



# Mapping Upstream and Downstream Temperature Differences Of Beaver Dam Complexes in The Umpqua River Watershed, Oregon

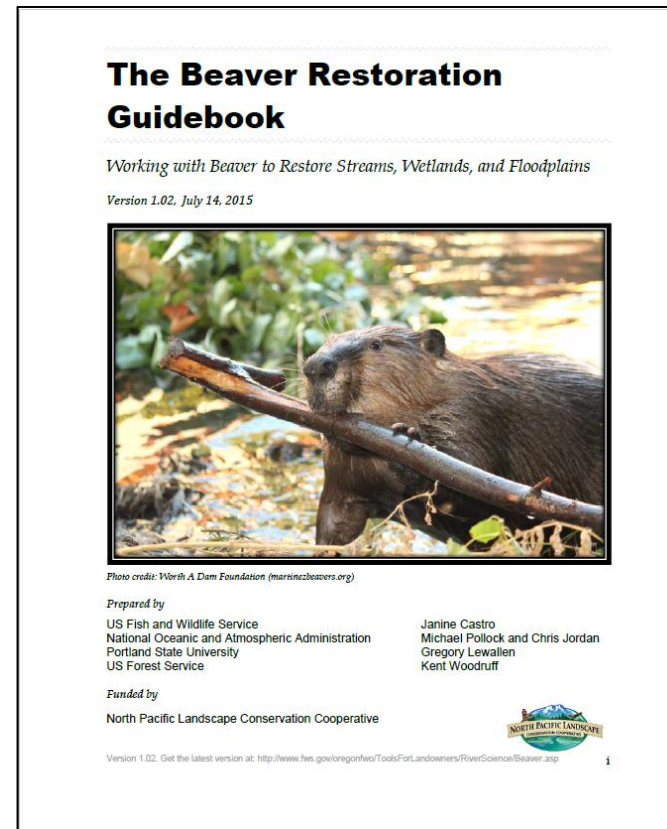
PNW DEWS Drought and Climate  
Outlook Webinar

John Stevenson,  
PhD Candidate, Oregon State University

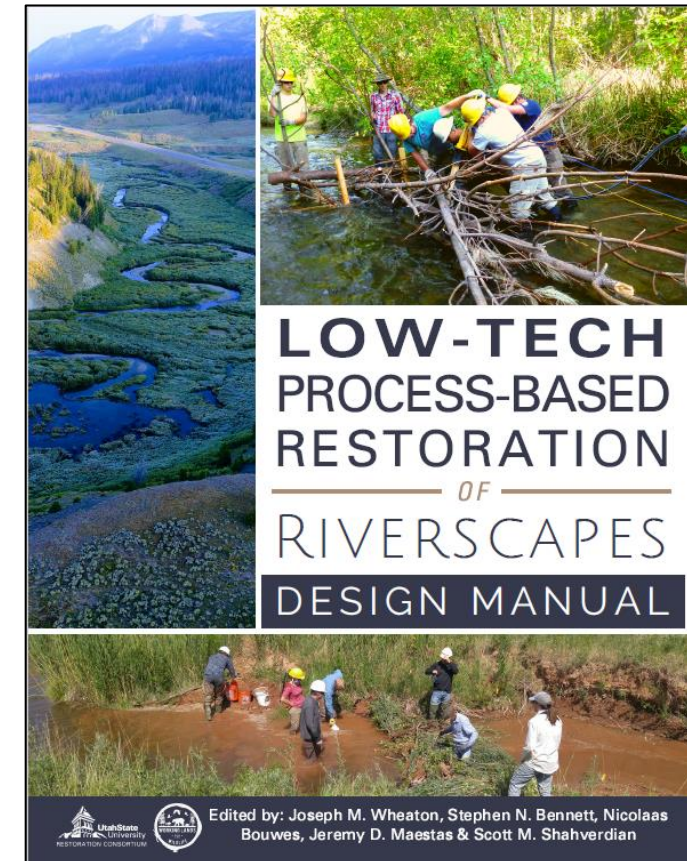
Dr. Jason Dunham, USGS FRES  
Dr. Jimmy Taylor, USDA NWRC  
Dr. Steve Wondzell, USFS PNW Research Station



# Beaver-Related Restoration (aka BRR)



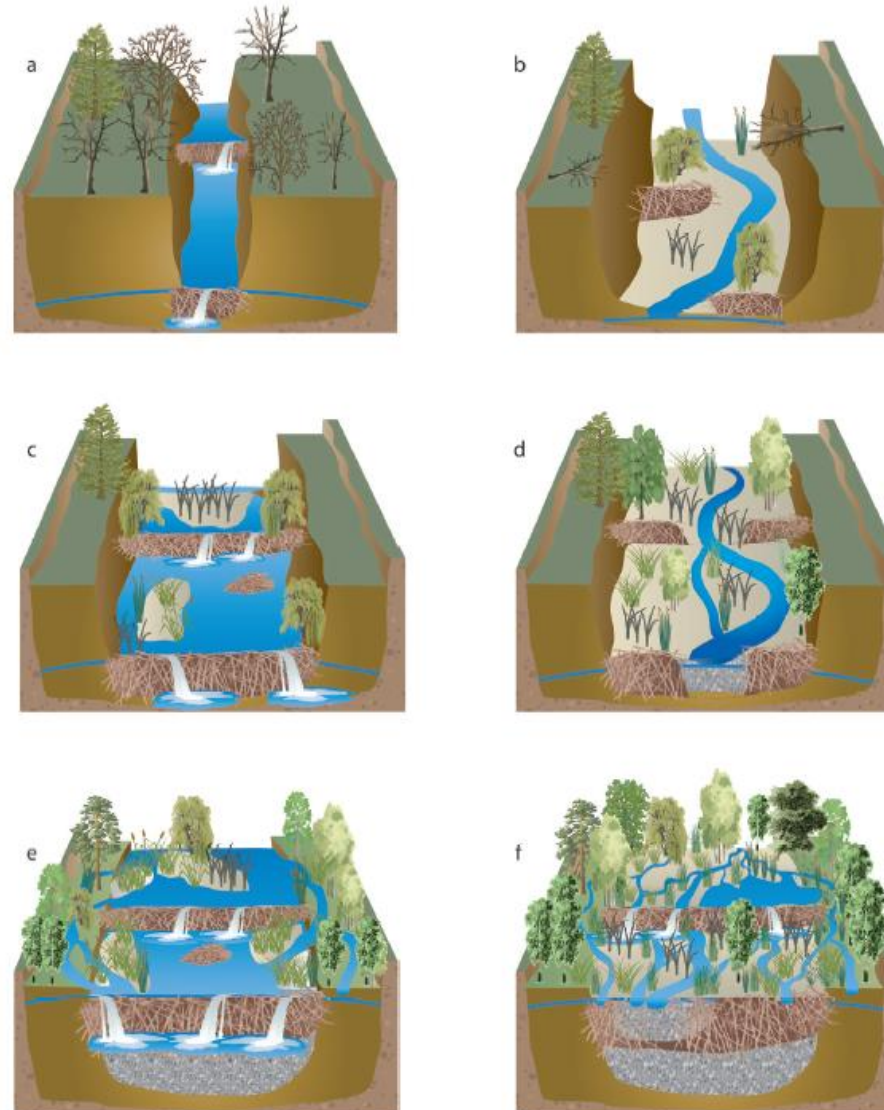
Pollock et al, 2015



Wheaton et al, 2019

## BRR Background

# Using beaver to accelerate morphology in degraded streams



Beavers as mediators for  
'Stage 0' stream evolution:

1. Unconfined multithread channels
2. Strong surface/ground water exchanges

## BRR Expectations



BRR  
Background

Water  
supply

- Increase late season flow
- Attenuated peak flows
- Increase habitat area/complexity
- Increased wetland area
- Increased groundwater recharge

Water  
quality

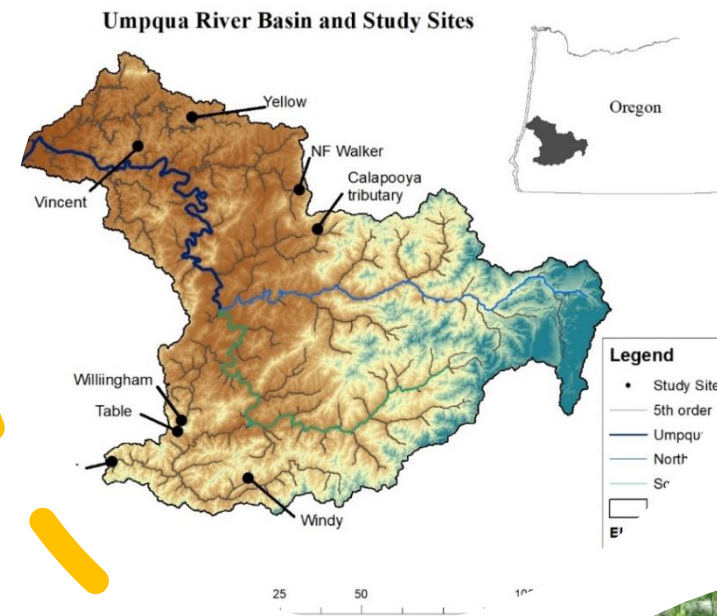
- Sediment retention
- Temperature moderation
- Nutrient cycling



# Water Quality Monitoring

## Research Questions:

- 1) How are beaver dam complexes influencing downstream temperature?
- 2) How far downstream do those changes persist below the dam complex?
- 3) Characterize late season dissolved oxygen conditions



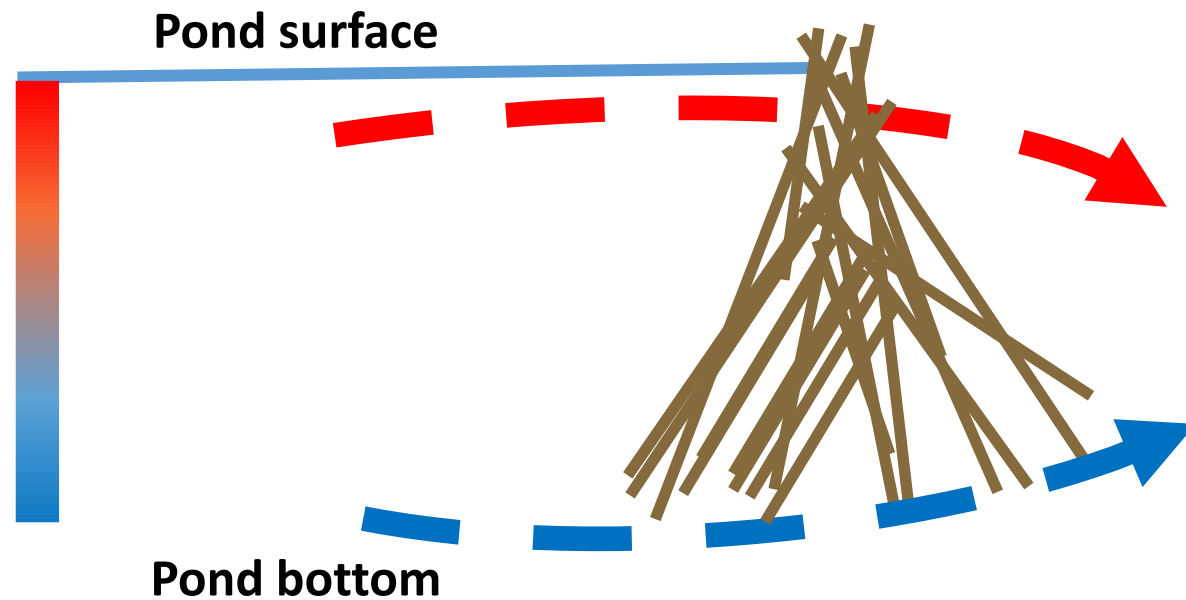


# Stream heat budgets are complex

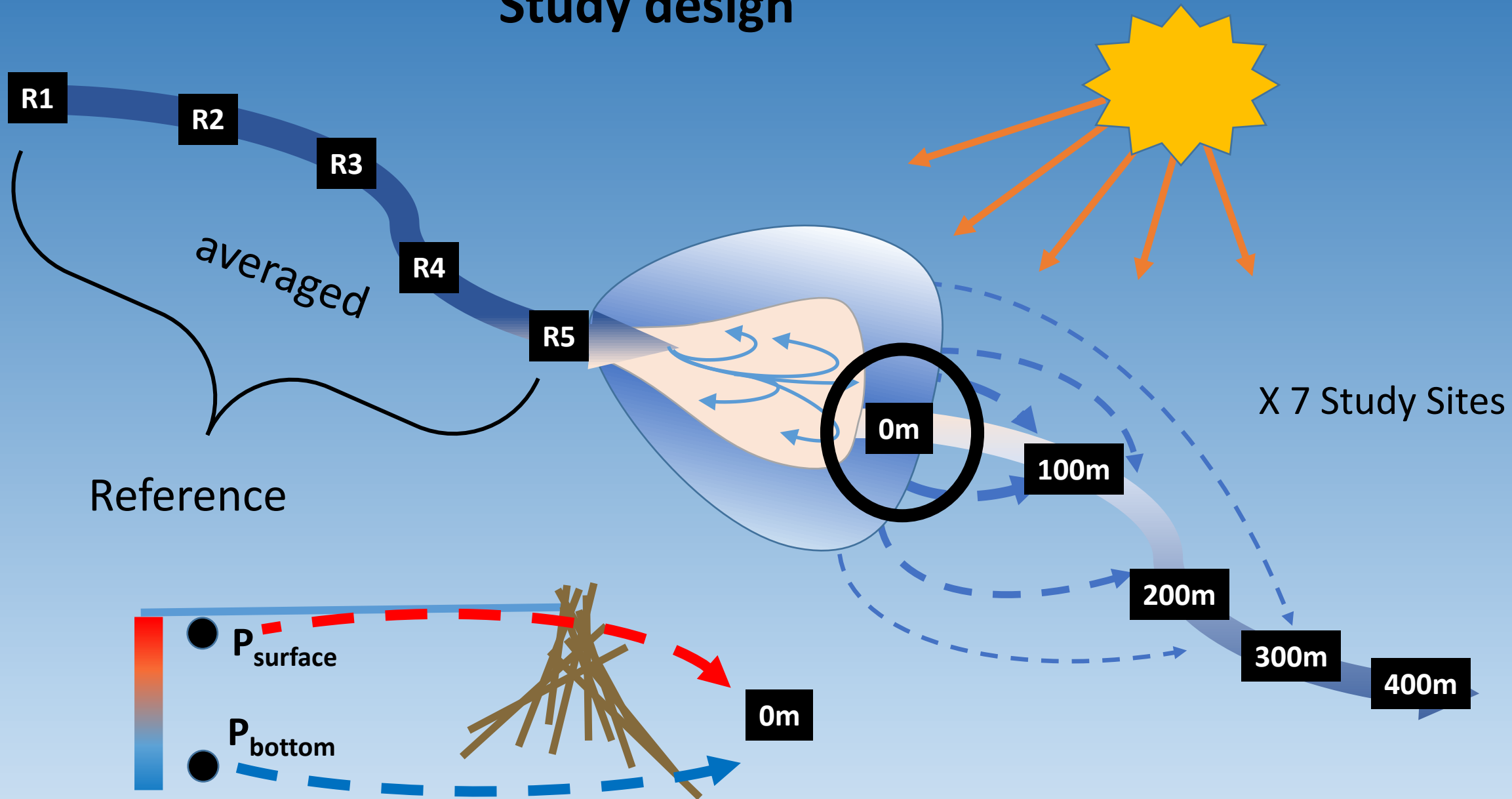


Credit: [Tom Kelly](#)

*Where does downstream water come from?*

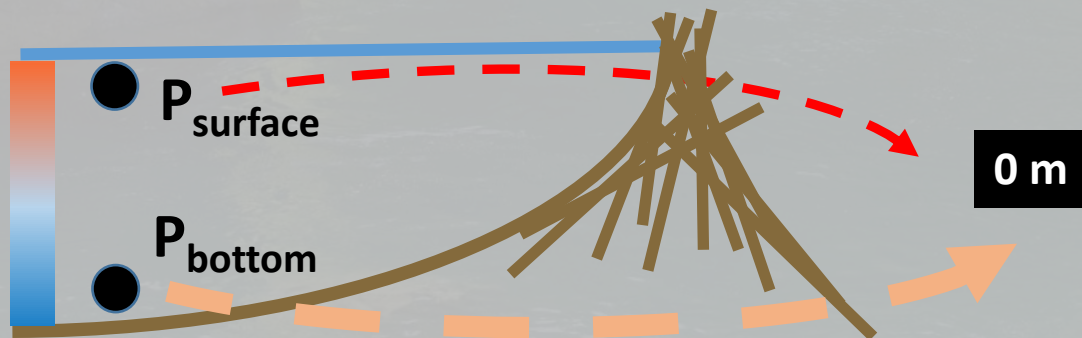


# Study design

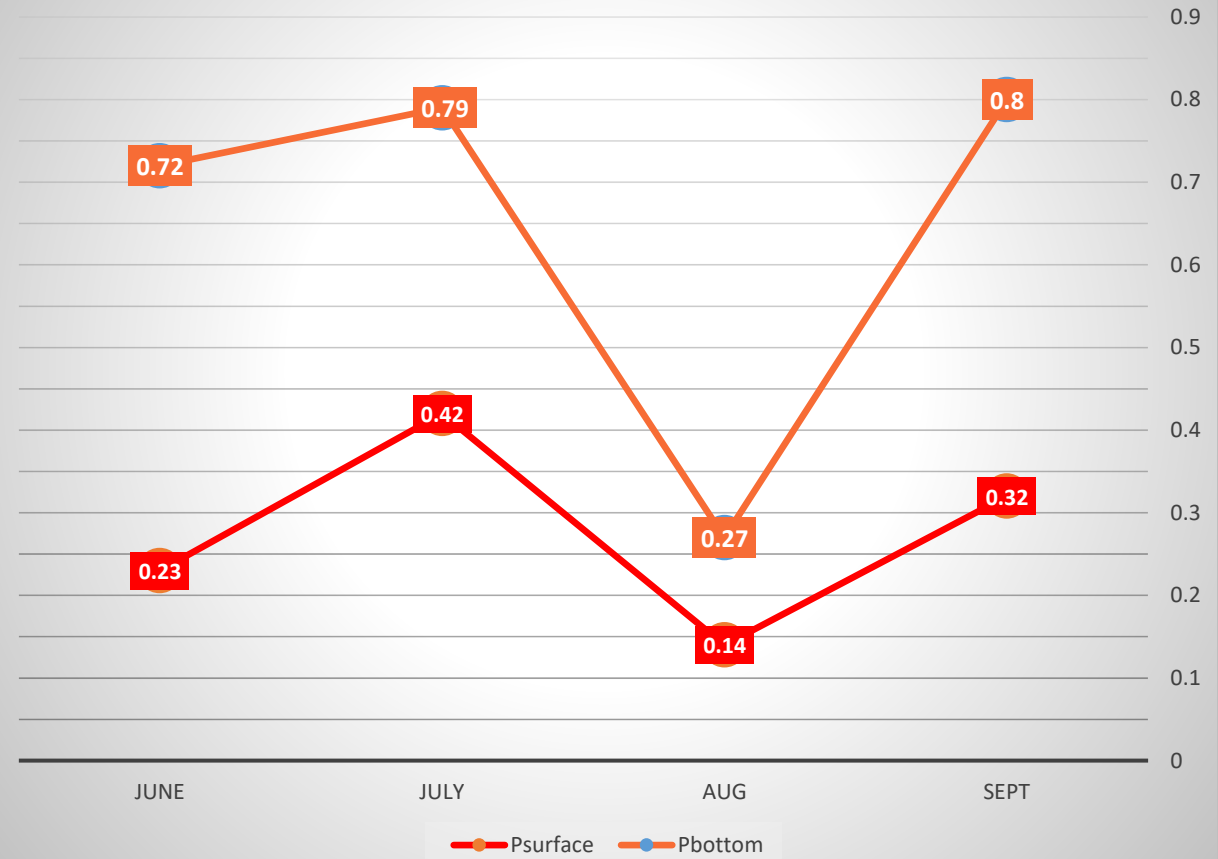




Is downstream  
temperature responding to  
pond surfaces or bottoms?



Portion of downstream temperature variation  
explained by pond surface or bottom temperature





# Conclusions



## Results:

- Warming below beaver dams, especially June and July
- Heating signal was localized
- Warming appears driven by heated water from pond bottoms

## Concluding thoughts

- Our findings are consistent with other studies
- 'Success' of BRR depends goals & site level processes

# Acknowledgements





# Questions?

