

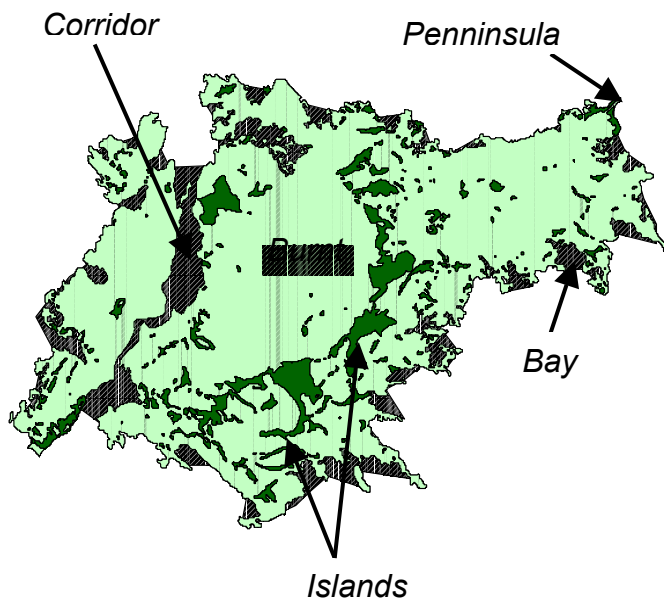
FMF Natural Disturbance Program Research

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Morphology of a Forest Fire

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It is easy to think of a forest fire as a continuously disturbed area scattered with a few residual individuals and clumps of unburnt material. Reality is much more complex – and variable. We already know that fire events usually involve numerous individual burnt patches (see Quicknote #7). The type, number, size, and spatial arrangement of unburnt patches within each disturbance event are equally important “natural pattern” considerations. In fact, on average, almost 1/3 of each fire event in the Alberta foothills is at least partially unburnt.



There are two major types of residual material within a fire; “island” and “matrix”. Matrix residual patches such as corridors, bays, and peninsulas are within the greater event area, but are still physically connected to the surrounding forest matrix. Matrix residuals account for between zero and almost 50% of the total area of a fire event, and averages 22%. Matrix residuals include both forested and non-forested areas.

Island residual patches are physically disconnected from the matrix, and thus completely surrounded by disturbed forest. Island residuals account for anywhere from 0-20% of the area of a fire event, averaging about 9%.

The distinction between matrix and island residual material is a subtle one. For instance, if the fire shown above burned for even one more day, it is not difficult to see how the corridor, or any number of bays could lead to the creation of islands. In fact, the distinction between islands and interior matrix residual patches is largely a classification and analytical artefact. Ecologically, they both amount to much the same thing; internal heterogeneity.

This conceptual model of a forest fire is quite valuable. For instance, restricting ourselves to the question of island residuals would significantly underestimate the actual area of residual material in a fire event. Islands account for only 9% of the event area, while the total area in event residuals is almost 32%. The close relationship between island and matrix residual material also suggests that all forms of “residuals” should be considered as a package when planning cultural disturbance events. Finally, this model demonstrates highly variable mortality within so-called “stand-replacing” fire events, further supporting the notion of age complexity in the boreal forest (see Quicknote #6).