QUESTIONS & ANSWERS
INCREASING OAK RESILIENCY IN SOUTHERN NEW ENGLAND

QUESTIONS (click a question to jump straight to the answer)


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Forest Stewards Guild
putting the forest first

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- Connecticut Forest & Park Association (CFPA)
- The Connecticut Agricultural Experiment Station (CAES)
- University of Connecticut Cooperative Extension Service (UConn)

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- Massachusetts Department of Conservation and Recreation
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- Providence Water Supply Board (Providence Water)
- Rhode Island Department of Environmental Management (RI DEM)
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- Rhode Island Woodland Partnership (RIWP)
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Q1. HOW DO I DEAL WITH THE IMPACTS OF WINTER MOTHS AND GYPSY MOTHS IN MY WOODS?

Assess the condition of your forest. First, you will want to get a baseline condition of your forest before deciding what actions to take. To assess if your forest is experiencing a gypsy moth outbreak, wait until after spring leaf out to see what is alive, dead, or experiencing some sort of impact.

Consider what actions you can take. If your forest is experiencing impacts from gypsy moth, you may want to consider having a salvage harvest after the outbreak because most of the oak will still be useable as firewood.

For winter moths, the University of Rhode Island Extension is working on the issue because winter moths are an agricultural pest. Data from Massachusetts shows winter moth populations plummeting because of an introduced parasitic fly.

Additional Resources:
Winter moth information from University of Massachusetts Extension: https://ag.umass.edu/landscape/fact-sheets/winter-moth-identification-management

History and information about the winter moth and the parasitic fly: https://ag.umass.edu/landscape/fact-sheets/winter-moth-in-massachusetts-history-biological-control

Q2. WHAT IMPACTS THE EXTENT OF GYPSY MOTH OUTBREAKS IN MY WOODS?

Drought impacts the severity of gypsy moth outbreaks. Only one known enemy of the gypsy moth can limit an outbreak's severity, the Entomophaga maimaiga fungus. In 2016, an extended drought caused the fungus not to reproduce and, consequently, not feed on the gypsy moth caterpillars, leading to expansive gypsy moth outbreaks. The fungus is better at controlling gypsy moths during cool and moist springs. The irony is that springtime is also flowering/pollinating season for all plants, including oak. Oak flowers and pollen prefer dry springs with lots of wind. Less humidity in the air allows pollen to travel further on the wind currents and reach other trees creating cross-pollination. The pollen from an oak tree can pollinate its own flowers, but that is not preferred. In summary, the fungus prefers cool, wet springs, and oak flowers and pollen produced by "catkins" prefer dry and windy springs.

Additional Resources:
Massachusetts DCR Forest health presentation from Nicole Keleher, Forest Health Director on Oak Decline and Mortality: https://www.youtube.com/watch?v=4eK4wdtuHPQ

Entomophaga fungus: https://blog.mycology.cornell.edu/2009/03/18/entomophaga-maimaiga-the-caterpillar-killer/

A healthy oak forest in Southern New England. All of the trees have their branches and leaves.

An oak experiencing a defoliation event caused by gypsy moth.

An oak forest after a gypsy moth outbreak. Notice the lack of branches.

Q3: WHICH SPECIES OF OAK TREES ARE MOST RESILIENT IN THE FACE OF GYPSY MOTHS AND DROUGHT?

Unfortunately, there is no straight answer, as is often the case in forestry. Northern red oak is the most resilient to gypsy moth. White oak and swamp white oak are likely the least resistant because red oaks have more tannins in their leaves. These tannins make red oak more resilient to all Lepidoptera (moths and butterflies) species. All oaks in the red oak group (black oak, scarlet oak, pin oak, northern red oak) generally have more tannins in their leaves relative to the white oak group (bur oak, chestnut oak, swamp white oak, white oak). Of course, there are nuances, as perhaps best demonstrated with black oak. Black oak also has the leaf tannins that foster insect resilience, but black oaks on our landscape are getting older. Observations suggest black oaks are not as capable of fighting off gypsy moth infestations. Generally, older trees are less capable of allocating resources to defenses. Younger trees are therefore considered more resistant or resilient in this context. Black oak, chestnut oak, bur oak, and scarlet oak are drought tolerant. Chestnut oaks do not have the tannins in their leaves required to defend gypsy moth outbreaks effectively. However, in regards to drought tolerance, these species are considered more adaptive to our changing climate, notwithstanding other limitations, such as age.

In most cases, it's less about which oaks are more resilient to gypsy moth and more about which oaks gypsy moths prefer. Overall, gypsy moth prefers white oak followed by red oak. However, in Franklin County, MA, for example, there isn't much white oak. Therefore they usually only see defoliation and death in red oak in the region. If the infestation is severe enough, the gypsy moth caterpillar will move off the oaks and turn to maples, and in extreme cases, will chew on pine needles.

Additional Resources:
Projections for individual tree species in the face of climate change in Southern and Coastal New England: https://forestadaptation.org/sites/default/files/NE_SouthCoast_Species_final.pdf

Gypsy moth larva (late instar)

Female gypsy moth laying eggs

Q4: WILL ALL OF MY OAKS DIE IF WE EXPERIENCE A SEVERE GYPSY MOTH OUTBREAK?

Oak trees do have some built-in responses for defoliation events. Even though gypsy moths are invasive, over 20 caterpillars naturally consider oak a food source. As such, oak species have co-evolved with them to respond to their feeding habits. An oak's ability to leaf out multiple times throughout the year is its primary defense. They initially leaf out in the spring, but an oak tree has enough energy stored in its root system to leaf out up to three additional times in the growing season. However, suppose an oak has to maximize its leaf out ability in a year during a severe gypsy moth outbreak. The tree will have much slower growth the following year because it will have spent its reserved energy the year before. In that case, the oak tree cannot sustain its leaf out response during the initial outbreak the second year and die. They may not die in year 2 of the infestation but most certainly in year 3 if the infestation continues as it did in Franklin County, MA in 2016/2017.

2017 Gypsy Moth Defoliation at the Quabbin Reservoir

Q5: HOW DO YOU PREVENT THE SPREAD OF INVASIVE PLANT SPECIES IN THE HOPE OF NATIVE GROWTH?

Invasive plants are tenacious, but treatments with a combination of mechanical (cutting), chemical, and biological methods may help you control their spread. Invasive species should be treated (or controlled) before a timber harvest or opening in the canopy to prevent their spread. Monitoring spread is vital, as controlling small populations is much easier. In extreme circumstances, machines may be needed. Not all species can be treated the same with the same effects, so control efforts are species-specific. Sometimes planting alternative (native) species can help combat invasive spread.

Additional Resources:
The Northeast Reagional Invasive Species & Climate Change (RISCC) Management Network has resources to help you understand the impact invasive species have on your land: https://www.risccnetwork.org/

Invasive species take advantage of disturbance in your forest. Immediate action is needed to keep the plants from spreading.

Q6. WHAT SHOULD I CONSIDER BEFORE HAVING A SALVAGE OR OTHER TYPE OF HARVEST IN MY WOODS?

Look at what is growing at ground level. Before considering a salvage timber harvest, or any timber harvest for that matter, look at the ground level. With oak mortality and following other disturbances such as a timber harvest, more sunlight enters the woods. Any decisions to disturb your forest, such as a timber harvest, should consider what the future forest will look like, which depends on what currently resides in the understory. It may be useful to let the understory grow up in certain instances. In many cases, the forest stand may need rehabilitation (i.e., invasive species removal) to ensure what grows back is what you want.

Speak to a consulting forester. There is plenty to consider when planning a harvest in the woods. Your forester can help answer your questions related to economic feasibility, wildlife habitat, safety and fire hazards, and invasive species management.

Additional Resources:
The Maine Forest Service has created a great resource to show landowners what your woods will look like based on various harvest strategies: https://www.maine.gov/dacf/mfs/projects/what_will_my_woods_look_like/index.html

"Forwarders" travel around harvest sites picking up harvested trees while minimizing ground impacts

Q7: HOW DO DEER IMPACT WHAT IS GROWING IN MY FOREST?

The presence of deer can have a major impact on your forest. White-tailed deer are a native herbivore and part of a fully functioning New England ecosystem. However, the removal of most of this species' natural predators and continued fragmentation of Southern New Egland's landscape have led to excessive population growth. Where deer are overpopulated, they will browse (eat) nearly all the native vegetation in the forest, from sprouting tree species to wildflowers, to sustain themselves. Their preference for native plants means that invasive plants are often left behind to reproduce and spread, which can lead to more issues in the forest.

Deer browse (eat) native vegetation in your forest, allowing invasive plants to take over.

Q8: HOW DO I STOP DEER FROM BROWSING NATIVE PLANTS AND TREES I WANT TO GROW IN MY FOREST?

There are many strategies you can employ to prevent deer browse in your forest. For those interested and willing, hunting deer can be a great way to control deer populations in your forest. If you are not a hunter, allowing others to hunt your property is an alternative to hunting it yourself. Other options include deer cages and tubes which go around individual tree seedlings to protect them until they get above browse height. A more expensive, but effective option is fencing, which exclude deer from large sections of forests. A cheaper option to fencing, is creating slash walls, which is created using materials from a harvest to form a wall around an area to keep deer from entering.

Check out a slash wall. Here is a 6-minute video from the Natural Resource Conservation Service (NRCS) and the Rhode Island Forest Conservators Organization (RIFCO) at RIFCO's demonstration forest in Foster, Rhode Island displaying their slash wall: https://www.youtube.com/watch?v=dOmUJR-SNw0&feature=youtu.be

A forest experiencing significant deer pressure. Note the lack of growth in the understory.

Q9: WHAT IS THE BALLPARK COST PER ACRE OF CONSTRUCTING A SLASH WALL?

Peter Smallidge of Cornell's College of Agriculture and Life Science in New York has calculated $2 per linear foot. This cost includes the lost opportunity cost of materials going into the slash wall rather than being sold as pulpwood. In general, the squarer and larger the slash wall, the cheaper it is to construct. A small linear wall would become incredibly expensive.

Alternatives to slash walls include deer cages/tubes, which protect individual trees from deer browse, or more extensive deer exclosures with fencing that is much more expensive to install, maintain, and remove.

"Stump sprouts" browsed by deer. When this happens, it makes it difficult to grow the next generation of trees.

Q10: DOES THE NATURAL RESOURCE CONSERVATION SERVICE (NRCS) PROVIDE FUNDING TO CREATE SLASH WALLS?

NRCS is not currently funding this practice because at this point it is experimental. This is a practice professionals are currently testing. It may be recommended as an NRCS practice, but it needs to go through the agency process at the federal level. If you have an NRCS contract and working with a planner, I recommend engaging them in a conversation to talk about what you could do and your interest in adopting this practice.

Slash Walls, and other methods can be used to protect oak seedlings from deer browse.

FOR MORE INFOMATION:
foreststewardsguild.org/oak-resiliency