Forest Health Review

July 2012

An emerald ash borer pupa (top left) embedded in a bark sample collected from Frederick County, which two weeks later had darkened into a pre-adult (bottom left). Galleries from emerald ash borer larvae are seen under the bark of a recently killed ash tree in Frederick County (right). *Left photos by Rachel Habig, Prince William County Office of Public Works, Gypsy Moth and Mosquito Control.*

In this issue...

Greetings

There is so much going on in the forest health world this year that my head is already spinning, and spring has just ended. As you all know, things got going a little early this year with the record warm March experienced across much of the country. By my estimation, leaf emergence and insect activity were about three weeks earlier than average, give or take. This early activity will be a recurring theme as you read through this issue. While a second year of widespread (and very early) cankerworm activity occurred across much of suburban Richmond, the real story for me was our first discovery this spring of widespread emerald ash borer destruction in a heavily forested, non-urban setting in northern Frederick County. It was only a matter of time for us, but was nonetheless very sobering to see after reading and hearing about devastation in other states like Michigan and Ohio. Read more details about this in the feature article. Speaking of sobering, federal funding has declined significantly this year and looks to continue the trend in upcoming years. It's hard to know if this is just a temporary downward dip or the new normal, but for the short term, we'll probably have to get used to it and make do the best we can by pooling resources as much as possible. The reality may be that certain programs and services in the forest health arena could be reduced or disappear altogether. However, our primary mission, in my view, is to keep you informed and up to date, and we will continue to do that. I hope you enjoy this issue of the Forest Health Review.

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Emerald Ash Borer in Action in Northern Virginia

If you take route 522 northwest from Winchester in Frederick County and come within a few miles of the West Virginia state line, almost in the shadow of Cacapon Mountain to the West, you will have arrived at the first known forested area within Virginia that is experiencing widespread ash mortality due to the emerald ash borer (EAB). While ash typically makes up about two percent of the forest by volume in northern Virginia (based on USDA Forest Service FIA inventory data), it seems to be quite a bit more abundant than that in this area. While we've known since 2010 that EAB was present in this county based on past trapping efforts by APHIS, there had never been any EAB-infested trees identified in the area until this spring. This provides further evidence that detecting emerald ash borer populations early in the invasion process is exceedingly difficult, especially in a heavily-forested area, even when trapping EAB adults serves as an indication that they are in the vicinity.

I was first made aware of this situation in March when I was contacted by Laura Shifflet, an employee of Frederick and Clarke counties who had been the gypsy moth coordinator in this area for many years. Laura discovered the EAB infestations following inquiries from a few landowners regarding dying ash trees on their respective properties. Subsequent surveys by Laura and Virginia Cooperative Extension Agent Mark Sutphin revealed that the infestation spanned an area roughly 6,000 acres to 7,000 acres in size (Figure 1). Given the size of this area and the difficulty of early detection, it is easy

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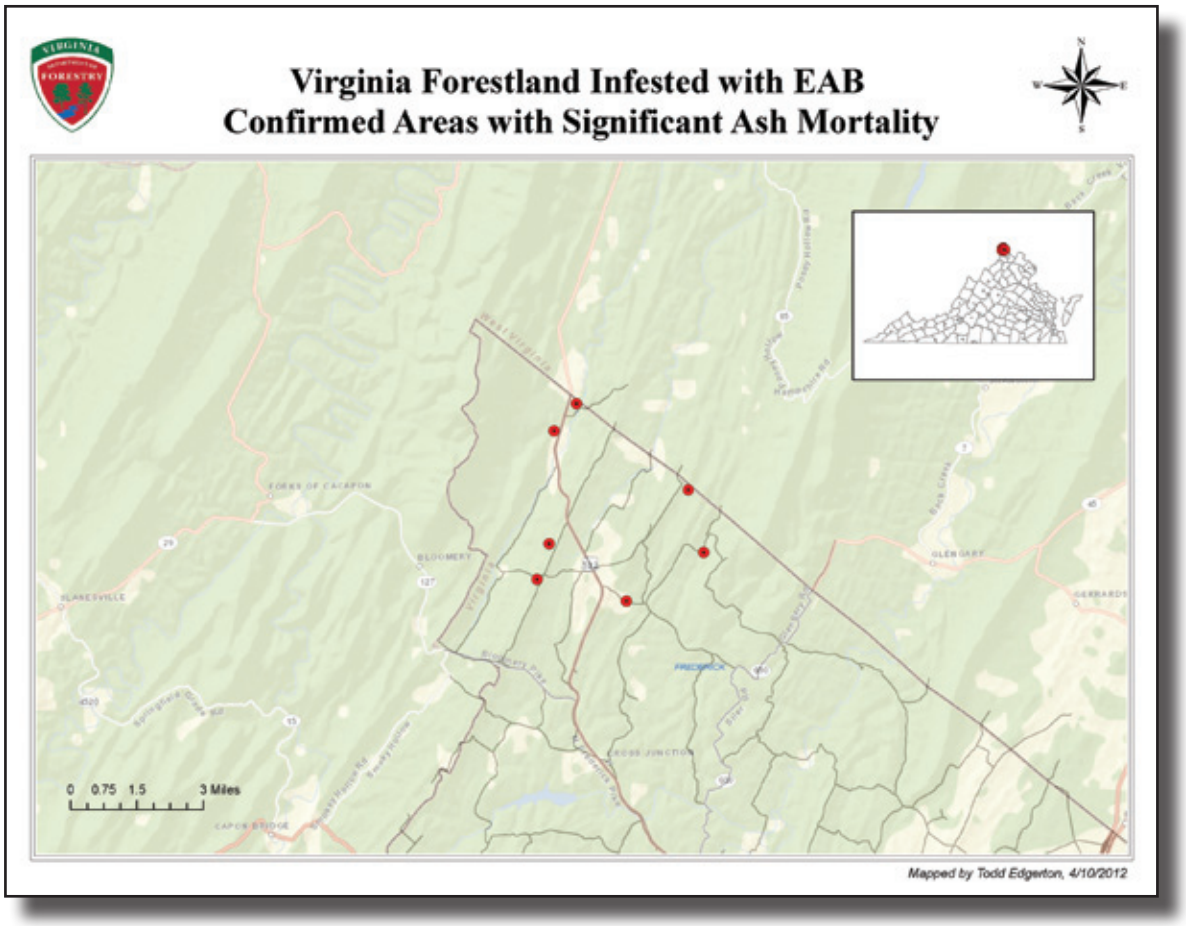

Figure 1

Figure 2. A patch of ash bark exhibiting flaking.

Figure 3. Bark flaking is exhibited along much of the bole of this ash tree.

to speculate that yet-to-be-discovered EAB populations are killing ash trees in other locations within Virginia right now.

I visited this location on April 4th, and upon walking up to the edge of one of these forested stands, the first thing I noticed was that the infested ash trees were extremely easy to pick out even though leaf emergence had not yet occurred. The reason for this was an unusual but very noticeable pattern on the bark surface, best described as "flaking" – where the outer, grayish bark sloughed off somehow to reveal a lighter colored, tan inner bark underneath (Figures 2 and 3). Sometimes this flaking was apparent only in small patches on the bole of the tree, and in other instances, it was obvious along the entire bole, in which case, the tree really stood out. I have never observed anything quite like this on any species of tree before, let alone ash. So naturally, my first question was "what is causing this?"

Continued on page 4

Emerald Ash Borer in Action in Northern Virginia, from page 3

One thing we knew for sure, bark flaking was apparent only on ash trees, and all the ash trees that had it were infested to one degree or another with emerald ash borer for some time – my educated guess is that these trees had been under attack for at least five years – but that is difficult to know for certain. We at least know that populations were present for three years given that adults were trapped in 2010 and likely emerged from nearby trees after a year of development. Could the flaked bark have been from woodpeckers, as some of us first speculated? Pileated woodpeckers often create large, splintery holes in trees during their search for meals, and there was certainly evidence of their past activity around, but on that particular day, we did not hear or see any woodpeckers. Nor could we explain why woodpeckers would flake off the outer bark in such a way that a flat surface was left behind – as if someone had planed the tree or sliced the outer bark off with a drawknife – something I have never observed anywhere else where woodpeckers were abundant. It seemed a stretch, but I didn't have a better explanation.

Fortunately some of the infested trees were cut into short bolts and piled nearby, where we were able to remove bark more easily, find EAB galleries and recover specimens of EAB larvae and pupae (Figure 4). Unlike pine trees, where bark peels off relatively easily after the tree is dead, ash bark remains tight on the tree and is difficult to remove even with the aid of a hatchet or draw knife. Working with short bolts of ash where you can more easily strip off bark from the edge made a huge difference. This was a real learning experience in many ways. Since the inner bark and outer sapwood seemed riddled with EAB galleries (Figure 5), my first thought was that it would be relatively easy to recover specimens by pulling off the bark – but initially this was not the case. Over time, it became clear that most of the larvae and pupae were in the middle of the thick bark, which seems to naturally divide along a seam that separates inner and outer bark. The best way to recover live specimens seems to be to tear the bark off in sheets and begin breaking it into smaller pieces, which often exposes larvae or pupae embedded between the bark layers. After this realization, recovery of specimens was easier.

Figure 4. Examining a pile of bolts cut from recently dead ash trees infested with emerald ash borer. Notice the flaked bark on most of the cut bolts.

Figure 5. Wood and bark samples exhibiting extensive emerald ash borer galleries.

Because EAB larvae reside between inner and outer bark, could the flaking off of the outer bark simply be a physical process that occurs when large numbers of EAB feed and reside within? This phenomenon has been observed in other states where EAB populations are high, so perhaps the exact mechanism of how and why this occurs will be studied in the future. In the mean time, it provides a very convenient pattern or 'search image' for detection of EAB-infested ash trees within forests.

We visited a second site nearby where many ash trees had been worked over by EAB in a similar fashion, with bark flaking widely evident. On one large tree in particular, we were able to peel off a lot of bark and collect many specimens. Barely a square inch of outer sapwood was found that was not crisscrossed with EAB galleries, even down to the root collar and soil line (Figures 6, 7). One can

Continued on page 5

Figure 6. Scouring a tree for emerald ash borer specimens.

Figure 7. Galleries go all the way down to the root collar and soil line on this tree.

only speculate how many hundreds or thousands of beetles might have fed off of this one tree. On the one hand, it was exciting as an entomologist to witness all of this first hand, but also very disheartening to see how devastating this insect truly is to the forest and what will likely be in store for other ash trees across Virginia.

While it is worth noting that biological control agents for EAB are being studied and were released in this same location last year by the USDA APHIS officials, it is not yet known whether there is much potential for them to suppress EAB populations to any meaningful degree. There are three insect parasitoid species being released, one of which is an egg parasitoid, and the other two are larval parasitoids (A parasitoid is an insect that develops from egg to adult stage within a living host, like a parasite, but eventually kills the host). It's always worth pursuing biological control if safe options are available; when it works, it can be incredibly effective, but it often does not have the desired effect, at least not in a way that is easily measured. As more releases occur, measuring their impact on EAB populations will be an active area of research.

Breaking News

A large area of emerald ash borer infestation has been found in southside Virginia. There was a find near the City of Danville in a log pile that was being inspected. In addition, EAB was detected along a 10-mile stretch of the Staunton (Roanoke) River between Staunton River State Park and Rt. 360 (the borderline of Halifax and Charlotte counties). Much of the land along the river is owned by the Army Corps of Engineers. One area that was inspected had thousands of dead ash trees meaning EAB had been present for at least three years. The Virginia Department of Agriculture and Consumer Services has instituted a quarantine for the counties of Charlotte, Halifax, Lunenburg, Mecklenburg and Pittsylvania and the City of Danville. The quarantine restricts the movement of regulated articles from quarantined localities to non-quarantined localities. The regulated articles, which include ash trees, green (non-heat treated) ash lumber and ash wood products, as well as hardwood firewood, pose a significant risk of transporting EAB. These regulated articles may move freely within the quarantined areas.

UPDATES

Weather

The most notable event this past winter was the unusually warm winter, especially the record-breaking March which saw multiple days in the upper 80s and averages that were 8-12 degrees above normal. Flowering and leaf-on in most locations was three weeks earlier than normal. Precipitation was steady through most of the winter, but things began to dry out during April. These conditions, combined with warm temperatures and dry air, led to a wave of fires across the George Washington and Jefferson National Forest. Fortunately, early green-up and more regular precipitation during the latter half of April helped reduce the fire danger quickly.

The table below presents the percent of average monthly precipitation and average degrees above (+) or below (-) monthly average temperature for each of 9 geographic regions in Virginia (defined below). For monthly temperatures, a '0' indicates average.

Table 1

	SW	CW	NW	NP	CP	SP	NCP	SCP	ES
OCT Precip	90 to 150%	90 to 130%	90 to 150%	90 to 200%	90 to 200%	70 to 200%	70 to 110%	50 to 110%	25 to 70%
OCT Temp	-3 to +1	-2 to +1	-2 to 0	0 to +1	-1 to +2	-1 to +2	-1 to 0	-1 to +2	+1 to +2
NOV Precip	110 to 150%	70 to 130%	50 to 100%	25 to 70%	50 to 90%	70 to 300%	25 to 110%	70 to 200%	50 to 90%
NOV Temp	0 to +3	+1 to +4	+1 to +4	+1 t +4	+2 to +5	0 to +4	+2 to +5	+1 to +5	+3 to +4
DEC Precip	130 to 200%	130 to 200%	100 to 110%	70 to 150%	70 to 150%	70 to 150%	50 to 110%	25 to 90%	25 to 50%
DEC Temp	+2 to +5	+2 to +5	+2 to +5	+4 to +6	+4 to +8	+2 to +6	+5 to +8	+2 to +6	+4 to +8
JAN Precip	70 to 110%	70 to 90%	50 to 70%	50 to 70%	50 to 70%	50 to 70%	50 to 70%	25 to 50%	50 to 70%
JAN Temp	+2 to +5	+2 to +5	+2 to +5	+4 to +6	+2 to +6	+2 to +5	+2 to +6	+4 to +6	+4 to +6
FEB Precip	110 to 150%	90 to 130%	90 to 110%	50 to 100%	70 to 150%	50 to 130%	90 to 110%	50 to 110%	70 to 90%
FEB Temp	+2 to +5	+2 to +5	+2 to +5	+4 to +6	+4 to +6	+2 to +5	+4 to +7	+2 to +5	+4 to +6
MAR Precip	90 to 150%	50 to 110%	25 to 90%	25 to 50%	50 to 110%	50 to 110%	25 to 50%	25 to 70%	25 to 50%
MAR Temp	+8 to +12	+8 to +12	+8 to +12	+8 to +12	+8 to +12	+8 to +12	+8 to +12	+8 to +12	+8 to +12
APR Precip	90 to 150%	50 to 110%	70 to 110%	50 to 70%	50 to 70%	50 to 110%	70 to 110%	70 to 110%	90 to 100%
APR Temp	0 to +2	0 to +2	-2 to +2	0 to +2	0 to +4	0 to +4	-2 to +2	-2 to +2	0 to +2

SW = Southwest (Cumberland Gap to Abingdon to Blacksburg & Galax)
CW = Central West (Roanoke to Staunton)
NW = Northwest (Staunton to Winchester)
NP = Northern Piedmont (Loudoun/DC to Greene/Spotsylvania)
CP = Central Piedmont (Albemarle/Goochland to Bedford/Nottoway)
SP = Southern Piedmont (Campbell/Lunenburg to Henry/Mecklenburg)
NCP = North Coastal Plain (King George/Northumberland to Chesterfield/Newport News)
SCP = South Coastal Plan (Dinwiddie/Brunswick to Virginia Beach)
ES = Eastern Shore

Fall Cankerworm Outbreak

For the second year in a row, heavy cankerworm populations have appeared in parts of suburban Richmond, particularly Henrico, Hanover, Chesterfield, Powhatan and New Kent counties. This year's outbreak, however, seems a lot worse and a lot more expansive. The phone calls began early this year (late March) when early-instar worms began ballooning down from trees on silken strands, looking for something to eat since leaves on most trees had not yet begun to emerge. In terms of timing, this was almost one-month earlier than last year, when an article in the Richmond Times Dispatch picked up on our April 27th News Release.

The "cankerworm" outbreak is actually a native defoliator complex of several species, primarily the fall cankerworm, with a smaller proportion of spring cankerworms present as well. The main difference between the two species is the activity period of the adult moths: fall cankerworm moths fly, mate and lay eggs during the fall, while spring cankerworm adults are active in late winter and very early spring. Obviously, caterpillars of both species emerge around the same time in spring, which often leads to confusion as to the reasoning behind their respective common names, since

few people ever observe the adult moths of either species. Fall cankerworm female moths are wingless, only the males are capable of flight. Therefore, outbreaks tend to occur in the same locations since pregnant, flightless female moths are incapable of spreading very far before laying their eggs. In Virginia, outbreak populations over the last half-century have been concentrated in a few select areas, including areas along the Blue Ridge Mountains, such as the Peaks of Otter just north of Roanoke and parts of Shenandoah National Park, the Bull Run mountains near Manassas, and more recently in several counties surrounding Richmond (Figure 8).

Cankerworms feed on a large variety of hosts. Although they strongly prefer oaks and maples over other species, tastes may vary somewhat depending on the prevailing tree species in the area of the outbreak. Preferred species can be completely stripped of all foliage during outbreaks. However, since this defoliation occurs at the beginning of the growing season, healthy trees are able to leaf-out again quickly. While this process can deplete the trees' energy reserves, it has all spring and summer to replenish these reserves through photosynthesis from new leaves. On the other hand, two years in a row of severe defoliation, on top of other stress factors, such as drought, can sometimes lead to decline and death of certain trees. This tends to be more common in mountainous regions, particularly near ridge-tops, where environmental stress factors, such as poor, shallow soils and temperature extremes are more prevalent. More fertile areas in the lowlands tend not to see as much mortality due to cankerworms, but they can certainly cause a great deal of distress to homeowners in heavily populated suburban areas. Local foresters and county extension folks around Richmond have been kept quite busy this year with phone calls from the media and a concerned public, but most are reassured that, while a nuisance, it is usually not much more than that. It already appears that re-foliation is occurring rapidly thanks to several weeks of steady rain beginning in late April.

Periodical (17-year) Cicada Outbreak

An outbreak of the periodical cicada, a phenomenon witnessed once every 13 or 17 years, is occurring this May across much of Roanoke, Botetourt and Bedford counties. It's one of the most impressive (and noisy) spectacles in the insect world. These are not the same cicadas that come out everywhere during the summer, which is an annual occurrence, involves multiple species and occurs later in June through August. The periodical cicadas emerge earlier in the spring, sound a lot different, are a lot more abundant, are limited to specific geographic areas and are active only for about three weeks. Each year, a different population, called a "brood," emerges somewhere in the eastern U.S., but the same location won't see an outbreak again for 13 or 17 years. Despite the abundance of these insects, cicadas generally don't do serious harm to most trees, although they can cause twig/terminal dieback on many species due to their egg-laying behavior, which involves cutting multiple slits into the bark with their sharp ovipositors, into which they insert their eggs. Folks may notice a lot of dead terminals or "flagging" on many different tree species this summer in those areas. I will write a more complete article about this phenomenon in the next (Fall) issue.

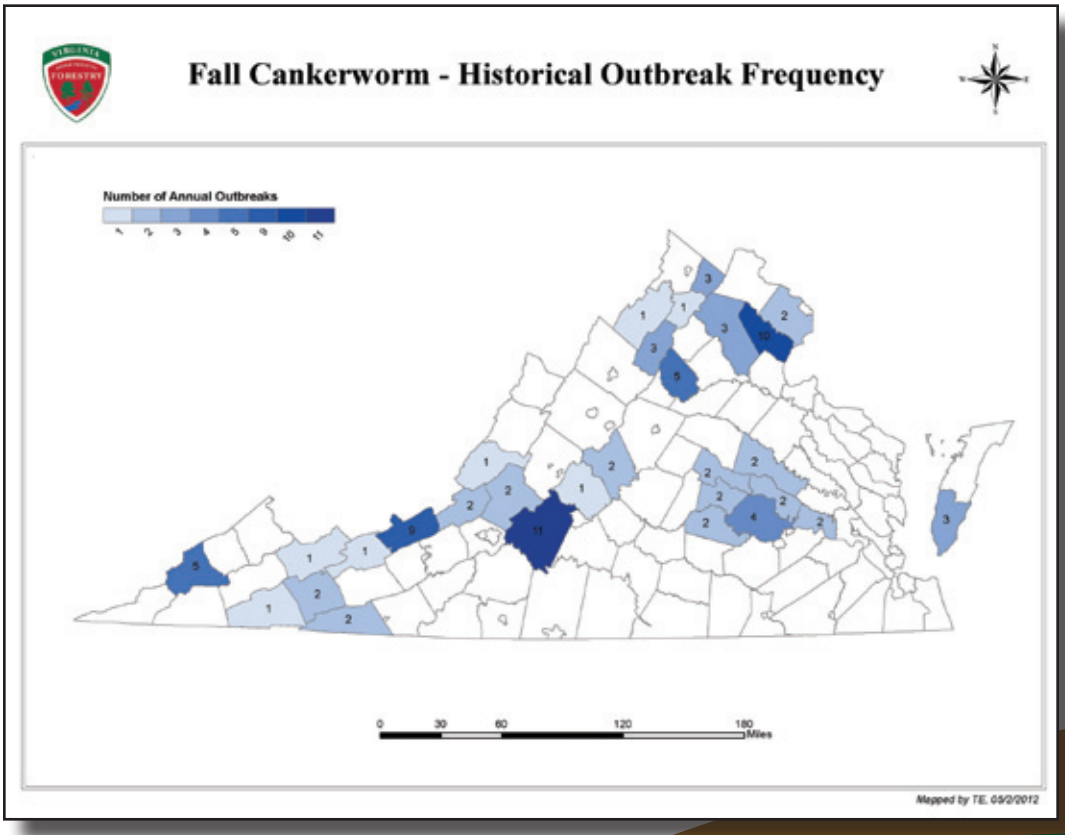

Figure 8

UPDATES

Southern Pine Beetle Prevention Program (SPBPP)

The SPBPP has been going strong since 2004, but, for the first time since its inception, has seen drastic cuts in federal funding this year. While we received substantial funding during the last two fiscal years, this year's award for Virginia was reduced by 67 percent. While we cannot precisely forecast the future, the next few years look to be even more grim in terms of cutbacks for many federal programs. Since the amount we received in 2012 was less than what we typically spend for the program in an average year, continued funding at this level or less will mean that sooner or later we will have to start cutting back on what we are able to fund through the program. Right now, we have solid funding that will carry us through 2012 and probably 2013 without any major disruptions to the following: landowner cost-share for pre-commercial thinning; cost-share for longleaf pine restoration; logger incentives for first commercial thinning on small tracts; state forest assistance, and support of our native longleaf pine restoration efforts. However, if funding streams continue downward, we will likely need to trim back some of what we can pay for, and perhaps limit what is left of our funding to cover landowner cost-share in select, high-priority areas. But for now, we are approaching 40,000 acres treated under the program since 2004 and hope to continue to build on those numbers.

Southern Pine Beetle

The 2012 spring trapping season for southern pine beetle (SPB) has been completed. Once again, overall populations across Virginia are forecast to be low to moderate, in keeping with the trend over the past 10 years. I should point out that this trapping survey gives us only an indication of broad trends with about 75 percent accuracy. It does not mean SPB spots will not materialize and grow here and there. Forest landowners still need to be vigilant, especially if stands are overstocked. As we saw in the last issue (November 2011), small spots that are not noticed early and never dealt with have the potential to grow rapidly if the conditions are right. A dramatic example of the kind of destruction SPB is capable of occurred in western Hanover County last year and resulted in converting hundreds of acres of heavily forested subdivisions into a virtual moonscape (Figure 9). While natural reforestation, planting and landscaping will eventually restore these sites, short-term property values have taken a significant hit. A public meeting at the Cultural Center in Montpelier sponsored by Virginia Cooperative Extension occurred on May 5th to discuss and learn from this unfortunate event.

Figure 9. A property near Goshen Road in Hanover County that was severely impacted by clearcutting of overstory pines killed by southern pine beetle. Mulch was put down to stabilize the soil.

Gypsy Moth

For the third year in a row, we are anticipating very little, if any, significant gypsy moth defoliation due to a lack of significant egg mass densities throughout much of the Commonwealth. Since 2009, we have seen significant rain during the critical period from late April until mid-June, when gypsy moth caterpillars are actively feeding, to allow for the fungus *Entomophaga maimaiga* to thrive and keep gypsy moth populations in check. After a very dry April this year, we have finally returned to a cooler, wetter pattern, which will hopefully continue into May and help maintain this trend for a fourth year.

Walnut Twig Beetle/ Thousand Cankers Disease Survey

The Virginia Department of Agriculture and Consumer Services (VDACS) will continue to survey for the walnut twig beetle (WTB) this year using pheromone baited traps. While the current quarantine zone includes Richmond and surrounding counties, the traps will be placed across much of the Commonwealth to see if any new areas outside of the quarantine zone are picked up that were not detected last year. A pheromone for the walnut twig beetle was discovered by USDA Forest Service scientists recently, and this makes for a very effective trapping tool that is specific to this particular pest. Because it can be a laborious process to detect thousand cankers disease (TCD) in the field and confirm it via isolation in the laboratory, and since TCD and WTB always co-exist, detecting the presence of WTB via trapping can be used as an indicator of TCD presence. So, we have a pretty efficient system in place for delineating the location of the TCD/WTB complex. Hopefully continued surveys will reveal that the current locations around Richmond remain the only areas of infestation in Virginia. However, given its occurrence in the Knoxville, TN, and Philadelphia, PA, areas, it would not be surprising if it showed up somewhere else, despite the quarantine efforts. Unfortunately, the long-term outlook for black walnut is looking grim unless new research comes up with a solution.

The Search for Hemlock Woolly Adelgid-Resistant Hemlocks

A new effort based out of North Carolina State University is under way to search for hemlock trees that display strong evidence of naturally occurring resistance to the hemlock woolly adelgid (HWA). In most stands throughout the eastern U.S., massive mortality of both eastern and Carolina hemlock has occurred following several years or more of HWA infestation. However, the Alliance for Saving Threatened Forests is interested in finding and evaluating those rare individual hemlocks that persist and appear healthy while neighboring hemlocks succumb. Their criteria for potentially resistant hemlocks are strict to discount other possible variables such as tree age, site quality, local climate or number of years of HWA infestation, which also may influence whether a particular tree succumbs. Candidate hemlocks must include the following characteristics:

1. Eastern or Carolina hemlock
2. Mature tree (greater than 20 feet tall)
3. Deep green needles, full and thick branches
4. Very little sky visible when looking up through the canopy
5. Few or no adelgids at the needle bases
6. Untreated by pesticides or horticultural oils
7. Greater than 95 percent mortality of surrounding hemlock trees or surrounded by more than 10 mature dead hemlocks

If you have seen a healthy-looking eastern or Carolina hemlock that fits all of the above criteria, please report this online at http://www.threatenedforests.com/locate or contact Ben Smith at North Carolina State University (828-456-3943). The online site includes a map with satellite imagery to pin-point the location.

White Pine Scale/Disease

In a previous issue (Forest Health Review, May 2011), I wrote an article regarding an unusual scale/pathogen complex that was potentially having a serious impact on white pine in the westernmost counties of Virginia on either side of the West Virginia State Line. I have learned in the past six months that the very same situation is occurring on white pine in the mountains of northern Georgia. Colleagues working in the forest entomology lab of Dr. Kamal Gandhi at the University of Georgia (UGA) recently made the discovery while working on other projects related to the hemlock woolly adelgid. While it is unfortunate that this condition appears to be more widespread than I initially would have imagined (perhaps across much of the southern Appalachians) (Figure 10), it is fortuitous that another group that has more time to do research can devote some much-needed attention to this complex phenomenon. We are now working jointly with UGA; Jill Rose, West Virginia

UPDATES

Department of Agriculture forest pathologist, and Michelle Cram, forest pathologist with the USDA Forest Service, Forest Health Protection Division in Athens, GA. Michelle has made several visits to Virginia over the years to assist us, and now she is working closely with her neighbors at UGA to further investigate the problem. I have been sending white pine twig samples to UGA so that they can continue to collect scale specimens for species identification and rear out pathogens associated with the scale. In addition, we have put in long-term white pine monitoring plots in several locations in Alleghany, Bath and Highland counties, which we will revisit every year to quantify the loss in white pine volume over time, the extent of which remains a big question mark. West Virginia and Georgia have also installed similar plots this spring so that we can eventually pool our data. This will continue to be a long-term work-in-progress, and I will keep you updated when new information becomes available.

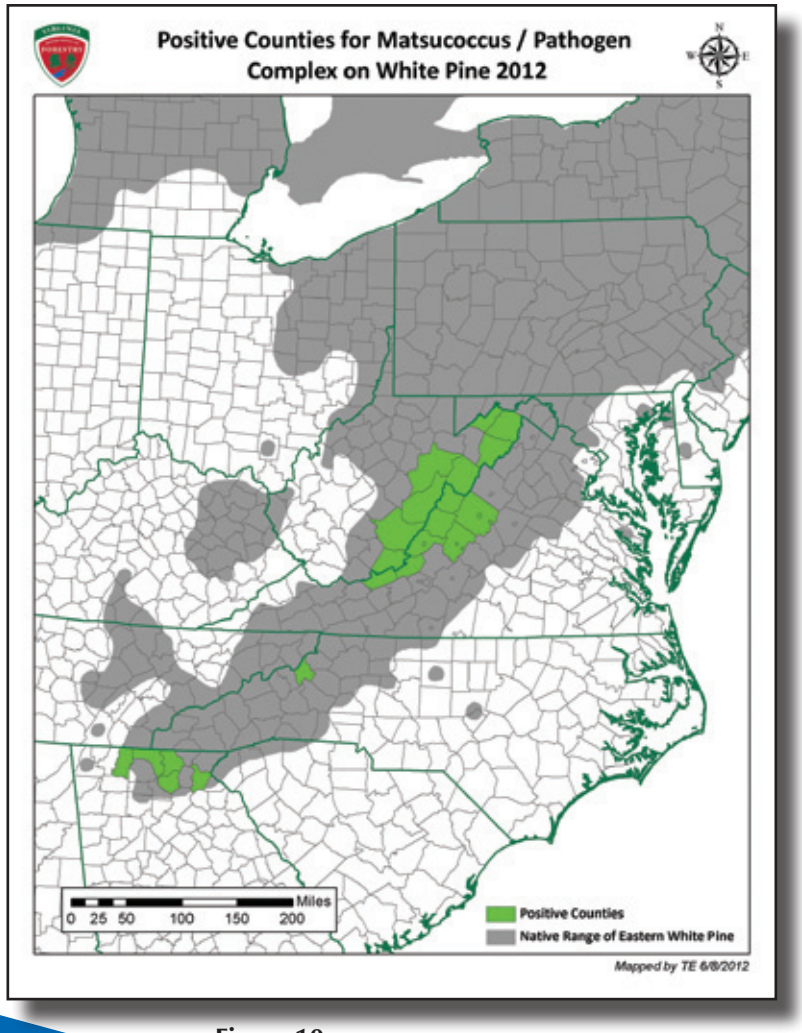

Figure 10

Pesticide Recertification

In past years, we have conducted one-day pesticide recertification classes annually in Charlottesville for those of our staff who are required to maintain an up-to-date commercial pesticide applicators license for category two (Forest Pest Control) and a few other categories. This will likely change in the near future as we are moving toward providing this course in an online format. This will enable those people who need it to obtain recertification at their leisure without having to travel to one location on a particular date, or find an alternative course being offered through Virginia Cooperative Extension. While the online course will still take multiple hours to complete, the option will be available to take the course part way, save your place and return at a later date when it is convenient. That said, options will still be available to recertify by attending live classes through Virginia Cooperative Extension and the Virginia Forest Health Professionals Meeting, if any of those options are preferable to taking the course online. We will continue to keep Department personnel informed as to the date and location of future course offerings.

In addition to these changes, we are arranging to have each individual holding a license to be responsible for renewing themselves, instead of having a go-to person in the Department keep track of it for them. All license holders will receive correspondence from VDACS to their home addresses regarding dates of renewal, class offerings and renewed licenses. This puts the responsibility fully in the hands of the individual to make sure his/her license is current. Look for announcements relating to these changes in the near future.

Ash Monitoring on the Whitney and Conway Robinson State Forests

The emerald ash borer is on the doorstep of two northern Virginia state forests: the Conway Robinson in Prince William County, and the Whitney in Fauquier County. Both forests have a significant component made up of ash trees (Figure 11, 12). This spring, we placed survey traps in each forest to see if EAB is present. We also will begin monitoring individual ash trees over time to observe what will likely be inevitable and gradual decline and mortality of mainly white ash throughout the area. Given the destruction we witnessed in Frederick County (see first article above), there is every reason to expect a similar wave of destruction will occur here. While there will be little we can practically do to stop it, we will at least have the opportunity to document and track the changes to ash tree health in a forested setting. Since the ash trees appear to be healthy, the assumption is that EAB is either not yet present or has not been in the forest long enough to begin causing noticeable tree decline. Hopefully, if present at low levels, we will be able to detect its presence using traps. We are testing new traps this year – instead of the purple sticky traps, we are using funnel traps similar to those used in our southern pine beetle survey, except that they are a light green color attractive to EAB instead of the usual black (Figure 13). These traps are somewhat easier to handle and collect samples from, but due to their cost can be practically utilized only on a limited basis.

Figure 11. Whitney State Forest

Figure 12. Ash trees are one of the latest species to leaf out in spring. An ash on the Whitney State Forest can be seen here just beginning to leaf out on April 24th.

Figure 13. A funnel trap baited with volatiles designed to attract the emerald ash borer hangs in the Whitney State Forest.

Introducing ForWarn

An exciting new tool has recently become available for natural resource managers that allows for near real-time detection of significant forest disturbances using MODIS satellite imagery. Researchers from the USDA Forest Service, NASA, US Geological Survey and Oak Ridge National Laboratory have created a user-friendly website that allows natural resource managers to detect changes in forest-reflectance, as measured by the NDVI (Normalized Difference Vegetation Index), and analyze the potential causes of that change over one-year, three-year, and eight-year time intervals from the date of observation. The MODIS imagery is updated every eight days so changes can be detected in almost real-time. Local field knowledge is essential for the user, since NDVI does not tell you exactly what is causing the detected changes in vegetation reflectance, although several tools are built in to the software that allow you to determine what the likely causes of change are. Therefore, this software is not designed to replace aerial survey, ground-truthing and a general awareness of forest condition based on your field experience, but to augment all of those things. MODIS' strength lies in detecting significant changes at the forest or landscape level, as pixel values are approximately 13 acres and therefore are not highly useful at seeing smaller changes. Significant changes in vegetative reflectance can be due to things like fires, storm damage, tornado paths, insect defoliation, severe drought stress, forest regeneration following a disturbance and land clearing for agriculture or development. In addition, the website stores many different kinds of data layers, such as monthly precipitation, drought indices, polygons of fires or insect outbreaks submitted by state cooperators, past tornado paths, and many other things from multiple sources that can be pulled up.

There are several online webinar recordings posted on the website and a separate tutorial, complete with videos on how to perform various tasks and navigate the toolbars and other features. Therefore, anyone can become proficient and self-taught in how to use ForWarn relatively quickly. After viewing two webinars, I was able to go onto the site and find my way around, view various data layers and feel comfortable using the software within a week. I encourage others to do the same – this tool has a lot of potential for those curious and creative enough to explore its possibilities. Go to the following link to visit ForWarn: http://forwarn.forestthreats.org/

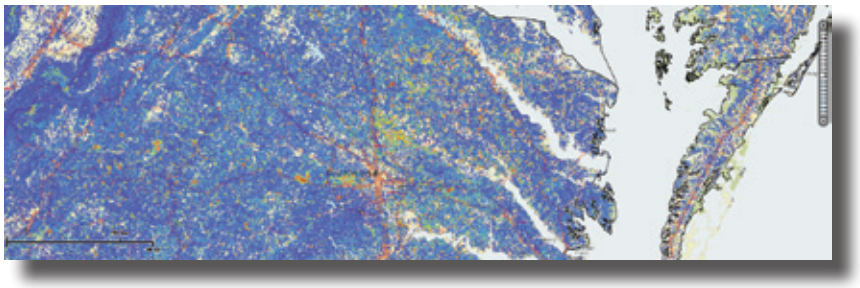

Figure 14. Imagery sample.

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