

HWA Update 2011 from UGA: The good, the bad and the ugly

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Greetings fellow hemlock enthusiasts and forest stewards! This is UGA's sixth year in the HWA biocontrol project, and the State has seen a devastating blow to our hemlock resource in the interim. Fully 90% of the hemlocks are infested at some level, and from Ellijay and Blue Ridge back to the Chattooga River the hemlocks are in severe decline with significant mortality in the 20 to 80% range. One of my favorite hikes on the 3-Forks trail is a sad mixture of dead and dying hemlocks, as is the road to Burrell's Ford through the Persimmon area on the Chattooga River. Several nice stands South of Hwy 52 near Ft. Mountain State Park as well as the Park itself remain in good shape, but from Lake Conasauga North to the confluence of the Jacks and Conasauga River, the infestation is spreading rapidly.

The last 2 years saw great growing conditions for hemlocks in N. Georgia, and the trees responded with abundant recovery growth both in 2010 and this year. Encouraged, we revisited a dozen or so of these hemlock stands which had been through the initial decline phase and were now showing good new growth. Even though the HWA level in most of these stands was ultra low, much of the recovery growth already had been reinfested during the first (Sistens) generation, and by the second generation (Progrediens) the new growth was again densely colonized. These trees will likely not survive the year. There were encouraging signs at 6 sites within 4 of the larger Hemlock Conservation Areas (HCA) that we revisited. Most of the positive results were from areas immediately adjacent to groups of soil-injected hemlock trees. We have observed this phenomenon consistently across the generally infested forest, and it is likely a result of the insecticide treatment radically reducing the number of HWA in the immediate area which in turn reduces reinfestation pressure on any particular hemlock there. This might give us an opportunity to go back in with predator beetles adjacent to treated groups of hemlocks and have at least a chance of establishment.

The Southern Consortium of labs participating in this biocontrol project consists of Clemson University, Young Harris College, University of Georgia and North Georgia College and State University. Together we have implemented a coherent, well-considered strategy for releasing 3 species of predator beetles in areas with infested hemlocks. This strategy consists of characterizing the HWA infestation in any particular area, and only making initial releases of beetles into hemlock stands that will likely provide food and habitat for our predators for at least 3 years. This means initially working in stands where it is difficult to find adequate adelgid densities on which to release. By year two, typically the HWA is easy to find, and we make abundant releases. In year three, the hemlock decline symptoms (no new growth, significant loss of needles....a sad tree to be sure!) are becoming widespread, and we release on whatever decent food (=HWA) that we can find. Sometimes we get a fourth year to make releases, but that is rare. Our release season runs from the last week in February until mid-June where we end up at the highest elevations (ca. 3300 feet) for our final releases. At this point, HWA crawlers have migrated to the new growth flush to "settle" for their summer diapauses (period of inactivity). By late-June this has pretty much happened at all elevations in Georgia.

Currently, we have 90 distinct sites, ranging in size from 1 to 40 acres each, on the Chattahoochee NF and State lands where we have released all 3 species of predators available for use. These are multi-season, multi-year, multi-phenology (eggs or adults) efforts which we feel gives the predators the best shot at

reproducing in the field, establishing and spreading to new areas. For the third year in a row, we have recovered predators from about 75% of the areas sampled...thanks in large part to the efforts of Cera Jones, a grad student here at UGA and Director of the NGCSU predator beetle lab. I can also say that almost all (90% plus) of our predator release areas have very little mortality even though the hemlocks don't look great. Compare this to the numbers I cited earlier, and it appears that a treatment effect may be in evidence. This is a very hard thing to document, so bear with us! Live trees at these areas after another 3 years would give us something to hang our hats on. The missing link for us here at the southern end of the hemlock's range may well be the absence of a specific predator to feed on the second (Progrediens) generation of HWA, as our primary predator (*Laricobius nigrinus*) is pretty much done for the year by early May. You see, *Laricobius* is so well tuned to its adelgid prey that it too undergoes a summer diapause, and wakes up in early to mid-October at about the same time as HWA. The other 2 species of predators we release are lady beetles (from Asia) which should give us the time-of-year bracketing that is necessary for adequate control of both generations of HWA. Unfortunately, neither of these species appears to be doing the job. *Sasajiscymnus tsugae*- or Sasi- has been recovered, but only marginally compared to the numbers released in the forests of GA, TN and NC. There is a tenacious little lady beetle from the Seattle/Tacoma area (same origin as our *Laricobius*) that we have been studying and that shows great potential to be our missing Progrediens predator. We are wrangling with APHIS right now trying desperately to get a permit for release in Georgia. We and some prominent experts in biocontrol see no downside to releasing this beetle, yet still we are encountering very frustrating procedural delays. I'll keep you posted!

Finally, there is a perfect storm of adelgids brewing in our hemlock stands right now due to the last 2 years of nice new growth and our unusually warm weather. New growth from last year was abundant so it did not become fully occupied by the crawlers settling in for their summer diapause (2010). This resulted in the first generation in 2011 having great conditions for feeding and reproduction. Boy did they ever reproduce! The second generation this year was massive! The new growth flush at most elevations this year was several weeks early due to the winter warm-up and our apparent jump right into summer temperatures. Normally, the eggs from the second generation of adelgids hatch and produce crawlers well before shoot elongation has progressed fully. That simple fact results in much crowding and intra-specific competition amongst the HWA crawlers that settle in for diapause. There is just no room at the inn. Significant mortality occurs. Not this year I'm afraid! There seems to be much more shoot elongation occurring before and during HWA egg hatch. These crawlers will find plenty of room to set up housekeeping, and ostensibly summer survival will be much better. I fear we may see a jump in tree mortality by the end of 2011.

GA Forest Watch has committed several thousand more dollars to the effort here at UGA (many thanks to all). The next 2-3 years will be very critical for conservation of functional hemlock stands in Georgia. Please find it in your heart – or should I say “budget” – to donate more dollars to this very worthwhile cause. These are fully tax-deductible, and we have a simple mechanism to receive donations from non-profits like Forest Watch. I'm certain that the Lorax must have alluded to the 'greenback being mightier than the adelgid' at some point in his storied career! Cheers from Athens.