

Jessica Hines  
GCA Progress Report  
October 16, 2007

Salt marshes are some of the most productive systems in the world. However, one of the basic paradigms of salt marsh food web ecology is that salt marshes are detritus based systems. That is, most of the biomass from salt marsh plant growth is not consumed by large herbivores, but instead it dies and enters the food web as animals feed on detritus. I examined how the composition of the detritivore community influences predator-herbivore interactions in the aboveground primary producer food web, and how the strength and variation of those inter-specific interactions cascaded to influence plant growth and decomposition. I found that leaf litter is an important factor that links aboveground and soil food webs and it plays a critical role in structuring salt marsh invertebrate community composition at many different spatial scales.

At a **local scale**, I investigated **species interactions** and found that the detritivorous isopod, *Littorophiloscia vittata* (Oniscoidea: Isopoda), can mineralize leaf litter and enhance wetland plant growth. Furthermore, by serving as alternative prey isopods can lead to reductions in the number of herbivorous *Prokelisia* planthoppers (Delphacidae: Hemiptera) consumed by generalist *Pardosa littoralis* hunting spiders (Lycosidae: Arachnida). At a **landscape scale** across an **elevation gradient** on the salt marsh there is a turn over of detritivore species. Although there is a strong overlap in species distribution at mid elevation habitats, *L. vittata* and *Melampus bidentatus* (Ellobiidae: Gastropoda) are more abundant in high elevation habitats two other detritivores, *Littoraria irrorata* (Littorinidae: Gastropoda), and *Orchestia grillus* (Talitridae: Amphipoda) are more abundant in lower elevations on the salt marsh. In a manipulative experiment I examined how changes in detritivore **community composition** influenced predator-herbivore interactions and I found that detritivore species that serve as alternative prey (*L. vittata* and *O. grillus*) can help maintain predator populations and therefore stabilize predator-herbivore interactions. In contrast voracious detritivores that are not susceptible to spider predation, such as *L. irrorata*, can quickly consume leaf litter and eliminate the habitat structure that is preferred by spiders. These species interactions seem to be consistent with broad scale **biogeographic patterns** in salt marsh community composition across a **latitudinal gradient** from Maine to southern Georgia. *L. irrorata* snails are more abundant on low latitude southern marshes, and their distribution is strongly negatively correlated with the distribution of *L. vittata* isopods and *Pardosa* wolf spiders which are more abundant on northern marshes. Thus invertebrate detritivore communities can play an important role in structuring salt marsh primary producer food webs at a local, landscape, and biogeographic scales.