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# Fire and vegetation history during the Holocene epoch in the North Slave Region, Northwest Territories, Canada.

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Fire is an important component of many ecosystems throughout the world and in the presence of widespread and frequent fire numerous species have evolved a range of adaptations to cope with its effects. Across the boreal region of Canada, wildfire is the primary driver of ecosystem change and future predictions suggest the frequency and magnitude of fires will increase during the current century. Currently, an average of 271 fires consumes 500,000-600,000 hectares of forests each year across the Northwest Territories of Canada. Fire adapted species such as jack pine (Pinus banksiana) and black spruce (Picea mariana) are important components of these ecosystems, with their serotinous cones opening after a wildfire and blanketing the landscape with the seeds that will germinate and form the next cohort of trees. However, long term studies of past wildfire occurrence are lacking for many parts of the Northwest Territories and thus fire statistics such as mean fire return intervals and fire frequency are broad estimations. In addition, the record of past fire activity in many parts of the Northwest Territories is limited to the period 1965-2017 when remotely sensed data is available. Prior to that, the record is temporally incomplete and spatially limited. Thus, these records are too short to compute realistic fire return intervals and estimations of fire frequency for an ecosystem with fire return intervals that are broadly estimated at <100 years to >500 years. This study presents the results of the analysis of macroscopic charcoal preserved in lake sediment records from 4 closed-basin lakes across the North Slave region near Yellowknife, Canada. Radiocarbon dating of organic material recovered from the sediment cores, in addition to the presence of glacial clays and/or glacial-fluvial sediment at the base of each core, indicates that the full Holocene epoch is recorded in the sediment records from these lakes. Subfossil pollen is also analysed to elucidate the interactions between climate, vegetation and fire in the past. Analysis of the macroscopic charcoal suggests fire return intervals were shortest and fire frequency highest during the early to mid-Holocene. Analysis of subfossil pollen records from this region suggest that treeline extended further north at approximately 5000 radiocarbon years BP. Further refinement of the vegetation history from the studied lakes will provide additional insights into the relations between vegetation and fire occurrence in the past.