Summer 2021 Vol. 12 Issue 2

One year ago, summer 2020. We were all tired of being shut up in our houses during the early months of the COVID-19 pandemic, and yearning for some in-person interaction (even if at an appropriate social distance). So my parents, sisters, and I, and all the kids/cousins, planned a picnic at our family cabin in the Bristol Hills (western Finger Lakes region). It was a beautiful weekend – we couldn't have asked for nicer weather, but the picnic was somewhat spoiled. Why? Because we could not escape the thousands of gypsy moths flying around us the whole time. It was particularly annoying when we were trying to eat outside!

Last summer was a bad year for defoliation of the oak-dominated forests of the western Finger Lakes by gypsy moth caterpillars. Many trees were bare. Frass was falling everywhere. People were talking about it and concerned for the health of the trees. Soon, the moths were flying. Quickly the trees became covered with egg masses, up and down trunks and limbs, as high as you could see in most of the trees. Even a blue spruce on the new FLLT Canandaigua Vista Preserve was defoliated – what caterpillar in its right mind would eat tough spruce needles?

Our worries about the forest were carried over into this year, when all of those eggs would hatch. Luckily, the infestation of gypsy moths in the western Finger Lakes was much less severe this year than last year. Maybe it had to do with the wet weather. But the moths spread east with the prevailing winds, and infestations erupted this spring and early summer all around the southern ends of Seneca and Cayuga Lakes. The phones began to ring again, from a new set of forest landowners, worried about the trees.

If you too are worried about gypsy moths, I invite you to learn a bit more about them in this issue of Afoot in the Field. The good news is that most trees will be able to survive a defoliation or two, and the moth infestation will fade away for some years. Just don't schedule a picnic during the peak of the outbreak!

Chris Olney
Director of Stewardship

All About European Gypsy Moth

Annabel Roberts-McMichael

You have probably noticed… the Finger Lakes region is experiencing a gypsy moth outbreak. It began in the western Finger Lakes in 2020, and has spread east this year. This spring, forested hillsides, especially oak forests, were defoliated by caterpillars. The European gypsy moth was introduced in 1869. Gypsy moths are always present in forests (there is even a native type), and are food for many birds, wasps, beetles and mammals. However, a combination of factors leads to outbreaks every decade or two. **Spoiler alert:** thankfully, after 2-4 years, gypsy moth populations collapse on their own, with the help of a virus and fungus.

5. ADULT

In our area, moths may emerge as early as June. Females cannot fly but only glide. They release pheromones to attract a mate. Males fly in a zigzag pattern. Adult gypsy moths don't eat or damage trees. At this stage of life, there is no effective way to control them.

Photo: Lilly Calderon & Kelly Estes, U Illinois

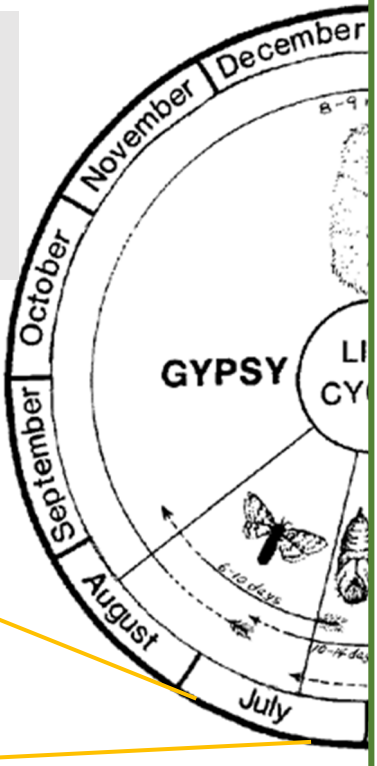


Photo: BioLib.cz

4. PUPA

In late June to early July, the caterpillars pupate. This stage lasts about 2 weeks.

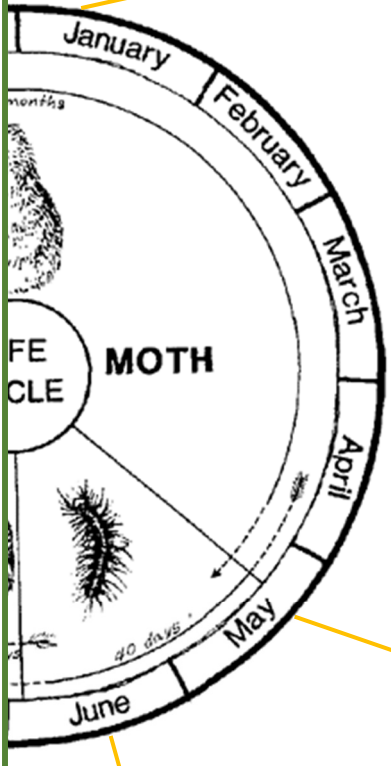
Did you know? The gypsy moth was named for how the mature caterpillars travel up and down the tree. In reference to people, the term "gypsy" is an exonym, a name imposed by outsiders having a negative connotation. They call themselves the *Romani*.

Photo: Katriona Shea

1. EGGS

Most of the year, you can find gypsy moth egg masses on bark. The female moth covers the eggs in hairs from the front of her body to protect them in winter. The felty texture is called "la spongieuse" in French. Each contains an average of 500 eggs.

TIP: In the fall, take a 5 minute walk into the woods while counting only the fresh, springy, tan egg masses, and then turn around and count again on the 5 minute walk back. If you count about 12 egg masses in total, you can expect a light defoliation. If you count about 50, expect heavy defoliation.



2. LARVA

When larva hatch, they ascend to the top of the tree, then spin down a long silken thread to waft on wind to new hosts ("ballooning"). Then, they begin to feed on tree leaves. The most effective control methods are focused on young larvae in spring, before they complete their 5-6 moltings.

Photo: Annabel Roberts-McMichael

Photo: Wikimedia commons

3. CATERPILLAR

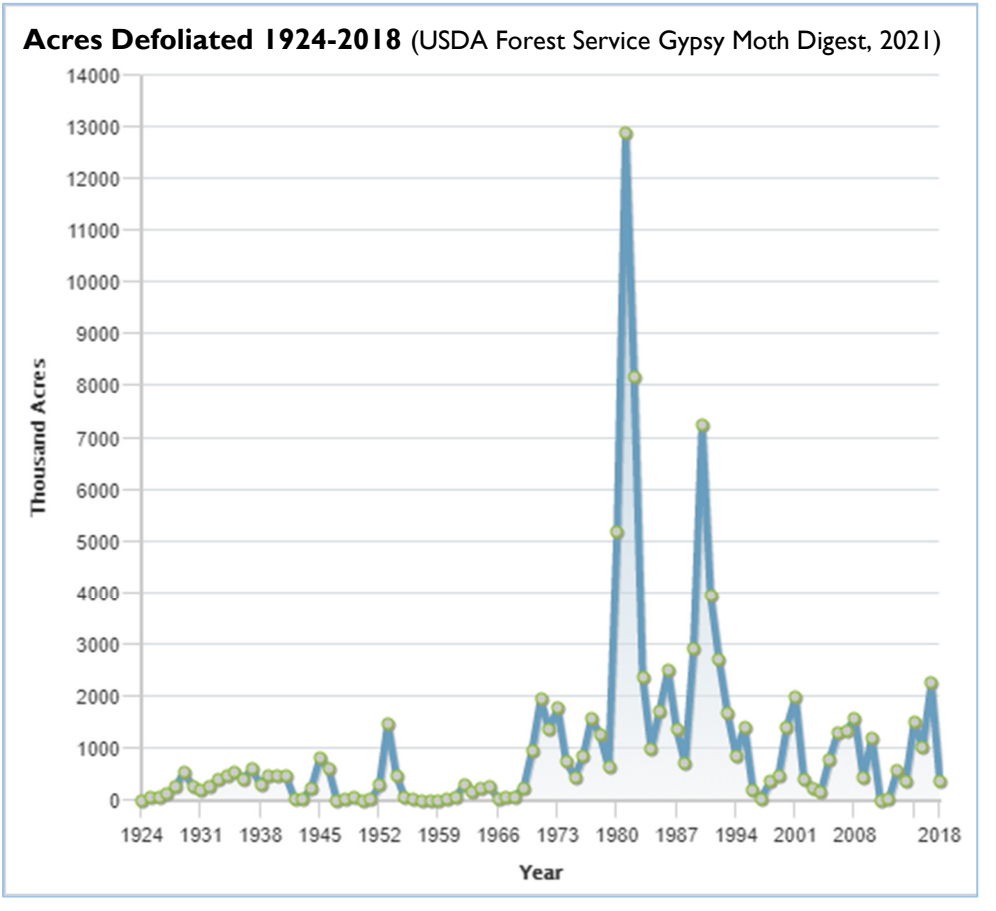
Mature larvae are marked by five pairs of blue spots and six pairs of red spots. They travel up the tree to eat at night, and down to shade in the day. At this stage, they may even eat conifer needles.

GYPSY MOTHS' FAVORITE TREES

Gypsy moth larvae feed on leaves of over 300 species of trees, however their favorite is white oak. Second most susceptible are chestnut oak, red oak, poplar (including aspen), willow, apple, crabapple, hawthorn, and birches. Less preferred are maple, cherry and beech. Mature caterpillars may eat hemlock, pine, or spruce, but avoid pure conifer forests. Least favored are ash, tulip tree, sycamore, walnut, cedar, and catalpa.

Effects of European Gypsy Moth on Forests & Trees

As you can see below, there has been a downward trend in gypsy moth impact since the worst outbreak in 1981, but the effects of gypsy moths are still serious. Impact is directly proportionate to the percent of oaks in a forest. Healthy deciduous trees will usually survive a couple years of defoliation, because they have evolved to drop and regrow their leaves. Even among oaks, 94% are expected to survive. Defoliation does stress trees, however, making them more vulnerable to other insects, diseases, and draught. Defoliation reduces a tree's growth for a few years, and also decreases the amount of acorns produced for wildlife. Already stressed or suppressed trees may die, and conifers are more likely to die after one year of heavy defoliation.



What Can We Do to Help Oaks, Poplars, etc.?

Within 1-2 years, gypsy moth populations will naturally collapse due to stress from overpopulation and competition, making them vulnerable to diseases that are present in the environment: the virus nucleopolyphedrosis (NPV) and the introduced fungus *Entomophaga maimaiga*. Cool, wet springs help the virus and fungus thrive.

For Forests & Large Areas:
Silviculture/IPM: "Maintaining a healthy stand of trees is the best option available for minimizing impacts of gypsy moth for forest landowners" (Swier, UNH).
A professional forester can help you tend your forest for diverse, healthy trees. *IF* recommended, thinning trees should be done 1-2 years after an outbreak, and no less than 3 years before the next, to avoid tree stress.

Btk: An aerial spray of bacteria in the spring kills moth and butterfly larvae in the Lepidoptera order. It is sometimes advised for oak-heavy forests, particularly when there has been other stress like drought. It is available for private landowners who choose to pay for a spraying service. On state forest lands, PA (which has a higher percent oak) has a spraying program, whereas NY does not. Some studies suggest that native species recover quickly.

GYPCHEK: The virus NPV is produced in small quantities by state and federal programs. It is expensive and appropriate for sensitive areas.

For Favorite Shade Trees:
Egg mass destruction: Before mid-April, scrape off new egg masses and place them in soapy water for 2-3 days.

Tree bands: Wrap a 12-18" strip of burlap around tree trunk, folded over a string. Caterpillars will seek shade in the burlap during the day, where they can be removed. Keep caterpillars with white wasp cocoons attached, however, as these are predators. Sticky bands can also be used such as Tanglefoot, however the petroleum-based products can be harmful if placed on tree bark.

Water: If you have a favorite tree that is being defoliated, provide extra water.

Gypsy moth caterpillars dying from diseases
Photo: Myra Schulman

Mitigating Climate Change

Over the last century, temperatures in our region have risen almost 2 degrees, with increased heat waves. Precipitation has increased 5 inches, with more falling in extreme events. This results in lower frequency of rain, and more short term summer droughts. These changes affect a forest health, including gypsy moth impacts. Sequestering carbon through responsible forest management, soil conservation, and renewable energy are all key parts of a climate change mitigation strategy.


Yellow-billed Cuckoo by Tom Reimers

GYPSY MOTH Q&A:
CHARLES SMITH

Charles R. (Charlie) Smith is a naturalist, educator, and conservationist, who earned his PhD. in wildlife ecology from Cornell, where he worked for nearly 40 years. Charlie is a member of the FLLT Preserve Management Committee and a volunteer Nature Preserve Steward.

FLLT: Can you tell us about your background and research?
CS: My interest in natural history began when I was ten with a serious interest in birds. In college, I majored in botany and zoology. At Cornell, I served in various capacities at the Laboratory of Ornithology, including Executive Director, and Director for the Natural Areas Program of the Cornell Botanical Gardens. I concluded my career teaching courses at Cornell in field natural history and bird conservation. My research focused on grassland birds, with an additional interest in butterflies. I recently co-authored *Butterflies and Moths of The Smokies*, with a former student, Elizabeth Domingue.


Photo: Colden Knapp

Saturniids like luna moths can be killed by Btk.

FLLT: Aerial spraying of *Btk* (a bacteria) is perhaps the most common pesticide used to kill gypsy moths. Can you speak to potential side-effects?
CS: Btk is a broad spectrum larvicide that can kill the caterpillars of other moths and butterflies indiscriminately. Caterpillar larvae are important to forest birds as food for themselves and their young. Use of Btk can cause food shortages during summer, when they are raising their young, possibly even leading to starvation. Notably, Black-billed and Yellow-billed Cuckoos are specially adapted to feed on spiny caterpillars like those of gypsy moth.

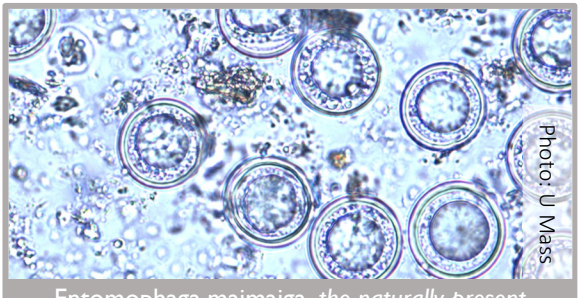


Photo: U Mass

Entomophaga maimaiga, *the naturally present fungus that helps cause gypsy moth population collapse after an outbreak.*

Early hairstreak (underside) by D. H. Cox

Early hairstreak (upperside) by Marcie O'Connor

FLLT: Are there certain native forest butterflies or moths we should be particularly concerned about with Btk?
CS: There is a small, rare forest canopy butterfly, the early hairstreak, whose larvae would be killed. Their larvae are thought to feed on American beech buds. Controlled studies have shown that eastern tiger swallowtail and Canadian tiger swallowtail larvae can be killed by Btk 30 days after application. Larvae of large, beautiful forest moths in the Saturniidae family, including luna, promethea, and polyphemus, can be killed by Btk. Scientists suspect broadcast spraying of mature forests with Btk may have contributed to widespread declines of large forest moths.
FLLT: If forests are not sprayed with Btk, are trees in jeopardy of dying?
CS: It appears that most healthy trees are able to recover from one defoliation in a season. When there are multiple stressors, like disease and severe drought during the same time period as gypsy moth defoliation, stressed trees may not survive.
FLLT: Are there any other approaches besides Btk you recommend to protect trees?
CS: Genetic engineering promises to contribute Bt strains that have less serious effects on non-target insects. In my case, I practice tolerance and don't spray. I lost more yard trees in a few seconds this June to a low-energy tornado than I've lost in more than 30 years to gypsy moths. I've never lost a yard tree to gypsy moths. At high population densities, a naturally present fungal pathogen kills the moth larvae. If you are troubled by the frass (caterpillar feces), it easily can be blown away when it is dry with a battery-powered leaf blower.
FLLT: We are facing a global decline in insects, affecting the whole food web, crop pollination, and more. How can people help conserve habitat for native insects? (Our easements include forests, farms, wetlands, etc.)
CS: I find the apparent global decline in pollinators especially troubling. Folks should use herbicides and insecticides as little as possible and choose kinds that are "eco-friendly" (e.g. neem). Home owners could mow less lawn, leaving habitats at the edges of their yards for insects and other plants and animals. They could spend the time normally used mowing to learn about these species and plant pollinator flowers.
FLLT: Are there any other cool summer insect facts or activities you'd like to share with readers? CS: I've found the study of butterflies especially satisfying. Spend some time this summer watching fireflies twinkle at night and listening to the trilling of cicadas during the day.

STEWARDSHIP STAFF UPDATE

We are sorry to announce that Conservation Easement Steward Annabel Roberts-McMichael will be leaving the Finger Lakes Land Trust in mid-August, after a little over a year of great work monitoring easement properties and serving as a valuable resource for landowners. She is planning to pursue her passion for ecological restoration and forestry, and said she will miss working with the land trust's wonderful landowners, volunteers and staff.

Good fortune has allowed us to already hire our next Conservation Easement Steward, Hailey Nase, who will start in September. Hailey was an FLLT intern in 2018, and has spent the past two years practicing easement and nature preserve stewardship at the Piscataquog Land Conservancy in New Hampshire, where she is from.

This snapping turtle emerged early from beneath the ice in spring (look up the word "brumation"), just in time for Betsy Darlington to photograph the turtle crossing the frozen pond.

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 provided for landowners in the Finger Lakes region who own conservation easement properties, or who are otherwise committed to land conservation and wildlife habitat protection. For questions regarding your conservation easement, please contact Chris Olney (607) 275-9487 or email chrisolney@fllt.org.

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Cover photo of swallowtail butterfly by Nigel Kent