

What Every Home Owner in Cape Elizabeth Needs to Know About Winter Moth

**By Mike Duddy
Tree Warden**

About 50% of the total land area of Cape Elizabeth is blanketed in trees. The Town's forest canopy is one of the Town's most significant landscape features, along with our dramatic shore line, parks, and neighborhoods. Most of Cape Elizabeth's tree cover consists of oaks and maples. Unfortunately, oaks and maples and other tree species are under attack by a Winter Moth infestation that appears to be growing in intensity and range. The Winter Moth infestation is likely to have dramatic impacts over the next decade or more, by altering the Town's appearance, putting pressure on the Town's budget, impacting property values, causing home owners to experience significant costs related to tree care and removal, and changing the ecology of Cape Elizabeth's natural spaces. There are steps the Town and individual home owners can take to mitigate the adverse impacts of the Winter Moth infestation. This article presents information every home owner in Cape Elizabeth needs to know about Winter Moth.¹

Overview

Winter Moth is a non-native insect. Because the insect did not evolve naturally in Maine's landscape, the insect has insufficient natural predators to keep its population in balance. The only way the Winter Moth infestation can be checked, is by the introduction of a tiny, non-native parasitoid fly which is evolutionarily adapted to prey upon the Winter Moth. The fly, originally from Europe where Winter Moth is a native insect, has been thoroughly tested in

¹ And because the Winter Moth infestation is already spreading into South Portland and Scarborough, the information presented in this article should be of significant interest to home owners in Cape Elizabeth's neighboring communities as well.

North America, and only attacks the Winter Moth. The Maine Forest Service has on two recent occasions released batches of the parasitoid flies in Cape Elizabeth, and there is now evidence that the flies have become established and are naturally reproducing. Ultimately, the population of the parasitoid flies should grow to such an extent that the flies will begin controlling the Winter Moth population. That process, however, is likely to take a decade or more.

In the meantime, all efforts at the Town and home owner level should be directed toward trying to maintain and manage endangered oaks and maples and other at-risk tree species until such time as the flies have controlled the Winter Moth infestation. Wide spread use of pesticide spraying, while protecting individual trees, suppresses the beneficial flies. Accordingly, pesticide spraying should only be used as a last resort, and should be avoided to the extent possible. There are other steps the Town and individual home owners can take to help mitigate the effects of the Winter Moth infestation without relying heavily on pesticides.

History

Winter Moth is native to Europe, where its population is held in balance by the parasitoid fly and other checks and balances in the European ecosystem. Winter Moth has few natural predators in North America, and so when it gains a toe hold in a community, the Winter Moth population tends to expand dramatically as long as adequate food supplies are readily available.

The first Winter Moth infestation in North America occurred in the area around Halifax, Nova Scotia. Winter Moth appears to have been transported to Nova Scotia by way of international shipping. Winter Moth caused extensive damage to the urban and natural forests in and around Halifax until the moth was subsequently brought into check by introduction of the parasitoid fly. The good news from the history of Winter Moth in Nova Scotia, is that we know Winter Moth can be controlled by introduction of the parasitoid fly. The other good news is that

with decades of experience, it is clear that the parasitoid fly, when introduced in North America, continues to only prey upon the Winter Moth and has no other impacts in the environment.

Although the Winter Moth infestation in Nova Scotia was ultimately controlled, the movement of people and shipping up and down the Atlantic coast of North America ultimately led to the introduction of Winter Moth into communities along the coast from Maine through the mid-Atlantic. Winter Moth infestations now appear to be present in several locations in Maine (for instance, Cape Elizabeth, Kittery, Vinalhaven), and many other locations along the coast of New England and the mid-Atlantic.

Winter Moth appears to have been introduced in Cape Elizabeth sometime in the early 2000s. By around 2010 to 2011, the Winter Moth population had become large enough that it finally caught the attention of Maine Forest Service entomologists and others. The epicenter of the Winter Moth infestation in Cape Elizabeth appears to be in the area of Two Lights State Park and Crescent Beach State Park. Winter Moth was probably introduced in those areas by tourists visiting from other areas where the insect was present.

Although the Winter Moth infestation in Cape Elizabeth appears to be most intense near the State parks, the infestation has spread over the last six years. The Winter Moth infestation now extends along Route 77 through the Town Center and in varying degrees all the way into South Portland. Winter Moth is now present along Shore Road near the Town Center, and in varying degrees along Shore Road toward Pond Cove and Ft. Williams. Winter Moth has also spread along Spurwink Avenue as far as Gull Crest and beyond, and along Sawyer Road into both Scarborough and the inland parts of Cape Elizabeth. It is reasonable to expect the Winter Moth population to continue to spread to other parts of Cape Elizabeth, South Portland, and

Scarborough, until such time as the parasitoid fly population begins to halt the Winter Moth progress.

Tree Species

Winter Moth does not attack all tree species, although it does prefer a fairly broad range of deciduous hardwoods. Winter Moth prefers oak, maple, and ash trees of all species; apple and other fruit trees; and Japanese zelkova (a common street tree in Cape Elizabeth). Winter Moth is also known to aggressively attack blueberry bushes, and is thus a tremendous threat in areas where blueberry crops are important. In Cape Elizabeth the Winter Moth does attack other types of hardwoods if they are adjacent to infested trees, but Winter Moth does not appear to prefer these other hardwood species unless they are in heavily infested areas.

The problem for Cape Elizabeth is that oaks, maples, and ashes comprise the vast majority of all trees in our yards, along our streets, and in our forests. In particular, red oak is the most common tree in Cape Elizabeth, and is probably the single most preferred species for Winter Moth. A loss or significant reduction in red oak trees in Cape Elizabeth will profoundly alter the landscape, and cause tremendous economic damage.

Life Cycle

Winter Moth earns its moniker because the adults hatch out of cocoons in the soil sometime around the last week of November or first week of December. In 2016, for instance, the Winter Moth hatch occurred in the late afternoon of November 25, the day after Thanksgiving, and continued through December 2nd. After that, only a few moths continued to hatch, and by December 3rd there appeared to be no further Winter Moths hatching.

When the moths hatch, the adult males take flight. They are the characteristic buff or tan colored moth seen hovering around lights of houses or headlights of cars. In some areas the

moths can be so numerous they appear like snowflakes falling from the sky. When the adult females hatch, however, the females begin crawling. The females do not have wings and cannot fly. Instead, the females crawl along the surface of the ground to the nearest desirable tree species, at which point they begin crawling up the trunks of the trees. While the females are crawling, the males use their flight capacity to find and mate with the females. The females continue to crawl up the trunks of trees to lay eggs along the higher portions of the trunk and in the branches of the tree canopy.

Once the adults are finished mating and laying eggs, their job is done and they die off. In the spring, out of the eggs hatch small green caterpillars. The caterpillars emerge at about the same time that leaves begin emerging in the spring time, which puts the emergence in late May to early June, depending on weather and tree species. The caterpillars immediately crawl to the newly developing leaves, and begin eating the leafy green portions of the leaves. The result is very noticeable skeletonized leaves, which are full of holes and eaten away essentially to the leaf veins. In trees where the infestation is especially intense, trees can be completely defoliated.

The caterpillars continue feeding through late June. Caterpillars are able to spread from tree to tree by “ballooning” or “parachuting” through the use of a web like strand that they swing on like a monkey uses a vine. Thus, even trees that initially appear to be free of Winter Moth caterpillars can begin showing signs of defoliation, as caterpillar’s balloon to the healthy tree from infested trees.

In late June, their damage done, the caterpillars descend from the tree tops, down their web like strands to the ground. The caterpillars burrow into the ground and surround themselves in a cocoon which is indistinguishable from the soil around them. There the caterpillars pupate

during the summer and fall until they emerge as adults in the third week of November or first week of December, and the cycle starts again.

Tree Mortality

Most trees suffer some amount of leaf defoliation from native insect pests with limited or no impact on tree health and survival. Indeed, a little bit of Winter Moth defoliation, or even moderate defoliation, might slow tree growth, but typically doesn't threaten a tree's survival. However, if a tree suffers from significant or complete defoliation for several years running, then the tree is likely to succumb. That is the risk posed by Winter Moth. If the Winter Moth infestation is bad enough long enough in an area, and trees are significantly or completely defoliated year after year, the trees are likely to use up their stored reserves and die.

How long does it take for Winter Moth defoliation to kill a tree? Winter Moth has been active at high levels in Cape Elizabeth for about six years, and we are now seeing widespread mortality of oaks and maples in the areas hardest hit. Thus, it looks like healthy trees can typically survive up to four or so years of repeated Winter Moth defoliation. Trees that are already in poor health are likely to die after only a couple of years of Winter Moth defoliation. On the other hand, trees that are only lightly defoliated each year, or heavily defoliated one year but with normal leaf growth in other years, appear to be able to survive just fine.

Thus, the goal of Winter Moth management is to prevent trees from being significantly or completely defoliated at all, or if that cannot be achieved, to prevent significant or complete defoliation for more than one or two years in a row. Since trees can survive some defoliation or occasional complete defoliation, control efforts typically don't need to achieve 100% eradication. Furthermore, the goal of control efforts should be to try to keep important trees

alive during the 10 years, more or less, it will take the parasitoid fly to become sufficiently established in Cape Elizabeth in order to provide natural control.

Transplanting Plants

As discussed above, Winter Moth pupa exist in the soil from mid to late June through their hatch in late November or early December. Accordingly, no trees, shrubs, or herbaceous plants should be dug and transplanted from infected areas from mid-June through the first week of December. If a shrub is dug from an infested area of Cape Elizabeth in June, and given to a friend or family member in South Portland for replanting, the gift of the shrub will be like a Trojan horse. The root ball or plant pot around the shrub could very well be carrying the cocoons of the Winter Moth. When the adults emerge in their new location in South Portland in November or December, the adults will search out the nearest oaks or maples or other host trees, and begin establishing an infestation in the new area. Accordingly, it is tremendously important to not transplant trees, shrubs or veracious plants from any winter month infected areas from mid-June through the first week of December.

Bruce Span Worm

Bruce Span Worm is a native insect which is commonly confused with Winter Moth. The life cycle of the Bruce Span Worm is very similar to that of the Winter Moth. Indeed, to the casual observer adult male Bruce Span Worm moths are basically indistinguishable from adult male Winter Moths. Bruce Span Worm caterpillars attack a wide variety of hardwood trees, but because Bruce Span Worm is a native insect, the Bruce Span Worm population seldom gets out of check. Accordingly, the damage done to hardwood trees by Bruce Span Worm is negligible and not worth control efforts. To the contrary, as a native insect, Bruce Span Worm plays an

important role in the environment, especially by providing a nutritious source of protein for song bird chicks, and so should not be target of control efforts.

Despite the similarity in appearance between the two adult male moths, there is a key difference. Bruce Span Worm Moths appear in September and October, and are thus present much earlier than Winter Moths. People frequently comment that the Winter Moth population appears to be really bad, because they report seeing moths in September and October. Undoubtedly, the moths they are observing are Bruce Span Worm moths, not Winter Moths, and thus have no bearing on the intensity of the Winter Moth infestation. More importantly, the presence of buff colored moths in September and October do not warrant control efforts, in particular spraying a pesticide. Bruce Span Worm plays a very important role in the natural Maine ecosystem, and the legitimate concern over Winter Moth must not be interpreted by homeowners to justify pesticide applications for Bruce Span Worm moths.

Town Efforts

The Town of Cape Elizabeth is involved on several levels in trying to help control and mitigate the impact of the Winter Moth infestation. First, the Town is cooperating with entomologists from the Maine Forest Service to monitor the Winter Moth infestation, and to support release of the parasitoid flies. Second, the Town has revised its Approved Road Tree List, to promote diversity in street tree plantings, and to impose a moratorium for the time being on the planting in public ways of oaks, maples, ash trees, and other tree species susceptible to Winter Moth (and other invasive insect pests). Third, the Town is preparing and implementing management plans for high value groupings of trees, such as in Riverside Cemetery and in Fort Williams Part. Fourth, through the efforts of the Tree Warden, the Town is providing education to homeowners, in the form of presentations, articles, and one-on-one visits with homeowners.

Finally, the Town is installing tree bands on high value trees in public areas of the Town hardest hit by the Winter Moth infestation.

Control Options

Homeowners and property managers have several control and mitigation options to use in controlling the effects of the Winter Moth infestation. In choosing the control option that seems appropriate for the homeowner or property manager, it is important to keep the big picture in mind. The Winter Moth infestation ultimately will only be controlled by the successful establishment of the parasitoid fly. Spraying pesticides will delay and hinder the successful establishment of the parasitoid fly, and have other deleterious impacts on the environment, and should be avoided to the extent possible. While it may not be possible to avoid all use of pesticide sprays, other less invasive control options should be used first, or as part of an overall integrated pest management program designed to mitigate impacts of the Winter Moth infestation to acceptable levels, with the least use of pesticide spraying possible. The goal for homeowners or property manager should not be 100% control, but rather, as discussed earlier, sufficient control to keep trees alive for the decade or more necessary for the parasitoid fly population to become established and control the Winter Moth. In general, control options include the following: species selection; appropriate removals; limits on transplanting trees, shrubs and plants during the summer; tree banding, horticultural oils, Bt, and pesticides. Each of these control options will be discussed in detail below.

Species Selection

Let's just get this out on the table right up front. Nobody in Cape Elizabeth should be planting red maple cultivars for the indefinite future. Red maple cultivars are normally one of the most popular tree species planted in yards and other locations, but it is one of the most

vulnerable trees to the Winter Moth. In general, homeowners and property managers should not be planting any of the tree species which are highly desirable to Winter Moth, such as oaks, maples, ashes, apples, Japanese zelkova, and fruit trees. If these trees are planted in areas of Winter Moth infestation, then immediately after planting a homeowner or property manager will need to implement control measures, which will take time and money, and possibly lead to use of pesticides. All of this can be avoided simply by planting tree species which are not subject to attack by Winter Moth.

For instance, Shagbark hickory is a wonderful native tree that appears to unattractive to Winter Moth. Shagbark hickory would be an excellent alternative to planting oak trees. In similar fashion, American sycamore would be good native substitute for sugar maple. Black gum, with its excellent red fall foliage, would be a very acceptable substitute for red maple and red maple's various cultivars. The Town is now steering away from the use of oaks, maples, ashes and other at-risk hardwoods, and the collective efforts of homeowners to limit new plantings over the next decade to resistant species will help control the infestation. Landscapers, horticulturalists, arborists, and property managers should all be attuned to the need to make sure any new plantings avoid the use of tree species which are merely fodder for the Winter Moth.

Removals

In general, the goal should be to keep large, mature oak and maple trees alive and on the landscape. The ecological benefits of large mature trees is significant, and should not be lost without great deliberation.

However, under the circumstances, there may be times when the best management option is tree removal. If a homeowner has a large old oak tree on his or her property which is already in poor health, and which due to numerous trunk defects might be difficult to band, it may be

appropriate to have the tree removed by an arborist. If the only option to save the tree is to apply pesticides, then removal might be the better option. That said, any removal should only come about as the result of careful deliberation between homeowners and professionals.

For property owners that own larger tracks of forest, now might be an appropriate time to consider harvesting the oak, maple, and ash trees on the property. Harvesting might be a very undesirable activity if the property is owned for its aesthetic and ecological benefits, but if the property is in an area of Winter Moth infestation, then it may be difficult under any circumstances to save the oaks, maples, and ash trees in the parcel of forest. Again, any decision to engage in harvesting should be reached in discussion with professional, and comply with all the Town's ordinances regarding tree harvesting.

Transplanting

As discussed earlier, no trees, shrubs, or veracious plants should be transplanted from areas of Winter Moth infestation from mid-June through early December. If everyone can stay compliant with this one strategy, it may be possible to slow down or prevent the spread of Winter Moth to areas that have not yet been infested.

Tree Bands

Tree bands can be an important part of a control strategy. The use of tree bands is sometimes downplayed because tree bands are not 100% effective. Even with tree bands, Winter Moths can access a tree from neighboring trees, and some defoliation can result. However, the goal of any control strategy should not be 100% eradication of Winter Moth, but simply sufficient mitigation to help keep the tree alive. With that in mind, tree bands provide a reasonably effective, handy, do-it-yourself control option.

The timing and method of installation are critically important to successful tree banding. Tree bands should be installed just before the Winter Moth hatch occurs at the end of November. If tree bands are installed too soon, the bands deteriorate before the hatch. If tree bands are installed too late, female Winter Moths will have already crawled up the tree trunk before the bands can provide a barrier. And once the hatch is over, which usually takes about a week, tree bands should be removed. There is no need or reason to keep tree bands on trees after the hatch ends. The tree bands deteriorate and look disheveled, and if left on the tree until the following spring the bands could tend to girdle the tree.

In 2016, the Winter Moth hatch began in earnest on the afternoon of Friday, November 25, the day after Thanksgiving, and the hatch finished by December 3. Thus, good practice would be to install tree bands early during Thanksgiving week, and take the bands down in the second week of December.

Bands should be installed on the trunk at a point no higher than chest height, and lower than that is better, provided the band is above the trunk's root flare. In areas of heavy infestation, two concentric tree bands should be installed, with about 12 inches separating the bands. In that fashion, when the lower band becomes full of Winter Moths, the upper band will continue providing an effective barrier.

There are two or more different tree band products on the market, and some homeowners manufacture their own bands. Any tree band that acts as a barrier to female Winter moths crawling up the tree is satisfactory. The Town uses a product called BugBarrier Tree Band, manufactured by Envirometrics Systems Inc., which is available from Shelter Tree in North Attleboro, Massachusetts or various online vendors, such as SherrillTree.² Regardless of what

² If you use this product, you do not need to purchase or use the optional cellophane spindles, which are used for Gypsy Moth.

product you use, you will know your tree bands are working when after the first day or two of the hatches, the bands are full or nearly full of trapped Winter Moths. Since the BugBarrier Tree Band does not contain any pesticides or other chemicals, the tree bands can be disposed of in the normal waste stream after use.

Spraying

There are a range of substances, varying in active ingredients, which can be sprayed on a tree to help control Winter Moth. One or more of these substances can be used, in conjunction with the other measures discussed above, as part of an overall control strategy. Since all of these substances involve spray application, homeowners should consult with a licensed commercial applicator for the details and specific considerations. And, as with tree bands, timing is critically important to spraying, no matter what substance is used.

The first category of spray products is commonly referred to as horticultural oils or dormant oils. Many horticultural oils are petroleum derived, although there are also plant-based oils on the market. Horticultural oils are sprayed on the crowns of trees in the spring to smother the eggs before hatching. Since many of the eggs are protected by bark, lichen, and other structures, horticultural oils have limited effectiveness on Winter Moth, but even limited effectiveness might be enough, in concert with other methods, to keep trees from being severely defoliated.

The second type of spray includes a variety of natural products, including a well-known substance called “Bt”, which stands for *Bacillus thuringiensis*. Bt is a naturally occurring bacterium. Bt is sprayed in the spring on emerging leaves in the tops of trees. The Winter Moth caterpillars ingest the Bt while eating the leaves, and the Bt eventually kills the caterpillar. Bt has limited effectiveness against Winter Moth, but might be a reasonable tool when used along

with other control strategies. Although Bt is a natural product, it is important to remember that it is non-specific. Any native insects eating leaves, like Bruce Span Worm, will also ingest and die from the Bt, so homeowners should still be careful with the product.

The final categories of sprays are pesticides. Although there are a wide variety of pesticides that can be used for Winter Moth control, the most common pesticide sprayed in our area for Winter Moth control is Conserve SC. The active pesticide ingredient is Spinosad. According to its label, Conserve SC is very safe around people and pets when used properly. Conserve SC is very effective against Winter Moth. The problem is that Conserve SC also kills a wide range of beneficial insects and is especially inappropriate to use around water bodies. And, as discussed earlier, Conserve SC kills off the beneficial parasitoid fly we need to cultivate in order to ultimately achieve Winter Moth control. Accordingly, while there may be situations where spraying a pesticide such as Conserve SC is appropriate—such as protecting especially important heritage trees or trees that would pose a significant risk if killed by Winter Moth, pesticides should be used sparingly and as a last resort.

Professionals are constantly experimenting with other products, and other means of application. Some products are now being delivered through tree injections rather than as sprays. The best approach is to consult with a licensed commercial applicator.

Conclusion

Winter Moth is going to pose a significant challenge to the Town of Cape Elizabeth and its residents over the next decade or so. Many people can still remember when Dutch Elm Disease ravaged the wonderful American Elms gracing many streets in cities and towns throughout our country. Until it's brought under control, Winter Moth can have a similarly devastating impact to our community. Homeowners should be proactive, attend any trainings

and education sessions offered by the Town or other organizations, and stay up-to-date on developments.