



Sunset over river and peaks in Moraine Park, Rocky Mountain National Park, Colorado © Tim Fitzharris/Minden Pictures

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# Grizzly Bear

## and other wildlife among the Rocky Mountain pine forests

Natural events — wildfires, floods, windstorms — often leave behind obvious marks on the landscapes they touch. Charred trees and scorched meadows, washed out trails, and swaths of fallen trees are some of the reminders of these powerful forces. The impacts wrought by other naturally occurring events and cycles are not always so easy to discern. For example, mountain pine beetles, the size of grains of rice, have long played an important role in forest ecosystems, but as climate change upsets the rules that once governed the dynamics between beetles and forests, the beetles' effects on forest ecosystems are bordering on catastrophic. Even the mighty grizzly bear, denizen of the northern Rockies, is likely to suffer from the changes wrought by the tiny pine beetle.

Diminutive in size, the beetle's lifecycle revolves largely around lodge-pole pines, primary components of forests throughout the Rocky Mountain region, including the forests of **Rocky Mountain** National Park. Adult beetles bore through the trees' outer bark and into the phloem



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tissue where they burrow about eating and laying eggs. When the eggs hatch the following year, the young eat their way back out, and head off in search of another lodgepole to start the process anew. Left behind is a tree that soon dies, its flow of nutrients thought to be fatally disrupted by the beetles.

Lodgepoles are not completely defenseless against the beetles' attack. They respond to the onslaught by exuding copious amounts of resin that drown many of the beetles. Cold snaps of 40 degrees below zero for ten days or more are also capable of killing the beetles, providing a respite for the trees. Large-scale fires can also help forests deal with the beetles because they promote the release

of lodgepole seeds from their cones, leading to eventual germination and growth of new trees.

Mountain pine beetles and lodgepole pine forests have long coexisted. But climate change is stacking the ecological cards against the lodgepole forests of the southern Rockies and in favor of the beetles. For starters, those deadly Rocky Mountain cold snaps are becoming few and far between. In addition, warming temperatures in recent decades have enabled the pine beetles to significantly broaden their infestations by (1) allowing them to complete their lifecycle in one year instead of two, a development that could lead to a doubling in the beetle's population growth rate, and (2) enabling the beetles to move higher in elevation

and attack not only more lodgepole pines but also whitebark pines that did not evolve with the insects and so have no natural defenses. In **Rocky Mountain National Park**, not only is climate change likely to aid pine beetles with warmer temperatures, but a dryer climate in the park's forests could further hinder the lodgepole pine's beetle defenses by reducing its resin resources. The warming and drying could also make the forests more prone to disease, further increasing their susceptibility to beetle attack. Park officials expect the predicted warming to initially make the lodgepole forests more susceptible to fire. In the long run, though, fire danger could drop due to a decrease in fuels.

Back in 2001 the U.S. Forest Service predicted that by 2017 some 21 million acres of Western forests were in danger of suffering "significant tree mortality" tied to the pine beetles. More recently, forestry officials are projecting that *all* mature lodgepole forests in Colorado will be dead by 2013. The impacts likely will be far-reaching. Fires kindled by lightning or careless humans in the tinder-dry forests of dead lodgepoles will create air-quality problems, damage watersheds, impact wildlife and possibly fisheries, affect the logging industry, threaten communities, and cost millions of dollars to fight.

The makeup of forests likely will change, too, as beetle outbreaks kill large swathes of lodgepole stands that then are susceptible to fires. Additionally, climate change is enabling this beetle to make longer and longer forays into the upper elevations of the greater **Yellowstone** ecosystem, inroads that are seriously jeopardizing another key tree species — whitebark pine — whose disappearance could have dire ramifications for the overall health of the ecosystem in general and the grizzly bear specifically.

Historically, whitebark pines have been out of reach of pine beetles. While

there have been isolated infestations in this pine species, the beetles typically couldn't survive the cold winter temperatures in the highest reaches of the ecosystem. But warming has allowed the beetles to reach more and more whitebark pine stands, and to complete an entire life cycle in one, not two, years, as was the old norm. These current infestations are unprecedented and threaten the future of the ecosystem. Some whitebark pine stands in the greater Yellowstone ecosystem have lost more than 90 percent of their trees to the beetles.

Remove whitebark pines from the ecosystem and you also remove their pine nuts, which are a valuable, high-protein segment of grizzly bears' fall diets. Studies have shown that when there's a good whitebark pine nut crop, grizzly sows gorge on them and head into hibernation both fatter and healthier. A key result is that they have larger and healthier cub litters than sows that hibernate with depleted reserves.

## SOLUTIONS

Reversing the warming trends that are allowing the pine bark beetle to thrive could take decades, but land managers have begun discussions about how best to combat the beetles under climate change scenarios. Initial suggestions include creating forests of different age-group trees (beetles bypass young trees and instead focus on those at least 5-6 inches in diameter at chest level); thinning forests to reduce the competition for nutrients and so produce healthier trees better equipped to combat and survive pine beetle attacks; and encouraging a diversity of tree species. Some parks and national forests also have been spraying pesticides and using pheromones to control mountain pine beetles, but these applications are controversial. Spraying pesticides in national parks runs counter to the National Park Service's mission to let nature run its course, and it is costly.

## We Can Safeguard Wildlife that Depend on Healthy Forests

### Stop contributing to climate change

Whitebark and lodgepole pine forests, and the wildlife that depend on them, will likely decline if we fail to reduce carbon dioxide pollution that is warming the Rocky Mountain region and aiding the spread of the pine beetle.

### Adopt "climate smart" management practices

By identifying and implementing forest management practices that help preserve some intact whitebark and lodgepole pine forests, and by focusing their efforts on areas with the greatest concentrations of at-risk wildlife, resource managers for the Park Service and other agencies can help communities of grizzly bear and other wildlife survive as their landscape continues to change.

### Give wildlife freedom to roam

Wildlife throughout the Rocky Mountain region that depend on whitebark and lodgepole pine forests need access to healthy forests as the trees in their current habitats succumb to pine beetle infestations.