

# INSECT INVASION!

A creepy-crawler is gobbling up our forests

**CHOWING DOWN:** A mountain pine beetle adult (center) and larva (below right) munch on a pine tree.

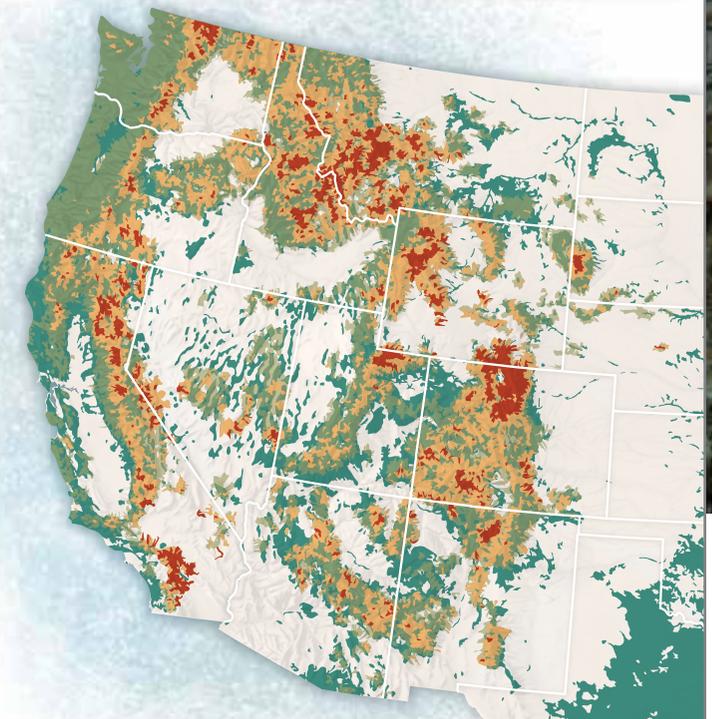


## ON THE MARCH

The map below shows the location of forests damaged by bark beetles.

Percentage of trees seen with damage

- undamaged tree areas
- 1% to 10%
- 11% to 50%
- 51% to 100%



At the size of a grain of rice, bark beetles don't look very scary. But don't be fooled: These little bugs are killers. They feed on the bark of pine and spruce trees, devouring the trees' living tissue. The trees weaken and die. Then the beetles swarm to their next victims.

A bark beetle species called the mountain pine beetle has destroyed about 46 million acres of forest—an area bigger than the entire state of Washington. And the assault isn't over yet. The beetles used to live only in western North America, but now they're

marching eastward, leaving billions of dead trees in their wake.

The U.S. Forest Service is doing everything it can to stop the attack. In an attempt to halt the spread, the agency is cutting down trees before the beetles can get to them. The barrage of bugs is so massive that foresters can't keep up.

But that might be OK, because new research is raising questions about whether going on the offensive is such a good idea after all. There's no question that bark beetles are destroying trees today. But at the same time, they may be helping create

stronger and healthier future forests. How? Some scientists have noticed that when the beetles lay waste to forests, they leave certain trees alone. The trees that survive seem to have a special ability to withstand hot, dry conditions. They may be the very trees we need to keep our forests alive as *climate change* continues to crank up Earth's thermostat.

So that begs the question: Are the tree-killing beetles good guys or bad guys? Should foresters fight them or leave them alone? The answer depends on who you ask.

*Continued on next page*

BILL MAYER/MOTHER JONES (ILLUSTRATION)

KEITH DOUGLAS/ALL CANADA PHOTOS/GETTY IMAGES (BEETLE INSET); KAREN MINOT (MAP); JIM MCMAHON (INSET MAP)

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## BUG BATTLE

Like many kids, Diana Six had a bug collection when she was growing up. Unlike most other kids, she also had a fungus collection. Today, Six is both an *entomologist*—a scientist who studies insects—and a *mycologist*—one who studies fungi—at the University of Montana.

Six first became interested in bark beetles because of their special relationship with fungi. The beetles depend on fungi that live in tree bark and wood. The fungi help transform the tree's tissues into digestible nutrients that the beetles can eat. In return, the beetles help the fungi spread through the forest and reach more trees.



**EATEN ALIVE:** Bark beetle damage on a tree trunk



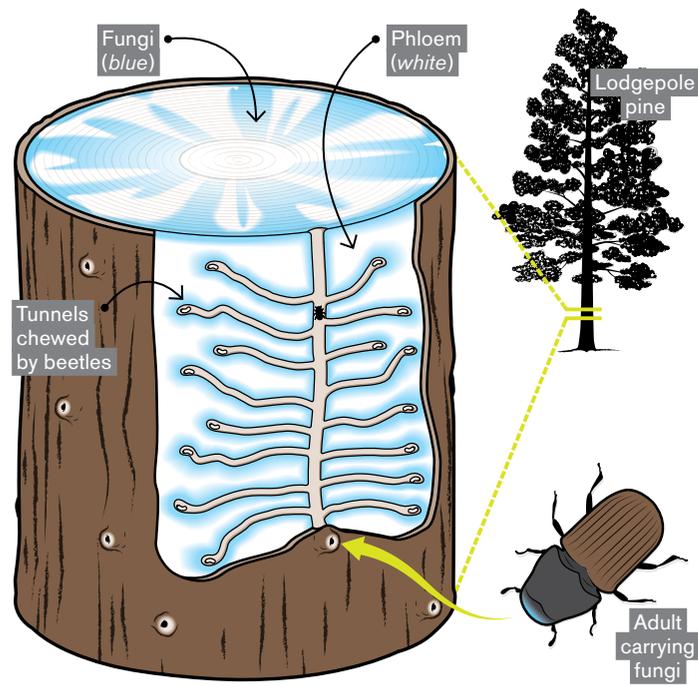
**PATH OF DESTRUCTION:** Spruce trees killed by bark beetles



**BATTLING BUGS:** Insecticides can help protect individual trees, but spraying a whole forest would be too costly and environmentally risky.

## BARK ATTACK

Bark beetles spread fungi that break down tree bark into digestible nutrients. Adult and larval beetles feed on *phloem*, tissue that transports nutrients through the tree. Infested trees eventually die.



When the beetles fly to a new tree, they carry the fungi with them. They pack the fungi into pockets on either side of their jaws that are “like little fungal suitcases,” says Six. Without the fungi, bark beetles could never have taken over the forests. It’s a *symbiotic* relationship, one that benefits both beetles and fungi.

Bark beetles have been feeding on trees for millions of years. Most of the time, the bugs attack and kill sickly trees. That allows healthier ones to grow in their place. But over the past several decades, the beetle population has been growing out of control. “This outbreak is 10 times bigger than any other in recorded history,” says Six.

## HEATING UP

Bark beetle outbreaks happen when conditions are abnormally dry and warm. Healthy trees can defend themselves against the beetles—for example, they can flood out the invaders with a sticky substance called *resin*. But in a drought, thirsty trees can’t create enough resin to defend themselves.

Warm weather also promotes beetle outbreaks. Cold spells usually kill off the insects, but their populations explode in warm conditions. Stronger numbers make it easier for them to overwhelm trees. “Put all those things together, and you have a

big problem,” says Six. “That’s the situation we’re in today.”

Droughts are becoming longer and more severe. And although Earth’s temperatures have always risen and fallen, it’s usually a gradual change over millions of years. But over the past 50 years, the planet’s average temperature has increased at a breakneck pace. Scientists think that human activity is responsible for this most recent trend. Power plants and vehicles release *carbon dioxide* and other *greenhouse gases* that collect in the atmosphere and act like a blanket, trapping heat that would otherwise escape into space. And as the world warms, the beetle population is exploding.

## MANY VICTIMS

Trees aren’t the only victims of the outbreak—so are the animals that rely on them. The beetles have killed 75 percent of the mature whitebark pine trees in Yellowstone National Park. That’s bad news for grizzly bears and Clark’s nutcrackers,

a bird species that eats pine seeds. Forest die-offs affect humans, too. Trees in areas where people live, hike, and ski are dying.

## NOT ALL BAD?

In the late 1980s, U.S. Forest Service researcher Connie Millar watched as bark beetles chomped through a stand of trees near her home. She noticed that the beetles left certain trees untouched. Curious, Millar kept an eye on those survivors. The next time there was a drought, she noticed that those trees stayed healthy.

If the beetles leave behind trees that are naturally better at surviving drought, then the insects may actually be helping forests. By killing trees that suffer in droughts and sparing those that stay healthy, bark beetles could be giving drought-tolerant trees an advantage in today’s warming world. Seeds from these trees could grow a forest that’s better able to withstand climate change.

If scientists like Millar are right, letting the insect army continue its deadly march might be the best way to help the forests of the future. But doing nothing means many trees will die in the meantime. Whether to act or stand back is something that scientists are hotly debating. ❁

—Stephanie Warren Drimmer

## CORE QUESTION

Do you think bark beetles are good or bad for North America’s forests? Cite evidence from the article to support your opinion.