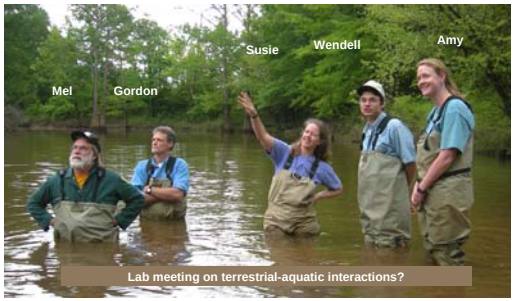
Susie Adams

Aquatic Ecologist

Oxford, MS

Science Area: Watershed Science
RWU- 4155, Center for Bottomland Hardwoods Research
Team: Aquatic & Terrestrial Fauna



Lab meeting on terrestrial-aquatic interactions?

ABSTRACT

I conduct research on fish, crayfish, and aquatic community ecology, primarily in wadeable streams, but also in lakes, large rivers, and floodplains. Here, I present a few of my ongoing studies and some areas for possible future collaborative research. Studies range from basic research on species distributions to more applied, community-level research. The overarching goal is to increase knowledge of the relationships between aquatic communities and land management or natural disturbance with an eye to improving our ability to effectively manage and conserve native, aquatic communities. I am interested in future collaborations exploring terrestrial-aquatic interactions. Particularly intriguing to me is the potential for collaborative research on relationships between burrowing crayfish, plant communities, and groundwater.

FISH ECOLOGY

Alabama shad autecology

Alabama shad (*Alosa alabamae*) is an anadromous species (related to American shad) that is a candidate for listing under the Endangered Species Act. The only known remaining population in MS is in the Pascagoula River drainage.

Goals: Estimate population sizes and determine genetic population structure, habitat use, food habits, predators, and life history of the species in Gulf of Mexico drainages, particularly the Pascagoula River.

Collaborators: U. of Southern MS

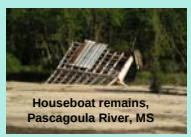
Susie on the lower Pascagoula R. with the only adult AL shad caught to date in this study

Juvenile AL shad on an electrofishing glove

Hurricane Katrina Impacts on Fish

Using data collected during the Alabama shad study and U. of S. MS data from smaller streams, I am working with Jake Schaefer (USM) and his students on data collection and analyses of fish impacts and recovery from the hurricane in small streams to the mainstem in the Pascagoula River drainage.

The hurricane eliminated much of the fish community in the mainstem and had lesser to no effects on upstream communities. Long-term effects in smaller streams may result from habitat alteration, particularly the beneficial addition of large wood to creeks.



Houseboat remains, Pascagoula River, MS

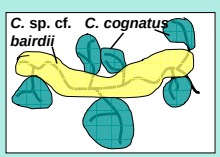
Recovery of the mainstem fish community has begun, largely via reproduction, but recovery rates appear to differ by family, with some families, such as sunfishes, still poorly represented.

Freshwater sculpin

Freshwater sculpin are widespread in northern, temperate rivers and lakes, and in western U.S. rivers, they often dominate the fish biomass. During a study of sculpin movements in the Blackfoot River, MT, we discovered a new sculpin species and interesting species distribution patterns.

Goals: Determine distributions, habitat associations, and interactions of the species and explore metapopulation implications of the distributions.

Collaborators: Montana Fish, Wildlife, and Parks; USFS RMRS



Schematic of hypothesized distributions of the two sculpin species in the Blackfoot R., MT, based on preliminary data.

CRAYFISH

The southeastern U.S. has the highest crayfish diversity in the world. About 65 species, including many endemics, occur in Mississippi. Crayfish live in a wide variety of ecosystems and fill multiple trophic roles. I study a range of topics from phylogenetics to community ecology of crayfish.

Phylogenetics of the *Orconectes* subgenus *Trisellescens* in MS

Before getting to the ecology, we need to address more basic questions including, "What species are these?"

Goals: Determine if present taxonomy of the subgenus is correct and if cryptic species exist in study areas.

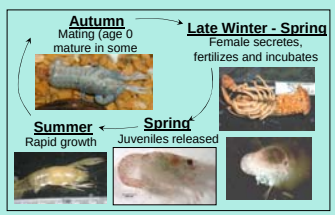
Orconectes chickasawae

Early results suggest that the subgenus has considerable spatial genetic structure and that while some species are undescribed, other species may not be valid.

Collaborators: Illinois Natural History Survey; Brigham Young University

Life histories of crayfishes

For many common crayfish species in the South, nothing has been published beyond the species descriptions. Understanding life histories is important for interpreting ecological studies and for predicting effects of land management. Results of this life history study of four species in four streams have already helped in the interpretation of patterns observed in other studies.



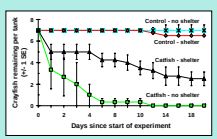
Generalized life history in Cambaridae. I find dramatic differences in reproductive timing and age-at-maturity among genera within sites.

Catfish predation on crayfish

I used experimental mesocosms to study the effects of shelter and crayfish species on catfish predation on crayfish. Catfish consumed more of the smaller species and shelter increased survival of the smaller but not the larger species. This may help explain distributions of the two species in north Mississippi streams, where little shelter remains. Results are in press in The American Midland Naturalist.

Mesocosm setup

Adult males of the two species



Results of predation trial with the smaller prey species.

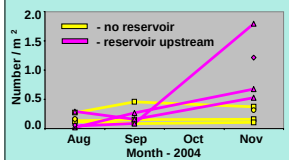
COMMUNITY ECOLOGY

Influences of small reservoirs on aquatic communities

Goal: Understand how small reservoirs influence structure and dynamics of aquatic communities in small streams.

I examined the effects of reservoirs on downstream crayfish assemblages and would like to extend this study to include up- and downstream effects on fish and mussels.

Conclusion: Small reservoirs may influence crayfish in about 284 km of 1st-3rd order streams in the Little Tallahatchie River basin, MS.



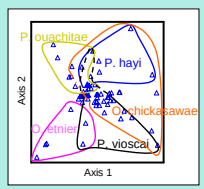
Differences in temporal patterns of crayfish densities in sites with vs. without reservoirs upstream were due largely to differences in species composition and associated differences in reproductive timing.

Community association of crayfishes

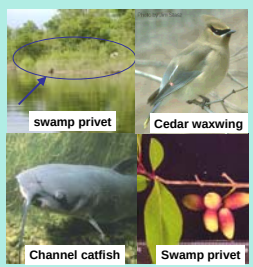
From 1999-2003, our Team conducted standardized sampling of stream habitats and biotic communities throughout the National Forests of Mississippi. I am analyzing crayfish distributions in relation to fish distributions and habitat variables. This work is leading to testable hypotheses about factors determining distributions of stream crayfishes, including the importance of predator-prey relationships between fish and crayfish.

A PCA plot of sample sites in species space (right) shows the spatial relationships among common species in the Holly Springs NF.

We also found a negative species-area relationship for crayfish, but not for fish, suggesting that fish predation on crayfish may be a determinant of crayfish distributions.



Dispersal ecology of swamp privet (Forestiera acuminata)



Working with a team of unit scientists, we identified potential dispersers of swamp privet seeds. Catfish consume and defecate viable seeds, and cedar waxwings consume and probably disperse seeds. As one of few plants fruiting in early spring, the plant may be beneficial to the fish just prior to spawning. Hydrological alterations that disrupt access of fish to the fruits may have ecological implications for both the plants and the fish.

FUTURE COLLABORATIONS?

Terrestrial-Aquatic Interactions

Influences of invasive, riparian plants on stream communities

Riparian plant invasions can lead to changes in stream structure and nutrient cycling. Kudzu commonly kills streamside trees in parts of the South; its leaves are high in nitrogen and fall later than those of many native trees. Thus, kudzu invasion may influence stream ecosystems in a variety of ways. As a preliminary investigation into whether kudzu may alter stream nutrient regimes, I conducted lab experiments on crayfish consumption of kudzu versus native plant leaves. Crayfish readily consumed kudzu leaves, preferring them over muscadine and poplar, but not over dogwood leaves. I am interested in collaborating on this or similar areas of research.

Muscadine Kudzu

Kudzu Dogwood

Leaf material remaining after feeding trials with crayfish. On right, leaves above and below broken line are from different tubs, illustrating the intraspecific variation in crayfish feeding behavior, at least in captivity.

Ecosystem interactions with crayfish

Many crayfish use terrestrial habitats to some degree, and some burrowers use them almost exclusively. Responses of the more terrestrial crayfish species to changes in land use, vegetation, water table levels, etc., are poorly understood, and even less is known about the importance of the crayfish and their burrows to ecosystems. Crayfish may influence terrestrial ecosystems via foraging habits, physical effects of their burrows, movement of nutrients vertically through the soil, and other mechanisms. These topics are ripe for exploration and collaboration -- of course, if studying burrowers were easy, it would have been done already.

Crayfish burrows near a streambank