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Abstract

Equilibrium forest age structure: Simulated effects of random wild fires, fire control, and harvesting

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Historically, fire has been one of the main determinants of age structure in the forests of British Columbia, but in the face of recurring fires and other disruptive processes, achieving a stable forest age-class structure for sustainable harvesting is a challenge. The present paper investigates possible interactions of fire with harvesting and fire control, and their effects on age structure of a pine forest with varying fire-cycle lengths and fire-size regimes. We used simulation to determine the effects of the frequency and size of fires, fire control, and harvesting on the equilibrium age distribution of a forest. For small fires, resulting equilibrium age-class distributions were all declining, whereas for large fires, equilibrium was never achieved. Volume available for harvest was much greater when fires were infrequent. Harvest increased with fire control, but decreased with harvest age. In this simulation, the combination of intensive fire control and early harvesting optimized wood volume production. Awareness of the implications of particular fire regimes on sustained forest yield can inform design of better forest management and fire protection strategies.

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