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White spruce stringers in a fire-patterned landscape in interior Alaska[1]

William A. Quirk and
Dwane J. Sykes
Department of Land
Resources and
Agricultural Sciences,
University of Alaska,
Fairbanks, Alaska

Abstract

In a south-facing subbasin of Caribou-Poker Creek Research Watershed near Fairbanks, several mature white spruce stringers, apparent relics of extensive stands that have escaped fires, were studied.

Tree-ring investigations show that the mature spruce stringers have remained fire-free for at least 200 years, whereas the adjacent areas show evidence of burning every 40 to 60 years. The tree patterns, composition, and density of the spruce stringers are quite homogeneous, but those of the adjacent areas of young birch-spruce show large variations both within the same area and among different areas. The previously burned areas indicate a long-term cycling effect (40 to 60 years) which seems to maintain or perpetuate a birch-spruce community. The stringers are associated with a slight depression in microrelief. Soil temperature at the 1-inch depth showed the previously burned site was a maximum of 7° F. warmer than the stringer site during summer 1970. Although the summer of 1970 was exceedingly wet and overcast, moisture conditions on the forest floor of the stringers were much higher than in the adjacent areas. As determined by Colman blocks, the soil moisture percent by volume of the surface horizon in the stringer site averaged 61.5 percent for summer 1970; the previously burned area averaged 40.2 percent during the same period. The higher soil moisture content of the stringers, along with possible shielding of these protected areas from winds during fire conditions, would seem to be significant factors in keeping the spruce stringers fire-free.