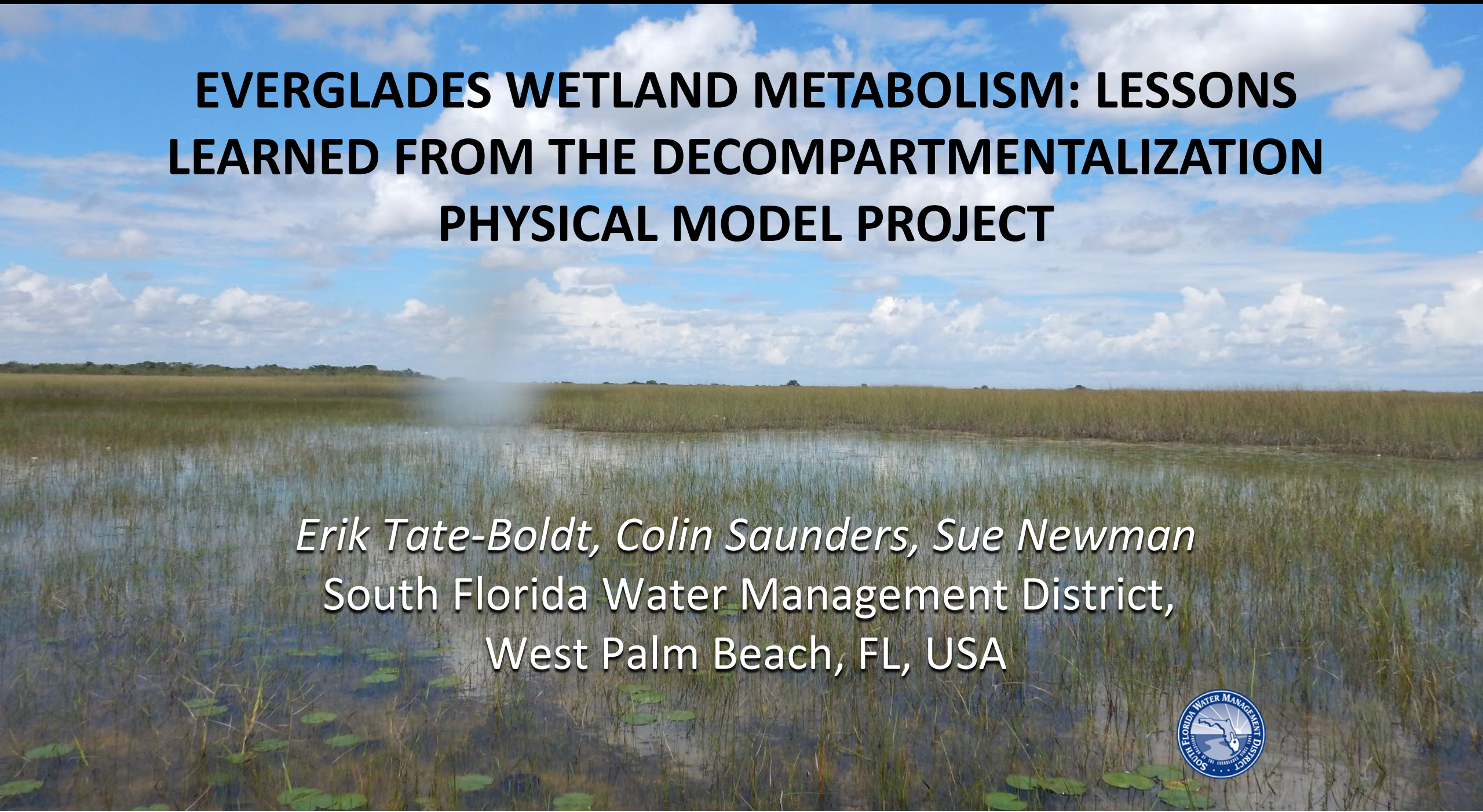
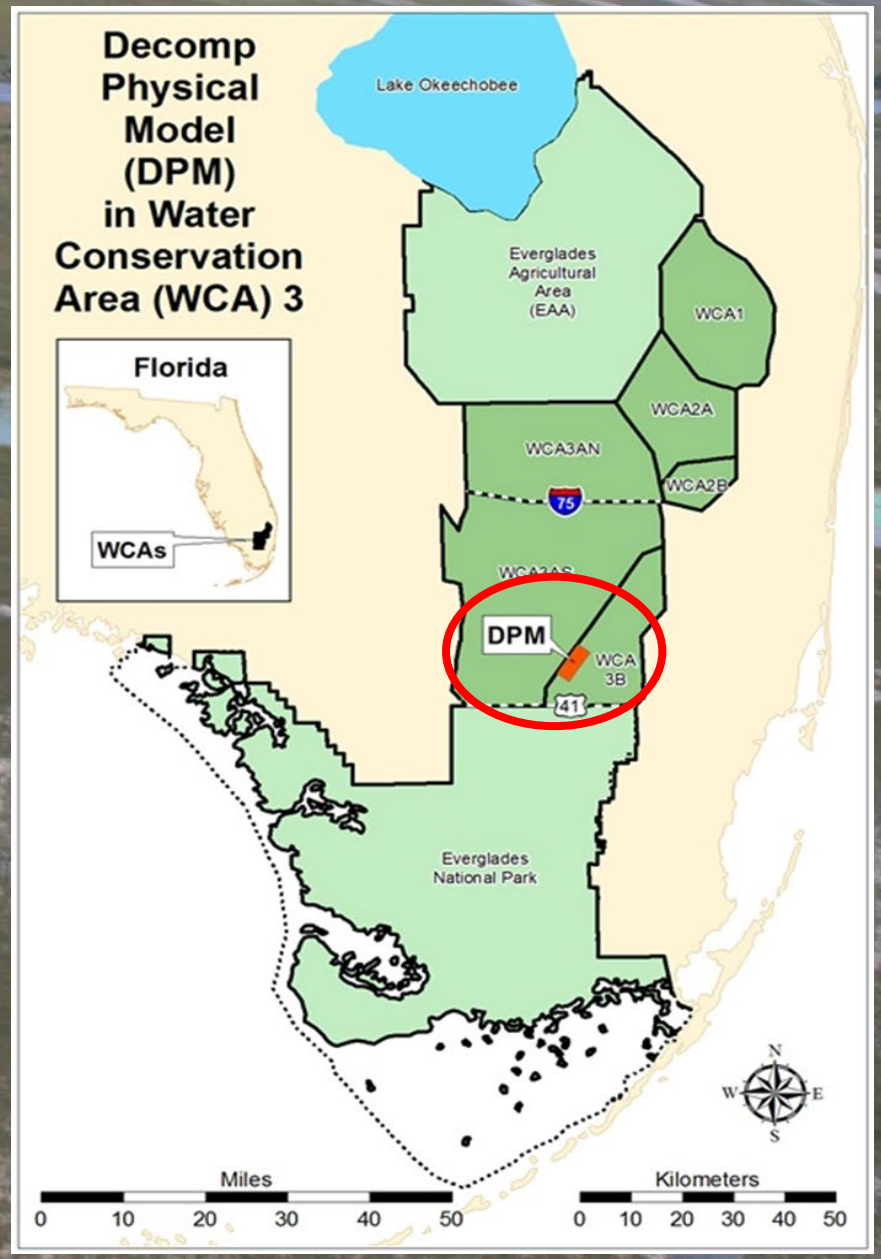


EVERGLADES WETLAND METABOLISM: LESSONS LEARNED FROM THE DECOMPARTMENTALIZATION PHYSICAL MODEL PROJECT

Erik Tate-Boldt, Colin Saunders, Sue Newman
South Florida Water Management District,
West Palm Beach, FL, USA

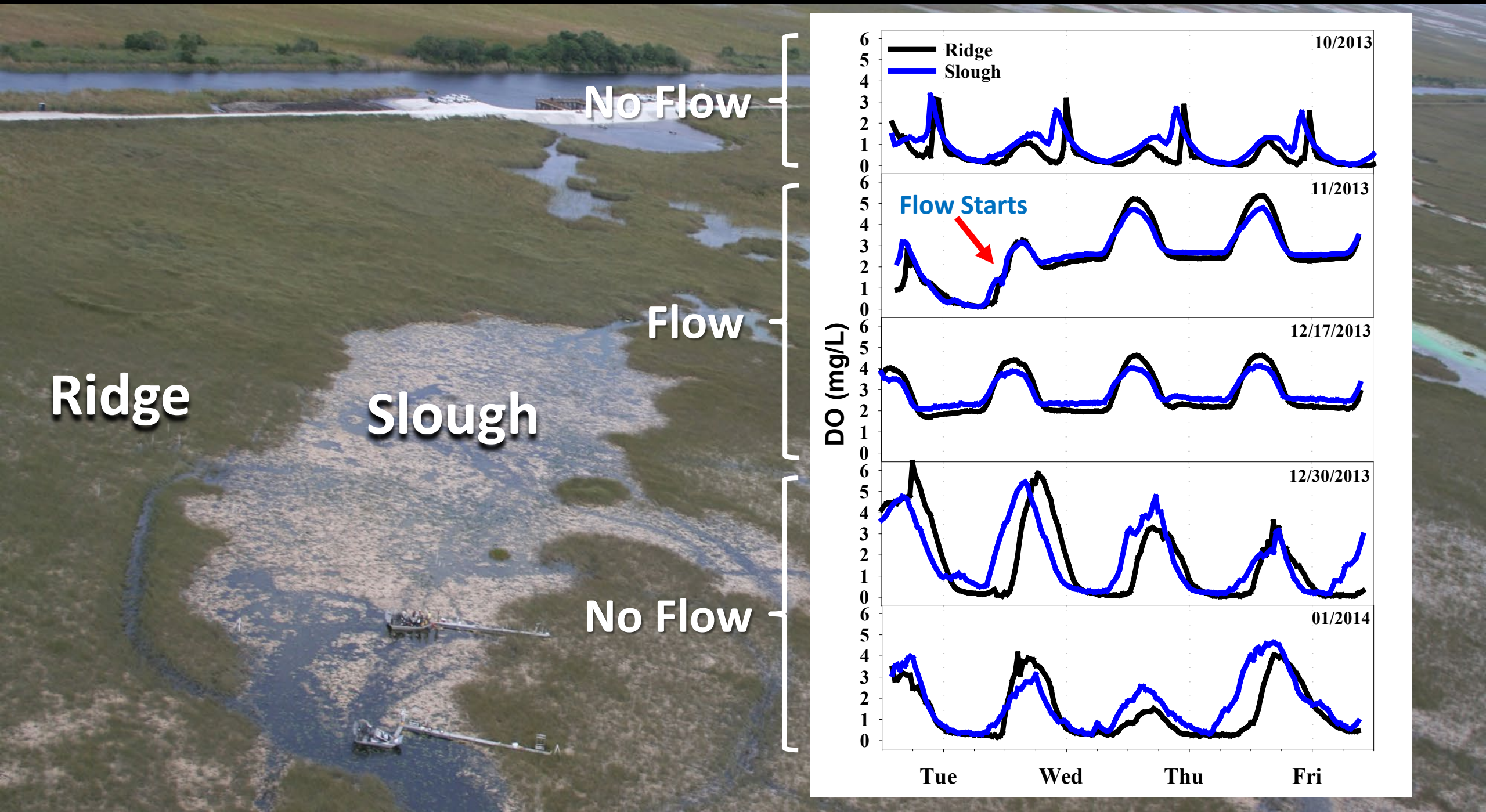

Decomp Physical Model (DPM) in Water Conservation Area (WCA) 3
Lake Okeechobee
Everglades Agricultural Area (EAA)
WCA1
WCA2A
WCA3AN
WCA2B
75
DPM
WCA 3B
41
Everglades National Park
Florida
WCAs
N
W
E
S
Miles
0 10 20 30 40 50
Kilometers
0 10 20 30 40 50

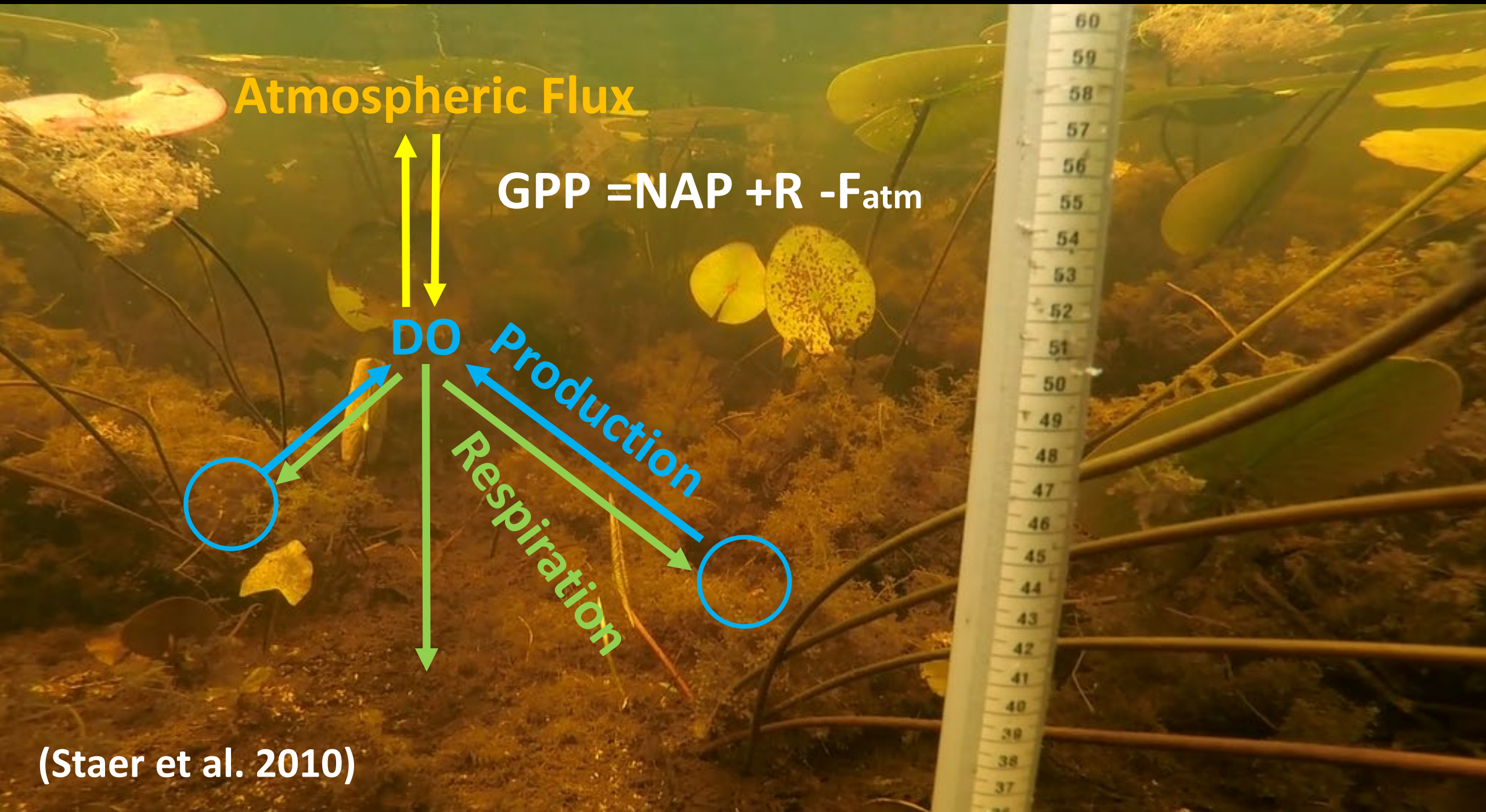

Ridge
Slough
2-5 cm s-1
Ridge
1-2 cm s-1
S152
300
c.f.s.

Ridge

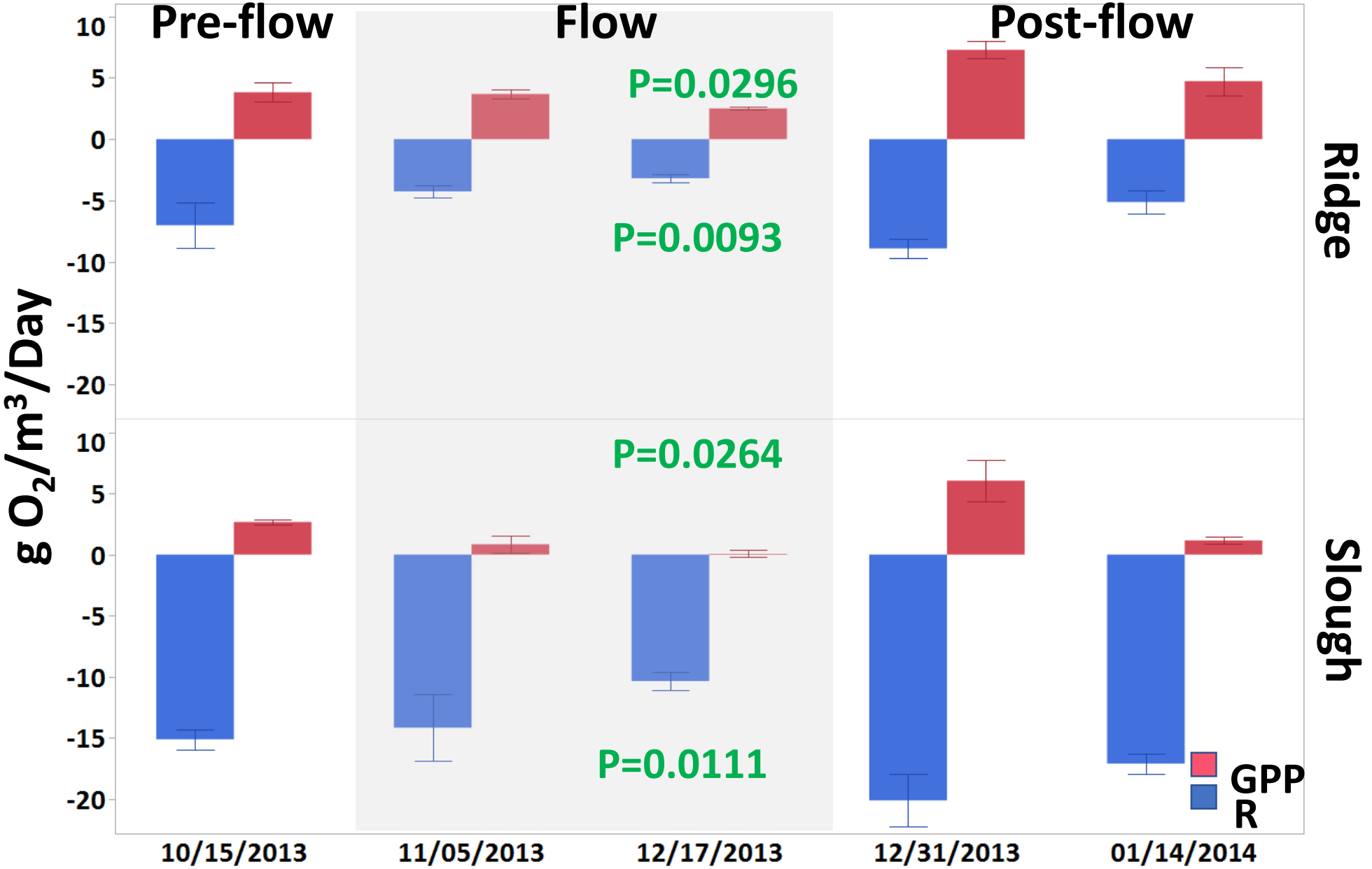
Slough

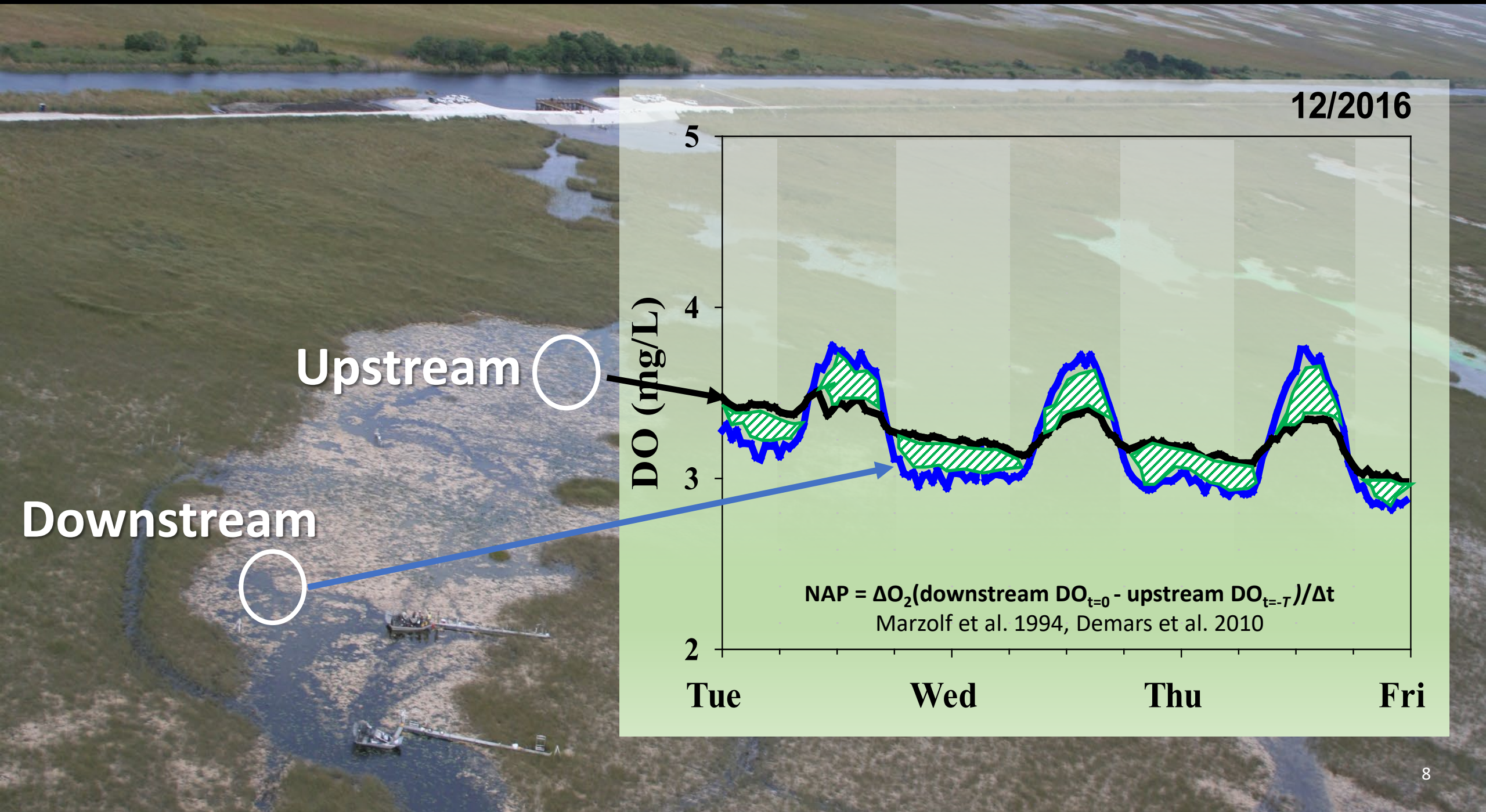
R


No Flow
Flow
No Flow
Ridge
Slough
Ridge
Slough
10/2013
11/2013
Flow Starts
12/17/2013
12/30/2013
01/2014
DO (mg/L)
0
1
2
3
4
5
6
Tue
Wed
Thu
Fri


Atmospheric Flux
GPP =NAP +R -Fatm
DO
Production
Respiration
(Staer et al. 2010)

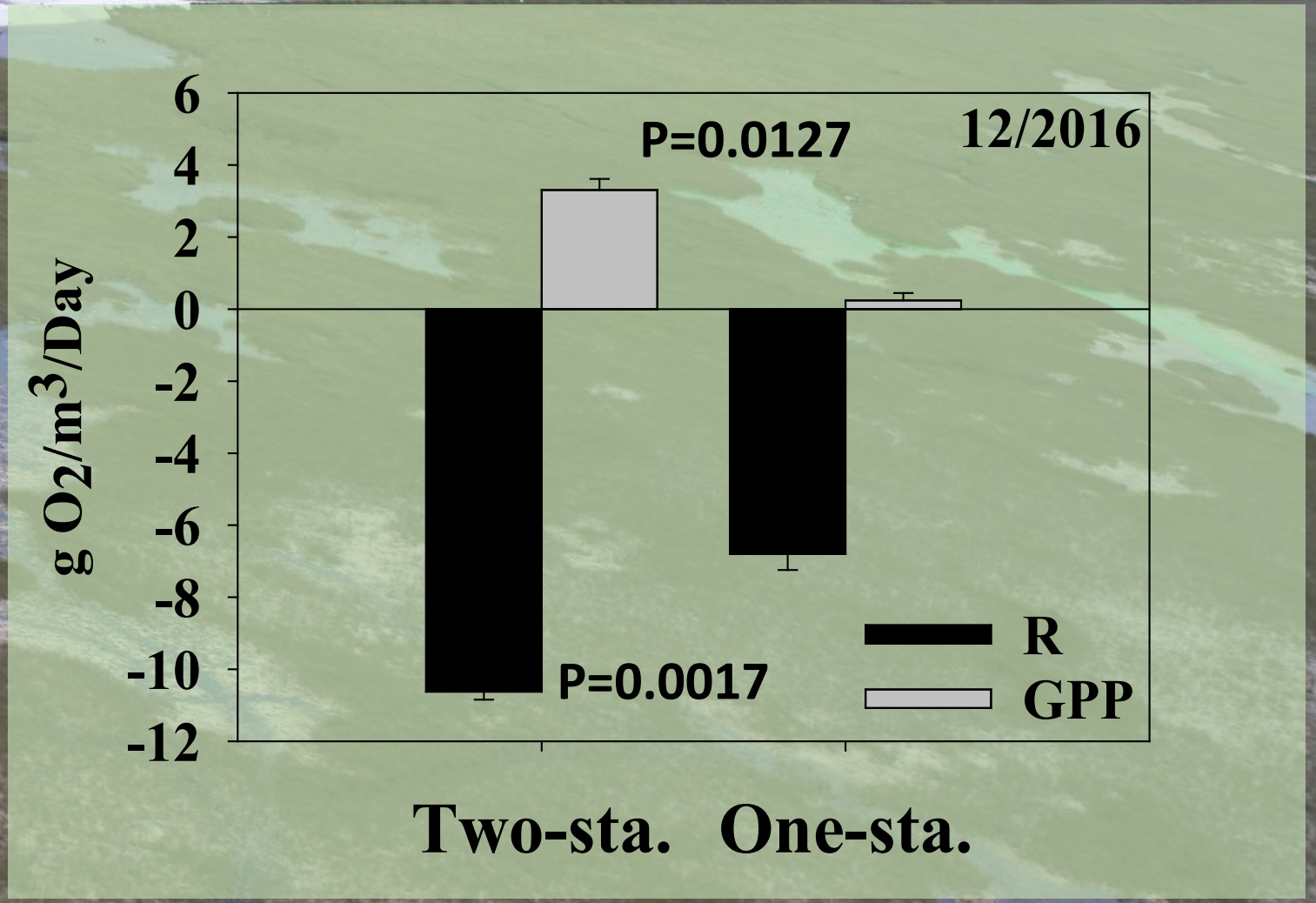
GPP and R vs. Flow

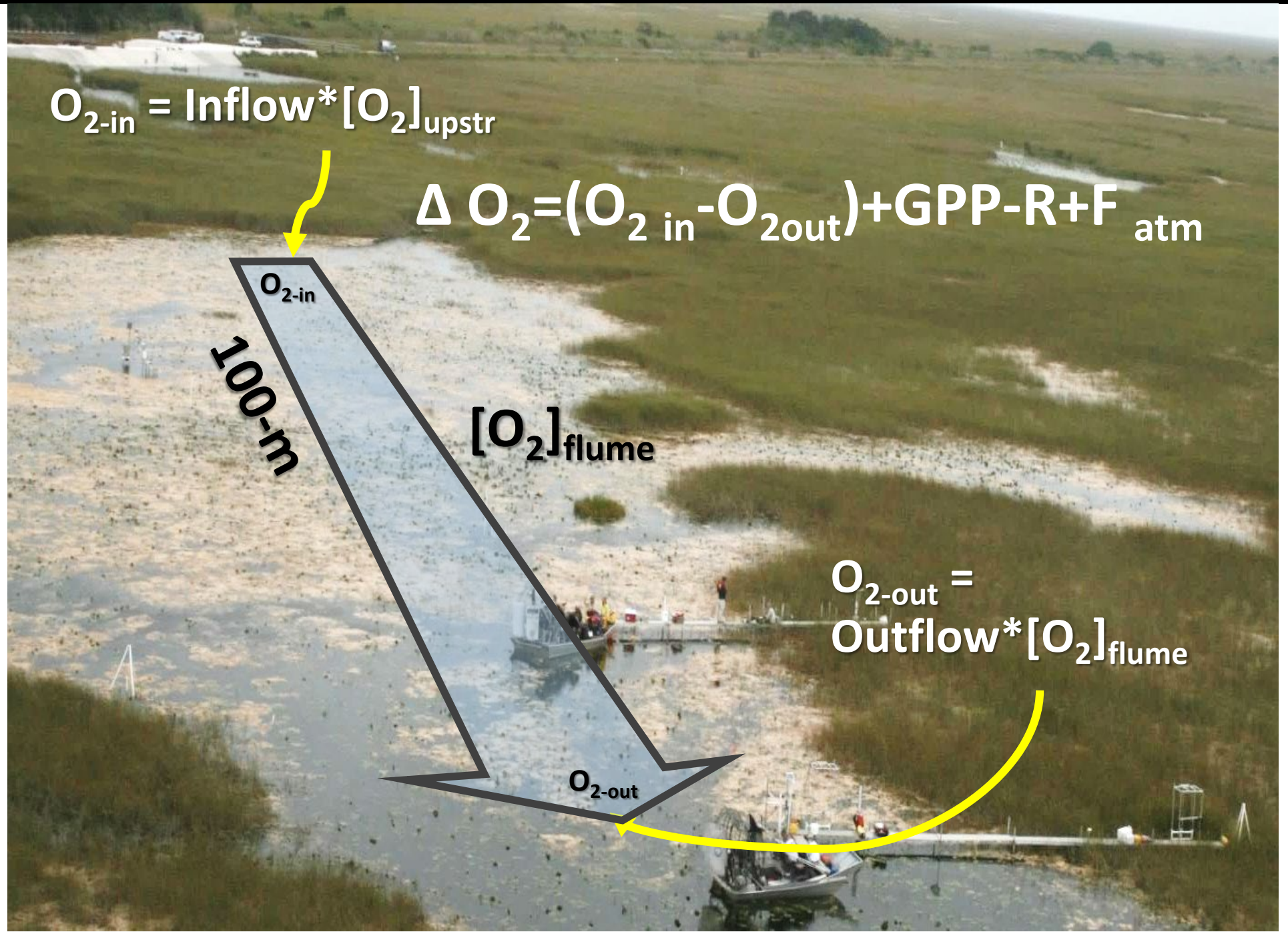


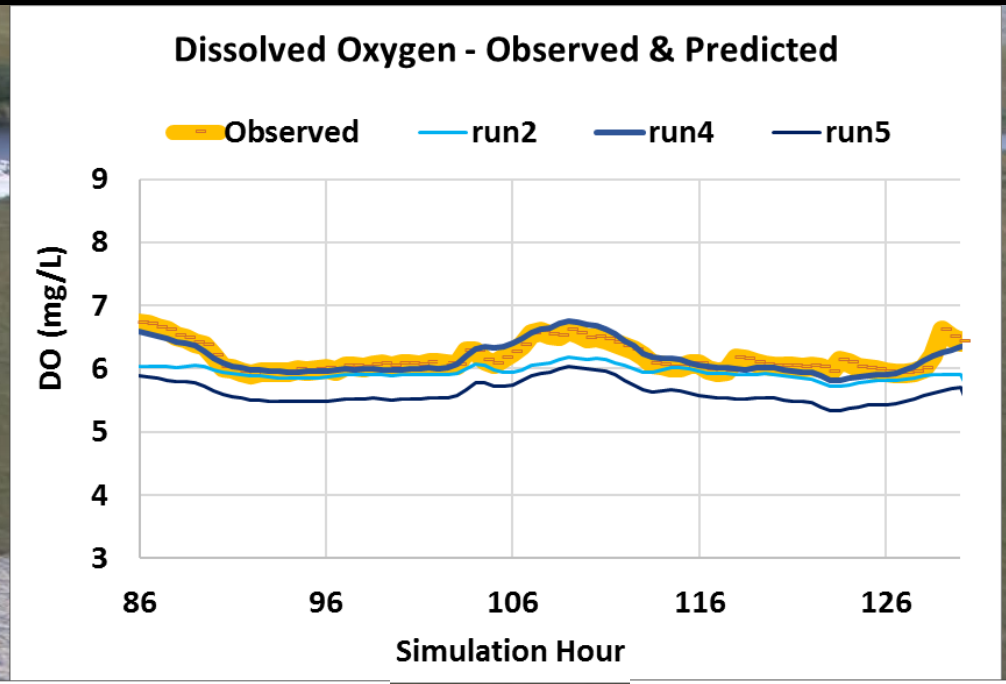

Upstream
Downstream
12/2016
DO (mg/L)
5
4
3
2
Tue
Wed
Thu
Fri
NAP = ΔO2(downstream DOt=0 - upstream DOt=-T)/Δt
Marzolf et al. 1994, Demars et al. 2010

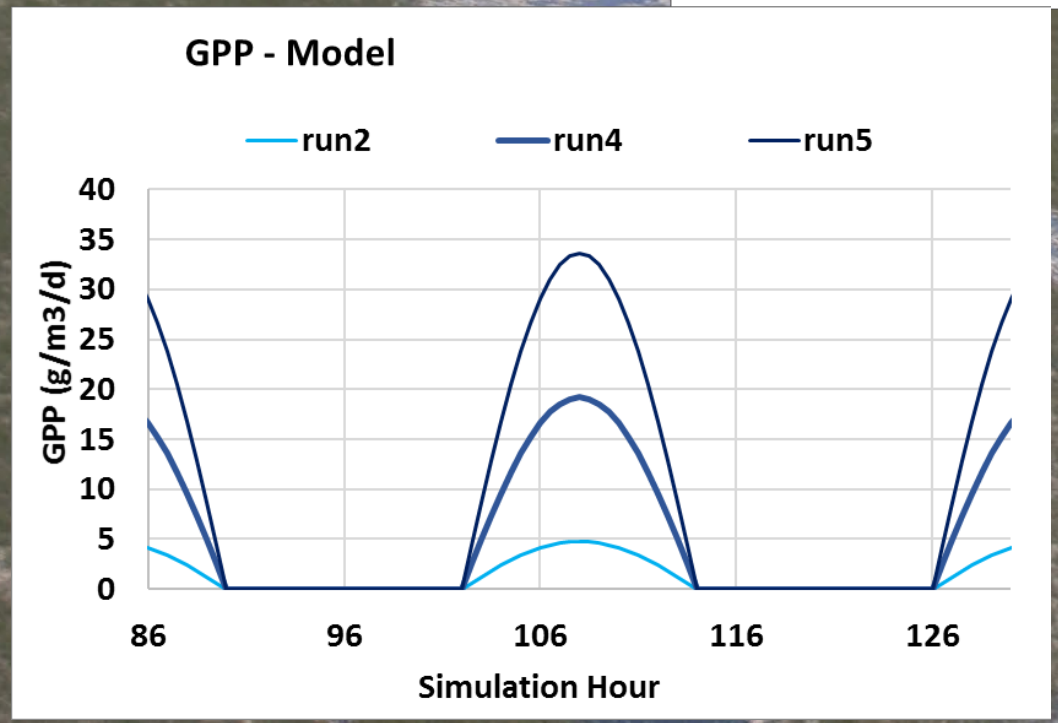
Upstream

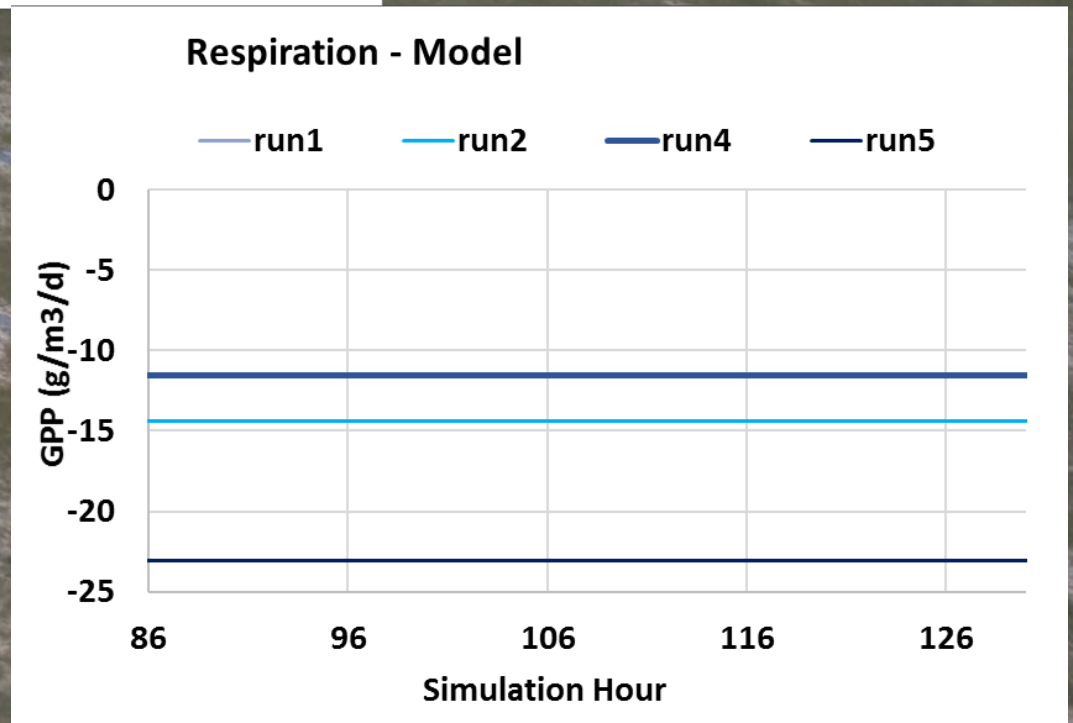
Downstream



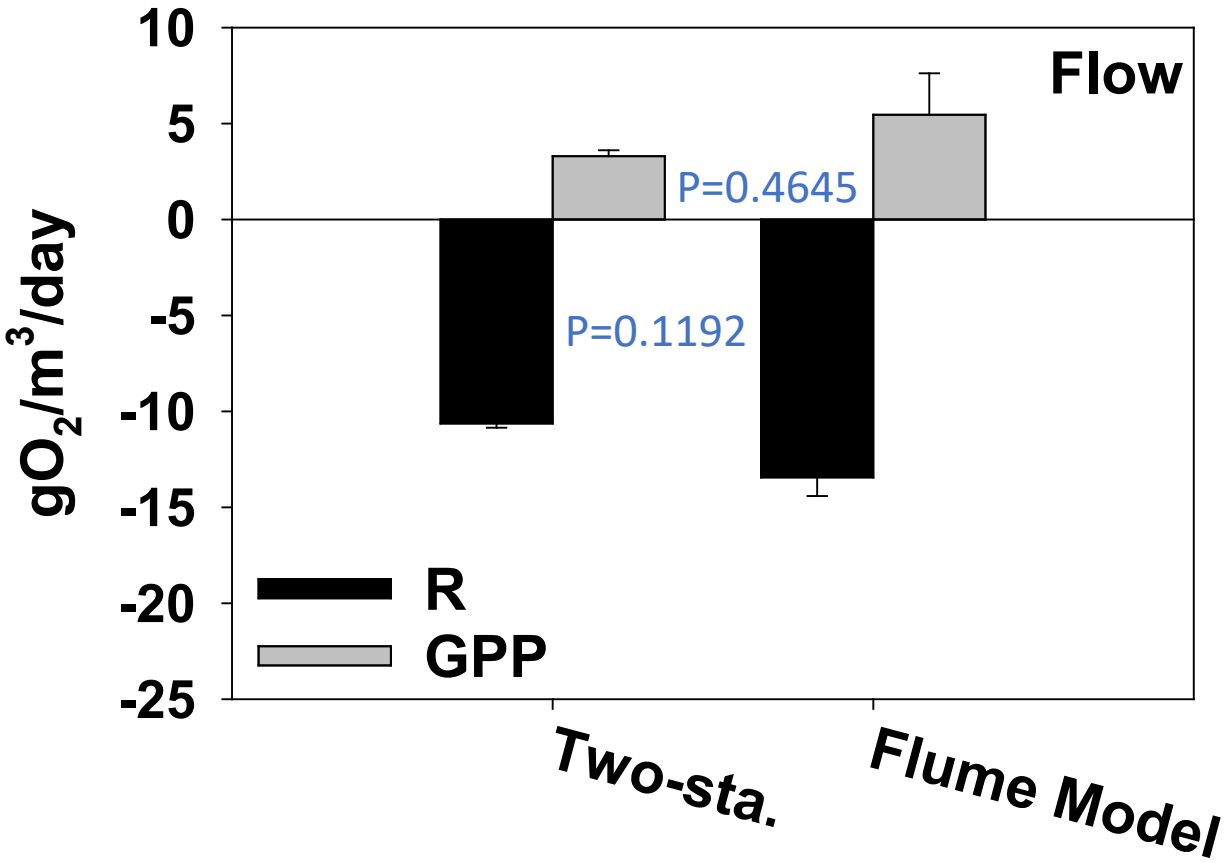

$O_{2\text{-in}} = \text{Inflow}*[O_2]_{\text{upstr}}$
$\Delta O_2 = (O_{2\ in} - O_{2out}) + GPP - R + F_{atm}$
$O_{2\text{-in}}$
100-m
$[O_2]_{\text{flume}}$
$O_{2\text{-out}} = \text{Outflow}*[O_2]_{\text{flume}}$
$O_{2\text{-out}}$

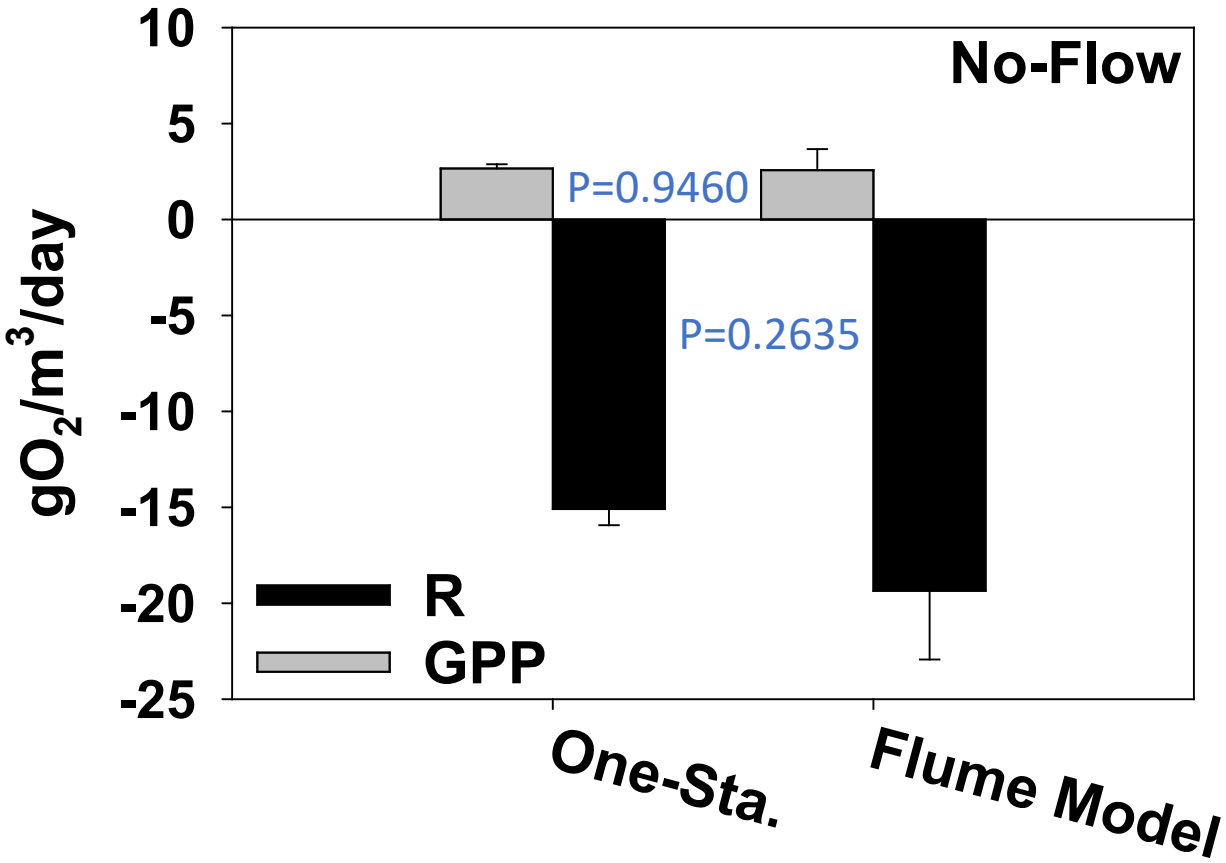

Dissolved Oxygen - Observed & Predicted
Observed
run2
run4
run5
DO (mg/L)
9
8
7
6
5
4
3
86
96
106
116
126
Simulation Hour


GPP - Model
run2
run4
run5
GPP (g/m3/d)
40
35
30
25
20
15
10
5
0
86
96
106
116
126
Simulation Hour

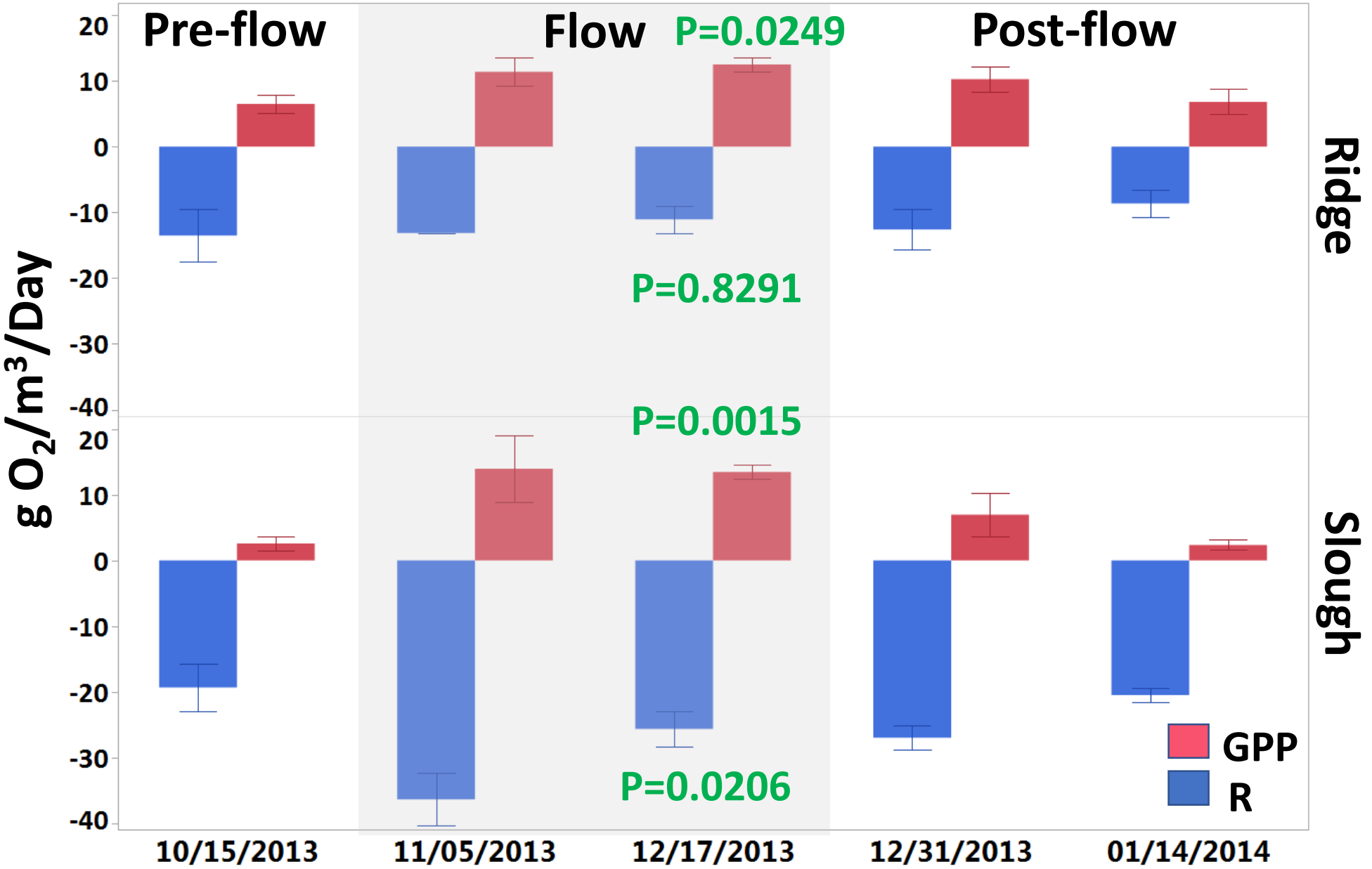

Respiration - Model
run1
run2
run4
run5
GPP (g/m3/d)
0
-5
-10
-15
-20
-25
86
96
106
116
126
Simulation Hour

“Flume” Model Performance

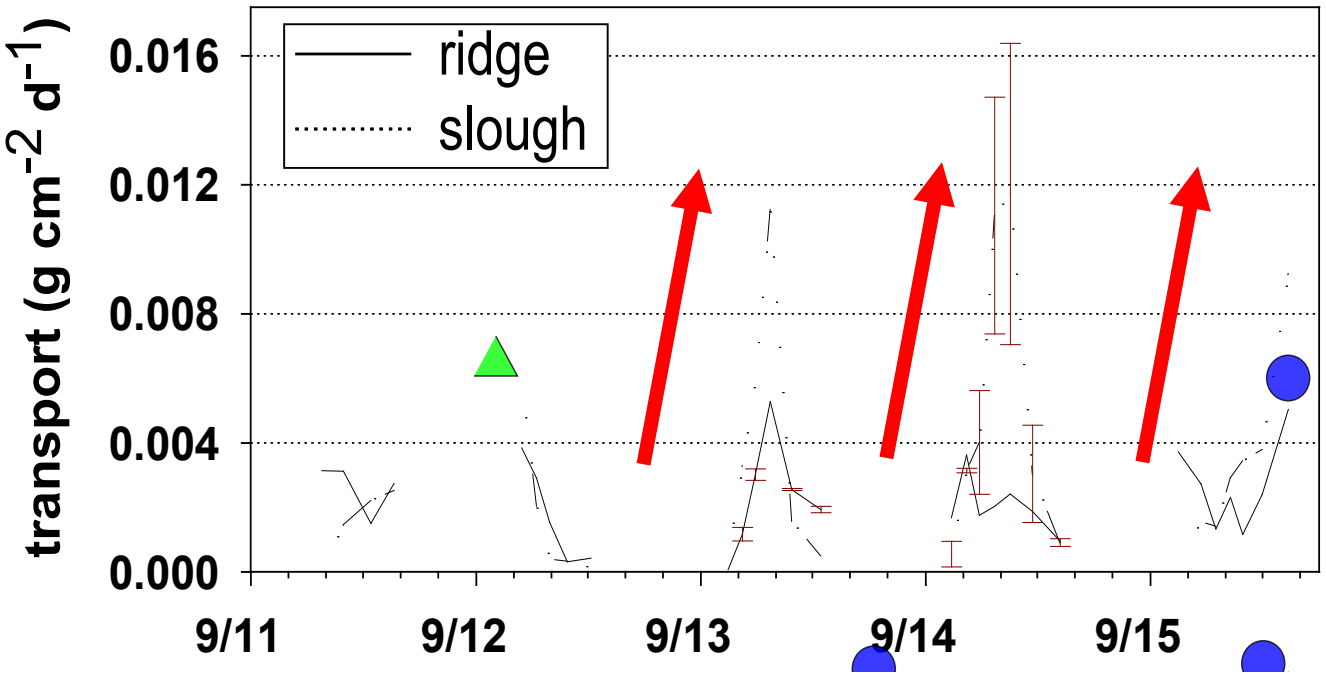




"Flume Model" Results



Floc transport increased with sustained flow



Floc transport increased with sustained flow

Data from C. Saunders, E. Tate-Boldt, C. Hansen, S. Newman

Conclusions

1. One-station method without flow underestimates GPP
2. The “Flume” model indicates that flow increases GPP and R in slough (still work in progress)
3. Greater GPP is consistent with greater sediment transport during flow and suggest more food production for consumers and wildlife

Acknowledgements

- Claus Hansen, Lisa Jackson, Garren Mezza, Allyson Genson, Christa Zweig, and Michael Manna