

# Dissolved Oxygen (DO) Sag Events in the Phase I Area of the Kissimmee River Restoration Project in 2016-2017

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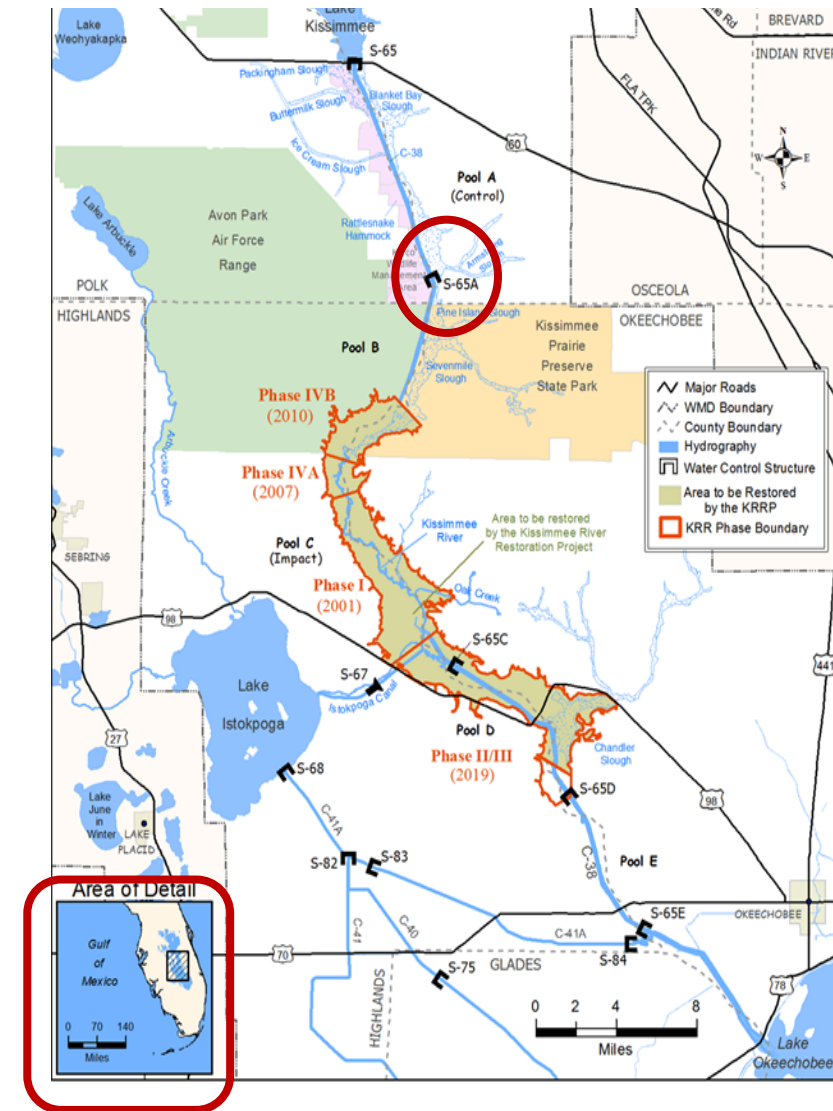
12<sup>th</sup> International Symposium on  
Biogeochemistry of Wetlands in Coral  
Springs, Florida, April 23-26, 2018



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# Kissimmee River Restoration Project (KRRP)

- ❑ The goal of the KRRP is to restore the ecological integrity of the river and its floodplain while retaining existing levels of flood protection for surrounding communities.
- ❑ By 2009 three (Phases I, IVA and IVB) of five phases of restoration construction had been completed.
- ❑ Once the final two phases (Phases II and III) are completed in 2019, these efforts will restore flow to 65 km of continuous river channel and allow seasonal inundation of over 10,000 ha of floodplain wetlands.





## Pre-channelization

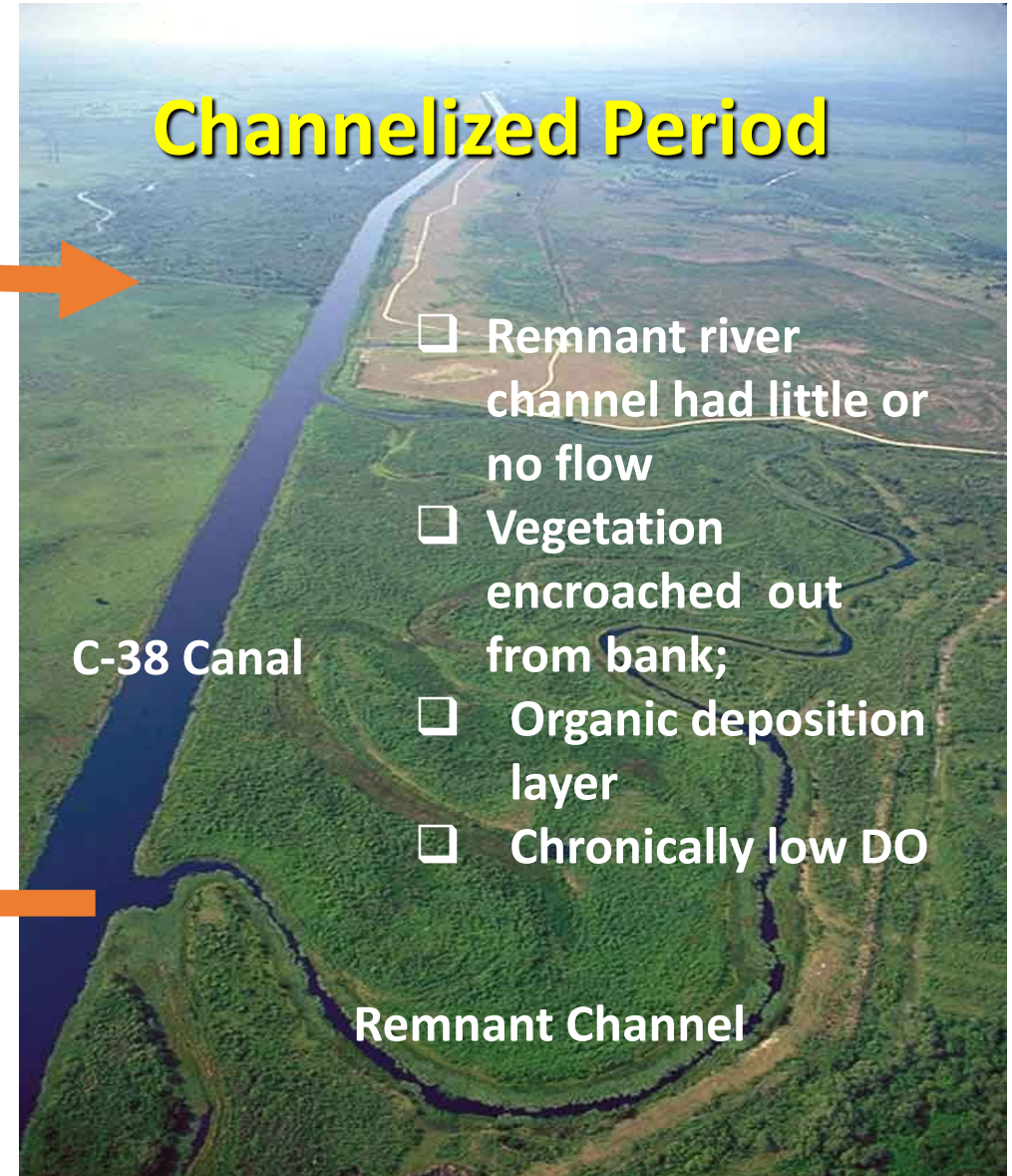


Restored flow has greatly improved DO concentrations

## Post-Phase I of the KRRP



## Channelized Period

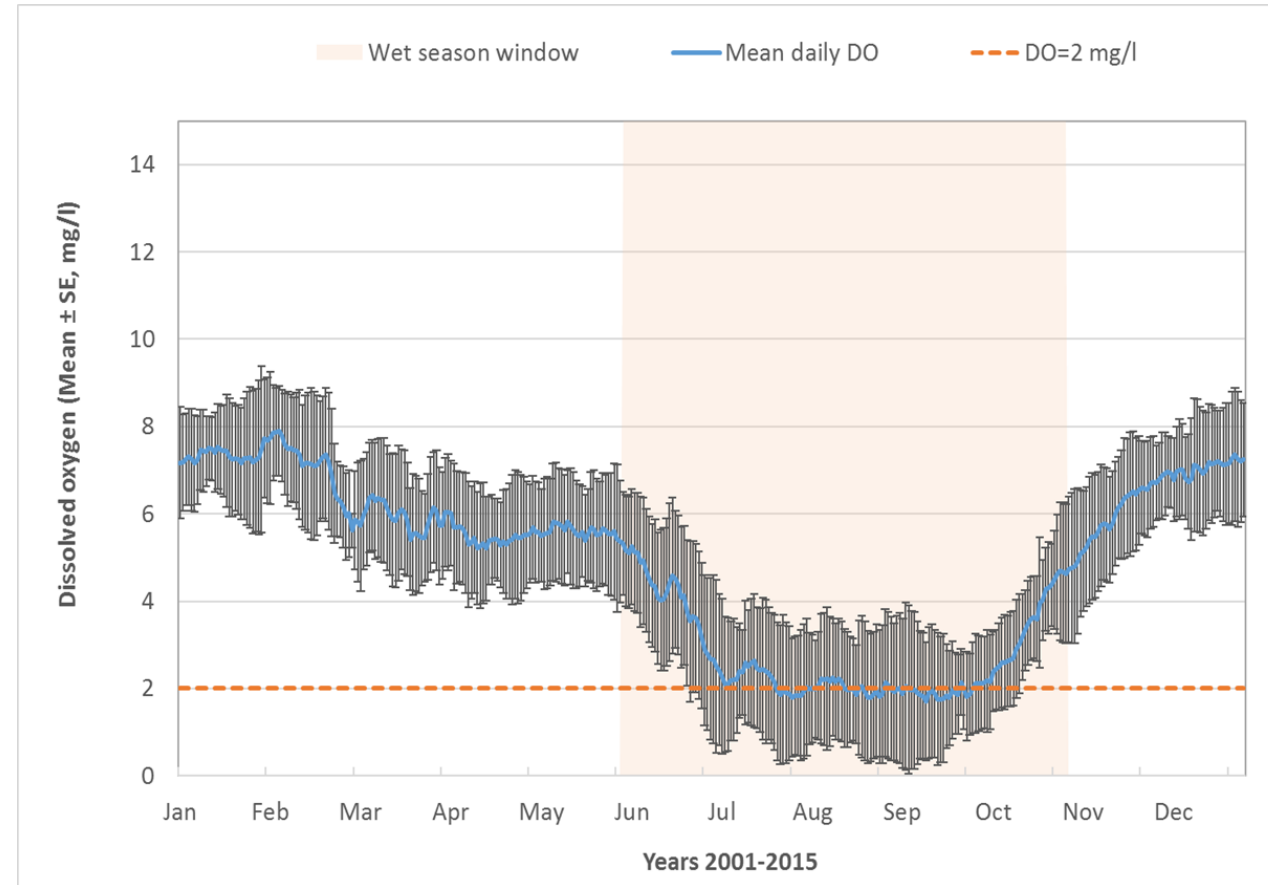


- ☐ Remnant river channel had little or no flow
- ☐ Vegetation encroached out from bank;
- ☐ Organic deposition layer
- ☐ Chronically low DO



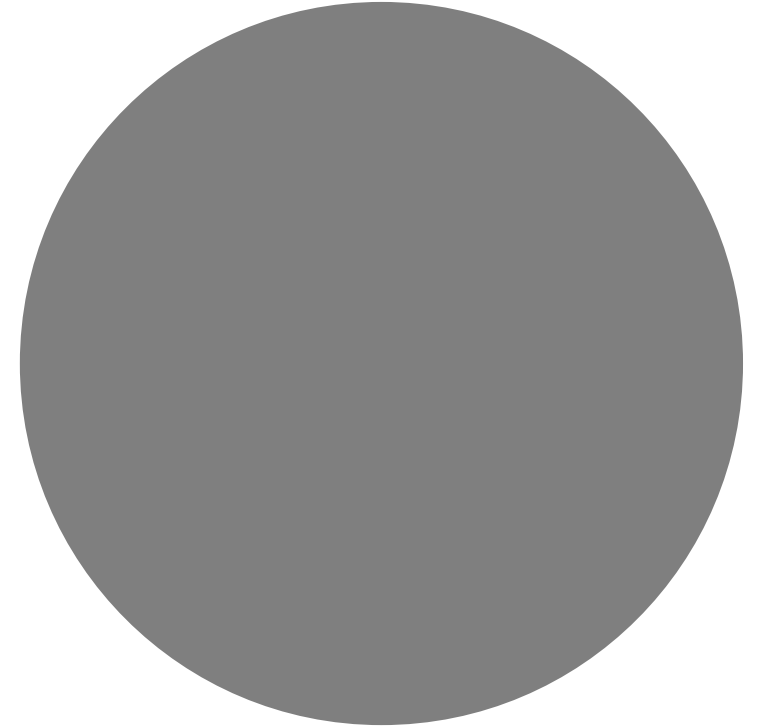
# DO Sag Events

- ❑ Despite substantial improvements in DO from restored flow, DO sag events (<2 mg/L) occur almost annually in Post-Phase I period.
- ❑ DO sag events have the potential to depress recovery of populations of aquatic fauna, especially Centrarchids (largemouth bass, sunfish) and other species intolerant of low DO.
  - ❑ DO sag events have been implicated in fish kills



Annually DO declines to hypoxic (1-2 mg/L) or anoxic (<1 mg/L) ] in the wet season.

To examine four DO sag events that occurred in the Phase I river channel in 2016-2017 in relation to major factors that may drive declines in DO concentrations.

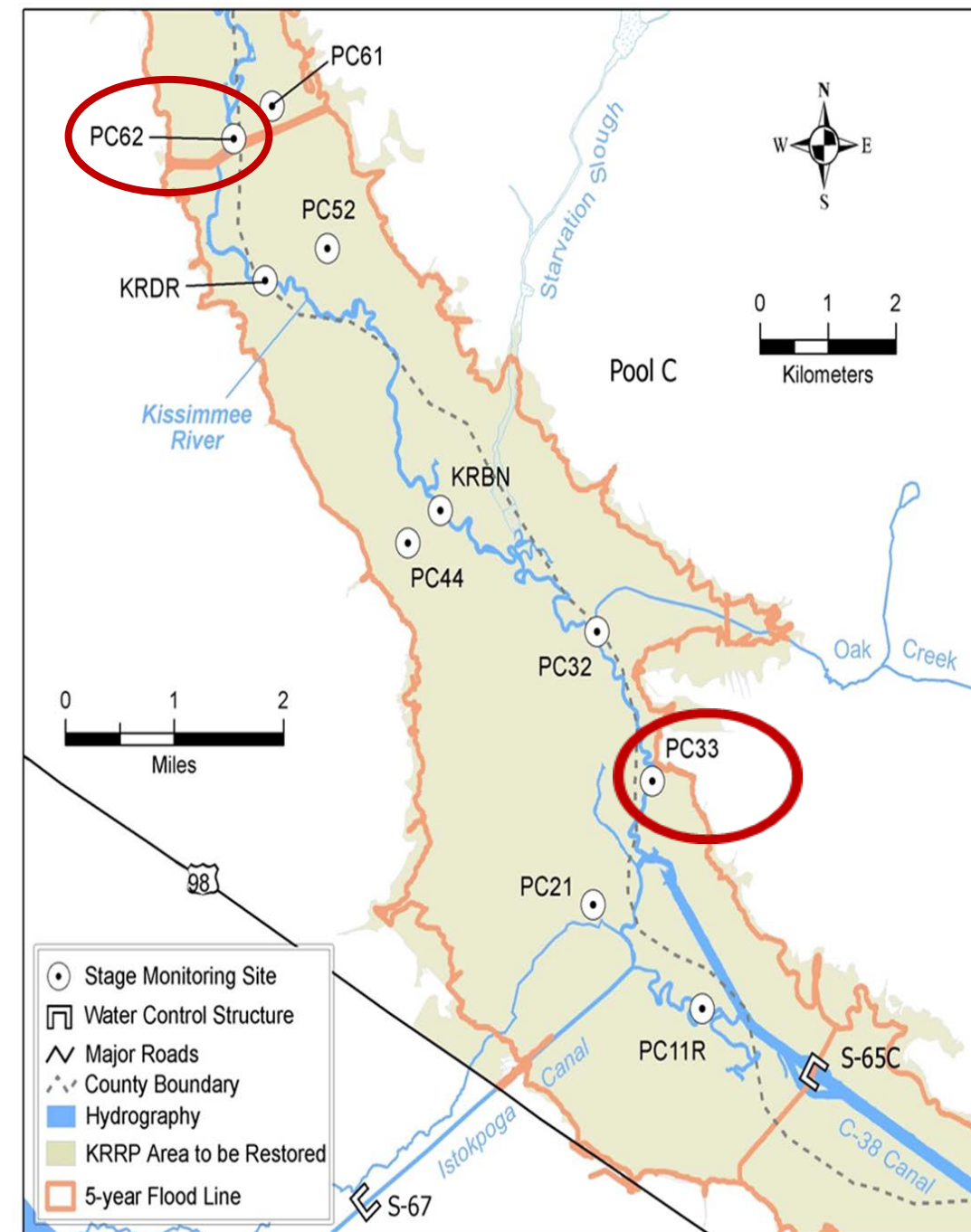


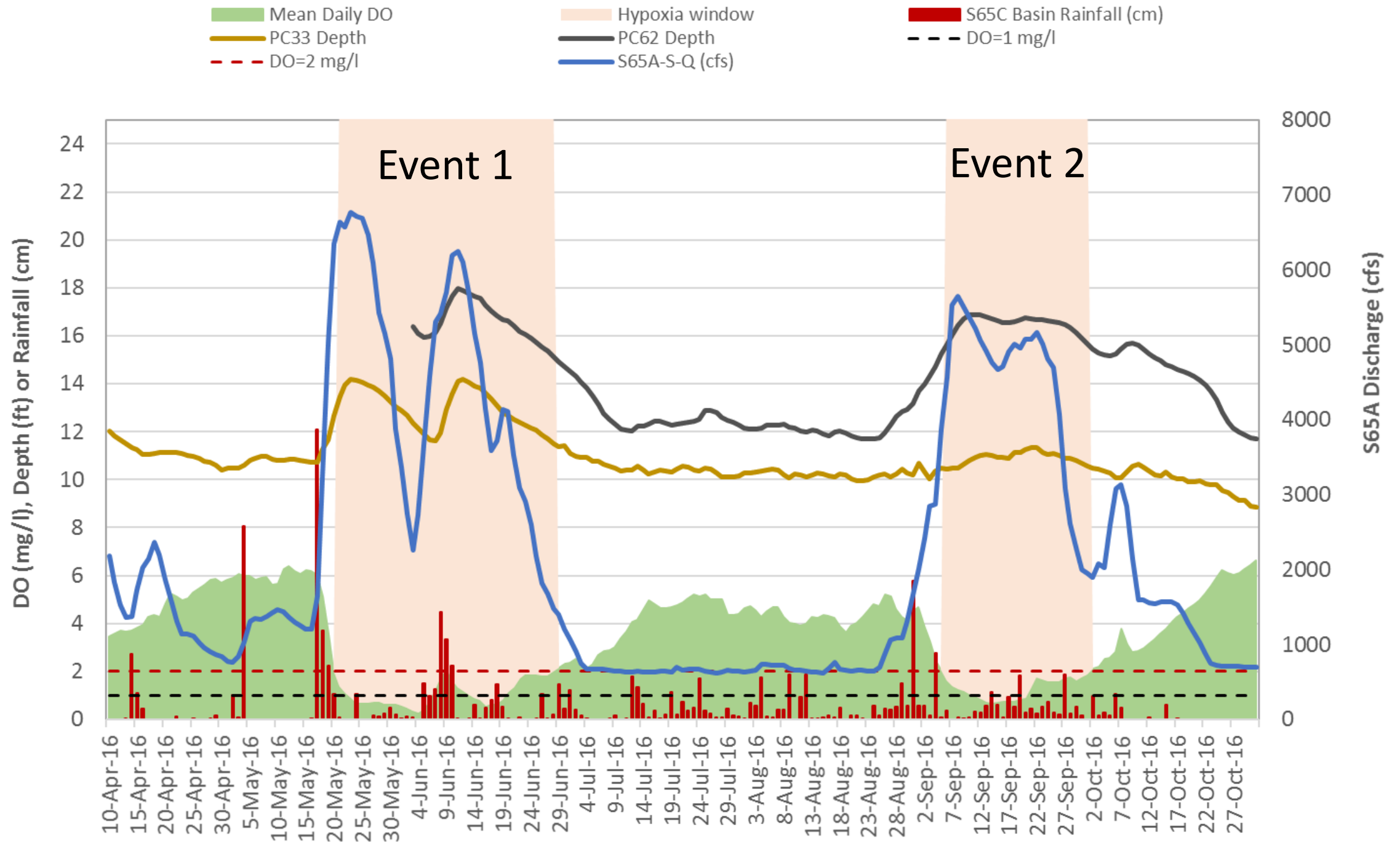
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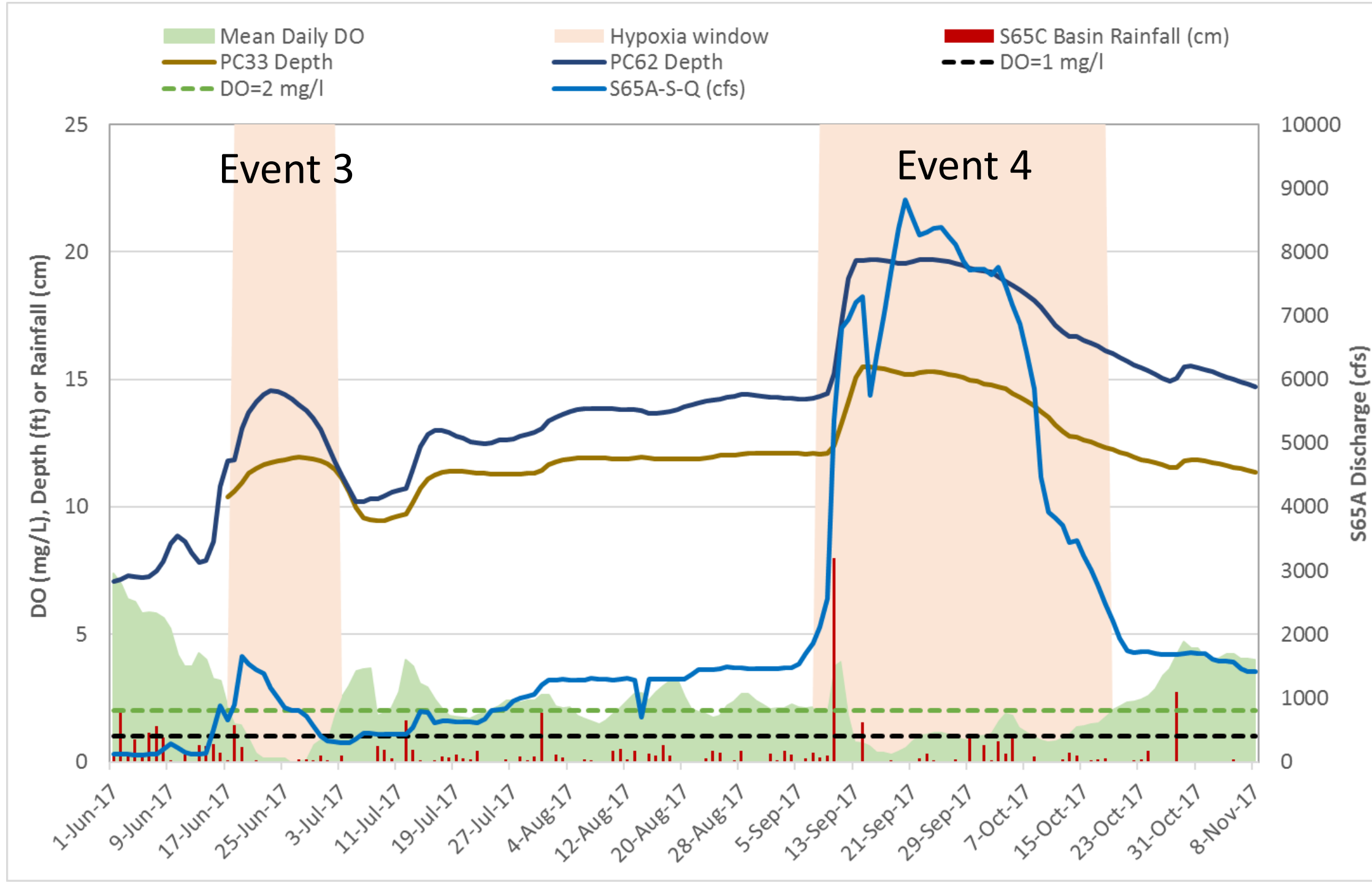
Objective of this Presentation

# DO Monitoring

- ❑ DO was monitored at two river channel stations.
- ❑ Measured at 15 minute intervals with YSI sondes.
- ❑ Placed near mid-water column; assume well-mixed
- ❑ Mean daily values were calculated and then stations were averaged.



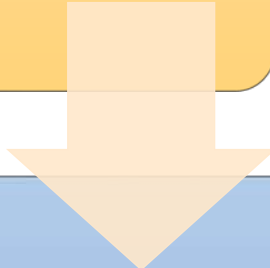






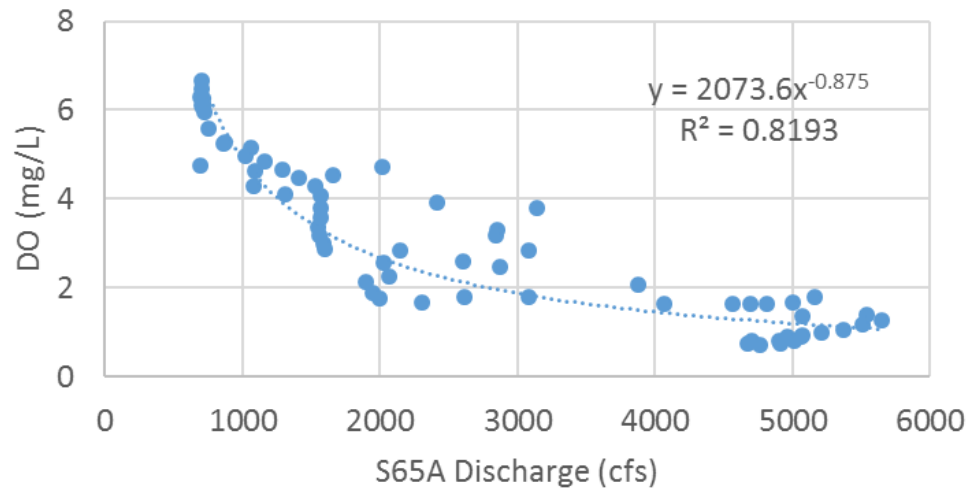
# Statistical Analysis of Long-term Data from 2001 to 2015

Stepwise regression between DO and temperature, water depth, specific conductance, rainfall, discharges from S-65A and S-65C, and S-65C stage was performed.

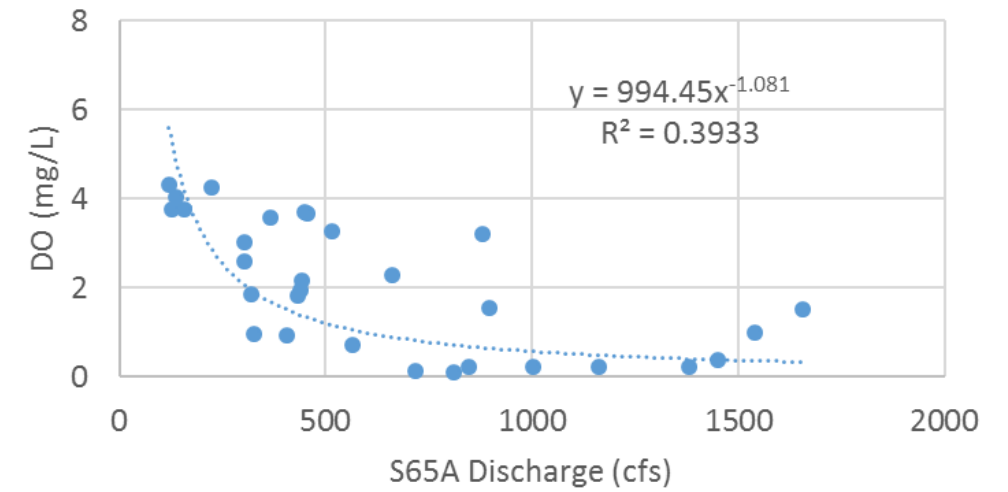


The most important variables influencing DO, in declining order were water depth (37%), temperature (6%), and specific conductance (5%) in the wet season (June through October).

Event 2 (8/25-10/31/2016)

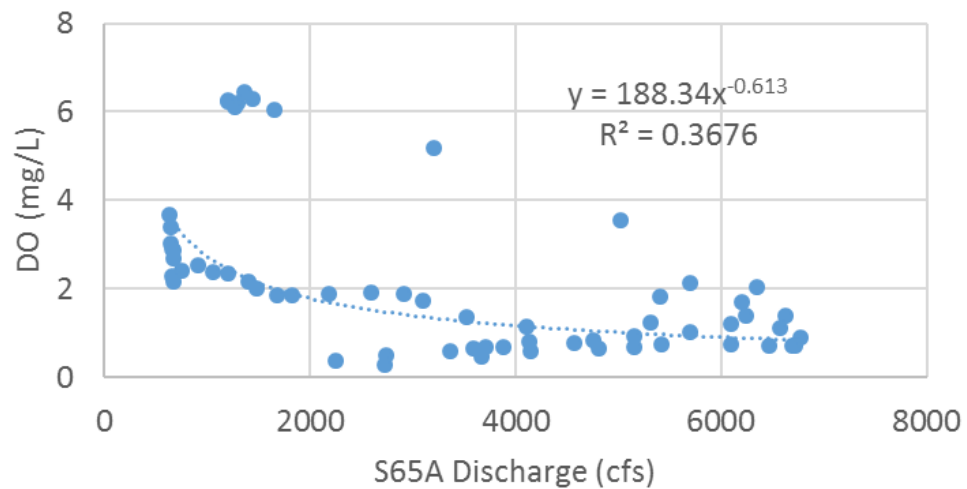


Event 3 (6/10-7/10/2017)

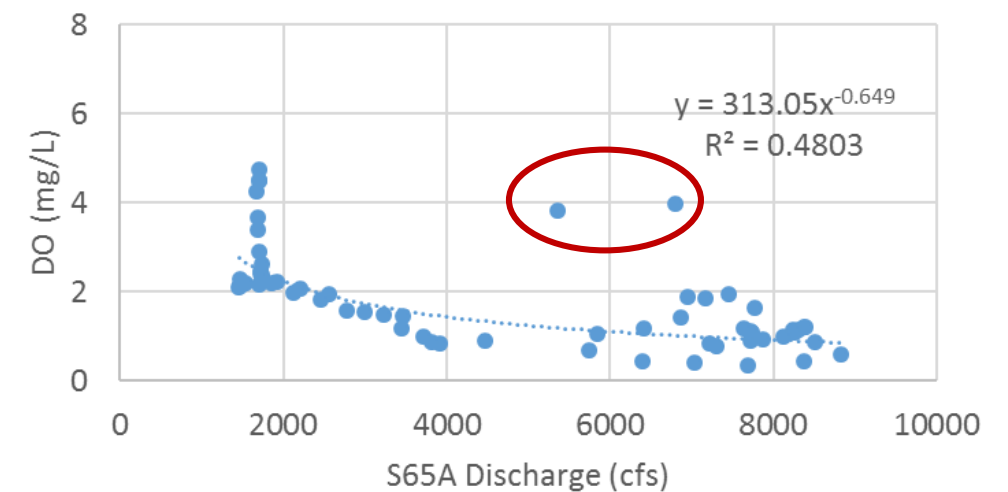


S65A discharge is used as a surrogate for river water depth because they are highly correlated

Event 1 (5/11-7/11/2016)



Event 4 (9/1-10/31/2017)



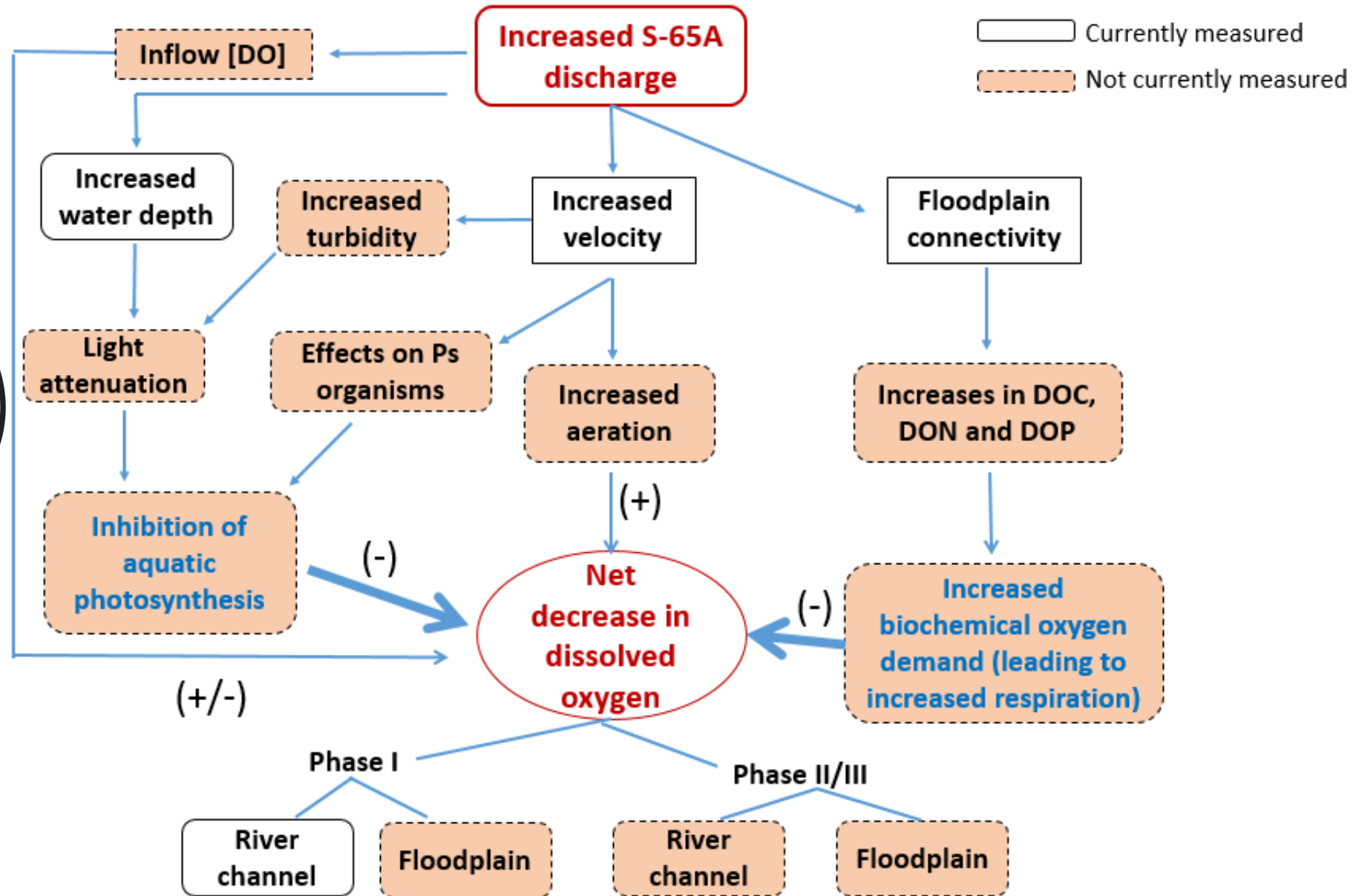
## Conclusion: a Negative Correlation between DO concentration and Inflow S65A Discharge

It suggests potential for adaptive hydrologic management (S65A discharge) to reduce the severity or duration of these DO sag events.

S-65A is the primary water control structure providing some level of control of water depth in the Phase I river channel.



# Future Monitoring & Studies



Thank You



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9/13/2017



## Characterization of Typical DO Sag Events:

During a DO sag event, increases in S65A discharge lead to overbank flow, resulting in declines in DO concentrations, especially when the increase is rapid.



# Main Hypotheses

Increased water depth with higher discharge results in greater light attenuation

Displacement of photosynthetic taxa

As higher discharge inundates the floodplain, nutrients are mobilized that rapidly initiate higher rates of respiration, consuming oxygen