Bark Beetle Inspector

Identification & Treatment Field Guide

Boulder County

Boulder County Forest Health Initiative

Promoting Forest Sustainability through Education and Public Outreach

Erich G. Vallery; Bugwood.org

MPB has a round rump.

Sheryl Costello; FS.Fed.us

MPB is about the size of a grain of rice.

Native Colorado Bark Beetles

This guide focuses specifically on two species of bark beetles that are causing the most damage in Boulder County as of Summer 2011. Dozens of other species of bark beetle exist throughout Colorado.

Meet the Mountain Pine Beetle (MPB)

Scientific Name: *Dendroctonus ponderosae*

MPB Identifying Features:

- Black beetle 1/8 to 1/4 inch long (about the size of a grain of rice).
- MPBs have a round rump.
- One flight per year from mid-July to mid-September.
- Primarily attacks the main trunk of the tree.

Native Colorado Bark Beetles

Meet the Ips Beetle (aka the Pine Engraver Beetle)

Scientific Name: *Ips pini*

Ips Identifying Features:

- Reddish-brown to black beetle 1/8 to 1/6 inch long.
- 3-5 flights per year– if it is warm Ips can fly.
- Spring flight often causes the most damage to trees.
- Attacks both the trunk and the branches of the tree.

The Ips Beetle can be distinguished from MPB by:

- depressed cavity and spines at the rump.
- Ips is a little smaller and skinnier than MPB.

Forestry Archive; Bugwood.org

Ips Beetle has a depressed cavity and spines at the rump.

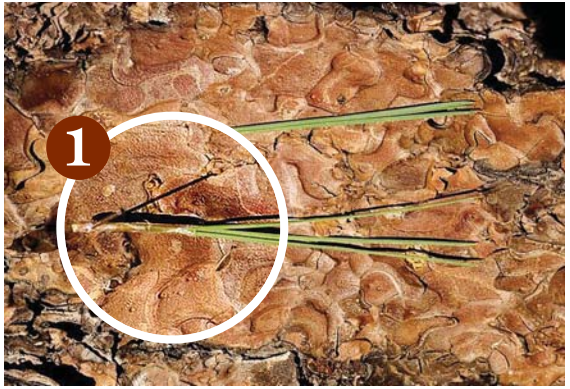
Identifying Pine Tree Species

Quick Tips to ID Pine Trees:

1. All native pine trees needles grow in clusters or groups.
2. Other native conifers like spruce and fir don't have clustered needles.

MPB and Ips Bark Beetles Primarily Attack Pine Trees:

- Lodgepole Pine (2 needle; 1.25-3 inches long)
- Ponderosa Pine (2-3 needle; 3-7 inches long)
- Limber Pine (5 needle; 2-3.5 inches long)
- Bristlecone Pine (5 needle; 0.75 - 1.5 inches long)
- Urban Pine – Austrian (2 needle; 3-6 inches long)
- Urban Pine – Scotch (2 needle; 1.5-3 inches long)



Tom DeGomez; Bugwood.org

Native Ponderosa pine needles and characteristic red bark.

Mary Ellen Harte; Bugwood.org

Native conifer Engleman Spruce needles.

Surveying Trees for Beetles

There are four signs to look for when surveying trees for beetle attack.

Sign of Beetle Attack #1

Do you see Pitch Tubes?

Pitch Tubes are popcorn-shaped sap plugs that are the tree's natural defense against the attacking beetles.

If Yes... this is a sign of MPB attack!

Ryan Ludlow; BoulderCounty.org

Pitch tubes are a sign of MPB attack.

Ryan Ludlow; BoulderCounty.org

Tree with multiple pitch tubes.

Ryan Ludlow; BoulderCounty.org

Pitch tubes are popcorn-shaped sap plugs.

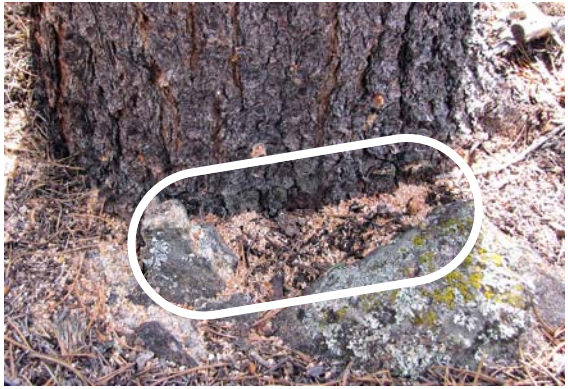
Surveying Trees for Beetles

Sign of Beetle Attack #2

Do You See Frass?

Frass (aka boring dust), looks like sawdust and can be found at the base of the tree or caught in the bark of the tree.

If Yes... this could be a sign of either MPB or IPS attack!



Ryan Ludlow; BoulderCounty.org

Frass at the base of the tree.

Ryan Ludlow; BoulderCounty.org

Frass caught in bark.

Ryan Ludlow; BoulderCounty.org

Close up of pitch tube covered in frass.

Surveying Trees for Beetles

Sign of Beetle Attack #3

Have You Seen Increased Woodpecker Activity on a Tree?

Woodpeckers become more active when there is an evident food source of bark beetles and other insects.

If Yes... this could be a sign of either MPB or IPS attack!

David Cappaert; Bugwood.org

Adult downy woodpecker.

Ryan Ludlow; BoulderCounty.org

Bark removed by woodpeckers feeding on beetle larva.

Ryan Ludlow; BoulderCounty.org

Example of an entire tree crown fading.

William Ciesla; Bugwood.org

Example of just the top of the tree fading.

Surveying Trees for Beetles

Sign of Beetle Attack #4

Is the Tree Fading from Green to Brown?

Tree Fade location and time-of-year can help determine which species of beetle attacked.

If Yes... this could be a sign of either MPB or IPS attack!

- MPB attacked trees fading season: Generally April thru July.
- Ips attacked trees fading season: March thru November.

Tree Fade Location Identifiers:

- If entire tree crown is fading, this is a sign of MPB or possibly Ips.
- If only isolated large branches of the tree are fading, this is a sign of Ips.
- If only the top of the tree is fading, this is a sign of Ips.

Note: If some interior branches of the tree are fading and it is in the Fall, this is probably normal seasonal needle drop and not a sign of beetles.

Beetle Attack Determination

Determining the Success of a Beetle Attack

To determine the success of a beetle attack, use a small hatchet or knife to remove the outer layer of bark and open a "window" to the inner bark of a tree. Place the "window" **a few inches above a pitch tube** or near frass accumulation on the bark of a tree.

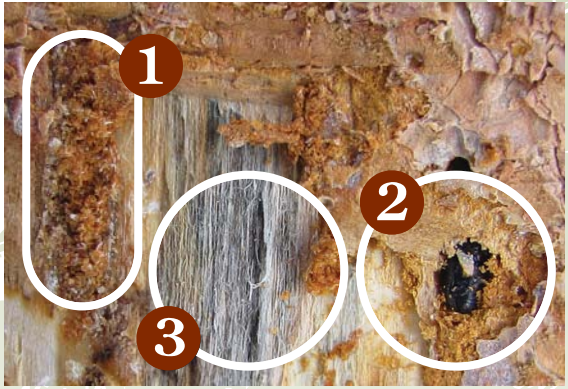
Consider these Questions:

1. Are well developed beetle galleries seen underneath the bark?
2. Are living beetles, eggs, or larva seen underneath the bark?
3. Is blue stain fungus seen underneath the bark?
4. Are pitch tubes covered in frass?
   (See page 6 for frass example)

If Yes to any of the questions... then the beetle attack was most likely successful!

Ryan Ludlow; BoulderCounty.org

Remove bark layer a few inches above frass-covered pitch tube.

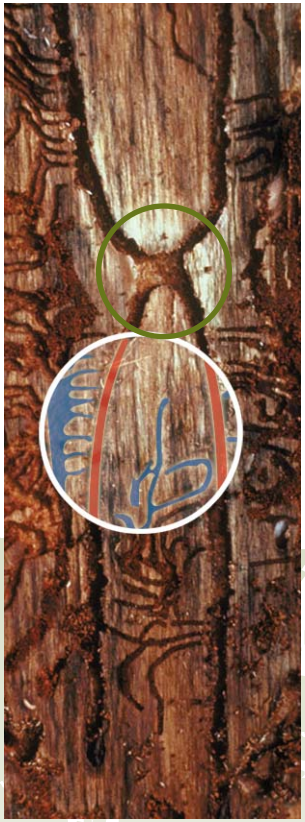


Ryan Ludlow; BoulderCounty.org

Example of galleries, blue stain fungus, and living beetles.

Ladd Livingston; Bugwood.org

View of MPB Galleries with bark removed



Jerald E. Dewey; Bugwood.org

View of Ips Galleries with bark removed

Beetle Gallery Patterns

Beetle Gallery patterns/shape can help determine what species of beetle attacked your tree.

Mountain Pine Beetle Galleries

- MPB galleries are I or J shaped.
- MPB galleries are packed full of frass.
- **Parental Gallery:** Each adult female excavates a long vertical gallery starting just above pitch tubes.
- **Larval Gallery:** Each larva excavates a smaller lateral gallery.

Ips Beetle Galleries

- Ips galleries are X or Y shaped.
- Ips galleries are **not** packed full of frass.
- **Nuptial Chamber:** Multiple females mate with one male in a Nuptial Chamber.
- **Parental Gallery:** Each female excavates a long parental gallery.
- **Larval Gallery:** Each larva excavates a smaller lateral gallery.

Beetle Sanitation Options

How to Kill Beetles Underneath the Bark

Option #1 Haul Tree Away

Transport currently infested material to a safe disposal location. Visit **www.bouldercounty.org/foresthealth** to find the closest disposal location.

Treatment Goal: Full removal of infested material.

Option #2 Chip Woody Biomass

Chipping kills most beetles. Make sure to spread chips evenly on the ground no deeper than 2-3 inches or haul chips away. A deep chip layer takes longer to dry out, may attract additional beetles to an area, and inhibits regeneration of seedling trees, flowers, and grasses.

Treatment Goal: Chipping kills most beetles or they dry out and die.

Option # 3 Peeling Bark

Peeling bark is labor intensive, but is a good option for small amounts of infested material or if material is difficult to access. Use a draw knife, log wizard, or other tools to remove outer bark of infested tree.

Treatment Goal: Dry out and kill beetles underneath the bark.

Ryan Ludlow; BoulderCounty.org

Solar Treatment for killing beetles underneath the bark.

Beetle Sanitation Options

How to Kill Beetles Underneath the Bark

Option #4 Solar Treatment (Note: only effective for MPB)

Crucial Steps to Solar: Be careful, Solar Treatment is easy to do wrong!

1. **Requires a great site location:** Site must be extremely sunny and south facing.
2. **Stack logs in a single or double layer:** Do NOT stack more than two layers of logs in one pile.
3. **Cover with clear 6 mm plastic:** Make sure to completely seal edges of plastic with dirt. You must frequently inspect log piles for rips or tears in plastic and repair any holes.
4. **Logs must be covered for a minimum 1.5 months before beetle flight:** The longer amount of time logs are covered the better. Please remove and throw away plastic after treatment is complete.

Solar treatment is more difficult at higher elevation because there is less heat available to bake the beetles. In order for solar to be effective you must be methodical.

Treatment Goal: Bake the Beetles.

Bark Beetle Management Tips

When to Survey

Fall is the best time to survey for and cut newly infested trees:

- Signs of beetle attack are most obvious in the Fall.
- Material cut in the Fall and Winter will have many months to dry before beetles fly the following Spring/Summer.

Slash and Log Management Tips

- MPB and Ips are attracted to freshly cut trees that are still green. They are not attracted to "Red and Dead" trees.
- If possible, limit cutting during beetle flight season. **However**, don't let fears of beetles, prevent forest health improvement projects. The need to be active stewards of our land outweighs the risk of beetles.
- If cutting during beetle flight, try to limit the amount of time freshly cut material stays on site.
- If possible remove or chip freshly cut slash and logs.
- Don't stack green logs near living trees.

Bark Beetle Surveys During Forestry Projects

1. **Pre-Treatment Survey:** Search for beetle infested trees before starting new cutting projects.
2. **Monitoring:** Monitor for the arrival of new beetles throughout the entire cutting project.
3. **Post-Treatment Survey:** Search for beetle infested trees after cutting is complete. If infested trees are found sanitize material (see page 11 and 12 for sanitizing materials).

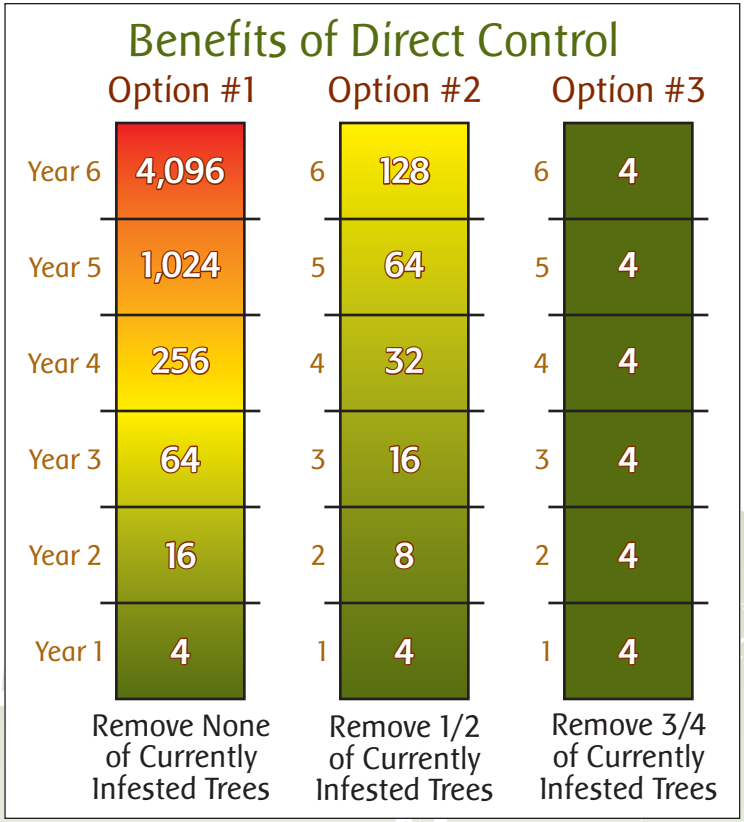


Illustration of Bark Beetle Management effectiveness if 4 new trees are infested each year.

Bark Beetle Management in Ponderosa Pine Forests

- During bark beetle epidemics, beetles have the ability to rapidly expand their population.
- Research suggests that aggressively surveying for and removing currently infested MPB trees (aka **Direct Control**) may slow the spread of beetles in ponderosa pine forests.
- If 100% removal isn't possible remove the largest diameter trees first, since these trees produce more beetles.
- The diagram to the left illustrates the importance of Direct Control and shows three options for removal. On average if there is currently 1 infested tree in your forest this year then you can expect enough beetles to be produced from that 1 tree to infest 3 to 7 trees the following year. In this example, a medium number of 4 newly-infested trees was used.

Bark Beetle Management in Ponderosa Pine Forests

Ponderosa Pine Restoration

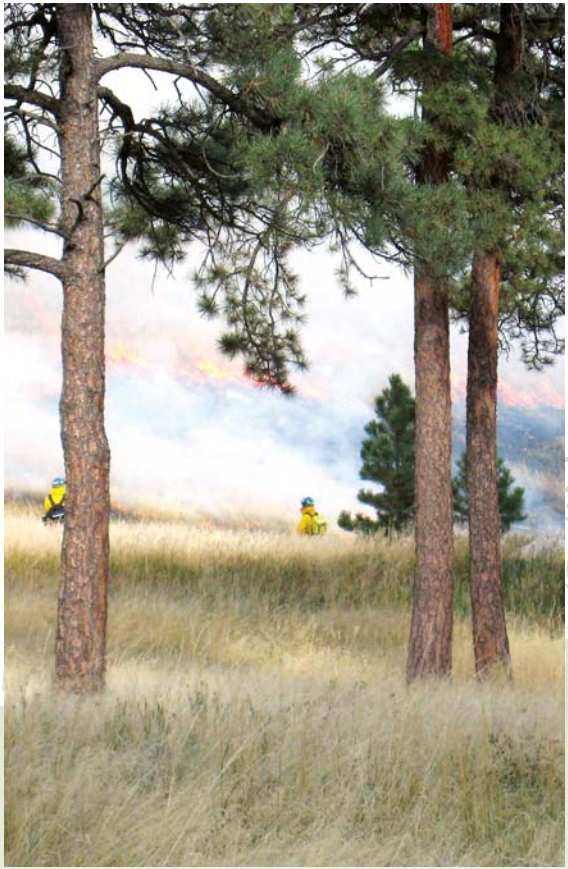
Aggressive forest thinning is needed before beetles arrive in large numbers.

Research suggests healthy ponderosa forests will experience less impacts than unhealthy crowded forests. Open grown healthy forests create a suite of unfavorable beetle conditions:

- More open environments help to disrupt beetle pheromones.
- Beetles avoid more open, sunnier, and hotter environments found in a healthy ponderosa pine forests.

Characteristics of Healthy Ponderosa Pine Forests Approximately 5,500 to 8,000 Feet Elevation

- Approximately 10-30 large trees/acre at lowest elevation.
- 30-60+ trees/acre at the upper end of elevation range.
- An open park like setting with well developed grasses.
- Frequent low intensity fires burned every 10-30 years, helping keep the forest open.
- Uneven-aged forest with many openings and some clumping of trees.
- South facing slopes have fewer trees/acre.
- North facing slopes have more trees/acre with higher densities of Douglas-fir.



Ryan Ludlow; BoulderCounty.org

Prescribed fire at Betasso Preserve Open Space.

Contact:

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Online Resources:

Boulder County Forest Health Initiative:
www.bouldercounty.org/foresthealth

Front Range MPB Working Group
www.frontrangepinebeetle.org

Colorado State Forest Service
www.csfs.colostate.edu