Pathways in Time--

Living with Change in a Lodgepole pine/ subalpine fir forest

FireWorks

Forests change all the time. Sometimes they change dramatically, as during a crown fire. Sometimes they change a little bit at a time; this happens during a "low severity" fire, like many surface fires. 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 lodgepole pine/subalpine fir forest.

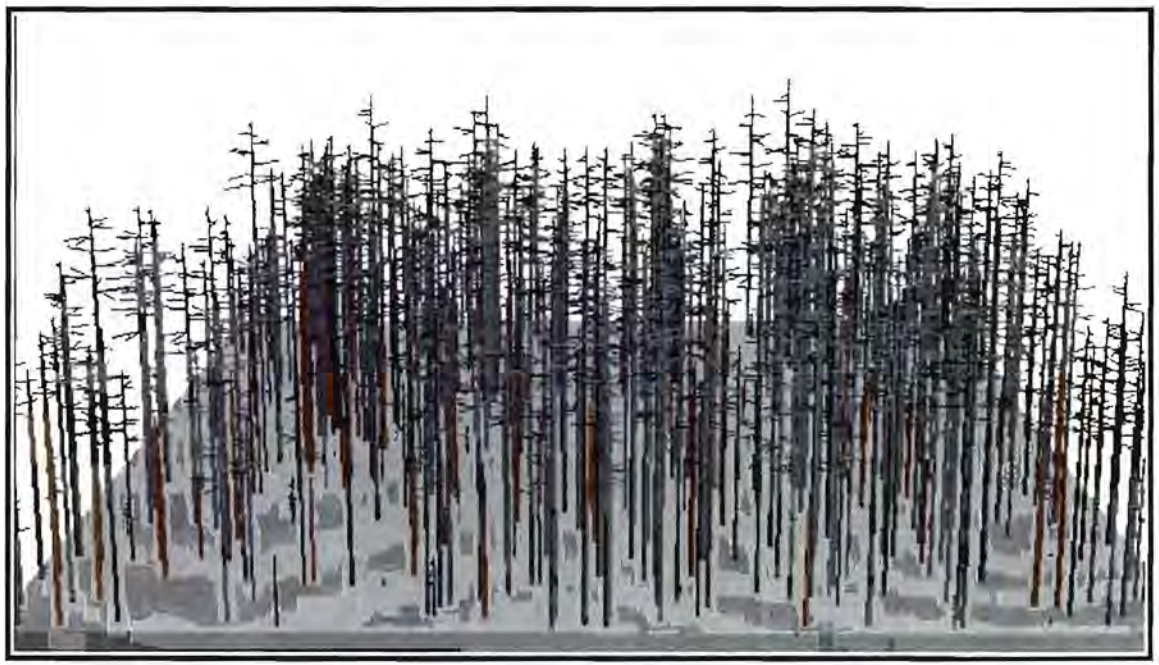
Lodgepole pine can grow in many locations in a forest. The kind of forest shown in this booklet grows in dry places on mountain sides and ridges. The drawings on the next pages show changes after a crown fire in this kind of forest. Use the two "tree portaits" here to figure out which tree species are shown in the drawings.

Lodgepole pine

Subalpine fir

The "cartoon forests" shown in this booklet are based on a study by researchers Steve Arno, Dennis Simmerman, and Bob Keane. These scientists measured trees in 77 places where lodgepole pine and subalpine fir grow on dry slopes or ridges. They studied some forest stands that had burned just a few years before in crown fires or very severe surface fires. They studied others that burned 100 years ago or more. The cartoon forests show how an average forest would look at different times after fire.

Most lodgepole pine/subalpine fir forests "got started" after crown fire or very severe surface fire. That doesn't mean there was no forest before the fire; it just means that, some time in the past, a fire killed nearly every tree on the spot and left a sunny, fertile place for seedlings to get started on. The forest looks barren right after fire, as this drawing shows.



Some plants sprout from the roots within a few weeks after fire. Others start growing from seed. Within a year or two, flowers and grasses cover the ground. Here is a field of fireweed flowering the year after a crown fire in Glacier National Park, Montana.

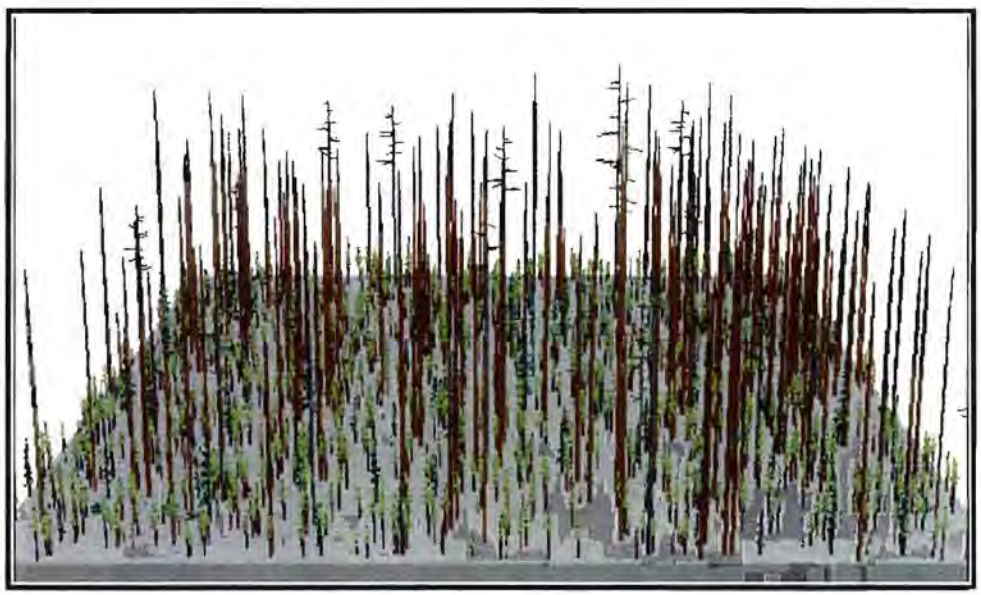
This photo shows lodgepole pine seedlings growing as thick as wildflowers four years after the same Glacier Park fire.

More than one kind of fire can visit lodgepole pine/subalpine fir forests. About two-thirds of the forests used for the drawings in this booklet had fire-scarred trees like the one shown here. That means that a surface fire burned through sometime after the forest "got started" and didn't kill the larger trees.

1889 was a hot, dry year in Montana and Idaho. Hundreds of fires burned in that year. Here's the story of how a typical lodgepole pine/subalpine fir forest might have grown in after a crown fire in 1889.

Right after the fire, many dead trees, called "snags," were still standing. There were more than 500 of them per acre. **By 1900, about half of the snags had fallen and the young forest had begun to grow. There were more than 1,500 trees per acre in this new forest, most of them lodgepole pines.**

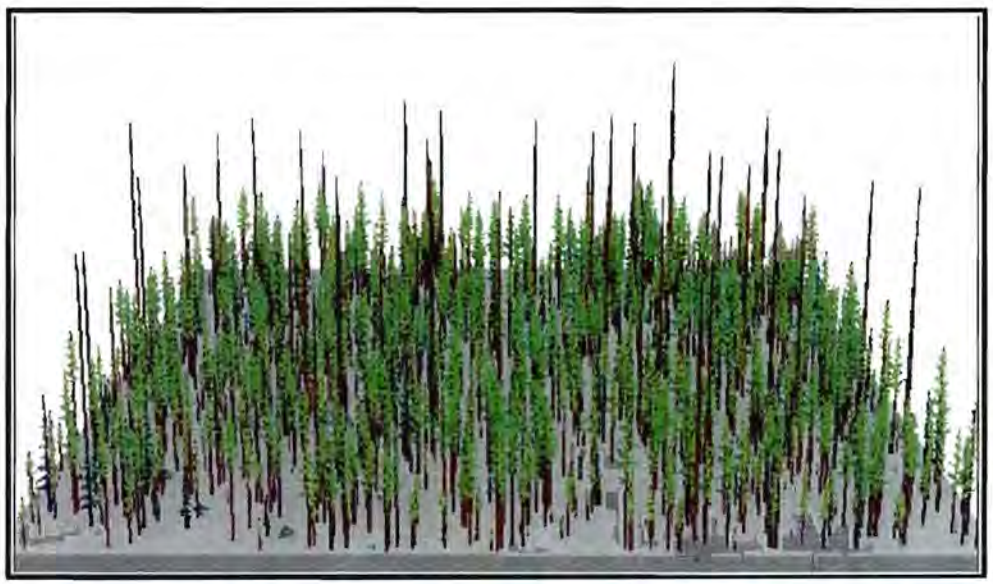
	How many trees?	
	<6 inches in diameter	**≥6 inches in diameter**
Lodgepole pine	1240	0
Subalpine fir	155	0
Standing dead trees	71	98
Total	1466	98



The next ten years were very dry. There were a lot of fires in Montana and Idaho, but this new forest didn't burn again. If it had, the hundreds of fallen logs on the ground could have made the fire very hot, killing seeds from the young trees and even killing the buried roots of wildflowers and shrubs.

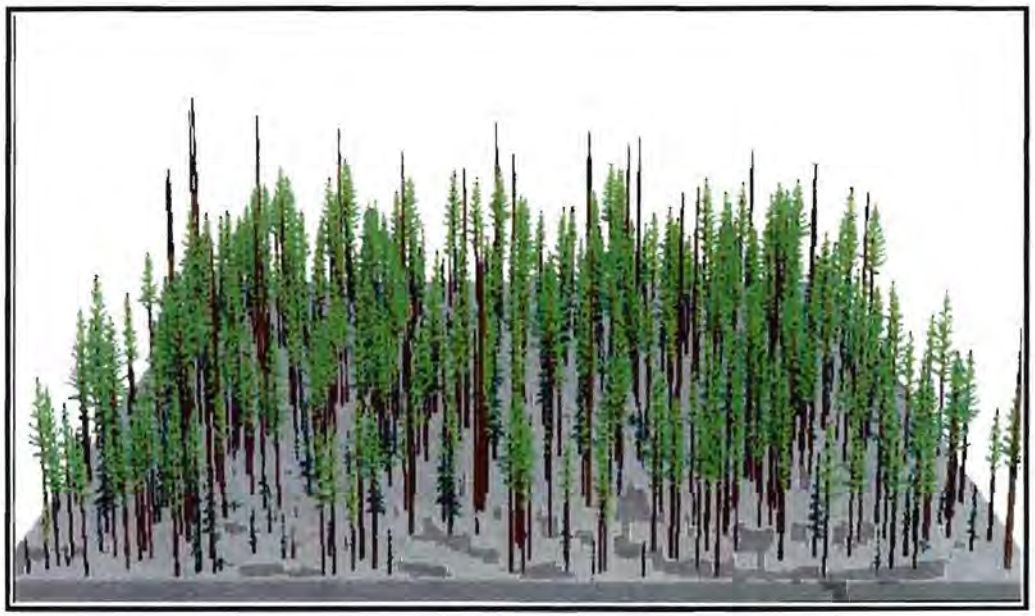
Although these summers were dry, the young trees grew well. **Thirty years after the fire, in 1920, there were still nearly 1,500 trees per acre.** Some of the lodgepole pines had trunks about six inches in diameter. The subalpine firs were growing too, but they were not as tall as the pines. A few snags still stood out above the new forest.

	How many trees?	
	<6 inches in diameter	**≥6 inches in diameter**
Lodgepole pine	1220	20
Subalpine fir	155	0
Standing dead trees	6	52
Total	1381	72



By the time the new forest was 51 years old, **in 1940,** it began to look "grown up." **Some of the trees were already 30 feet tall. Since no surface fires had burned through, the trees were still crowded, more than 800 per acre.** Very few snags from the 1889 fire remained standing.

	How many trees?	
	<6 inches in diameter	**≥6 inches in diameter**
Lodgepole pine	388	188
Subalpine fir	192	8
Standing dead trees	4	32
Total	584	228



In this cartoon drawing, it is 1960 and the oldest, biggest trees in the forest are 71 years old. There are fewer trees than there were in 1940-- only 662 per acre. The snags have fallen. The lodgepole pines have grown tall, and some of the firs seem to be catching up. There are only a few young lodgepole pines because they can't get a good start in the shade of the large trees. There are a lot of young subalpine firs, since they grow well in shade.

	How many trees?	
	<6 inches in diameter	**≥6 inches in diameter**
Lodgepole pine	54	377
Subalpine fir	180	47
Standing dead trees	4	0
Total	238	424

By 1980, this forest looks much like it did before the 1889 fire. The forest has more than 600 trees per acre. A few lodgepole pines are dying, perhaps because of mountain pine beetles. They are the snags of this aging forest. There are not many young lodgepole pines, but subalpine fir is continuing to grow and reproduce well here.

	How many trees?	
	<6 inches in diameter	**≥6 inches in diameter**
Lodgepole pine	40	384
Subalpine fir	170	75
Standing dead trees	0	5
Total	210	464

When you look at a forest just burned by crown fire, it may seem impossible for anything to grow there ever again. Perhaps that's how the people living in West Glacier, Montana, felt after the Half Moon Fire of 1929, a crown fire that burned thousands of acres. The top photo shows what their mountain valley looked like in 1935, six years after the fire. The bottom photo shows the same view 46 years later, in 1981.