



Ecological effects of biochar on
stream benthic communities:
(very preliminary findings)

Objectives

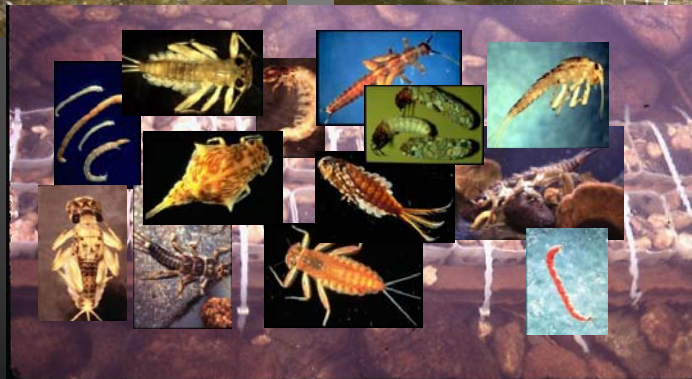
- Assess effects of Biochar on: 1) survival and community composition; 2) macroinvertebrate drift; 3) colonization rate; 4) community metabolism
- Quantify combined and interactive effects of 2 size fractions of Biochar (focus on filter feeders)
- Compare Biochar effects to those of a “reference toxicant”

Experimental Approach

1. Field colonization studies
Colonization with and without Biochar
2. Effects of Biochar in stream microcosms
 - Large versus small Biochar particles
 - Control
 - Large (1.0 -5.0 mm)
 - Small (< 1.0 mm)
 - Both
 - Biochar & reference toxicant (Copper)



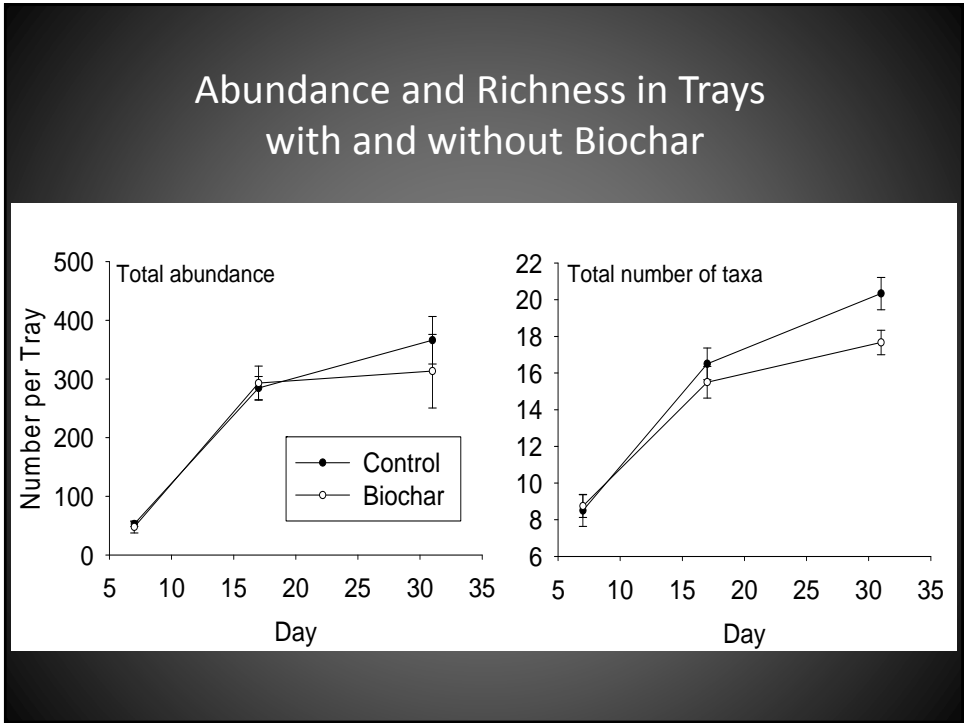
1. Macroinvertebrate Colonization Studies



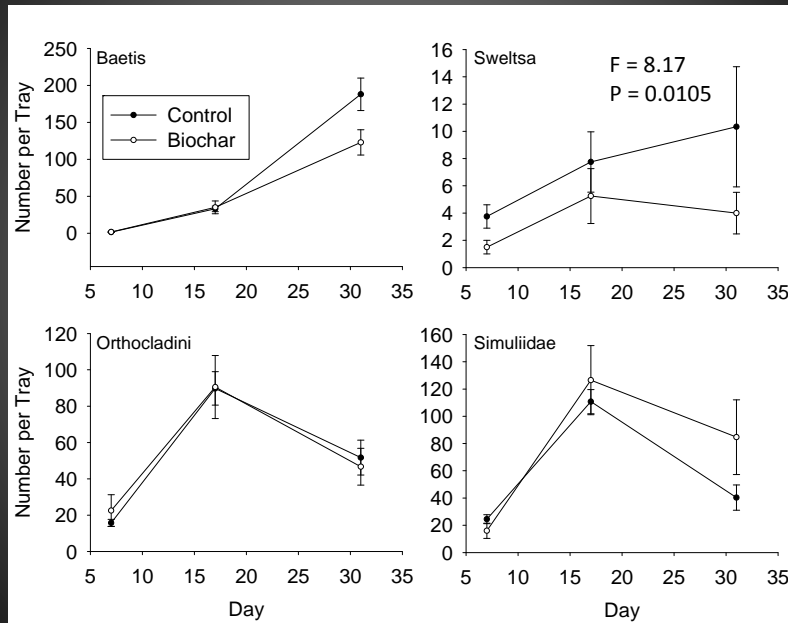
Diverse Range of Taxa & Functional Feeding Groups (~ 40 taxa)

<u>Mayflies</u>	<u>Stoneflies</u>	<u>Caddisflies</u>	<u>Dipterans</u>	<u>Other Taxa</u>
BAETIS	CAPNIA	BRAAME	CHIRON	HETCOR
DIPHET	ZAPADA	MICRAS	TANYTA	HYDRAC
DRUDOD	TAENIO	GLOSSO	ORTHOC	NEMATO
DRUGRA	SWELTSA	ARCGRA	TANYPO	OLIGOC
SERRAT	HESPAC	LEPIDO	BEZZIA	POLYCEL
CINYGM	ISOPERLA	RHYACOP	EMPIDI	
RHIHAG	MEGSIG	ALLOYM	CHELIF	
PARALEP	SKWALA		PERICO	
AMELET	PTEBAD		SIMULI	
			ANTOCH	
			HEXOTO	

October, 2013



Dominant Taxa in Trays with and without Biochar



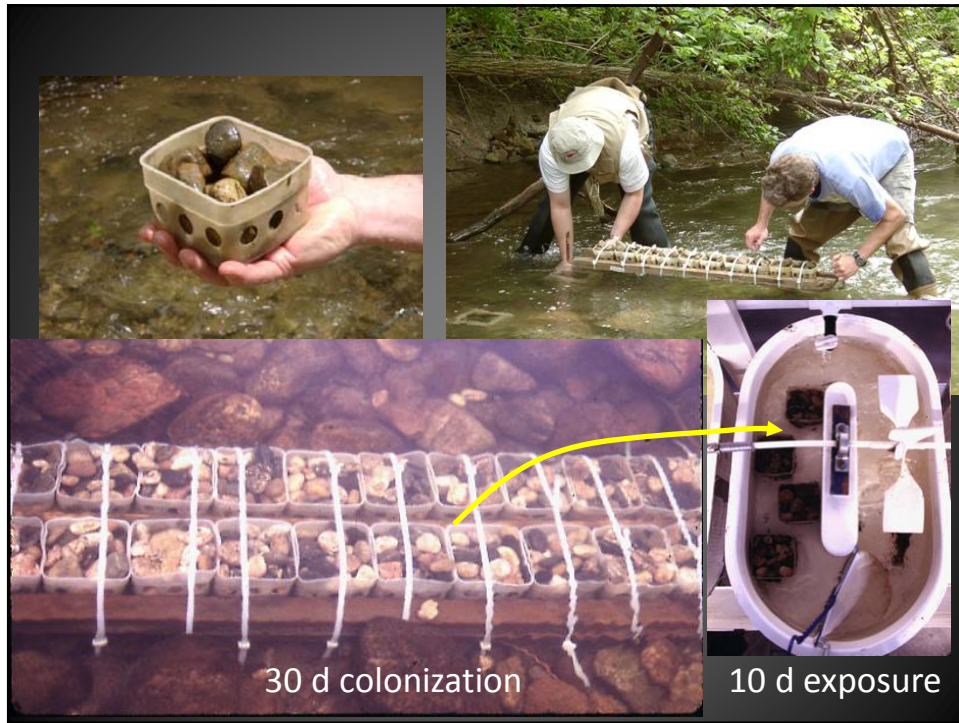
2. Effects of Biochar in Stream Microcosms



CSU Stream Research
Laboratory

Natural water source
(oligotrophic reservoir)
Natural sunlight
18 20-L microcosms
Flow through (1.0 L/min)

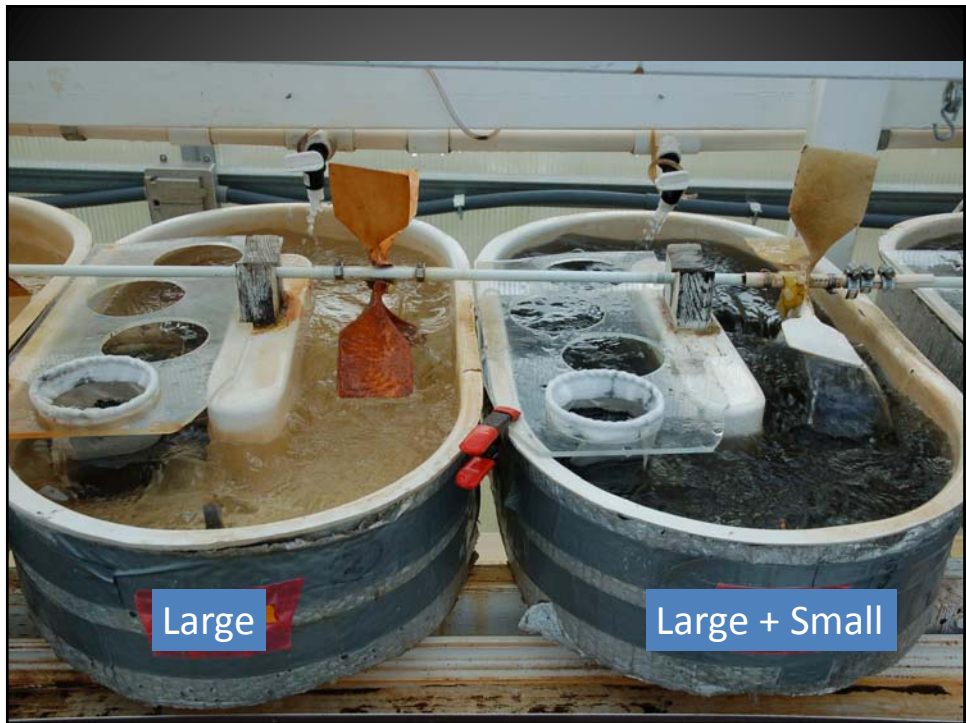




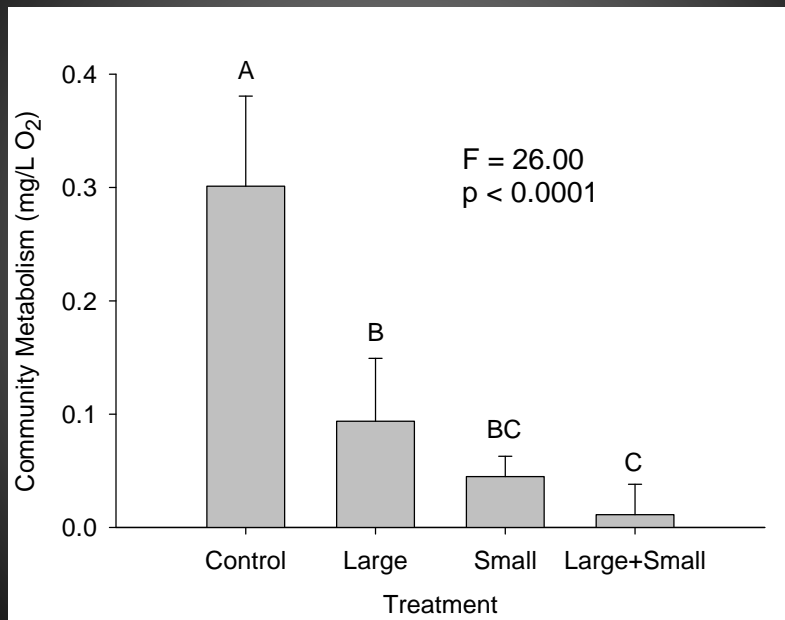
Endpoints Measured

- Macroinvertebrate drift
- Immigration rate
- Survival
- Community composition
- **Community metabolism**

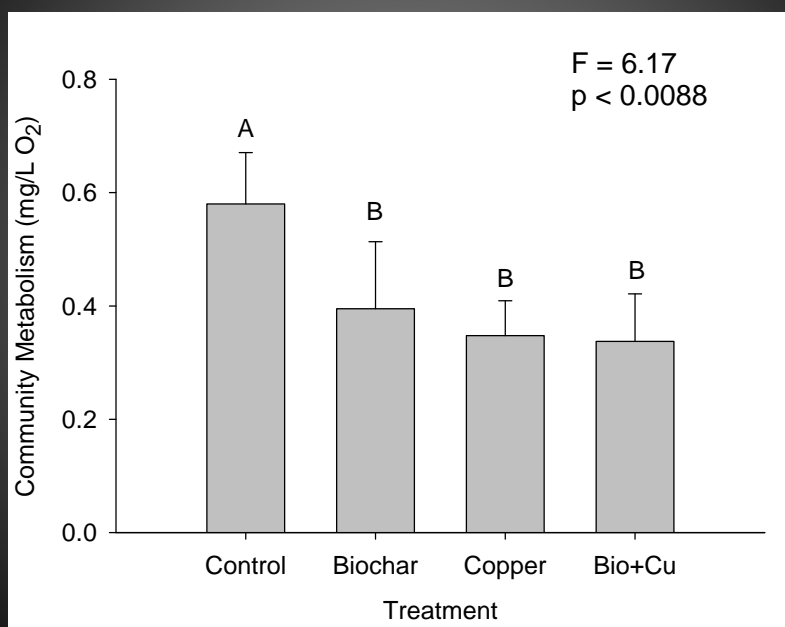


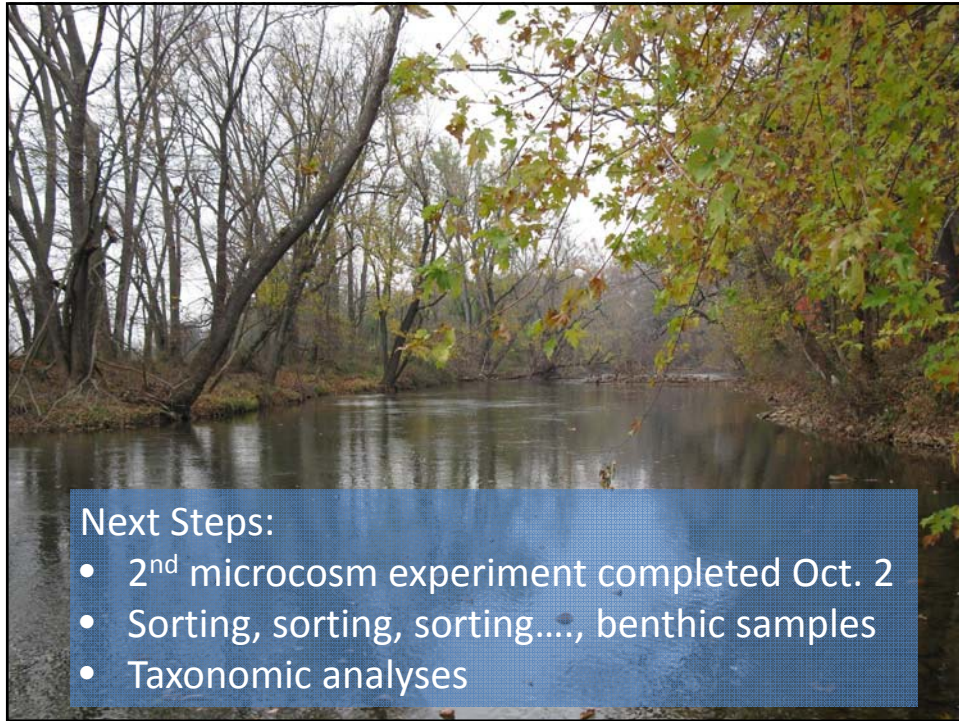


Highly significant effect on community metabolism



Magnitude of Biochar effects comparable to copper





Next Steps:

- 2nd microcosm experiment completed Oct. 2
- Sorting, sorting, sorting...., benthic samples
- Taxonomic analyses