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Partners News

June 2016

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.

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Inside this issue:

Welcome New PIF Member(s)

Joe & Karla Berken

INTRODUCTION TO THE HIGH GRADING ARTICLES

One of the very first directives of PIF was to do everything in our power to encourage true sustainable forestry, and expose improper cutting for what it is: stealing from the future. We often discuss in forestry of the importance of adding value to our timber crop, and that starts with nurturing the 'crop trees' to grow to full potential.

There are all too many reasons driving people to poor forestry practices, we often term these practices 'high grading or diameter cutting.' An example that I can not help but allow to linger in my mind is 420 acres the Ottawa National Forest will acquire from the Delich land exchange.

We are very fortunate to have two complimentary stories for you. PIF friend Paul Hetzler from Cornell Extension calls it Golden Goose Forestry. And our own John Schwarzmann gets right down to the details in economics with specific examples. After reading these great stories PIF hopes we all have a better understanding of just how bad a practice 'high grading' can be.

Diameter Limit Cutting is a form of high grading, which means the removal of only certain species over time or above a certain size or of high value, leaving residual stands composed of trees of poor condition or species composition, through which the forest may become depleted over time of the best genetic growing stock. Many forestry practices have advantages and disadvantages for future stands. Highgrading has no advantage. *See the features by John Schwarzmann and Paul Hetzler, as well as John's December '15 story.*

HIGH VALUE FORESTRY, please do not succumb to diameter limit cutting!

John Schwarzmann, Forest Supervisor
Board of Commissioners of Public Lands

John Schwarzmann guiding a landowner in sizing up the potential in growing red oak veneer. John made the point that often growing larger diameter can increase grade by growing over minor defects. This tree is 18" dbh and this landowner has no interest in practicing "golden goose forestry".

To date, managers of northern hardwoods have frequently marked timber based upon a target diameter distribution with a reverse J-shaped diameter shape where the top diameter is normally 24 inches. In this distribution there are, for example, approximately 1.3-1.5 times as many trees in the 7-9 inch diameter class as there are in the 9-11 class. When graphed, this reverse j-shaped distribution is named after Carl Arbogast, a scientist who did early research into northern hardwood forestry. One complaint with the Arbogast diameter distribution is that some large sugar maple trees lose value to large dark heartwood discoloration towards the top target diameter of 24 inches. While discoloration can become more frequent as trees approach 24 inches in diameter, this defect is exaggerated because even with a top diameter of 24 inches, due to the reverse j-shaped diameter distribution, most trees are still under 21 inches in diameter and the large sawtimber makes up 10-20% of the canopy and sawtimber volume. Heartwood discoloration is also poorly understood. Factors others than large age and size, such as soil pH, injury, and soil drainage appear to be involved with discoloration. Certain higher pH soils do not appear to develop large hearts in sugar maple nor do very well-drained high nutrient soils in other locations.

Some large forest landowners and timber buyers who place a premium upon short-term gains are proposing to reject the conventional Arbogast system and cut maple dominated northern hardwood stands according to a diameter limit. Typically, all trees above a certain diameter between 14 and 21 inches are cut. While theoretical economic projections that aim to meet an arbitrary rate of return target may provide some rational for diameter limit cuts, there are no current long-term silvicultural trials that show diameter limit cuts between (14-21 inches DBH) in either even-aged hardwoods or all-aged stands sustainably maintain timber values nor provide adequate regeneration conditions. Economic theory simply fails to take into consideration detrimental impacts upon regeneration, drastic losses in crop tree numbers and quality, lack of ingrowth into crop trees, crop tree spacing, and loss of veneer quality. Economic theory simply assumes that crop trees numbers will be held constant assuring long-term yields. That assumption is simply not warranted under existing conditions in most of the forests of the Upper Midwest.

The reasons against managing hardwood stands using a diameter limit cut falls generally into three categories: 1) Loss in future timber quality and yield ; 2) Detrimental impacts upon regeneration; 3) Elimination of critical wildlife habitat.

Loss in future timber quality and yield – If a diameter between 14 and 21 inches takes paramount importance when selecting trees to remove in timber sales, the likelihood of removing too many crop trees in a single harvest and thereby reducing the value of future harvests is very high. The reason is that crop trees are rarely evenly distributed among all of the tree sizes due to past episodic regeneration. Frequently, crop trees are found in predominantly two to three diameter classes such as 11-13 inches and 19-21 inches. In some second-growth stands originating from a past heavy cut, nearly all of the crop trees can be bunched into one or two sizes. When a large portion of the crop trees are found within a narrow diameter range, a single harvest could eliminate so many crop trees that there would not be enough crop trees to spread out over the ensuing 3-4 cutting cycles. This problem is exacerbated by the fact that in many stands of northern hardwoods in northern Wisconsin, ingrowth of new crop trees is severely lacking due to loss of regeneration to deer browsing over the past 25-30 years and the suppression of existing saplings via lateral crown expansion in small gaps. The condition in most northern hardwood stands is that there are a very finite number of crop trees that must be well managed to sustain valuable harvests for the foreseeable next 3-4 harvests.

For example, typically northern hardwood stands contain 25-50 crop trees per acre with an average of 35-40. Over the next 4-5 cutting cycles it would make sense to cut 4-10 crop trees per acre per harvest. If trees between 14 and 18 make up more than this fraction, a single cut would reduce the number of crop trees that could be harvested in the future.

Another reason why using a diameter limit cut would reduce future value growth is that spacing and basal area constraints would no longer be applied when selecting trees to mark for harvest. Since crop trees are often grouped together because they originated as a cohort of fast growing trees in big gaps following blowdowns that removed 20-50% of the canopy, cutting groups of crop trees within a diameter class would result in the creation of large gaps and the overexposure of any adjacent crop trees in the intermediate, suppressed and co-dominant crown class. Many of these trees develop epicormic branches and lose value. A significant fraction would no longer even be considered crop trees.

The loss of timber quality due to insect attack is another reason to avoid diameter limit cuts and even-aged hardwoods. Harvest studies at the Argonne Experimental Forest in NE Wisconsin have shown that low forking caused by a bud minor and bark necrosis caused by the Sugar Maple borer are more frequent in even-aged stands. Seams and cracks are also more frequent in these stands.

Cutting trees between 14 and 18 inches DBH would also limit the value of future harvests by greatly reducing the potential for prime veneer. In northern hardwoods, veneer trees between 13 and 17 inches in diameter often grow into prime veneer between 17 and 21 inches in diameter. The reason for the jump in value from veneer to prime veneer is that the permissible defects associated with regular veneer are small enough to be covered by additional diameter growth. A small knot in a 17-18 inch diameter tree is often no longer recognizable when that tree reaches 21 inches in diameter. If you look closely, most of the veneer-quality trees below 18 inches DBH are regular veneer while most of the veneer trees between 18-21 inches are prime veneer.

While loss of future timber value is very important, diameter limit cuts can also reduce future timber growth as well. The reason is that the trees that would be released from competition by cutting neighbor trees would more often be small-crowned, intermediate and suppressed non-crop trees. In conventional timber harvests, poor-vigor trees are removed next to crop trees so that enhanced

growth can occur on more valuable trees. The opposite situation would occur if the highest value trees are preferentially removed. Obviously future timber values would decline since more growth would be concentrated upon tress that can't jump in value due to poor vigor or defects.

If diameter limit cuts are used in conjunction with even-aged forestry, slower forest growth would be the result. The reasons are twofold. Even –aged forests go through a stage when almost all the trees are small seedlings and saplings. While these trees may grow quickly in height, they grow very little in wood volume. Uneven-aged or multi-aged forests never go through this stage of slow growth. Secondly, uneven-aged forests have a much more complex multi-layered canopy capable of capturing more light than the single-layered, even-aged forest where the trees are nearly all the same age and tree heights are very similar. The ability to capture more light is another way that uneven/multi-aged forests outgrow even-aged forests.

Detrimental impacts upon regeneration

Making tree diameter the top criteria for selection in a harvest is also likely to detrimentally impact tree regeneration. Again, the uneven distribution of crop trees would lead to the harvesting of groups of trees resulting in the creation of large gaps. Large gaps over much of northern Wisconsin are becoming dominated by berry bushes to the exclusion of desirable tree regeneration. Gap studies on the Nicolet National Forest, Oneida County Forest and Northern Highland American Legion State Forest all show that large gaps are not regenerating. They are filled by raspberry, elderberry, blackberry, Penn sedge and ironwood saplings. Recent research has shown that large gaps are warmer than small gaps resulting in more organic matter decomposition. Enhanced decomposition causes a nitrogen flush which stimulates nitrophillic species such as raspberry. The Nicloet National Forest study showed that raspberry bushes can capture a gap and preclude regeneration for as long as two decades resulting in a loss of productive timberland acreage as these gaps are no longer growing trees.

Where small gaps are created through the removal of one or two adjacent trees, regeneration may not be much better off. In a forest where the top diameter is only 18 inches, all of the trees would be in a stage where crown expansion is rapid. Again studies have shown that gaps can close up at a rate of 15 inches per year when the trees surrounding the gaps are young pole-sized or small sawtimber-sized trees. Any regeneration in such a gap would stand a very high likelihood of becoming suppressed from overhead lateral crown expansion of surrounding trees.

Under normal conditions, tree mortality follows a u-shaped diameter distribution where both very small trees and very large old trees die at much higher rates than trees between 6 and 20 inches in diameter. Since trees would not get old in 14-18 inch diameter limit cuts, the production of well decayed, large coarse woody debris (CWD) would be minimal. CWD is a common substrate for germination of yellow birch, upland white cedar and eastern hemlock. While these seedlings require other factors besides decayed CWD for their successful recruitment, without CWD, their numbers will no doubt be much lower. In addition, decayed CWD provides organic matter which acts as a moisture holding mulch for other benefit of other tree species.

Elimination of Tree Species, wildlife habitat and other ecological functions

The composition of most northern hardwood stands consists of shade tolerant sugar maple and eastern hemlock with minor amounts of mid-tolerant shade species such as yellow birch, basswood, black cherry, white ash and red oak. While shade tolerant trees can regenerate at intervals of 10-40 years when wind or a timber harvest knocks down 10-20% of the canopy, mid tolerant tree species require large gaps created through heavy partial wind disturbances that occur on average once every

300-400 years. The result of these episodes is that mid-tolerant species largely consist of a single age class where most of the trees are similar in size. If these trees fall within the diameter limit cut zone, all of the crop trees could be eliminated for an entire species in a single timber harvest! It would drastically reduce already meager mid-tolerant tree numbers and reduce seed production detrimentally impacting regeneration. Eliminating or reducing mid-tolerant tree species leads to near pure sugar maple stands which are targets for timber quality reducing insect attacks of sugar maple borer and bud minors.

While the reduction in mid-tolerant tree species composition is a serious economic and ecological impact, the lack of CWD and snags as mentioned above would have an enormous impact upon wildlife communities. Numerous studies have shown that many bird, reptile, mammal and insect species require snags and downed large coarse woody debris for all or portions of their life cycle. Any walk through the woods provides ample evidence as to the importance of snags. They are riddled with woodpecker cavities and other holes used by birds for shelter and mammals for hibernation. It is quite literally impossible to find a snag that is not a magnet for wildlife activity. Dead wood is a critical wildlife habitat feature in lakes and streams and is no less important in terrestrial ecosystems. Without ample dead wood, the lack of CWD habitat for insects and small amphibians undermines the entire base of the food chain.

Studies have also shown that both large trees and abundant CWD is critical for the efficient nutrient cycling, especially for growth-limiting nitrogen. Lichen species that fix nitrogen are more prevalent on large trees because in most cases, older trees have rough bark that provides attachment points for a wide variety of lichen and moss species.

PIF is proud to have John as vice president. John is the Forest Supervisor for the Wisconsin Board of Commissioners of Public Land and oversees management on the Trust lands in Northern Wisconsin.

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GOLDEN GOOSE FORESTRY

Paul Hetzler
Natural Resources Educator at Cornell Cooperative Extension

What do you call a dairy farmer who spends decades improving the genetics of a herd, then abruptly sells all the best animals to start a new herd from scraggly, unproven stock? Crazy, perhaps, or foolish at the very least, right? (Or maybe someone with a gambling debt).

Under normal circumstances, no livestock farmer culls their best animals to start over with random ones. Yet it's common for a woodlot owner to sell all the large, well-formed trees during a timber sale and leave nothing but small and defective trees to regenerate the next forest.

Genetic variation in trees works just like it does in other organisms. If you take a thousand seedlings, some are going to have a slight genetic

Please consider sharing your experiences and interesting observations with us for the newsletter.

advantage. Maybe they are more efficient at photosynthesis, or they're less apt to develop weak (narrow) branch attachments that are prone to breakage. When an unusually straight, fast-growing tree rises head and shoulders above its peers, it's generally more than mere chance—that tree probably has something the others don't, and that's the one you want seeding the next forest.

The multigenerational process of choosing superior genetics in trees is called silviculture. Ideally a forester marks defective trees to cull for firewood, and marks some mature trees for harvest. She or he intentionally leaves some of the very best trees for seed.

This kind of timber production is sustainable in both an economic and ecological sense. Not only does the overall gene pool improve, but periodic selective harvesting creates openings in the forest canopy, increasing habitat diversity as it releases understory trees.

Many forest owners have heard of silviculture but continue to practice what some foresters call "silver-culture," maximizing short-term gain at the expense of long-term forest health. Harvesting all trees above a certain size, known as a diameter-limit cut, has been called "selective harvesting" by unscrupulous loggers (and even the occasional forester).

Land owners can protect themselves from such deception by hiring a consulting forester to inventory timber, mark trees and oversee a harvest. For information on locating a good consulting forester, contact Partners in Forestry or go to the DNR website.

The thing is, a diameter-limit cut may be worse than clear cutting. Like a clear-cut, it causes much residual damage and soil disturbance. Coupled with greatly increased light penetration, this can lead to unwanted vegetation taking hold, either an invasive like swallow-wort or a native like hay-scented fern. Such plants are called "interfering vegetation" because they inhibit seedling germination and survival, often delaying the start of forest regeneration for many years.

Most forests are roughly even-aged, meaning tree size differences have more to do with genetics, and of course site conditions, than with age. While clear cuts take the bad with the good, diameter-limit cuts take only the best, leaving the runts to re-seed the forest. Going back to the dairy, this is like a farmer knowingly getting a bull whose progeny produce less milk, not more.

Have you paid your PIF dues?

A prevailing opinion in our culture right now seems to be that doing the right thing for the environment will hurt financially. Although that may be true in some instances, it is definitely not the case in forestry.

Dr. Ralph Nyland, Professor of Forestry at the State University of New York College of Environmental Science and Forestry in Syracuse stresses that forestry is a very long-term endeavor. He believes we have to start thinking much farther into the future. Dr. Nyland illustrates why good forestry make the most cents—and dollars—in the following example:

Assume you and your neighbor have identical woodlots with salable timber (everything 16" in diameter and larger) worth $20,000. Your neighbor goes for a diameter-limit cut and gets that entire amount. But you mark a select cut, harvesting $10,000 worth of timber and leaving trees of equivalent value standing. It sounds like your neighbor made out better, doesn't it? Just wait.

The next time you can harvest is fifteen years later. By that time, your timber is worth $34,000. You harvest half, leaving trees valued at $17,000. Your neighbor won't yet have enough salable timber for a harvest at this time.

Thirty years after the first cut, your neighbor again has salable timber valued at $20,000. Their total income plus residual value after 30 years is $40,000. Your timber, though, will now be worth $77,000, which means that your total income plus residual value after 30 years is $104,000. Now we have two winners, both you and your woodlot.

OK, what do you call a poultry farmer who kills the goose that lays one golden egg each day just to get his hands on two or three gilded ova all at once? Well, for starters you'd call them fictional, but also dumb as a rock. Don't manage your woodlot like that.

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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.

Are you concerned about Monarch Butterflies? I want to help.

By Marion True, USFS Silviculturist (retired)

Dear PIF members and friends,

The above subject may be of interest in your newsletter and no doubt some readers will have much more to say. I am just getting started in this milkweed growing game. I harvested quite a few common milkweed (Asclepias syriaca) pods last October-November along an old RR grade in Ironwood. I de-fuzzed and scattered some seed in a garden patch just before snow fall. The over winter provides the "cold stratification" needed for spring germination. Now, I still have quite a bit of seed with fuzz TO GIVE AWAY. I'll even pay postage! Some seed I over wintered in a couple of boxes in our unheated garage. That may have provided the cold stratification needed for this spring planting and germination. Other seed I kept in a bag in our basement at something like 50 degrees F, is also available. That likely will require some kind of a quickie cold shock treatment to that seed (fun and games) prior to this spring planting. So, if any of your readers want some seed, have them e-mail or call me.

There are lots of WEB sites on this subject, such as: monarchbutterflygarden.net/milkweed-plant-seed-resources/. You can also get a lot of information with a google search, "monarch butterfly" or something related. For this spring I suggest seeding be in peat pots with potting soil, so you can keep close contact on any germination. Keep warm, well watered. Transplant germinated seedlings per instructions. Common milkweed is native and is readily available in the wild. However, milkweed seed, seedlings, even Monarch caterpillars may be available to purchase. It would be wise to avoid purchasing milkweed seedlings (key food for the butterfly) from a business that treats whatever plants they sell with an insecticide that is toxic to certain bugs, flies, etc. The insecticide active ingredient half-life may remain toxic to butterflies, bees, etc., attracted to the milkweed seedlings.

I separate the seed from the fuzz by placing the fuzzy seed in a paper bag (bag #1) along with some used wooden thread spools. Tie or roll shut the top of bag #1, but snip a small hole in the bottom corner of the bag, just large enough to allow separated seed to pass thru. Place bag #1 inside a second bag, bag #2. Into bag #2 the seed drops. Tie or roll shut the top of bag #2. Now comes the fun part. Shake, rattle and roll the bags. The thread spools help provide the separation in bag #1. It is suggested this not be done in the house. Both bags are opened up to collect seed and also view the separation success. Last fall I did mine in our garage.

mariontrue@charter.net Phone: 906-932-1606.

PIF note: We encourage any one interested to get a hold of Marion, a very friendly and knowledgeable individual. Marion is one of the guys under the hemlock on another page.

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Thinking like an investor: why diverse forests are a good bet for an uncertain future

Stephen Handler

Northern Institute of Applied Climate Science, USDA Forest Service Northern Research Station

A big part of my job is to talk with forest landowners about their investments. So, am I a stock broker? No. A financial advisor? Nope. A real estate salesman? Wrong again. I'm a climate change specialist with the USDA Forest Service and the Northern Institute of Applied Climate Science, and my job is to help foresters and landowners prepare their woods for climate change.

Trees live for a long time – several decades to centuries, depending on the species – so managing and conserving forests requires careful long-term planning. In a lot of ways, managing a forest is like managing a retirement portfolio. Forests are assets that mature slowly over time, just like you expect your retirement investments to grow over decades. You're mostly concerned with the economic value of your retirement portfolio, but forest landowners can think about "value" more broadly – in terms of economics, aesthetics, ecological value, and more. Landowners have a lot of flexibility to choose their management practices based on their individual goals, risk tolerance, and other factors – just like the flexibility you have as an investor. These goals and attitudes towards risk can change over time, just like your investment strategy might change depending on whether you're 30 or 80 years old. Adding to the metaphor, changing climate conditions and unpredictable weather events will add risks for a forest, similar to the uncertainties in our chaotic and interconnected economic system.

So what can our retirement portfolios tell us about how to take care of our woods? Well, regardless of whether you're a risk-taker early in your career or cautiously nearing retirement, it ***always*** makes sense keep a diverse investment portfolio. As the old saying goes, "don't put all your eggs in one basket." It's a losing bet to have all your retirement savings pooled into slow-growing securities, and it's also a risky bet to invest all of your savings in the next "hot stock" like Facebook or Pets.com. Diversifying your investments reduces the chance that any one bad year (or series of bad years) will ruin your savings, and it increases the chance that you'll reap the benefit of a good year.

So, if diversity is crucial for long-term risk management, how can landowners encourage diversity in your woods? Here are a few suggestions for how diversity can help your woods tolerate changing climate conditions:

Species Diversity: Forests naturally contain mixes of different tree species, and you can evaluate each species in terms of climate change risk. Northern or boreal species like quaking aspen, black spruce, and balsam fir are expected to decline in the Northwoods across a range of climate scenarios, while some species like red maple, white pine, and shagbark hickory are projected to do well. As a landowner, you should look for opportunities to maintain a diverse mix of species on your property – try not to have all your forest dominated by one or two species.

If you're going to plant some new trees on your property, you may want to focus on species that are projected to tolerate future climate conditions. If you're more cautious, you can plant native tree species that are already common but expected to do well in the future. If you're willing to take risks, you can try planting tree species that are currently uncommon but expected to do well – perhaps even some long-distance migrants from southern Wisconsin!

Genetics: Foresters are already used to thinking about genetics in their work, because they favor high-quality genes by retaining trees that have resisted pests and stress and remove trees that have succumbed to these factors. As a landowner, you might also notice that a certain pocket of aspen has withstood a drought better than another pocket, or that certain individuals of other species just

seem to be superior. You can try to favor these high-performers through management. Additionally, if you're going to be planting trees but you don't want to use new tree species, you may be able to introduce some genetic diversity by acquiring seedlings from locations further south in Wisconsin. The idea here is that populations of trees that currently live in areas exposed to more heat and drought might have genetic adaptations that allow them to tolerate those conditions.

Structure: The structure of a forest includes the horizontal spacing among trees (including gaps in the canopy) as well as the number of layers of vegetation (dead trees, forest floor, tree seedlings, young trees, sub-canopy trees, and dominant canopy trees). Keeping a diverse forest structure provides a variety of micro-site conditions that result in different amounts of moisture, temperature, shade, and ground cover. These different micros-sites can help different tree species to find their optimum growing conditions. Additionally, keeping several different age classes of trees on your property is another way to reduce risk, because trees are more susceptible to certain risks at different ages. For example, young trees are more susceptible to drought, while older trees might be more susceptible to insect pests. Keeping a few different age classes will reduce the chance that any one event will cause a lot of damage.

Climate change will challenge Northwoods forests over the next several decades, sometimes in unpredictable ways. We might not have all the answers for how to best prepare for the changes that are coming our way, but landowners and foresters will do well to encourage diversity. As a general rule of thumb, it's a great way to reduce risk. And while you're at it, go ahead and diversify your retirement portfolio, too!

A young aspen stand, which currently has a single age class. Keeping multiple age classes on your property or across a landscape is a way to increase diversity. Photo credit: Maria Janowiak, USDA Forest Service.

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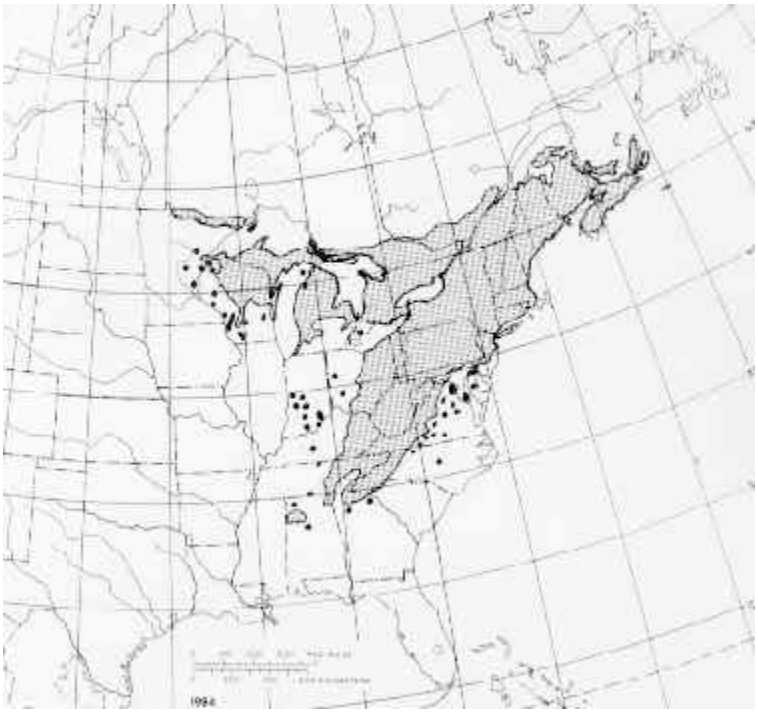
A big thank you to the University of Wisconsin Center for Cooperatives for once again placing faith in the mission of PIF. We appreciate their support for our efforts in assisting members and the public with sustainable forest management and conservation.



Tsuga Canadensis: HEMLOCK

Eastern hemlock, also called Canadian Hemlock or Hemlock Spruce, grows well in shade and is very long lived. It commonly reaches 100 feet in height and three feet DBH, exceptional trees are recorded at 175 feet tall and 6 feet DBH. Largest recording are in the southern part of its range.

The leaves are typically 15 to 20 mm (0.6 to 0.9 inches) in length, but may be as short as 5 mm (0.2 inches) or as long as 25 mm (1 inch). They are flattened and are typically distichous, or two-ranked. The bottom of the leaf is glaucous with two broad and clearly visible stomatal bands, while the top is a shiny green to yellow-green in colour. The leaf margins are very slightly toothed, especially near the apex.

The wood is soft, coarse-grained, and light buff in color. Relatively light weight, air-dried, a cubic foot weighs 28 lbs. The lumber is used for general construction and crates, but can be prone to ring shake. Because of its unusual power of holding spikes, it is also used for railroad ties.

Hemlock can grow at sea level in the northern part of its range but is only found at higher elevations as the range reaches south. Minnesota is the far west edge of its range and it occurs eastward to the Atlantic and south in the Appalachians.

It is found on rocky ridges, ravines and hillsides with relatively high levels of moisture.

There are, on the average, about 200,000 hemlock seeds per pound when cleaned. The light brown seeds are small at .1″ in length and grow egg shaped, with wings of .3".

Hemlock is generally confined to areas with cool and humid climates. Precipitation in the areas where it grows is typically 29 inches to more than 50 inches per year. The lower number is more typical of northern forests that receive heavy snowfall; the higher number is common in southerly areas with high summer rainfall. Near the Atlantic coast and in the southern Appalachians where the trees often reach their greatest heights, annual rainfall often exceeds 60 inches. In the north of its range, the temperatures in January average -12 °C, while in July they average only 16 °C. In these areas, the frost-free season can last fewer than 80 days. In contrast, the southern end of the range experiences up to 200 days without frost and January temperatures as high as 6 C.

The species is currently threatened by the hemlock woolly adelgid (*Adelges tsugae*. See the Pest Alert included or at http://na.fs.fed.us/spfo/pubs/pest_al/hemlock/hwa05.htm, and read a following story by Paul Hetzler.

Fully stocked stands of eastern hemlock form such a dense canopy that an understory seldom is able to develop. Natural stands of eastern hemlock nearly always contain a large component of relatively even-aged trees but consistently have a stocking of older age classes and larger diameter trees that provided shelter during the regeneration period.

Eastern hemlock is the most shade tolerant of all tree species. It can survive with as little as 5 percent of full sunlight, but under severe suppression only partial growth rings form and some may be missing entirely from the lower bole areas. In one study, from 10 to 40 rings were missing for a 120-year period of suppression. The tree is capable of withstanding suppression for as long as 400 years.

At all ages, however, eastern hemlock responds to release in both height and diameter growth. Growth rates in excess of 6.4 cm (2.5 in) per decade are possible following release either from side or overhead suppression.

In mixed stands of hardwoods and hemlock, where the proportion of hemlock is 15 percent or more, it is feasible to manage for hemlock, but at various residual stocking levels. Hemlock does not require as much growing space as hardwoods, so residual stocking is greater in stands where hemlock predominates.. If less than 15 percent hemlock, the stand should be managed for the hardwood type represented.

Many fully stocked stands of eastern hemlock have basal areas in excess of 300 ft²/ acre.) When thinning dense stands no more than one-third of the total basal area should be removed at one time.

White-tailed deer readily browse this species although it has been ranked seventh in winter food preference. In some regions, areas of regeneration have been eliminated following heavy browsing when deer populations are high. Although deer have been blamed for the absence of eastern hemlock in many localities, no regeneration occurred under similar conditions in fenced areas; thus, overstory-site-temperature requirements are presumably also critical.

Drought is probably the most serious damaging agent to eastern hemlock, especially during the seedling stage. Winter drying caused by excessive transpiration on warm, windy days has caused severe needle injury.

Tannin from the bark of eastern hemlock formerly was extracted for use in processing leather. Now synthetic products are used and a once prosperous industry is no more.

Photo by Mark Hovel

Hemlock grove on the NHAL near Star Lake Wisconsin

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HEMLOCK WOOLY ADELGID

Paul Hetzler
Natural Resources Educator at Cornell Cooperative Extension

Don't look now, but the sky is falling. Again. This time it's poised ominously over our hemlock trees, whose verdant canopies shade many a North Country stream and glen. Although hemlocks make lush hedges for home landscapes, they're best known as stately forest giants that form cathedral-like stands in the North. It's hard to believe these titans are being killed by a tiny insect less than a sixteenth of an inch long.

Native to Asia, the hemlock wooly adelgid (a DELL jid), or HWA for short, is an invasive pest that is moving north faster than expected. Closely related to aphids, adelgids insert piercing mouthparts and drain stored starches from twigs and branches. Even though they're tiny, they're deadly because they strike in huge numbers. When populations are high enough they'll suck the life out of a mature hemlock in as few as three years.

Their name comes from waxy white filaments they make to protect themselves from drying out. In a heavy infestation, hemlock trees can look gray from all the "wool" on twigs and

branches. They can't fly, but are spread by wind and also hitch rides on the feet of birds, which can carry hemlock wooly adelgids for long distances.

These "hemlock vampires" were first discovered in 1951 in Virginia, and by 2005 had spread to fifteen other states, with mortality highest in VA, PA, NJ and CT. Experts once thought low temperatures would limit its range, but it appears HWA is becoming cold-tolerant. Currently there are infestations in about 26 NYS counties.

Cold-tolerance depends on more than just the thermometer reading. The faster the mercury plummets, the fewer adelgids survive. But given time to harden off, HWA can live through a significant cold spell. They have been documented to survive conditions as cold as -24F. How long it remains cold is another factor; obviously the longer the better as far as we are concerned. The frightening thing (OK, one of many) is that as HWA make it through cold winters, their genome is shifting toward an ever-increasing tolerance of northern latitudes.

Hemlock wooly adelgids reproduce asexually by *parthenogenesis*. This means adult females produce female offspring without needing to mate. All it takes is a single female HWA to create a new infestation. Another unusual feature of HWA is that they go dormant during the hot summer months, feeding most heavily from October through early spring. Unlike native pests, the HWA has no North American predators to help curb their population. Left unchecked, all HWA infestations are lethal within 3 to 10 years, depending on how healthy the tree is.

The good news is that, in contrast to the situation with the emerald ash borer, there is some hope for actually controlling HWA. For one thing, chemical treatment is both effective and economical. Insecticides are used to eradicate early infestations in the wild, and also to preserve hemlocks in home landscapes and public areas. These chemicals can be applied to the soil around a tree, but are usually sprayed on or injected into the trunk.

Another bright spot is bio-control potential. Several predatory beetles have been identified, and at least one, *Laricobius nigrinus*, has been approved for release. Cornell Professor Mark Whitmore, who has studied HWA extensively, tells us "It will likely take a complex of natural enemies to maintain hemlock woolly adelgid populations below damaging levels. Efforts to locate, evaluate, and establish other natural enemies continue."

With any invasive pest, early detection is important. But in the case of HWA, scouting and early detection can be, and has been, critical in preserving hemlocks in sensitive habitats. Learning how to identify HWA can make a real difference in your woodlot or your favorite camping spot.

For more information on HWA please visit:

https://www.invasivespeciesinfo.gov/animals/hwa.shtml or www.nyis.info/index.php?action=invasive_detail&id=24

and be involved in your forestry Coop to learn more.

Sitting on a rock ledge under towering Hemlock, the five 'old timers' in this photo represent decades of experience in resource management. They came together in mutual opposition to the Ottawa National Forest trade of Wildcat Falls. Included here, the careers represented are; a surveyor, a silviculturist, a botanist, a geologist and a forest manager. This photo was taken on April 1, 2012. Please guess, first and correctly, the combined ages of the 5 on that date, for a T shirt or similar prize! Hint, two of them are octarians!

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Below is a link related to the same topic as Geary Searfoss' *Enhanced Conservation Easement Charitable Income Tax Deduction - What's the Big Deal?* in our January 2016 issue.

http://s3.amazonaws.com/landtrustalliance.org/ConservationEasementTaxIncentiveBrochure2016.pdf

DEER GRANDMA AND GRANDPA

Paul Hetzler
Natural Resources Educator at Cornell Cooperative Extension

Just about everyone who saw the Walt Disney classic "Bambi" shed a tear, or at least stifled the urge to lacrimate (that's cry in Scrabble-ese). Even if I had known of the devastating effects deer have on forest regeneration, not to mention crops, landscapes and gardens, it still would have been a trauma for my five-year old self when Bambi's mother got killed. (Oops—spoiler alert there, sorry.) But how might the movie have ended if they had all lived happily ever after?

What is life like for those few lucky, possibly smarter, white-tailed deer which manage to avoid cars, coyotes, projectiles and parasites beyond the first few years of existence? Could an aged deer manage to gum your hostas to a nub when its teeth have worn away? I picture a wizened Grand-Buck griping that salt licks were better when he was a fawn, and that yearlings have it easy crossing the road these days now that cars have antilock brakes.

Seriously though, life gets harder in many ways as organisms age. Ask anyone who retired to Florida why they left the northland and they'll probably tell you winters were enjoyable until arthritis and various other ailments set in. What happens to wild deer as they become senior citizens—do they succumb to age-related health issues like bad joints, decayed teeth, or tumors?

I put the question to retired New York State Department of Environmental Conservation (NYSDEC) Wildlife Biologist Ken Kogut. He laughed. "To have a deer die of old age in the wild is an oxymoron," he said. Ken went on to explain that in terms of hunting, data shows the vast majority of harvested deer are in the 1.5 to 3.5 year-old range (because they are born in May and June, deer are always in a half-year by hunting season). "To see a seven or eight year-old buck is very, very unusual."

To illustrate this point, consider that the Max Planck Institute for Demographic Research states the average lifespan of captive white-tails is 16 years, with the confirmed oldest captive deer living to be an ancient 23 years old. Compare that to wild white-tails, which do not have a good track record, so to speak. The average lifespan of a wild deer? According to a University of Michigan report, two years. Yeah. Ten is considered the upper age limit, and a very rare occurrence at that.

Determining the vintage of white-tails is called aging deer, not to be confused with the aging of parents, which is a function of both the number and activity level of their children. How do we find how many birthdays a deer has had? Dentistry.

White-tails have canine teeth (the irony of which, sadly, is lost on them) and incisors on the lower jaw, but none on the upper. In other words they can't snip off a twig the way a rabbit can, but have to tear it away with an upward motion. But they do have upper and lower molars, and the wear on these is used to tell how old a deer is. Or was, as this is generally done post-mortem.

Aging deer started as kind of a home-grown citizen-science project. In years past, keenly observant hunters who could identify an individual deer from yearling stage onward took note of molar wear when it was harvested. Years of correlation of known deer age with measured teeth wear (turns out it's one millimeter per year) made some hunters experts in aging white-tails.

Aside from hunting, another thing driving down the average lifespan of wild deer is predation of fawns by coyotes and black bears. Surprisingly, at least in the Adirondacks, the latter may kill more fawns than coyotes do. Predation is hard to quantify, though, as coyotes and bears eat every last vestige—bone, hair and innards—of any animal they kill or find dead of other causes. Because predators do not feel safe out in the open, they seldom eat dead deer on roadsides, which are left to rot.

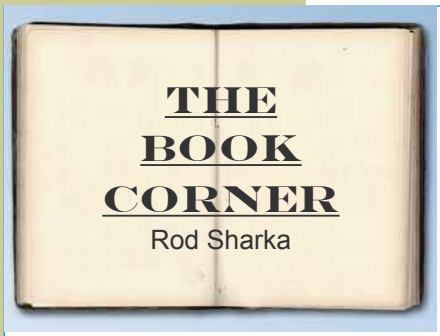
Deer-vehicle collisions are another huge factor. But starvation during hard winters, says Kogut, is probably the single factor likely to kill older deer. For various reasons including worn molars, they are likely to have less stored body fat going into winter than a younger deer.

With all this carnage, are white-tails disappearing? Hardly. Dr. Peter Smallidge, the State Forester for Cornell Extension, says New York State had an estimated 20,000 deer in the early 1900s, fewer than one deer per two square miles. Today there are a million, more than enough to destroy the ability of many forests to regrow, as young trees are devoured by deer while they are seedlings.

Lyme disease is also a result of deer overpopulation. Cornell Extension Wildlife Specialist Dr. Paul Curtis believes that if the deer population went down below six per square mile—still higher than the historic density—then deer ticks, which spread Lyme disease, would become too scarce to be a public health threat.

What might cause the deer population to decline like that? I don't know, but it certainly won't be old age.

Note from Joe: I have spent 2 years on the Vilas CDAC and have learned how controversial deer management is. I have all but given up trying to regenerate white birch and have seen thousands of white pine seedlings browsed away with many other species also suffering the wrath of white tail. I also suffer reoccurring bouts of serious rheumatic distress as a result of Lyme Disease 25 years ago, so Dr. Paul Curtis has my attention. At our recent CDAC meeting as much of the deer crowd claims there are no deer, and the all too common line "see more wolves than deer" we were given the estimate of 17.5 deer Sq/Mile currently in Vilas. The top end tolerable for our habitat is about 15. The discussion immediately went back to the drastic shortage of deer, as my frustrations rose. I have long thought there may need to be a choice between deer numbers or forest regeneration, but now with Dr. Curtis information, human health also becomes part of the equation. Stay tuned, as Paul Hetzler has put me in contact with Paul Curtis! This could get interesting.



For this issue of Partners News, may I recommend the following book for your reading pleasure:

WHERE THE WILD THINGS WERE

by William Stolzenburg

Where the Wild Things Were is a book about the relationship between top predator animals and the balance in nature. If you are reading this newsletter, you are probably involved somehow in growing and/or managing woodlands. As such, you may be wondering why I am recommending a book about predatory animals. Why, you ask, should I care about coyotes and songbirds, cheetahs and pronghorn, starfish and mussels, otters and sea kelp? The truth, as many of you already know, is that any woodlot or forest consists of more than just trees, and that the sum of all living things that can be found within this living community are not just sharing space, but are interacting with each other in an interdependent way.

With all of the local controversy surrounding the deer herd issue...not enough or too many, deer feeding or baiting helpful or harmful, what to do about CWD?...or the controversy over Wisconsin's wolf population...deer lovers and others promoting the old "big bad wolf" fears and urging their elimination, it is apparent that too many good folks are acting out of emotion rather than understanding and appreciating the importance of balance in nature. By the way, there is one very pertinent chapter that focuses on wolves and deer or elk and forests as well.

Where the Wild Things Were tells the story about apex predator ecology and trophic cascades, but the heavy science of these fields is cleverly packaged as a narrative story for general audiences that is engaging and entertaining, and allows the reader to "discover" the same ecological truths and relationships that the scientists did, instead of merely being told what the results are.

I personally believe that this book should be required reading for all high school and undergraduate biology students. In fact, every human being who depends on this planet for their sustenance and survival (and what human being doesn't) needs to read this book. Perhaps if everybody had a better understanding and appreciation of the importance of diversity in nature, we might, as a species, have a better chance at saving the only earth we will ever know.

Please read *Where the Wild Things Were* by William Stolzenburg.
Your trees, and planet, will thank you.

CALL THE DOGS OFF THE LIONS

Paul Hetzler, Natural Resources Educator
at Cornell Cooperative Extension

April showers bring May flowers, but not all posies are a welcome sight. Although it is quite possible they arrived on the Mayflower, dandelions do not get the esteem they deserve as plucky immigrants that put down firm roots in a new land, or as a vitamin-packed culinary delight, or as a multipurpose herbal remedy.

On this latter point, dandelion is so well-respected that it garnered the Latin name *Taraxicum officinale*, which roughly means "the official remedy for disorders." There are many reported health benefits of dandelion, including as a liver support and for alleviating kidney and bladder stones, as well as externally as a poultice for skin boils. I don't pretend to know every past and present medicinal use of the plant, and I strongly recommend consulting a respected herbalist, as well as your health care provider, before trying to treat yourself.

That said, the University of Maryland Medical Center has devoted an entire web page to dandelion, and it cites some peer-reviewed studies. I had previously heard that dandelion was used as an adjunct diabetes treatment, but had not found any references. However, the U of M Medical Center states that:
"**Preliminary animal studies suggest that dandelion may help normalize blood sugar levels and lower total cholesterol and triglycerides while raising HDL (good) cholesterol in diabetic mice. Researchers need to see if dandelion will work in people. A few animal studies also suggest that dandelion might help fight inflammation**."

I'd say that's not bad for a weed. You can buy dried and chopped dandelion root in bulk or in capsule form at most health-food stores, or you can get it for free in your back yard, providing you don't use lawn chemicals.

Dandelion's common name comes from the French "dent de lion," or lion's tooth, referring to the robust serrations along their leaves. Leaves vary widely in appearance, though, and aside from their yellow mane, not every dandelion is as leonid as the next. Apparently the French have a corner on the common-name market, because the other dandelion moniker is "pis en lit," or "wet the bed," as the dried root is strongly diuretic. More on that later.

Dandelion greens are best in early spring before they are done flowering. Harvesting late in the season is kind of like picking lettuce and spinach after they have bolted—edible, but not at their best. If you had a few dandelions take root in your garden last year, they are probably ready to uproot and eat right now. Sort of a new twist on the phrase "weed-and-feed."

Young greens can be blanched and served in salad, or else boiled, but I like them best when chopped and sautéed. They go well in omelets, stir-fry, soup, casserole, or any savory dish for that matter. Fresh roots can be peeled, thinly sliced and sautéed. A real treat is dandelion crowns. The reason they flower so early is that they have fully-formed flower bud clusters tucked into the center of the root crown, whereas many other flowers bloom on new growth. After cutting off the leaves, take a paring knife and excise the crowns, which can be steamed and served with butter.

Roasted dandelion roots make the best coffee substitute I have ever tasted, and that's saying something because I really love coffee. Scrub fresh roots and spread them out on an oven rack so they are not touching each other. You can experiment with higher settings, but I roast them at about 250 until they are crispy and dark brown throughout. Honestly I can't say just how long it takes, somewhere between 2 and 3 hours. At any rate I always roast them when I have to be in the house anyway, and check them frequently after the two-hour mark. Grind them using a food processor or mortar and pestle. Compared to coffee, you use a bit less of the ground root per cup.

The beverage tastes dandy, but as mentioned above, it is more diuretic than coffee or black tea. I have never found this a problem, but if your morning commute frequently involves a traffic snarl, choose your breakfast drink accordingly.

I have not tried dandelion wine, a tradition that dates back centuries in Europe, and so have no first-hand experience to report, but scads of recipes can be found on the Internet. Several friends and family members have tried it, with negative and positive reviews pretty well split. I have no idea if it is personal preference or wine-making skill that is so evenly divided.

Given all the virtues of dandelions, it is amazing how much time and treasure our culture puts into eradicating them. It seems to verge on an obsession with some people, who drench their lawn with selective broadleaf herbicides like 2,4-D, dicamba and mecoprop. These all come with health risks, not to mention hefty price tags.

For those who perhaps take the whole lion connection too far and can't sleep at night if there are dandelions lurking on the premises, I'll share a secret to getting them out of the landscape. Setting the mower to cut at four inches high will not only get rid of most weeds, it will help prevent diseases, and will greatly reduce the need for fertilizer.

I say we stop trying to kill the only North American lion that is not in danger of extinction, and learn to appreciate and use it more.

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Future Articles

Future stories we are working on and hoping to share with you soon!

- Roy D' Antonio of Associated Title on the things to look for in title issues when buying or selling a real estate holding
- Dustin Bronson on woody biomass.
- Information on the Managed Forest Law, pros and cons and what DNR Foresters can and cannot do for the landowner
- Timber Theft by Paul Hetzler
- Updates on big trees, White Pine and more

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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