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## What did the mixed-pine forests of Upper Michigan look like in the early 1800s?

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Across Upper Michigan, the extensive exploitation of forest resources began in the late 19<sup>th</sup> century. However, by the Great Depression of the 1930s most of the original forests across the region had been cut-over and many subsequently burned because of the large amounts of slash left on the forest floor following the logging activities. Once the land was cleared, farming was attempted by many settlers, but most were unsuccessful and large areas of former forestland were abandoned. Currently, many of Upper Michigan's forests are recovering from late 19th century deforestation and early 20th century land-use practices, and many forest restoration projects are helping these forests return to a more natural condition.

But what did the mixed-pine forests of Upper Michigan look like in the early 1800s? Besides historical photographs like the one above, we can use the observations of the first land surveyors that worked as part of the U.S. General Land Office (GLO) in the early 1800s to help reconstruct a picture of these forests.

## What do we know about the mixed-pine forest ecosystems of Upper Michigan in the early 1800s?

Based on the early surveys provided by the GLO, the mixed-pine forest ecosystems of Upper Michigan were dominated by three species – jack pine, red pine and eastern white pine. Jack pine barrens were typically found on very sandy outwash plains where wildfire was a frequent occurrence. However, a mixture of red pine, eastern white pine and other hardwoods (such as oaks and aspen) were the dominant forest type on other excessively well-drained or well-drained sandy soils. In many parts of eastern Upper Michigan, these forests were typically embedded into a matrix of wetland forests, fens and bogs. At what is now the Seney National Wildlife Refuge, mixed-pine forest ecosystems were common features of the landscape located both on small sand ridges surrounded by patterned fens as well as along glacial remnant outwash channels associated with the Driggs River.

Analysis of old-growth mixed-pine stands that escaped the harvest activities of the late 1800s leads us to believe that low-intensity wildfires were relatively common in these forests, occurring once every 5 to 40 years. These wildfires essentially “thinned from below” creating small gaps in the forest canopy allowing red pine and eastern white pine to regenerate and establish successfully while at the same time maintaining relatively low amounts of fuel on the forest floor. However, under certain conditions such as drought, wildfires may have become more severe, resulting in stand-replacing wildfires. The frequency of these stand-replacing wildfires is thought to have ranged from 160 to 320 years depending on the site and species composition.

We are currently working to better understand the composition and structure of these mixed-pine forests and the role fire played in shaping these important forest ecosystems. To do this we are studying the fire history of mixed-pine forests at the Seney National Wildlife Refuge and other areas across eastern Upper Michigan. This information will help us design new management strategies to emulate the outcomes of natural wildfire, such as stand structure and biodiversity, using prescribed fire, silvicultural techniques, or a combination of both.

For more information, please see: <http://www.pinerestoration.org/>



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