Wild Heritage

By Todd Tanner

Robert Louis Stevenson said it with real flair: "It is not so much for its beauty that the forest makes a claim upon men's hearts, as for that subtle something, that quality of air, that emanation from old trees, that so wonderfully changes and renews a weary spirit."

Whether you're slipping through a gold-tinged aspen grove with your shotgun, casting a fly under the overhanging branches of a magnificent cedar or relaxing in the shade of a grandfather oak, America's forests offer a break from society's day-to-day travails. Unfortunately, our woodlands, especially our western woodlands, are in serious trouble.

Headlines like "Beetle scourge goes from bad to worse" (*The Denver Post*), "Deadly wildfires roar across California" (*USA Today*) and "Bark Beetles Kill Millions of Acres of Trees in West" (*The NY Times*) are all too common. From New Mexico to Colorado to Montana, and north into British Columbia, what were once healthy forests are turning red and dying. And we're not talking about a few trees here and a few trees there. The scope of the problem, which is measured in the millions of acres, is almost unimaginable.

So why are our western forests so sick? The easy answer is beetles. Mountain pine beetles, to be precise. *Dendroctonus ponderosae*.

It's getting ugly out there as insects, disease and drought lay waste to more and more western forests.

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Dead and dying ponderosa and lodgepole pines are scattered all across this ridge in Montana's Helena National Forest.

The beetles bore into pines, create a tunnel under the bark and lay their eggs. They also introduce a fungus that weakens the tree and stains the wood blue or gray. When the eggs hatch, the larvae eat their way around the tree's cambium layer. If there are too many larvae feeding on a pine – and there usually are – they kill the tree.

Mountain pine beetles have been around for a long time, though, and we've never experienced an epidemic like this. As the *Times* reported, we're currently witnessing "the largest known insect infestation in the history of North America."

I spoke with Bob Cain, a USFS entomologist, and he explained that Colorado's pine beetle infestation grew by an amazing 900,000 acres from 2006 to 2008. And that's just lodgepole pine. Overall, more than 2.5 million acres of Colorado's lodgepole, ponderosa and limber pine have been attacked.

In the past, the beetles, which were kept in check by winter temperatures of 25 below or colder, focused their attention on old, weak or diseased trees. Now, with warmer winters becoming the norm and western woodlands stressed from long-term drought, the beetles are overwhelming entire forests. North of the border, the province of British Columbia has lost an almost incomprehensible 35 million acres of woodlands to pine beetles. That's an area larger than the entire state of Wisconsin.

As pervasive as they are, though, and as much damage as they do, mountain pine beetles are only one part of a larger problem. Pine beetles focus on pine trees. They don't kill aspen, birch, fir, cedar, hemlock or spruce. Yet, it turns out that other tree species are also in jeopardy.

A recent study published in the journal *Science*, titled "Widespread Increase of Tree Mortality Rates in the Western United States," details an ominous trend. Trees in western forests – pristine, untouched western forests – are dying much faster than they used to. According to the paper's authors, "Our analyses of longitudinal data from unmanaged old forests in the western United States showed that background (noncatastrophic) mortality rates have increased rapidly in recent decades, with doubling periods ranging from 17 to 29 years among regions. Increases were also pervasive across elevations, tree sizes, dominant genera, and past fire histories."

If you have a hard time with scientific jargon, I'm happy to decipher those last two lines. Individual trees in western forests are dying twice as fast as they were just a few decades ago, while trees of different species, sizes and ages, along with trees that live at different elevations, are all being impacted by this new trend.

I talked with Dr. Nathan Stephenson of the USGS, one of the study's lead authors, and he confirmed that his data was from undisturbed forests more than 200 years old and that it incorporated trees of all sizes and age classes. (Scientists believe that old growth forests provide the best possible information.) He also verified that mortality had increased at low, middle and high elevations, and for small, medium and large trees. Without, I should add, a corresponding increase in new tree recruitment.

Altogether, 87 percent of the individual study sites (in California, Colorado, Oregon, Arizona, Washington, New Mexico and British Columbia, and which included western hemlock, white fir, silver fir, red fir, Douglas fir, ponderosa pine, sugar pine, lodgepole pine, western white pine, incense cedar, Pacific yew,

Sitka spruce and Engelmann spruce) experienced increased mortality rates.

After extensive study and rigorous analysis, Dr. Stephenson and his colleagues were able to rule out fire exclusion, forest fragmentation, air pollution, successional dynamics and endogenous (internal) forest processes as likely causes for the increased mortality.

Their research did point to a predictable culprit, though – a warming climate. Warmer temperatures lead to declining snow packs, earlier snow melts and serious summer droughts. These conditions, in turn, make trees more susceptible to insects and pathogens. According to the report, "temperature and water deficit were positively correlated with tree mortality rates."

So what does all this mean? "The probabilities are very high that we're going to see big, big changes in our lifetimes," Dr. Stephenson told me. "I don't think anyone can say for sure how these changes will play out, but it seems likely that we'll be talking about declining forest health, insects, disease and catastrophic wildfires for a long, long time.

Bob Cain, the Forest Service entomologist, suggested that I caution hunters and anglers about the very real danger of dead trees, as they tend to fall over unexpectedly and crush whatever they land on. He also mentioned that sportsmen in the Rockies would be wise to carry chainsaws when they drive into the backcountry.

Perhaps the single most sobering observation came from the unlikeliest of sources – a friend who stopped by our house this past summer. "Every tree," she pointed out, "has its bug."

Those five words are truly the crux of it. Given the right set of conditions, every tree species is susceptible to insects and disease.

So when tree-killing pine beetles get a boost from warmer temperatures, we have a serious problem. When trees are stressed by low moisture levels, we have a serious problem. And when we combine insects and drought, as we're currently seeing across the western U.S. and Canada, we have the potential for truly massive changes to the landscape.

I can look out my window here in Montana and see hundreds of sick birch, aspen and pine. Trees in "healthy" northwest forests are dying twice as fast as they were just 17 years ago. Colorado and other western states are suffering from something called Sudden Aspen Death (SAD), with 553,000 acres of aspens impacted in Colorado alone. British Columbia has lost more than 35 million acres of lodgepole pine. In other words, it's getting ugly out there.

So what can we do? Unfortunately, as with so many of the major problems facing sportsmen, there aren't any easy answers. Some folks suggest letting nature run its course. Others advocate "assisted migration," which encourages planting drought & disease-resistant trees – trees that aren't native to the affected ecosystems. Still others call for maximizing forest health with stewardship restoration projects like mechanical thinning and prescribed burns.

Whatever our personal biases, there's one point we should all agree on. Our scientists need the tools and funding to develop the best possible solutions. That means Congress has to allocate the money for further research, and for a comprehensive, science-based approach to the problem. Call your Senators. Call your Congressman. Tell them that that you're a sportsman and that you don't want them sitting on the sidelines while our western forests circle the bowl.