Partners News

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Inside this issue:

WELCOME NEW MEMBER

Colleen Matula

PREFACE

by Joe Hovel

This issue and this COOP are all about you and yew. Be involved, through proper management you help protect special plants like yew, so your grandkids can also have the very opportunities to enjoy the features our forests offer.

Canada Yew is abundant but threatened by deer browsing on the Pilgrim River project. This area in the north portion closer to town has been hampered by browsing more severely that the south west portions near South Range where assumedly the more remote character and deeper snow conditions have deer populations in check.

You may recall our wood decay interview with Dana Richter. Dana is an active birder-naturalist in addition to being a forest product decay specialist. You can catch Dana in a short video of Tech Alumni involved at the Pilgrim River project, with Bill Leder and John Ollila, at www.pilgrimriverwatershed.org. Yew is a very important species on the Pilgrim Project, and certainly a part of the reason the lands need protection.

Do any of you know of any sizable stands of yew (also called Ground Hemlock) in Wisconsin? I am very interested in this plant and would be interested to know. I would hope there is in Iron County, where the heavy winter lake effect snows deter the deer from overbrowsing."
Joe

ANSWERING A SIMPLE QUESTION: DECAY RESISTANCE OF CANADA YEW

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Canada yew (*Taxus canadensis*) is a shrub that is not so economically important. In the northern Lake States it is one of our few evergreen shrubs and usually indicates undisturbed or old-growth northern hardwood sites. The shrub never gets more than about six feet high. Canada yew has come under pressure in some areas due to its palatability to white-tailed deer. Why deer prefer to browse this species is a mystery, as the red berries are known to be very poisonous to humans. Apparently the foliage is not harmful – at least to deer.

The related Pacific yew (*Taxus brevifolia*) gets to be a moderate sized tree. In the 1980s the bark was found to contain an anti-cancer drug named "taxol" (later, "paclitaxel"), particularly effective against ovarian cancer. The drug was also shown to be present in Canada yew, and some harvesting took place to extract taxol for medical use. Now the drug is made synthetically and is widely used to treat a variety of cancers.

The wood of any of the yews is of little commercial importance, because even Pacific yew only ever gets to be about a foot in diameter. Perhaps the greatest use of Canada yew is in ornamental plantings. Certain cultivars make nice hedgerows and borders along buildings. The wood of yews is considered to be resistant to decay, but this comes primarily from field observations throughout the centuries. Try to find actual field or lab data on the wood decay resistance of any of the yews and one comes up with a blank.

So what does it matter, knowing about the decay resistance of Canada yew? A few years ago a lengthy article appeared in a major journal on the ecology of Canada yew. The article covered all the various aspects of growth and survival of the shrub. A premise of the article was that Canada yew was under threat in certain parts of its range due to over-browsing by deer. The authors conducted numerous field studies and found that small patches of Canada yew could be entirely killed by deer. However, it was found that larger patches of Canada yew were browsed only on the outer portions, since deer would not expend the energy to penetrate the interior of the patch. Therefore, the authors speculated, living portions of large patches of Canada yew were protected from deer by the outer branches that remained stiff and intact for long periods even after death. This feature of Canada yew branches provides living branches a refuge to make seed and continue to reproduce – decay resistance as a survival mechanism.

This assertion is based solely on observation. Stems of Canada yew appear to be decay resistant, but just how decay resistant? How to test this? It was done with a couple good students, a lab and some wood decay fungi. Take branches of Canada yew, and branches of

a couple other woody species for comparison: northern red oak representing a decay susceptible species, and eastern white cedar representing a decay resistant species. Without going into all the gory fungal details, Canada yew was tested in the pathology laboratory as part of a class exercise at Michigan Tech using pure cultures of common wood decay fungi: one a brown rot and one a white rot. All wood, composed primarily of cellulose and lignin, is decayed by fungi in two different ways called brown rot (degrades cellulose) and white rot (degrades lignin).

After 16 weeks of incubation under ideal decay conditions in the laboratory, using sufficient replicates and controls, branch wood of Canada yew was shown to be significantly more resistant to decay than northern red oak when exposed to *Gloeophyllum trabeum*, a brown rot fungus, and *Trametes versicolor*, a white rot fungus. Using the same fungi, Canada yew was shown to be equal in resistance to eastern white cedar when exposed to the brown rot fungus, and more than twice as resistant to decay than eastern white cedar when exposed to the white rot fungus.

Canada yew branch wood was indeed demonstrated to be resistant to decay – as much or slightly more-so than Eastern white cedar. This feature of the dead branches of Canada yew very likely restricts deer browse only on the outer portions, while the inner portions of a patch are left alone and able to continue to reproduce – reproductive "refugia," the ecologists say. The results may have relevance to survival of Canada yew under pressure from deer browse. With a couple curious and capable forestry students, a small piece of the deer/plant ecology puzzle was put in place.

The paper was recently published in an article titled, *Resistance of Canada Yew (Taxus canadensis) Branch Wood to Two Wood Decay Fungi*, coauthored by Dana L. Richter, Amy M. Berns (MS Graduate Student, Forestry, MTU), and Clare F. Frederick (Undergraduate Forestry Student, MTU), in The Canadian Field-Naturalist, Vol 12, No. 2, pp160-163 (December 2012).

Yew berry

Photo taken from October 2011 PIF Newsletter article "IN DA WOODS by Melanie F. Fullman, US Forest Service, 'Here's Looking At Yew'

As a service to PIF members, contact Joe for special pricing in your needs for:

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Contributed by: John Schwarzmann, Forest Supervisor
Board of Commissioners of Public Lands

Dutch Elm Disease – Recommendations to maintain healthy native elms

Dutch elm disease (DED) is a vascular wilt disease caused by the fungus *Ophiostoma ulmi sensu lato (O. ulmi s.l.)*. Disease incidence for O. ulmi s.l. is high, with infection rates near 100% within invaded areas. In the last century two worldwide DED pandemics have occurred, with the second one which started in 1972, still continuing. Without serious control measures the current destructive trend will prevail.

(A)

(B)

(C)

Photos
Different vectors of Dutch elm disease:
A) H. rufipes (Courtesy of I. L. Pines, Manitoba Natural Resources,Winnipeg, Manitoba, Canada)
B) S. scolytus,
C) S. multistriatus (Courtesy of P. Svihra, University of California, Novato, CA, USA)

Principal vectors of DED

In Europe the two principal vectors of DED are *Scolytus scolytus* and *S. multistriatus,* the larger and the smaller elm bark **beetle** respectively. *S. laevis,* the intermediate-sized European elm bark **beetle**, is one of the main vectors in Scandinavia and Britain (probably the only one in Norway). The small elm bark **beetle** *S. pygmaeus* may also be involved in DED dispersal to some extent in central and southern Europe. Around 1910 *S. multistriatus* was introduced in North America. It has replaced the native elm bark **beetle** *Hylurgopinus rufipes* in many parts of the country. However, in contrast to *S. multistriatus, H. rufipes* is able to survive the cold winters. As a result, *H. rufipes* is important for DED transmission in the far northern parts of the United States and Canada. Although *S. scolytus* was also introduced in North America in the twentieth century, it never became established .

A beetle-mediated infection with Dutch elm disease usually starts on one or several branches and then spreads to other parts. An entire tree may die gradually branch by branch over a period of several years. Alternatively, dispersal of the foliar symptoms throughout the whole tree may occur within a few weeks, causing death of the elm by the end of the season. In the latter situation, infection of the elm often results from root graft transmission of DED. Occasionally - as was found on a wide scale during the first DED pandemic - trees infected in late summer may recover and show no disease symptoms the following year. However, often the wilted branches die during the winter, and in spring the disease continues to spread to new parts of the tree. Eventually, the elm dies as a consequence of Ophiostoma ulmi sensu lato (O. ulmi s.l.) moving across into a new year's growth. Twig die-back detected in early spring is indicative of autumn infection.

Resistance to DED is based on the ability of the elm's vascular system to restrict fungal spread. Like animals, plants have a vascular system of conductive tissues. Whereas animals have veins and arteries, plants have phloem that conducts sugars and hormones from the leaves to the rest of the plant and xylem, a system of tubes which are formed by vessels stacked on top of one another that move water from the roots to the leaves. DED blocks the tree's water conducting xylem and the tree simply wilts and dies because the leaves can no longer receive enough water.

The speed of this process appears to be a crucial determinant of resistance. A rapid response by the elm tree localizes the infection to a small part of the tree, giving the elm ample chances of survival. In contrast, a delayed response provides the fungus O. ulmi s.l. with the opportunity to rapidly disperse throughout the tree, reducing the tree's ability to overcome infection.

At both ends of a xylem vessels so called perforation plates are found. Transport of water is not hampered by these obstacles. However, when *O. ulmi s.l.* spores encounter perforation plates during their passage throughout the elm xylem they need to germinate, penetrate the barrier and sporulate again. Subsequently, the new spores are passively carried by the elm sap stream until another obstacle is reached and the penetration process has to be repeated.

In the small number of native elms that exhibit some resistance to DED, their xylem tissue is narrower and they are able to block the spread of the fungus within the tree by growing tissue across the xylem tubes, thereby walling off the fungus. If the response is quick and the number of xylem tubes that are blocked is small, the tree will not wilt.

The higher the number of barriers the fungus meets on its way, the more time the tree has to defend itself and to produce effective physical plugs ahead of *O. ulmi s.l.* Compared to susceptible trees DED resistant elms have relatively short xylem vessels. To overcome these obstacles *O. ulmi s.l.* needs to germinate, penetrate the barrier, and sporulate again.

In elm stems and branches of more than 2 years old, the xylem (water-conducting woody tissue) of each annual growth ring consists of a layer of early-wood vessels overlaid by a dense layer of late wood. In contrast to late-wood vessels, early-wood vessels have a large diameter and a thin wall. In general, high susceptibility of elms to DED is found only during the limited period of the year that coincides with the development of early wood. At that time the wide zone of long early-wood vessels permits the rapid transport of spores through all parts of the tree. DED susceptibility declines with the beginning of the formation of the shorter late-wood vessels, in which spores can only be carried for short distances.

Photo: *Roughness of the elm bark appears to be one of the tree's determinants of attractiveness to elm bark beetles (Courtesy of H. Kaljee, OMEGAM Groenadvies, Amsterdam, The Netherlands).*

Elm species show differences in the time and duration of the period of susceptibility. The short susceptibility period of the DED-resistant Siberian Elm U. pumila is due to its early initiation and the subsequent production of late wood. Compared to U. pumila, the susceptible American Elm U. americana shows a smaller and more delayed formation of late wood. During the period of DED susceptibility early in the growing season, the elm's xylem is dominated by large/long early-wood vessels, permitting rapid water conductance as well as rapid movement of the DED fungus. The late-wood vessels formed later in the season are small, more scattered, and less suited for *O. ulmi s.l.* spread due to the absence of interconnections between vessels and groups of vessels. Infections resulting from inoculations performed in a section of elm late-wood therefore remain localized. DED-resistant elms appear to produce fewer early-wood vessels compared to susceptible trees.

Besides environmental factors, tree age and the physiological condition of the tree, other anatomical features may partially determine the elm's susceptibility to DED infection. Such characteristics as roughness of the bark, crown shape, and height of the tree appear to be related to the attractiveness to bark beetles and, therefore, to the chance of reaching the threshold inoculum of *O. ulmi s.l.* spores for successful infection.

Chemical barriers to DED

Elms can try to raise chemical barriers against invasion of the DED fungus. These barriers may include the formation of fortified cell walls to increase resistance to degradation by fungal enzymes. In addition, the elm can produce compounds directed against the living fungal cell. An example of this last category is the deposition of phenolics in the barrier zone after DED infection.

These plant chemicals called mansonones cause a reduction in O. ulmi s.l. growth and spore formation. So far, seven mansonones (named A, C, D, E, F, G and H) have been isolated from elm. The rate of mansonone accumulation appears to be one of the factors that determine whether a tree is DED resistant or not.

Elm root graft connections

As early as 1935, the presence of root grafts in elm was observed, especially between elms growing in a crowded stand. While self-root grafts are common, root connections between different elm species are rarely reported. When elms have developed by suckering from a common root system (e.g., hedgerows), root contacts similar to root grafts are present. Approximately all trees over 20 cm in diameter produce root grafts if the stems are no more than 7 m apart. The inter-tree distance at which root graft formation can still occur increases with the age of the tree. Regularly, root graft connections have been observed between elm trees growing 35-50 ft. apart. However, large elms may be grafted over distances greater than 50 ft.

O. ulmi s.l. is able to move from one elm tree to another through grafted roots. Extensive brown streaking in the wood of the trunk and buttress roots on that part of the elm nearest a previously diseased elm, indicate DED transmission by root connection. Once DED has become established in a community, spread through root grafts may be responsible for up to 80% of the elms killed.

Root graft connections may strongly influence the biological processes of the trees involved. Approximately all elms over 8 in diameter produce root grafts if the stems are no more than 20 ft. apart.

Transmission of Dutch elm disease by root graft connections .

Biological Control

The most important enemies of elm bark beetles are woodpeckers and wasps Although they are able to strongly reduce the number of elm bark beetles at a particular field location, their activities never completely devastate the beetle population.

Photo: woodpecker

Management Recommendations

1. There is some natural resistance to DED in populations of native elm species. This resistance is not immunity and all trees can be killed if they are weakened or receive a large enough dose of spores to overcome their defense mechanisms.

2. In areas with concentrations of young elms, thin out the elms so that there is at least 20 feet between the edge of the crowns. Thinning should hinder the formation of root grafts.

3. Elm trees are very sensitive to competition. They don't tolerate any shading from neighboring trees. Healthy elms should be "released" from competitors so that the crown of the elm is at least 7-10 feet away from neighboring trees.

This material as well as other information about DED can be obtained from the source below:

Annemarie S. Buchel & Ben J.C. Cornelissen
Swammerdam Institute for Life Sciences.
Faculty of Science, University of Amsterdam, the Netherlands.
http://www.dutchelmdisease.org/

Have you checked out PIF's website?

www.partnersinforestry.com

The website is for members to expose your business, service or tree farm, share thoughts, ideas, articles, photos, and links.

This is your COOP, we need your input as much or more than your dues.

Article Intended for Lake Associations' Newsletters in Vilas, Lincoln, and Oneida counties.
Article by Brian Schwingle, WI DNR Forest Health Specialist, 715-536-0889

DEADLY OAK WILT FIRST APPEARS ON DEVELOPED LAKESHORES IN NORTHERN WISCONSIN

The DNR detected Oak Wilt for the first time last year in Vilas, Lincoln and Sawyer counties. Oneida County was found to have this fatal fungal tree disease for the first time in 2010. In each case the infected tree was growing on a lakeshore or river edge property, and the affected property was surrounded by hundreds of seasonal homes.

It is noteworthy that none of these counties in northern Wisconsin has an Oak Wilt find in an undeveloped forested area (see map below). The reason for this is not because foresters and forest disease experts are not actively surveying for this disease, but rather, it is because seasonal homeowners, developers, and ornamental tree care workers are guilty of spreading this damaging disease. Eventually this disease will march into undeveloped forests, as it has in southern and central Wisconsin.

So what should lakeshore property owners do about Oak Wilt? Besides learning about what infected oaks look like (see Figures 2 and 3), they need to know that humans can easily prevent this disease from entering an area. After all, the beetle that carries this disease only flies up to a quarter mile from the originally infested firewood pile or tree, and it rarely flies that far. By simply not transporting fresh oak firewood (less than 2 years old) from an infested area to a clean area, people can prevent Oak Wilt. Not wounding oaks in any way between April and July is also an important strategy to avoid Oak Wilt. Lastly if oaks are damaged in any way from April through October, those wounds should be cut clean and the cut surface painted with a latex-based paint to prevent disease transfer.

For as long as communities, property owners, developers, and tree care professionals ignore the easy strategies to prevent Oak Wilt, the disease will continue to spread into clean areas of Wisconsin, decreasing property values and killing beautiful oaks. Please prevent Oak Wilt and report suspect infected oak trees to a professional forester or Extension agent. Educate your neighbors, community leaders, property developers, and tree care professionals about the easy ways to prevent Oak Wilt.

Additional information about Oak Wilt can be found online using the keyword "oak wilt" at dnr.wi.gov.

Joe:
When I resided in Central Wisconsin some years ago I had witnessed apparently healthy red oaks wilt, brown and loose leaves in a week's time. We must be diligent to protect wilt free areas from oak wilt. I was angered just last summer as the Vilas County Highway Department spent weeks along County Road K with a large rotary delimbing machine, exposing open wounds on numerous red oaks along a scenic road.

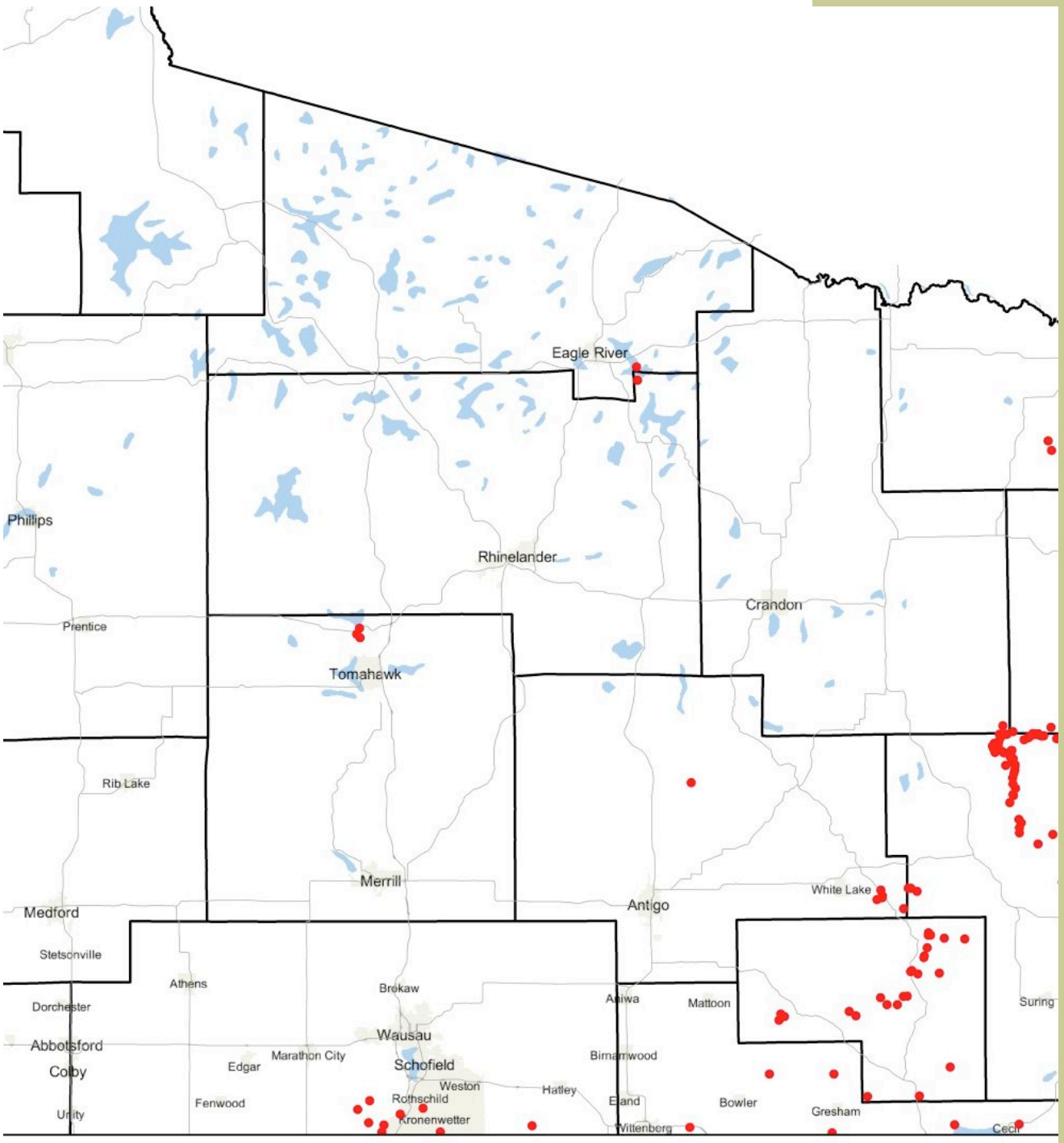

Figure 1. Red dots represent confirmed or suspected Oak Wilt cases in North-central Wisconsin. Only the northwestern edge of infestation is shown for Menominee County. The closest confirmed Oak Wilt in Michigan's U.P. is in southeastern Iron County (MI), north of Florence County (WI).

Figure 2. An oak tree with Oak Wilt at the end of August. This tree was perfectly healthy in May. Now it is dead. Other diseases, insects, and severe drought can kill oaks, but none will kill a healthy oak in only a few months.

Figure 3. Northern Red Oaks with Oak Wilt often times shed their leaves quickly starting in mid to late June (left). Fallen leaves will be totally green or bronze, or they will have brown tips (right).

What Did **YOU** Do to Recognize and Celebrate Earth Day This Year?

By Rod Sharka

If you stayed indoors on Monday, April 22 this year, you probably weren't alone. Given the weather conditions (at least in Lake Tomahawk, WI) of cool, dreary, drizzly rain with a foot of icy snow still on the ground, it wasn't a very pleasant day. However, about two dozen dedicated AP Biology and Environmental Science students and their teachers from Lakeland Union High School in Minocqua spent the day helping DNR Forest Ecologist Colleen Matula map, cut and control an invasive bush honeysuckle population that had established itself on an old DNR owned tree nursery/plantation near Lake Tomahawk. I know, because I was also there helping as a representative of the Wisconsin Headwaters Invasives Partnership (WHIP). As you are aware, PIF is a participating member of WHIP, along with several county, state, federal, tribal, and private agencies, all with a common interest in fostering public awareness of terrestrial invasive species and implementing programs for their control and management.

Actually, this was a terrific educational as well as practical control event, and is an example of the extra effort that DNR ecologist and new PIF member, Colleen, extends every day in her role as DNR Forest Ecologist. Not only did the day's activities successfully instill an awareness of and appreciation for the serious threat that terrestrial invasive species like Eurasian Bush Honeysuckle impose on forest health in our environment, but it contributed to reducing the risk of spread of this species. Colleen explained that expected disturbance caused by a timber sale that is scheduled in this tree plantation would likely cause the spread of the honeysuckle if it wasn't controlled first. It should be noted that it is important to treat the cut stumps of honeysuckle with an appropriate herbicide to prevent re-sprouting. Due to the weather conditions, this was not possible on the day of the event, which meant that Colleen would have to make a second trip back a day or two later to treat the cut stumps.

As our newest PIF member, please join me in extending a warm welcome to Colleen for joining our PIF family. I have had the privilege of knowing Colleen for several years and can attest to the fact that, for anyone who cares about our natural environment, she is a good person to know. I'm sure that all PIF members will appreciate her personal dedication towards managing and protecting the sustainability of our northwoods. See the interview of Colleen by Charlie Mitchell in the next issue.

Colleen instructing students.

Students energetically whacking a honeysuckle bush

Photos:
Michele Woodford

Municipal Forests

In Wisconsin and Michigan, there are hundreds of thousands of acres of forested land owned by hundreds of different municipalities. This does not include the 30 county forests (29 in WI and 1 in MI) with organized forestry programs. I am referring to counties as well as townships, cities, schools, or any other type of public entity with forestland that do not have foresters on staff.

The focus of attention for those of us involved in forestry/logging is often the state and federal forests. Obviously, the acreage involved with municipal forests is minuscule compared to the millions of acres of state/federal forest in both states. However, the ability to impact how these municipal forests are managed should be much easier realized than that of influencing state/federal forest management. The management or non-management of these municipal forests is controlled by boards, councils, commissions, etc. comprised of members from that municipality. These members, many times, are your friends, relatives, or maybe even yourself. At the very least, they are your representatives.

What benefits can managing these forests bring to the municipality, itself?

- A healthy, well-managed forest that can be used as an example for other landowners
- Income. For example, the school district I live in has a 2,000+-acre forest that has been actively managed with the assistance of a consulting forester for the past 36 years. A forest management plan is in place for this property with scheduled harvest occurring on a regular basis. Over one million dollars of income has been realized over that time. Obviously most municipalities do not own this amount of forested acreage, but for most, any income would be greatly appreciated.

Having a forest management plan is key. With the regular change over in staff and elected representatives that municipalities go through, it is imperative that the governing body be able to refer to an accepted, guiding document as provided by a forest management plan. Many times, in order to address budget shortfalls, these municipal forests will be harvested in desperation with no consideration to sustainability or long-term management. Whereas if a management plan was followed, it is likely that far greater income could be realized in the long term. I do realize many of these properties have long-term uses (building, sites, roadways, gravel pits, etc.) other than forests planned, but why not maximize the benefits from those forests until the time those other plans are realized?

I am not saying that there are no municipal forests being actively managed, the school forest I mentioned is a great example of active management. There is also an active school forest program in Wisconsin that promotes and assists schools with developing management plans and managing their forests. However, there are many more municipalities with the potential to manage actively their forests for multiple benefits to their local communities.

Proactive involvement by GLTPA members in working with local municipalities to encourage forest management on these properties can yield multiple benefits including realization of forest income for the municipality, public awareness, more forest acreage being managed, and more forest product in the marketplace.

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Timber Harvesting Schedules

I did a forest resource assessment for a client who was considering increasing their wood consumption dramatically. My assessment of their procurement area showed that the wood needed for their expansion was readily available, but the company was still concerned about the public perception that forests would be devastated in order to supply this expansion. They asked me if there was a way that I could present the projected harvest numbers giving the company a way to calm the potential public qualms over this expansion.

After giving the situation some thought and taking into account the different ownership types (federal, state, county, private, and industrial) and past/projected annual harvest acreages, I came up with an explanation that pleased the client and took into account the five different ownerships listed above. An average of 2.1% of all forested acreage had a harvest on it annually. This ranged from 1.7 to 3.3% by ownership sector. Put in simple terms, this meant on average, that an acre of forestland would be harvested every 48 years (range: 30 to 59 years). When the data is thought of in this way, it gives a very different perception of the impact that timber harvesting has.

Using percentages is a very easy way to get a quick gauge of when a certain ownership is being managed to its full potential. Of course, this alone does not tell the true story. If aspen were the only timber type on an ownership, 50-year entries would be a good number. On the other hand, if an ownership was all northern hardwood being managed on an all-aged basis, entries would typically be every 10-15 years, stated another way; 6-10% of the acres would have a harvest on them in any given year. For a better example, combining equal acreages of a clearcut species, such as aspen, on a 50-year rotation with northern hardwood on a 12-year selective harvest schedule an average acre would be entered for harvest every 31 years or 3.1% of all acreage would have a harvest in any given year.

Of course when doing the computations you must look at only the acreage that is being managed for timber production, not the entire ownership. Non-productive swampland, wilderness areas, and other areas not being actively managed should not be figured into this percentage. There might also be other values (wildlife, aesthetics, water quality, etc.) taken into consideration other than timber production when determining a harvest schedule. However, active management that provides trees optimum growing space and takes full advantage of the ages when tree have the highest vigor also often provides benefits for other values such as encouraging new growth for wildlife and increased heath and vigor to help against insect and disease outbreaks.

Although an aspen stand may survive until 70 years of age, often times, the stand will have less volume than it did at 50 years as well as having more rot and defects reducing the wood quality. In addition, if a stand were cut at 50 years old, the new stand would already be 20 years old instead of harvesting an over mature, lesser quality stand at 70 years of age. There are many examples in all timber types of harvests/thinnings being less frequent than they should be for optimum tree growth, health, and vigor.

Often times we do not take into account the negative impact of delayed management on forest health and local economies. By paying attention to both forest management and timing of forest management, we can hold the various forest landowners more accountable.

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Have you paid your PIF dues?

Future Articles

If you have questions that you would like to see addressed in the newsletter, suggestions for, or have articles for, future newsletters, please contact us at partnersinforestry@gmail.com or by mail:

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"This institution is an equal opportunity provider."

Protecting your wooded land for the future is essential to clean water, clean air, wildlife habitat, sustainable wood supply…all things that are necessary to society and health, and that are gone forever if the land is developed.