

ENVIRONMENT: A steamy tale of sex, CO2 and destruction in the woods (03/19/2008)

Christa Marshall, *ClimateWire* reporter

Two years ago, Dr. Reese Halter, a biologist, paused in a forest in Grand Prairie, Alberta. He had noticed something odd: It was raining mountain pine beetles. After 40 minutes the pesky, voracious insects covered his hair and clothes.

"The sky was blackened, like it was a vicious hailstorm," recalled Halter, the founder of Global Forest Science, an international conservation group. "They literally sounded like staccato machine guns as they hit farmers' roofs."

Millions of the beetles, known for ravaging pine forests stretching from Colorado to British Columbia, had gotten sucked into a massive wind storm carrying them eastward across the Rocky Mountains to Alberta. They had caught a ride on one of nature's shuttles.

The insects' introduction to the central part of Alberta resulted from their explosion on the Western side of the Rocky Mountains, a phenomenon helped by warmer temperatures. With global warming, many scientists are concerned that the beetles will thrive in a once-hostile part of Alberta and move into the pristine Canadian Boreal Forest.

The 2006 incident was the first time the pests settled in central Alberta, but they continue to move from British Columbia through valleys into southern Alberta, which has experienced beetle outbreaks in the past. Warming trends also could increase their numbers there, many experts say.

The mountain pine beetle, which is the size of a small ant, wreaks its destruction through a multistage process. In the late summer, the female of the species seeks out a tree to infest and takes a bite out of the wood of a suitable candidate.

It starts with pheromones on the breeze

If the female beetle likes the taste, she emits pheromones that lure in other mountain pine beetles. They begin a mass attack and bore into the tree, which helplessly produces a substance containing chemicals similar to turpentine in an attempt to expunge the critters.

The beetles carry a fungus in their mouths that stains the tree's interior blue, shutting down its defense capacity. The tree dies relatively quickly, although its demise is not evident until the following spring when red pine needles appear instead of green.

Climate change is a problem in the process, said Natural Resources Canada scientist Allan Carroll, because freezing winter temperatures of minus 40 degrees Fahrenheit over several days are necessary to kill the insects during their developing stage. They produce a natural antifreeze in their blood.

"Previously, beetles blowing over the Rockies into Alberta wouldn't have been a problem because the winters were too cold and the summers too cool," Carroll said. "Now we've got them where we wouldn't have had them before."

Mountain pine beetle. Photo courtesy of Natural Resources Canada.

Recent warm temperatures in British Columbia also helped swell the population to such a massive size that the beetles' ultimate dispersal in Alberta was unusually wide, Carroll said. In British Columbia, the beetles are expected to kill 80 percent of mature pine by 2013, according to Canadian Forest Service estimates.

Carroll added that fire suppression techniques contributed to the infestation by preserving old trees, which the beetles prefer.

Currently, the wind-transferred beetles of Alberta live in lodgepole pine trees, as well as hybrid species that grow outside the border of the Canadian Boreal Forest, which covers most of the northern region of the province.

"The boreal is one of the last big wilderness forests left in the world," said Susan Casey-Lefkowitz, Canada director at the Natural Resources Defense Council. "So there obviously is concern about the beetles getting in there."

Part of the fear is that the boreal is home to a tree species called the jack pine, with a range that spans thousands of miles to Canada's eastern coast.

If the beetles were to move into the jack pines, the greatest risk would not be mass tree death as has been the case in British Columbia,

because the jack pines are less dense in the boreal forest, Carroll said.

Releasing more CO2 and summering in balmy Alaska

Instead, Carroll said infestations in the boreal region could spark forest fires on an unprecedented scale across Canada. This would not only strain Canadian firefighters, but release more greenhouse gases into the atmosphere, as the boreal region stores billions of tons of carbon in its plant life.

What is happening in Alberta is not an isolated incident. There are several species of bark beetle that have moved into areas once believed too cold for their survival, a problem noted in the North America chapter of the fourth assessment report of the Intergovernmental Panel on Climate Change.

Recent warm summers in Alaska, for example, helped the spruce bark beetle speed up its development from egg to mature adult in one year rather than the typical two, said Glenn Juday, professor of forest ecology at the School of Natural Resources and Agricultural Sciences at the University of Alaska Fairbanks.

"They have continued to spread into cooler margins of their distribution in Alaska -- west across the Cook Inlet," Juday said.

Meanwhile, governments in vulnerable regions are scrambling to control outbreaks. In Canada, the federal government announced in 2006 it would provide \$200 million over a three-year period to control the British Columbia infestation and slow its eastward spread.

"The only way to treat this is to cut down the tree and process it through a mill, or burn on the spot," Carroll said.

In Alberta, this means that crews are surveying the forests in the fall, searching for infested trees, which are marked for later destruction. Each arboreal victim is rated on a scale of 1 to 17 according to its risk factor, which includes proximity to other pine trees, said Duncan MacDonnell of Alberta Sustainable Resource Development.

As was the case with the Rocky Mountain region of the western United States, the Canadian outbreak has spawned a slew of organizations such as the Cariboo-Chilcotin Beetle Action Coalition of British Columbia, which has established working groups to protect its community from the beetles. There also are business opportunities for

sellers of fungus-stained wood, a fashion statement in some lodge homes.

For now, Carroll and other scientists are cautiously optimistic that an exceptionally cold 2007 winter might have killed off many of the beetles in central Alberta. But they express caution that the cold spell could be a temporary blip in a warming world, raising the specter of additional outbreaks in the years ahead.

"The entire Canadian forest industry is at risk," Halter says.