

EFFECTS OF FIRE SUPPRESSION ON FOREST ENCROACHMENT AND SOIL ORGANIC CARBON IN NEWTON HILLS STATE PARK

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ABSTRACT

Fire suppression policies within our national park systems have resulted in dramatic changes in landscape composition during the last century. One important result of this has been a change from more open grassland areas to more forested areas due to forest encroachment. It is likely that this change has resulted in an increase in the amount of carbon being stored both in above and belowground carbon pools. In effect, the forests, most of which are found in the Northern hemisphere, have acted as a net sink for the increased anthropogenic carbon emissions. The overall objective of the study was to determine if forest encroachment at Newton Hills State Park has also resulted in an increase in soil organic carbon (SOC). To determine this, tubes of soil were collected, using a manual hammer, from paired grassland/woodland sites where woodland appeared to be a result of recent succession. Each soil tube was separated into three or four depth increments, each of which was analyzed on the SIRA-10 isotope ratio mass spectrometer to determine the $\delta^{13}\text{C}$ and the percent SOC. The results indicated that both grassland and woodland soils showed similar isotope values at lower depths but the woodland soils showed a significant decrease (more negative) $\delta^{13}\text{C}$ above 10 cm indicating a shift from a more C_4 grass signal to a more C_3 plant signal. In addition, forested soils had larger SOC values in the very shallow (0-1 cm) soil depth. These results indicate both that forest encroachment has occurred at Newton Hills State Park and that encroachment has resulted in an increase in SOC, at least within the 0-1 cm depth.

Keywords

Forest encroachment, soil organic carbon, $\delta^{13}\text{C}$, fire suppression