



Yakima River water stargrass and water quality

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Lower Yakima River Water Quality and Habitat Coordination Meeting

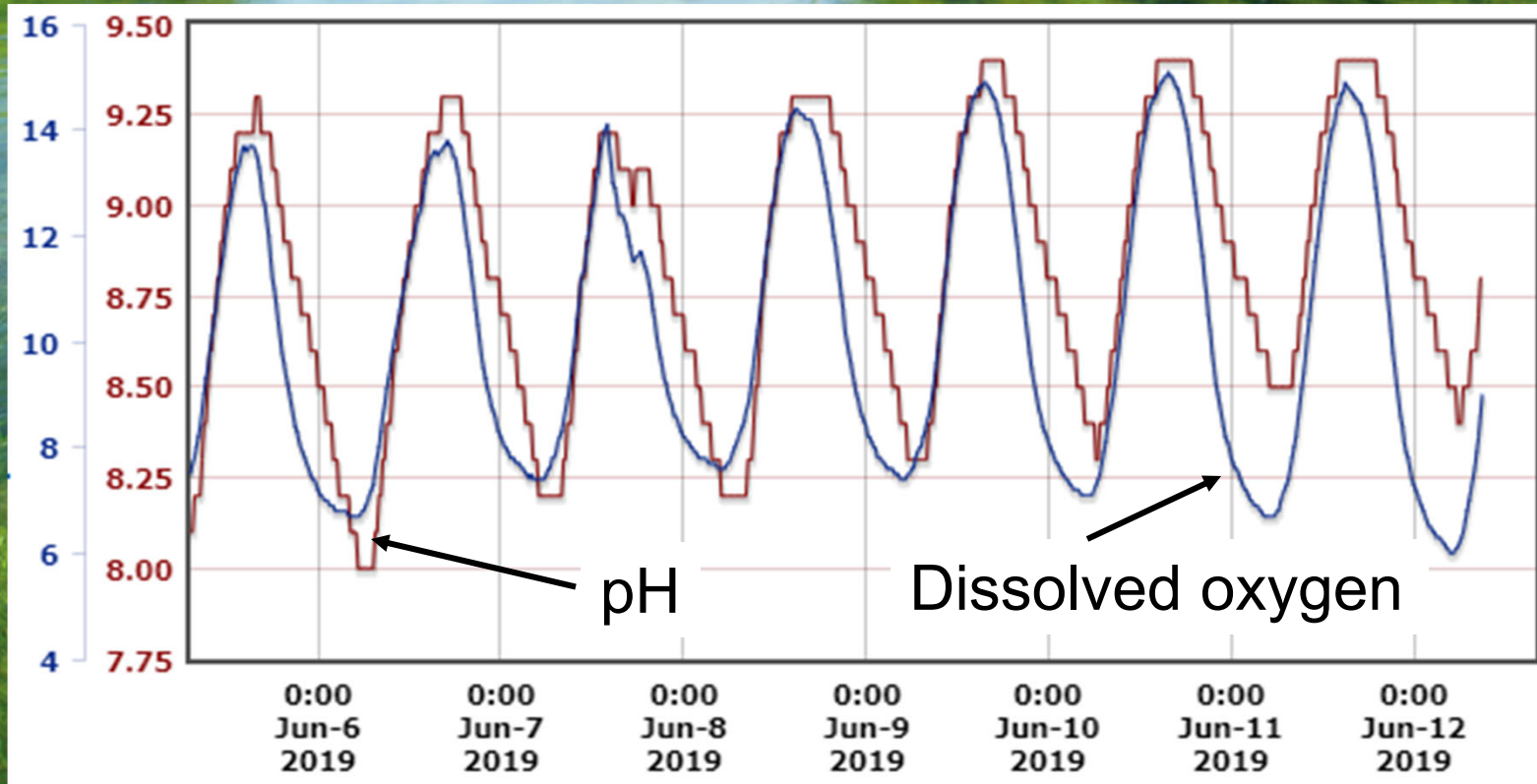
Oct 26th, 2021

**U.S. Department of the Interior
U.S. Geological Survey**

Introduction

- Investigate the relationships between water stargrass biomass, nutrients, and water quality parameters on the lower Yakima River (Prosser to West Richland)
- Results of study may help inform future management actions for mitigation and control of water stargrass

Kiona (site 12510500)



Example of typical pH and DO patterns from photosynthesis

Project Scope – Water Quality

- Install three continuous water quality sites
 - Prosser, Kiona, Van Giesen
 - Measure: Temperature, conductivity, dissolved oxygen, pH, Turbidity, light (PAR), stage
 - Continuous nitrate at Kiona and Van Giesen
 - Continuous flow at Kiona
- Monitored Summer 2018 - October 2020



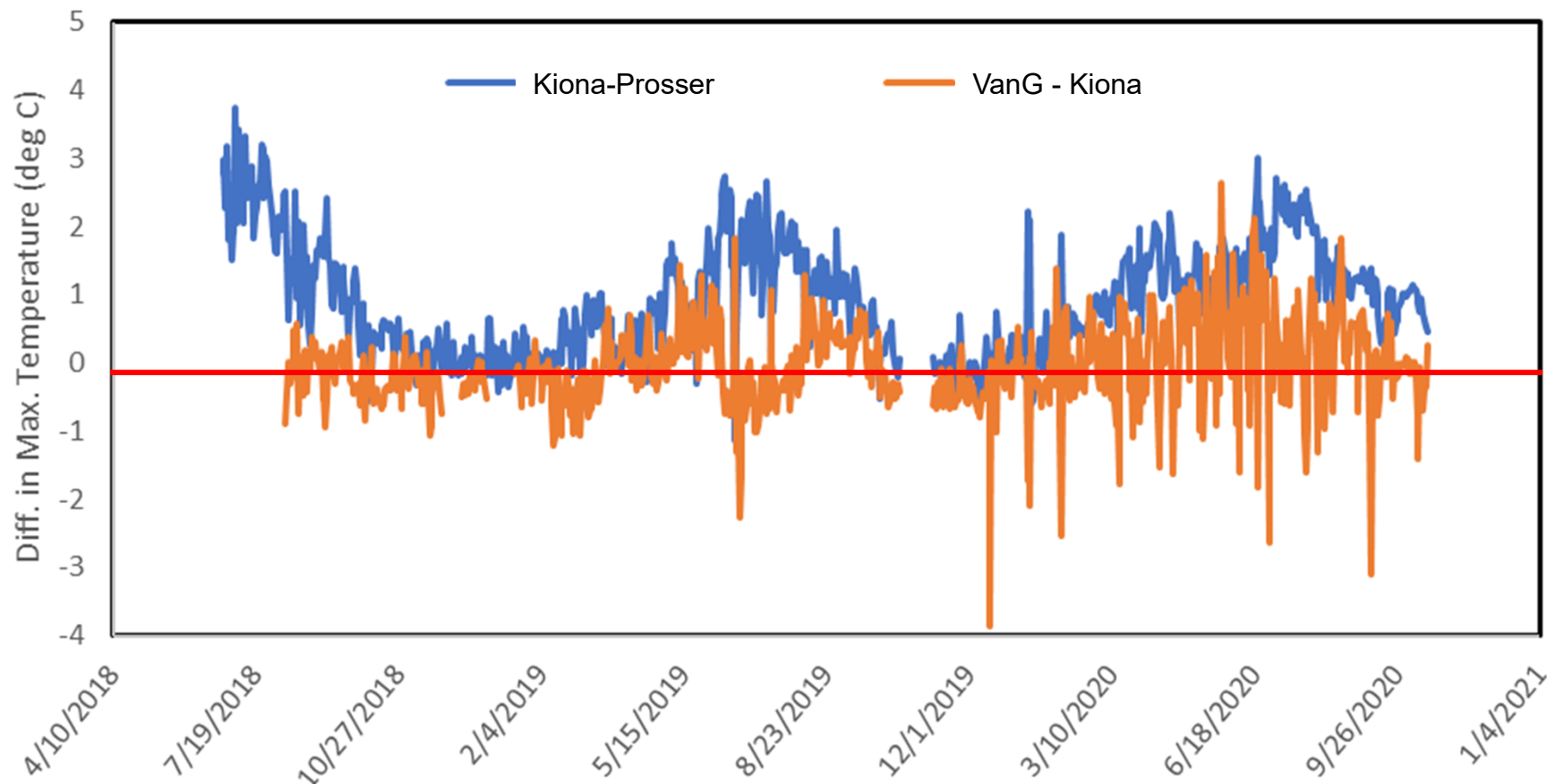
Van Giesen

Project Scope – Water Stargrass

- Document stargrass growth over time
 - Estimate percent cover and biomass from June through September
 - Examine relationships between water quality and plant growth



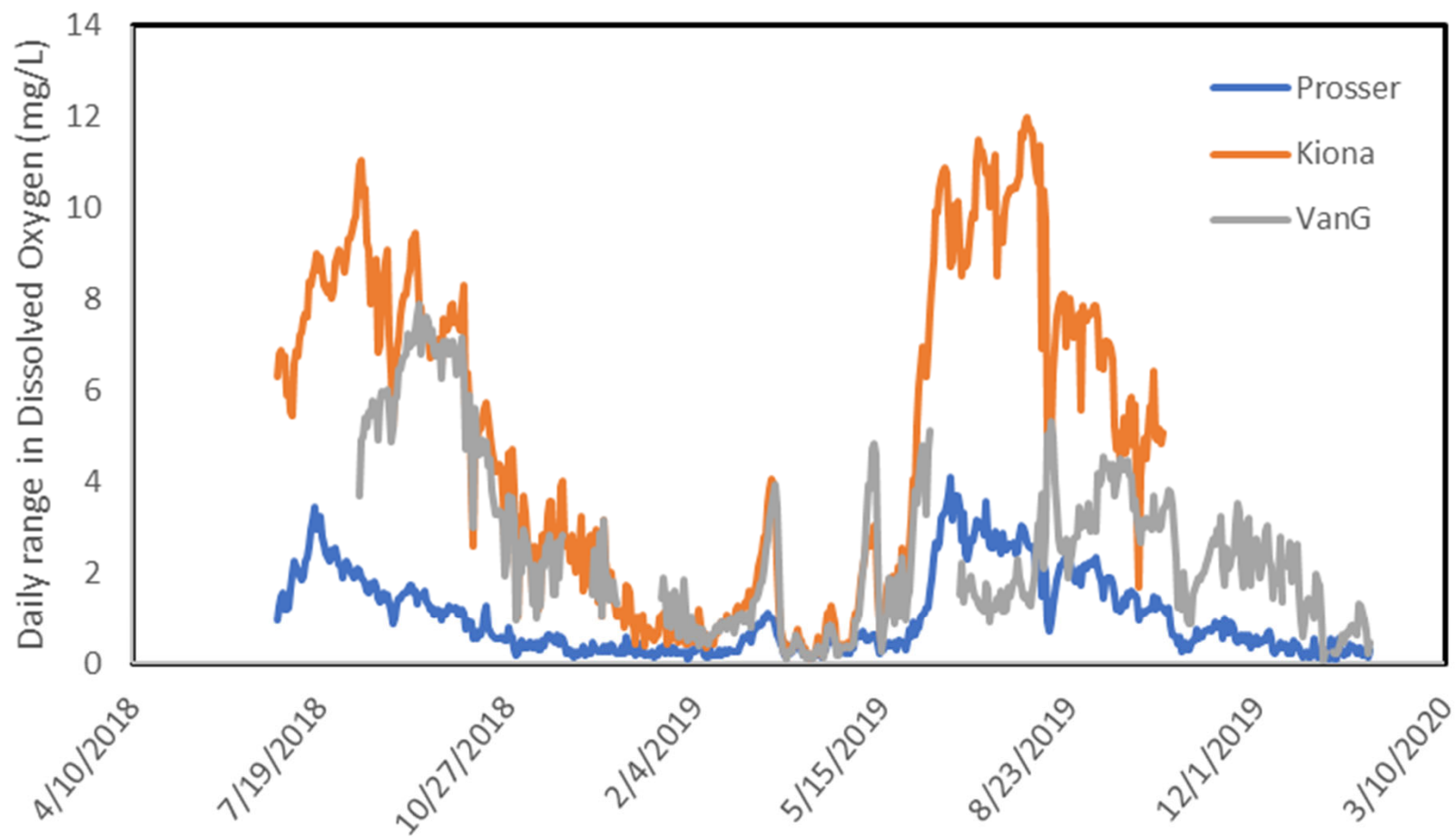
Daily maximum temperatures - longitudinally



Mainstem warming from Prosser to VanGiesen

Preliminary Data – Subject to Revision

Daily Dissolved Oxygen range



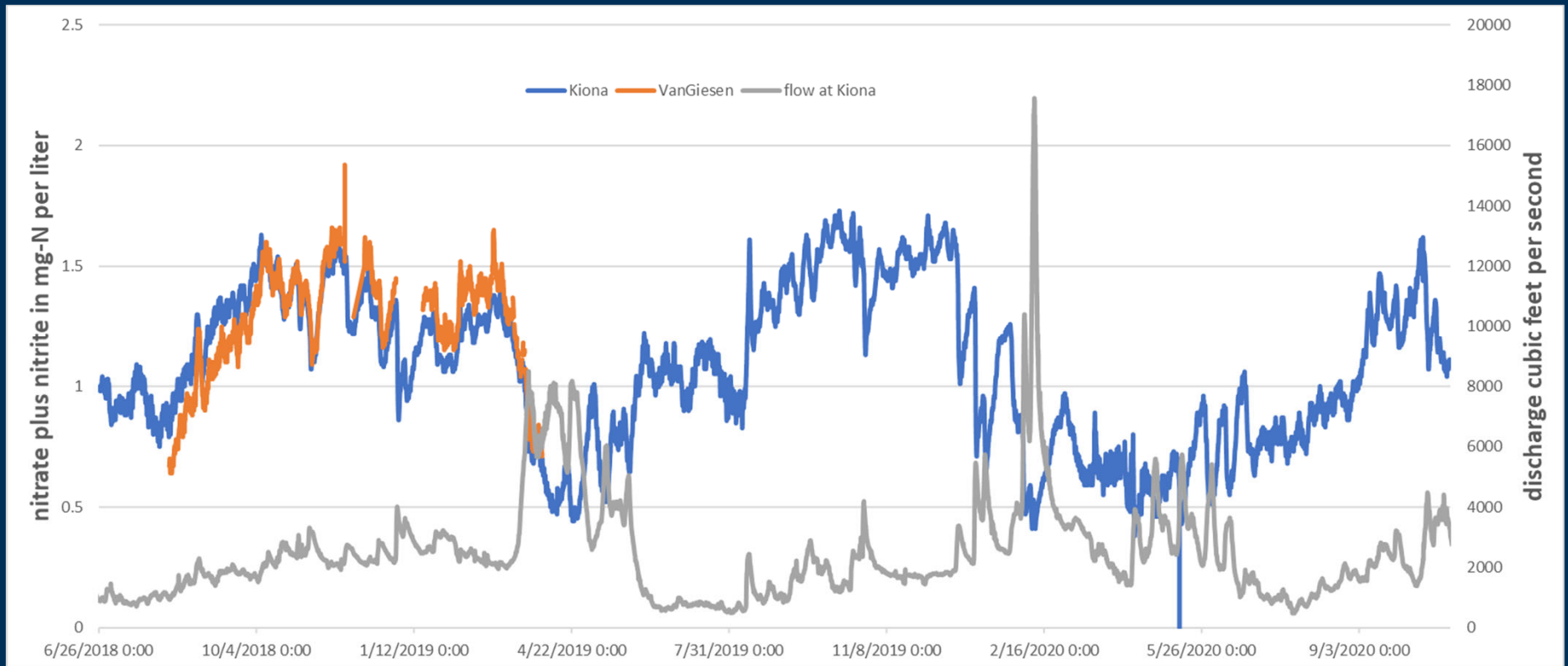
DO range greatest in summer, with Kiona usually exceeding the other two sites

Dissolved nutrient summary through October 2020

	Nitrate		OrthoP	
	Median	range	Median	range
Prosser	1.20	0.4 to 1.86	0.07	0.03 to 0.12
Kiona	0.93	0.4 to 1.79	0.06	0.03 to 0.10
VanGiesen	1.00	0.5 to 1.87	0.07	0.03 to 0.10

Relatively low nutrients on 'eutrophic' river

Continuous nitrate versus flow through October 2020

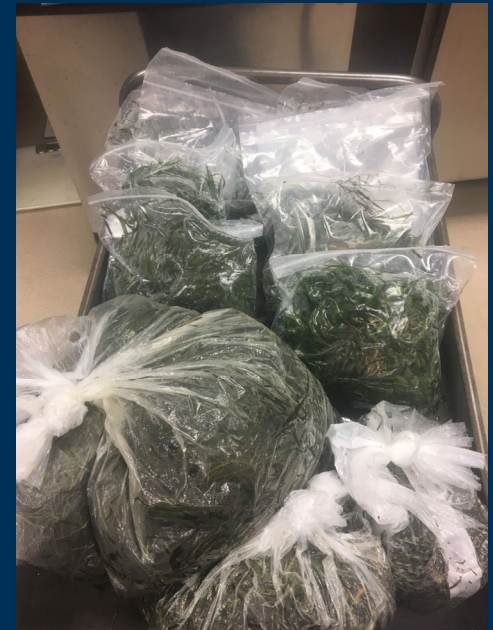


Spring runoff shows some dilution of nitrate, however summer nitrate increases during baseflow which is indicative of sustained inputs



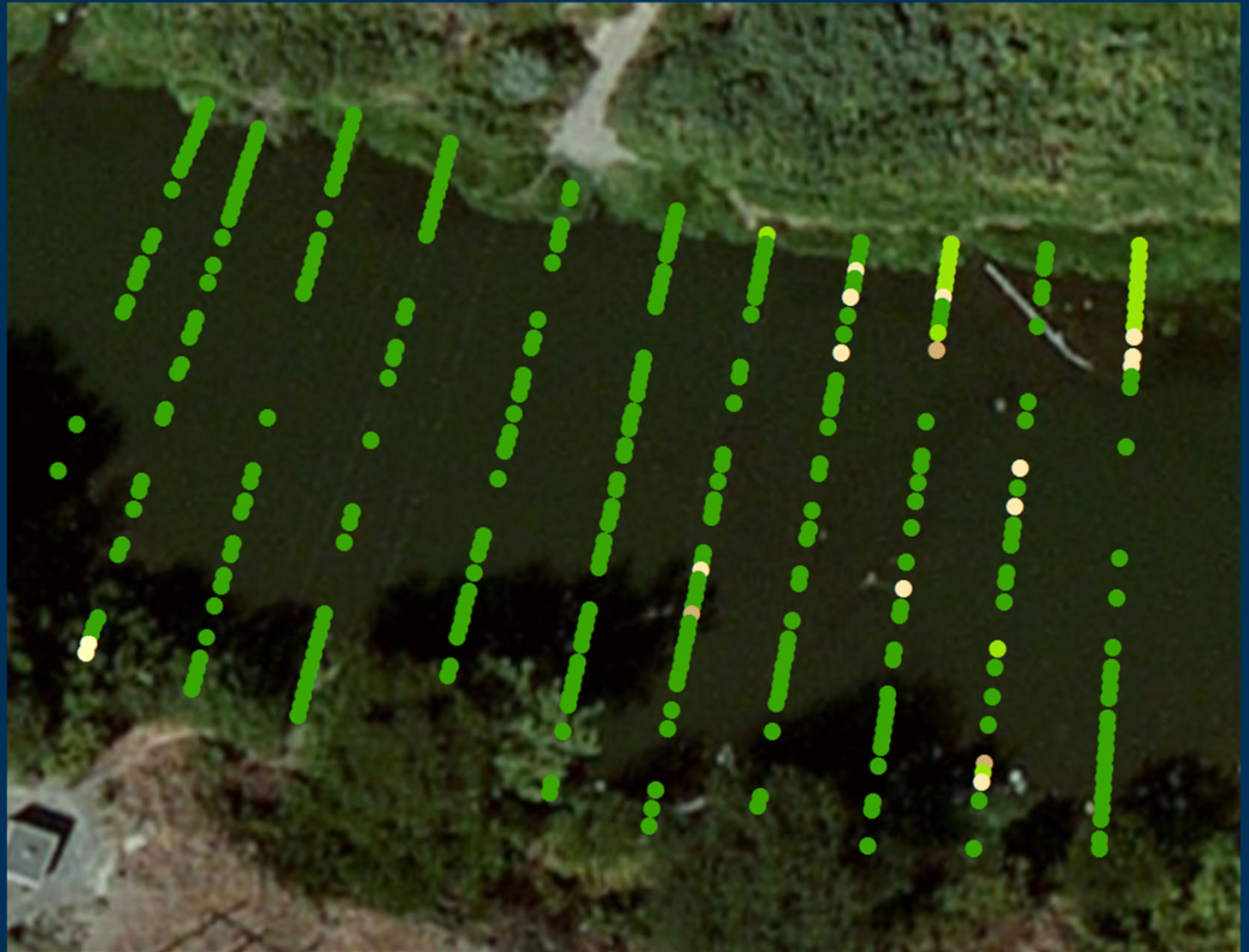
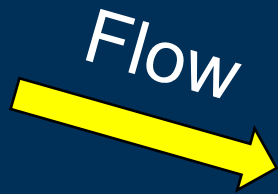
Stargrass Estimates

- **Estimated stargrass cover and biomass:**
 - August 2018
 - June, August, and September 2019
 - June and September 2020
- **Measured ~ 100m long reaches, with a minimum of 10 transects**
- **Harvested 10 samples from each site of known area, tried to capture variability**
- **River rinsed and collected above ground biomass**
- **Bagged and frozen until lab processing**
 - Dried at 60°C for 2 to 7 days to constant weight



Stargrass Cover

Prosser



Stargrass Biomass over time

Prosser

Aug 2018 = 2018_1

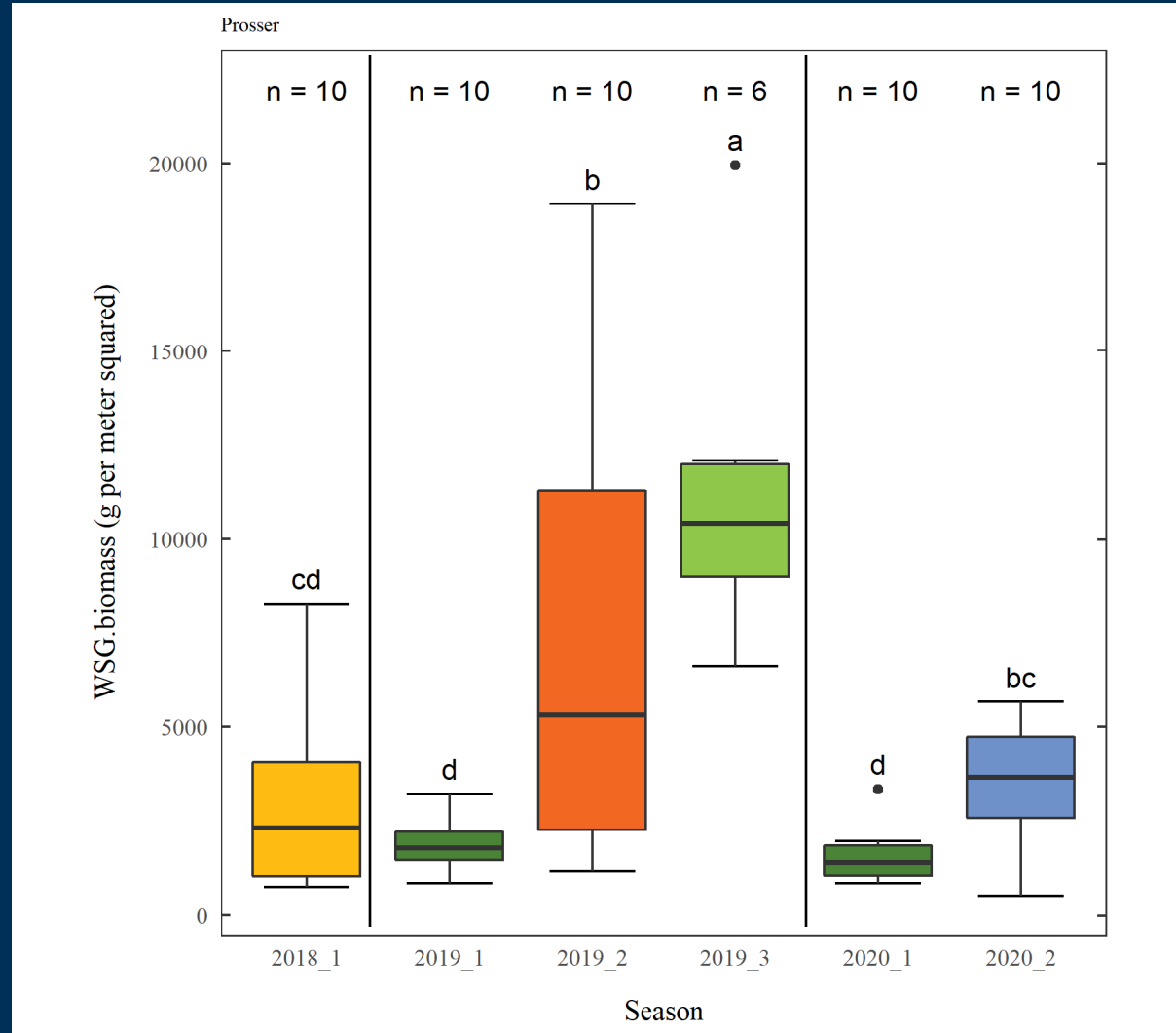
June 2019 = 2019_1

Aug 2019 = 2019_2

Sept 2019 = 2019_3

June 2020 = 2020_1

Sept 2020 = 2020_2



Stargrass Biomass over time

Kiona

Aug 2018 = 2018_1

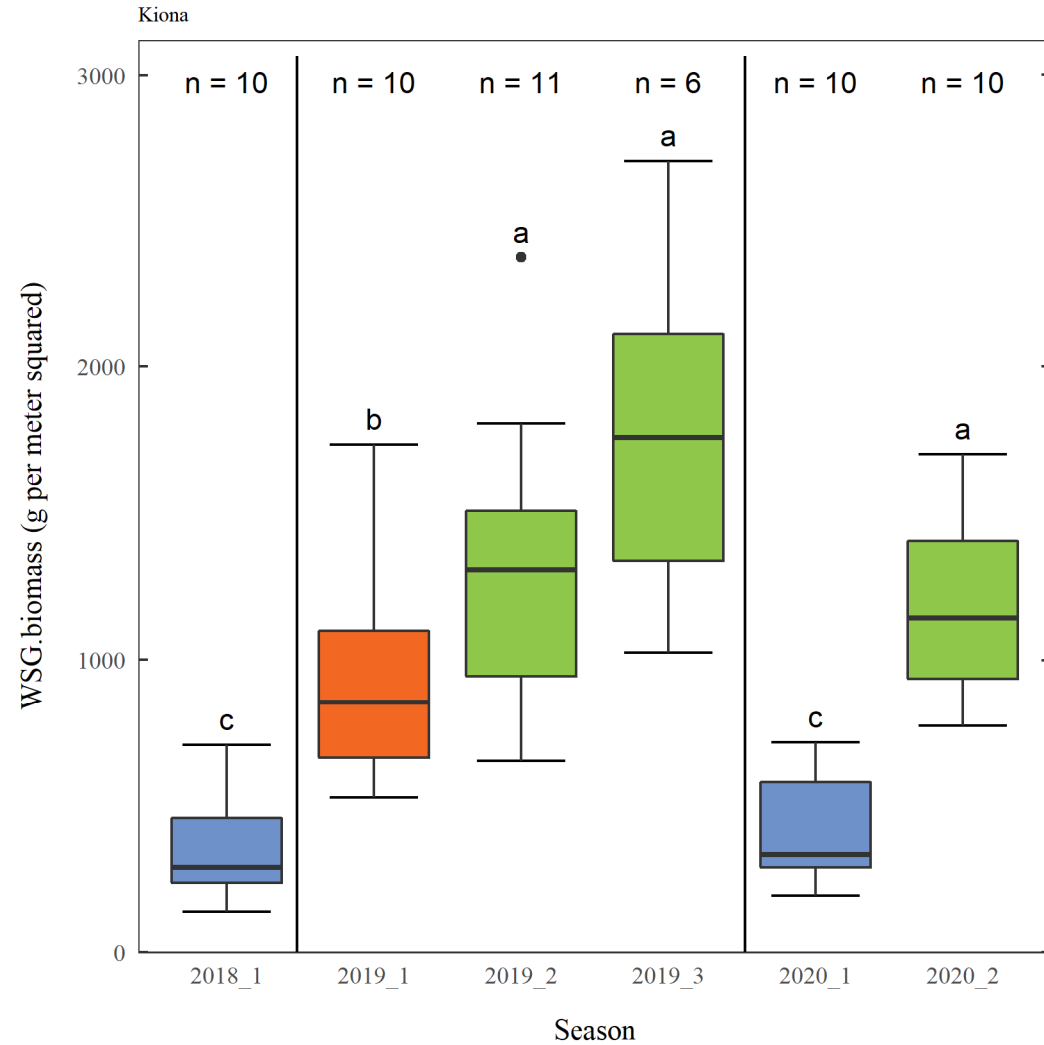
June 2019 = 2019_1

Aug 2019 = 2019_2

Sept 2019 = 2019_3

June 2020 = 2020_1

Sept 2020 = 2020_2



Stargrass Biomass over time

VanGiesen

Aug 2018 = 2018_1

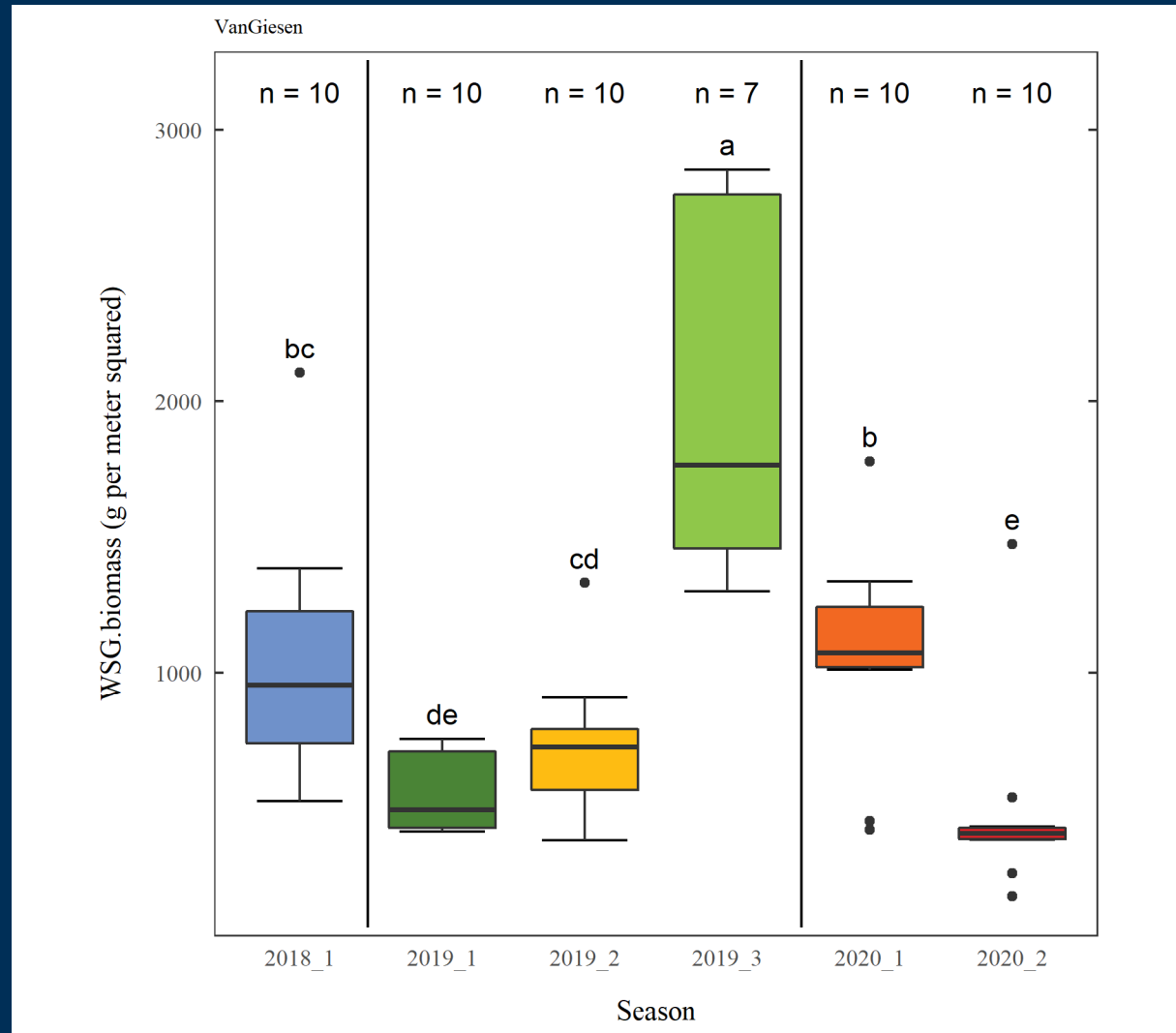
June 2019 = 2019_1

Aug 2019 = 2019_2

Sept 2019 = 2019_3

June 2020 = 2020_1

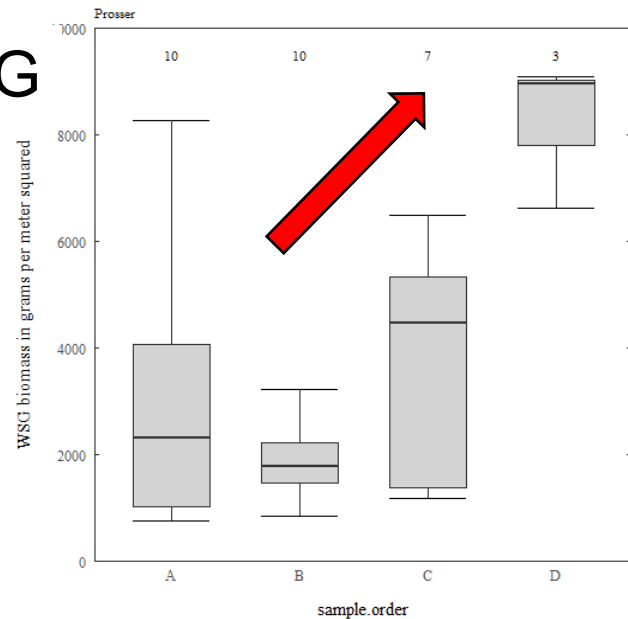
Sept 2020 = 2020_2



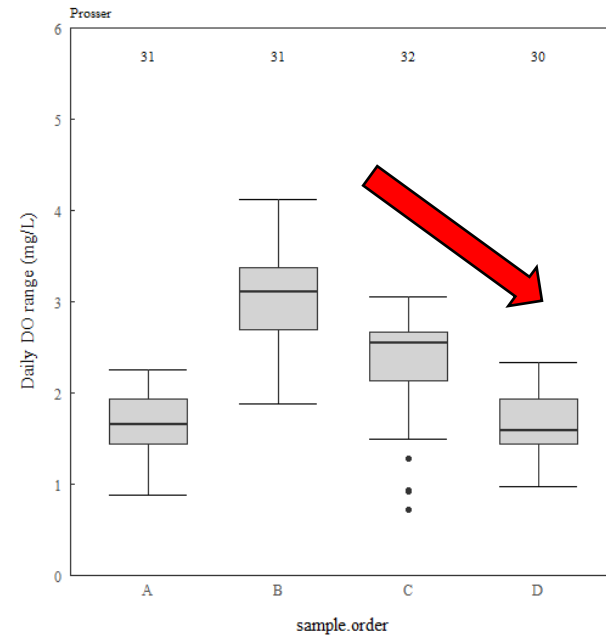
Stargrass Biomass and WQ

Prosser

WSG



DO



Sample order – Aug2018, June 2019, Aug2019, Sept2019

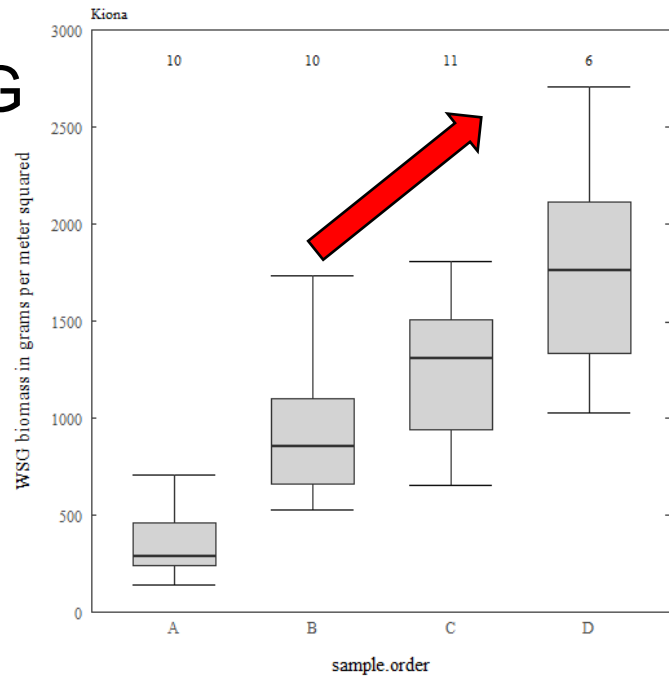


Preliminary Data – Subject to Revision

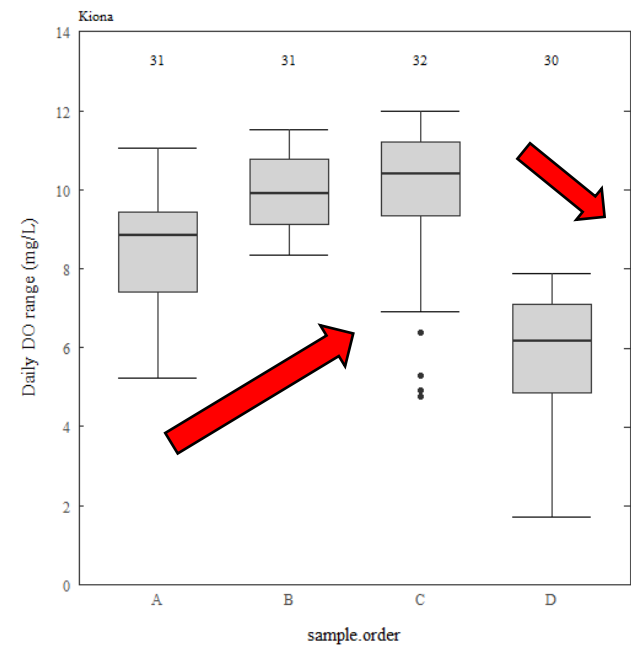
Stargrass Biomass and WQ

Kiona

WSG



DO



Sample order – Aug2018, June 2019, Aug2019, Sept2019

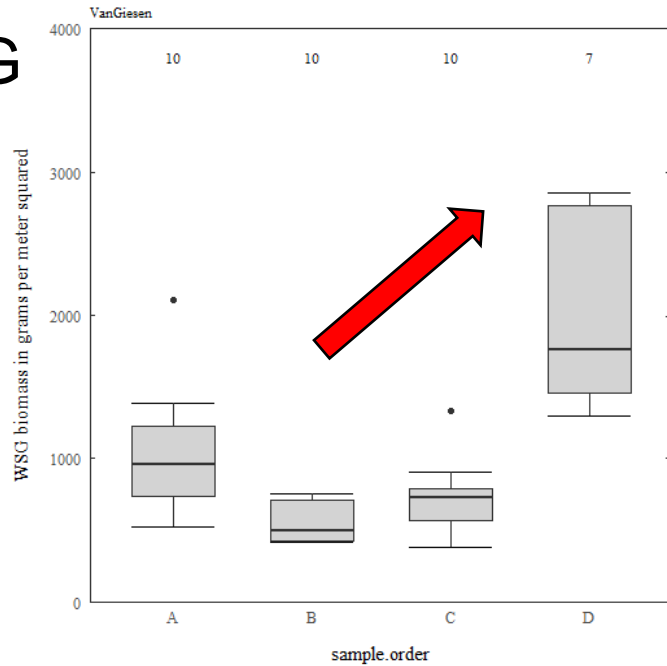


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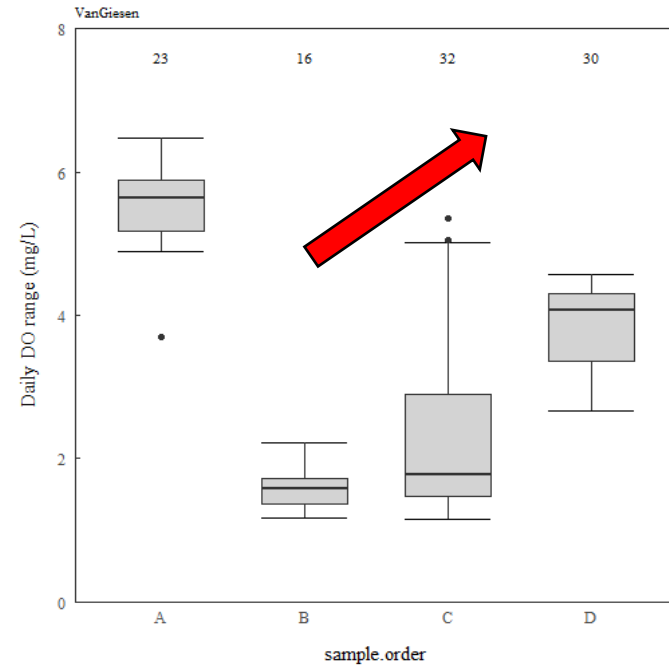
Stargrass Biomass and DO range

VanGiesen

WSG



DO



Sample order – Aug2018, June 2019, Aug2019, Sept2019



Preliminary Data – Subject to Revision

Stargrass biomass and water quality

- At all sites, we see increase in biomass over the growing season
- DO range increased with biomass most clearly at Van Giesen

Stargrass - other physical observations

- **Prosser** - deep, slow velocity, large plants
- **Kiona** – fast flowing, mid-range depths, big plants on margins of channel
- **Van Giesen** – fast flowing, shallow, much smaller plants

Hydrology is influencing the amount and size of plants we see

Final Tasks

- Investigate correlations between WQ parameters and biomass, including PAR, and water depth/scour
- Investigate metabolism relationships
- USGS Scientific Investigation Report - Spring 2022

Acknowledgements

- Centennial Grant – Department of Ecology
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- Julia David, USGS

