Effects of Stage Ascension and Recession on Dissolved Oxygen Concentrations in the Kissimmee River

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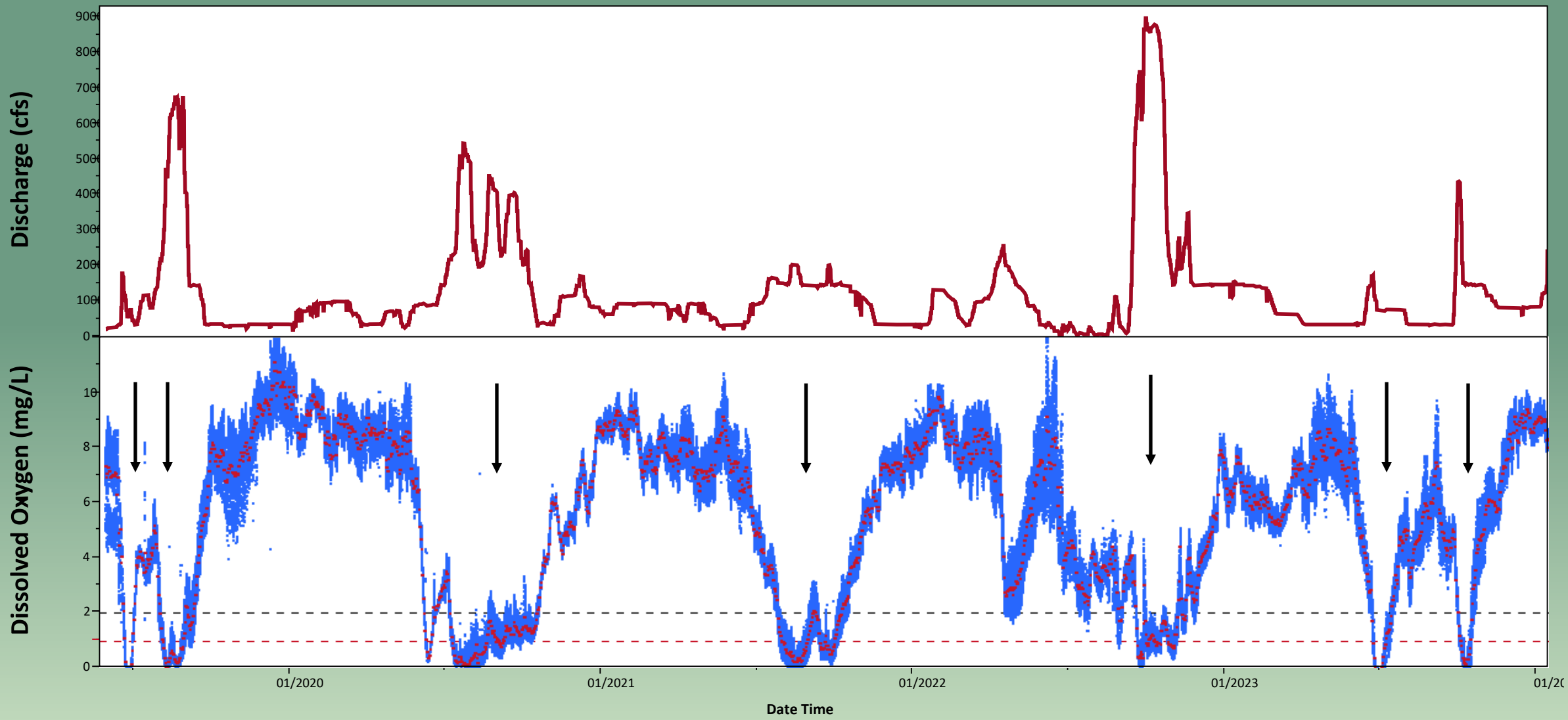
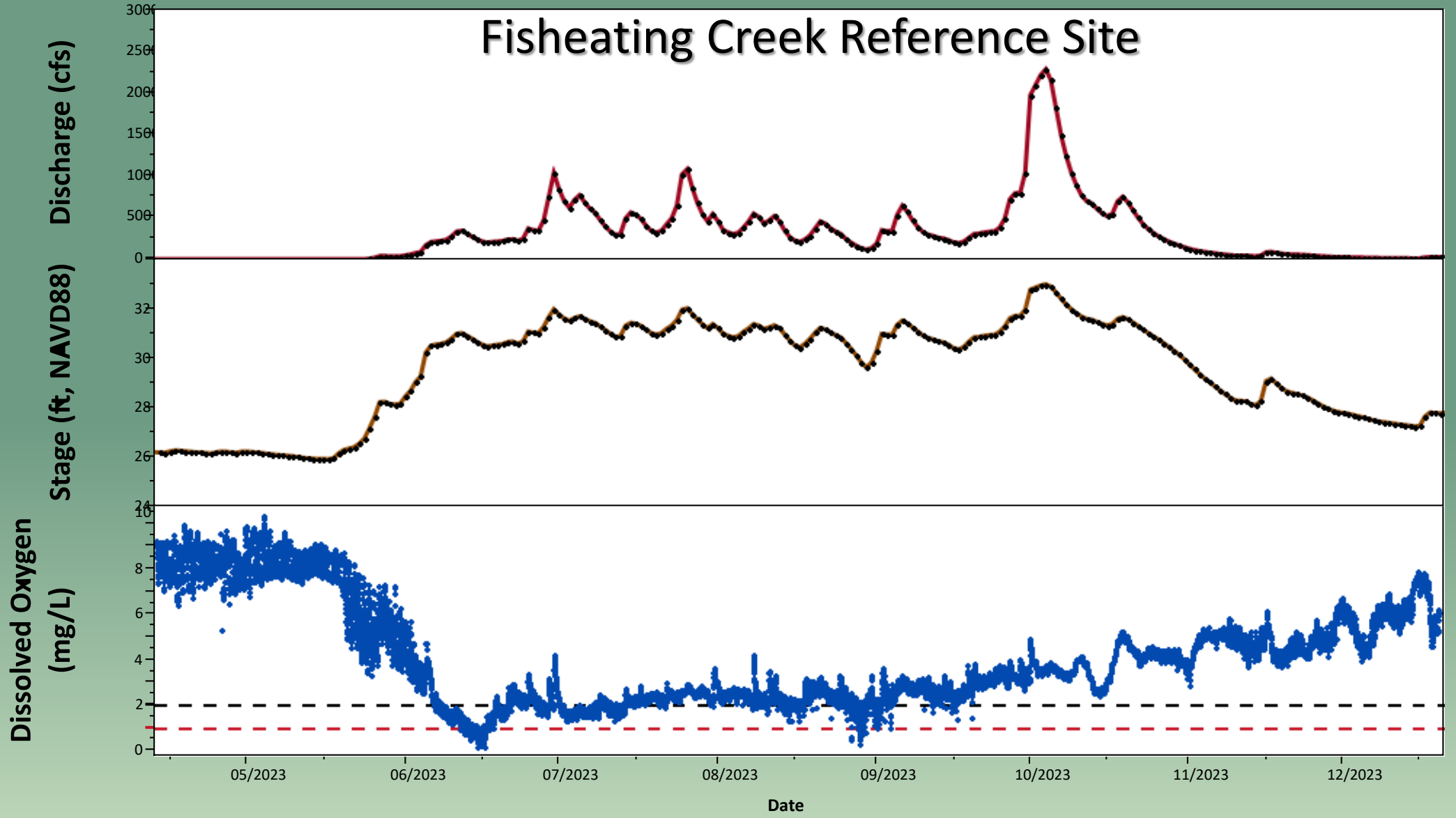
Photo: Brent Anderson

Discharge and Dissolved Oxygen




Fisheating Creek Reference Site
Discharge (cfs)
Stage (ft, NAVD88)
Dissolved Oxygen (mg/L)
300
250
200
150
100
50
0
32
30
28
26
24
10
8
6
4
2
0
05/2023
06/2023
07/2023
08/2023
09/2023
10/2023
11/2023
12/2023
Date

Objectives

1. Dissolved oxygen (DO) background
2. Discharge, Stage and DO
3. DO Crashes
4. Conclusions

Photo: Brent Anderson

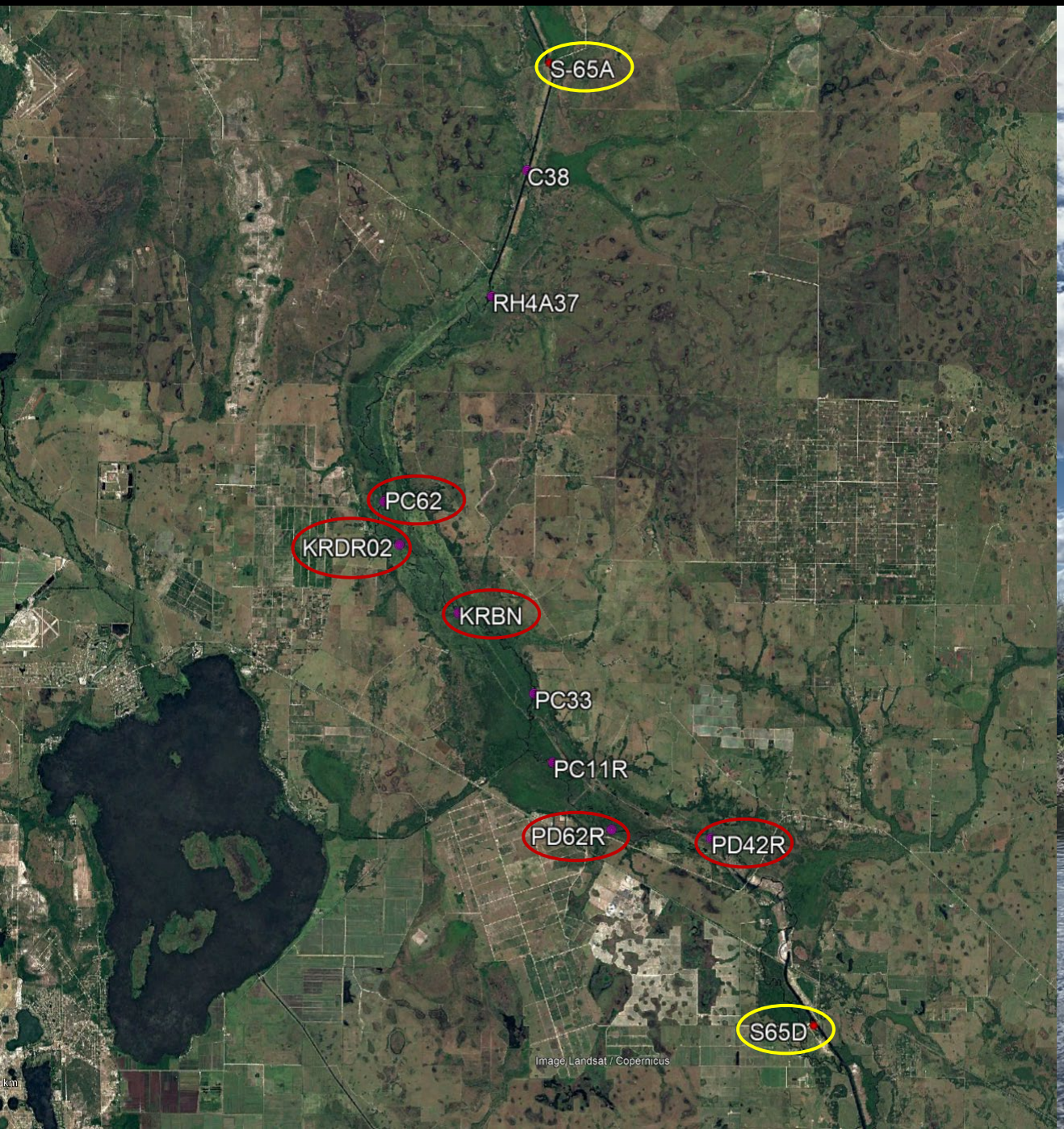
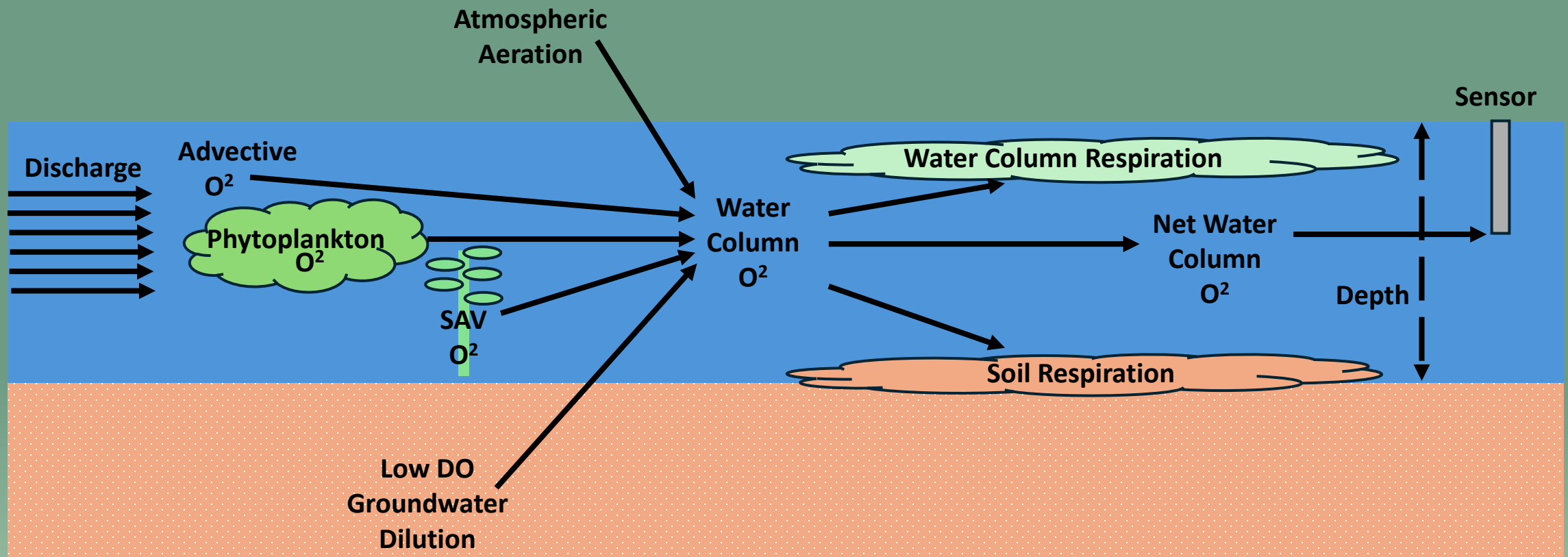


Photo: Brent Anderson

Riverine O_2 Budget



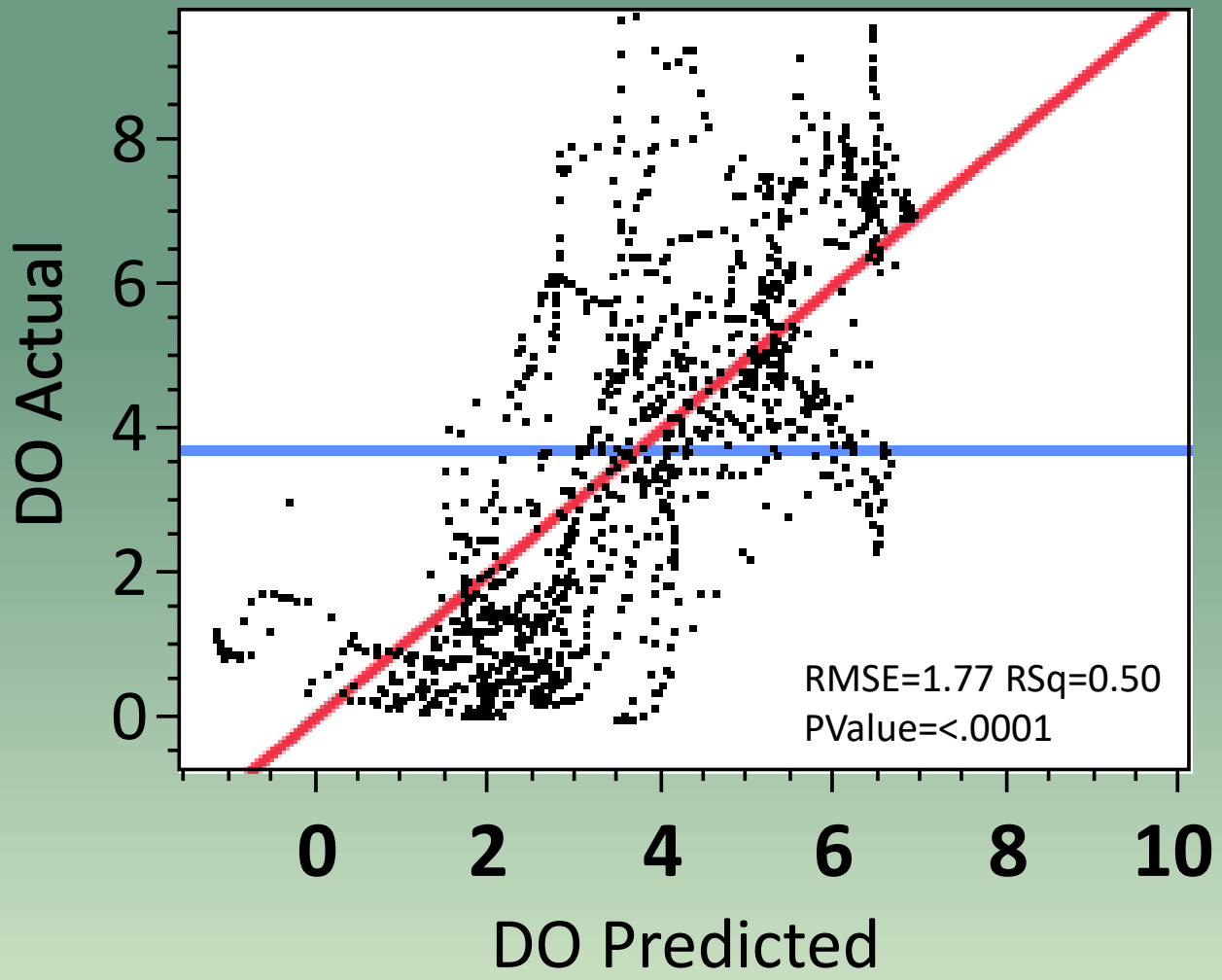
*Chemical oxygen demand (COD) is excluded because of difficulty in measurement and is assumed to be minimal.

Riverine dissolved oxygen concentration is governed by dynamic processes that can be boosted or reduced by:

- Hydrology
- Weather
- Water Chemistry
- Temperature

Discharge, Stage and Dissolved Oxygen:
Magnitudes and Rates

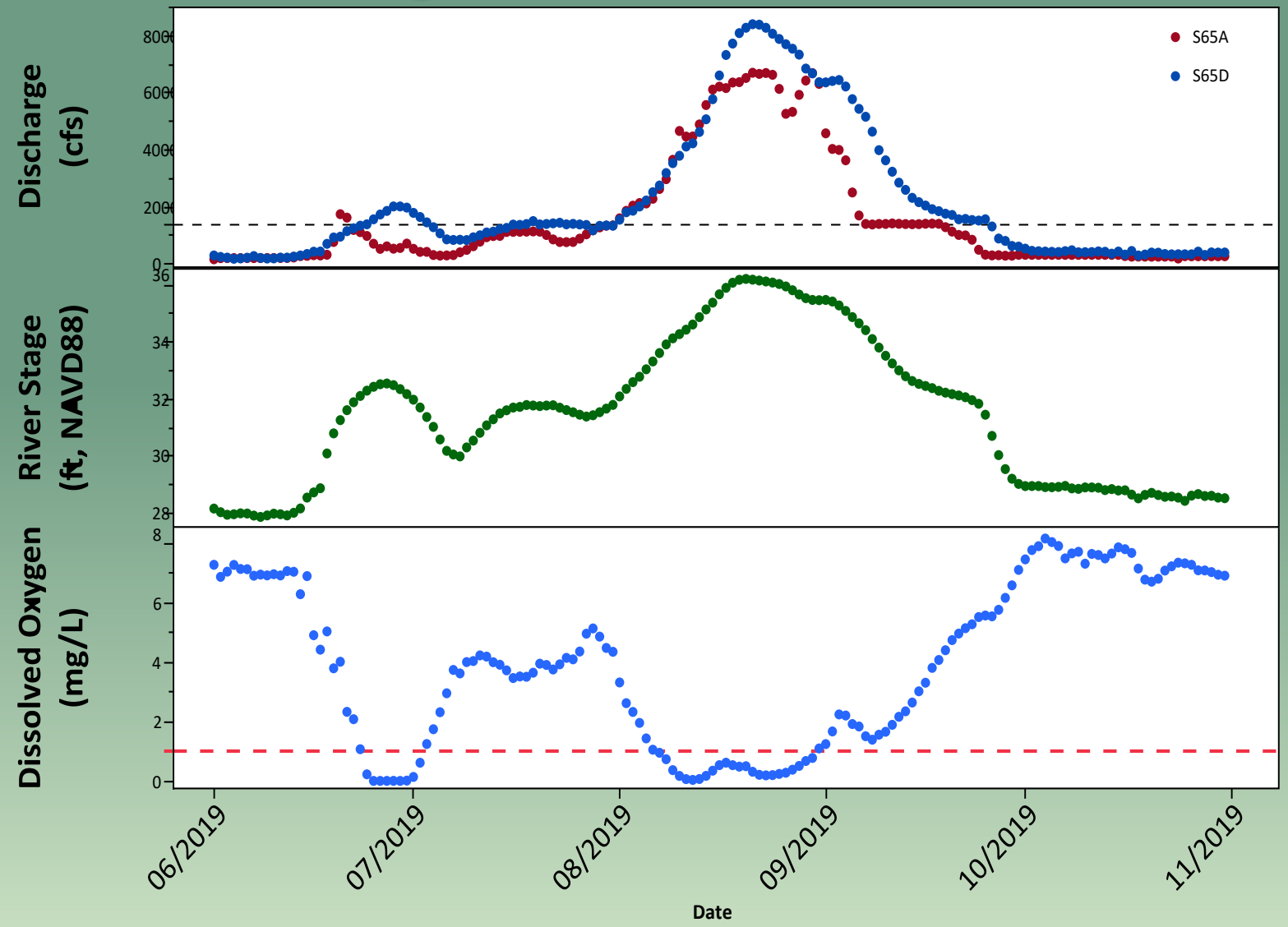
2019 – 2024 Mean River Data



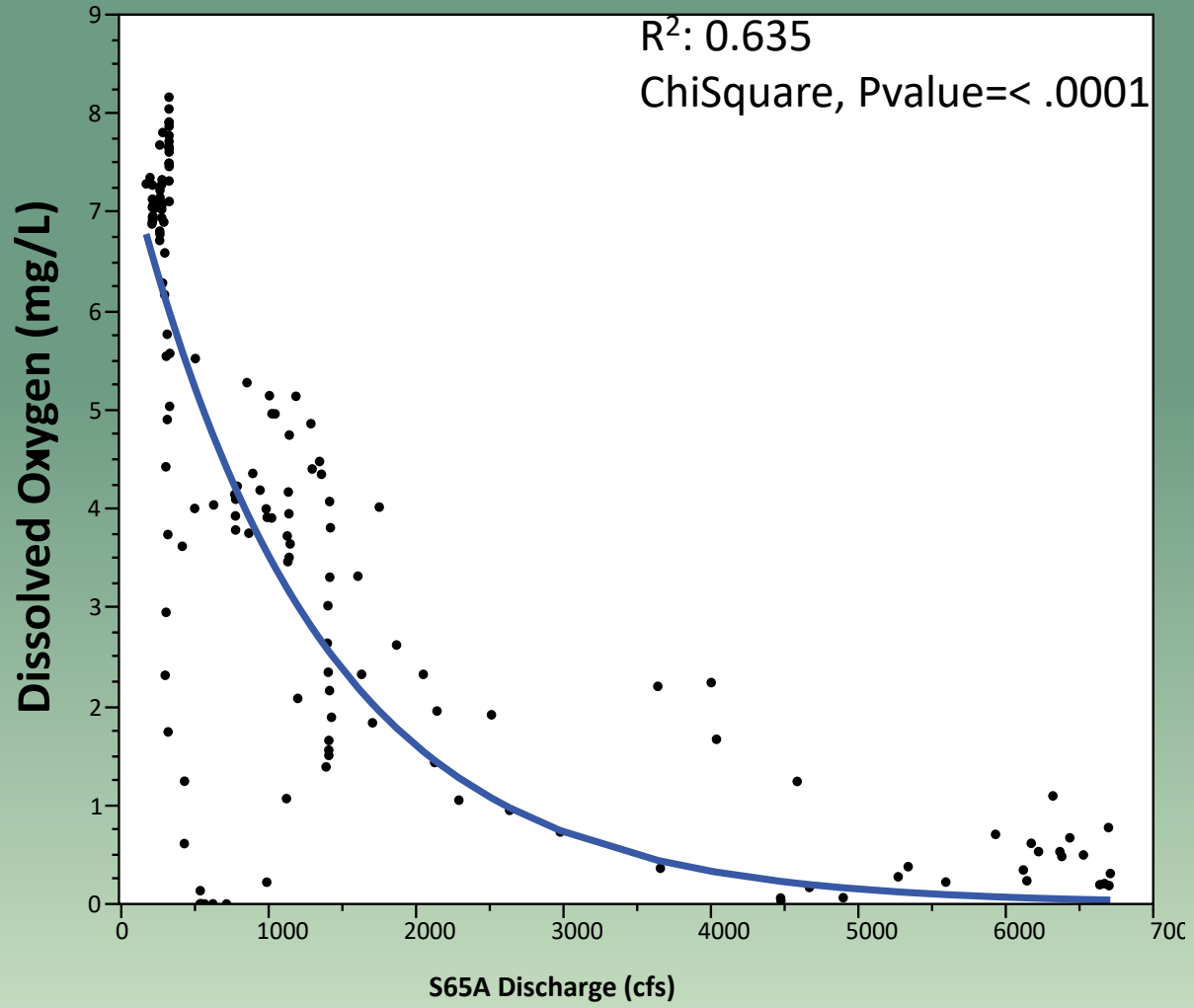
Source	Logworth	PValue
River Stage	6744.110	0.00000
S65D Discharge (cfs)	10.662	0.00000
S65A Discharge (cfs)	3.121	0.00076

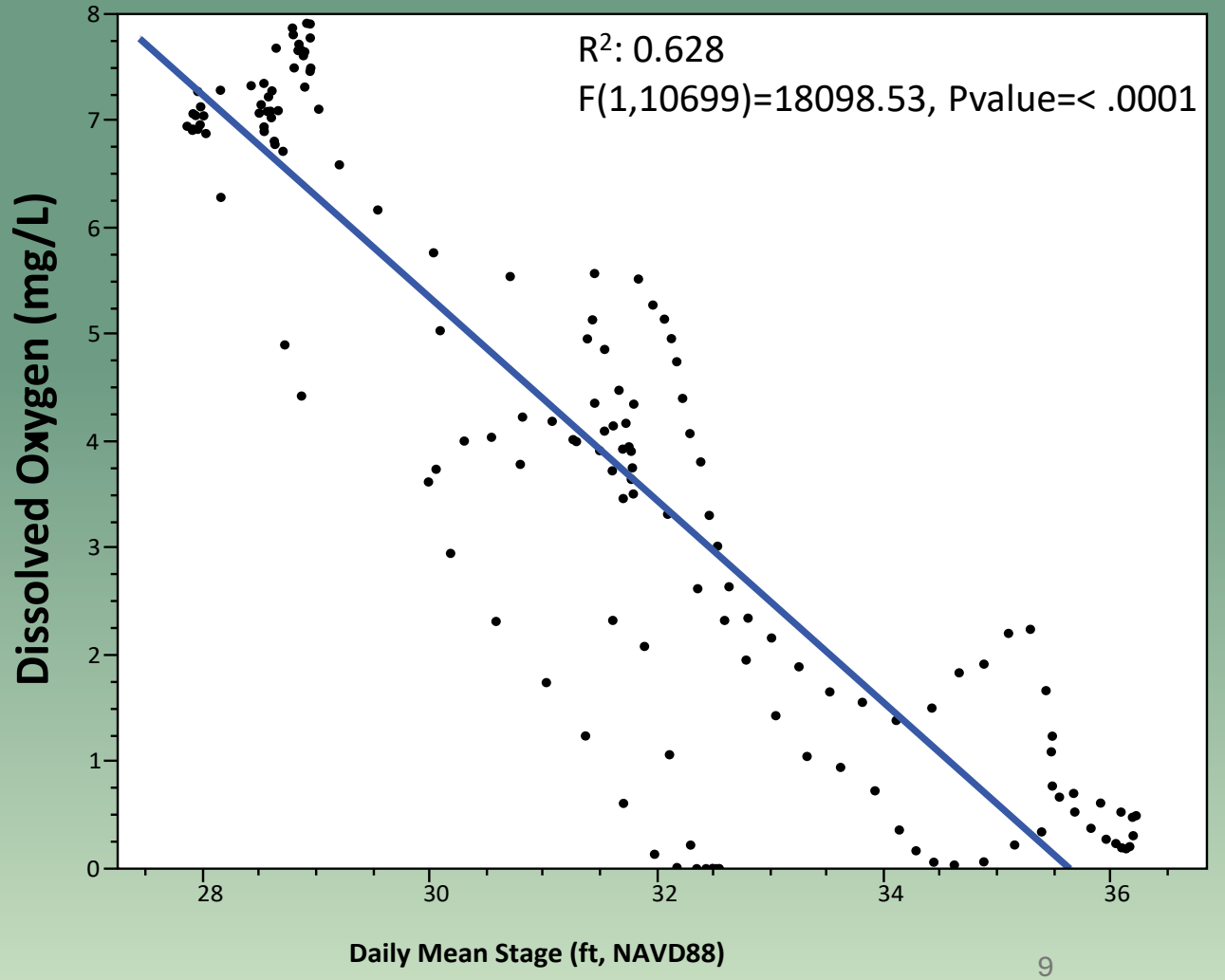
Discharge, Stage and Dissolved Oxygen:

Magnitudes and Rates

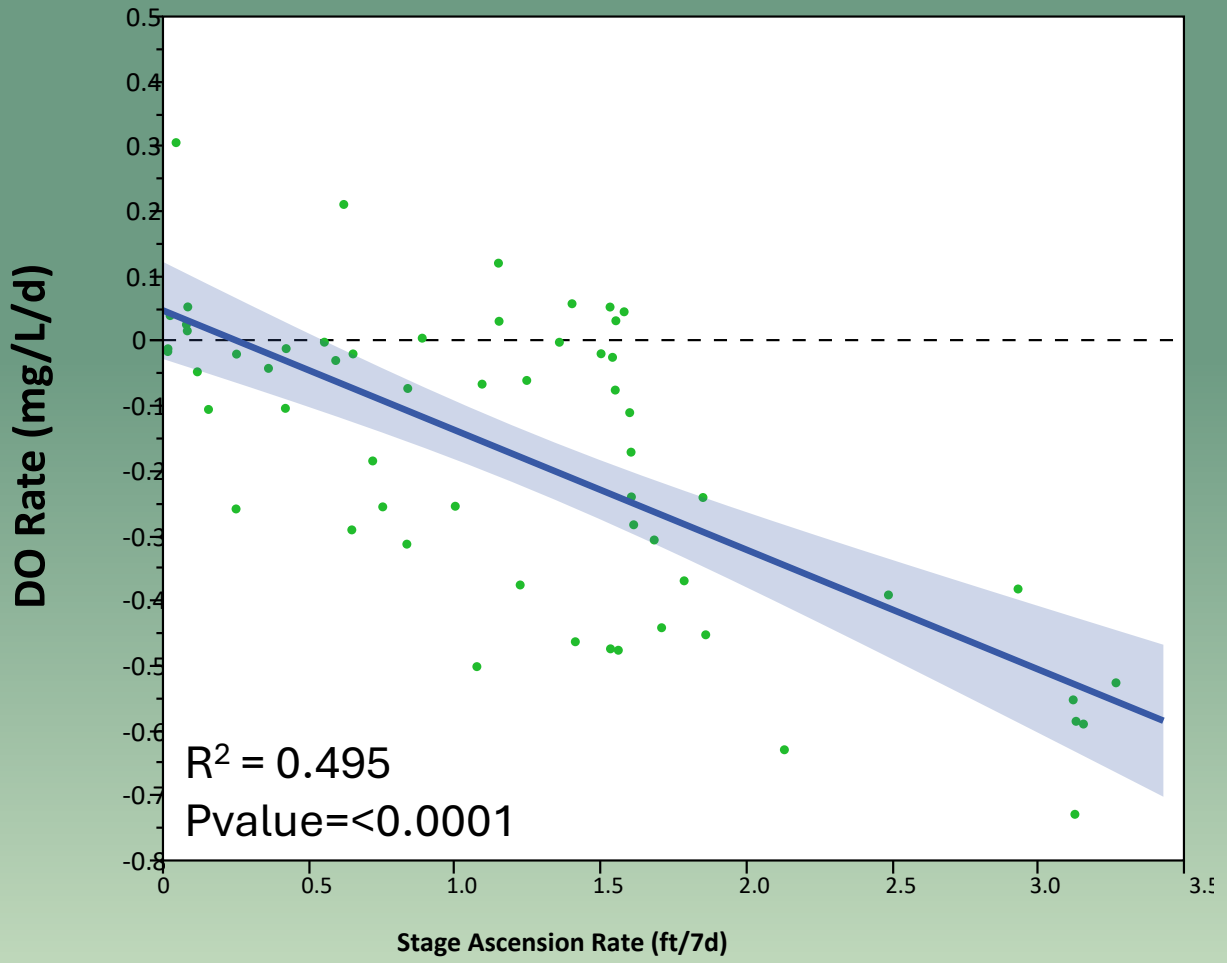


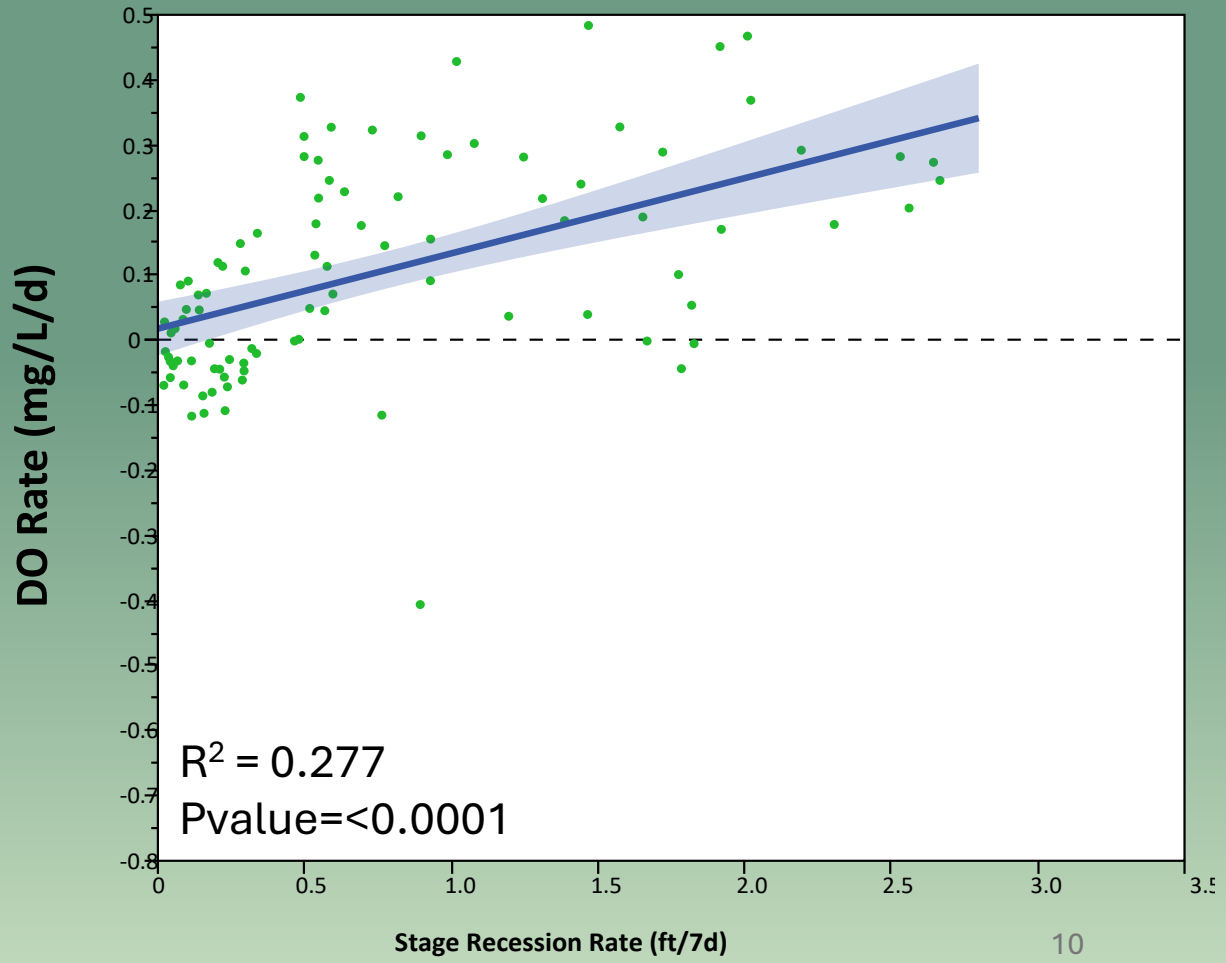
Discharge, Stage and Dissolved Oxygen:
Magnitudes and Rates



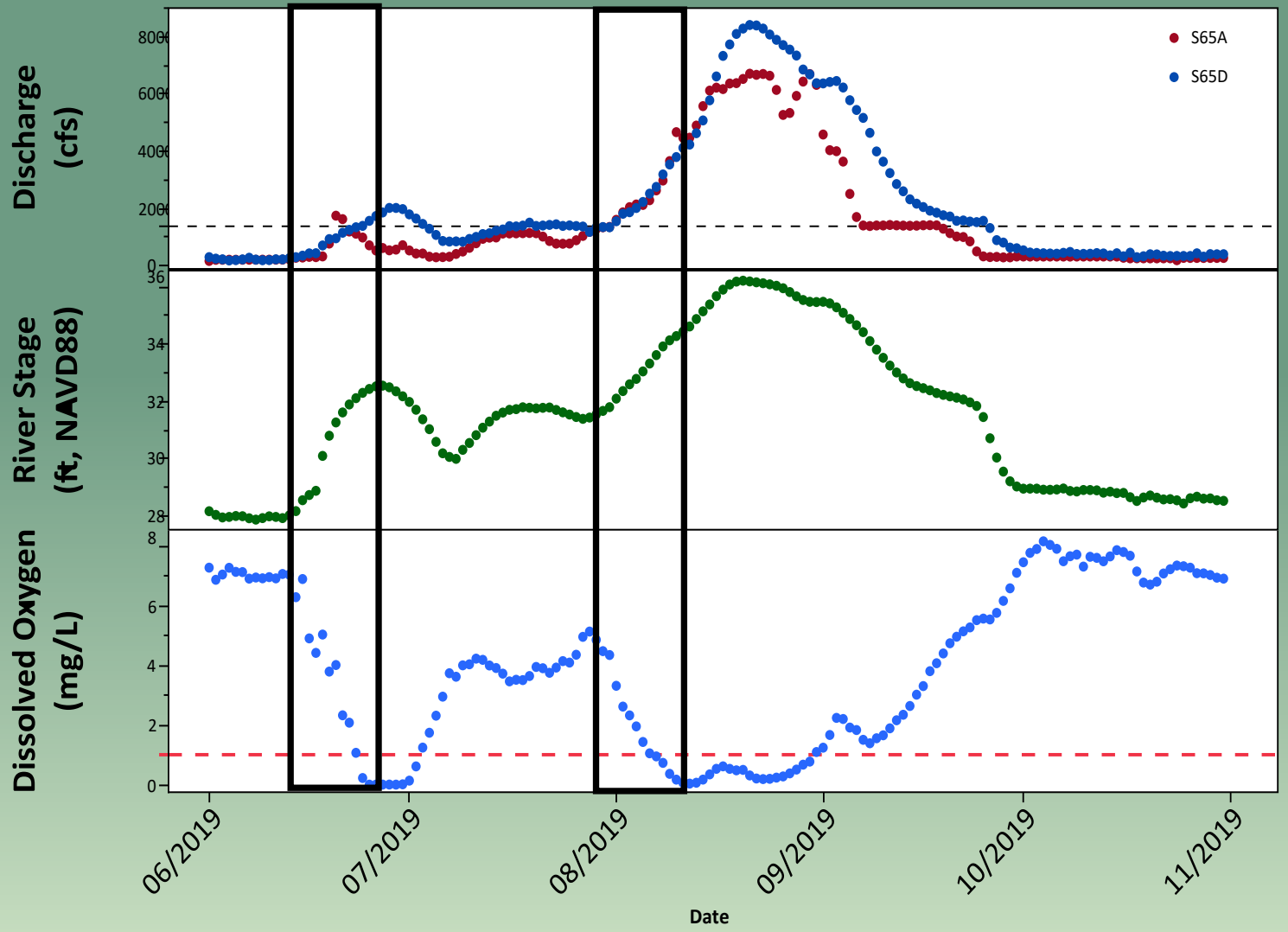


Discharge, Stage and Dissolved Oxygen:
Magnitudes and Rates

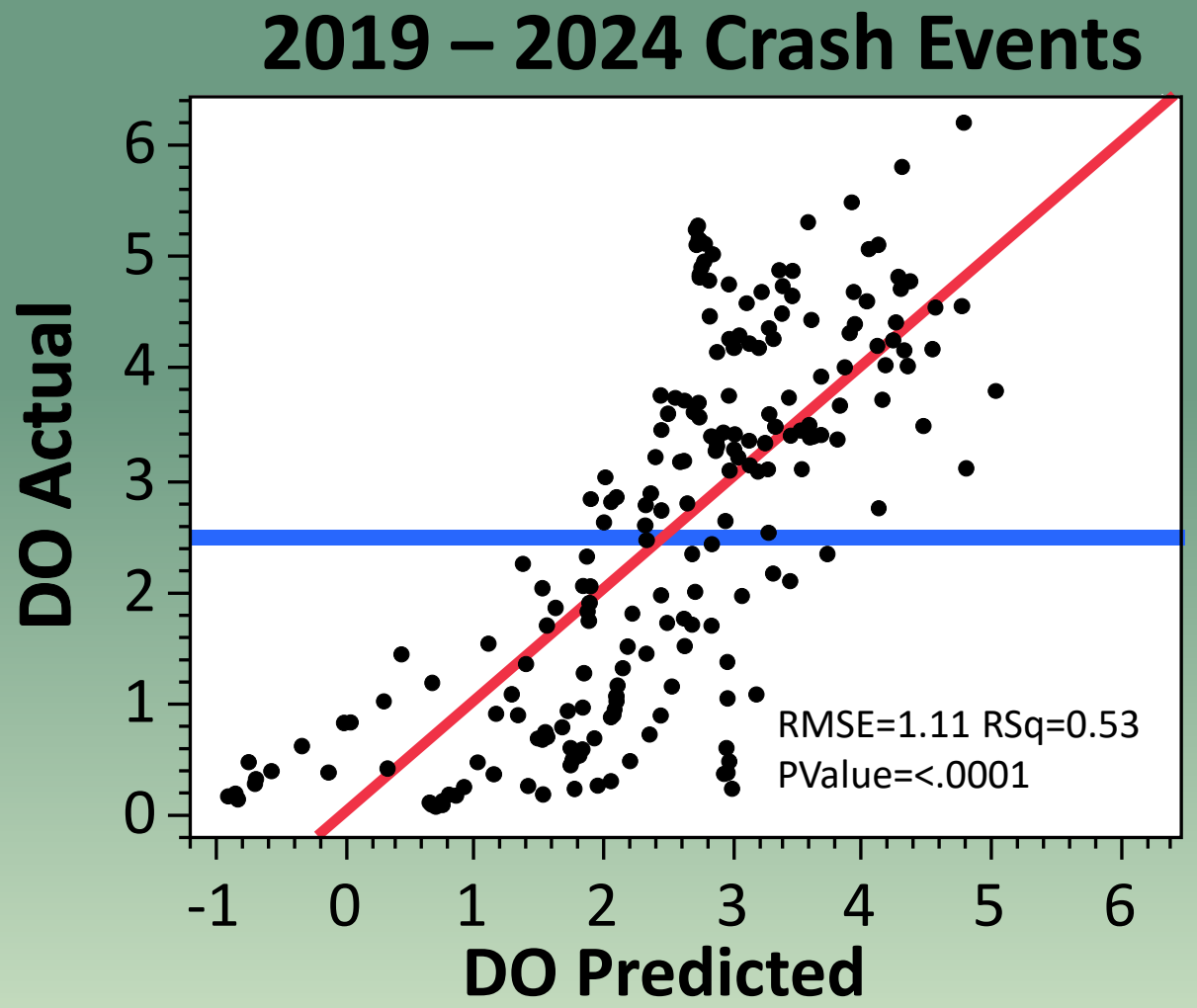




Discharge, Stage and Dissolved Oxygen:
DO Crashes



Discharge, Stage and Dissolved Oxygen:
DO Crashes



Source	Logworth	PValue
River Stage (ft, NAVD88)	865.62	0.00000
Ascenion Rate (ft/7d)	288.64	0.00000
S65A Discharge (cfs)	27.40	0.00000
S65D Discharge (cfs)	1.31	0.04874

Conclusions:

Action		DO Reaction		Mechanism	
Discharge	↑	[DO]	↓	Increased TSS/TOC Transport	Stimulated Respiration
River Stage	↑	[DO]	↓	Light Limitation	Reduced Photosynthesis and Stimulated Respiration
Ascension Rate	↑	ΔDO ↑	[DO] ↓	[DO] Decrease Faster	
Recession Rate	↑	ΔDO ↑	[DO] ↑	[DO] Increase Faster	Photosynthesis Recovery

- Future directions include:
  - Modelling discharge duration and magnitude effects on DO
  - Effects of runoff organic carbon on respiration rates

Thanks to the Field Team:

- Brent Anderson
- Allison Lippert
- Megan Barlow
- Tyler Parr