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Natural Disturbance Program Quicknote #45

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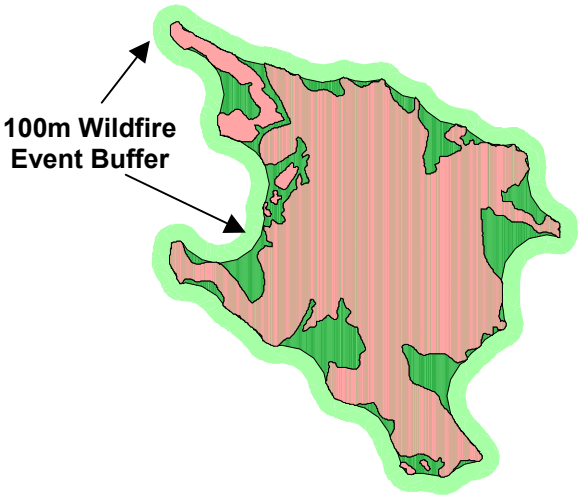
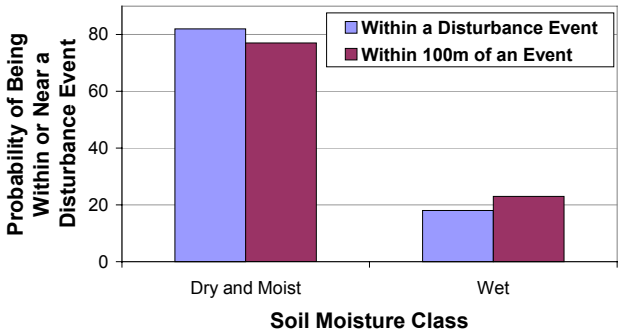
Are Natural Wildfire Event Boundary Locations Random?

Yes and no. The buffer zone just beyond the boundaries of a wildfire in west-central Alberta (shown in light green in the adjacent Figure) have wetter soils, smaller trees, more hardwood leading forest, and more treeless areas than the surrounding landscape.



For example, all things being equal, one would expect the proportions of soil moisture conditions within the buffer of a wildfire event to be similar to the proportions of soil conditions within the event itself. In contrast, our research reveals that areas with 'wet' soil conditions occur 18% of the time within a disturbance event, compared to 23% of the time within the 100m buffer around a disturbance event.

Probability of Being Within, and Just Beyond, a Disturbance Event, by Soil Moisture



These burning tendencies are consistent with those noted for matrix remnants from Quicknote #31. The findings are also consistent with traditional wisdom that dense, dry conifer-dominated forested areas are more likely to burn than young, hardwood leading forest or wet areas.

Perhaps an even more revealing aspect of this analysis is its nature. The vegetation and soil conditions immediately inside wildfire event boundaries are not significantly different than those immediately outside that boundary. Only when the analysis is expanded to compare the entire event area against an external buffer (100m in this case) are differential patterns noted.

This is an excellent reminder that fire is a chemical reaction, responding to fuel type changes over both space *and* time. For example, imagine a wildfire burning at night under high humidity and no wind. The transition from a south facing conifer-dominated slope to a shrub-dominated wetland may be enough to halt the advance of the fire at or near the boundary between the two vegetation types. Now imagine the same area burning mid-afternoon under low humidity and favourable wind conditions. Although a wetland may slow the fire down, it is now more likely to burn well beyond the fuel-type boundary. In other words, when fuel conditions change, it can sometimes takes time - and space - for a fire to respond.

Implications: First, understanding this dynamic helps us formulate better research questions. Second, we can also now add the concept of an "event boundary zone" to our new spatial language. And lastly, stand-type boundaries are imperfect surrogates for disturbance event boundaries. Wildfires reshuffle the landscape mosaic in more complex ways than we imagine.

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