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Reconstructing Fire Disturbances in Coastal Temperate Rainforests on the Central Coast of British Columbia, Canada

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The coastal temperate rainforests of British Columbia's Central Coast are comprised of old growth, mixed-age stands and a mosaic of non-forested bogs. This region receives approximately 4000 mm of annual rainfall, and fire disturbances caused by lightning are thought to be very rare. Because of the late successional characteristics of these forests and the presumed lack of visible fire evidence, fires have been estimated to occur at up to 6000-year return intervals. We attempt to distinguish the roles of natural and cultural (First Nations) fires using multiple lines of evidence from tree ring records, fire-scarred trees, soil charcoal and archaeological evidence from First Nations settlement areas. To reconstruct the Holocene fire history of the study area located on Hecate Island (N 51 38 W -128 05), thirty 400m2 forest mensuration plots were systematically established in a 287-hectare area burned in 1893. Analyses focused on the relationship between fire events and climate recorded in tree rings and instrumental records, as well as nutrient concentrations and pH of soils and plant community characteristics. Four fire events (1893, 1776, 1525, 1372) were recorded in forty-five living, fire-scarred western redcedar (Thuja plicata), yellow cedar (Xanthocyparis nootkatensis) and shore pine (Pinus contorta var. contorta) trees. Five additional fire events (1785 Cal BP, 2760 Cal BP, 3355 Cal BP, 4735 Cal BP, 7740 Cal BP) were dated with accelerated mass spectrometry radiocarbon dating of in situ macro charcoal (> 5mm) buried in stratigraphy in both organic and mineral soils. The short intervals between fire events, coupled with the long history of First Nations settlement and land use in the study area, suggest purposeful and repeated low-intensity ground fires. Our research demonstrates that fires are more widespread and common than previously recorded on the very wet Central Coast of British Columbia. It is important to incorporate cultural fires into fire history research to better understand the ecological legacies associated with repeat fire disturbances in coastal temperate rainforests.