

Alsea Watershed Study Revisited: Hydrologic Response to First Harvest

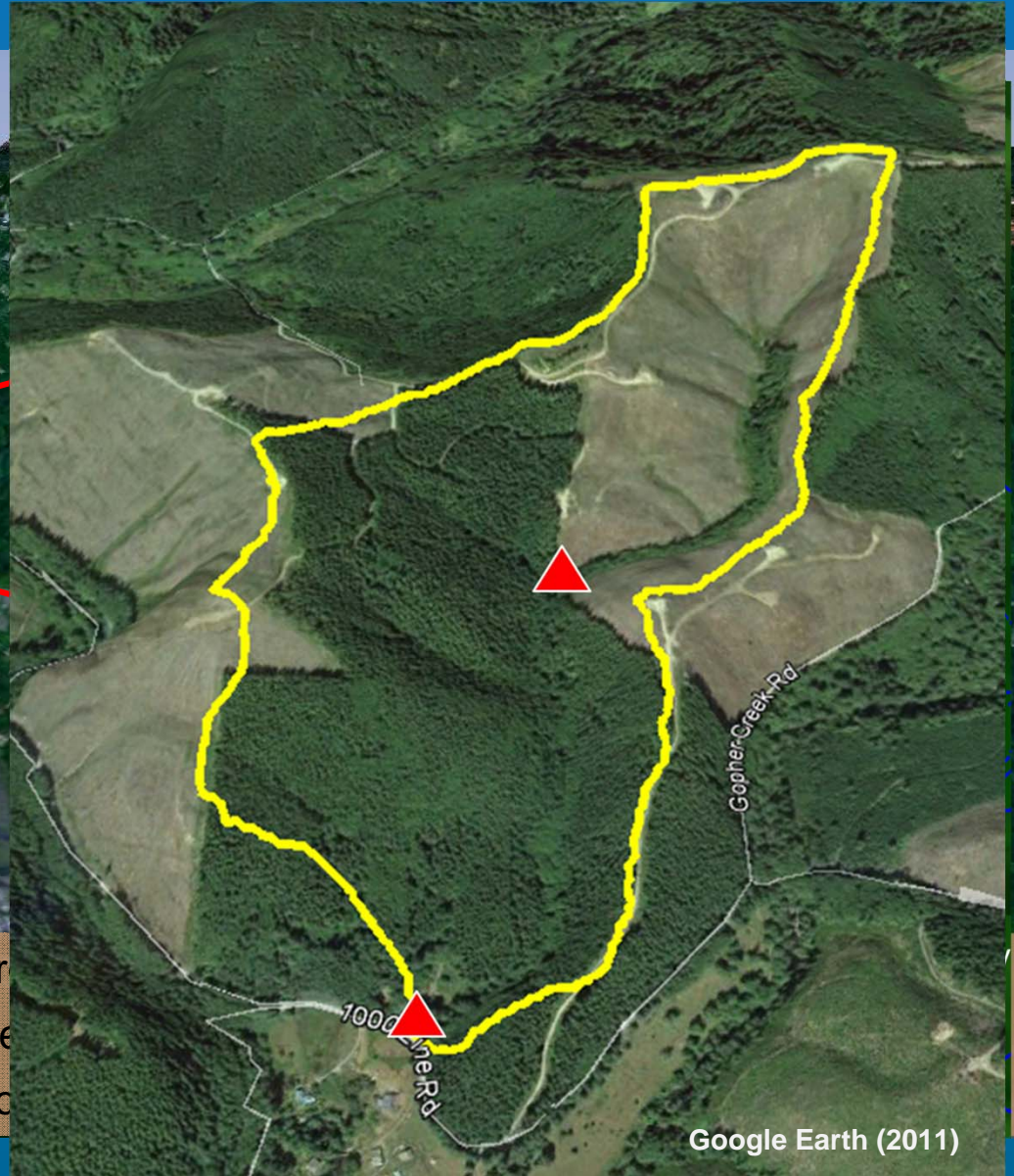
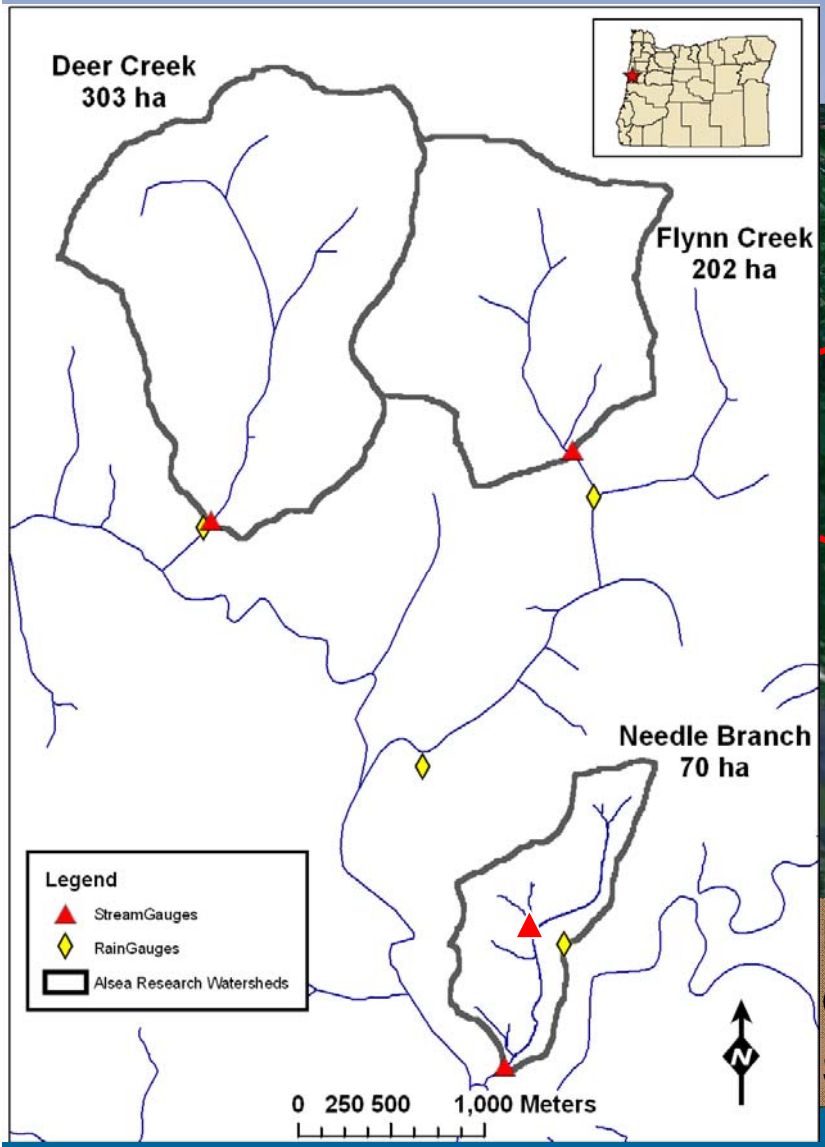
Cody Hale, George Ice, John Stednick,
Jeff Light, and Nicolas Zegre

Watersheds Research Cooperative
Paired Watershed Conference

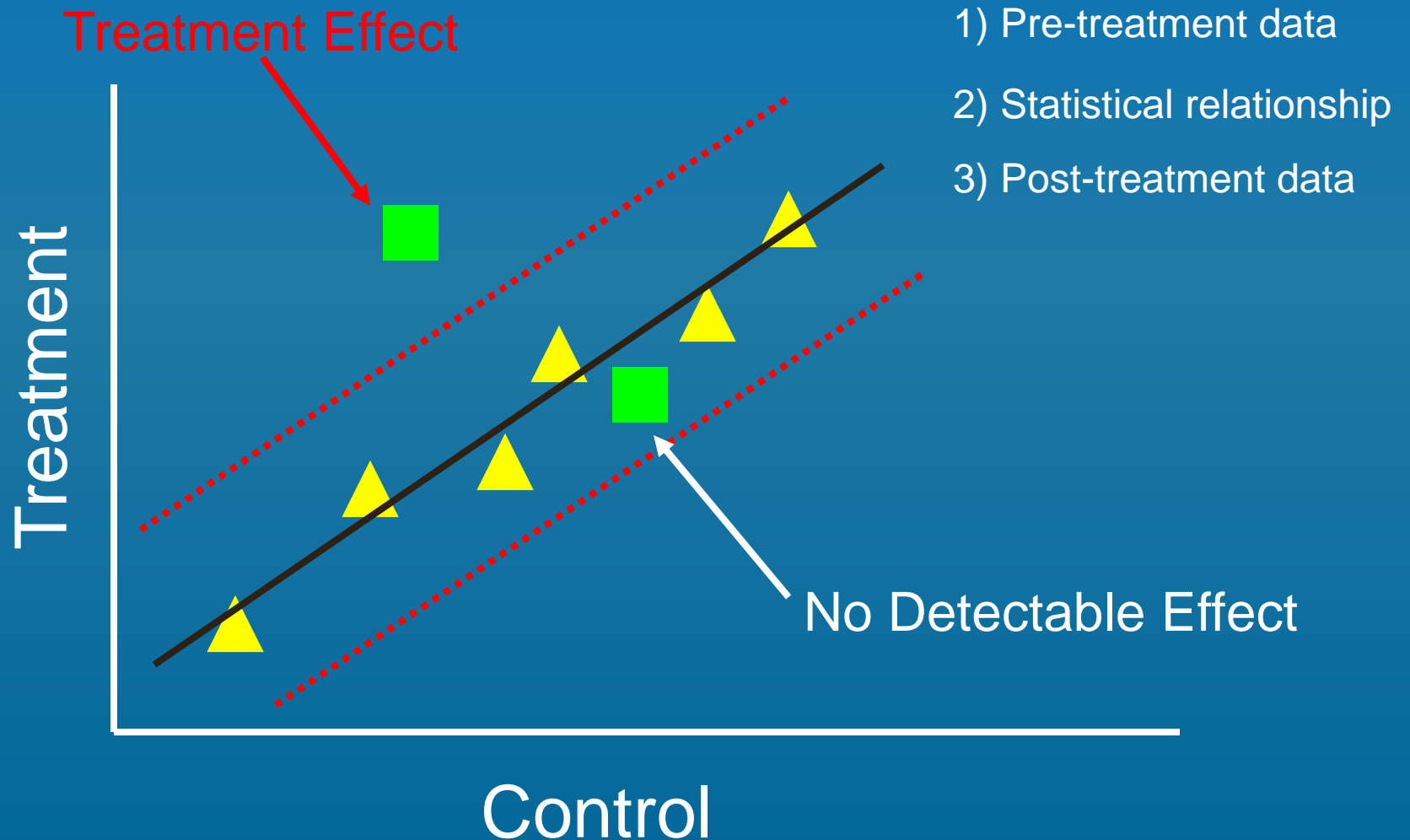
Oregon State University
April 18, 2013



Alesa Research Catchments



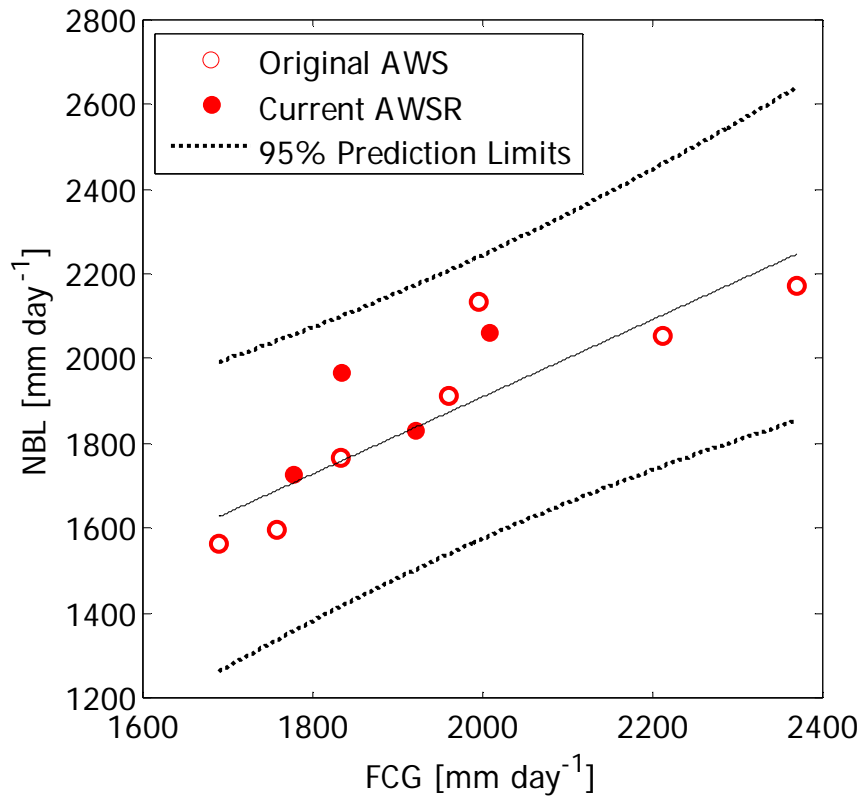
Traditional Paired Watershed Approach



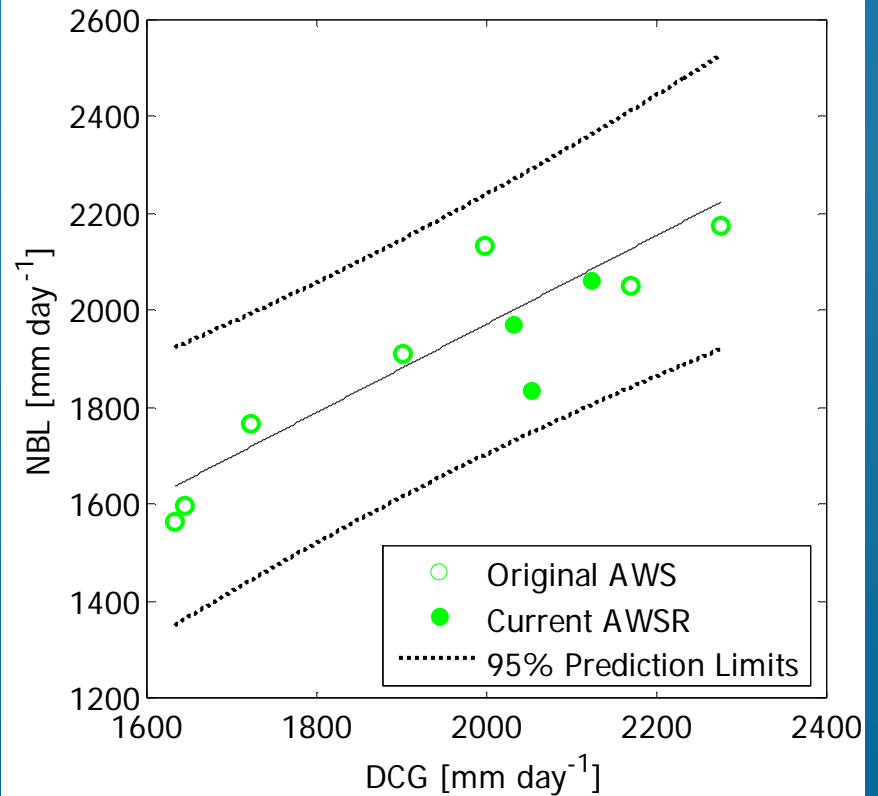
Long-term Recovery:

Pre-treatment to Pre-treatment Annual Streamflow Totals

Lower Needle Branch
v/s
Flynn (Historic Control)

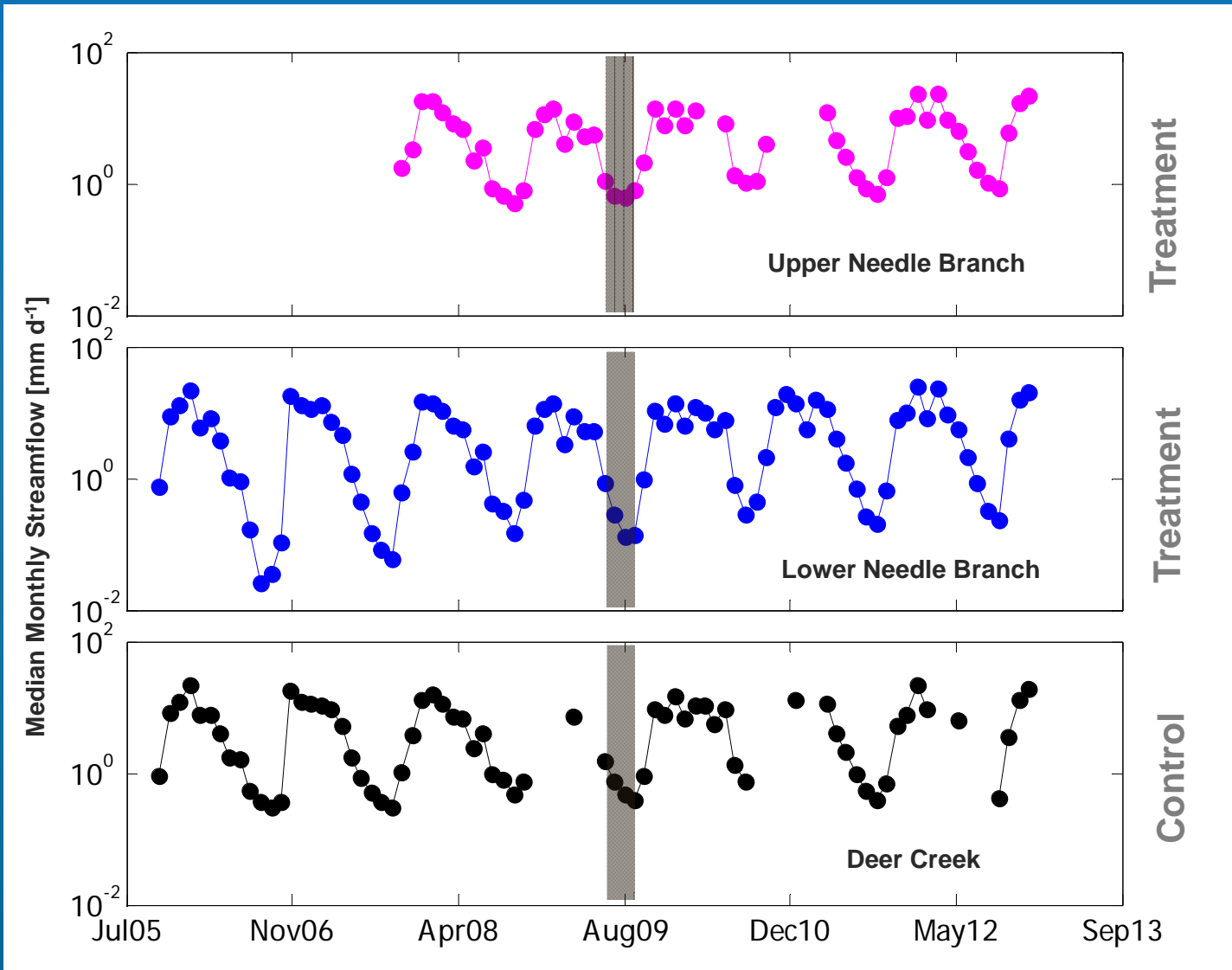


Lower Needle Branch
v/s
Deer (Current Control)



Median Monthly Flow Series

Alea Watershed Study Revisited (Oct 2005 – Dec 2012)



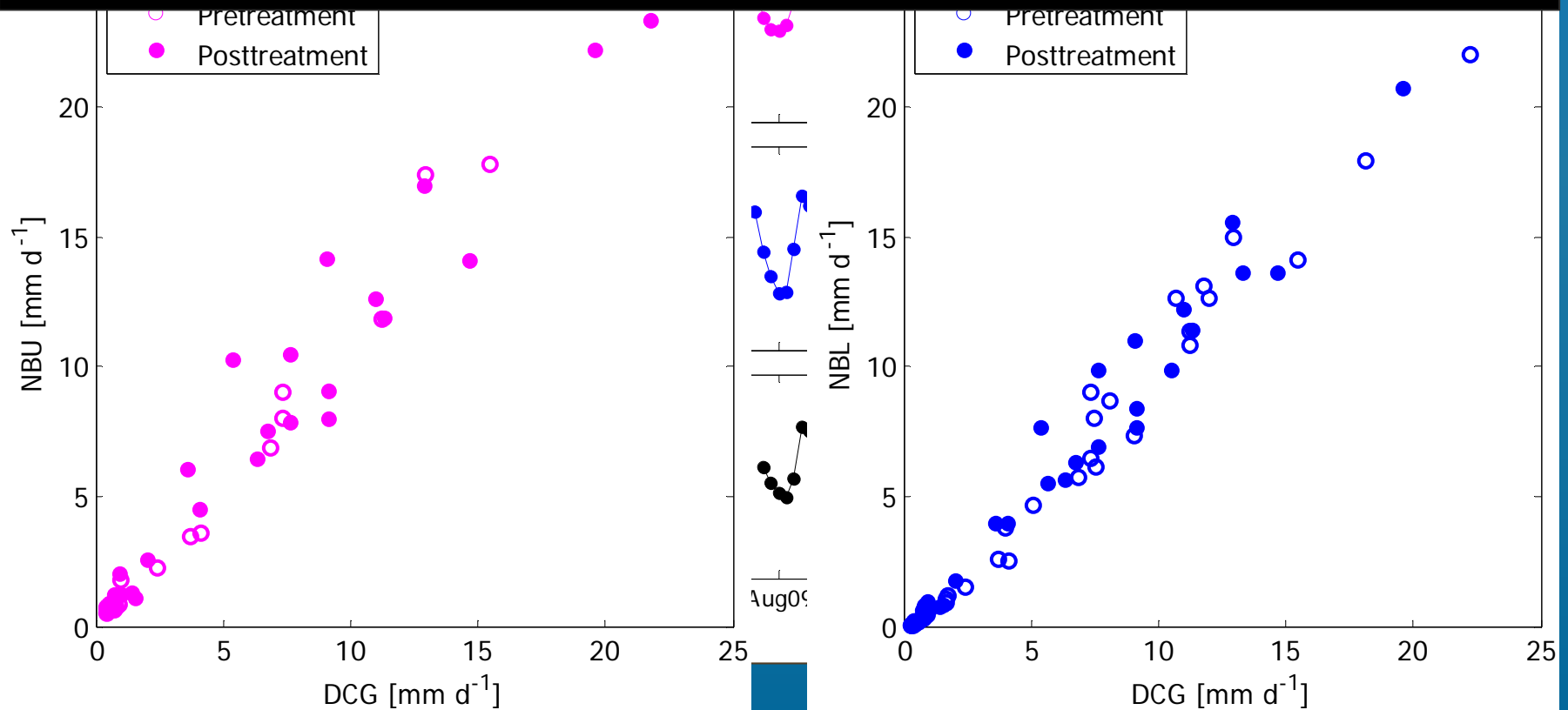
MONTHLY ANALYSIS

Need to deal with heteroscedasticity → log transform treatment and control

Need to account for periodicity → add sine and cosine terms

Borderline serial autocorrelation at 1 month lag → ignore for now

= Multiple Ordinary Least Square Regression

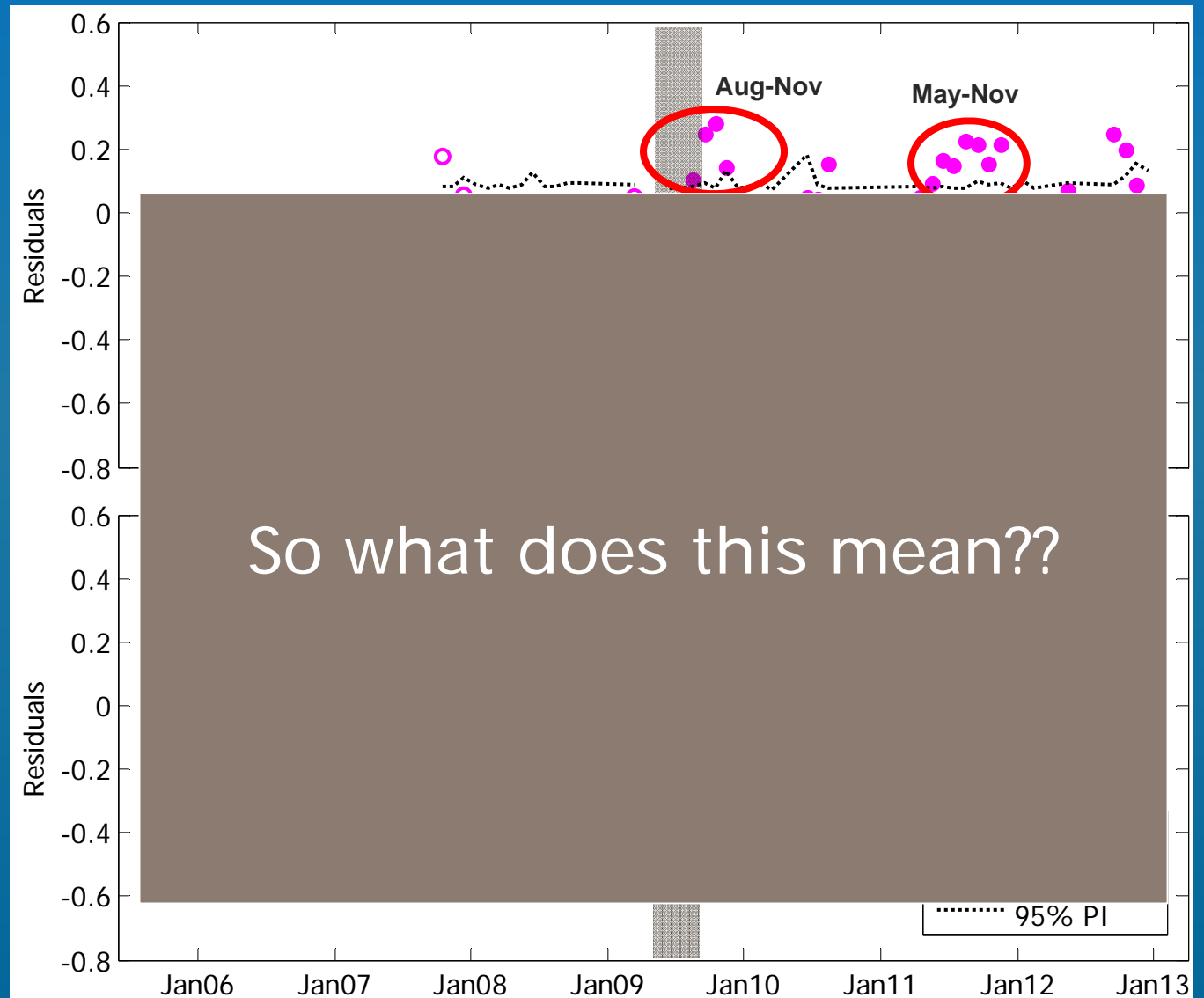


Treatment Effects?: Median Monthly Streamflow

Upper
Needle Branch
(NBU)



Lower
Needle Branch
(NBL)



Absolute Change:

^a
no pattern for wettest months

largest increases in transition months

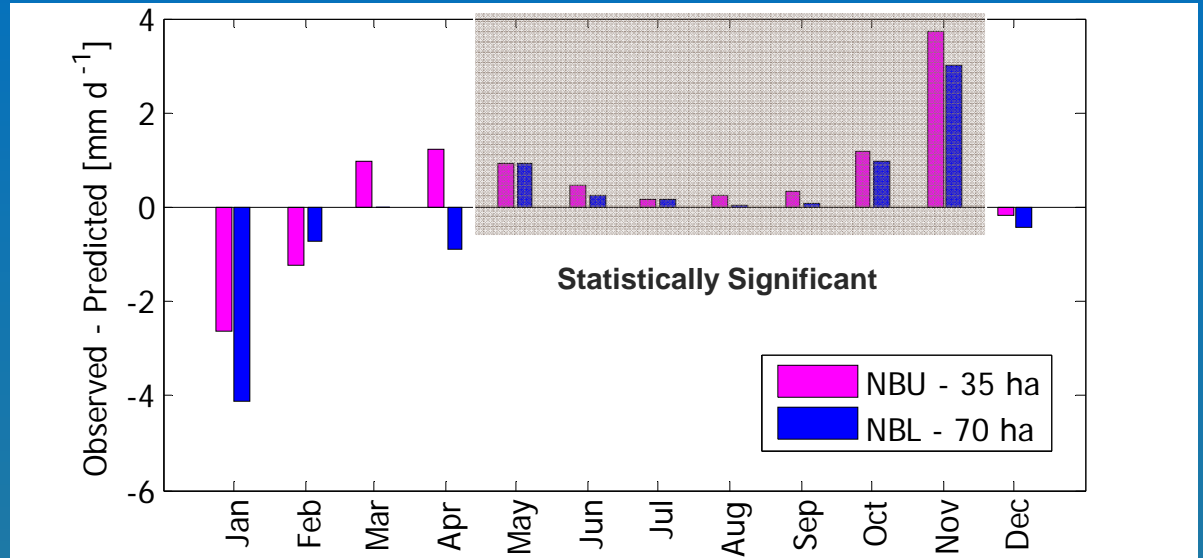
upstream/downstream behave similarly

Relative Change:

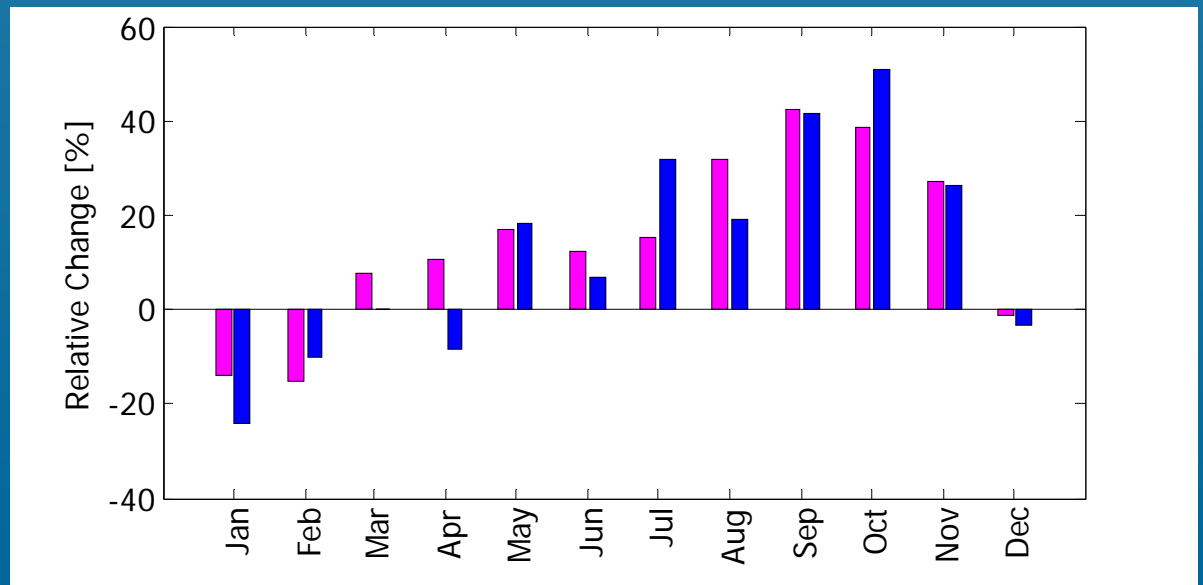
^a
largest increases from late-summer through early-fall

January deviation not as large as it previously appeared

Mean(Observed – Predicted)



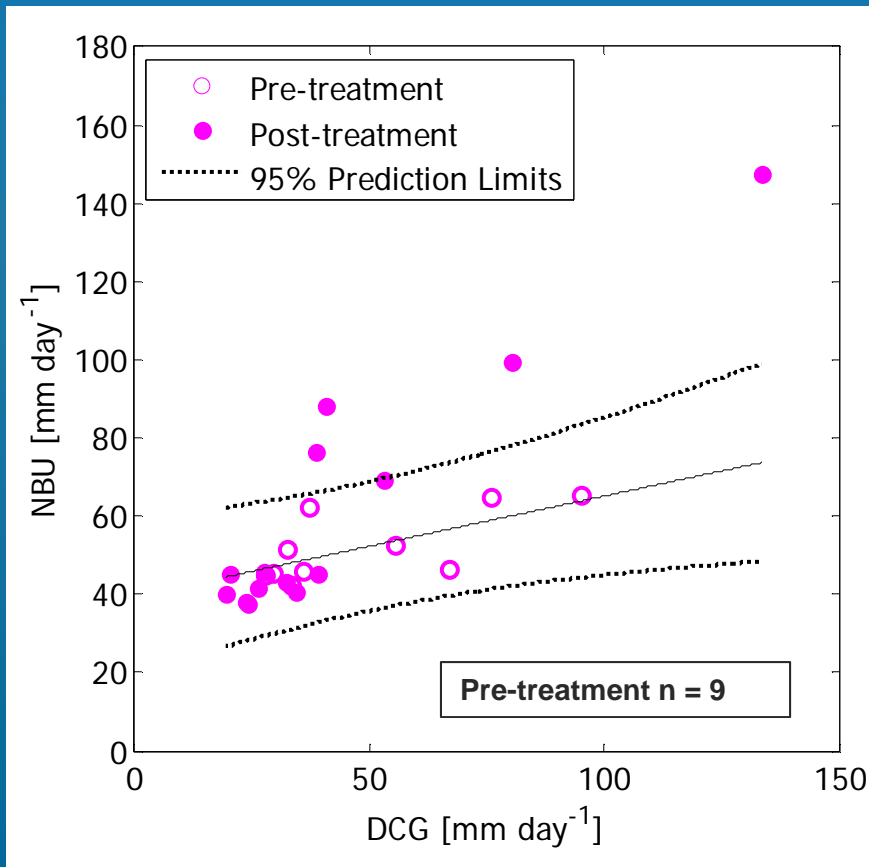
Mean(Observed – Predicted)/Mean(Observed)*100



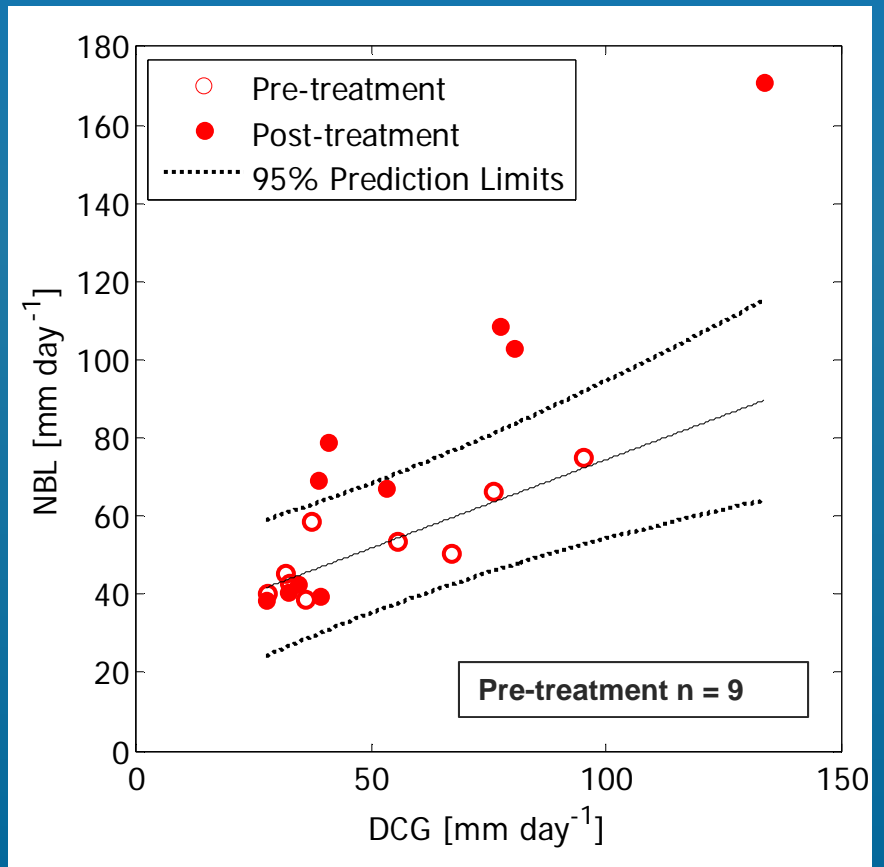
Treatment Effects?: Peak Flows

Discrete peaks greater than 37 mm day^{-1} (equivalent to 98th flow percentile)

Upper Needle Branch



Lower Needle Branch



Results Summary

- Total annual flow at Lower Needle Branch has recovered from original AWS harvest effects
- Deer Creek is a suitable control for the current study
- Upper and Lower Needle Branch responded similarly
 - Increase in median monthly streamflow for summer and fall months
 - Largest increase in fall wet-up months
- Peak flows increase for peaks greater than 60 mm day⁻¹

What's Next?

- Continue hydrologic analysis
 - incorporate AWS pre-treatment data
 - add 2013 data
 - check for influence of autocorrelation
 - utilize hydrologic model for change detection
- Suspended sediment analysis is in progress
- Publish first harvest results
- Get ready for second harvest in 2014