



Type N Stream-Associated Amphibian Response to Manipulation of Forest Canopy Shading

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Purpose of the Study

- 1) Assess the effects of shade reductions on Stream Breeding Amphibians (SAAs).
- 2) Determine if there is an optimum level of shade retention.
- 3) Identify potential causal mechanisms for any changes observed.



Not Effectiveness Monitoring

The study did not:

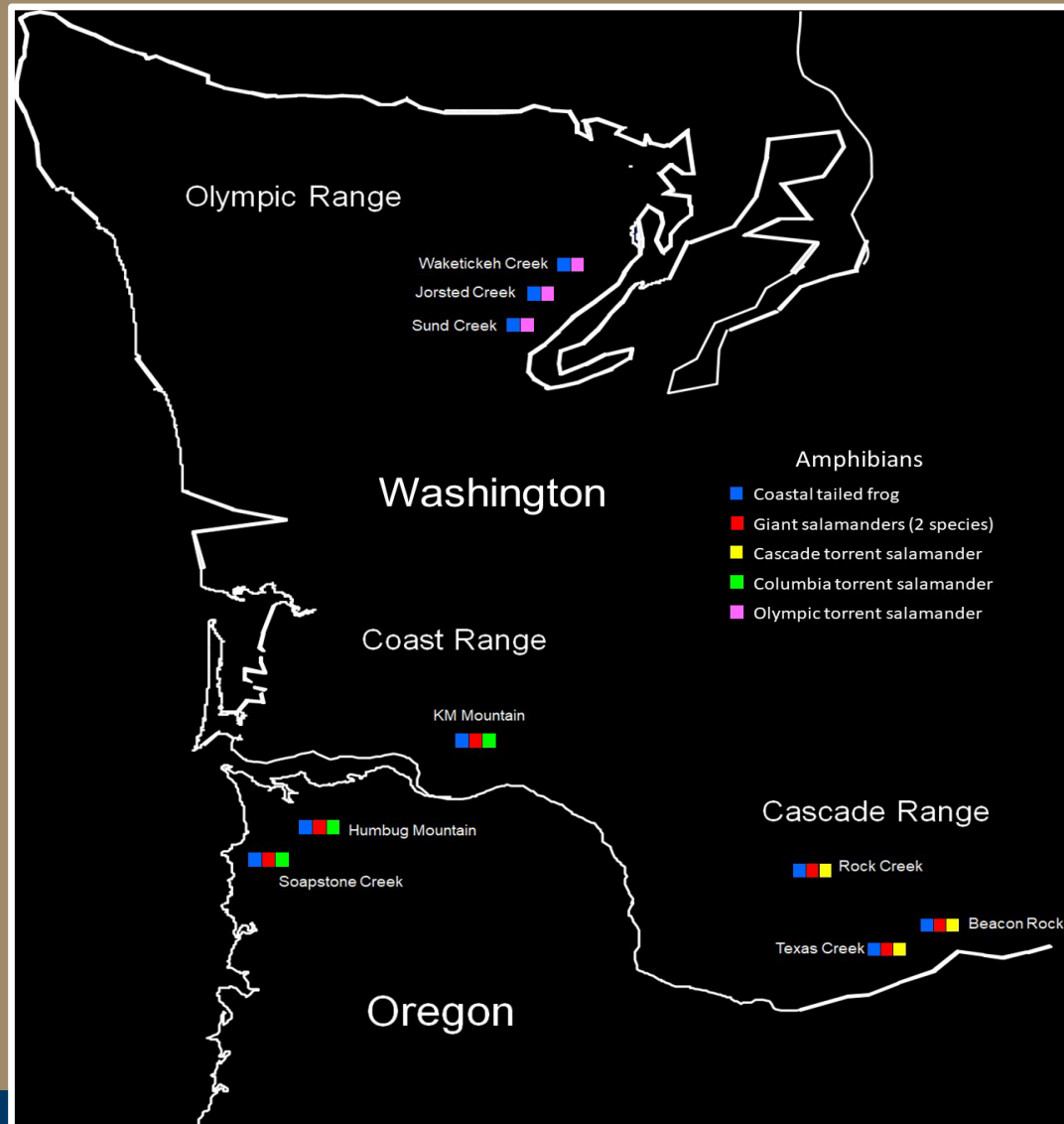
- **Test the Type Np prescriptions, or**
- **Apply the treatments at a spatial scale common for commercial harvests**

Thus the results can only indirectly inform the effectiveness of the rules.



Study Frame

25 Treatment Sites & 6 Focal Species

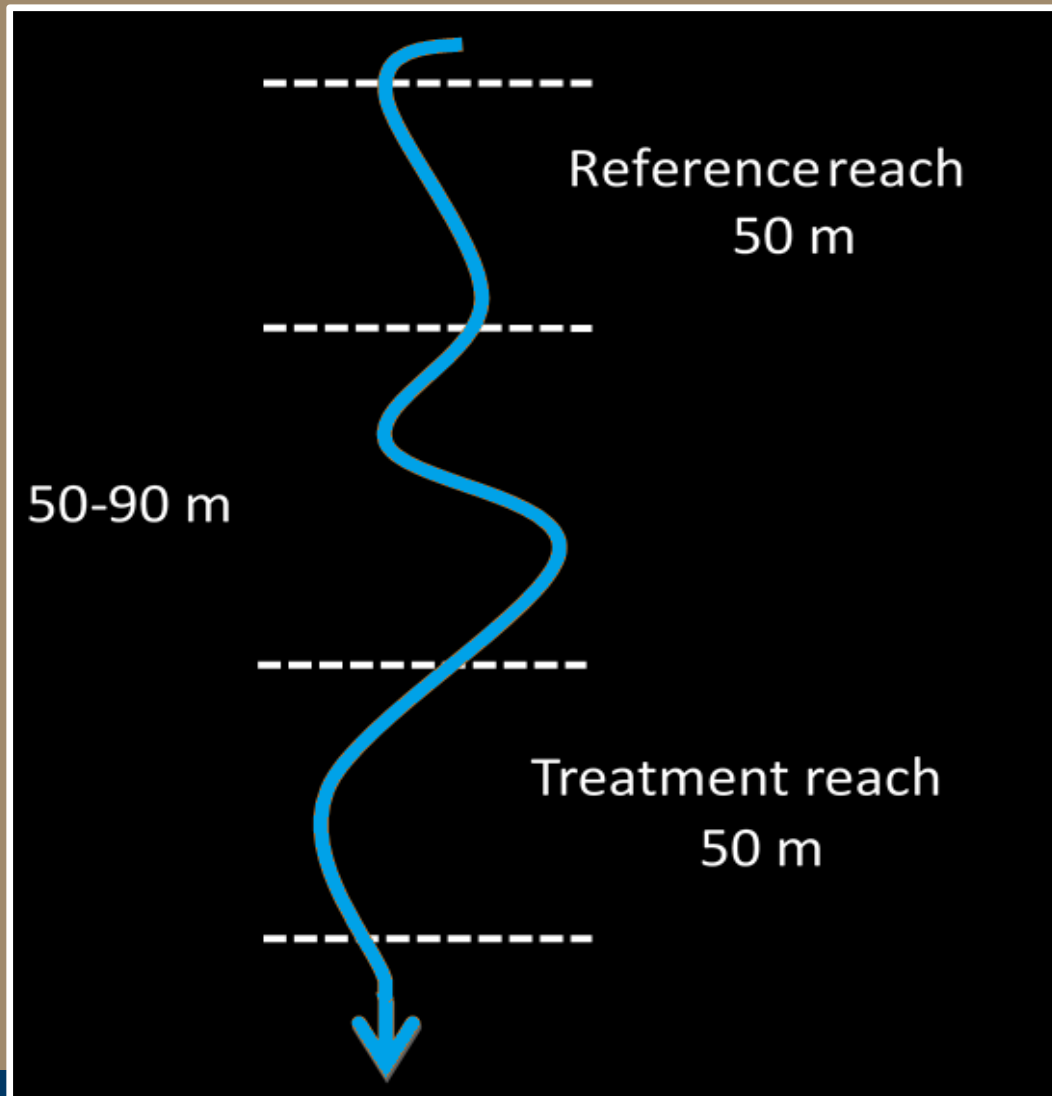


Variables Measured 2 Years Pre & 2 Post Treatment

1. **Vegetation Cover**
2. **Light** (photosynthetic active radiation)
3. **Water Temperature** (7DADMax, Ave DMax)
4. **Biofilm/Periphyton**
5. **Stream Drift:**
 - **Course and Fine Detritus**
 - **Macroinvertebrates** (gathers, collectors, shredders, predators)
6. **Amphibians** (abundance, body condition, growth)
 - **Coastal Tailed Frogs,**
 - **Coastal and Columbian Giant Salamanders,**
 - **Cascade, Olympic, and Columbian Torrent Salamanders**



Experimental Stream Configuration 50 meter Treatment Reaches



Tested 3 Shade Reduction Treatments Creating a Gradient of Shade

Shade Reduction Treatment	% Overhead Stream Cover Retained	Sample Size
“Intermediate”	77 (+/- 3)	8
“Low”	61 (+/- 3)	9
“No”	40 (+/- 4)	8
Reference	Un-manipulated	25



Treatment Example

Intermediate Shade Reduction

Olympic Block

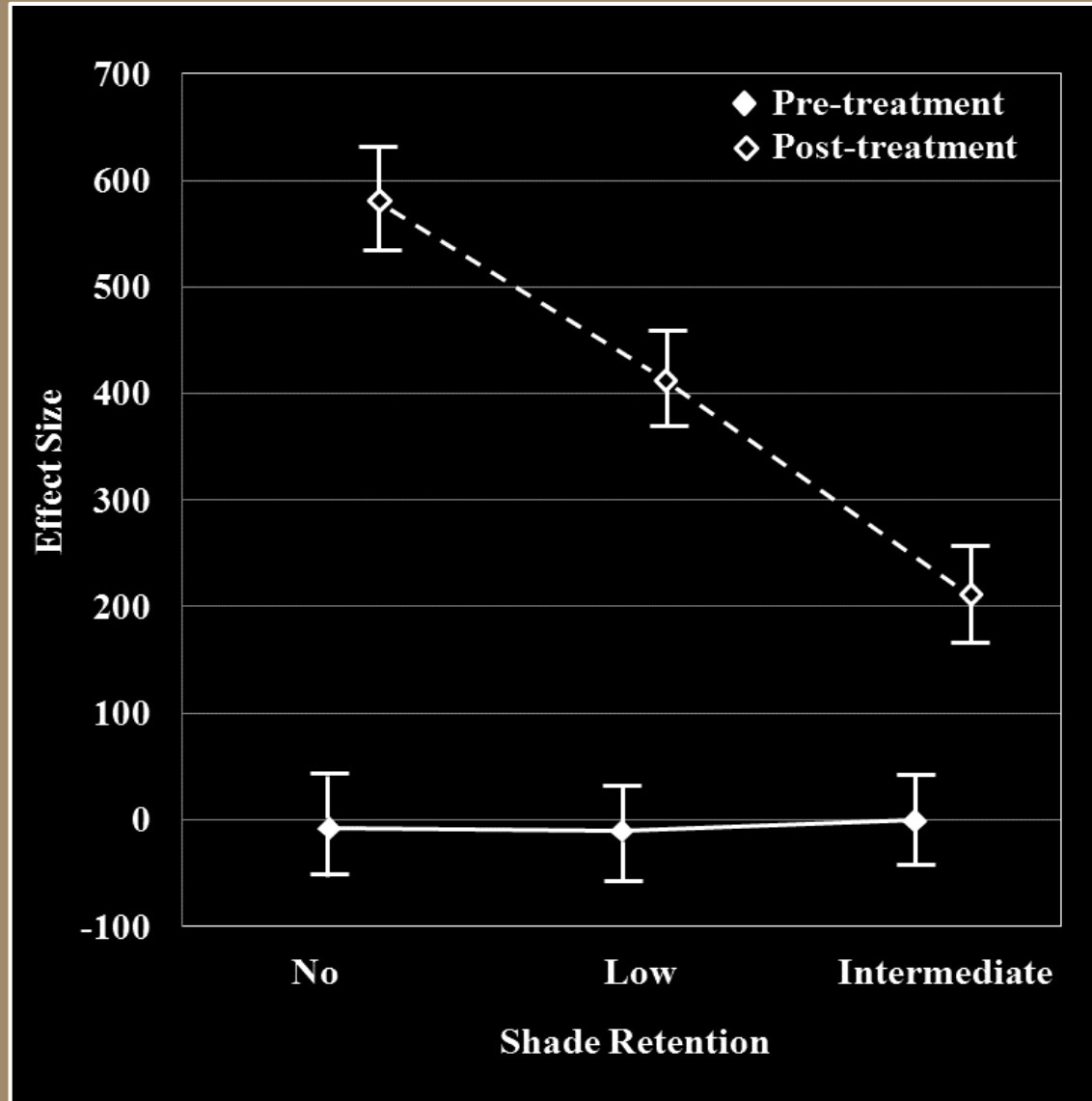


Pre-Harvest

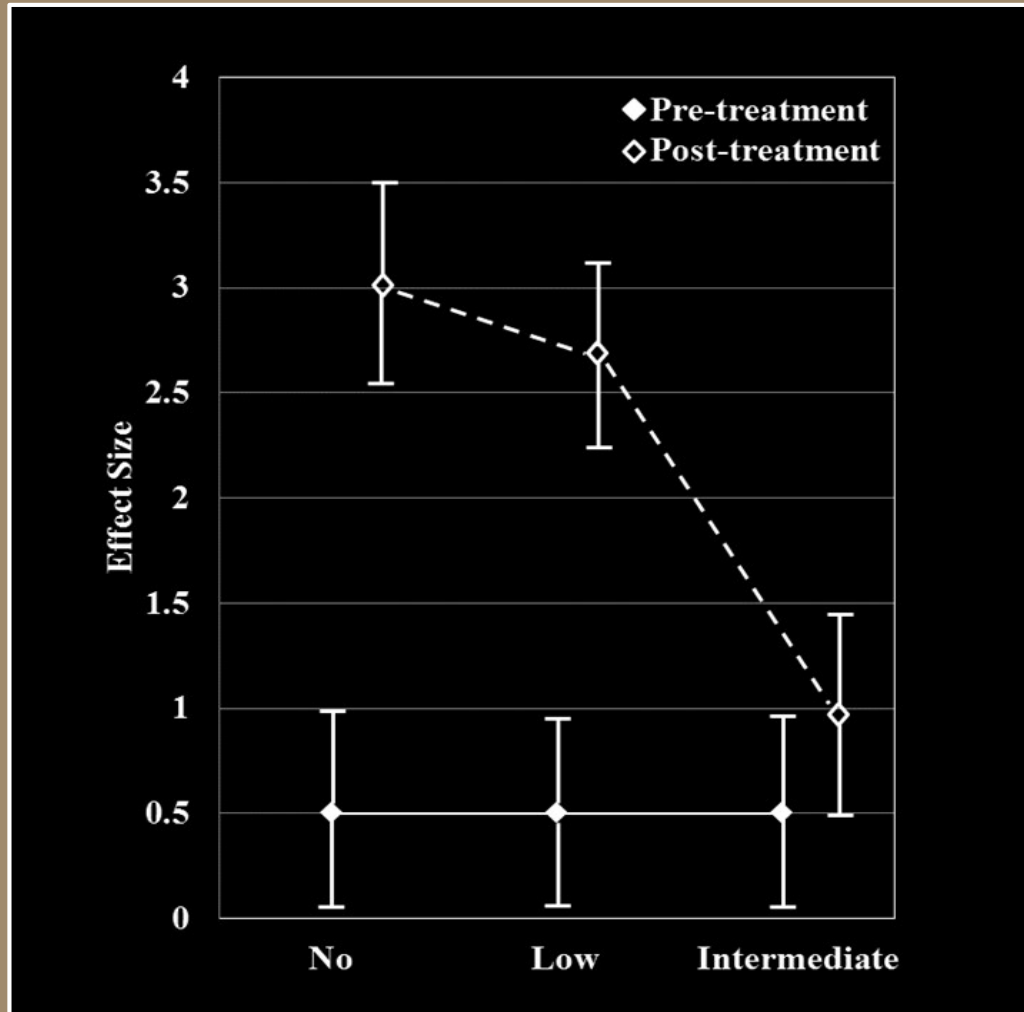
Post-Harvest



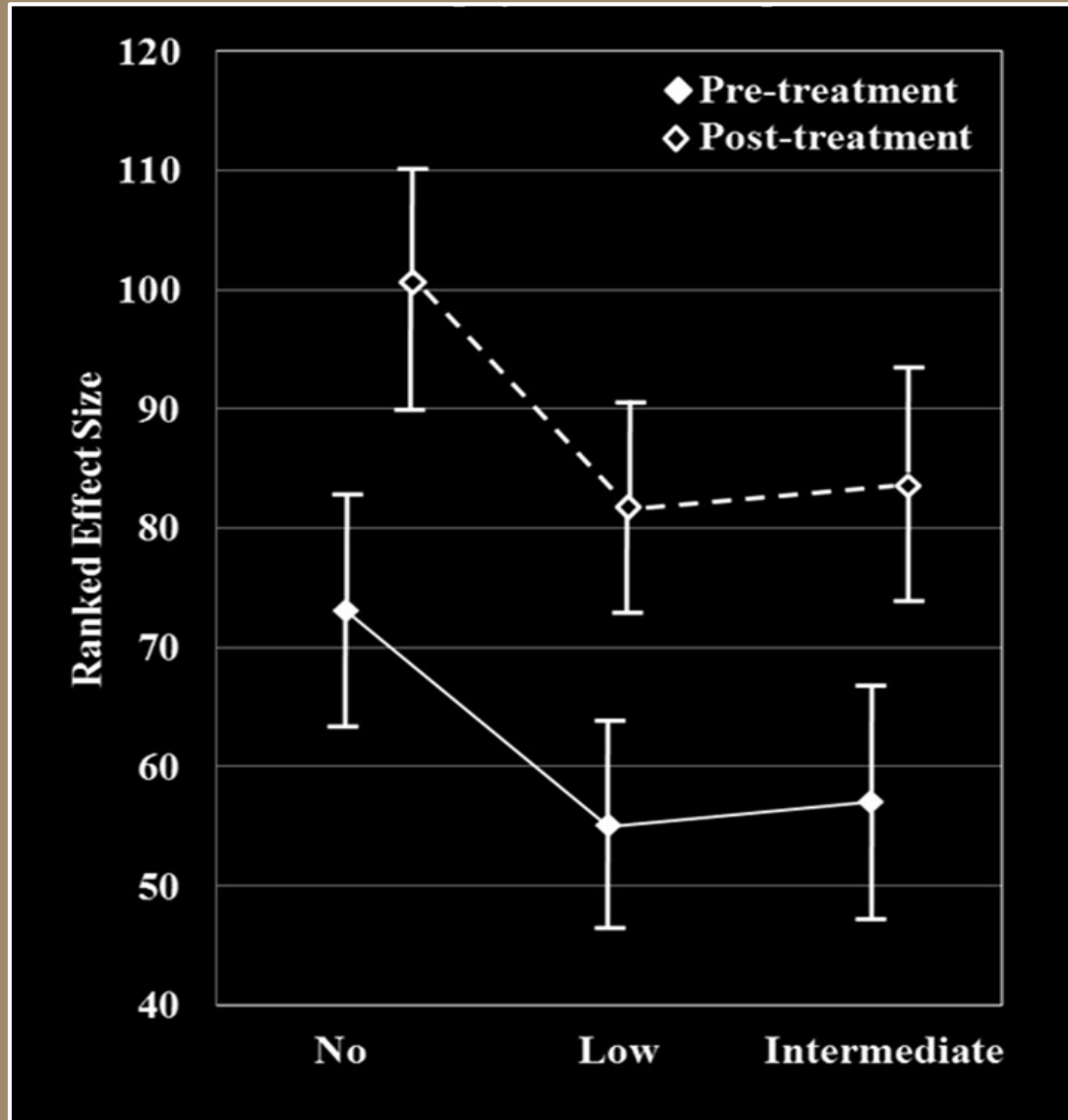
Created Strong Light Gradient



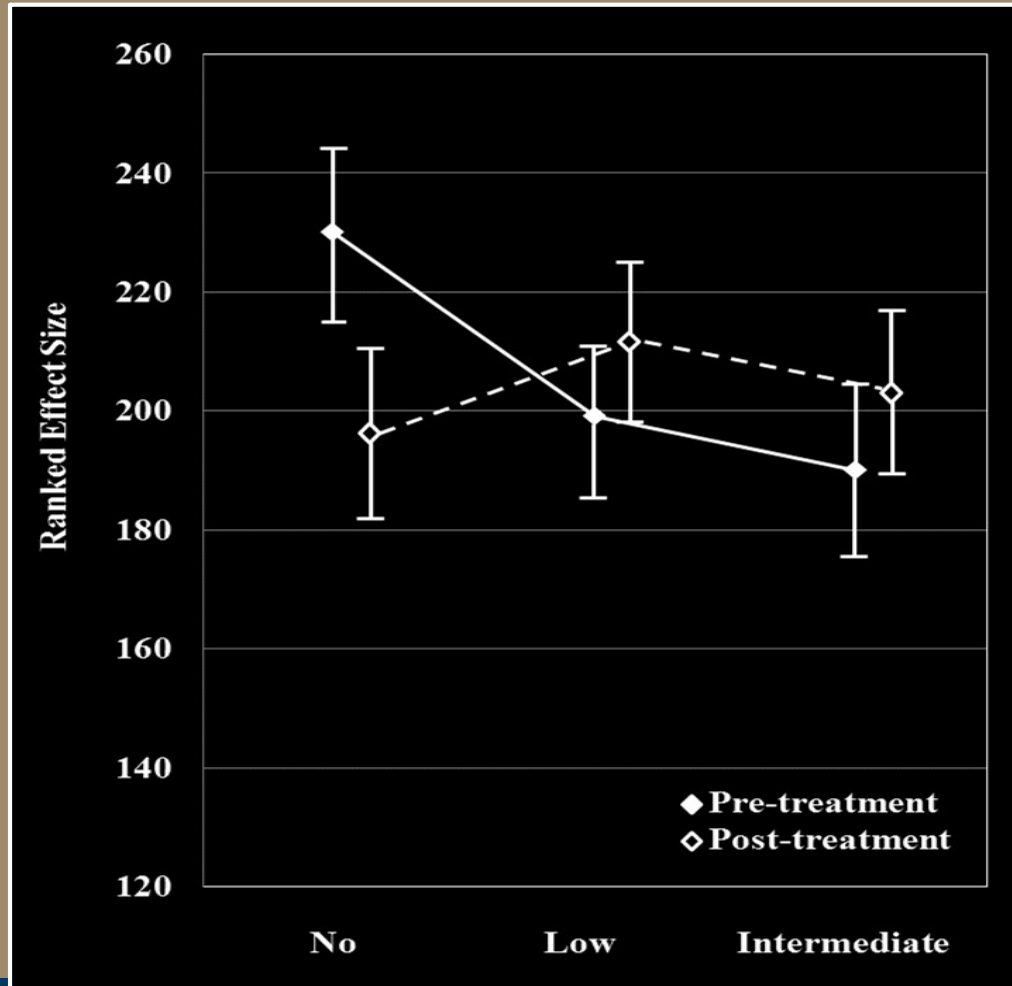
Water Temperature Increased Significantly in 2 of 3 Treatments (7-day Moving Average Maximum)



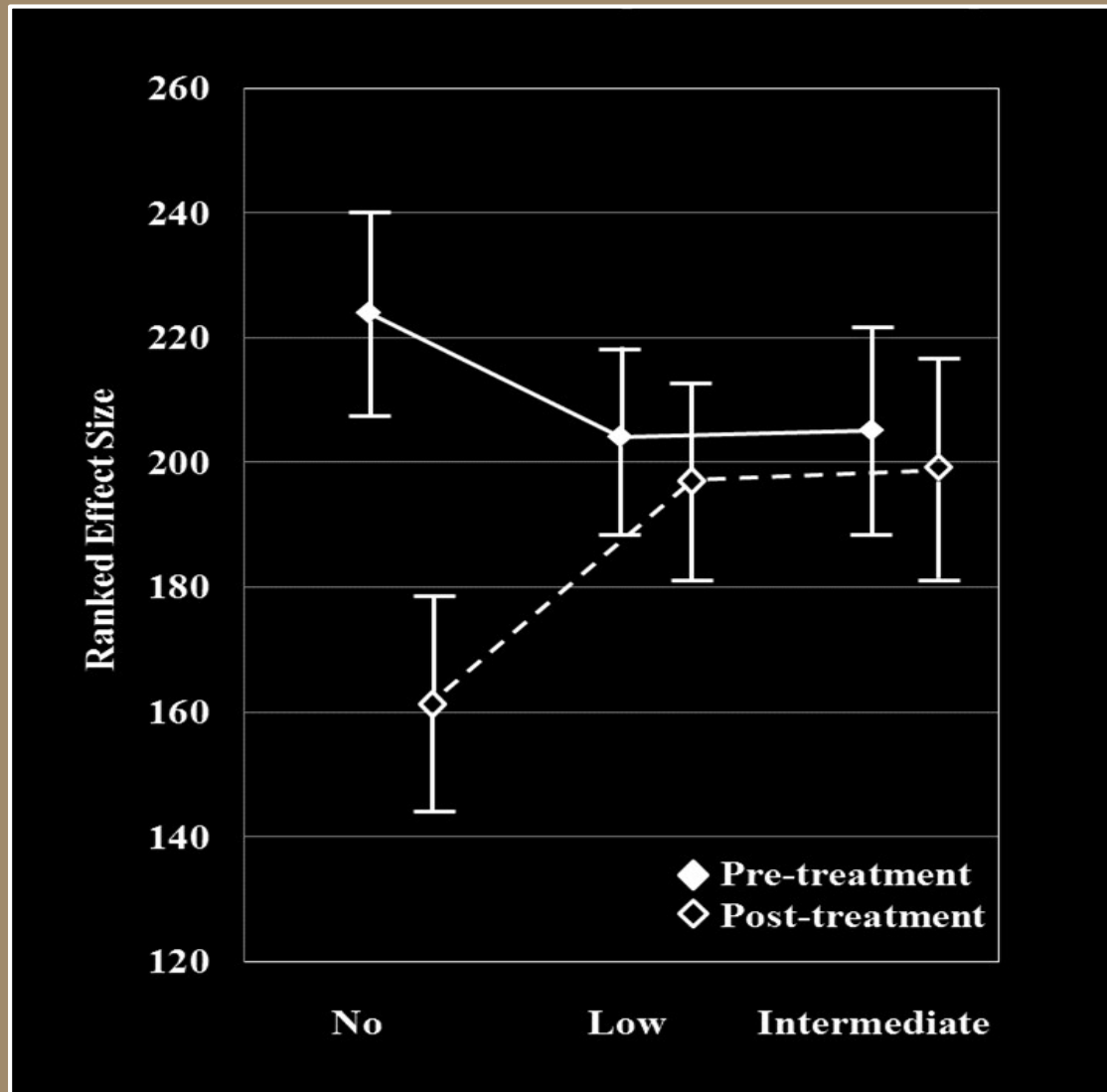
Biofilm Increased in all Treatments



Drift of Organic Matter Declined only in the No-Shade Treatment (Fine Particulate Matter)



(Course Particulate Organic Matter)



Biological Response Highlights

Six species of amphibians were tested for three different biological responses (abundance, growth, body condition).

Four functional feeding groups of macroinvertebrates were tested.

This creates too many different and complex results to go over in this presentation.

So I am summarizing only key results.



- **Several changes in macroinvertebrate production seemed to track shade reduction gradient-induced changes.**
- **Similarly some stream-associated amphibian responses are consistent with expectations linked to the shade reduction gradient.**
- **But some of the changes or lack thereof among macroinvertebrates and SAAs lack a clear ecological explanation.**



- **Considering macroinvertebrates and amphibians collectively, the study found more positive and fewer negative responses in the Intermediate Shade treatment than in either the No or Low Shade treatments.**





Thank You