

Preliminary Results of Effects of Intercropping on Crayfish Communities in the Sand-Clay Hills Subsection of Mississippi: Pretreatment Data Collection and Analyses

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Introduction

In February 2008, Weyerhaeuser Company began to explore intercropping switchgrass (*Panicum virgatum*), as a biofuel feedstock, between rows of planted pine (*Pinus taeda*) on Weyerhaeuser-owned land. Large scale implementation of this strategy has created questions about the potential effects of intercropping on the hydrology and the biota in headwater streams.

Our objectives of this study were to:

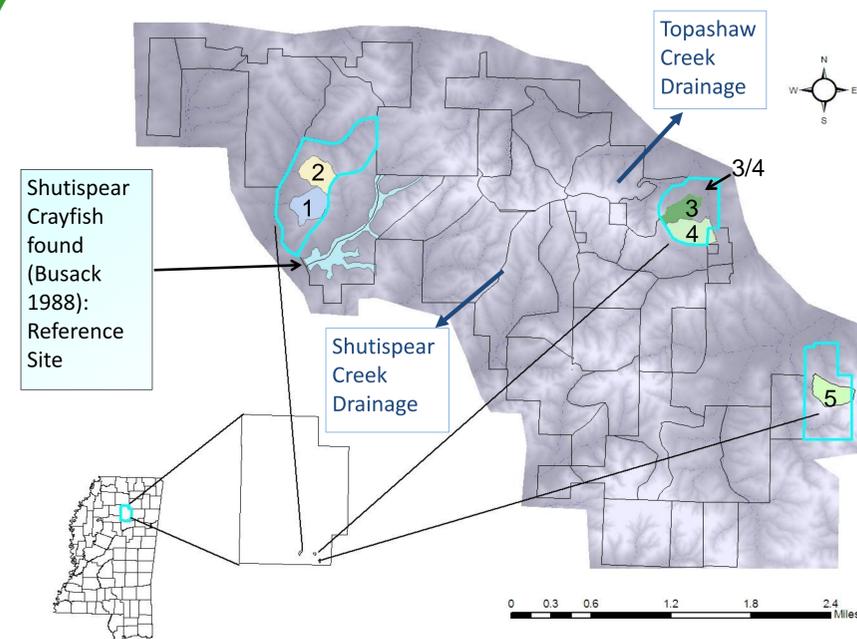
- determine if crayfish species of concern were present in streams
- revisit historically sampled sites where *Procambarus lylei* (Shutispear Crayfish) was collected in 1988
- evaluate whether species of concern are reproducing
- evaluate impact of intercropping on crayfish communities using a Before- After Control-Impact study design.

Treatments

Treatments applied at the watershed scale. First four treatments are in 4-6 year old stands.

1. Switchgrass Intercropped in Loblolly Pine Plantation
2. Traditional Loblolly Pine Plantation
3. Switchgrass Only
4. Understory Biomass Harvest in Loblolly Pine Plantation
5. 17 to 18 year old Plantation with Potential for Understory Harvest

Study Site



Sand-Clay Hills Subsection, Calhoun County, MS

Methods

- Electrofishing (Smith-Root electrofisher)
- Catch-per-unit-effort (CPUE)
- Field identified to species (Susan Adams, Forest Service)
- Length, weight, sex, stage of maturity, presence of eggs
- Water Quality (Hydrolab and Flumes)
- Habitat Measurements (quantify volume of stream reach)



Results

Overall total, species counts, and percent contribution of all crayfish caught on all watershed sites. (*) denotes a species of concern.

Species	Count	Percent
<i>Cambarus striatus</i>	124	38.75
<i>Hobbseus yalobushensis</i> *	25	7.81
<i>Orconectes trisellecens spp.</i>	26	8.13
<i>Procambarus hayi</i>	79	24.69
<i>Procambarus hybus</i>	1	0.31
<i>Procambarus lylei</i> *	65	20.31
Total	320	

Results

- *Procambarus lylei* was in the top three dominant taxa
- Considered endangered by the American Fisheries Society and Heritage Global Ranking
- Found in perennial streams in the Shutispear Drainage
- Found on two new locations within managed pine landscape
- Still persistent 23 years after initial discovery (one rotation)
- Juveniles, adult males and females were found

Reason for being a dominant species **AND** being a species of concern:

"... populations are vigorous in reproduction, reproductive adults and juveniles both being present" (Busack, 1988)

Problem lies with limited habitat and range



Shutispear Crayfish
Procambarus lylei

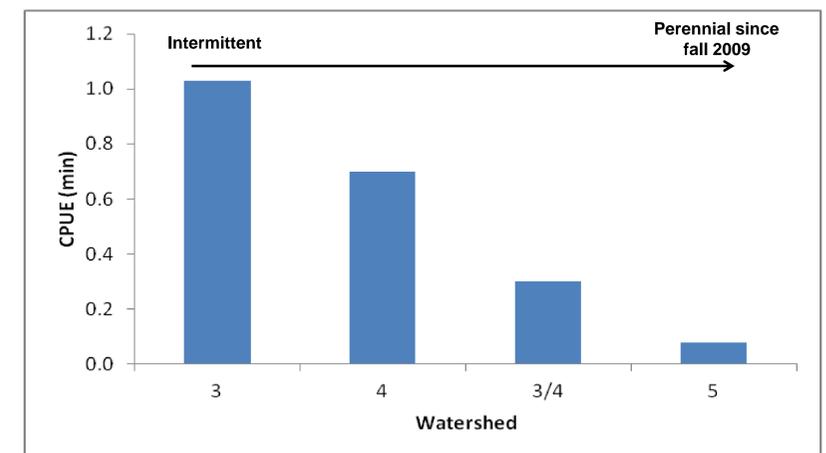
Results

- Found in the Topashaw Creek Drainage in intermittent streams
- *H. yalobushensis* had never been collected in these streams
- Juveniles, adult males and females were collected
- Found a relationship between flow permanence and catch-per-unit effort (CPUE)
- Abiotic factors, interspecies competition, and predation could have an independent or interactive influence *H. yalobushensis* CPUE



Yalobusha Riverlet Crayfish
Hobbseus yalobushensis

Results



Catch per unit effort (min) for *H. yalobushensis* by watershed. No analysis was performed on these streams because of a lack of replication. Watershed 3/4 is the confluences of Watershed 3 and 4 streams. Water has been flowing in Watershed 5 on a perennial basis since October 2009.

Conclusions

- *P. lylei* was found 23 years after Busack (1988) originally identified the species in a loblolly pine plantation (one rotation)
- *P. lylei* and *H. yalobushensis* were both found in streams that were not previously sampled in loblolly pine plantations
- *H. yalobushensis* CPUE appears to decline with an increase in flow permanence
- Juveniles, adult males and females were collected for both species
- *P. lylei* populations appear to be stable in streams with existing forested buffers
- Further study on *H. yalobushensis* populations will be conducted to compare CPUE across years

Additional Research

- Additional streams will be sampled to look for other populations of *H. yalobushensis*
- Sites will be instrumented to quantify flow permanence and the relationship of *H. yalobushensis* CPUE
- Further evaluation of both populations (*P. lylei* and *H. yalobushensis*) will continue to determine population stability
- Community structure of crayfish will be compared before and after switchgrass planting to evaluate the effects on the community and species of concern