

Data Nugget: Can mudsnails disrupt a salt marsh foodweb?

Original blog post can be found at <http://blogs.brown.edu/bef/in-their-own-words/in-their-own-words-for-students/harriet-booth-unraveling-the-mysteries-of-plum-islands-marshes/>

[Harriet Booth: Unraveling the mysteries of Plum Island's marshes](#)



The square, plastic quadrat slapped down where I tossed it, splattering me with little droplets of mud. As I bent down to examine the sampling area, I noticed one side of the small quadrat seemed to be moving slightly, lifted by some tiny but determined force. I looked closer and watched as a small snail, muddy-colored and roughly the size of a peanut, emerged from the edge of the plastic, making a bid for freedom across the mudflat. I watched this little guy trundle resolutely away from me, making slow but steady progress across what must have seemed to him, a vast expanse of mud. His tiny antenna occasionally appeared from beneath the front of his shell, wiggling about and seeming to wave at me as I crouched in the creekbed. Eventually, I picked the snail up and placed him back inside the quadrat, counting the rest of the remaining snails at the same time. However enjoyable it was to watch these little creatures bumble around, I had many more quadrats to toss before making my own escape out of the sucking mud of the salt marsh.

In the summer of 2012, I came to the salt marshes of Plum Island Estuary in northern Massachusetts to study these mudsnails and the salt marsh food web as a whole. Unfortunately, these snails had gotten a bad rap because of the way they plow through the mud flats of the salt marsh like little army tanks, creating a web of shallow channels behind them. They were accused of bulldozing the habitat of the worms and insects that live in the top layer of mud, overturning their homes and exposing them to surface predators. Omnivorous, salt-marsh fish, the top predators in the marsh, eat these worms as well as the algae that cover the surface of the mud. In recent years however, scientists noticed that the tidal waters of the creek held fewer and fewer fish while the mudflats were increasingly covered with masses of snails. Fingers immediately pointed to these snails as the cause of the fish decline, supposedly eating all the algae and harming the worm prey of the fish.

My particular task consisted of following the mud-loving invertebrates through the marsh to determine who was consuming the bulk of the added nutrients and where this energy was going. I took my job seriously. Armed with my waterproof field notebook, bags, bottles, coolers, and tape measure, I sampled the snail and worm populations in four saltmarsh creeks, laying out my 200-m transect along the creekbed at low tide. Spending most of my days trekking through the thigh-deep mud of the creek that pulled me down into the water on numerous occasions, I became well-acquainted with the snails, crabs, and other little creatures that thrived in

this murky habitat. When I jumped down into the creek, I disappeared from view and entered a new world, where small wet eyes would peer down at me from the tall creek banks on either side and the only sounds were the sucking of the mud at my legs. My peers remained clean and dry up in the swaying green grasses of the marsh platform while I became a creature of the marsh, intent on learning about my fellow mud-loving creatures in this complex web of energy.

As I spent more and more hours in the creek, collecting these snails and observing their habits, I increasingly came to feel like their sole champion in this study, known around the field station as the “inverts person”. Perhaps I spent too many hours in the sulfur-infused mud of the salt marsh, or maybe it was due to my natural tendency to become attached to odd animals, but I became quite enamored by these snails. I would often take a minute in the field to simply watch these creatures as they plowed purposefully through the mud. In the lab, they would wiggle their little antenna at me as I struggled to balance them between the tips of my calipers, and the minute I put them down, they would ooze out of their Petri dish and trundle persistently away across the lab table. However, even as I became fond of them as animals, the science part of me automatically assumed they were still to blame for the loss of fish in the fertilized creeks.

As I collected my data over the months however, several observations made me wonder if the snails could really be the true culprit. For one thing, there were areas of snails in all of the marshes but these areas were patchy, only occurring every several meters along the creek channel. In the past, snails covered vast expanses of the mudflats at low tide, making it easy to assume these creatures were dominating the habitat. In addition, I noticed green crabs scuttling along the edge of the creek wall, something that hadn't been observed since the beginning of the project, 9 years before. Green crabs are one of the few salt marsh species that prey on mudsnails, so the fact that they were back in the area meant they were consuming at least a portion of the snail population. It became more and more questionable whether the observed numbers of snails in the creek were significant enough to be disrupting the normal energy flow in the salt marsh.

By the middle of the fall I had my results and sure enough, not only were snail densities much lower than assumed, but the edible worm populations were quite large, even in habitats shared with the snails. The foraging activity of the snails, previously thought to be so detrimental, appeared to have no negative effects on other mud-dwellers, and the low amounts of snails were certainly not dominating the algae that the fish shared. Of course, this opened up two more huge questions: 1) if not snails, then what was causing the declining fish populations, and 2) where in the world did all the snails go?

I don't have answers to those questions yet; we have some ideas, but like I learned throughout this project, ideas and assumptions are often quite wrong. Yes, it may have been satisfying to have results that supported my hypothesis in a neat, pretty picture, but the mudflats of the salt marsh are not a neat, pretty place. They suck you in and make you fight to get back out, and even when you do escape, you are left covered in mud and missing a boot. I thought I had leapt out of the mud with answers and both my boots intact, but it seems I need to turn around and dive right back in to find the truth behind these mysterious salt marsh creatures. Snails may not be completely off the hook, but I proved them innocent for the time being. I can leave my marsh behind knowing these little creatures are no longer known as destructive eating machines, but just another grazing invertebrate, happily trundling across the endless, muddy expanses of its home.