



## Beetlemania

Hatching now in a national forest near you: *Dendroctonus ponderosae*, the ravenous insect destroying every tree in its path.

By Fred Haefele



**IN THE PALM OF YOUR HAND**, they don't look like much: a black bug the size of a chocolate sprinkle. Put one under a microscope and the mountain pine beetle, *Dendroctonus ponderosae*, is hairy and lethal-looking, a shovel-faced, tanklike chewing machine with legs. Since the first outbreaks began, in the early 1990s, the beetles have infested more than 81,700 square miles of North American forests, an area larger than Nebraska. Last

year, in my home state of Montana alone, the plague more than doubled—from 1.2 million acres in 2008 to 2.7 million in 2009. Depending on whom you talk to, this makes *Dendroctonus* either the most destructive insect in the recorded history of North American forests or, as some ecologists see it, a massive influx of "ecosystem engineers" working tirelessly to improve woodland biodiversity. Call me anthropocentric, but the idea of a bug in the driver's seat doesn't inspire much confidence.

Take this lodgepole I'm standing next to, one of the beetle's favorite pines. It is green-needled and vigorous-looking, but it's actually dead as a phone pole. The bark is riddled with hundreds of bulging, popcorn-size hits. Made of sawdust, pitch, and bug scat, these spots mark where last year's hatch of adult beetles chewed their way in to lay their eggs, which turn larval by the fall. Infused with natural antifreeze that withstands temperatures down to 30 below, *Dendroctonus* larvae hibernate till summer, when they pupate, abandon their brood tree, and take flight to attack fresh stands. The short of it is, this green tree's a goner. By next spring the needles will fade; by summer, they'll turn red. Not some feel-good autumn-in-Vermont red, either. More like the rocker-panel rust on a junkyard Dodge.

There's something about a red evergreen that says we're deeply screwed. Take a drive over Montana's 6,320-foot MacDonald Pass and you'll see these trees by the millions,

spilling down the Continental Divide like leftover marinara. Some ecologists say there's little to worry about from *Dendroctonus*. They're quick to point out that these beetles are endemic—that they've been around as long as the forests themselves, that they cull older, weaker trees, and that these outbreaks come and go naturally over the centuries.

But this time, things have changed. Stressed by less rainfall and a warmer climate, our high-altitude lodgepole stands can't muster enough pitch to flush out the invaders in the numbers the bug now presents. Low temperatures used to control the beetle population, killing most of them off each winter, but the last time my hometown of Helena saw sustained temperatures of 30 below was 1996. As populations continue to multiply, as they continue to thrive at higher elevations and latitudes and develop tastes for new species (the whitebark pine is now functionally extinct in some places), human intervention has so far proved maddeningly ineffective.

There's never been a better time to be a beetle. With the forests spread before them like a cruise-ship buffet and no serious predators to worry about, the beetles are writing a whole new script, one in which they're no longer mindless, ravaging insects but a particularly exuberant tribe of eco-nihilists. Or perhaps just another few billion insatiable consumers and, in that way, not so different from us.

Nobody knows how all this will play out. But hard-hit Colorado already stands to lose virtually all of its mature lodgepoles. High-altitude trees help retain winter snowpack; if they go into decline, spring runoffs could radically change, affecting local water management. In places like Yellowstone, the whitebark's demise could eliminate one of grizzly bears' main food sources, the tree's cone seeds. And what happens when all these carbon-absorbing trees decay and become carbon producers? The temperature goes up another notch.

At this point, the situation is much like what happens when a Third World country unexpectedly goes nuclear: There's widespread alarm followed by a rush to learn about a long-ignored, now ominous threat. Who are these bugs anyway, and what do they have in mind for the Rockies?

IT'S ONLY NATURAL THAT a panorama of several million dead pines would have a disquieting effect on the psyche.

Many think that, should these red trees ignite, it will mean a cataclysmic fire of untold ferocity, one hot enough to vitrify the earth, scald the very air, and turn the verdant northern Rockies into a Mars-scape.

But some ecologists believe that red, dead trees are only moderately more flammable than live ones and that, without the green trees' volatile resins, they might actually burn

cooler. That doesn't mean that fire danger is lower, says University of Colorado geography professor Tania Schoennagel. "Despite having recently come out of a 5-7 year drought," she points out, "Colorado can soon expect another. With or without the pine beetle, the potential for catastrophic fire is always there."

It seems like a stretch, but according to a Colorado Forest Service release, we run a greater risk of being hit by a tree while hiking than of burning up in a fiery cataclysm. "[Beetle-killed trees] begin to fall within 3-5 years," the report states. There are 550 miles of power lines and 691 miles of trails running through infested stands—in Colorado alone.

For both these reasons—fire and public safety—there's now an urgency to fell these hazard trees, especially in what the U.S. Forest Service likes to call "the Wildland– Urban Interface"—the place where the buildings leave off and the woods begin.

In Helena, this has created a boom of sorts for bonded contractors and the somewhat chancier element of out-of-work loggers and gypsy woodsmen. As it happens, I fall somewhere between these two tribes. I was a teacher until the economy went under, but for 30 years before that, I worked as an arborist. So, last June, I dusted off my hard hat and joined my fellow recession-strafted friend Tom Harpole—himself a former coastal timber faller turned magazine writer—to clean up the woods around the ski cabin of our pediatrician friends Mike and Tess, in the Flint Creek Range, 90 miles southwest of Helena.

On the drive over, Harp, an athletic, gently ravaged senior in a hickory shirt, tried out the results of his cataract surgery, reading me an article from the *Helena Independent Record*. Taken from Governor Brian Schweitzer's spring fire briefing, the piece informed readers that if they were dumb enough to build in the woods, they were on their own. "You have a personal responsibility," Schweitzer said. "Don't look to the government to bail you out."

Harp put down the paper and grinned. "Is that tough love or what?" The idea behind a beetle "treatment," as the Forest Service calls it, is to ambush the bugs before they hatch out, which in Montana generally happens in late July. Harp and I would fell the brood trees—the ones with active larvae—and then cover the downed wood with black plastic, frying the hatch before the beetles could fly out to attack nearby trees.

We gassed up our saws and went to work. The affected three acres had upwards of 500 trees—two-thirds of them lodgepole, half of which were infested. Since it was a family cabin and small children were usually afoot, we felled other hazard trees too: leaners (uprooted trees held up by their neighbors), widow-makers (detached tops, hanging in the canopy), snags (rotten, unstable trees), and jackpots (an idiot's delight of leaners, snags,

and widow-makers). I even climbed and topped two stricken lodgepoles that were uncomfortably close to the power lines.

It's been years since I spent a whole day felling trees, but the work felt much like it used to, which is to say hard, dirty, and dangerous. The only thing that had changed was the way such inviolably straightforward labor was now bedeviled by vagaries: Because of the magnitude of this outbreak, did it really matter if we covered our downed wood when the neighbors left their brood trees standing? Who were we kidding with this bit of woodland housekeeping?

HARP AND I FELLED a lot of beetle kill last summer, specializing in higher-risk trees—the pines so close to buildings, propane tanks, and chicken coops that the other renegade sawyers wouldn't touch them. In August, we bid on a job to remove three beetle-killed pines from the property of Harp's friend Perry, five miles west of Helena. The dead trees threatened the power lines, but Perry was most concerned for the six "focal" ponderosas by his house. These had a scattering of beetle hits at the base, so he wondered if we should just take them, too.

I told Perry with utmost confidence that, no, such a light scatter of hits meant that the pines had pitched the bugs out. I went on to announce that, by this point, the beetles had certainly hatched, but to be on the safe side he could spray them with the insecticide carbaryl, arguably the most effective beetle deterrent on the market. Perry, a plumber by trade, wasted no time. The next day he rented a pressure sprayer and hosed down every viable pine he had.

When Harp and I returned five days later, we found a hatch in full progress. The insects had swarmed the house pines—the ones I'd presumed to call safe—and chewed through the carbaryl like butterscotch. In spite of the rainy summer, the big pines offered little resistance. From the base up past the 50-foot mark, thousands of entry holes peppered the trunks. There was nothing to do but remove them.

As I spiked my way up the first tree, I heard a commotion below. I planted my gaffs, hung back on my flip line, and peered down. Like a genie out of a bottle, a fresh hatch was boiling from the tree Harp had felled. The bugs crawled up his Husqvarna, flew into his face, and in a moment fairly engulfed him. Frantically, Perry scraped clumps of them off Harp's shirt.

"Those fuckers were trying to take me down," Harp would tell me later.

"They mistook you for a pine," I said. "It could happen to anyone."

"No," he insisted. "This was personal. They infested me, Fred. I felt violated."

It was good for a laugh, but the incident continued to haunt me. The beetles had emerged weeks past the hatch window, attacked well-hydrated trees, and made a point of attacking not just mature trees but the saplings that would take their place. And they ate through fresh carbaryl to do it. In the span of an afternoon, everything I thought I knew about this bug had been proven wrong.

At the Blackfoot River Brewing Company later last fall, I stood next to a strapping fireman named Scott Bockman who sprays carbaryl on the weekends for extra cash. I mentioned the events out on Perry's spread: the swarming of Harp, the jailbreak hatch, the strange timing of it all. Scott laughed and bought me a beer.

"You can toss that 'hatch window' crap out with the term 'unseasonably warm,'" he said. "Near as I can tell, they hatch whenever they feel like it. As far as that goes, I've seen bugs attack spruce and Doug fir. Things are changing so fast out there, the science can't keep up."

FOR NOW, OUR EFFORTS at beetle intervention have indeed seemed feeble. Carbaryl works in places, but nobody wants to talk about the collateral effects of a forestwide application on honeybees and songbirds. Controlled burns sound neat, but a fire of that scale would be hard to control, and the bugs would already have left the red trees for live ones. So we make inroads where we can and cling to small victories when we find them.

Retired Colorado entomologist David Leatherman, who has studied these beetles for more than 30 years, offers a glimmer of hope. The past couple of years have brought anomalous weather patterns, he says, particularly to Colorado. Higher and faster summer winds have borne beetle hatches aloft, sometimes carrying them 150 miles or more—in one case as far as Nebraska. This might sound like yet another example of the climate accommodating the bug, helping them colonize, but such events can disperse the hatch, making it difficult for beetles to infest a pine with numbers large enough to kill it. Of 700 pines attacked in Fort Collins in 2008, Leatherman says, there was only a 10 percent mortality rate.

Meanwhile, scientists are finding ways to interrupt the beetles' highly successful cycle. The focus falls squarely on their sex life, something Leatherman makes sound downright erotic. "For openers," he says, "these guys have very short lives, and they spend 360 days of it in pitch dark. Then they pupate and suddenly they've got wings! They crawl out from under the bark, down a long tunnel, fly into a brilliant summer sky. Can you imagine? They float in the dazzle, rise on the breeze, soar off on the scrumptuous pheromone trails that the females thoughtfully left behind."

The male follows this trail to the nuptial chamber that the female has prepared in the new brood tree, where he delivers a sequence of clicks, chirps, and squeaks that, according to Leatherman, constitutes the standard pitch of every male looking to score:

"What's up? Nice place! I'll be gentle..."

A few years back, science broke in on this love fest with a synthetic pheromone called trans-verbenol, which mimics the hormonal "no vacancy" signal that *Dendroctonus* sends out when a pine is full. The U.S. Forest Service has been broadcasting synthetic pheromones by the helicopter-load over Sun Valley's ski runs to combat beetles, while Aspen is stapling trans-verbenol packets to individual trees.

And we're learning more about the bugs' love song itself. I recently purchased a CD of the beetles' vocal stylings. The audio was captured by New Mexico composer David Dunn, who poked a microphone into the phloem layer of a piñon pine infested with *Ips confusus*, the *Dendroctonus* cousins that decimated southwestern forests in the early 2000s. It's not Barry White, but there's an edginess to it, a rising bolero of cheeps, chirps, and scratchings. The ensemble features a rhythmic crunching sound, like an 1890s stamp mill, and a periodic flushing noise, like a line of public urinals, followed by a melodious squeaking like a dry cork twisting in a bottle. It may never go platinum, but it's got an interphylum charm that could cross over.

Last winter, Northern Arizona University researchers Richard Hofstetter and Reagan McGuire employed a similar choir in their experiments with sonic-bullet-style beetle control. They'd already hit a *Dendroctonus* colony with high-volume Rush Limbaugh broadcasts, to no effect. They'd tried hip-hop. Again, nothing. But when they blasted a recording of remixed *Dendroctonus* "voices" at the colony, the beetles went insane. "There'd be a male and a female, they would mate... and two hours later, he'd chew her to pieces," said McGuire. "That's not natural."

Dunn, who consulted on the project, had mixed feelings about the results. "I fell in love with [these beetles]," he said. "But then, we're watching them cannibalize each other. I always think, 'How bad is this karma?'"

My own beetle karma caught up with me last Thanksgiving, when I ran into Tess for the first time since summer. I asked how her pines had fared and she gave me a rueful smile. "The beetles destroyed most everything," she said. "We need you to come back, I guess."

With millions of acres going red, I don't know why it was so hard to swallow. Of course, our efforts had come to nothing. Her woods were simply part of the rapidly changing larger landscape, and it was time I appreciated its scale. Once again, the bug had the final word.