Timberland Research and Education

Physical Risks for Managed Timberland: Fire, Wind, Insects, and Disease

Summary

The risks of physical loss from fire, insects, disease, wind, and other agents to timberland investments in well-managed forests are very low. Various studies and Campbell Global's own experience put the losses at under 0.5% per year. Well established management techniques minimize the effects of these natural processes and quick response time reduces losses that do occur.

Introduction

Over the past decade there have been plenty of attention-grabbing headlines of massive wildfires consuming vast areas of forestland or epidemic insect outbreaks killing wide swaths of trees. A potential timberland investor would naturally want to know what the chances are that a timberland investment property is likely to meet this fate. This paper will explore some basic information about the sources of physical forest damage: fire, wind, insects, and disease; and will quantify the loss history of managed forestland, concentrating on timberlands in the United States.

Fire

The basic ingredients for fire are the same as you learned in elementary school: fuel, oxygen, and a heat source. We can disregard oxygen due to its abundance in the forest context so the variables of interest are ignition source and fuel. Depending on the region of the country, fires can be most frequently attributed to lightning or man-caused sources. The frequency of these ignition sources has stayed fairly constant but varies by region of the country. Forest fuels, on the other hand, both the amount of combustable material in the woods and its condition, have, in many cases, changed due to man and nature.

It should be recognized up front that fire is an integral part of many forest landscapes. For example, fire is part of the natural cycle of renewal and regeneration for the lodgepole pine forests of the Interior West, jack pine in the Lake States, and California chaparral ecosystems. Ponderosa pine forests in their natural state regularly experience low intensity fires that keep the understory in a park-like condition. In natural forests, these cycles have been disturbed by human activities, most notably through fire suppression in the absence of active forest management that keeps out regular low intensity fires and allows the build-up of fuel levels.

Fuel condition is also an important factor, i.e., not only the volume but also the moisture content (or lack thereof) of the live vegetation and downed woody material. Low winter snow pack and increasingly dry summers can increase fire danger significantly. Under these conditions, when fires start in dense stands, they burn with much greater intensity. The other factor that puts these fires front and center in the news is the much higher level of human occupation of forested areas then in the past. That means when large fires do occur they are much more likely to cause property loss and fatalities.

Insects

Insect damage, like fire, is a natural part of forest dynamics. Occasionally, however, insect populations rise to epidemic levels as is currently the case with mountain pine beetle in inland British Columbia and Alberta[1]. Such large scale tree mortality from native insects is very unusual in forest systems. The beetle outbreak is predicted to kill one billion m^3 of lodgepole pine in this region, before it runs its course over the next five to ten years. The reason for the scale of this outbreak, seems to be a result of fifteen years of warmer winter temperatures that have allowed the beetle population to grow unchecked.

Disease

Like insects, various disease agents are part of forest ecosystems. Trees have natural resistance to attacks by fungi, bacteria, etc. but when they are stressed in over-dense stands or by old age or are growing at the margins of their natural range, they become more susceptible. Tree diseases generally only reduce growth rates but can weaken the trees, leaving them open to attack by insects. Diseases can also hamper the establishment of new stands.

Wind

High wind events can happen almost anywhere but trees are adapted to be wind firm under normal ranges. Hurricanes occur in coastal regions of the Southeast but major high wind events are rare in the Pacific Northwest. Wind damage in the West is generally limited to small blow-down damage on ridges. The last major widespread loss from windstorm in the region was the Columbus Day storm in 1962.[2]

Large-Scale Events

In the cases of large-scale fire and insect outbreaks cited above, the damage has been heavily concentrated in natural forests, generally public forests, with little or no active management. The large fires of the past decade have been mainly in overstocked stands of older trees and very high levels of fuel (smaller, densely packed understory trees) that allowed the fires to spread quickly. Furthermore, they were often in areas that are poorly roaded where the ability to attack the fire when it might still be easily contained is limited.

1 See Campbell Global report *Canada Mountain Pine Beetle Outbreak Update*.

2 There were locally significant wind damaged areas during the storms of December 2007.

Managed Forests

Losses from insect and disease are highly correlated with forest health – vigorously growing forests are much less susceptible to outbreaks than stressed, overcrowded, senescent forests. The characteristics of managed forests that make them less susceptible to physical risk include:

- healthy trees that have natural resistance to insect and disease attacks;
- closely monitoring health conditions and bringing insect and disease outbreaks under control as soon as they are observed by removing attacked or infected trees;
- well roaded and closely monitored during periods of high fire danger allowing initial attack on any fire outbreak to be fast and effective, usually with cooperative fire protection agreements with surrounding land owners to share fire suppression resources;
- low fuel loading with few trees in the understory that can carry fire into the crowns of the trees;
- designated prevention activities that include restricting public access and management activities during times of increased fire danger;
- appropriate timber harvest unit placement to minimize potential wind damage, avoidance of clear-cut boundaries on damage-susceptible ridge tops, and growing trees in vigorous, wind-resistant stands;
- appropriate species selection and stocking level controls to minimize ice and snow damage;
- use of seedling protective devices to reduce the risk associated with animal browsing, implementation of "bear feeding" programs to provide alternative food sources during the season when trees are vulnerable, and implementation of animal control programs to minimize porcupine damage; and
- use of residual biomass sales to reduce fuel loadings after harvest.[3]

All of these factors greatly reduce the likelihood of major physical damage in managed forests. A recent study for Wells Timberland[4] found total losses on professionally managed timberland from insects, disease, and fire to be in the range of 0.25% to 0.50% of volume per year. An earlier report from James W. Sewall Company[5] puts the annual loss at a lower 0.03%. The Hancock Timber Resource Group puts the loss at 0.1% of the total value of assets under management in any given year.[6] Campbell Global's own internal data shows similarly small losses.

3 See Campbell Global education document, *Biofuel Opportunities for Timberland Owners*.

4 http://www.wellstimberland.com/docs/TMMPREPP0808-0803.pdf

5 http://www.sewall.com/files/timberlandreport/v6n4.pdf

6 http://www.htrg.com/htrg/pdf/htiaQ2_03.pdf

It should be noted that the idea of loss in this context is not synonymous with zero residual value. When a forest experiences a fire, disease outbreak, or an insect attack, trees die, or at the least, exhibit slower growth. But dead trees can be salvaged and much if not all of the wood can be utilized. The salvaged wood may not be suitable for the highest value products, e.g., pulpwood instead of sawlogs, so that would entail some loss in income. If high winds damage trees on a property, most of those trees can also be salvaged. For example, a Campbell Global property was hit with a hurricane. Some timber was non-salvageable, some was salvageable with no degrade, and some was salvageable with a product degrade (sawtimber to pulpwood or pulpwood to chips). The total loss was about $200,000 from properties that have annual sales of approximately $150 million.

A secondary effect of a major event such as this is that operations resources are diverted to salvage the wood before it deteriorates. If a large volume of wood is put on the market in this way, it is reasonable to suppose that wood prices in general will be driven down to some extent.

What about insurance? Insurance for physical damage risk on large timberland holdings is cost prohibitive, given that the likelihood of material impact is low and premiums are very high. What is typical however is for timberland managers and third-party contractors to carry insurance that protects them from suppression-cost liability in the event that they are found liable for a fire occurring as a result of their actions.

The best insurance to minimize loss from physical agents is through a diversified portfolio of actively managed timberland properties.