



# A Guide to Managing Spruce Beetles on Private Property

MARCH 2020

## FACTS ABOUT THE SPRUCE BEETLE?

Bark beetle outbreaks are normal occurrences in the pine, spruce and Douglas-fir forests that dominate the landscape in the Omineca region of British Columbia. However, changing climate and weather patterns have resulted in conditions that have allowed bark beetle populations (including spruce beetles) to increase beyond what the region has experienced historically.

Populations of spruce beetles (*Dendroctonus rufipennis*, Figure 1) are currently higher than normal in some parts of the Omineca region. Recent data suggests that the beetles are shifting from their more common two-year life cycle to a one-year life cycle, and that their overwintering survival rates are contributing to an increase in population levels.

Spruce beetle outbreaks typically last five years or more and they have killed extensive stands of spruce in B.C. in the past. Outbreaks often occur when beetle populations increase in downed material (such as "blowdown" trees). The beetles

then move on to attack live, mature, large-diameter spruce trees. Potential host trees include Engelmann spruce (in the Interior), white spruce, Sitka spruce and occasionally black spruce. Spruce beetles can also attack ornamental species such as Norway spruce and Colorado Blue spruce.

Spruce beetles generally prefer to attack:

- » mature, standing trees with a diameter at breast height (DBH) greater than 20 cm (They will also attack smaller trees with a DBH less than 20 cm. They are also attracted to high stumps and slash piles.)
- » trees that have fallen or been blown down in storms ("blowdown" trees)
- » trees that have been injured (damage to the bark or roots)
- » trees that have been weakened or stressed (by drought, defoliation, root disease, etc.)

To learn how to identify a spruce tree, consult B.C.'s *Tree Book* online (or download the entire book for free) at: [www.for.gov.bc.ca/hfd/library/documents/treebook/](http://www.for.gov.bc.ca/hfd/library/documents/treebook/)

## IDENTIFYING A "CURRENT" SPRUCE BEETLE ATTACK

From early May to early July, female spruce beetles will attack a host tree by boring into the bark and releasing a pheromone that attracts both sexes and ensures a mass attack on the tree. Eggs are laid in galleries parallel to the grain of the wood. The brood spends the winter in the tree and then in the following spring or early summer, they pupate and become adult beetles.

In late August, the new adults will bore their way out of the tree and crawl or drop to the base of the tree, where they'll again bore under the bark and spend the following winter there.



Figure 1. Adult spruce beetles are black-red in colour. Their size ranges from 4 to 7 mm long (about the size of a grain of rice).

In the first year after spruce beetles infest a tree (referred to as a “current” attack) the tree’s foliage may show signs of discolouration (Figure 2). The needles change from green to a pale yellow-green one to two years after the initial attack. After a couple of years, the needles usually turn red-brown and fall to the ground.



*Figure 2. A forested area that’s been attacked by spruce beetles.*

The time of year when this discolouration becomes noticeable varies, depending on the location, date of attack, intensity of the infestation, elevation and weather.

A spruce tree that’s experiencing a “current attack” may maintain a green, healthy-looking crown for months, but it’s important to understand that live beetles will emerge from the tree’s bark the following year and infest nearby trees. If you see a spruce tree on or near your property with needles that appear to be pale yellow-green or red-brown, check whether the surrounding trees have also been infested with spruce beetles.

Spruce beetle attacks frequently occur at or below eye level, including at the base of the tree or in roots appearing above ground. You must examine a tree carefully to determine whether beetles are present.

### **EXTERNAL SIGNS OF A SPRUCE BEETLE ATTACK**

- » The tree has a pale yellow-green or red-brown crown (Figure 2). It may take a year or more for the needles to change colour and fall off the tree.
- » Light brown or red-brown “frass” (fine sawdust) appears on the tree’s bark and around the base of the tree (Figure 3). Note that wind or rain may displace some of the frass, making it harder to spot on the bark’s surface.
- » Live trees that have been attacked may produce pitch tubes (crystallized tree sap) where beetles bored into the bark (Figure 4). However, pitch tubes rarely form if a beetle attack occurs late in the fall or in stressed trees.

- » An excessive amount of fresh sap has run down the tree trunk (Figure 5).
- » Woodpeckers have removed some of the tree’s bark in search of larvae, exposing red patches on the trunk (Figure 6).



*Figure 3. Frass (fine sawdust) on a tree trunk, an indication that beetles have bored into the tree.*



*Figure 4. Pitch tubes (small masses of resin) can be seen after a spruce beetle attack.*



Figure 5. Streaming resin on a tree trunk.



Figure 6. Damage caused by woodpeckers feeding on trees that have been attacked by spruce beetles.

## INTERNAL SIGNS OF A SPRUCE BEETLE ATTACK

- » Beetle galleries (the shallow tunnels that beetles create while feeding) are etched into the underside of the bark (Figure 7).
- » Live beetles or larvae are present. If it's cold out and you're not sure if an adult beetle is alive, warm it up in your palm to see if it starts wriggling. (You could also try the "squish test". A dead beetle will be dry and crumbly.)

- » The cambium (the layer of tissue between the bark and the wood) is brown and crumbly. The cambium of a tree that was only partially attacked (for example, where the flow of the tree's sap successfully dislodged the beetles) will be pink.

## REMOVING A SPRUCE TREE THAT IS UNDER CURRENT ATTACK

If you confirm that there are infested spruce trees on your property, the best way to stop the beetles from spreading is to remove the affected trees **before** the beetles emerge and fly in the spring (typically in early May).

After the "current attack" trees have been identified and marked for removal, please follow the guidelines below:

- » Remove and destroy all infested trees (felled and blowdown trees) from the property **before** the annual beetle flight occurs in the spring (typically in early May).
- » Cut down these trees in a way that does not allow them to fall against or scar nearby healthy trees, since the resulting injuries could attract beetles the following year.
- » To avoid damage to healthy trees, hire experienced fallers and use small equipment to extract the cut trees.
- » Keep the height of stumps as low as possible (less than 30 cm above ground level). If the stumps can be ground, debarked or burned, this will increase the mortality of the remaining beetles. Burning is the recommended option, since it will also kill some of the beetles that overwintered in the "duff" matter (forest floor debris) at the base of the tree.
- » Burn or chip all debris piles completely **before** the annual beetle flight occurs in the spring (typically in early May).



Figure 7. Spruce beetle galleries under the bark, indicating that the tree is infested and should be removed from the property to minimize the chances of the beetles spreading to other nearby trees the following year.

- » Remove, peel or burn all pieces of wood debris with a diameter greater than 17.5 cm at breast height or with a length greater than one metre. When the bark is peeled off the logs, the beetles, larvae and/or pupae are exposed to the weather and predators, which will usually kill them over the winter.

- » **Note:** The recommended method to dispose of infested trees is burning. However, if burning restrictions are in place, the previously mentioned measures are suitable methods to help destroy spruce beetle populations in felled trees.

- » **Before lighting any open fire, visit the BC Wildfire Service website for information about open burning, burn categories and current fire bans:**  
[www2.gov.bc.ca/gov/content/safety/wildfire-status/fire-bans-and-restrictions](http://www2.gov.bc.ca/gov/content/safety/wildfire-status/fire-bans-and-restrictions)

- » **Please also check with local government authorities for any other restrictions before lighting any fire.**

#### Firewood:

- » If you're splitting infested trees for use as firewood, burn any wood with bark on it before the following spring (early May).
- » For firewood that you plan to store over the winter, it's recommended that you peel off all bark from the wood and leave the cut wood exposed to the weather over the winter to kill the beetles. (Spruce beetles can survive in wood that has been sheltered from the elements and could emerge to attack nearby trees the following spring.)
- » Stack firewood loosely to encourage air movement and rapid drying. Do not stack infested firewood near living spruce trees.
- » Remove the bark from any stumps higher than 30 cm.

Healthy trees growing near the sites of infested trees should be monitored the following spring. Any newly infested trees should be removed.

## PREVENTATIVE MEASURES

Anti-aggregation pheromones can successfully repel spruce beetles from vulnerable areas and can be used to help protect small stands of trees. The anti-aggregation pheromone methylcyclohexenone (MCH) is used to disrupt or prevent beetle attacks.

This pheromone is most effective when the number of infested trees or susceptible trees is low and when it's applied before the annual beetle flight occurs (typically in early May) on: blowdown trees; large, susceptible trees (veterans); and damaged or severely stressed trees.

To find out more about how MCH is used to control spruce beetles, contact the regional forest entomologist in your area (see list below).

## FOR MORE INFORMATION

You can contact the regional forest entomologist in your region by calling FrontCounter BC at the appropriate local number below:

- » Omineca and Northeast (Prince George): 250 561-3479
- » Cariboo (Williams Lake): 250 398-4574
- » Skeena (Smithers): 250 847-7356
- » Kootenay-Boundary (Cranbrook): 250 426-1766
- » Thompson-Okanagan (Kamloops): 250 828-4131

You can also reach a FrontCounter BC representative online at [FrontCounterBC@gov.bc.ca](mailto:FrontCounterBC@gov.bc.ca) or call 1 877 855-3222 toll-free to be directed to the B.C. government regional forest entomologist in your region.



Above: spruce beetle larvae.