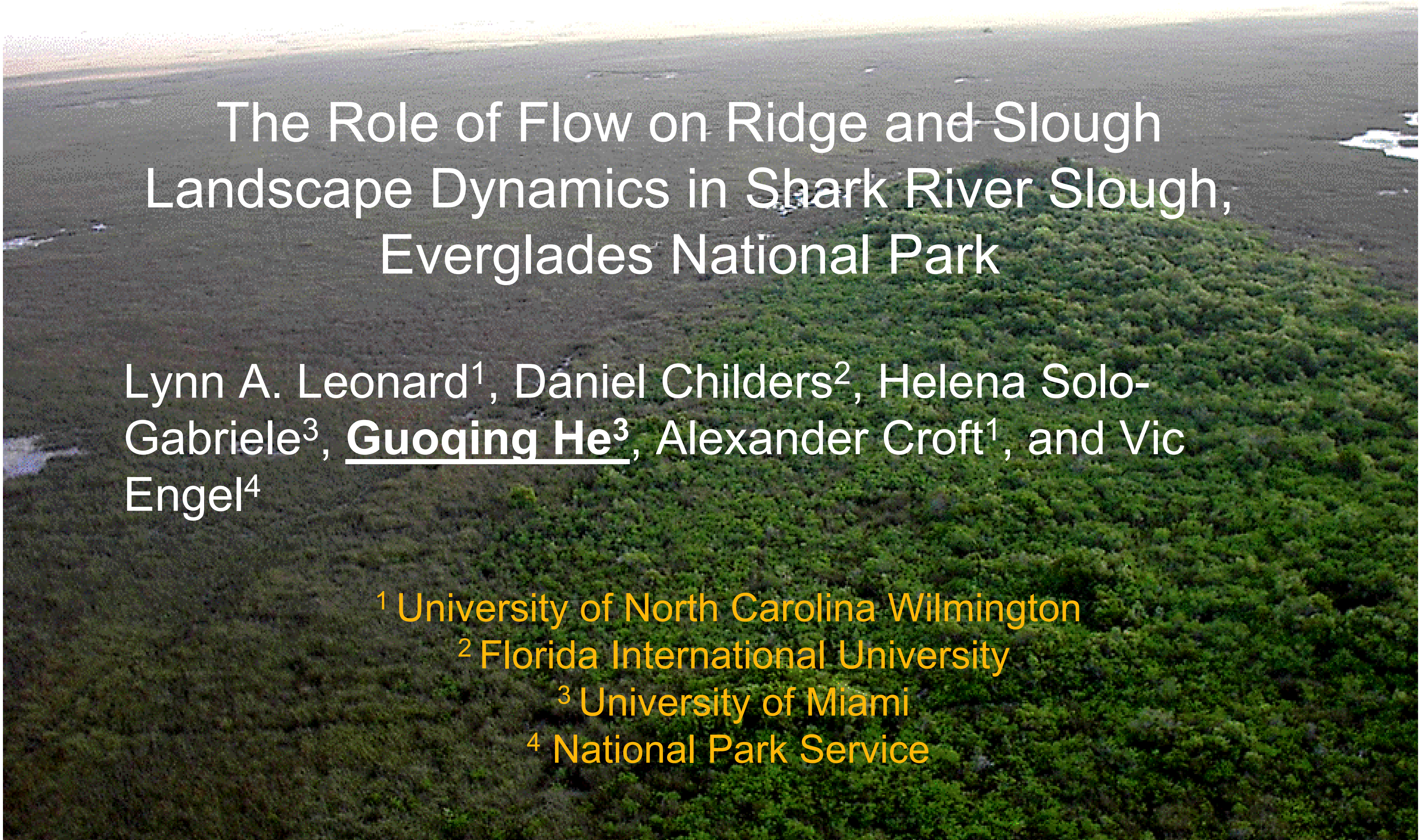

The Role of Flow on Ridge and Slough Landscape Dynamics in Shark River Slough, Everglades National Park

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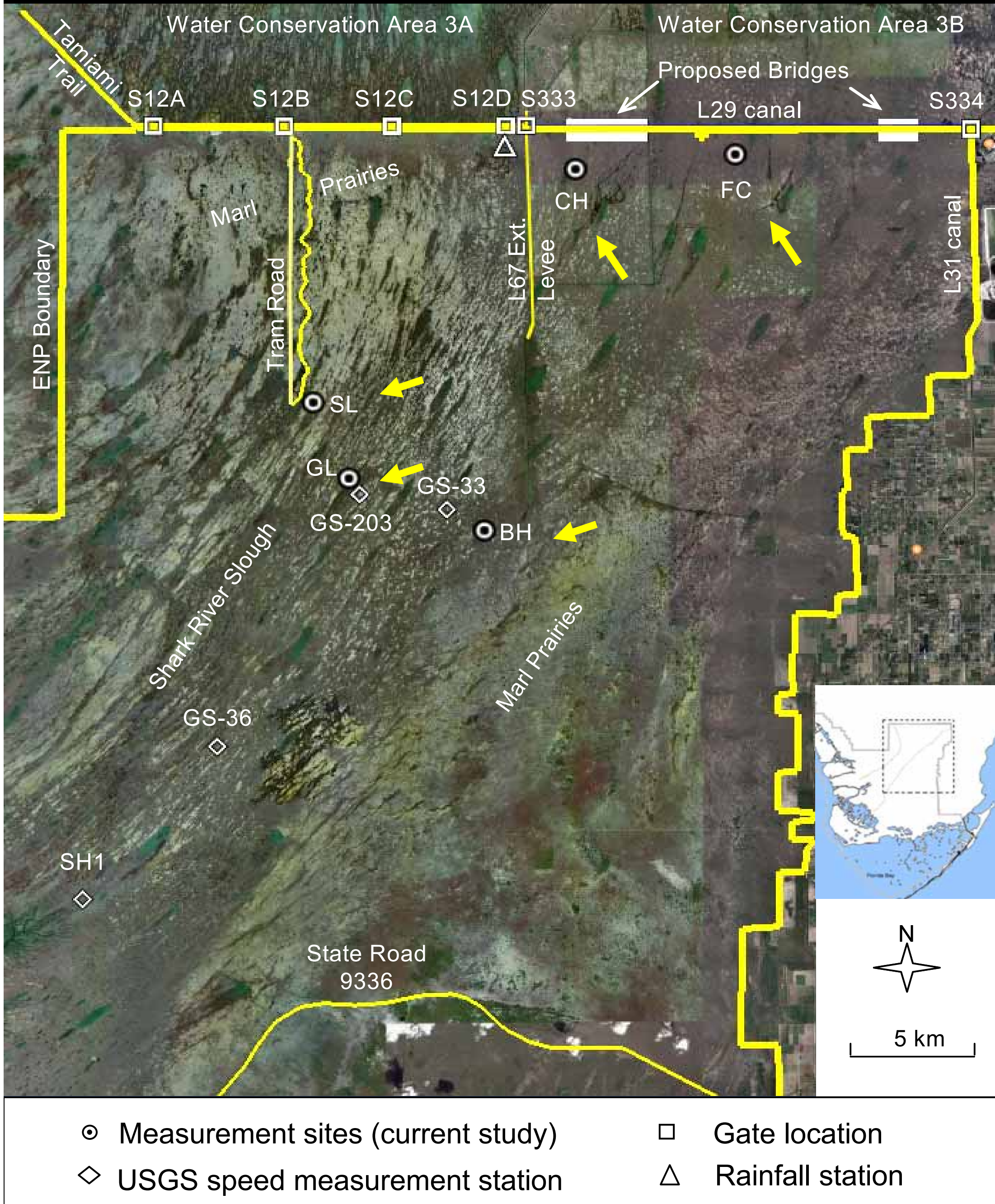


Objective: Describe how water flow through the vegetated ridge and slough system influences landscape maintenance in upper SRS-ENP

- Influence of human activities
- Meteorological forcing
- Effect of Vegetation

Development & validation of flow models → Response of ridge & slough topography to future increases in flow

SL: 2003 – 2005

BH: 2003 – 2005

GL: 2003 –

FC: 2006 -

CH: 2006 -

Water speed (cm s^{-1}): Continuous Sampling Sites

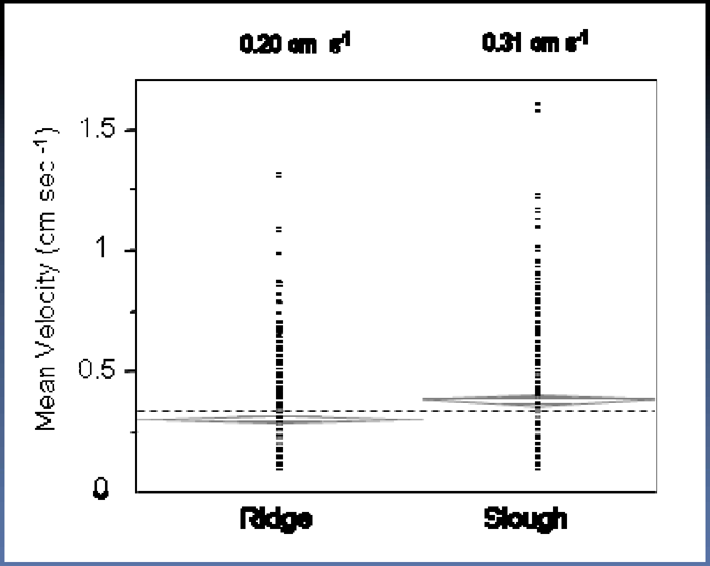
Site	2003 Wet	03-04 Dry	2004 Wet	04-05 Dry	2005 Wet	05-06 Dry	2006 Wet	06-07 Dry	2007 Wet
BH	0.89	0.65	0.42	0.33	0.89	N	N	N	N
GL	1.59	0.92	0.29	0.08	1.3	0.37	0.04	0.14	0.03
SL	1.67	0.43	1.1	0.94	1.89	0.03	N	N	N
CH	N[a]	N	N	N	N	0.15	0.18	0.11	0.14
FC	N	N	N	N	N	N	0.4	0.07	0.05

N – no data

2002-2007: Transect Sites (GL, CH, FC)

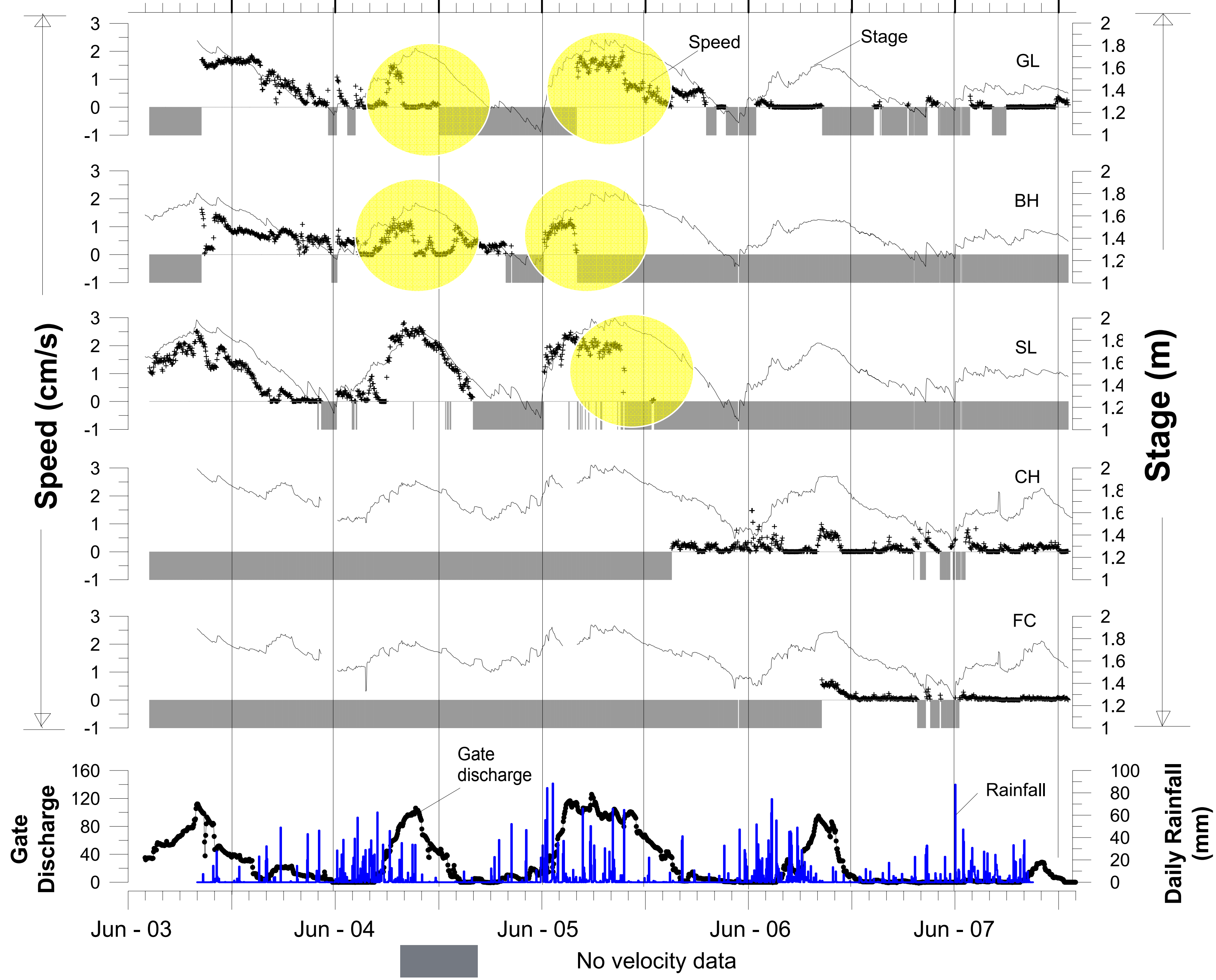
Flow speeds typically less than 2 cm s^{-1}

Wet season flow speeds > Dry season flow speeds



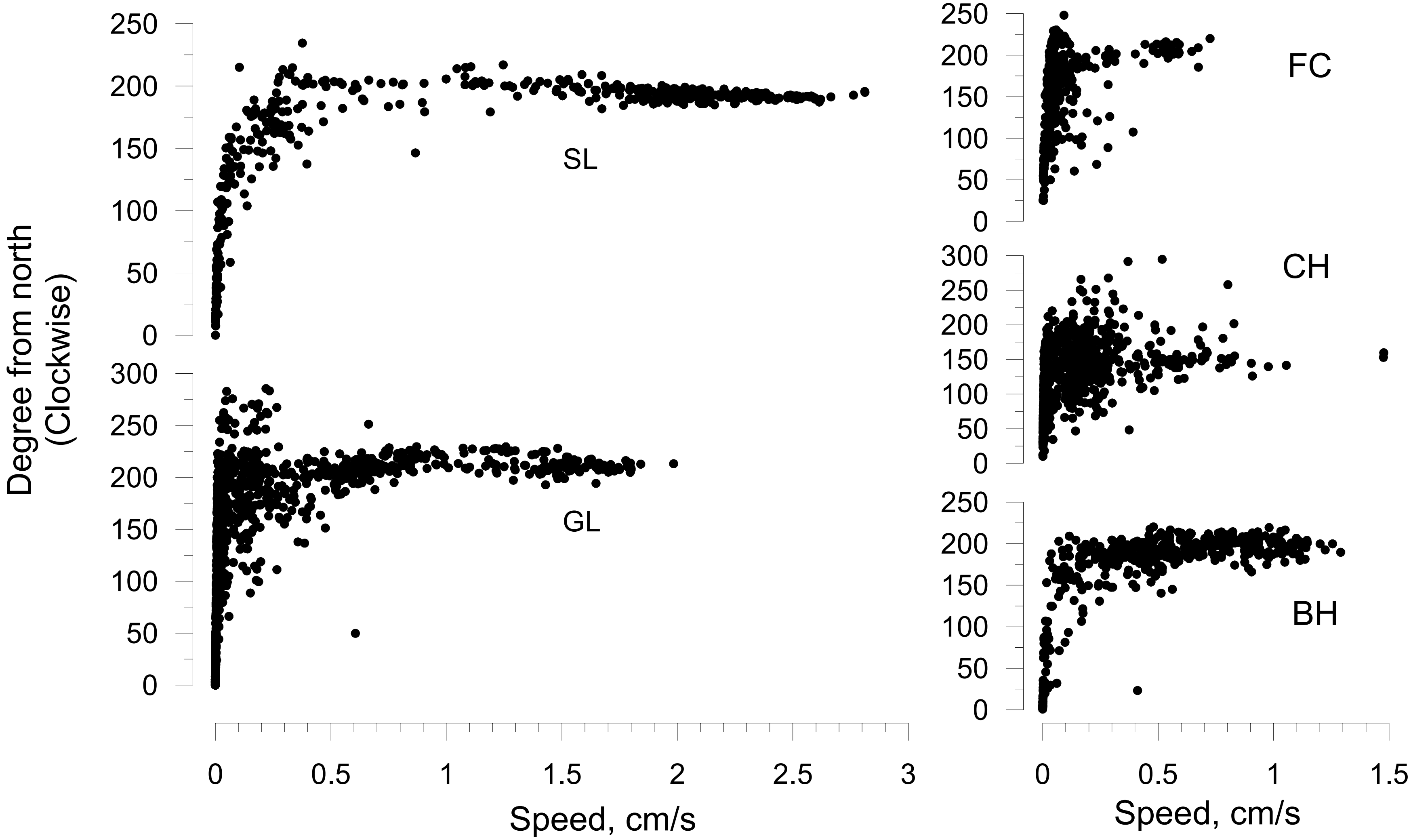
Slough velocity ~ 1.5 X sawgrass velocities

$p < 0.0001$
$F_{(1,842)} = 31.52$

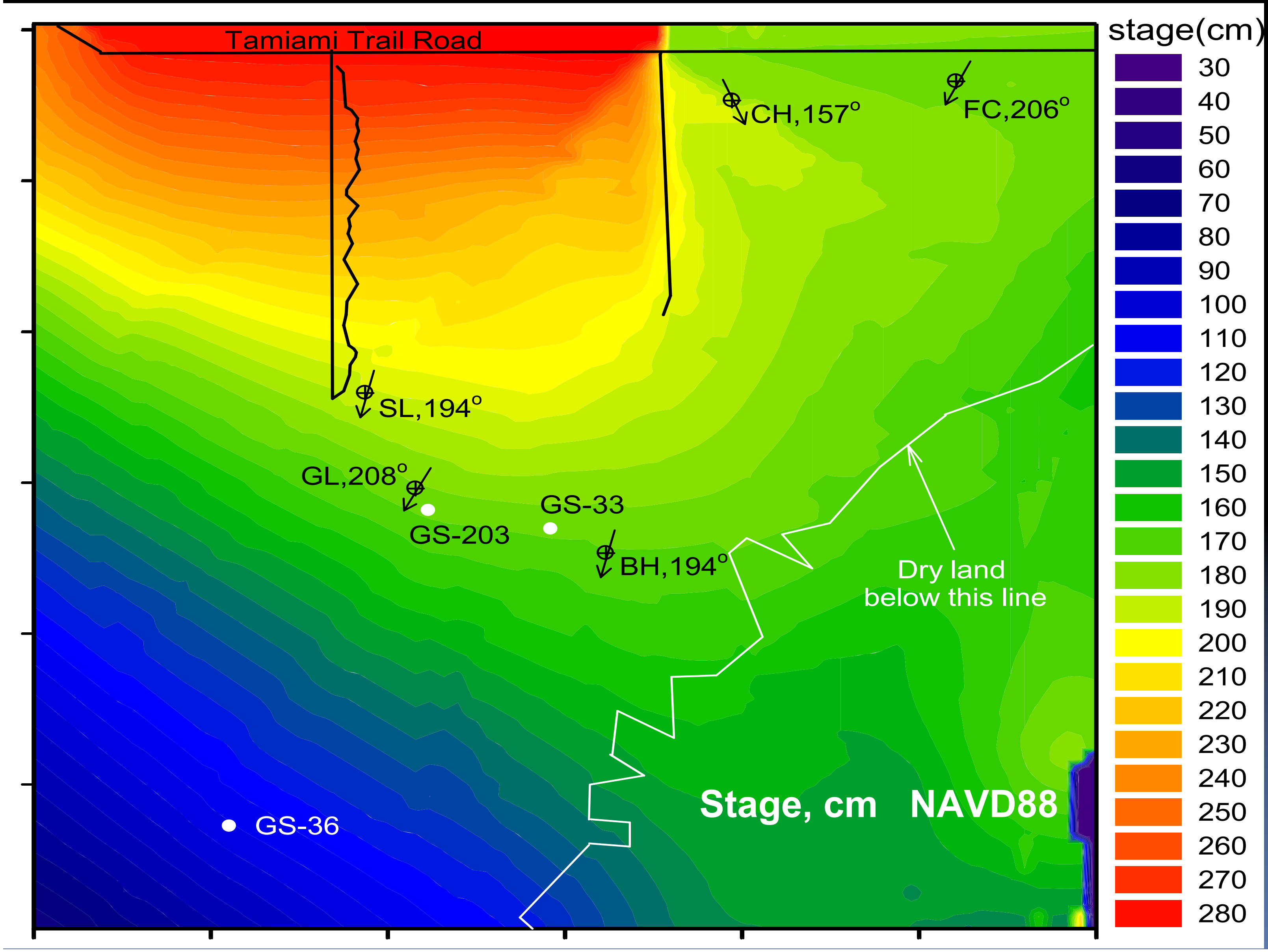


Speed (cm/s)
Stage (m)
Speed
Stage
GL
BH
SL
CH
FC
Gate Discharge
Gate discharge
Rainfall
Daily Rainfall (mm)
Jun - 03
Jun - 04
Jun - 05
Jun - 06
Jun - 07
No velocity data

Water flow direction vs. speed



EDEN stage contour vs. measured direction (9/15/2004)



	S12A	S12B	S12C	S12D	S333-S334	stage	gradient	rainfall	R^2
	Water Control Structures								
CH		x			x	x			0.10
FC			x	x	x	x			0.90
BH	x	x	x	x	x	x	x		0.52
SL		x	x	x		x	x		0.78
GL	x	x	x		x	x			0.58

Discharge and stage are key factors

Local rainfall is not significant

Manning's Eqn.

$$U = \frac{1}{n} * h^{2/3} * S_f^{1/2}$$

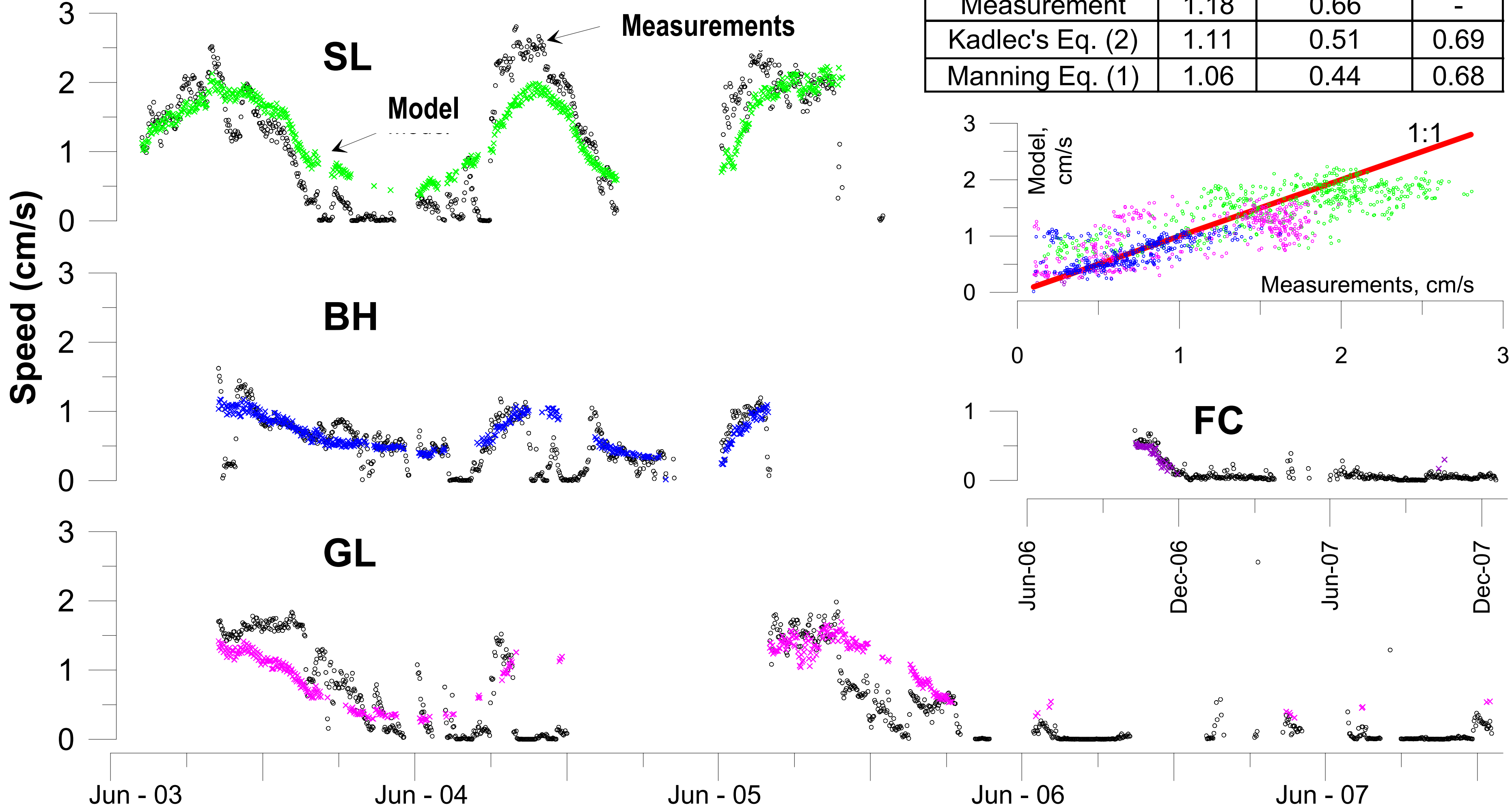
n = 0.46

Kadlec's Eqn.

$$U = K_f * h^{\beta} * S_f^{\lambda}$$

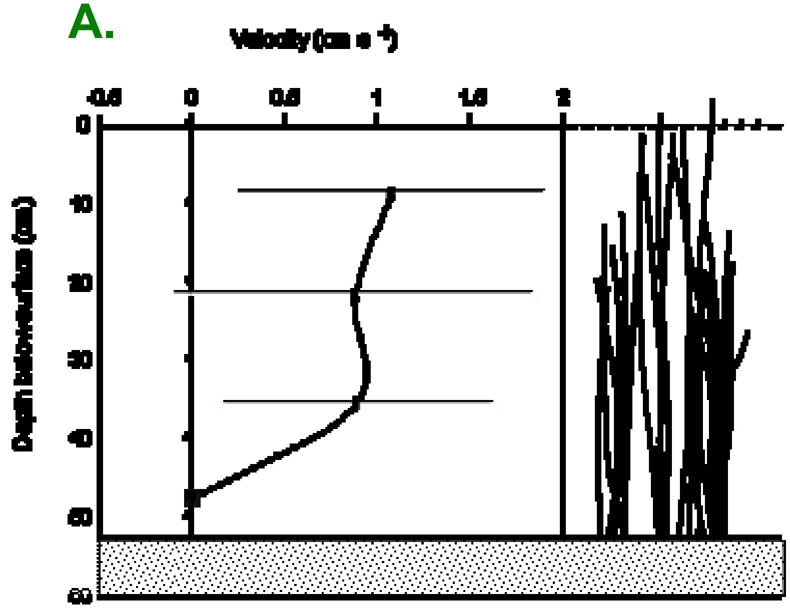
λ = 0.66, b = 2.67, and *Kf* = 14.44 m-1.67s^{-1}

Unit=cm/s	Mean	Std. Dev.	R^2
Measurement	1.18	0.66	-
Kadlec's Eq. (2)	1.11	0.51	0.69
Manning Eq. (1)	1.06	0.44	0.68

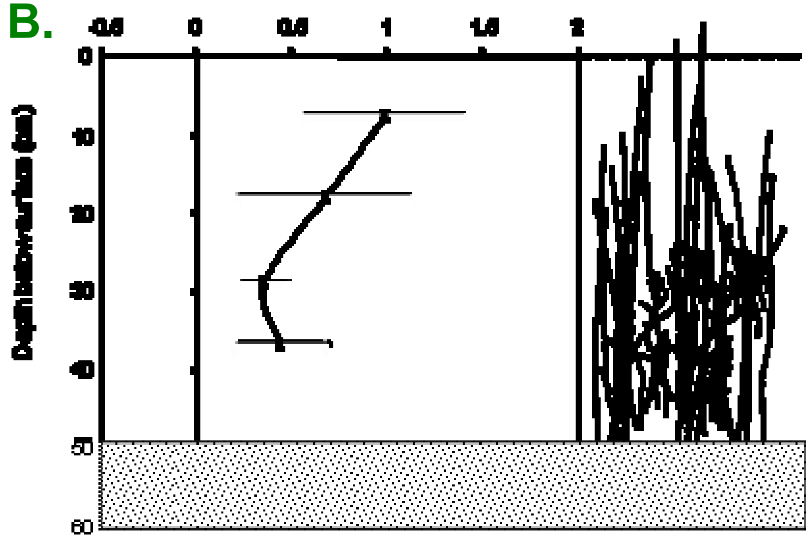


Vertical profiles in spikerush

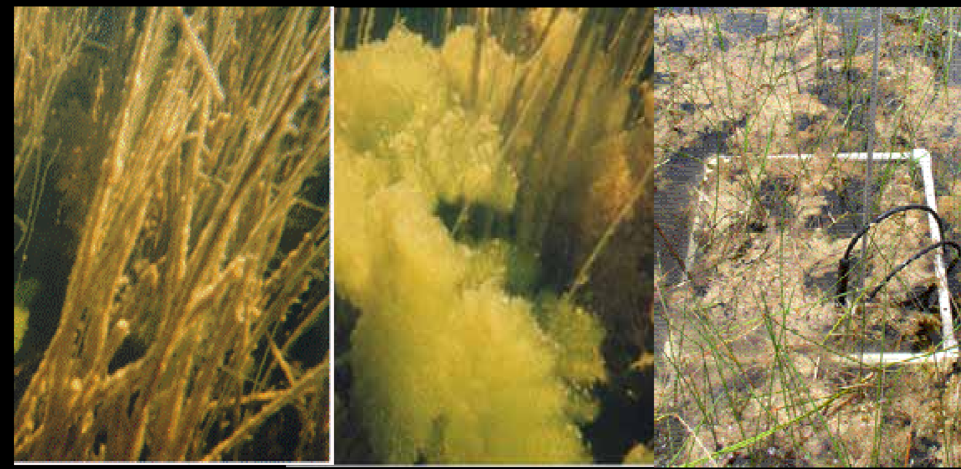
A.



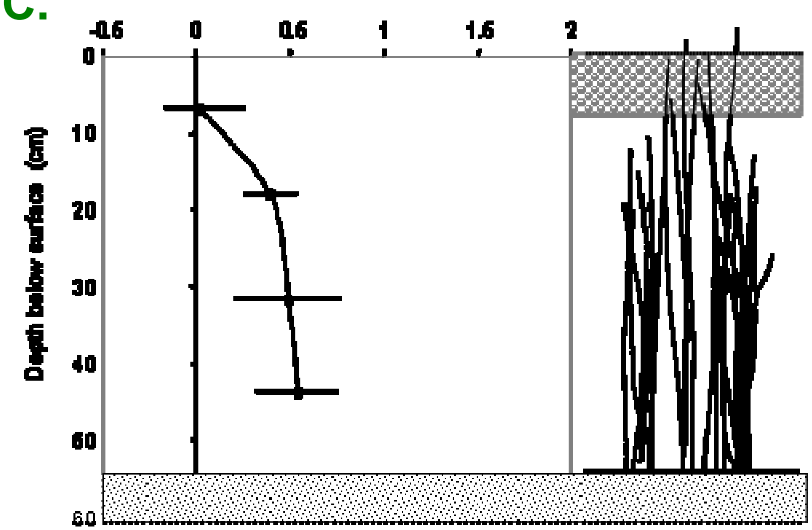
B.



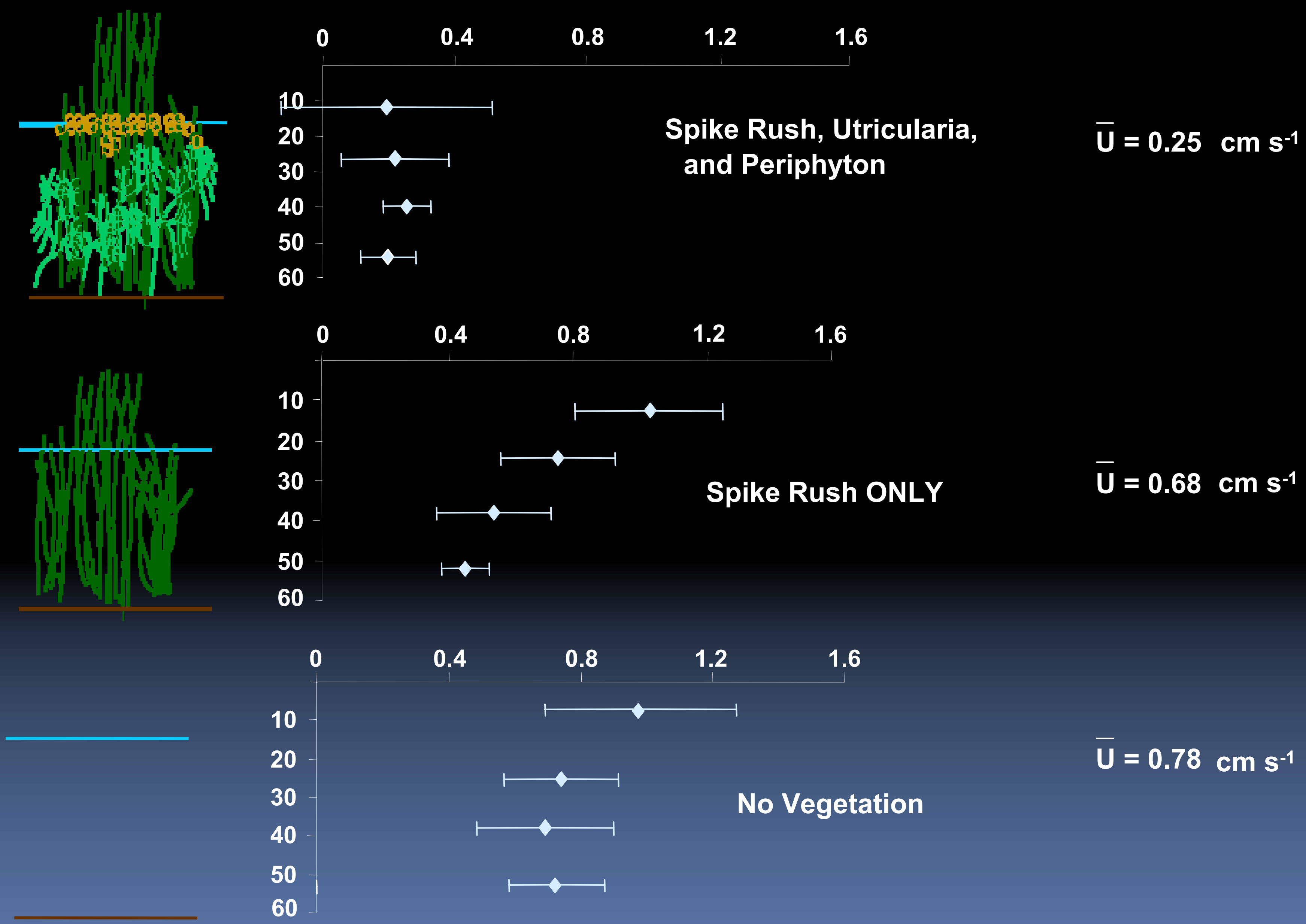
A. B. C.

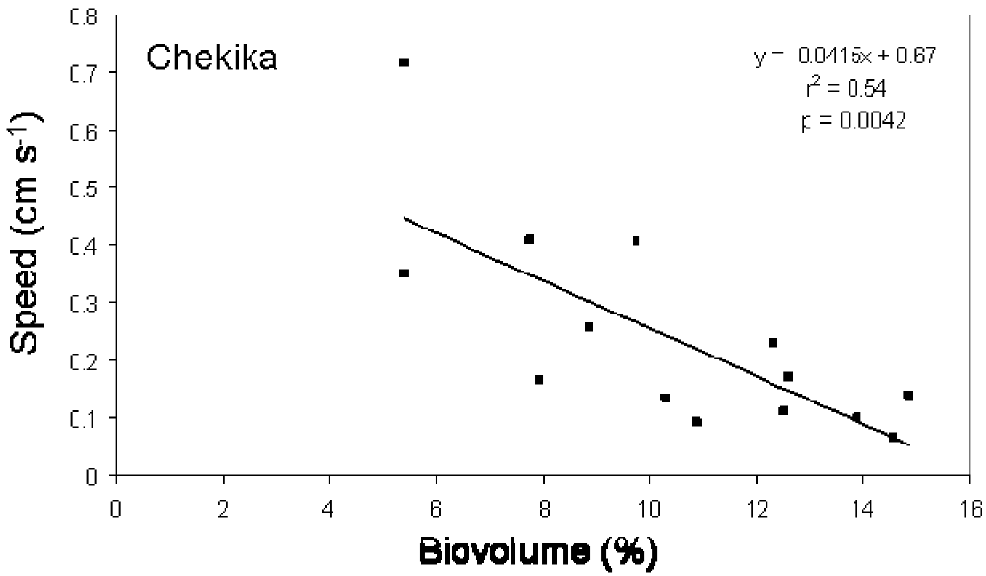


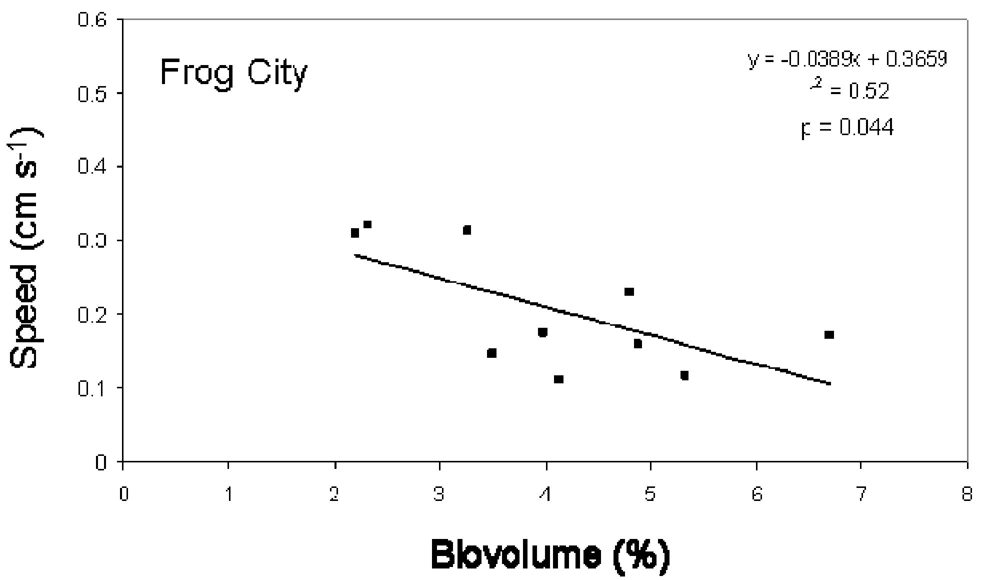
C.



Vegetation Manipulations







ANCOVA: p = 0.9295, F = 0.0081

SUMMARY

Mean flow in sawgrass < spikerush

Flow speed shows seasonal variations that are related to stage

Flow direction is consistent and is to the SSW at higher speeds

Discharge and stage are the key factors influencing flow speed; Local rainfall is not significant at any sites

~ 70% variation in flow speed is predicted by Manning and Kadlec Eqns; additional variability may be due to biomass, groundwater influence, and/or morphology

The volume of floating biomass and periphyton exerts significant control over flow in sloughs

Future modeling efforts should take measures of floating biomass into consideration

Thank you!