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OHIO Woodlands, Water, & Wildlife

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Research Highlight: Hemlock Woolly Adelgid Impacts on Bird Communities

Marne Titchenell, SENR, OSU Extension Wildlife Specialist

An interesting article recently passed across my desk that I thought I would share with Ohio's woodland owners and enthusiasts. The article highlighted research conducted in Delaware and New Jersey looking at the impacts of Hemlock Woolly Adelgid (HWA), and the subsequent loss of hemlocks, on bird communities.

In case you are unfamiliar with HWA, it is a non-native insect threatening Eastern and Carolina Hemlocks in eastern North America. Hemlock woolly adelgids cause damage to hemlocks by piercing the base of hemlock needles to feed on the tree's nutrients. Populations increase rapidly due to the adelgids' proliferate reproduction. The loss of resources causes needle loss and ultimately, mortality.

HWA has spread through many eastern states, including Ohio. Found in a natural stand of hemlocks in 2012, it has since spread to several counties in Ohio. The USDA Forest Service reports that HWA poses a significant threat to the health and sustainability of hemlocks. There is no doubt that hemlocks are valuable resources.

Anyone who has visited the Hocking Hills region, Mohican State Forest, or Lake Katherine State Nature Preserve and walked the hemlock-dominated forests appreciates their value. Hemlocks are also important resources for wildlife, which brings us to the subject of this article.

According to research conducted by Dr. Matthew Toenies and colleagues, HWA is reportedly changing the bird communities in hemlock-dominated stands. There are certain species of songbirds that are hemlock specialists, such as the Blackburnian warbler, Acadian flycatcher, Blue-headed Vireo, Hermit Thrush, and Black-throated Green Warbler. These specialists showed substantial declines; the Black-throated Green Warbler declined in occupancy by 30% across HWA infested stands. Interestingly, as the specialists declined over time, other bird species increased. Species such as the Eastern Wood-Pewee, Wood Thrush, and Hooded Warbler occurred in greater abundance in the dying hemlock stands. In addition, woodland edge specialists such as the Blue Jay and Brown-headed Cowbird were among the species most detected. Both of these species can impact nesting success of songbirds, as blue jays are nest predators and cowbirds are brood parasites (cowbirds lay their eggs in the nests of other birds).

So why was there such a dramatic change in the bird communities within these declining hemlock stands? Obviously, there is a direct link between hemlock decline and hemlock specialist bird decline. However, the decline of hemlocks also leads to a significant change in forest structure, which is very important to a bird. Consider for a moment, what a loss of hemlocks would do to the structure of a forest stand. Hemlocks with needle and limb loss create openings in the tree canopy, allowing sunlight to reach the forest floor where a dense understory begins to grow, namely deciduous seedlings and NOT hemlocks. In addition, deciduous trees become more prevalent in the overstory due to canopy gaps. This more open canopy forest with dense undergrowth is attractive to shrub and edge-associated birds like wood-pewees and blue jays.

While it may be good news for blue jays and other species moving into declining hemlock stands, its bad news for biodiversity. We hear a lot about biodiversity these days, especially considering nonnative, invasive

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species. Biodiversity is the variety of life in the world, or in this case, a particular ecosystem. Key to biodiversity is the importance of each individual species, and their role in sustaining an ecosystem. Simply replacing a lost species with another (say a Blue Jay for a Blackburnian Warbler) doesn't cut it. Aldo Leopold, the father of wildlife management, said, “To keep every cog and wheel is the first precaution to intelligent tinkering.” This can be interpreted many ways, but I interpret it to mean that within an ecosystem, every cog and wheel has a special, and critical, part to play.

Sadly, the results reported by Dr. Toenies and his colleagues run parallel with the ecological impacts typically caused by nonnative, invasive species – loss of biodiversity and changes in forest communities and structure. One positive, reported by Dr. Toenies, was that an unhealthy hemlock was still better than no hemlock at all, for hemlock bird specialists. This is even more reason to identify HWA infestations early and work to manage against HWA in already infested areas. If you suspect HWA, please call the Ohio Department of Agriculture for verification and guidance.

In conclusion, I will share a memorable and very important quote from the article that spawned this one. “But a tree is a tree is a tree, right? Wrong. Especially if you are a bird.” In the case of HWA and birds, the tree species most definitely matters.

For more information on HWA and management options, please read the Ohio State University Extension's Bulletin 962, Hemlock Woolly Adelgid: Managing a Nonnative Invasive Pest in Ohio (go.osu.edu/HWA).

If you would like to read the article published in Forbs magazine by GrrrScientist, that inspired this article, please visit here (go.osu.edu/HWAbird). To read Dr. Toenies' research article, visit: (go.osu.edu/ToeniesETAL2018).

2019 Ohio Maple Days

It is time to make your plans for attending one of the 2019 Ohio Maple Days programs.

Registration is $35, pre-registration is required
Please register before January 11th

Morrow County Meeting
Thursday, January 17, 2019 - 8:00 AM - 3:00 PM
Lutheran Memorial Camp
2790 State Route 61, Fulton, Ohio 43321

Wayne/Holmes County Meeting
Friday, January 18, 2019 - 8:00 AM - 3:00 PM
Mennonite Christian Assembly Church
10664 Fryburg Road, Fredericksburg Ohio 44627

Geauga County Meeting
Saturday, January 19, 2019 - 8:00 AM - 3:00 PM
Huntsburg Community Center
12396 Madison Road
Middlefield, Ohio 44062

Contact: Ashley Gerber—330-674-3015 for registration information

Does Resource Abundance Always Lead to a Strong Forestry Sector? A Comparison of Three Ohio Regions

Sayeed R. Mehmood, Associate Professor and Extension Specialist, Natural Resource Economics

Forests provide a variety of goods and services. These goods make substantial contributions to the economy. In Ohio, forest industries directly employ about 50,500 people, while another 71,000 are employed in other sectors due to economic activities of the forest products industry. This industry also contributes $9.95 billion in total value added to the state's economy. This number is important because it represents the value “added” to the economy by processing primary forest products, such as logs and lumber, into higher value secondary products such as furniture. In some ways, we could also look at it as a measure of the strength of the forest sector within an economy. However, a statewide view does not always paint an accurate picture. States are often identified, officially or unofficially, with regions. Delineation of these regions could be based on purely geographic, physiographic or even cultural factors. In any case, these regions often have socioeconomic characteristics that define them as individual economic areas. The strengths and weaknesses of these regional economies even within the same state can vary widely, regardless of natural resource abundance.

To demonstrate this, we will compare the Southeastern, Northeastern and Northwestern regions of Ohio in terms of their natural resource and socioeconomic characteristics.

The Southeastern region of Ohio includes Athens, Hocking, Meigs, Morgan, Perry, Vinton and Washington counties. This region is part of the greater Appalachia and hence the terrain is hilly with vast amounts of forest and some farm land. The region is primarily rural and has lower than average per capita income than the state. Poverty, unemployment and low educational attainment is a persistent problem in the region, although they do vary somewhat by county.

The Northeastern region includes Ashland, Ashtabula, Columbiana, Cuyahoga, Erie, Geauga, Huron, Lake, Lorain, Mahoning, Medina, Portage, Richland, Stark, Summit, Trumbull and Wayne counties. This region is a mix of rural and urban landscapes and by far the largest population of all three regions. This region is characterized by rolling hills and includes several counties adjacent to Lake Erie.

The Northwestern region includes 27 counties covering a vast area of the state. These counties are Allen, Auglaize, Champaign, Crawford, Defiance, Delaware, Fulton, Hancock, Hardin, Henry, Knox, Logan, Lucas, Marion, Mercer, Morrow, Ottawa, Paulding, Putnam, Sandusky, Seneca, Shelby, Union, Van Wert, Williams, Wood and Wyandot. Although the region is primarily rural, it does include the fastest growing county in Ohio—Delaware County. This same county also has the highest per capita income in the state. The Northwestern region is characterized by flat terrain and dominated by agriculture. The region is not particularly rich in forest resources.

Impact Analysis for Planning (IMPLAN), a leading economic simulation program, is often used to estimate economic contributions of a particular industry or impact of changes in such an industry. IMPLAN is based on the input-output model which shows the flow of goods and services within an economy through interindustry transactions. The basic assumption is that each industry within an economy is dependent upon every other industry.

In this analysis, IMPLAN 2015 data was used to analyze forest products industry's contribution to the economies of Southeastern, Northeastern and Northwestern regions of Ohio. IMPLAN results were then further analyzed using forest resource data from the U.S. Forest Service Forest Inventory and Analysis (FIA). Demographic data were collected from the Bureau of the Census and additional economic data were collected from the Bureau of Economic Analysis.

Figure 1 shows the regional breakdown of Ohio. These regions are identical to the FIA regions for Ohio. Household income distribution between the three regions is substantially different **(Figure 2)**, with the Northwestern Northeastern regions having a larger share of higher income households. Even though the

Figure 1: Map showing Ohio regions and forest resources (Source: USDA Forest Service).

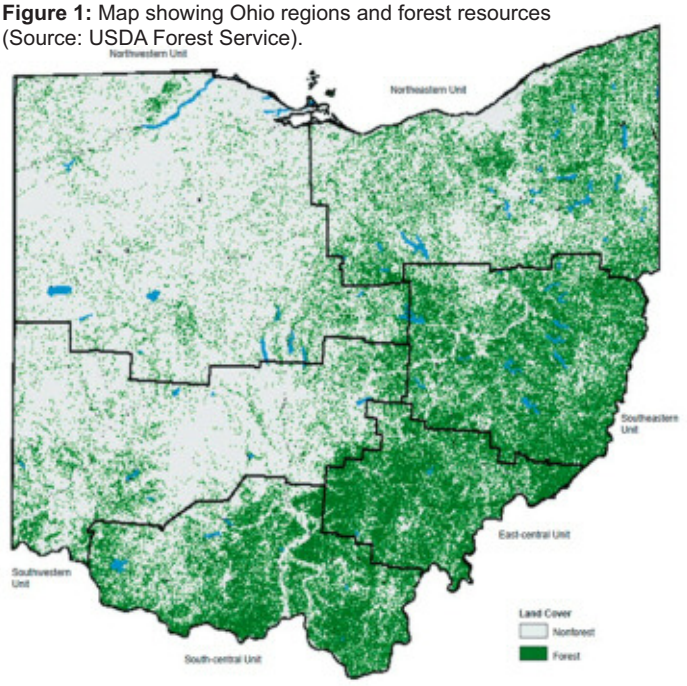
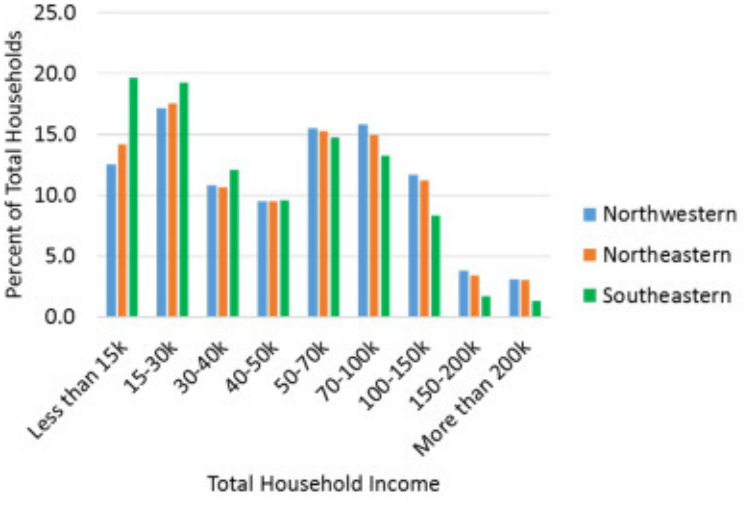


Figure 2: Total household income distribution for the three regions.



Northwestern region is disproportionately larger than the Southeastern region **(Table 1)**, the latter has a higher abundance of forests. The Northeastern region has the largest population of all three regions, but still is rich in forest resources. Part of the Northwestern region is growing rapidly and with a growth to drain ratio of 0.51 **(Table 2)**, forest loss is a major concern. However, when it comes to capturing economic benefits from forest products, the Northeastern region clearly does significantly better than the other two regions. The region's forest products industry accounts for almost 73% of the total forest sector value added for the state, whereas the Southeastern region's share is less than 1%. Similarly, while the Northeastern region captures $14.5 million in value added for every million board feet of removals, the Southeastern region only captures $0.2 million. Despite its meager forest resources, the Northwestern region does relatively well consistently behind Northeastern but well ahead of the Southeastern

Table 1: Demographic data for the three regions.

	NW	NE	SE
Land Area (sq. mile)	11,730	7,977	3,236
Population	1,852,117	4,204,309	242,556
Density per sq. mile	158	527	75
Percent below poverty	13.8	14.1	22.1

Table 2: Resource and industry data for the three regions.

	NW	NE	SE
Forest area (MM Ac.)	0.77	1.52	1.43
Volume (MMBF)	20,695.	41,027	35,887
Removals (MMBF)	249	441	345
Growth to Drain	0.51	2.12	2.03
Employment	11,274	17,335	1,243
Value added (MM $)	774.10	6,368.22	66.24
Percent of state totals for forest sector	8.85	72.81	0.76
Federal taxes (MM $)	219.12	454.80	15.16
Percent of state totals for forest sector	15.26	31.68	1.06
State and local taxes	108.98	227.59	7.38
Percent of state totals for forest sector	14.55	30.40	0.99
Taxes generated per acre of forest	424.12	448.22	15.77
Taxes per MMBF of removals (MM$)	1.32	1.55	0.07
Employment per MMBF of removals	45.34	39.35	3.60
Value added per MMBF of removals (MM$)	3.11	14.46	0.19

Table 3: Employment and value added data for aggregated forestry sectors.

	NW		NE		SE	
	Employ.	VA (Mill. $)	Employ.	VA (Mill. $)	Employ.	VA (Mill. $)
Forestry and Logging	1,308	62.7	2,103	182.5	283	10.7
Lumber and Wood Products	2,517	151.7	4,393	1,146.2	676	40.1
Pulp and Paper	4,047	385.9	6,979	4,240.3	140	9.7
Furniture	3,402	173.9	3,859	799.3	144	5.8

region. This implies much of the wood processed in this region is coming from other parts of the state. When we look at the four aggregated major sectors **(Table 3)**, the stark differences in employment and value added between the three regions are quite evident.

So why does the Southeastern region lag so far behind despite its resource abundance? Capturing economic benefits from forest resources depends heavily on the industrial infrastructure within the regional economy. As **Table 3** demonstrates, both Northeastern and Northwestern regions have substantially more employment in each of the forest sector categories. This implies more economic activities in secondary forest products industries which then translates into higher value added. These value added industries provide higher paying jobs and generate substantially higher federal, state, and local taxes.

However, there are important policy and social implications of this type of disparity. Economic activities generate state and local taxes. Legislators sometimes use tax contributions as a factor in their decision for allocating funds for different economic and social programs. Consequently, some regions may not adequately benefit from these programs, even though their forest resources are helping other regions to do so. This raises serious equity and social justice concerns. It is, therefore, imperative that federal, state, and local governments redouble their efforts in the economically disadvantaged regions through increased education, training, and funding for business development to encourage primary and secondary processing industries. This will enable these regions to maximize economic benefits from their forest resources.

SEASONALITY OF NATURE – The Good, The Bad and The Ugly!

Amy Stone, OSU Extension – Lucas County

Everyone has likely heard, “tis the season.” While that phrase may remind you of the snow, cold temperatures and winter holidays; if you enjoy nature and being outdoors, take the time to explore and take in, even the little things, all year round. The winter months should be no exception. While you might think there isn't a lot to see this time of the year, even a short winter walk-about will be a pleasant (or even not so pleasant) surprise. It was the beautiful side of horticulture that drew me to choose a career among plants. With that said, I enjoy the challenges of identifying plants and pests. What is this “bug”? Can you name this plant? What caused the leaf spot? What is attached to the branch? Answering these mysteries can make a gardener, woodland owner or naturalist become a nature detective.

A detective not only solves mysteries, but determines what actions, if any, are needed to manage the situation. Recently, there have been some regulars that I have either observed, received calls or emails on, or have been brought samples to diagnose. Here are just a few:

Gypsy Moth Egg Masses - Calling all gypsy moth *(Lymantria dispar)* caterpillars, or the homeowners or woodland owners that have experienced these leaf eating machines over the summer of 2018. The gypsy moth is a non-native caterpillar that feeds on over 300 different trees and shrubs, but oak trees are a definite favorite.

While you won't be seeing the gypsy moth caterpillars, or even the adult moths this time of the year – you could see egg masses. It is the egg masses that are present now, full of eggs that will become the leaf eating machines next spring and summer. In high numbers, the caterpillars can totally defoliate entire trees no matter their size. In addition to being a plant pest, they are also problematic when people can't enjoy the outdoors. Caterpillar feeding equals frass, aka bug poop, falling from above wherever they are feasting. Yuck!


Gypsy Moth Egg Masses
Kathy L. Smith, Ohio State Forestry

Egg masses are tan in color but turn lighter in color as they age. They can be dime, nickel or quarter sized, but normally more oval shaped rather than circular. The eggs are covered that give the mass a felt-like appearance. Egg

masses that were laid earlier this season are firm to the touch, whereas those that are older are “squishy” or soft because the eggs have hatched and are empty. The older egg masses are almost cream colored as the age as a result of being exposed to the weather.

Egg masses can be laid on nearly anything – trees, outdoor furniture, fences, buildings, garden art and vehicles. If you are looking on trees, check out the undersides of branches.

For more information about the gypsy moth in Ohio, refer to the Ohio Department of Agriculture (ODA) website.

Mantis Eggs - Mantises also survive the seasonal chill as eggs. More than 100 eggs are laid cozily into egg cases called oothecae. Each autumn, a female mantis deposits one or more oothecae on upright vegetation such as the branch of a tree or shrub or a stem herbaceous plant. As temperatures warm next year, tiny mantises hatch and emerge in search for prey. “Mantis” stems from the ancient Greeks who used mantis to describe a soothsayer, one that could see into the future. There are three mantises that you could commonly encounter in Ohio. *Mantis religiosa* is a native of Europe where it goes by the name of praying mantis. Since its introduction to North America in the 1890's, it has spread and is distributed east of the Mississippi and northward into Canada. The European mantis is readily identified by the black and white marking on its inside upper foreleg.


Mantis Egg Mass
Whitney Cranshaw, Colorado State University, Bugwood.org

Another common exotic predator, the Chinese mantis, *Tenodera sinensis*, has been around for over 100 years. This species originated from China and Japan. European and Chinese mantises are well-known for their sit and stay predation as they wait for their next insect meal. They are related to other mantises including the native Carolina mantis, *Stagmomantis carolina*. This smaller grey or brown mantis ranges from New Jersey, south to Florida and west to Arizona. Like other mantis species, the Carolina mantises eat a wide variety of insects and spiders found in gardens and landscapes – including other mantises if other insects aren't readily available.

This time of the year you may encounter oothecae – hopefully outdoors. If an egg case hitches a ride into your warm home on a Christmas tree or other natural decorations including twigs and branches, beware. Indoor temperatures may trigger the insects to hatch, thinking that spring has arrived. You could be greeted by lots of small, hungry mantises. Surprise!

Bagworms - Bagworms, *Thyridopteryx ephemeraeformis* (Haworth), are caterpillars who spend the winter as eggs inside the female's bag. The spindle-shaped silk bag is camouflaged with bits of foliage, bark and other plant debris and range in size between 1 ½ to 2 ½ inches in length.

Bagworms on evergreens are commonly mistaken for the plant's “cones” or have been described as a nature's ornament hanging from branches. Arborvitae are definitely an evergreen favorite, but the insects will also feed on pine, spruce and juniper. Bagworms can also be found on deciduous trees and commonly found on willow, black locust, sycamore, apple, maple, elm, poplar, oak and birch.

Bagworms found now can be removed by hand or heavily infested branches can be pruned and disposed of. Well-timed insecticide treatments can be very effective later in the year as caterpillars hatch and exit the bag to begin “building” their own home or bag. For more information about bagworms, check-out the OSU FactSheet: ohioline.osu.edu/factsheet/HYG-2149-10

Viburnum Leaf Beetle Egg Laying Sites - This invasive species is spreading across the buckeye state, eating viburnums along the way. While Ohioans in NE Ohio have been dealing with the viburnum leaf beetle (VLB), *Pyrrhalta viburni*, for many years, it is moving to the west and southwest. If you have viburnums, a little scouting this winter will help determine if your shrubs are currently infested. The most susceptible viburnums include: Arrowwood viburnum *(V. dentatum)*, European cranberrybush viburnum *(V. opulus)*, American cranberrybush viburnum *(V. opulus var. americanum = V. trilobum)* and Rafinesque viburnum (V. rafinesquianum). Adult females chew pits on young stems and lays eggs in those pits. The egg laying sites are lined up on those twigs, typically on the newest growth or tips of the branches. This damage can weaken the branches and some will break. If you noticed this egg laying sites on your viburnums, pruning can remove the next year's generation.

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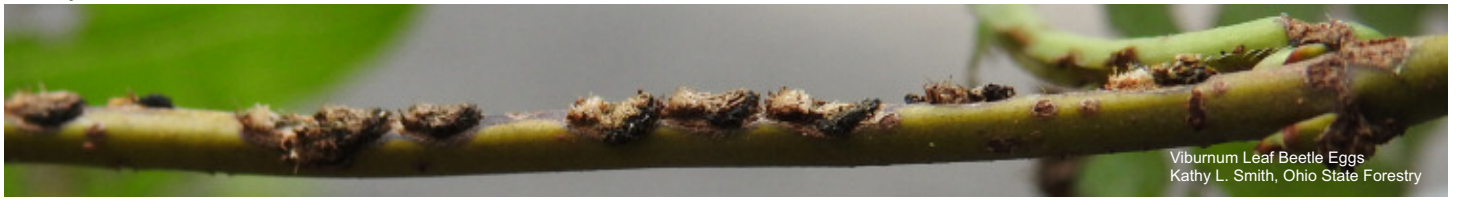
Viburnum Leaf Beetle Eggs
Kathy L. Smith, Ohio State Forestry

For more information on VLB, check-out the OSU FactSheet: ohioline.osu.edu/factsheet/anr-39
Are you ready for this new role in your garden, landscape or woodlot? In addition to enjoying the beautiful side of nature, don't overlook the plant pest. While you are outdoors be on the lookout for the good, the bad and the ugly. If you find something you aren't familiar with know there are resources to help. A winter-walk can be an eye-opening experience – if you let it be.

Other References:

- Buckeye Yard and Garden Line, bygl.osu.edu/
- Ohioline FactSheets, ohioline.osu.edu/
- OSU Plant and Pest Diagnostic Clinic, ppdc.osu.edu/

Calendar of Events

January	**17th**	**2019 Ohio Maple Days**	**Morrow County, OH**
	18th	**2019 Ohio Maple Days**	**Wayne/Holmes County, OH**
	19th	**2019 Ohio Maple Days**	**Geauga County, OH**
February	**28th**	**Your Woods: Management and Liabilities**	**Crawford County, OH**
March	**6th**	**2019 Ohio Woodland Water and Wildlife Conference**	**Mansfield, OH**
	30th	**Ohio River Valley Woodland & Wildlife Workshop, Clifty Inn**	**Madison, IN**

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