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Partners News

April 2017

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Partners in Forestry Landowner Cooperative

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Have you paid your PIF dues?

WELCOME NEW MEMBER(S)

DAVID AND CAROL SHERRILL

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Inside this issue:

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Dear Partners in Forestry colleagues,

In this letter is a note about my hopes for the Nelson-Knowles Stewardship fund to be continued. Two years ago, the Governor proposed to eliminate funding for land purchases in the Stewardship Fund. To me, if funding was eliminated, it would not return. A reduced funding was put back in place by the legislature at 33 million per year. Some land has been purchased because of this, and many of the other great things the stewardship fund does have occurred such as conservation easements, cost sharing on local projects and so on.

We are now in the next budget cycle and my understanding by following the news is the Governor has included funding in this budget. I hope it makes it through the whole budget process. It remains significant but dismal in comparison to the 2010 budget cycle.

As I worry about the Stewardship Fund, I thought about all the great things I have experienced as a result of the program. One of those things was being at a place where Warren Knowles was fishing and talking to him. While working for the DNR I was on two committees working with local people that established a 500 acre public hunting grounds preserving 5 miles of Wolf River shoreline and in another location established the Sturgeon Trail along the Wolf River which was a half mile paved walkway along the Wolf River in which rip -rap was installed for Sturgeon spawning and fishing access and fishing platforms were constructed. Hundreds of people come each year to view the sturgeon. I do not think the average outdoor user knows how much the fund has done to enhance our outdoor experiences, i.e. boat landings, parks, state forests, trails networks…the list goes on.

I thought I would try to speak up for the Stewardship Fund this year so I attended the Governor's listening session in Keshena. You always get very little time to speak in these type events so as he left I gave him a brochure from the New London Chamber Commerce touting the Sturgeon Trail. I spoke at Senator Robert Cowles and Representative Tauschen's listening session in Shawano. I went to the recent budget hearing in Berlin and got my 2 minutes to speak after sitting there about 5 hours. I also spoke up for the forestry mill tax. I had a recommendation question voted on during this year's Conservation Congress Spring hearing that simply asked for continued support of the Stewardship Fund. It had a good explanation of the fund included. About 3,000 people attended statewide and it passed by about a 10 to 1 margin with all 72 counties supporting it. Finally I emailed my legislators asking for support.

I formed an opinion about some of major complaints from legislators and others that we can not afford the Stewardship Fund. Some of the complaints are the bonding debt is 88 million dollars, the state is paying a million dollars of interest per week for the stewardship and 900 million is owed. My thoughts are the two year state budget is 72 billion dollars of which 1 billion in total is spent on conservation-72 to 1. We have 5.6 million people is Wisconsin. If my math is correct concerning the $88 million bonding, each person owes $17.

If the claim of $1 million of interest paid each week then each person owes about 17 cents. Seems the issue is a real bargain for Wisconsin citizens, visitors and businesses.

Mark Beilfuss

(PIF applauds Mark for his grass roots efforts which benefit the people of Wisconsin)

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Partners in Forestry is steadfast and committed to our support of the Knowles-Nelson Stewardship Program and the Land and Water Conservation Fund. We recognize the vast array of public values these programs offer to society.

Forests for Fish is an interesting concept brought to our attention in part because of the habitat importance of the Pilgrim River Watershed Project.

A new research project by Chris Adams, a PhD student from MTU, under Dr. Casey Huckins, is fascinating to say the least. For some time now the conventional wisdom has been that the prized brook trout fishery in the Pilgrim was strictly Fluvial, in that they lived only in the streams. This has recently been proven false, in that the Pilgrim does host Adfluvial brook trout. According to the researchers it may yet be too early to call them true Coaster Brook Trout, however, these adfluvial brook trout grow much larger than strictly stream habitat fish.

It is exciting to realize how our forest management impacts much more than the mammals and birds we see everyday, and this knowledge reaffirms our commitment to responsible stewardship. Be it the Pilgrim River, the Upper Wisconsin River Legacy Forest, or any body of water within the watershed of your woodlands, Forests for Fish is worth following. Our conservation efforts are all about the H. Habitat, habitat and habitat.

One of three forks of the Pilgrim River which fork on the Pilgrim conservation project lands. A prized trout fishery, with new research demonstrating Adfluvial brook trout inhabiting the Pilgrim.

"Forests for Fish" is a three year project to bring together foresters, loggers and fisheries biologists to improve how ***"Michigan's forests provide abundant clean water and quality fish habitat."*** Forests for Fish will connect foresters and loggers with fisheries biologists to discuss how forest management and wood in water can improve fish habitat. Forests for Fish will provide advice to landowners and anglers on how they can manage their forest for clean water and quality fish habitat. Forests for Fish will develop educational materials for landowners, anglers and natural resource professionals on how forests provide the clean water that benefits humans, animals and fish.

Forests for Fish provides financial incentives for landowners, foresters and loggers. Landowners who join the American Tree Farm System are able to get a free site visit at their forest with a forester and cost share to develop a Forest Stewardship Plan to manage, protect and enjoy their forest and water resources. Consulting foresters who attend a workshop will get reduced costs to join the Michigan Association of Consulting Foresters. Loggers and industry foresters who attend a workshop will get reduced costs to join the Michigan Association of Timbermen.

Forests for Fish is a new name for an old idea. American foresters have recognized the connection between forests and water for over a hundred years. The federal Organic Act of 1897 stated that America's national forests were established "to improve and protect the forest within the reservation, or *for the purpose of securing favorable conditions of water flows*, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States." Water has long been valued as a forest product that everyone needs.

Michigan is blessed with an abundance of fresh water. Our state has 36,000 miles of rivers, more than 11,000 inland lakes, and is surrounded by four of the Great Lakes, the largest body of fresh water on Earth. Michigan has so much water that we usually take it for granted. But clean, fresh water is not infinite or free, and everyone in Michigan should value our outstanding fresh water resources.

Land use has significant impacts on water quality and quantity, and forests are important for providing abundant clean water. About 80 percent of the surface freshwater in the United States originates in our forests that cover only 34 percent of our nation's land area. In Michigan, forests cover 56 percent of our land, and play a vital role in producing clean water for domestic, agricultural, industrial and ecological needs.

Abundant clean water originating from Michigan's 20 million acres of forest land *might* be as valuable as the $20 billion forest products industry that supports our rural communities, but water is harder to quantify than wood. Protected forests and well managed forests produce essential wood products, ecosystem services like clean water, beautiful places for recreation and habitat for animals and fish. Foresters and loggers implement relevant "Best Management Practices" to protect soil and water quality because the clean water provided by Michigan's forests is essential for humans, animals, fish and other aquatic organisms.

The DNR Forest Resources Division is the project manager for Forests for Fish. Partners include the DNR Fisheries Division, Michigan Trout Unlimited, Michigan Tree Farm Committee, Michigan Association of Timbermen, Michigan Association of Consulting Foresters and the United States Forest Service. Forests for Fish is funded by the United States Forest Service, State and Private Forestry.

For information about Forests for Fish, contact Mike Smalligan, the DNR Forest Stewardship Coordinator at 517-284-5884 or smalliganm@michigan.gov. As project materials are developed over the next few years, they will be made available at www. ForestsForFish.org.

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BITS AND PIECES

Snap shot Wisconsin is now available in Oneida County.
See contacts below to learn more or to participate.

Contact Information for Snapshot Wisconsin
DNRSnapshotWisconsin@wisconsin.gov
608-572-6103

Signup to Host a Trail Camera:
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www.SnapshotWisconsin.org

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Michigan Society of American Foresters 2017 Spring Conference: Forests for Fish

I've heard some pretty grand fishing tales. I've told a few good ones myself. My Grandfather told a great one about a monster pike that he wrestled with for hours before having to row the thing into shore on Lake Independence. I've heard epic tales from teens attempting to sneak into the Huron Mountain Club to even just glimpse the tantalizing trout there… I won't speak on if they were successful or not. My relatives tell tall tales about an ancient one-eyed walleye that lived under our swimming raft on Crystal Lake. My first big bass drug me around half the lake on a kayak in Big Island Wilderness. Stories upon stories, fishing runs deep in the heart of the Great Lakes.

On Thursday and Friday, March 30th and 31st, the UP Chapter of the Michigan Society of American Foresters (SAF) hosted their 2017 spring conference. This year's topic brought Private and Public Foresters, Conservationists, DEQ and DNR Reps, Hydrologists, Biologists, and Forest Industry Reps together. What topic could possibly do all that? Fish, of course! Obviously fish are extremely significant to the State of Michigan and the Great Lakes region. Apart from their propensity to inspire tall tales of mythic proportion, Great Lakes fisheries support a huge industry with both commercial and recreational fishing contributing roughly $5 billion annually to the regional economy. We know they are important but how are they connected to forest management?

The 2017 conference centered on that discussion. Forests play an enormous role in maintaining and feeding healthy streams, rivers, and lakes. Forests provide filtering, shade, and erosion control for water quality and also inputs of coarse and fine woody debris for aquatic habitat and food resources. As we all remember from Ecology 101, this food chain is just a subset of a very large food web that makes up our Great Lakes ecosystem. From the bacteria that begin to breakdown leaf inputs to the trout that feed on stream invertebrates, they all rely on a specific set of conditions in order to live and thrive. These conditions can be affected by surrounding forest management. Such actions include harvesting, road building, and stream or creek crossings.

The effects of forest management on water quality and stream habitat have been and are continuing to be well studied. The main discourse of the conference was about preventing negative impacts with Best Management Practices (BMPs) such as buffer zones and specific road building techniques as well as proper permitting, and partnering with other organizations. One theme that arose throughout the presentations was the communication of those activities to landowners and the general public. Firstly, attendees heard from Jim Dexter, the Michigan DNR Fisheries Division Chief. He spoke on the overall connection between Fisheries and Forestry and the importance of interdisciplinary coordination. Then attendees heard from several project leads on their experiences refining management practices to improve water quality and fish habitat. This

included Bill Racine, Environmental Manager from Verso. He spoke on how the Escanaba mill manages their water quality and environmental impacts. Lizzy Montgomery, a PhD student in Forest Science at Michigan Tech presented about her time on the California coastline working with public and student volunteers at the Lower Topanga Oak Woodland. Her project aimed to restore oak cover and improve habitat for their locally endangered steelhead trout. Mitch Koetje from the Michigan Department of Environmental Quality - Water Resources Division and Pat Riley, a Forester for Weyerhaeuser spoke together on a project involving building woods roads and controlling erosion and sedimentation as well as the importance of understanding exemptions within the DEQ's permitting process.

Maria Janowiak of the Northern Institute of Applied Climate Science (NIACS) spoke on adapting forested watersheds to climate change under increasing occurrences of shifting and extreme weather events. Brian Kozich, the Environmental Science Department Chair from the Keweenaw Bay Ojibwa Community College discussed his ongoing project involving several students monitoring culturally significant trout streams and the importance of human-water relationships.

There were several more exemplary speakers and discussions with one of the highest turnouts for the UP Chapter SAF conferences. More than 140 people attended. It was also a record turnout for sponsors with 14 companies and organizations involved in making this meeting happen. 27 students from Michigan Technological and Michigan State University attended as well as several retired industry professionals.

The Great Lakes contain 21% of the world's fresh water with both strong fishing and forestry industries. The healthy and sustainable management of Michigan's forests provides abundant clean water and quality fish habitat. With the current administration gutting funding for Great Lakes research, coming together as an interdisciplinary group of invested stakeholders is more important than ever. The success of the conference is a testament to the intersection of industry, conservation, research, and public connection. It was perfectly summed up by Jim Dexter's presentation title: "Woods, Water, and Wildlife: Connecting the Dots". Whether we are taking part in these conferences, doing this research, managing these forests, or even just reading this article we are doing them for the same reasons: Sustainable resources, healthy forests, and the human-water connection…and of course the fishing tales…lots and lots of fishing tales!

Bethany Baetsen

Forester - JM Longyear LLC

Secretary/Treasurer - UP Chapter Michigan Society of American Foresters

You can find the presentations from the 2017 MI SAF meeting on the MI SAF website: www.misaf.org

TV6 coverage of the conference: http://www.uppermichiganssource.com/content/news/MSAF-Conference-explores-intersection-of-forests-and-fish-habitats-417699533.html

Forests for Fish program: www.ForestForFish.org

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The above story is by our Pilgrim neighborhood forestry associate Bethany Lyons, now married and named Bethany Baetsen. Bethany is a forester for Longyear Company out of the Northern Hardwoods sawmill in South Range. She can be reached at bethanybaetsen@jmlongyear.com

Bethany is excited about the Forests for Fish concept and sustainable forestry in general.

REPORT FROM JOE

Those damn deer

The later winter months on the Porcupine Tree Farm saw much receded snow levels and very firm crusty conditions following unusually warm periods in January and again in February. It has been a lousy maple sap year, the warmer days also had too warm a nights as well, with several exceptions.

We have had an awful struggle growing young, desirable species from tree planting and natural regeneration because of the high deer numbers, which for some reason they truly favor our home woodlands. The receded but very firm snow levels in much of March left many young trees only partly buried in snow with the tops ripe for overgrazing.

In 2004 we undertook some white pine under planting, as I had done in the 80's with success back then. The 1990's were much too busy for me, but by 2004 I was naively eager to get planting, at least 1 to 3 thousand trees in lighter stocked areas every couple years or so seemed like a good plan. In the 1980's we had fewer, but larger deer than now.

Just this week, as we prepare for a major tree planting project on the Legacy Forest, where I hope the deer numbers are much lower, and while I pray for rain this growing season, I took a tour of the areas planted in recent memory on our home lands. The 2004 planting has become insignificant, maybe in part because I did not strictly define the planting area. The 2006 and 2007 plantings required a tremendous effort, with the drought summers we even watered many of them, as well as a bucket of saw dust mulch to hold moisture and define the plantings. Perhaps 30% of both these years plantings have survived, mostly in a deformed state….because of continual deer browse. In 2011, following a year of more normal moisture, we regained confidence and planted one thousand 2 year white pine seedlings, with mulch and wood stakes in order to monitor the growth. Sadly these trees were maimed this late winter.

This photo shows 10 year old white pines which have barely survived the continual deer browse, in a very deformed stature.

I need to get my head around a few things perhaps. One, there is a load of BS out there when it comes to deer. I am on the Vilas CDAC, and am convinced these councils are a poor function, as they are under represented by non hunters. Deer damage to forest regeneration is much more severe and more widespread that most folks care to acknowledge, yet hunters do not wish to address this. I wonder if the NRB will care to understand the problem. I know I am not alone as these 2 member comments demonstrate.

Whoever said deer don't prefer white pine apparently never tried to plant any. And once you get them up above the browse level, the deer seem to prefer white pine to rub the velvet off their antlers. G.S.
Also Leopold would turn in his grave if he saw what passes for wildlife management of deer in Wisconsin. DNR leadership has been nonexistent. And to hear outdoor writer Kurt Krueger continue to whine about deer numbers below 20/square mile drives me crazy. Even on my five acres I have witnessed the impact of too many deer. No regeneration of conifers or maple. Little of oak. Little in the way of understory growth. Have to put tree shelters on conifers till they get 6-7 feet high. Maybe the only thing which will save the northern forests will be rampant CWD. Then what will the deer hunters do? Dan

This image was one of most all of the 2011 planting, which survived until now, but were severely browsed in March when the tops were exposed above the hard packed snow.

In the adjoining area of 2006-2007 plantings most survivors are deformed white pine. After this winter only a bit of tip above browse line and a lower limb or 2 protected from the snow remained.

Earth Day, is it worth celebrating this year?

The story was titled Scorched Earth Day? The writing was not in a conservation journal, but a mainstream Christian magazine. The subject of course was our President's executive orders and actions placing the environment at greater risk. 'When Earth Day is celebrated for the 47th time on April 22, there will be an air of disbelief that one election can be so destructive to the environment' was an attention grabbing line early in the story.

Besides dismantling the Clean Power Plan and lifting the requirement for federal policy makers to consider the environment when approving permits, the damage did not end there. A budget proposal calls for massive cuts to the Environmental Protection Agency, the overturning of the halt of the Keystone and Dakota Access pipelines, scrapping of a rule barring mining companies from polluting waterways and lifting the moratorium of coal leasing on federal lands.

And in these pages we advocate for responsible, sustainable forest management to consider the needs of future generations, these actions listed above make our efforts seem pretty darn trivial in a sense. It would be refreshing to hear some, any, pro-conservation voices from the Trump administration.

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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:

Partners In Forestry
6063 Baker Lake Rd
Conover, WI 54519

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GOT GAS? TAP YOUR MAPLES!

Paul Hetzler, Cornell Cooperative Extension

Here we have an enlightening Maple Sap story, PIF will guarantee you will learn something. PIF is very grateful to Paul Hetzler for his exceptional teaching ability.

Some foods give you gas, but this is the time of year when gas gives you a really delicious food. Maple syrup, which is nutritious enough to be listed by the USDA as a food (I say it deserves its own Food Group designation), is gas-powered. Carbon dioxide-powered, to be specific. If it wasn't for a bunch of little gas bubbles in the xylem tissue, maple sap would not flow. Who knew that wood was carbonated?

A mere ten or so years in the past, science was at a loss to explain what causes maple sap to run. I always like it when people who are smarter and better-paid than I am don't have the answer, either. We all know that below-freezing nights and warm days lead to sap flow. But it wasn't until recently that the mechanism behind sap flow was understood.

Throughout sugar maple's range, maple production has been economically important since Native Americans first taught European settlers how to gather maple sap to make syrup and sugar. Back then it involved placing red-hot stones into containers of sap to boil it down. We're all thankful that technology has improved. Today's maple producers have reverse-osmosis units, vacuum pumps and efficient high-capacity evaporators.

Aside from maple, very few tree species have a spring sap run. Birch and butternut are exceptions, but their roots generate pressure that forces sap upward, which is not the case in maples. It turns out maple sap flow is due to the way its wood interacts with freeze-thaw cycles. In biology we learned that wood, or xylem, is responsible for upward transport of water and dissolved nutrients, while sugars move down through the phloem, the outermost layer of cells. Fortunately for us, xylem "misbehaves" during the spring sap run, ferrying sugars upward where we can get to them. Later in the season, xylem casually returns to the textbook model, acting as if nothing unusual happened.

Xylem is composed of several types of cells, including vessels to transport liquid, and fiber cells to provide strength. Unlike most trees, maples have fiber cells which are partially gas-filled. Carbon dioxide and other gases in those fibers are critical to generating flow because they dissolve in sap. The geyser that results when we open a seltzer bottle (especially a warm one) too fast is a reminder that plenty of carbon dioxide can dissolve in water. If that bottle is icy cold, the risk of a gusher is low because cold water holds more dissolved gas.

During the night, gases in fibers shrink as they cool, eventually dissolving into sap in the vessels. This contraction of gases causes the tree's internal pressure to drop, creating a suction that draws sap up from the roots. As the temperature warms in the

morning, gases bubble out of solution and expand, increasing the tree's internal pressure and forcing sap out the tap hole at about 15 pounds per square inch (psi) on average, occasionally up to 40 psi.

Rather than flowing up from the roots and out the tap during the day as was once commonly thought, sap actually flows down from the crown (in addition to some lateral flow) toward the tap hole. When a warm day follows a sub-freezing night, sap may run for a few hours or up to several days, depending on the tree, and factors like barometric pressure changes. If temperatures remain warm at night or below freezing during the day, sap will not run.

Using vacuum changes this picture because it reduces a tree's internal pressure. A tap hooked up to vacuum will yield twice as much sap as one that isn't. Even a sapling will yield quite a bit sap if vacuum is applied to its severed trunk. Of course it will have a very short life—a tree needs a full complement of leaves to produce enough sugar to support itself.

All native maples yield sweet sap. Although sugar (hard) and black maples are most commonly used, producers will also tap silver and red maple if available. Even the much-maligned boxelder belongs to the genus *Acer* and can be tapped. And though I hesitate to admit it, the Norway maple, which along with its red-leaf cultivars is listed as an invasive species, can be used.

Maple sap is two to three percent sucrose on average, although sugar content can range from one up to ten or more percent. In addition to sugar, sap contains organic acids, amino acids, minerals and other compounds, many of which contribute to maple's flavor. During the boiling process, an insoluble sediment composed of sugar and calcium maleate forms. This is called niter or sugar sand, and is filtered out.

If tasting great is not incentive enough to use maple syrup, consider its health benefits. One 100-gram serving of maple syrup provides more than 100% of the recommended daily amount of manganese and riboflavin (vitamin B-2), and is a significant source of magnesium, zinc and calcium. In 2016, a Toronto-based research team announced they had identified a compound in maple syrup that may inhibit beta-amyloid brain proteins from clumping, which could help prevent Alzheimer's disease.

The freeze-thaw, dissolved-gas, pressure-differential explanation of sap flow has some holes, though. While the mechanism should work with pure water, it turns out that sap only flows if it has a minimum level of sucrose. Flow should also happen in all xylem tissue, not just the living sapwood, but that's not the case either. So the mystery of sap flow continues. Sometimes it's a relief not to have all the answers.

Recently, a higher percentage of maple producers have been branching out, you might say, into value-added products like maple cream and candy. Another item gaining in popularity is maple sap. Fresh sap is bottled, pasteurized, and then—of course—carbonated. What goes around, comes around, it seems.

This hardy sugar maple is part of a family woodlot in northern Vilas County and is managed for timber as well as syrup. The highest quality crop trees are not tapped, but the medium quality trees with large crowns are tapped for sap.

HERBAL MEDICINE FROM THE LAND

Paul Hetzler, Cornell Cooperative Extension

By mid-March it starts to feel as though winter is the only time of year not in a hurry to get somewhere. By comparison, every other season seems to go by with a Doppler-type velocity like an Indy car blurring past. But I realize that any day now, spring could get sprung, and when that happens, plant life will change by the day, if not the hour. Some of the first plants to catch my eye are ones which have historically been used to treat coughs and colds. Good timing, I'd say.

Herbal remedies have been part of human culture since the day culture got invented. No matter where our early ancestors settled, they exploited regional plants for medicinal as well as culinary value. In a sense, unknown plants served as an evolutionary pressure, except they selected against bad luck, and perhaps gullibility, and likely didn't help the human genome a lot. As knowledge of plant medicine accrued, it was refined, committed to memory and passed along—first orally and later in writing—from one generation to the next. Ancient healers had to know the properties of a given plant, what it might interact with, and how to tell it from similar species. This of course helped protect them from the wrath of disgruntled patients, not to mention early malpractice suits.

People often focus on the "herbal" half of the term and gloss over the "medicine" part. Many potent modern drugs are derived from plants. When Beatrix Potter has a naughty Peter Rabbit drink chamomile tea and go to bed, we feel warm and fuzzy about herbs. If Mommy Bunny had served Peter a cup of digitalis tea, it would have been a very different story, one involving a funeral for Peter and possible jail time for Ma Bunny. As much as I support and respect the use of herbal medicines, it should always be done in cooperation with your health-care provider and an experienced herbalist.

Now that the lawyers are happy, let's talk about coltsfoot, whose dandelion-like, bright yellow flowers emerge, long before any leaves appear, from muddy roadside ditches, rail embankments and other places with a history of soil disturbance. Although it is native to Europe and Asia, coltsfoot (*Tussilago farfara*), a plant which seems to materialize overnight as the snowbanks melt, has naturalized throughout North America. Its species name, *Tussilago*, stems from the Latin word for cough, and its common name comes from the fact that its leaves, which emerge as the flowers die back, are shaped like a horse's hoof.

In medieval Europe, its flowers were virtually synonymous with healing, becoming the symbol for an apothecary, sort of an old-time drugstore that dispensed herbal medicine. Coltsfoot leaves are either used as a tea, made into a syrup, or smoked. This latter sounds counter-intuitive as a cough treatment, but is a fairly common way to treat respiratory issues. Pliny the Elder—think Socrates, but Roman instead of Greek and slightly less ancient—treated his asthma by inhaling the smoke of dried coltsfoot leaves and flowers. (In an ironic and tragic twist, Pliny died of smoke inhalation during the eruption of Mount Vesuvius.)

The white blossoms of bloodroot (*Sanguinaria canadensis*), a native woodland flower, also appear just as the snow recedes, although its leaves unfurl before petal drop. Bloodroot has a fleshy tuber, which when broken will produce beet-red sap. In bygone days, this was employed as rouge. Its cosmetic value pales in comparison to its medicinal use, though. In addition to being antiseptic, bloodroot is a powerful expectorant, used in minute amounts to break up and clear out dense bronchial congestion.

A few caveats regarding bloodroot. On public lands, it is a protected plant, and cannot legally be harvested. And while it is one of my all-time favorite wildflowers, it is one of those remedies that absolutely should not be used without supervision. It contains toxins which induce violent vomiting in quantities beyond a tiny therapeutic dose, and could even cause liver damage.

Another early-season cough remedy comes from a domesticated plant of European origin, horseradish (*Armoracia rusticana*). A cousin to broccoli, this perennial has long slender white roots that may be harvested in any month containing the letter "R." (A helpful guideline, but one that makes it sound like horseradish was brought to you by Sesame Street.) In our region we probably need to move a bit of snow to dig horseradish before its roots become too tough to process after the Rs run out in May. It might be a late winter/ early spring herb, but it does not send up any showy blooms to announce its location—you need to have some idea of where you planted the stuff.

Although we are familiar with it as a condiment, horseradish has a long history as a botanical remedy. In addition to being a good diuretic, is used externally as a chest compress to break up congestion. But even with a garden-variety medicinal plant, caution is needed—horseradish is so powerful that it may cause skin blistering if the compress is not prepared correctly.

I recently learned that our friend Pliny thought that horseradish also worked as a scorpion repellant. In the twenty years since I first began growing the mustard-oil laden herb, there has not been one scorpion found at my place, so maybe he was onto something. Since coughs are still common, I'll focus on ways to treat those, and worry about poisonous arachnids later.

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Forest Health Specialist with WDNR, Mike Hillstrom, has reported he has yet to experience this concern of Paul's, but has confirmed it is close enough to us to be on the look out.

HOLEY MAPLE LEAVES, BATMAN!

Paul Hetzler, Cornell Cooperative Extension

Only a joker would argue that plant breeders have secretly crossed our beloved sugar maples with Swiss cheese, but given the way this year's maple leaves are riddled with mysterious holes, it almost seems a plausible explanation. Beginning in August, near-perfect circles of leaf tissue have gone missing from sugar maples, and from other trees to a lesser extent, as if swarms of Hole-Punch Gnomes had gone berserk.

In addition to holey-ness, leaves also exhibit circular brown patches, and by September some had turned entirely brown and fallen off. What's actually going on is that the maples are moth-eaten. It sounds like another joke, but it's true. The maple leafcutter (Paraclemensia acerifoliella) moth, a tiny insect that is rarely noticed, is a native pest with a steel-blue body and a bright orange head (although I could probably say anything once I've told you it's hard to see).

When they first hatch in mid-June, leafcutter larvae burrow into maple leaves and begin "mining" tissue between the upper and lower epidermis, or skin, in a circular pattern. This does not produce holes, however. Larvae, which are infinitesimally small (OK, slightly larger than that but not much) at that point, do minor damage in the miner phase, and in fact their burrows are difficult to spot.

Once the wee caterpillars are big enough to "run with scissors," they use their sharp mandibles to excise rounds of leaf tissue. They then combine two of these discs to use as a protective case. In the words of Douglas C. Allen, Professor of Forest Entomology at SUNY/ESF, they are "a moth with a mobile home."

The case protects them as they feed on the leaf in a manner known as skeletonizing, consuming all green tissue between veins, and when they move to another part of the leaf they leave behind a round scar. This feeding causes more significant damage than does the leafminer stage. In September when they are mature, leafcutter larvae descend to the ground, carrying their homes with them, and wriggle into the topsoil to pupate. Leafcutters finally leave their homes when they emerge as adults in spring.

Maple leafcutter damage has been noted since the 1850s, with significant outbreaks in New York State in 1911, the early 1920s and in 1997; the mid-1970s in Vermont and New Hampshire; and 1981 in both Vermont and Ontario. Some infestations spanned a number of years, in a few cases more than five. The current outbreak was first noticed last fall by several sugar bush operators and has become more widespread this year.

Because the majority of leafcutter damage occurs late in the season, Cornell's Department of Natural Resource bulletin states "Sugar maple apparently is more resilient to defoliation by the leafcutter than to that of other insects, probably because of its unique feeding behavior and late-season feeding." In general, leaf damage that occurs from August onward is of little consequence, as trees have already produced more than adequate amounts of sugars for the season.

But leafcutter populations can remain high for several years in a row. Since some damage is done beginning in June, repeated severe infestations can affect tree vigor and reduce sap sugar content. Cornell's bulletin explains "Studies in Vermont indicated that 3 years of complete defoliation by this insect were required to significantly reduce the starch content of maple roots (an indication of physiological stress)."

Due to the fact they are always either fully inside a leaf or a "mobile home," insecticide treatment is not effective against leafminers. Homeowners and maple producers are encouraged to do what they can to support the health of their trees, like supplemental watering, appropriate fertilizing based on soil tests, and keeping equipment out of the woods when the soil is wet.

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Joe Hovel:
Few trees have the economic importance to Wisconsin and the UP as sugar maple. In past issues of Partners News we have extensively covered many different aspects of sugar maple forests, with stories from Gary Willis, Robert Hyde, John Schwarzmann and more. Much of this information is available in past newsletters on the PIF website. We all enjoy sugar maple in one form or another. Widely used in gym floors, baseball bats and many specialty wood products, sugar maple is a main stay to the higher value forest products industry, as well as being very important for pulp wood and a very good wood fuel. And this is not even to mention the sweeter aspects of what we enjoy about sugar maple. See the Spring 2008 issue for Joseph LeBouton's story on sugaring.

Sugar Maple Acer saccharum

The sugar maple is one of America's best-loved trees. In fact, more states have claimed it as their state tree than any other single species—those states being Wisconsin, New York, West Virginia and Vermont. While commercially grown for its delicious syrup and value as lumber, this tree makes a great addition to any yard or park. And one of its most prominent features is amazing fall color. As the seasons change, the leaves turn vibrant shades of yellow, burnt orange and red.

The sugar maple can be expected to grow in Hardiness Zones 3–8. This tree is considered both a shade tree and an ornamental tree. It features a spreading canopy capable of blocking sunlight and adds visual interest and beauty to landscaping. The sugar maple grows to a height of 60–75' and a spread of 40–50' at maturity. This tree grows at a slow to medium rate, with height increases of anywhere from less than 12" to 24" per year. Full sun and partial shade are best for this tree, meaning it prefers a minimum of four hours of direct, unfiltered sunlight each day.

The sugar maple grows in deep, well-drained, acidic to slightly alkaline soil. It prefers moist soil conditions but has moderate drought tolerance.

- Develops a dense crown, offering great shade.
- Features 3–5" medium to dark green leaves with 5 (rarely 3) distinct lobes that are slightly coarsely toothed.
- Produces small, greenish-yellow flowers in groups that curve downward on long, delicate stems, blooming in April and May.
- Yields pairs of winged seeds about 1–1½" long that mature in September or October. Seeds are produced annually, with particularly heavy crops every 2–5 years.
- Grows in a round or oval shape.
- Should not be planted in confined spaces or areas where salt is a problem.
-

Sugar maples are commonly browsed by white-tailed deer, moose and snowshoe hare. Squirrels feed on the seeds, buds, twigs and leaves.

In 1663, chemist Robert Boyle informed the Europeans about the tree in the new world that produced a sweet substance. John Smith was among the first settlers who remarked about the Native Americans' sugar processing and the fact that they used the product for barter. They also used the inner bark to make a tea to treat coughs and diarrhea. Other historic uses included making soap from its ashes, using the bark as a dye, drinking the sap as a spring tonic and taking the syrup for liver and kidney problems. During the 2001 baseball season, Barry Bonds switched from the traditional ash wood baseball bat to one made of maple and hit 73 home runs—a new record!

Thanks to the Arbor Day Foundation for the above and for inspiring people to plant, nurture and celebrate trees, And to Cornell University for the below information.

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.

THE LIFE OF A SUGAR MAPLE TREE

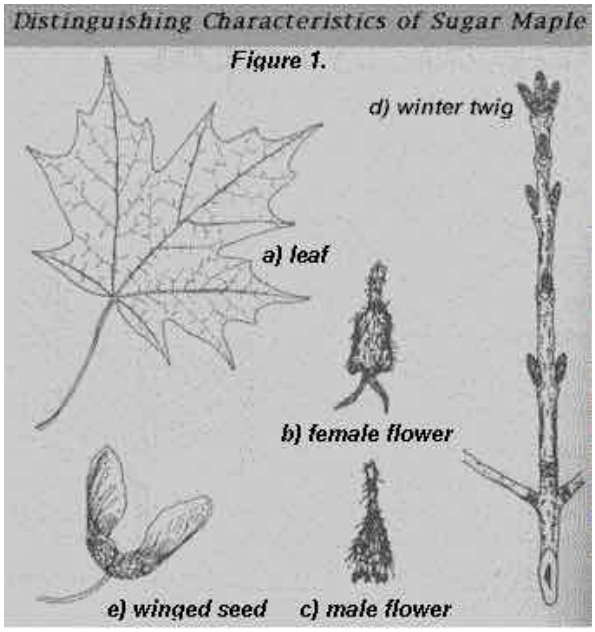
Sugar Maple *(hard maple, rock maple)*

Sugar maple (*Acer saccharum*) is the most abundant of the seven maple species found in the north east, the Lake States, Mid-Atlantic states, and several Canadian provinces. Its historical and economical importance, both in the production of maple syrup and as a timber species, has earned sugar maple its status as the official state tree of several states. The sugar maple leaf on the Canadian flag is evidence of this species' importance in Canada.

Description

Under optimal growing conditions, sugar maple can attain heights in excess of 100 feet. The largest reported individual was found near Bethany, West Virginia; it had a diameter of 5.6 feet, a crown spread of 75 feet, and a height of 110 feet. Most mature trees, however, range from 70 to 90 feet in height and have diameters at breast height (4.5 feet above the ground) commonly measuring from 2 to 3 feet. Trees grown in the open have trunks that branch near the ground, forming crowns that spread 60 to 80 feet. In contrast, those found in shaded forest conditions normally develop clear, straight boles and narrow crowns.

The leaves of sugar maple are simple (single) and like the buds are in an opposite arrangement on the twigs *(Figure 1)*. They are usually five-lobed although certain trees may possess leaves with three, four, or five lobes. Leaves are dark green on the top surface and paler underneath. They are generally smooth on both sides, although the veins underneath may be slightly hairy. Leaves typically measure from 3 to *5* inches long. The margins between lobes are shallow and smooth, which distinguishes them from leaves of the similar-looking red maple *(Acer rubrum),* which has serrated lobe margins. Another difference in the leaves is the "U-shaped" connections between lobes of sugar maple leaves versus the "V-shaped" connections of red maple.



Twigs are fairly slender, a shiny reddish-brown color, and covered with lenticels (small openings in the bark, *Figure 1-d*). The pith (inside core) of the twig is white. Buds are narrow, sharply pointed, and brown. The terminal bud may be larger *(0.25* to *0.5* inch) than the lateral buds (0.10 to *0.25* inch).

The bark on young trees is dark gray, but as the tree ages the bark develops rough vertical grooves and ridges (fissures) and may appear dark brown. On mature trees, the bark typically appears to have long plates that peel along the side edge. The bark on mature red maple trees typically has more narrow plates that peel from the top or bottom edge.

The flowers of sugar maple are greenish yellow with long stalks (pedicels) appearing in drooping clusters 1 to 2.5 inches long. Sugar maple is monoecious; that is, it has female (staminate) and male (pistillate) flowers on the same plant *(Figure 1-b and Figure 1-c)*. The fruit, a double samara, has a characteristic winged shape *(Figure 1-e)*.

Distribution and Habitat

Sugar maple is one of 148 maple species found in the Northern Hemisphere, which includes about 90 native and introduced species in the United States. The range of sugar maple in North America extends from Nova Scotia and Quebec at its northern edge, west to Ontario, southeastern Manitoba, and western Minnesota, south to southern Missouri, and east to Tennessee and northern Georgia *(Figure 2)*. Sugar maple is most common in New England and the Great Lakes states as well as Ohio, Pennsylvania, and New York.

Figure 2. Natural range of sugar maple

Elevational limits vary throughout sugar maple's extensive range. In northern New York and New England sugar maple occurs at elevations up to 2,500 feet. In the Great Lakes states, 1,600 feet is usually the upper limit. However, in the southern portions of its range, where the climate is typically warmer, sugar maple has a lower elevational limit of 3,000 feet and an upper limit of 5,500.

Naturally occurring combinations of different tree species form associations called cover types. Sugar maple is part of six forest cover types within its range. These are listed in Table 1.

Table 1. Forest cover types in which sugar maple is a major component

Cover Type	*Principal Locations*
Sugar maple-beech-yellow birch	Northeastern United States, *Lake States* and throughout higher elevations of the Appalachian region
Sugar maple-basswood	Throughout the eastern United States
Black cherry-sugar maple	Throughout the eastern United States
Red spruce-sugar maple-beech	Northern New York, New Hampshire, Vermont, and Maine
Beech-sugar maple	East of the Mississippi River throughout the range of the sugar maple

Climate

Average temperatures within the geographic range of sugar maple have average January temperatures from 0 to 50° F and average July temperatures from 60 to 80° F. Maximum temperatures in the summer months range from 90 to 100° F, while winter minima vary from -40 to +20° F. Annual precipitation throughout the geographical range averages 20 to 50 inches of rain, plus from 1 to 150 inches of snow. In unusually wet years in the southern reaches of this broad range total annual rain in excess of 80 inches has been recorded. The first killing frost usually occurs between September 1 and November 10 and the last from March 20 to June 15, depending on latitude and elevation. Thus average growing seasons are from 80 to 260 days.

Soils
Sugar maple can survive in a wide variety of soil types, but for maximum tree growth and sap production, soils should be deep, moist, and well drained with medium or fine textures. In the Northeast, such soils are common along glacial tills and benches. Areas generally not favorable to sugar maple establishment include swamps, dry sandy ridges, and thin rocky soils. The pH of soils supporting sugar maple ranges from 3.7 (strongly acidic) to 7.3 (slightly alkaline), but the species is most commonly found on soils with a pH of *5.5* to 7.3.

Forests dominated by sugar maple often produce a heavy leaf litter. Through the nutrients present in sugar maple leaves, the decaying litter can gradually have an influence on soil pH and nutrient status. Sugar maple leaves contain about 1.8% calcium, 0.8% potassium, 0.1% phosphorus, and 0.7% nitrogen based on their dry weight.

Over the full range of soils where sugar maple occurs, it may be expected to reach a height at age 50 of between 40 and 80 feet. This relationship between height and a standard base age is known by foresters as site index. However, site index has limits in utility for shade tolerant species such as sugar maple that can remain suppressed as juveniles in the understory. In these cases, site index values would underestimate the potential productivity of the site.

Life History
The leaves of sugar maple are usually fully expanded three to four weeks after the leaf buds begin to swell in the spring. The flowers emerge soon after the leaves and are in full bloom within a week. Normally, a single tree will produce both perfect (those containing *both* male and female parts) and imperfect (those containing *either* male or female parts) flowers. The ratio of male to female flowers is rarely less than ten to one and is usually about fifty to one. There is a noticeable localization of female flowers on certain areas of a tree crown. The flowers are pollinated by bees. Fruits that result from flower pollination usually mature in about 10 to 12 weeks and become ripe in September or October. The double samara fruit is characteristic of sugar maple, but usually only one seed is viable. The samaras fall about two weeks after ripening, which is approximately the same time the tree suspends its annual height growth. Birds, squirrels, and other rodents usually consume only a negligible amount of the seeds.

The minimum seed-bearing age for sugar maple is about thirty years. After this age some seed is produced every year, but massive quantities of viable seed are produced cyclically, usually at two to five-year intervals depending on climatic conditions. During these good seed years, trees are loaded with flowers, which gives them a yellowish cast when seen from a distance. The seeds are relatively heavy (average clean weight of 6,100 seeds per pound), but the winged shape of the samaras provides for wide dispersal by wind and blowing over snow.

The large quantities of seed produced in good years normally result in many seedlings. Seeds usually germinate in the spring following their autumn dispersal. In addition, sugar maple has a strong tendency to sprout in response to fire, cutting, disease, or physiological disorders. Stump sprouts are an important means of vegetative (asexual) reproduction in many hardwood forest stands. Reproduction or regeneration of a forest should be a major concern for any woodland owner who is planning to harvest trees. In the case of sugar maple, natural regeneration through seed establishment and prolific sprouting is generally successful in replenishing the amount of growing stock in a stand even after a fairly heavy cutting. Eastern forests can usually be regenerated naturally, without the need to plant seedlings. However, this involves careful planning, consideration of factors such as interfering vegetation and deer browsing, and is best accomplished in consultation with a professional forester.

Once the seedlings are established, frequent browsing by white-tailed deer can be a problem. Sugar maple seedlings can survive heavy browsing for many years, but they will most likely become stunted and deformed. Such selective removal through browsing by deer and other wildlife can cause significant changes in the composition of hardwood forests.

The annual initiation of height and radial growth in sugar maple usually corresponds with leaf emergence. Depending upon location and local weather patterns, height growth is usually completed in about 15 weeks; radial growth normally ceases in 14 to 17 weeks following initiation.

The root system of sugar maple in good soils is deep and branching. Natural root grafts are common. The seasonal periodicity of root growth is independent of aerial growth and often continues into the winter months if the soil remains unfrozen. Over half of the root growth for any given year, however, occurs during the same period as height and radial growth.

The growth rate and crown form of sugar maple are largely dependent on the origin of the saplings, as well as environmental factors. Saplings originating from sprouts tend to grow faster than those from seeds or even planted seedlings. The latter two, however, usually produce a healthier and better-formed mature tree. Sprouts from stumps with diameters of less than 2 inches are less likely to develop decay than those from larger stumps or multiple sprouts.

Sugar maple trees average about 1 foot of height growth and 0.2 inch of diameter growth annually for the first 30 to 40 years. Hence a 30-year-old tree might be 6 to 8 inches in diameter and 30 to 35 feet in height. After about 140 to 150 years, height growth ceases and radial growth slows greatly. Although rare, old-growth sugar maple stands can average 300 to 400 years in age; individual trees range from 70 to 110 feet tall with diameters at breast height of 20 to 36 inches.

Common Diseases, Insects, and Injuries

All trees, whether in a forest or urban setting, are constantly exposed to many damaging agents during their lifetime. Various diseases, numerous crawling and flying insects, and physical injury can all cause the decline of sugar maple.

Diseases

Sugar maple is susceptible to various disease organisms at all stages of development. *Rhixoctonia solani* and *Sclerotium bataticola* attack nursery seedlings; the latter damages the pith. As the trees age, they are subject to various foliage and stem diseases. Some of the more common foliage diseases include anthracnose *(Gloeosporium apocryptum),* which forms necrotic (dead) areas on the leaves. These are sometimes circular in shape and may be of various sizes; they turn brown, purple, or black as the disease progresses. Tar spot (caused by *Rhytisma acerinum) is* the name commonly given to a foliage disturbance in sugar maple that starts with small black dots on the leaves, which eventually combine to form large, black, thickened areas. Most stem diseases exhibit cankers or galls. Cankers are sunken portions of the trunk or woody branches that often have a callus-like buildup of bark around the edges. Two common cankers of sugar maple are caused by the fungi *Nectria* and *Eutypella*. Galls are obvious out growths on the main trunk of a tree, usually within 8 feet of the ground.

Vascular (stemwood) diseases that can injure sugar maple are usually caused by fungi entering the stem through wounds in the trunk or branches. Most vascular diseases are not fatal, but they can produce toxic substances that cause decay. For example, trunk rots are caused by fungi that enter the tree through frost cracks, dead branches, and stubs and less frequently through the roots.

Sugar maple is relatively free from diseases of the root system, although they sometimes attack otherwise weakened or diseased trees. For example, verticillium wilt (V. *alboatrum) is* a common killer of shade trees, but it is less damaging to sugar maple than to Norway maple *(Acer platanoides)*. This disease infects the roots and causes green streaks in the wood. Stains are another broad group of diseases affecting both hardwood (broadleaf) and softwood (conifer) trees. They discolor the wood, reducing its commercial value.

Insects

Insect predation of sugar maple is usually not a serious problem, although in some years under certain conditions insects can initiate significant growth decline or mortality. In periodic cases of unusually large

insect population buildups, such as with gypsy moth *(Lymantria dispar)* in the Northeast, however, insect damage may be serious. Other insect species that commonly attack sugar maple include the fall webworm *(Hyphantria cunea),* saddled prominent (*Heterocampa guttivitta*), sugar maple borer (*Synanthedon acerni*) pear thrips (*Taeniothrips inconsequens*), forest tent caterpillar *(Malacosoma disstria),* maple trumpet skeletonizer *(Epinotia aceriella),* maple leaf cutter *(Paraclemensia acerifoliella),* and maple petiole borer *(Caulocampus acericaulis).* As implied by the names of these pests, most insect-related problems in sugar maple involve the leaves.

Other Problems
Sugar maple is very sensitive to high sodium levels in the soil. Hence it can sustain major injury from salt added to road surfaces to melt winter ice and snow. The use of salt in the winter is a common practice throughout much of New York State and New England. Affected trees are found primarily along roads, although in extreme cases water drainage from roads into maple stands has caused extensive damage. Salt enters the roots and accumulates throughout the tree. When soil moisture levels decrease, the high salt concentration in the tissues causes the death of many twigs. Therefore, salt damage becomes obvious following long dry periods during the summer.

Management
The successful management of any forest must begin with specific goals. Stands of sugar maple can be managed to produce sap for syrup and wood for a variety of products. Both of these alternatives can be beneficial to wildlife by providing cover, browse, and nesting sites.

A sugar maple stand managed for the production of maple sap is commonly referred to as a sugar bush or sugar grove. The ideal tree in such a stand has special genetically and environmentally controlled characteristics that provide for a large amount of sweet sap to be produced annually; it can then be gathered and evaporated efficiently. Most important of these characteristics is a large crown in which many leaves are exposed to direct sunlight. Sap flow is also enhanced by large stem diameters, which develop from wide, deep crowns. Hence open-grown trees with wide crowns favor high sap production rates. Therefore, in a closed stand heavy thinning is normally recommended to simulate an open-grown environment. Before completing abrupt changes in your forest through timber or firewood harvests, it's best to consult with a professional forester.

Growing trees for high-quality timber requires a different type of stand than that desired for maximum syrup production. A good sawtimber stand has trees with tall, straight stems and no branching below the growing crown. Historically, forest management in hardwood forests has favored uneven-aged stands and natural regeneration. As markets for fuelwood and other uses for pole-size (4 to 12 inches in diameter at breast height) trees develop, thinning of young stands becomes increasingly attractive to the forest landowner. Thinning a stand, practiced at various stages of development, involves removing poorly formed trees, as well as dead and diseased trees, to promote the growth of healthy, well formed members of the stand. Hence the goal for dense sugar maple stands is to remove as many inferior trees as possible without promoting open-grown characteristics in the remaining trees.

Products and Uses
Products derived from sugar maple trees are common in house holds throughout the country. The maple syrup and sugar industry is an important part of many agricultural economies in the Northeast and lake states. The earliest written accounts of maple sugaring were made in the early 1600s by European explorers who observed American Indians gathering maple sap. Today, sugar maple stands and roadside trees provide private landowners with an annual cash crop as well as a rewarding hobby.

Sugar maple has long been valued as a hardwood timber species because of the wood's hardness and resistance to shock. In early America, the wood was used for a variety of household items, including rolling pins, scoops, apple grinders, and cheese presses. Today its uses include lumber for general construction, flooring, furniture, cabinet work, and woodenware. The high density of sugar maple wood makes it a popular fuel for home heating.

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