



FOREST HEALTH REVIEW

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Dead pine trees within a southern pine beetle spot in Mecklenburg County.

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One scenario I would always hope to avoid is to have to deal with a major gypsy moth and southern pine beetle outbreak during the same year. With populations of both pests on the rise, my fears may soon be realized. Perhaps that's overstating it a bit – we expect these populations to go up and down periodically, but if both pests reach epic levels at the same time, let's just say I will be doing a little more running around than usual. The last major southern pine beetle epidemic, which affected more than half of the Commonwealth, occurred in the early 1990s, so it's commonplace to say we are 'due for another big one soon.' Gypsy moth, on the other hand, is an exotic insect which only just arrived in Virginia in 1984, defoliated more than 400,000 acres for six consecutive years between 1990 and 1995 and then crashed to relatively low levels with the sudden arrival of the gypsy moth fungus, *Entomophaga maimaiga*. Since 1995, despite the gypsy moth continuing to spread to the far reaches of Virginia, it has defoliated less than 100,000 acres in all but one year. That year (2001) came on the heels of multiple years of drought, particularly spring drought. We are potentially on the cusp of another gypsy moth surge, unless the spring rains come with a vengeance. If so, the fungus has a chance to thrive and beat them back. Likewise, pine trees with renewed vigor may be able to ward off significant bark beetle attacks. The good news is that April has been a wet month for much of Virginia. I'll let you know how this story plays out in the next issue.

Chris Asaro, forest health specialist



RETURN OF THE SOUTHERN PINE BEETLE?

The last time an outbreak of the southern pine beetle (SPB) affected a significant portion of Virginia was during 1993. During that year, more than 50 counties from Frederick in the north to Halifax in the south and most counties east to the Chesapeake Bay were impacted. Given a cycle of approximately 10 years between major outbreaks, many say we are long due for another big one.

SPB activity has slowly been on the rise during the last couple of years. While severe damage has not been widespread, it has been very significant in a few

locations. Most notably, Chesterfield County reached epidemic status with 42 spots reported totaling about 55 acres worth of dead pine. Pocahontas State Park first saw SPB activity in 2006 and has since been working hard to cut out and halt the spread of new spots. The other area of concern is near Kerr Lake in Mecklenburg County, where severe mortality has occurred throughout an area of more than 600 acres, much of it on land owned by the Army Corps of Engineers. Most of this activity went unreported to us until after November so mention of it did not appear in the previous issue of FHR (November 2007). Additional counties that saw smaller amounts of activity were Amelia, Appomattox, Dinwiddie, Halifax and Prince Edward. Often confusing matters, *Ips* beetle activity has also been widespread and on the rise, too.

"It is a curious thing that people only ask if you are enjoying yourself when you aren't."

Edith Nesbit, 1925

RETURN OF THE SOUTHERN PINE BEETLE, CONTINUED

The southern pine beetle spots around the Kerr Reservoir were unusually large. Interestingly enough, very little SPB activity seems apparent in the rest of Mecklenburg County until one gets quite close to the vicinity of the lake shore. A number of possible reasons proposed for the severity of the infestation near the lake include: an unusual amount of large, mature loblolly and shortleaf pine stands, the latter species being particularly susceptible to SPB attack; large, continuous blocks of pine with few gaps or barriers to inhibit SPB spread, and poor soils exposed to periodic flooding followed by successive years of drought,

the effects of which may have been exacerbated by extreme fluctuations in lake levels and the water table near the lakeshore.

This unusual activity around the Reservoir prompted a gathering in March of forestry staff from the US Army Corps of Engineers (USACE), North Carolina Division of Forest Resources, USDA Forest Service and VDOF to look at the damage. We discussed the USACE plans and preparations for managing and reforesting these outbreak areas. Since 2004, when the first SPB infestations began, USACE has harvested approximately 1,100 acres of pine resulting in more than 75,000 tons of forest products. USACE property encompasses 55,000 acres of land and 50,000 acres of water. Its long-term management plan for the property includes maintaining a diverse forest of approximately 30 percent pine and 60 percent hardwood, with the remaining 10 percent as open space. Most of the devastated areas will be replanted to pine. If possible, methods such as low-density pine plantings and even planting of longleaf pine on appropriate sites may be pursued to mitigate future impacts from SPB.

Much of the SPB activity last year in other parts of the Commonwealth seems to have occurred relatively late in the season, since most reports began coming in beginning in November and extending through March. Although beetles remain pretty inactive with the onset of cold weather, trees attacked and girdled during the fall may remain green for months before beginning to fade to brown. This often creates the misperception that beetle spots are 'actively' spreading during the winter when, in fact, these trees were effectively killed the previous year and bark beetles long since vacated. In contrast, during spring and summer, SPB-attacked pine trees can begin to fade within a week of attack.

Because many attacked trees remain green for so long, winter is a difficult time to assess SPB activity and to diagnose the potential of an SPB

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Foresters approach a large southern pine beetle spot near the Kerr Reservoir.



Paul Merten with the USDA Forest Service, Forest Health Protection office in Asheville, NC, discusses southern pine beetle management options with a group of foresters from the US Army Corps of Engineers, VDOF and NC Division of Forest Resources.

"The great tragedy of Science: the slaying of a beautiful hypothesis by an ugly fact."

T.H. Huxley, 1894

RETURN OF THE SOUTHERN PINE BEETLE, CONTINUED

spot to grow and expand. Compounding the problem, drought has rendered the defensive resin system of many pine trees unproductive, and it is not uncommon to find attacked green and fading trees with no resin blisters on them. Diagnosing the potential for an SPB spot to expand requires finding green infested trees with active SPB brood (developing larvae) inside. However, without resin blisters as a starting point, it

is difficult to know where to begin to dig under the bark to find them. One often must wait until activity resumes in April and May and we deploy our SPB traps to forecast the outbreak potential for the coming year. So far, traps indicate elevated SPB activity in those areas experiencing problems last year, but generally low in most areas.



Scattered southern pine beetle spots and low lake levels are visible along the Kerr Reservoir in Mecklenburg County, VA. Photo by Will Harlon, US Army Corps of Engineers



“Fanaticism consists of redoubling your effort when you have forgotten your aim.”

George Santayana, 1905

UPDATES

WINTER

The trend of warmer and drier weather continued overall through the fall and winter months, although Virginia has been in far better shape than states like North Carolina, South Carolina, Georgia, Tennessee and Alabama, all of which have experienced a drought of historic proportions. November was exceptionally dry, with most areas receiving 25 percent of average monthly precipitation or less. Northern and southwestern Virginia saw the most rain, reaching levels that were 50-70 percent of the monthly average. Despite the dry conditions, significant rainfall towards the end of October and a statewide burning ban in November kept major fires to a minimum. Temperatures were actually 1-3 degrees cooler on average in the southwest, northern and coastal areas. However, the central portion of the state was slightly above average while one five-county area centered on Cumberland County averaged 2-4 degrees above normal for November.



A winter day near the Charlottesville Reservoir

December was quite warm, with temperatures in most areas 4-6 degrees above average, while pockets in northern Virginia were 2 degrees above average. Precipitation was quite variable but significantly higher than during November. The extreme southwest and much of the piedmont

saw precipitation levels that were 70-90 percent of average; the Grayson Highlands and counties to the north were about 100-130 percent of average, while most of the coastal plain and some parts of the southern piedmont received rainfall amounts between 110-200 percent of average. January saw more dry weather, with most areas receiving less than 50 percent of average rainfall except some areas of the mountains and southwest, which picked up more than 50 percent. Some areas of the southside and northern piedmont saw less than 25 percent of normal precipitation. Temperatures were extremely variable during January, transitioning from 3-5 degrees above average in the northern and central part of the Commonwealth to about 1 degree above or below average heading towards the western and southwestern extremes.

February was uniformly warmer than average for most areas by about 2-4 degrees. Precipitation was once again quite variable: only areas around the Grayson Highlands and the southeast corner of the state were between 100-130 percent of monthly the average, while everyone else saw 25-90 percent of average. The driest areas, 25-50 percent of normal, were those counties around the southern Blue Ridge Mountains and counties just to the west and north of Richmond. During the weekend of February 10th, we saw a record-breaking number of fires and acres burned at one time when a warm, dry front brought fierce winds across Virginia. March was also uniformly dry (50-90 percent of normal precipitation) except for the southern piedmont and a few counties south of Richmond, which saw precipitation levels between 100-200 percent of normal. Temperatures during March transitioned from 2-5 degrees above normal for most of the coastal plain and eastern piedmont to 1-2 degrees above almost everywhere else. Southwest Virginia was the coolest spot once again, with average temperatures about 1-2 degrees below average.

“A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it.”

Max Planck, 1949

UPDATES

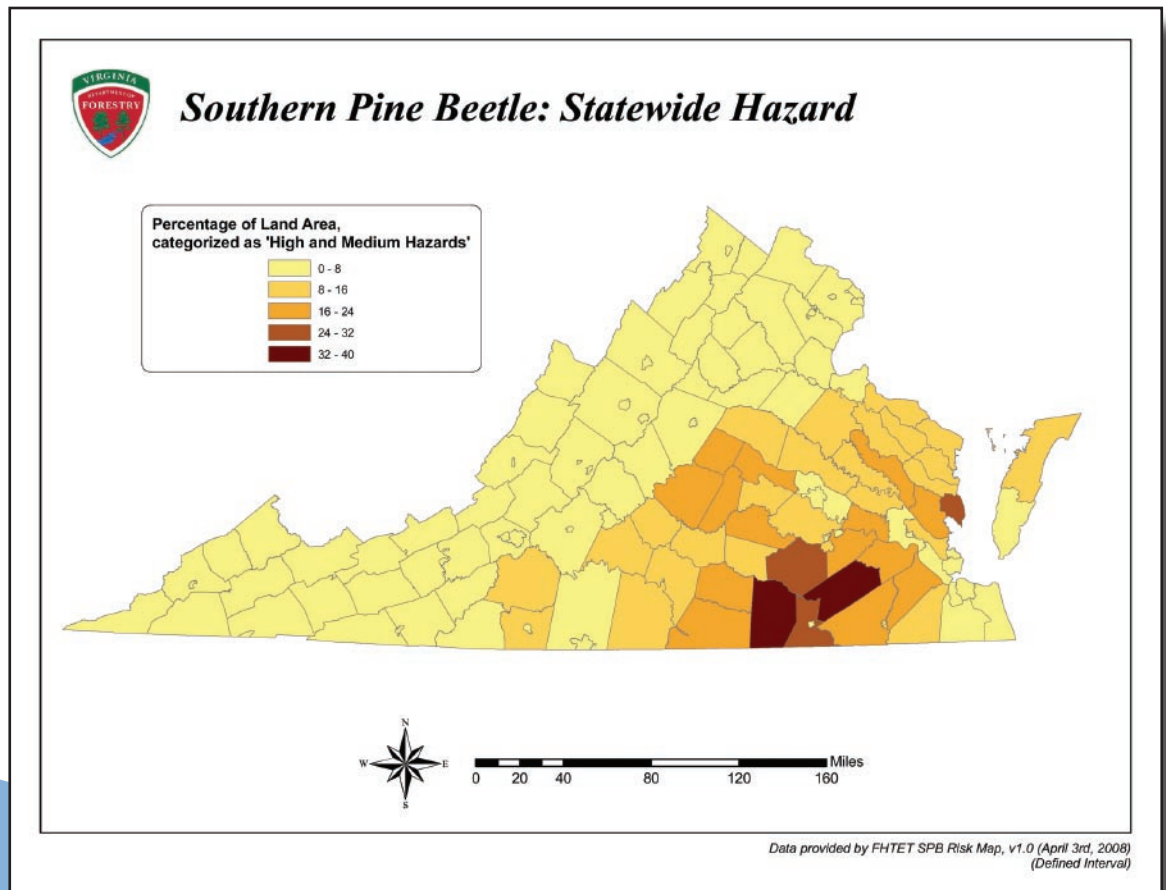
SOUTHERN PINE BEETLE HAZARD MAPS

New SPB hazard maps are available for all southern states. A hazard map indicates which areas are most vulnerable to SPB should an outbreak occur and are usually based on site and stand factors, such as soil type, slope, pine basal area, etc. These maps were the result of a collaborative effort by the USDA Forest Service Forest Health Technology Enterprise Team (FHTET) in Fort Collins, CO, and the USDA Forest Service Forest Health Protection office. The individual hazard maps for each state can be found at: http://www.fs.fed.us/foresthealth/technology/nidrm_spb.shtml

On the Web site, you can click on each individual state to download the one in which you are interested. Different models with a variety of variables were used for the many different eco-regions across the south. Four models were used in Virginia that more or less break down to the coastal plain, piedmont,

mountains and southwest Virginia.

You can click on each model to see what variables went into it and how they were weighted. This should give you some insight into what the maps actually mean. My colleague, Todd Edgerton, has also been working to make these hazard maps viewable at the county level so that our foresters can examine their respective jurisdictions in more detail. We will make these available to our foresters soon. In addition, Todd has also generated a statewide hazard map that rates each county based on the proportion of land area labeled medium to high hazard for SPB (see Figure). Hopefully, these maps will serve as a useful tool to identify potential SPB problem areas and plan areas of emphasis for thinnings and replanting pine at wider spacing. Recognize, of course, that these hazard maps are based on models and are therefore not infallible. There will no doubt be questions and controversies raised by some, and such feedback is welcomed and encouraged as this is a work in progress.



"Skill comes so slow, and life so fast doth fly, we learn so little and forget so much."

John Davies, 1599

GYPSY MOTH

Between 2006 and 2007, we saw defoliation due to gypsy moth increase from about 14,000 acres to 74,000 acres. We are likely to see additional increases, possibly into the hundreds of thousands of acres, unless we receive adequate rainfall between the critical period from mid-April through May when egg hatch and early larval development occur. Rainfall during this period will allow the gypsy moth fungus, *Entomophaga maimaiga*, to take hold on developing larvae. However, the population momentum for gypsy moth is so high right now, it would take an excessive amount of precipitation to slow them down. We will know very soon how things play out this year.



A low-density stand of shortleaf pine in Halifax County is less vulnerable to southern pine beetle.

EARLY DETECTION RAPID RESPONSE PROGRAM (EDRR)

The USDA Forest Service EDRR program is a nationwide survey deploying traps in selected states each year to detect exotic bark and ambrosia beetles. The globalization of the economy has coincided with an alarming incidence of accidental introductions, including many bark and ambrosia beetles that are difficult to detect and whose biology is often not well known. In turn, while most forest entomologists are adept at identifying locally important native bark beetles, special taxonomic training and knowledge is required to identify many of these exotic insects.

The goal of the survey is to have a short turnaround time between trapping of these pests and having them identified by a taxonomic specialist. That way, if a new threat emerges it can be quickly acted upon before the pest problem gets away from us. The emerald ash borer and *Sirex noctilio* problems serve as poignant examples of what can happen with a slow response to an exotic insect. In the case of the emerald ash borer, nobody was looking for it, so it was many years after it had become established that it was even identified. In the *Sirex* example, this was a well-known pest of pine plantations in the southern hemisphere for decades, and there was always the perceived threat it would some day make it to our shores. When it was identified for the first time in North America, in upstate New York, it was from a trap sample collected the previous summer but not examined until the following year. Such delays in sample processing can critically impair



A Lindgren multiple funnel trap is a standard tool for trapping bark and ambrosia beetles.

“Men talk of killing time, while time quietly kills them.”

Dion Boucicault, 1841

UPDATES

any potential eradication efforts.

We are fortunate to have the assistance of VDACS inspectors this year to conduct the trapping and sample collecting for the EDRR survey. Trap samples will be collected every two weeks from April through August and sent to a USDA Forest Service lab in Louisiana for a specialist to identify. All identified specimens are associated with a particular trap location and entered into a Web-accessible database. More information can be found at <http://www.fs.fed.us/invasivespecies/earlydetection.shtml>.

DON'T MOVE FIREWOOD!

We are working very hard with other agencies, such as VDACS, VDCR, VA Cooperative Extension, Shenandoah National Park and the Nature Conservancy, to slow down the eventual arrival and spread of the emerald ash borer (EAB) into Virginia by limiting the spread of a major vector... firewood. Campers moving firewood infested with larvae across state lines to campgrounds have been identified as a primary pathway by which this pest has been able to move across the mid-West and into the South so rapidly. Normally EAB only spreads about two miles per year on its own.

Another threat is the sale of firewood at outside grocery chains, such as Kroger, Harris Teeter and Food Lion, big box stores like Lowe's, Wal-Mart and Home Depot, as well as gas stations and convenience stores. An informal survey by VDACS inspectors has revealed that while about 32 percent of the wood sold was from Virginia, the rest came from 11 other states and three countries. A majority of the wood coming from outside Virginia includes those that have emerald ash borer populations (Pennsylvania: 28 percent and West Virginia: 11

percent, and lesser amounts from New York, Maryland, Kentucky, North Carolina, Georgia, Missouri, Texas, New Mexico, California, Canada, Honduras and Estonia).

While I can't, with much authority, speak to the economics of importing firewood from such disparate locations, I can say that this scenario is a nightmare from the stand point of invasive species risk. Other invasives (including the Asian Longhorned Beetle, European woodwasp [*Sirex noctilio*], gypsy moth, oak wilt fungus and countless other species that spend at least a part of their life cycle in or on trees) can be transported via firewood. For that matter, I don't believe we should be importing firewood to Virginia from western states either. There are plenty of insects native to the western United States that could take up residence in the East and wreak havoc. One strategy to combat this problem is to require all firewood being sold for sale in Virginia to be certified as kiln-dried. I think this is a no-brainer; other states have taken this route, and if we don't adopt it as well, then shame on us. Interagency cooperation at local, state and federal levels will be necessary to make actions such as this happen.

EMERALD ASH BORER

For the first time this year, USDA Animal and Plant Health Inspection Service (APHIS) is providing VDACS with a large number of EAB traps to place throughout the Commonwealth in places like state parks and the national forests. VDOF will do a limited amount of trapping in some of our larger state forests. The purple color of these traps is said to be attractive to EAB, while the manuka oil bait does have some short-range attraction. Because these traps are not specific to EAB and do not provide long-range attraction, their usefulness for early detection and precise delimitation of EAB populations will be limited. However, they should reveal the presence of any significant EAB populations that are in the vicinity, which is far better than nothing.

"A whale ship was my Yale College and my Harvard."

Herman Melville, 1851

Our primary effort will go in a different direction. It is anticipated that emerald ash borer will eventually arrive in Virginia and be most noticeable and destructive to our urban forests, which are most visible to the public and have a considerably higher proportion of ash in some locations than what is typically found in our natural forests. Statewide, ash in Virginia represents about one percent of the volume based on Forest Inventory and Analysis (FIA) plot data. However, since FIA plots include only contiguous forest and not urban forests, there is surprisingly very little accurate data concerning the makeup of our urban forests. It is very important to know how much ash we have in our major and minor municipalities to estimate potential losses, estimate costs, and effectively plan for major tree removal and replacement efforts. This year, I will be working with Professor Eric Wiseman at Virginia Tech to establish a detailed survey of Virginia urban forests using a sub-sampling scheme and the STRATUM street-tree assessment software provided by the USDA Forest Service. Beyond planning for EAB, this information will have many applications and will be extremely useful to folks involved in urban and landscape planning.

FUSIFORM RUST

Significant levels of fusiform rust were reported in a couple locations in Isle of Wight County. Historically, Virginia has not had many problems with fusiform rust. However, a major rust infection in our Garland Gray nursery during 2004-2005 led to the outplanting of many infected seedlings throughout the Commonwealth (reported in the September 2005 issue of the Forest Health Review). It has not been too uncommon to find young loblolly pine plantations with rust infestations that can be traced back to that year of infection. One of the reported infestations was a three-year old pine stand, but it isn't clear from where the original seedlings came. Garland Gray now routinely treats all pine seedlings in the nursery to protect them from fusiform rust.

BEECH BARK DISEASE



Beech scale on the surface of a beech tree

Beech bark disease (BBD) is caused by an insect-fungus complex that can severely injure or kill American beech. The fungus invades the tree through feeding wounds made by a scale insect. Both fungus and insect are thought to be exotic and were first discovered in the United States in Massachusetts in 1929. Since then, the disease has spread like a wave from the northeast southward. The active front of this wave is now about halfway through Pennsylvania. However, outlying populations of diseased trees can be found in the mountains of Virginia, West Virginia, North Carolina and Tennessee. For a while, only three counties in Virginia had reported either BBD (Highland), or the scale insect without the fungus (Bath and Rockbridge). Just in the past six months, biologists from Shenandoah National Park and the Wintergreen Foundation have reported BBD or the scale in Madison, Albemarle and Nelson counties. These new reports are very disturbing. American Beech is a very common and important species and, in many areas, is the dominant understory or overstory tree. It represents yet another native tree species facing potentially catastrophic decline.

"I'm not over-fond of animals. I am merely astounded by them."

David Attenborough, 1995

UPDATES

WHAT IS IT?

Have you seen this fungus?

With the arrival of some nice spring rains, fruiting bodies from a colorful fungus known as quince rust (*Gymnosporangium clavipes*) have shown themselves on the stems of many eastern red cedars. Like most rusts, this fungus has multiple life stages that alternate between different host species. The stage pictured



here infects trees in the genus *Juniperus*, while alternate hosts for other stages include rosaceous plants, such as serviceberry, chokeberry, hawthorn, quince, flowering quince, apple and crabapple. On rosaceous hosts, the fruits, petioles and twigs are attacked by the fungus; while on *Juniperus* hosts, it often forms branch and stem cankers. A stem canker can persist for years without seeming to harm the tree, although cankers are associated with a gradual decline in vigor and may lead to premature death of the conifer host.



“That action is best which procures the greatest happiness for the greatest numbers.”

Francis Hutcheson, 1725

UNMANAGED DISTURBANCE IN SUBURBAN FORESTS

Story and photos by Jim McGlone, VDOF Urban Forester

I work in Fairfax County. For most people in the forestry trade, that means concrete and congestion. There is plenty of that, but there are also 40,000 acres of forest. In addition, there are plenty of deer and invasive plant species, which are significant threats to the forest and to good forest management.

The Virginia Department of Game and Inland Fisheries has estimated deer densities in Fairfax County range between 100 per square mile in more developed areas to 400 per square mile in less developed areas. In a fall 2006 three-day public hunt on 3,000 acres of Mason Neck State Park and the adjoining Fish and Wildlife Refuge, 172 deer were taken. The county reports 4,000 to 5,000 deer-vehicle collisions in 1998. Impressive statistics, but what do they mean?

In June 2006, I visited an 80-acre property in the Potomac Palisades region of the county. Except for the home site, the entire property was forested with beautiful stands of oak and poplar, some measuring more than 30 inches DBH. There is a nice riparian stand of mixed hardwoods, including black walnut and ash. The forest floor was carpeted with new sprouts of oak and maple, but there were no shrubs other than paw-paw. Aside from the sprouts, there were no trees less than 10 inches DBH. The laurel and holly were completely browsed up to four feet, and the only herbaceous plants were garlic mustard and Japanese stiltgrass, both invasive species. After three years, there was literally nothing growing in a wind throw gap from hurricane Isabel. I told the landowner she had a regeneration problem; she said, "Send me men with guns."

This is the norm for Fairfax forests: beautiful, healthy mature trees with nothing growing underneath; forests that look like they have been mowed; unexploited gaps in the canopy; failing stands of Virginia pine and eastern red cedar with no hardwoods succeeding them. Where there are shrubs and herbs in the forest, they are usually invasive plants that deer won't eat. Park managers have told me that paw-paw and spicebush (apparently two deer-resistant species) are expanding within the parks where invasive

plants have yet to become a significant problem.

Invasive plants have moved into the deer-browsed forests and occupied the space they have left behind. While the invasive shrubs and herbs seem to out-



A hardwood stand with very little regeneration due to deer browse.



Invasive plants dominate the understory of a hardwood stand in Fairfax County.

"The man who makes no mistakes does not usually make anything."

Edward John Phelps, 1889

UNMANAGED DISTURBANCE IN SUBURBAN FORESTS, CONTINUED

compete native tree seedlings and other vegetation, the vines – kudzu, English ivy, bittersweet and porcelain berry – attack and kill the mature trees. It is difficult to separate the effects of these two pressures. Do the invasives suppress native flora or do the deer eat the native flora and leave behind the invasives?

Ironically, the deer browse and invasives have awakened land managers in Fairfax to the need to actively manage the forest rather than let nature take its course. I have used this awakening to guide their thinking about forest management by explaining succession and the silvics of tree species, and how to use these concepts to achieve desired outcomes. Time is also an important consideration: if your management goal is a mature oak stand and you don't have an oak component, then it will take you 50 years to get there. When these discussions get to the need to cut trees as part of some management practices, I run into the problem of deer browse and invasive plants.

Many traditional forestry practices do not achieve the desired results under the deer browse and invasive species pressures here in Fairfax County. Opening up the canopy to allow more sunlight on the forest floor just produces more food for deer or encourages the growth of invasive species. Forest management in Northern Virginia, and probably in most urbanizing areas of Virginia, has become less about introducing appropriate disturbance and more about managing the uncontrolled disturbance of deer browse and invasive plants.

Much of the work I do is focused on education about and addressing the problems of deer browse and invasive species. I have made contacts with local bow hunting groups and try to put them in touch with forest landowners. The Fairfax County Park Authority and I are partnering to build deer exclosures in some of the county parks to educate citizens and decision makers about the effect of deer browse and the need to reduce deer herds. Any forest management plan I write includes information on deer browse and invasive plants. Several volunteer groups are now focusing on invasive plant removal, and they all recognize VDOF as a partner in their efforts.

Deer browse and invasive species are subtle problems that can sneak up on you. Both exhibit exponential growth but can be dealt with if recognized early. For areas where they have not become obvious problems, I encourage learning to recognize them in their early stages and confronting them directly. Learn to recognize invasives in the landscape and remove them when found if at all practical. Learn the signs of excessive deer browse and encourage your landowners to cull their herds before they damage



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