Pathways in Time--

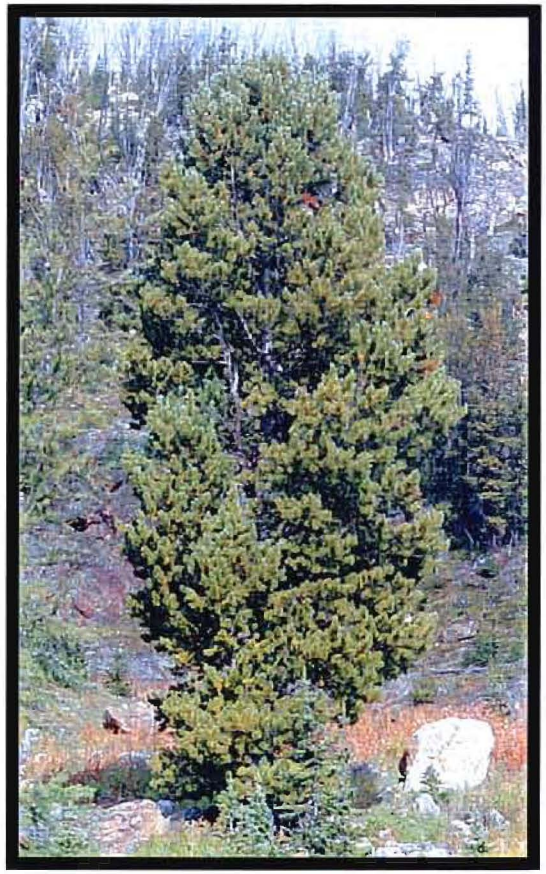
Living with Change in a Whitebark pine/subalpine fir forest

FireWorks

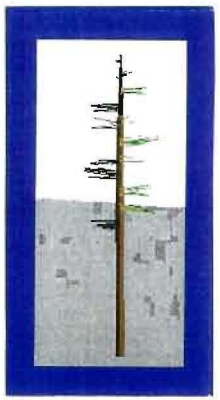
Forests change all the time. Sometimes they change dramatically, as during a big, severe fire. Sometimes they change slowly and subtly, so the differences are hard to see from year to year.

Think of the forest travelling a path through time, changing as it goes. This booklet shows a few stops along the path that would be followed by a whitebark pine/subalpine fir forest.

Whitebark pine can grow in many locations in a forest. The kind of forest shown in this booklet grows high in the mountains, in a dry area near the top of a ridge. It looks like this:



The drawings on the next pages show changes during the past century in a whitebark pine forest high in the mountains. Use the small "tree portraits" below to figure out which tree species are shown in the drawings.



Whitebark pine

Douglas-fir

Subalpine fir

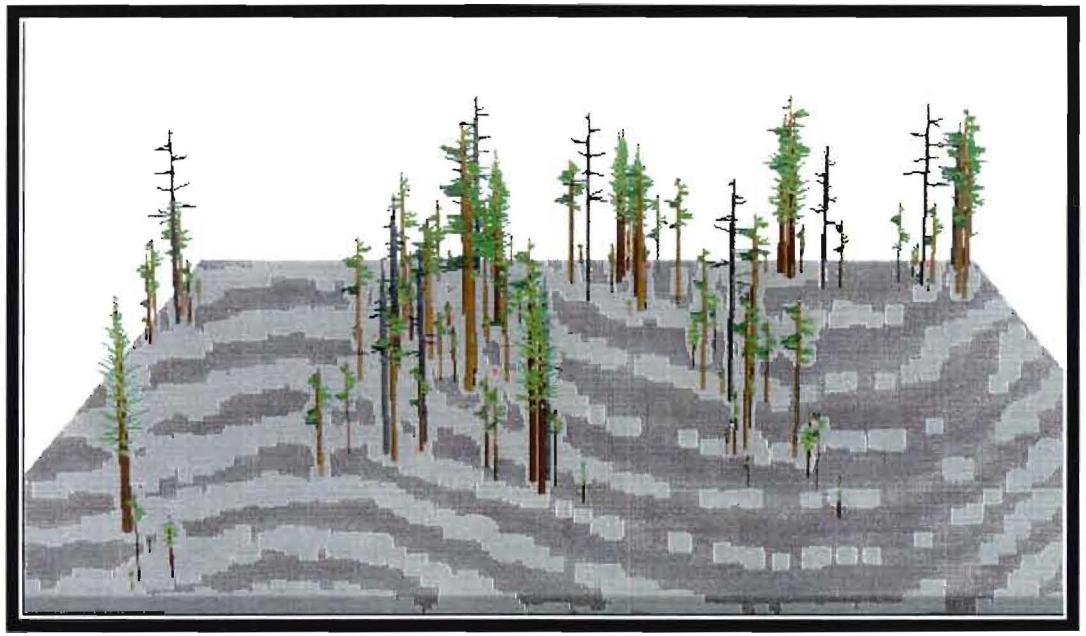
Lodgepole pine

These "cartoon forests" are based on a description of Stand 299 in a study by research scientist Mike Hartwell. Mike measured the trees of Stand 299 in 1994. Then he calculated what their sizes would have been in about 1900.

Mike found fire scars on the trees in Stand 299. According to Mike's observations, a fire burned there in 1900. Mike calls it a "mixed severity" fire, one that burned surface fuels and left fire scars, but also killed the trees in some patches. The flannelboard story for whitebark pine/subalpine fir forests calls this kind of fire a "rollercoaster fire."

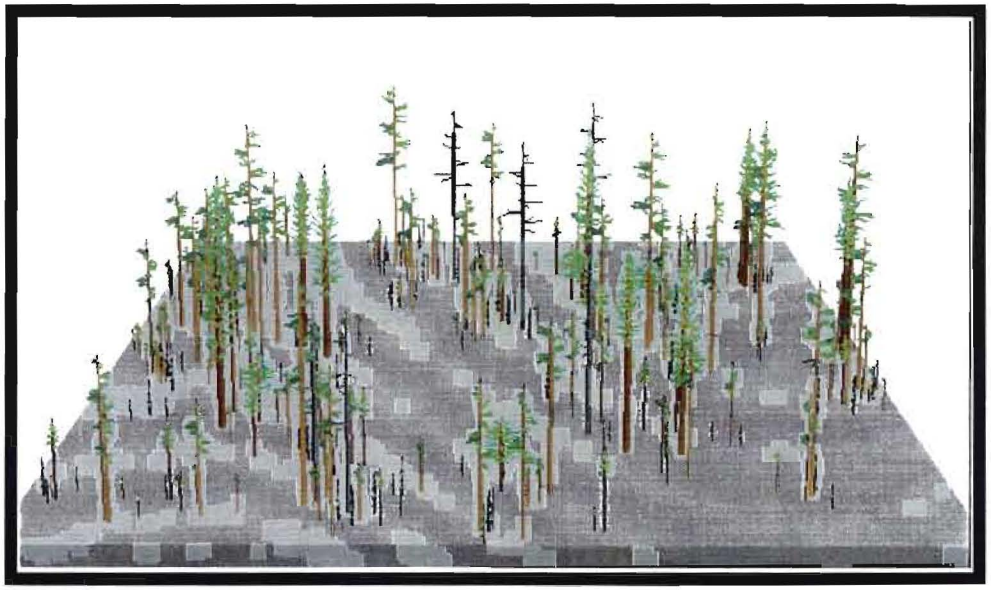
In 1901, Stand 299 probably had about 147 trees per acre. There were many whitebark pines and a few subalpine fir trees. Stand 299 also probably had several dead standing trees, called "snags," killed by fire the year before. There were not many small trees in 1901 because the previous year's fire had cleared out most young trees.

	How many trees?	
	< 8 inches in diameter	**≥ 8 inches in diameter**
Whitebark pine	90	10
Other species	10	10
Snags	15	12
Total	115	32



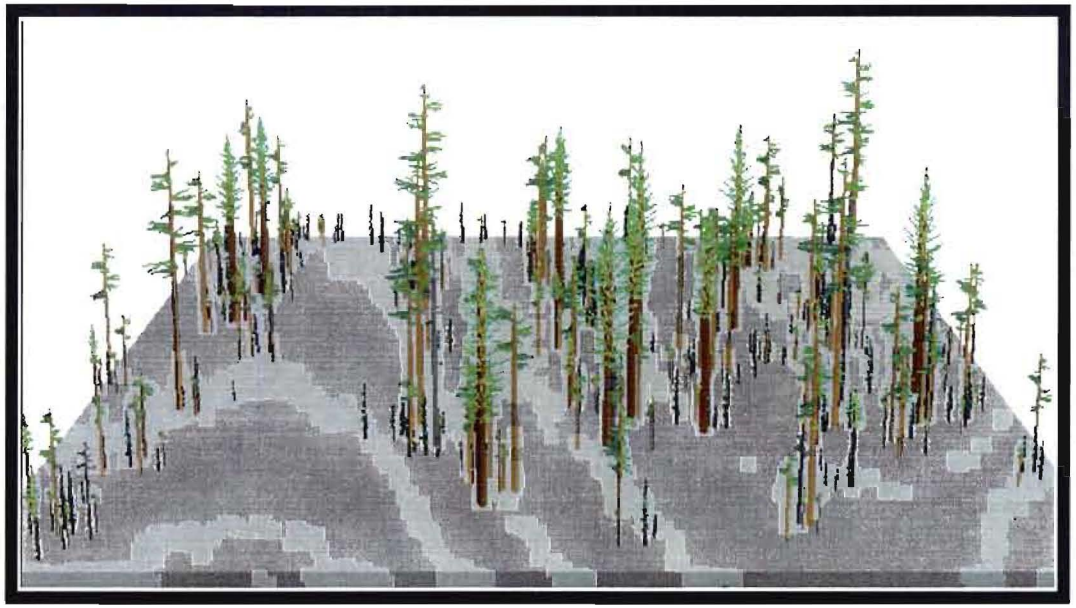
Here's another portion of Stand 299, as it may have looked in 1925. There were probably around 341 trees per acre, including small and large ones, living trees and dead snags. By this time, most of the snags from the 1900 fire had fallen. Most of the living trees had grown a bit larger, and many small trees had grown in. Some of the young trees were whitebark pines; others were lodgepole pines and subalpine firs.

	How many trees?	
	< 8 inches in diameter	**≥ 8 inches in diameter**
Whitebark pine	140	20
Other species	160	10
Snags	5	6
Total	305	36



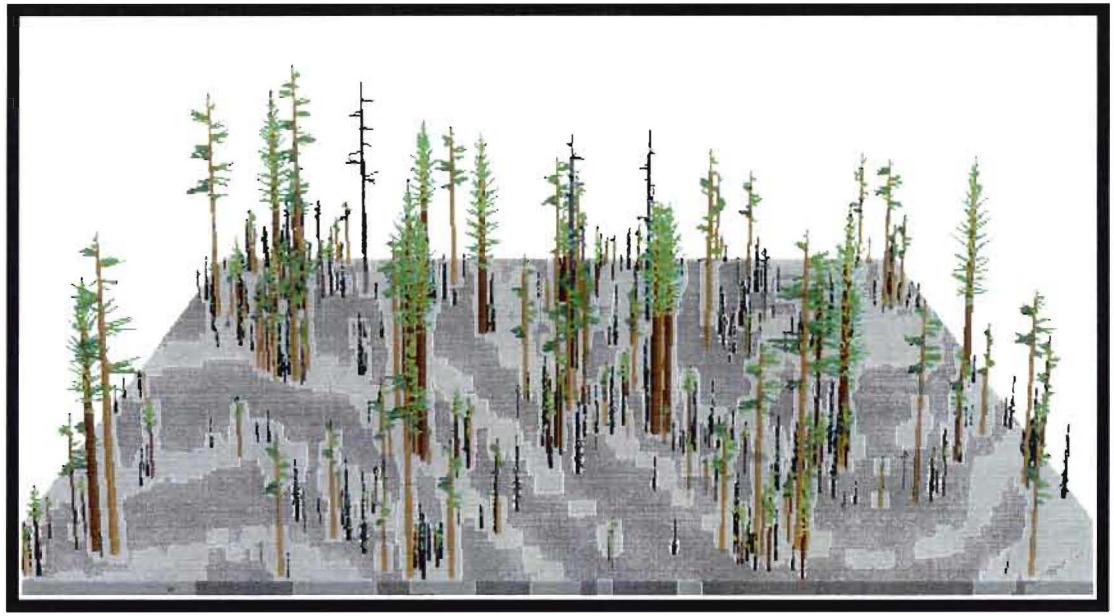
By 1950, Stand 299 probably had about 418 trees per acre, nearly twice as many as it had in 1901. Most likely, all of the snags from the 1900 fire had fallen. A few trees had probably died from other causes, creating new snags. Many young trees were growing under the large, old ones.

	How many trees?	
	< 8 inches in diameter	**≥ 8 inches in diameter**
Whitebark pine	150	20
Other species	230	10
Snags	5	3
Total	385	33



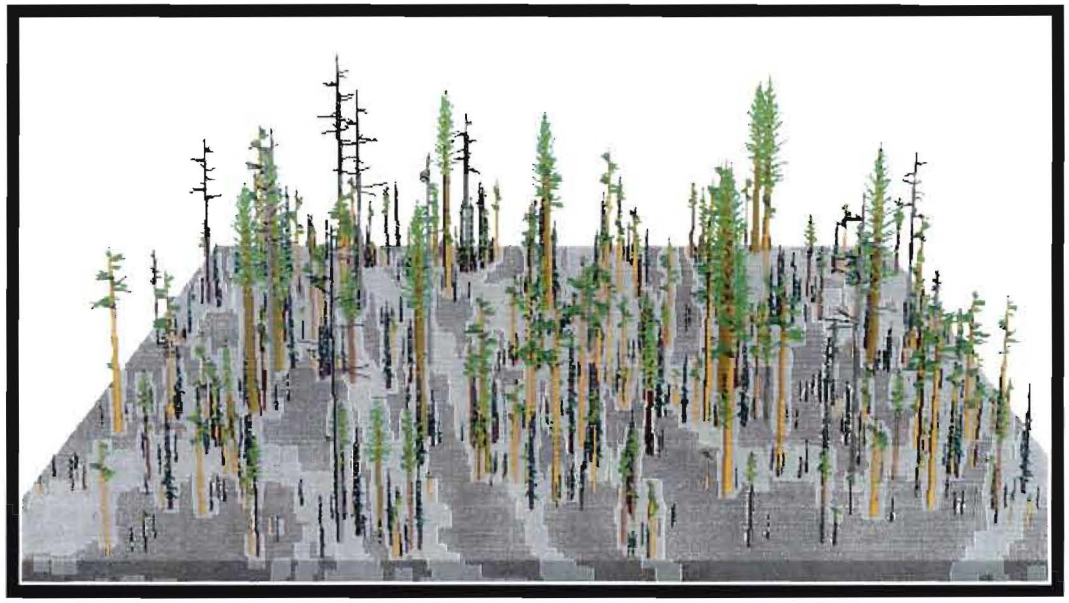
Here's a portion of Stand 299 as it may have looked in 1975, with about 500 trees per acre. Since no fires had burned this forest stand in 75 years, there were many young trees and they were beginning to form fuel ladders into the crowns of the large trees. White pine blister rust had killed a few whitebark pines, so there were more snags than in 1950.

	How many trees?	
	< 8 inches in diameter	**≥ 8 inches in diameter**
Whitebark pine	173	17
Other species	290	10
Snags	7	3
Total	470	30

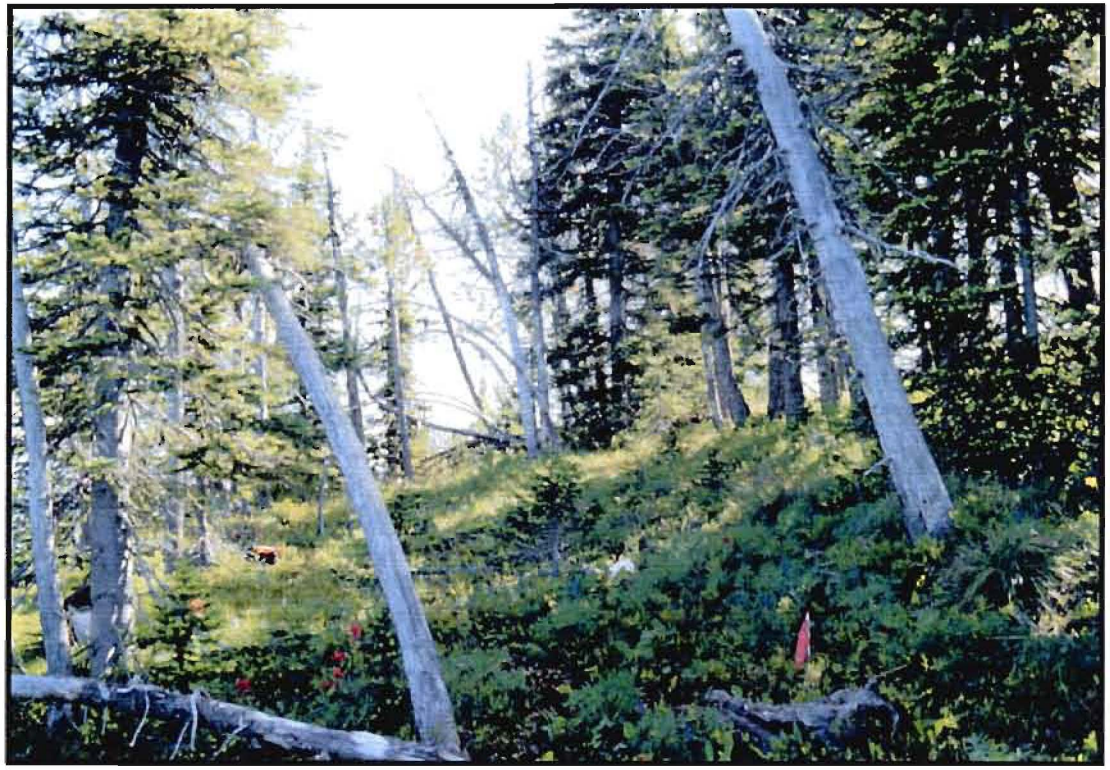


Here's a cartoon forest showing Stand 299 when **Mike visited it in 1994 and counted about 910 trees per acre**-- more than six times as many as there were in 1901. White pine blister rust had killed most of the large whitebark pines. There were hundreds of young trees, but they were mostly subalpine firs. The forest no longer looked open, as it did in 1901. Whitebark pine did not seem a very important species in Stand 299 anymore.

	How many trees?	
	< 8 inches in diameter	**≥ 8 inches in diameter**
Whitebark pine	280	10
Other species	556	44
Snags	10	10
Total	846	64



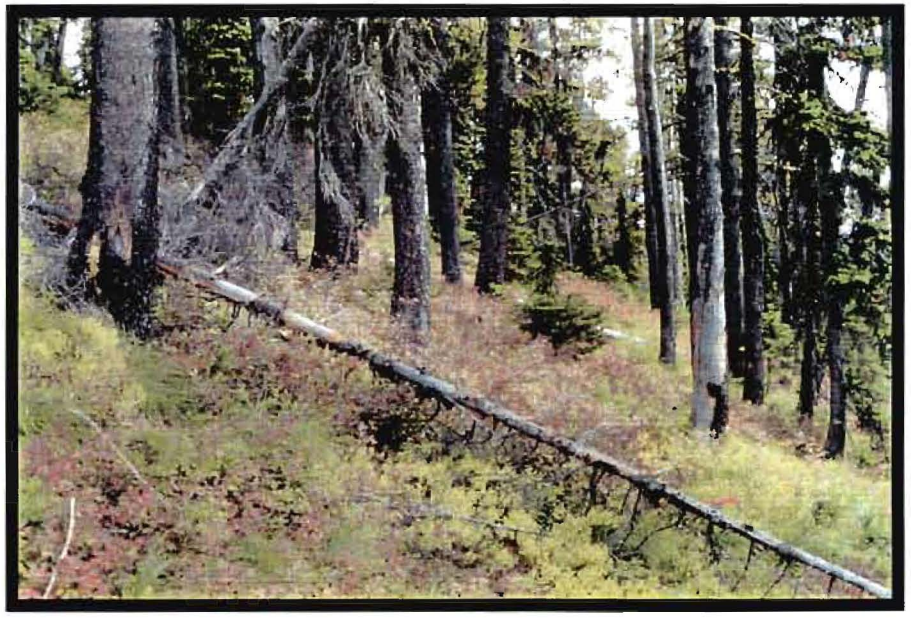
White pine blister rust is a fungus that lives on five-needled pine trees. It is not native to North America, so very few of the trees it attacks have evolved ways to survive. One of the North American trees that blister rust lives on, and kills, is whitebark pine. Here is a "ghost forest" of whitebark pine, with most of the pine trees killed by a combination of blister rust and mountain pine beetle.



How much has blister rust changed the whitebark pine forests in the northern Rocky Mountains? Here are two photos taken from exactly the same spot in a whitebark pine/subalpine fir forest, twenty years apart. Differences in lighting and film make the colors different in the two photos, but more important to forest inhabitants is the difference in trees. Look carefully at the bark of each tree. How many trees died during the 21 years between photos?

1971

1991



Sometimes whitebark pine forests burn in large fires that kill nearly every tree. A burn like this is a great place for nutcracker seed caches, but it looks bleak right after the fire.

Thanks to the nutcrackers, trees grow back even in large burns. Here's a whitebark pine forest that burned about 75 years ago.

Within 100 years, subalpine firs begin to fill in under the young whitebark pines.

In another century or two, fir trees grow tall and get all mixed up with the pines. Nowadays, with the pines dying of blister rust, subalpine firs may be the only kind of tree that grows in these high elevation forests. Can you find any whitebark pines, dead or alive, in this picture?