

Summer 2018

Vol. 9 Issue 2

he State of New York declared July 8-14 to be Invasive Species Awareness week, which got us thinking about non-native, invasive species in the Finger Lakes region. In a scientific paper about common buckthorn, I read that, "Invasive species are now regarded as second only to habitat loss as a cause of biodiversity loss." Non-native invasive species are a major stressor and can disrupt a natural balance between organisms, sometimes with one disruption cascading into another and another. Terrestrial plants are just one subset of non-native, invasive species. To learn about non-native, invasive plants (NNIPs) in our area, and for suggestions on how to approach a possible control effort on your land, I invite you to refer back to the Winter 2010 issue of Afoot in the Field at fllt.org/publications.

The most obvious impact of NNIPs, the one that is easy to see with our own eyes, is how they can grow un-checked, crowding out not only native plants, but trails too, quickly taking over roadsides, fields, and young woods. What is harder to see are the more subtle, but arguably more important, negative impacts that NNIPs can have on the disruption of food webs, reproduction, or other life dynamics of native species. Any ecologist will tell you that the myriad interactions and relationships between organisms in an ecosystem are incredibly complex. Ecological research teases out many of these relationships, but so many others surely remain a mystery. Some of the known negative impacts that these infestations of NNIPs have on wildlife species and ecosystems are profiled in this newsletter by Hannah George. Who knows how many other consequences to natural systems are yet undiscovered.

What to do about this problem? Unless you have substantial resources to tackle heavy infestations of non-native plants head-on – such as the tractor and giant claw one of

our FLLT preserve neighbors uses to rip large honeysuckle bushes out of the ground – the priority should be to protect pristine places first, by keeping non-native plants out of high quality habitats where they do not yet occur; and also "early-detection/rapid response" of new NNIPs when they still are able to be more easily controlled. We also place a lot of hope on research in bio-controls- organisms released to control invasive species over the long-term (and which hopefully do not have unintended consequences). I, for one, would love to see swallow-wort, Japanese knotweed, and other bad actors relegated to low background levels in our environment, much the way purple loosestrife is today.



Chris Olney Director of Stewardship

BIODIVERSITY: The Complicated Impacts of Non-Native, Invasive Plants by Hannah George

Every few months, it seems, there is news of yet another non-native invasive plant (NNIP) or pest headed our way. There seems to be no end to the onslaught in sight, and with a problem so enormous, I begin to wonder if it even is a manageable problem. Are the changes in species composition significant to the overall ecosystem? Can nature find a new balance? Who will suffer? Why should we care? These questions are big, and the answers are complicated and often subjective.



To begin to answer these big questions, it helps to take a more focused look at individual relationships in nature. The takeover of natural ecosystems by NNIPs can reduce the prevalence of native plants and affect the entire food web in subtle but significant ways. Due to thousands of years of co-evolution, many animals depend on native plants for survival. When NNIPs take over, the local loss of biodiversity threatens the resilience of the entire system. Compounded with the effects of more extreme weather, deer overpopulation, and shrinking habitat, the environment may not recover those losses if no action is taken. While many questions about the impact of NNIPs remain unanswered, some insights have become clear from research. Here are some examples for species in our region.

Bird Nesting Success

One question is how NNIPs affect nest survival rates of the northern cardinal. Nest success in multi-flora rose (*Rosa multiflora*) is consistently worse than in

native plants, and early season nests built in non-native bush honeysuckle fledged 20% fewer young over the course of the season, compared to native plants. Because predators have an easier time finding nests all built in the same plant species, at the same time of year, these early nests had only a 14% chance of having one or more eggs survive to fledge.

Bird Nutrition

An environment dominated by NNIPs also affects the kind of nutrition birds obtain. For example, the berries of non-



native bush honeysuckles (*Lonicera sp.*) are mostly water, sugar, and only 2-3% fat and protein. For migration, winter survival, and reproduction, birds need more substantial fuel. Hungry birds can obtain their calories more efficiently with native plant berries such as viburnum, dogwood, and spicebush, which are as much as 50% fat and protein. Insects are also an important food source, as 96% of terrestrial birds raise their young on insects. Herbivorous insects, as well the birds that eat them, are more common in properties with native plant landscaping than a typical suburban lawn.

Butterfly Reproduction

A problematic NNIP that demonstrates the negative impacts on specialist insects (ones that feed on only certain plants) is pale swallow-wort (Cynanchum rossicum).



Pale swallowwort can crowd out milkweed plants and act as an "oviposition sink" for the monarch butterfly, meaning that in some cases, the monarch butterfly mistakenly lays its eggs on swallow-wort, thinking it is milkweed (which is in the same plant family). When this happens, none of those caterpillars will survive. In one study site in Rhode Island, this occurred as much as 20% of the time and has been identified as a contributor to the monarch butterfly decline.

The aquatic world is also affected when NNIPs disturb the natural ecosystem balance. Because of a lack of natural controls. NNIPs such as Eurasian watermilfoil, yellow floating heart, and water chestnut can take over an aquatic ecosystem. Beside clear impacts on humans, such as impeding boats and making fishing difficult, aquatic plant invasions can have extreme effects on the local environment. Unchecked plant growth can be followed by die-off, and then the decomposition of these plants can lead to significant depletion of



oxygen in the water and thereby cause fish mortality.

Allelopathy



Allelopathy is the chemical inhibition of one plant (or other organism) by another, due to the release into the environment of substances/chemicals acting as germination or growth inhibitors. A classic example of a native allelopathic plant is the black walnut tree, which produces a chemical (juglone) that inhibits many other plants from crowding the walnut tree. Several NNIPs have similar capabilities. Non-native, invasive trees including common buckthorn (Rhamnus cathartica) and tree-ofheaven (Ailanthus altissima) do the same thing. Garlic mustard (Alliaria petiolata) produces a chemical that inhibits some mycorrhizal fungi that live in soil and help trees access nutrients in exchange for carbohydrates.

Even after garlic mustard is removed, this chemical legacy results in slower growth of native tree seedlings. Similarly, even after buckthorn is cleared from a site, the altered soil chemistry can persist for years and impede native plant restoration efforts.

BIOLOGICAL CONTROL OF NON-NATIVE INVASIVE SPECIES

In some cases, non-native invasive species can be suppressed by another species, usually introduced from the native range of the non-native invader. This strategy is called biological control or bio-control. Before releasing a bio-control agent, such as the beetles that have famously suppressed the non-native, invasive purple loosestrife plant in wetlands, scientists first conduct extensive research to understand their life cycles and possible ecosystem impacts. Here are some updates on bio-controls for invasives species affecting the region:

• A new lab at Cornell University is rearing bio-control predators to feed on hemlock woolly adelgid (*Adelges tsugae*), a non-native insect that threatens the survival of the beautiful hemlock trees so common in our gorges. The predators include a small beetle (*Laricobius nigrinus*), and now also two species of silver fly (*Leucopis argenticollis* and *L. piniperda*), which have the most optimism for success.



FLLT Executive Director Andy Zepp and Cornell University volunteers release silver flies on hemlock trees at the Land Trust's Ellis Hollow and Lindsay-Parsons Biodiversity preserves to combat hemlock woolly adelgid.

- Scientists at the USDA Agricultural Research Service and the University of Rhode Island are studying a moth native to Ukraine (Hypena opulenta) as a bio-control for non-native, invasive pale swallow-wort (Vincetoxicum rossicum) and black swallow-wort (Vincetoxicum nigrum). These perennial climbing vines have spread rapidly in the past 20 years, taking over roadsides and infiltrating forests. Dr. Lindsey Milbrath, Research Entomologist at the USDA, explains that traditional control techniques such as mowing or applying herbicide can be ineffective on the target plant, negatively affect surrounding plants, and/or be too expensive. While the population of the moth is still very low in Ontario where it was first released in 2014,
- Researchers in Ohio and Pennsylvania are studying the possible bio-control of the non-native, invasive tree-of- heaven (*Ailanthus altissima*) by a native fungus (*Verticillium nonalfalfae*).
- The potential bio-control of Japanese knotweed (*Fallopia japonica*) has been studied in the US and United Kingdom for nearly 20 years, with trial releases of multiple control species. There is not yet an effective bio-control agent being released in widespread areas, but a psyllid insect (*Aphalara itadori*) shows the most promise.

Resources

releases have also begun in New York.

NY Invasive Species Information: http://nyis.info. Profiles of many types of invasive species that affect both natural ecosystems and agriculture.

iMapInvasives: https://www.imapinvasives.org/.An invasive species tracking and distribution application that harnesses the power of having many trained observers report occurrences of invasive species around NY State; used often by FLLT Stewardship staff.

Finger Lakes Partnership for Regional Invasive Species Management (FL PRISM): http://fingerlakesinvasives.org. Part of a network of 8 regional PRISMs created by NYS, which are a cooperative partnership of diverse stakeholders interested in invasive species knowledge.

NATIVE PLANTS

The Winter 2010-11 issue of Afoot in the Field provided some basic advice about how to have a strategic approach and allocate limited resources if you are interested in trying to control non-native invasive plants on your property. Such an effort could entail as little as a few hours, or as much as many weeks, with tractor and mower, chainsaw, brush-saw, sprayers with herbicide, or even a herd of goats. But what if keeping invasives at bay is not enough, and you want to actually restore native plants to areas where you have pushed back the non-natives? That is a noble goal and may be achievable with some dedicated effort.

As wise folks have said, "Nature abhors a bare spot." Unless you purposely restore native plants to a cleared area, it is highly likely that the non-native species will recolonize. If the previous plants that occupied the area were allelopathic, producing chemicals that exclude other plants, then restoration may be made more difficult due to lasting chemical impacts to the soil. Also, fencing may be necessary to prevent deer from gobbling up what native species you do seed or plant in a restored area.

Looking at the native plant species that occur in your area can provide some indication of which native plants are likely to thrive in the environments that occur on your property. For example, red osier dogwood is a beautiful, wildlife-friendly shrub found in damp areas, and may be a good replacement for the non-native, invasive common buckthorn; gray dogwoods and some viburnums grow well in drier fields, and could replace non-native, invasive bush honeysuckle. Following are some profiles of native species that could be of interest in a habitat restoration project and are often available from native plant nurseries, or by collecting seed or transplants from nearby areas where they are prevalent (and not protected from collecting). For more native plant suggestions, visit **filt.org/nativeplants**.









This wild looking wildflower, scarlet beebalm (*Monarda didyma*), is easy to grow in a variety of sites, and is beloved by pollinators but not by deer.

Red Osier Dogwood (*Cornus serocea*) in bloom.The plant is especially appreciated in winter, when the red stems stand out and birds flock to the berries.



Viburnum (Viburnum spp.) features delicate white flowers in late spring and provides cover and berries for wildlife.

NOTE: Before conducting restoration work on your property, remember to check your conservation easement document and consult with FLLT stewardship staff for any limitations on permitted plantings and soil disturbance.

LANDOWNER PROFILE: Dan Halton

Dan Halton, of Lafayette, NY, owns 105 acres of forest and meadows in the Town of Danby, Tompkins County.



FLLT: How did you come to own your conservation easement property?

DH: In 1980, I purchased 120 acres of undeveloped land in Danby, NY with my oldest brother Bill and his wife Kathy. As we three partners grew older and retired, Bill and Kathy offered to deed over to me their interest in 105 acres of our joint land parcel, if I would fund the necessary administrative costs required to put most of our original land into a binding conservation easement with the FLLT.

I had never heard of the FLLT and I was hesitant about sharing management authority over land that I owned outright. Nonetheless, I quickly entered into negotiations with FLLT. I was surprised and pleased to find that perhaps 80% of my conditions for an agreement were acceptable to FLLT from day one. Still, there were several issues of seemingly complete disagreement that were potential deal breakers. I believe that trust, developed in good faith negotiation, carried us to compromise on these issues. Ultimately, I signed a binding agreement with FLLT that I am totally and unconditionally prepared to implement on my land forever. Subsequent to the signing of my land trust



The cleared meadow area, now free of honeysuckle, is mowed once a year.

agreement, all my dealings with FLLT staff have reinforced these feelings of trust, respect and friendship. The more I read and learn about the accomplishments of FLLT, the more I am convinced that I am participating in a movement that meshes with my own land and environmental ethic.

FLLT: In the past several years, we have seen you make significant progress in cutting back non-native, invasive plant species. How much have you done, and what is your strategy?

DH: When we first bought the land in 1980, the meadows were mostly grasslands with a sprinkling of ten foot tall white pines, and we focused most of our attention on the condition and management of our 58 acres of hardwood forest land. I have no recollection of the presence of non-native invasive honeysuckle on our land at that time, but by the turn of the century, perhaps 80% of our 32 acres of meadow land was covered by this honeysuckle. The plants were up to ten feet tall, with stalks up to four inches in diameter and crowns so completely inter-woven that they were almost impenetrable to people or road vehicles.

In 2007 we started an all-out campaign against the honeysuckle that was a systematic process of chain sawing the plants off low enough to clear the deck of a farm tractor brush-hog mower, further cutting the largest fallen branches to lay close to the ground,

grinding the green brush with the brush hog, and keeping the cleared area mowed to prevent regrowth of the honeysuckle plants. In a few years the roots and heavy stumps rot out and lush native grasses again cover the landscape. It is necessary to mow the grassland annually or the ever-present honeysuckle and other woody brush will quickly return to re-infest the landscape. At the present time, perhaps 80% of our open grass meadows have been restored and our wildlife numbers and diversity seem to be dramatically benefiting.

It goes without saying that heavy brush can be cleared quickly and easily with heavy equipment, including bulldozers, tracked excavators, or commercial brush-hogs. I chose a longer, labor intensive process in part because of the cost and disruption to the land, but also to give me more time on the land involved in a labor of love.

FLLT: The Land Trust has a connection to Aldo Leopold, author of Sand County Almanac and the Land Ethic, through his son Carl Leopold, who served as the Land Trust's first president. How would you describe your own personal land ethic and how does the FLLT fit in with it?

DH: I love all things natural, but I am not



A good friend uses a 28 horsepower tractor and brush-hog to grind brush that was cut down with a chainsaw. The green grass in the foreground is from previous clearing operations.



A recently cleared area, with newly pulverized brush after cutting with a chain saw and grinding with the brush hog. In the background, more honeysuckle remains. The large white pine tree was de-limbed in order to get clearance for the tractor and brush hog near the tree trunk.

always enthusiastic about "forever wild." I believe in sustainable use and management of our natural resources, but I am often persuaded that man is too rapacious or lacking in knowledge to wisely use or manage precious resources at this time.

Consequently, I support hands-off protection of selected natural resources which are not replaceable, uniquely fragile and/or which may be desperately needed for more important uses in the future.

I love the fact that I own my land in Danby, but above all I think of myself as just the temporary custodian of this land and the resources on it. I feel obligated to continue to use my skills, time and resources to protect the earth's natural resources to the best of my ability for the rest of my life. When I sit on the porch of my cabin with a cup of coffee as dawn is breaking and the wildlife are beginning to stir, I hope Aldo Leopold would think of me as a kindred spirit.



The Finger Lakes Land Trust is a member supported, non-profit conservation organization that works cooperatively with landowners and local communities to conserve forever the lands and waters of the Finger Lakes region, ensuring scenic vistas, local foods, clean water, and wild places for everyone.

Afoot in the Field is a newsletter provided by the Land Trust for landowners in the Finger Lakes who own properties that are permanently protected with a conservation easement, or who are otherwise committed to, or interested in, land conservation and wildlife habitat protection and improvement. For questions or concerns regarding your conservation easement, please contact Chris Olney by calling the Land Trust at (607) 275-9487 or email chrisolney@fllt.org

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Cover photo: Nigel Kent