



City of Bangor, Forestry Division

Red Pine Scale Response Plan

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Red pine trees succumbing to red pine scale in Merrimack River Outdoor Education and Conservation Area in New Hampshire. Image retrieved from the [Society for the Protection of New Hampshire Forests](#).

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Executive Summary

Red pine scale (RPS) is a scale insect native to Asia that is believed to have been introduced to the U.S. in the 1930s. It feeds on nutrients in red pine trees by inserting their sucking mouthparts into the upper branches and twigs. This feeding interrupts the flow of nutrients and water to the needles of the trees, leading to canopy decline and eventual death. RPS was first detected in Maine in Hancock County on Mount Desert Island in 2014. Since then, it has also been found in Washington County and York County. Over 1,800 acres of red pine mortality have been detected by the Maine Forest Service and are directly attributed to RPS. There is concern that it will eventually spread to Penobscot County.

The City of Bangor has 131 red pine street and park trees. These trees will continue to be monitored for signs and symptoms of RPS; however, they are of relatively low concern because they are a low percentage of the urban canopy. What is of greater concern are the thousands of red pine trees planted in plantations across the City's publicly owned properties and parks in Bangor and Winterport. These are monocultures of red pine that are highly susceptible to RPS infestations and much more difficult to monitor on a regular basis.

Chemical treatment of publicly owned red pine is not a viable option for managing RPS in the City. For this reason, active management through invasive plant management, pre-commercial thinning, harvesting and replanting these red pine plantations is the chosen course of action. Invasive plant management will occur first and involve the use of mechanical, cultural, and chemical controls. This will be followed by a pre-commercial thinning of the red pine, where the least successful trees are removed to allow the remaining red pine to maximize their growth, and promote natural regeneration of other tree species. This management will reduce wildfire risks, increase forest species and age diversity, and improve wildlife habitat. A final harvest of the remaining red pine will be performed once RPS is detected in Winterport or Bangor. Spacing out the removal of red pine in these plantations will give the more successful trees the opportunity to increase in size so that they are more likely to be merchantable by the time they are harvested. If adequate regeneration of native tree species isn't achieved by the time the final harvest is completed, replanting the areas with seedlings may be necessary. Appropriate species for the soil types and other environmental conditions will be selected.

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Purpose

This document serves the following purposes:

1. To educate the public about red pine scale and its potential impact on the red pine population of Bangor.
2. To propose a proactive response plan for red pine scale in Bangor to mitigate potential safety hazards and infrastructure damage caused by standing dead trees and to improve the overall health of Bangor's forests.
3. To inform the public of future changes that will be made to the species compositions of areas of public forests and parks in anticipation of red pine scale in Bangor.

Background Information

Red and Other Species of Pine in Maine

Maine is known as the Pine Tree State. While this name comes from the large, distinguishable Eastern white pines (*Pinus strobus*) you can find across the state, there are several native Maine species of pine. This includes red pine (*Pinus resinosa*), pitch pine (*Pinus rigida*), and Jack pine (*Pinus banksiana*). Scots pine (*Pinus sylvestris*) can also be found distributed across the state but is not native to Maine. Pine species (genus *Pinus*, family *Pinaceae*), are coniferous or evergreen. This means that they have needles instead of leaves for photosynthesis, keep these needles through the winter, and reproduce using cones instead of flowers and fruits.

The easiest way to distinguish Eastern white pine from red pine is by looking at the fascicles (bundles) of needles. White pines will have five needles per bundle, and red pines will only have two. Their needles are also typically longer and thicker than white pine, and red pine bark appears to be "scaly" while white pines have smooth bark when they are younger and as they age it becomes furrowed. Pitch pines will have three needles per bundle, but Jack pine and Scots pine will also only have two.

Red pine has a very low tolerance for shade, and grows best in full sun and on dry, upland sites. Their trunks grow very straight and can reach 60-80 feet, which makes them suitable for being used as telephone poles. For these reasons, and to maximize their growth and eventual value, red pine is often grown plantation style, where they are planted in rows at certain spacing intervals to minimize competition with other trees.

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Figure 1. White (left) versus red (right) pinecones and needles. Image retrieved from the [University of Wisconsin- Madison photograph library](#).

What is Red Pine Scale (RPS)?

Red pine scale (*Matsucoccus matsumarae resinosae*) is a scale insect that infests red pine to feed on nutrients flowing to the needles and twigs. It is also referred to as pine bast scale. It is native to Japan, where it survives on its host species of Asian pines.

It is also considered an economically important pest in other Asian countries like China (McLure et al., 1983).

Two species names are used to refer to it: *M. matsumarae* and *M. resinosae*. *M. matsumarae* is the species name that originated in China upon its initial discovery, and *M. resinosae* is the species name that was given by Bean and Godwin upon its discovery in the U.S. (McLure et al., 1983).

It is thought to have been introduced into the U.S. as far back at 1939, where it is hypothesized that it arrived on imported Asian pine species for the New York World's Fair (*Pest Alert: Red Pine Scale (Matsucoccus resinosae)*, 2012). It was detected in Connecticut in 1946, New York in 1950, and New Jersey in 1960. These infestations remained fairly localized, most likely because these areas are in the southern range of red pine, so there were not as many host trees and the scale mostly affected plantations and ornamental



Figure 1. Wingless, adult female red pine scale insect. Image sourced from [Vermont Invasives](#).

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plantings (Bean and Godwin, 1971). It was found in New Hampshire in 2012, and in Maine in 2014 on Mount Desert Island in Hancock County (*Maine Department of Conservation, Agriculture, and Forestry*, 2014).

There are two generations per year. The first begins when the eggs are laid by adult females in late spring, and hatch in the early summer. The larvae feed under the scales of the red pine bark until mid-July, when they develop into the intermediate stage. For the males this means that they develop into a pre-adult phase and then enter cocoons around August. They then emerge as true-adult males. Intermediate phase females do not develop into pre-adults, but directly into true adults. These females lay eggs in late August. These eggs hatch before the winter, marking the second generation. They



Figure 2. A heavy infestation of red pine scale where woolly structures are visible on the branches. Image sourced from [Vermont Invasives](#).

overwinter as partially developed larvae and then resume growth in the Spring. They go through the same intermediate phase as the summer generation and develop into adults by April, starting the cycle over again (Bean and Godwin, 1971).

Adult females are larger than adult males. Both are pear-shaped and appear to be wrinkled. Males have wings, though their flight do not contribute to long-range spread. Eggs are yellow, and laid in woolly sacs (*Red Pine Scale*, Vermont Invasives).

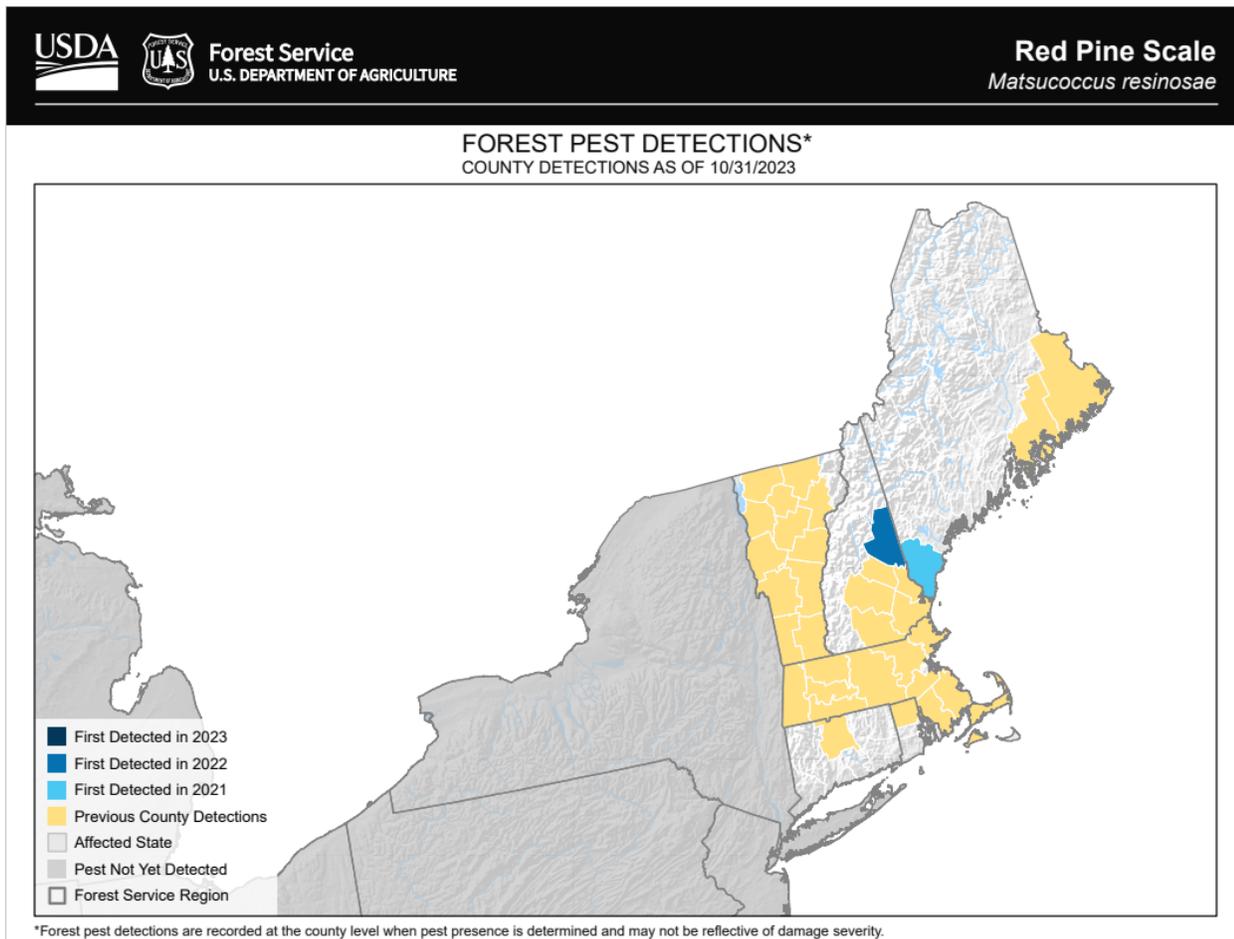
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Figure 3. 2023 red pine scale county detection map. Map acquired from the [USDA Forest Service](#).

Red Pine Scale Signs and Symptoms

RPS is difficult to detect in early infestations, especially on mature red pine trees. This is because the insect is so small, there are very few lower branches on red pine trees, and because an initial or low-level infestation of RPS looks like normal dieback of needles. Additionally, there are several other causes that can cause needle dieback that looks like RPS, such as *Diplodia* tip blight, *Sirococcus* shoot blight, or even salt damage from nearby roads. Once the infestation grows, there is noticeable browning of the needles because the water and nutrients required to maintain their function are being intercepted by the scale insect.

Eventually, the browning needles will fall off the tree, and there will be noticeable crown loss. When the entire crown has been infested, the tree is no longer able to keep itself alive, and it will die. When inspecting the twigs and limbs of an infested tree, white to off-white, wooly structures can be seen.

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Red Pine Scale in Maine

Since it was found in 2014 on Mount Desert Island, RPS has spread throughout Hancock and Washington counties. RPS is typically spread through wind dispersal, and very small juveniles can travel up to a quarter mile through the air (Bean and Godwin, 1971). It is also spread through the movement of red pine wood either as it's transported to mills or as firewood for recreation. It can also be transported on nursery stock of its host species. It is likely more easily spread along the coast of Maine because of the higher average wind speeds, which can carry the insect further.

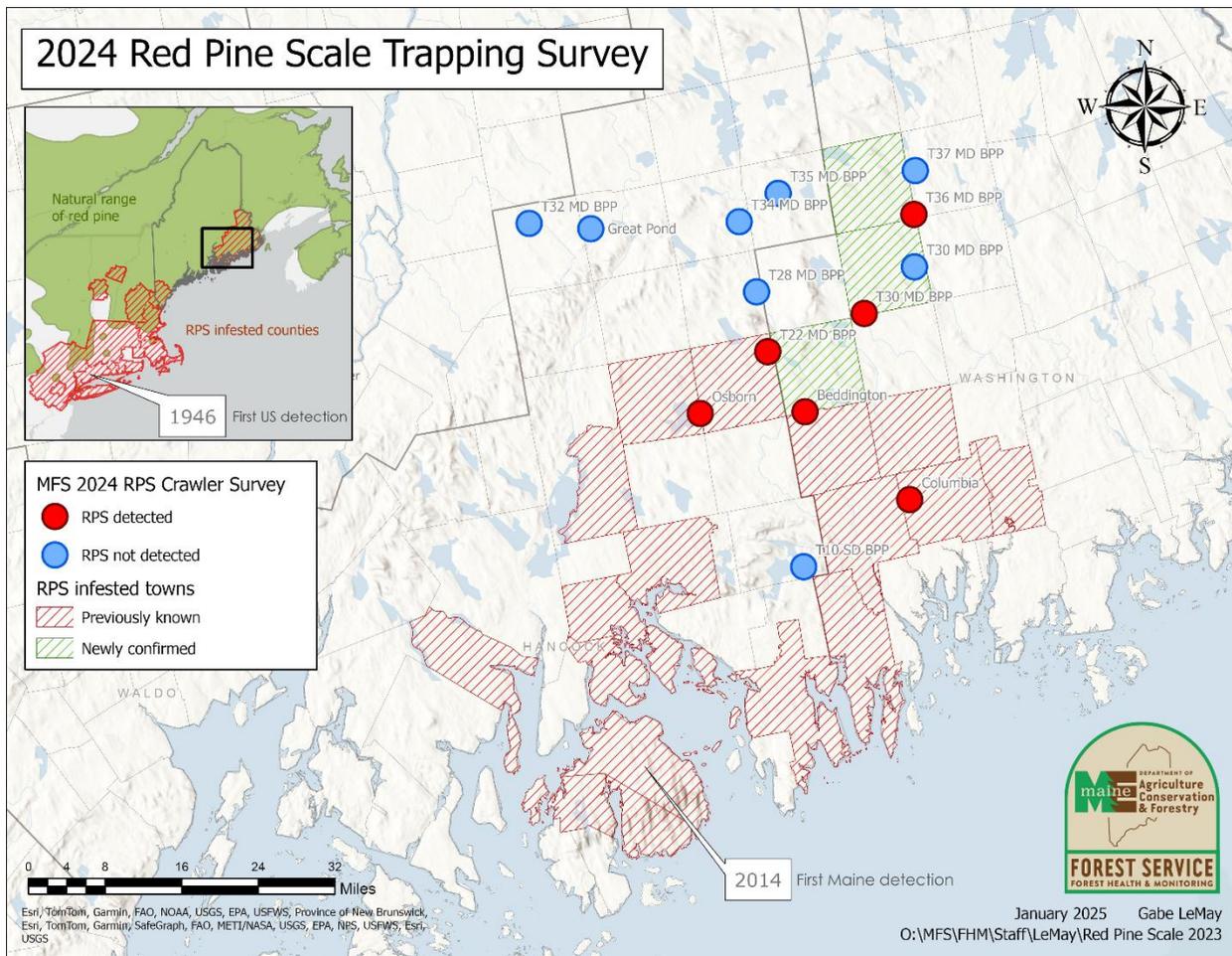


Figure 4. Map of the Maine Forest Service's 2024 red pine scale trapping survey in Hancock and Washington Counties. Map created by Gabe LeMay and published in the "Forest and Shade Tree Insect and Disease Conditions for Maine" [summary](#) for 2024.

In 2024, RPS monitoring continued in Maine. The Maine Forest Service conducted an aerial survey to observe areas that were previously found to have been infested by RPS, and to determine any new areas of infestation. They documented 1,800 acres of RPS damage, primarily in Washington County, with a new detection in the town of Osborne (*Maine Forest Service: Forest Health and Monitoring, 2025*). They also deployed sticky traps that were developed to attract and trap hemlock woolly adelgid—another invasive scale insect that affects Eastern hemlock—to detect emerging infestations. The traps were placed in the Downeast region, and confirmed several new infestations in T36 MD BPP, T30 MD BPP, and Beddington (*Maine Forest Service: Forest Health and Monitoring, 2025*).

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In 2025, traps were deployed once again, however the results of these have not yet been assessed. One of these traps was placed in Old Town to determine if there is an infestation in Penobscot County. The 2025 aerial survey season ended in August 2025, and according to the August 25th “Forest & Shade Tree Insect and Disease Summary,” from the Maine Forest Service, 14 new towns were identified as having infestations in both southern Maine and the Downeast region via aerial survey flights. Three more towns were identified as having an infestation through ground surveys in southern Maine (*Forest and Shade Tree—Insect and Disease Conditions for Maine, 2025*).

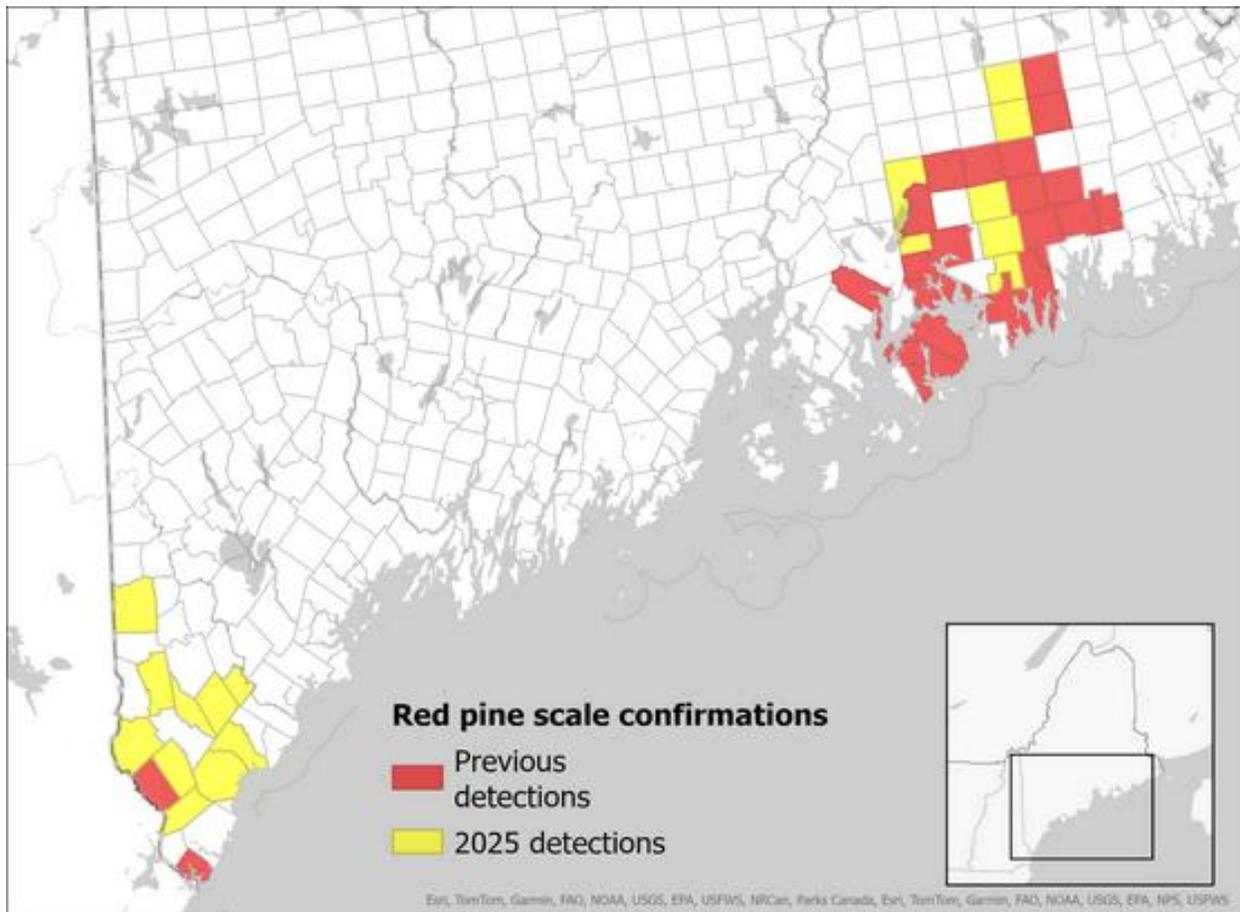


Figure 5. Map of the new towns in Maine where red pine scale was detected using aerial and ground surveys in 2025 by the Maine Forest Service. Map created by Gabe LeMay, and taken from the August 25th, 2025 [Forest & Shade Tree-- Insect & Disease Conditions for Maine](#) bulletin.

Red Pine Scale in Bangor

Fortunately, RPS has yet to be identified in Bangor. The infestations in Maine have so far appeared to remain closer to the coast. The Forestry Division will continue to monitor for its presence within the City into the future. There is also potential to work with the Maine Forest Service to deploy traps for early detection of RPS on City-owned properties.

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Figure 6. Map of the red pine plantations found in Prentiss Woods (top left) and Essex Woods (bottom right).

If RPS is found within the City, the publicly owned red pine plantations in the City parks and forests are at great risk. In the 1990s, thousands of red pine seedlings were planted in Prentiss Woods, Cascade Park, Essex Woods, on a property in Winterport that is owned by the City, known as Twining Pit, and on a parcel owned for Bangor Community and Economic Development (CED) found on tax map 01 as lot 014. In total there are approximately 36 acres of red pine plantations owned by the City. There is a small plantation of red pine in the City Forest, however, most of these have already died and their management will be performed in tandem with other management in the City Forest. Red pine has been planted individually across the City as street and park trees. Though, in the 2024 Complete Urban and Street Tree Inventory (CUSTI), only 131 red pine trees were recorded as street or principal park trees within the City.

Tree plantations are typically monocultures and are specifically spaced and planted to maximize the growth of the species you are trying to favor. They are more like how we grow crops than forests and are primarily used to generate income from timber production. The success of a plantation is highly dependent on the types of soils found at the planting sites. Different species of trees require soil with different drainage types or moisture levels, mineral and nutrient compositions, etc. These differences in soil properties also greatly influence the growth and success of planted trees of the same species.

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For this reason, although the red pine plantations owned by the City were planted within a few years of each other, the trees in some of them have grown enough to be considered merchantable--like those found in Prentiss Woods-- and others have not-- like those found at Twining Pit. A sustained lack of appropriate soil moisture, minerals and nutrients also causes individual trees to be continually stressed, making them much more susceptible to pests and disease. So, because of the poor soil quality for red pine at Twining Pit, there are now approximately 17 acres of stressed red pine that is highly susceptible to RPS infestation.



Figure 7. Map of red pine plantations in Cascade Park.

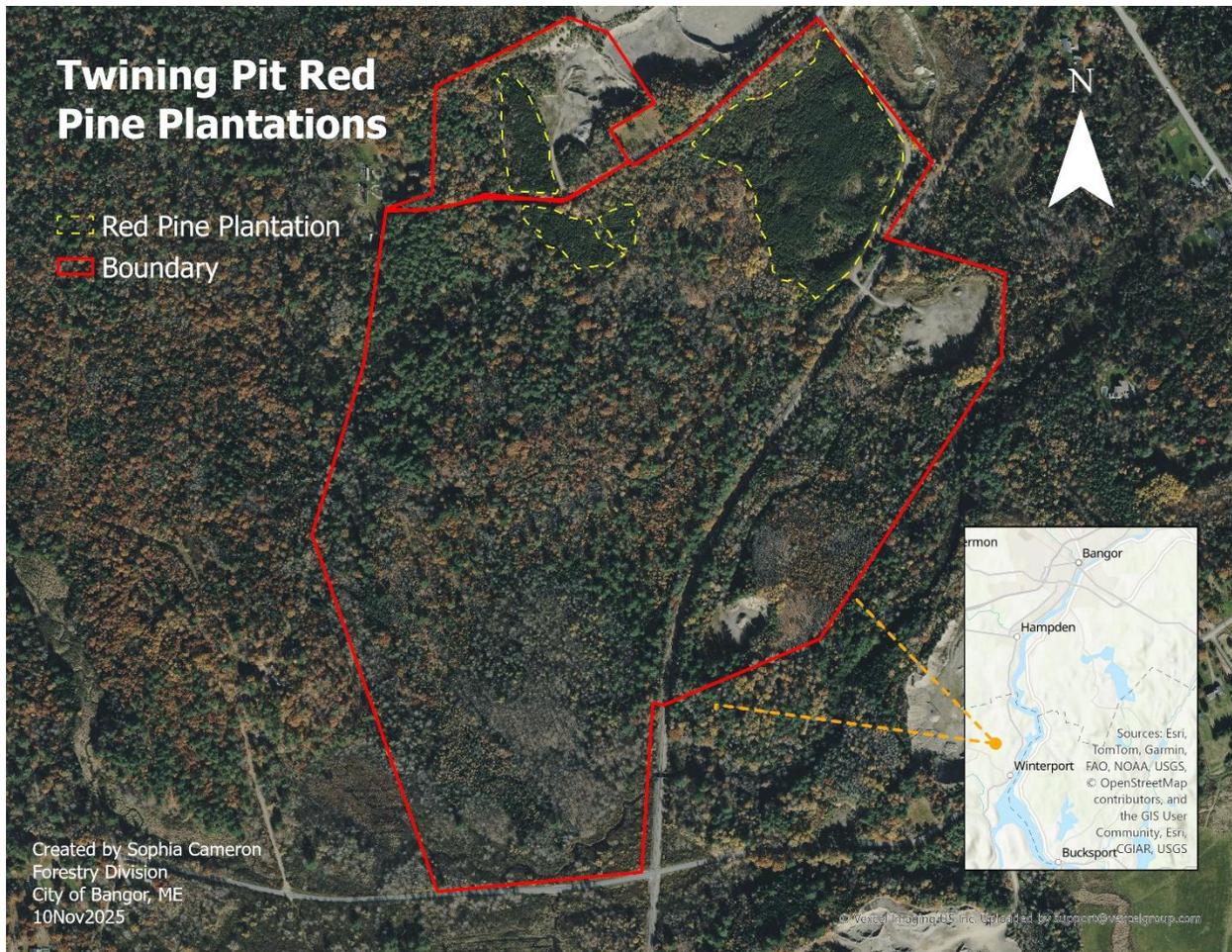
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Figure 8. Map of red pine plantations in Twining Pit in Winterport, ME.

There are two major concerns within the City when it comes to RPS. The first is the hazards that could be posed should street or park red pine begin to succumb to RPS. Dead trees in urban areas can drop large branches or collapse entirely if not properly dealt with, which can result in injuries or property damage. The second—in regards to the red pine plantations—is the increased amount of deadwood that would be present in a forested area. Dead or downed woody debris can be a great source of nutrients for future growth, create wildlife habitat, and promote a higher diversity of fungi. However, it also creates a perfect environment for forest fires during drought conditions. Dried red pine wood lights easily and burns quickly, and the tight spacing of the plantation means that when trees die, they may lean up against other trees, serving as “ladder fuels” that bring fires up into the forest canopy. A canopy fire is incredibly dangerous, fast moving, and difficult to extinguish once started. Forest fires can spread at a speed of 14 miles per hour, depending on wind and other conditions (*How Fast Do Wildfires Spread?*, 2024). To mitigate forest fire risk, dried fuels need to be removed either through harvesting and debris removal or relocation, or through prescribed burning.

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Figure 9. Map of the red pine plantation in C&ED parcel Map 01, Lot 014.

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Red Pine Scale Response Plan

Scope

This RPS response plan applies to all publicly owned properties in the City of Bangor where red pine trees may grow, including public parks, cemeteries, public school grounds, rights-of-way, and forested areas. Red pine management on private properties will be determined separately.

Administration

The City Forestry Manager will be responsible for implementing this plan and ensuring its completion through the Department of Public Works in conjunction with other departments based on tree placement through separately managed properties within the city (Parks and Recreation Department, Bangor School Department, etc.). He will oversee Forestry Division employees, hired interns, and contractors conducting RPS management work. All management work will be performed internally when possible. However, given the scope of the issue, hiring contractors may be necessary.

Removal of Red Pine

Because of the nature of the red pine growing in the City, and the lack of significant landscape red pine, removals are going to be the best strategy for managing red pine in the face of RPS. As stated previously, there are only 131 street and park red pine trees recorded in the 2024 CUSTI. This is not a high enough percentage of the urban canopy to require proactive removals. However, these trees should be monitored closely for signs of RPS and should be removed at the first sign. This may look like single tree decline in urban areas, so reporting from the public will also be helpful.

In the red pine plantations harvesting will be necessary, though the timing of how this is accomplished will be dependent on the continued results of the Maine Forest Service's monitoring efforts. It is recommended that trees that appear to have limited growth, are stressed, or have a poor growth form are removed preemptively within the next one to two years. This is considered pre-commercial thinning (PCT) and will accomplish several goals.

The first is that the removal of these trees will allow for the remaining trees that are more successful to have more growing room and more access to resources such as water. This may contribute to better growth for these trees should it take RPS longer to arrive in the area. Ideally, the City would like to maximize the growth of these remaining trees to maximize their value when they are finally harvested. Increased health and vigor of the remaining red pine trees in the plantations may also reduce their susceptibility to RPS.

The second is that more light will be able to reach the ground in these plantations, allowing for the germination and growth of a new and more diverse cohort of trees. Because of the tight spacing of these trees when they were planted, not much has regenerated underneath them in some of the plantations. In general, forests with a greater number of species and a greater number of age-classes are healthier for the following reasons:

- 1) Increased species diversity lowers the risk of a forest being wiped out by a species-specific insect or disease, such as RPS.

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- 2) Different tree species have different tolerances of environmental factors such as drought or flooding. This means that the more species that are present in a forest, the more tolerant the entire ecosystem is to these factors. This is especially important to consider as climate change progresses.
- 3) Forests with varying age-classes create habitats for wildlife and create more diverse ecosystems which increases the number of wildlife species present.

The final goal that preemptive removals of stressed or poorly growing red pine in plantations will achieve is the removal of potential forest fire fuels. These stressed trees would likely be the first to be affected by RPS in these plantations, and by removing them ahead of an infestation the Forestry Division is heading off their uncontrolled mortality and creating a scenario where the debris can be systematically removed from the plantation and either utilized or disposed of. Summer drought conditions—like those of the Summer of 2025—are likely to become more common as climate change progresses, thus making forest fires more common in Maine. By removing potential fuels sooner rather than later, we can limit the likelihood of ignition as well as rate of spread.

Eventually, all red pine in the plantations will be harvested to capture their value ahead of their loss to RPS. The timing of this final harvest will depend on continued monitoring and the arrival of RPS in either Winterport or Bangor.

Any cutting of red pine should be done in the winter months to avoid the increased spread of the scale. This will also reduce the likelihood of the spread of a fungal pathogen called *Heterobasidion* root disease (*Heterobasidion annosum*), which is discussed further in the “Other Considerations” portion of this response plan below.

Chemical Treatment Options

There are currently no recommended effective chemical treatment options for RPS in plantations. The only recommendation put forward by the Maine Forest Service is to maintain the vigor of red pine in plantations, which may increase their survival rates. This will be accomplished through the preemptive removal of stressed red pine as stated above. Fertilization of trees should be avoided, as this has been found to encourage the scale (*Pest Alert: Red Pine Scale (Matsucoccus resinosae)*, 2012).

Ornamental red pine can be treated with horticultural oil to attempt to control the scale, though this requires direct contact with the insect, which means that you would need to be able to reach and coat the upper branches for effective control. Two applications per year are recommended to align with the two insect generations (*Red Pine Scale (Matsucoccus matsumarae)*, 2023). Logistically, this would only be appropriate for very high-value ornamental red pine trees, of which the City maintains none.

Other Considerations

When managing forested areas, it is always important to consider how management action against one disease or pest may inadvertently promote another disease or pest. In the case of managing for RPS, we must consider a fungal pathogen called *Heterobasidion* root disease (*Heterobasidion annosum*). *Heterobasidion* root disease (HRD) is hosted by several native Maine conifer species: all native pine species, all native spruce species, Eastern hemlock, and balsam fir. It is a decay fungus that enters trees through wounds left behind after harvests in conifer stands. It breaks down living tree tissues, rots the structural wood, and results in extensive blow-down and mortality of conifer hosts. HRD

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also colonizes fresh stumps of conifer host species left behind after a harvest or management (*Heterobasidion Root Disease*, Maine DACF).

HRD is usually very difficult to detect in early stages of disease, because it can be present in trees long before they start exhibiting symptoms. For this reason, when harvesting conifers in forested areas where other host trees will be left standing, it is best to assume that HRD is already present. Since the primary management strategy for managing RPS in City-owned red pine plantations will be harvesting red pine, additional steps must be taken to mitigate further ecosystem damage from HRD.



Figure 10. Fruiting bodies of heterobasidion root disease (HRD) fungi on a conifer tree stump. Image retrieved from [Invasive.org](https://www.invasive.org).

To reduce potential spread of HRD through the remaining red pine or other conifers left standing in the plantations, all harvesting should be done in the winter during the coldest months. This reduces the likelihood of spore dispersal should a tree containing HRD be cut. Care should be taken to minimize residual harvest damage done to the remaining trees as well to maintain the trees' resistance to both HRD and RPS. Stumps from the harvest can also be treated with sodium borate powder or solution to prevent their colonization by HRD (*Heterobasidion Root Disease*, Maine DACF). While this



Figure 11. Invasive Norway maple seedlings invading the understory of a forest. Image retrieved from the [Minnesota Department of Agriculture](https://www.dac.state.mn.us/).

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may be labor intensive, it will preserve the remaining conifer species in the plantations and surrounding forested areas and prevent widespread mortality from HRD.

It is also important to consider the other plant species already present in the understory of these red pine plantations. While there is some light regeneration of other native species—such as red oak and white pine at Essex Woods—there are also large populations of invasive plant species such as Norway maple, bittersweet vines, and Japanese barberry. If these invasive species are not dealt with ahead of other management, they may outcompete and suppress the natural regeneration that we are attempting to encourage. For this reason, invasive plant management should be performed ahead of pre-commercial thinning or final harvesting.

Privately Owned Red Pine Management

If you are concerned about RPS on privately owned red pine, you can contact the Forestry Division or the Maine Forest Service. At the time of this document's publication, no determined course of action was established for red pine trees found on private property throughout the city. If you would like to attempt to treat or remove a privately-owned red pine tree, you can contact a licensed Maine arborist or pesticide applicator.

Red Pine Scale Monitoring

The Forestry Division will continue to monitor the City's red pine plantations for signs and symptoms of RPS. This will be mostly visual monitoring for needle browning and canopy decline from the ground, and closer inspection of needles and branches during individual removal of red pine trees across the City. The Forestry Division has also been in contact with the Maine Forest Service to coordinate the deployment of sticky traps in several of the red pine plantations owned by the City. The findings of these traps will help inform not only RPS management in the City, but also statewide management and infestation tracking. If you are concerned about RPS in a public or privately-owned tree you can contact a member of the Forestry Division, submit a report through SeeClickFix, or reach out to the Maine Forest Service.

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Red Pine Plantation Harvest Plan

Management Schedule

Below is the timeline for the proposed management strategies for RPS:

Management Item	Approximate Time Performed
Invasive plant management in understory	Fall of 2025-Fall of 2027
Pre-commercial thinning of low-quality red pine	Winter 2026 OR Winter 2027
Final harvest of red pine	Winter, dependent on detection of RPS
Replanting of other tree species (may not be necessary in all areas)	Spring or fall following the final harvest

Management Locations

Below is a summary of the stands to be included in RPS management:

Property Name	Location	Acreage
Prentiss Woods	Bangor	6.5
Essex Woods	Bangor	1.7
Cascade Park	Bangor	1.8
Twining Pit	Winterport	17.3
Community & Economic Development Parcel Map 01, Lot 014	Bangor	9.3

Invasive Plant Management

While some of the red pine plantations such as those at Twining Pit have a very limited understory, others such as Essex Woods have understories almost completely made up of invasive plants. Ahead of any other management practices, these invasive species should be controlled to prevent continued growth and spread, and to ensure the success of future regeneration. Integrated pest management (IPM) principles will be used to reduce the usage of chemical pesticides, and when pesticides are used all state and federal laws and regulations will be followed.

Woody invasive plants such as glossy and common buckthorn, and Norway maple should be mechanically removed either using a forestry mulcher or hand crew during the Fall. All debris should be removed from the plantations and chipped to reduce the possible risk of seed spread. The remaining stumps of these larger shrubs can be treated with basal bark applications of herbicides the following Spring to prevent continued sprouting if this is an issue. This control will use the principles of integrated pest management (IPM), so that the least amount of herbicide will be used. These efforts have already been started in Essex Woods. Continued mechanical removals may be necessary in the future to maintain the populations throughout future management.

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Pre-commercial Thinning

Most of the trees that will be removed in the initial pre-commercial thinning (PCT) of the red pine stands will not be merchantable as timber. This is because we will be removing the least successful trees from the plantations to provide the more successful trees with greater access to resources. Any trees that are removed that have merchantable logs could be marketed through contracted services. However, most of the volume generated from the PCT will likely be chipped and used for biomass or possibly biochar.

Because this management activity is largely an effort to mitigate future wildfire fuels and minimize the possible existence of current low-level RPS infestations, brush generated from the PCT should not be left in the plantations. It is not feasible because of the tight spacing to remove the felled trees whole to be delimbed at a landing site where the resulting brush would then be chipped. The use of a cut-to-length system using a processor and forwarder or a hand-crew with a cable skidder will be the most effective method of completing the PCT. At closeout, all brush generated should be removed from the plantations and chipped.

All best management practices (BMPs) and regulations will be adhered to during this management and a Forest Operations Notification will be filed with the Maine Forest Service ahead of any management done on two or more acres. To maintain soil quality and reduce any risk of HRD spread, the PCTs should be completed in the coldest months of the winter.

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Figure 12. A stand of tree before (top) and after pre-commercial thinning. Images taken from the Northwest Natural Resources Group [website](#).

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Final Harvest

The long-term goal of these properties is not to continue to maintain them as red pine plantations. Instead, the aim is to increase the species diversity and restore the areas to naturally regenerating forests. Depending on the results of continued monitoring for RPS in these areas, the remaining red pine trees will be harvested. By delaying the harvest of the remaining well-formed red pine, and performing the PCT, we hope to maximize their growth and value. This harvest will hopefully produce merchantable products but will also produce biomass and biochar.

Depending on the amount of regeneration growth between the completion of the PCT and the final harvest, the final harvest may be able to be accomplished as a whole-tree operation using a feller-buncher. This would streamline the removal of brush from the plantations, however, would reduce the ability of the operator to protect the soil. Alternatively, a cut-to-length system using a processor and forwarder could be used once again, with the same close-out requirement of bringing brush out of the plantation upon completion.

Some of the red pine plantations regenerated other species early on, and these trees have also reached maturity. This is the case at Cascade Park and in parts of Prentiss Woods. In this scenario, the mature trees of any species other than red pine that are native and desirable will be left as seed sources.

All best management practices (BMPs) and regulations will be adhered to during this management and a Forest Operations Notification will be filed with the Maine Forest Service ahead of any management done on two or more acres. To maintain soil quality and reduce any risk of HRD spread, the final harvests should be completed in the coldest months of the winter.

Replanting

Most of the red pine plantations have not regenerated adequately since they were first planted. This means that there are too few trees to succeed those that will be removed during the final harvest. The hope is that once the PCT is performed, this will allow for regeneration to begin underneath the remaining trees because more light will reach the forest floor. However, if this is also not adequate, replanting with appropriate, native tree species may be necessary.

To promote successful regeneration, the right trees must be planted in the right place. This means that we must account for light conditions post-harvest, soil types, and annual temperatures. All these factors can vary greatly by site, so the table below outlines the conditions of each red pine plantation and the species that would be appropriate for replanting for each. The goal of regeneration is not to grow crop trees, or not to increase the profitability of harvesting the stand, but to improve species diversity, so non-timber species can be used for replanting as well.

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Location	USDA Plant Hardiness Zone	Primary Soil Types (% of AOI)**	Drainage Classes**	Light Conditions Post-Management	Recommended Species**
Prentiss Woods	5a	Telos-Chesuncook complex (39.2%), Elliottsville-Chesuncook association, 3-8% slopes (10.3%), Elliottsville-Chesuncook association, 8-15% slopes (47.4%)	Somewhat poorly drained, Well-drained	Partial shade* to full sun	Yellow birch, white spruce, Eastern white pine
Essex Woods	5a	Telos-Chesuncook complex (98.6%)	Somewhat poorly drained	Full sun	Red maple, white spruce, yellow birch, Eastern white pine
Cascade Park	5a	Boothbay silt loam (100%)	Moderately well-drained	Partial shade*	Northern red oak, sugar maple, red maple, white spruce, yellow birch
Twining Pit	5a	Masardis fine sandy loam (44.2%), Pits, gravel and sand (48.4%)	Somewhat excessively well-drained	Full sun	Eastern white pine, white spruce, paper birch
Community & Economic Development Parcel Map 01, Lot 014	5a	Pushaw-Swanville-Urban land association (15.1%), Chesuncook-Telos complex (73.4%)	Poorly drained, somewhat poorly drained, moderately well-drained	Partial shade*	Red maple, white spruce, yellow birch, Eastern white pine, sugar maple

*There will still be partial shade in these stands because since the red pine was planted other species have also matured within the stand, and these will be left during the final harvests.

**Determined using USDA NRCS Web Soil Survey.

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Summary of Recommendations

The official recommendations of this RPS response plan are as follows:

- I. Continue to visually monitor for the arrival of RPS in Bangor, and work with the Maine Forest Service to place monitoring traps in red pine plantations in the City and at the Twining Pit in Winterport, ME.
- II. Continue invasive plant management in red pine plantations using both mechanical and chemical methods, with specific emphasis on using integrated pest management (IPM) to control growth and spread of invasive plants already present in the understory of the plantations.
- III. Complete a pre-commercial thinning (PCT) of all plantations in either Winter of 2026 or Winter of 2027, to remove poorly formed, or unsuccessful red pine trees.
- IV. Perform a final harvest of all plantations to remove the final overstory red pine trees upon detection of RPS in Bangor or Winterport. These will be winter harvests.

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Amendments and Updates

Due to the ever-changing nature of forest management, amendments and updates regarding the management of RPS across City-owned properties will be added here periodically.

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CORRECTION—Upon the discovery of additional documentation in the Forestry Division archives, it was determined that the planting of the red pine plantations across the City spanned from the 1960s to the 1990s. While this better accounts for the variability in size of the red pine in the plantations, it does not change the recommended course of action provided here.