foothills MODEL FOREST
research growing into practice.

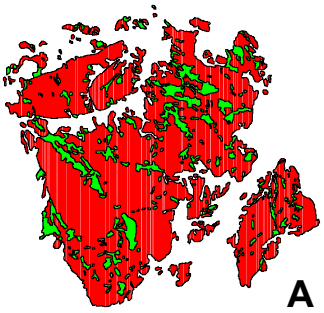
Natural Disturbance Program Quicknote #28

September 2004 ***By: David W. Andison***

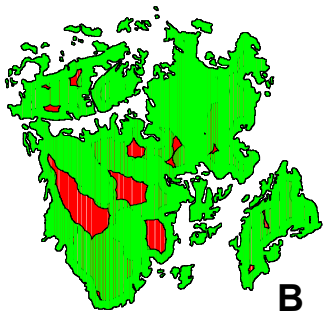
What Do Events, Disturbed Patches, & Islands Have in Common?

They create spatial complexity. The shapes, composition, sizes, and density of these spatial elements combine to make forest fires highly complex entities. As a result, the probability of being in the vicinity of undisturbed forest is fairly high. In fact, in west-central Alberta, an average of 91% of a 100 ha fire is within 100m of either an island remnant or the fire perimeter, and 99% of the area is within 300m. As a reference point, only 32% of the area of a 100 ha circle with no internal islands is within 100m of undisturbed forest. The difference is the combined influence of the convoluted boundaries of multiple disturbed patches (Quicknote 7), and the large number of island and matrix remnants (Quicknote 19, 22).

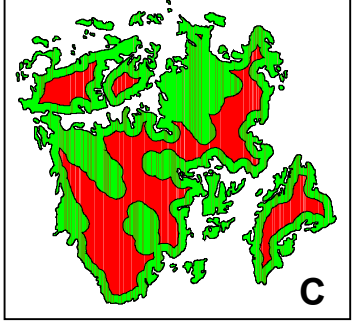
16% of 680 ha fire area in island remnants.



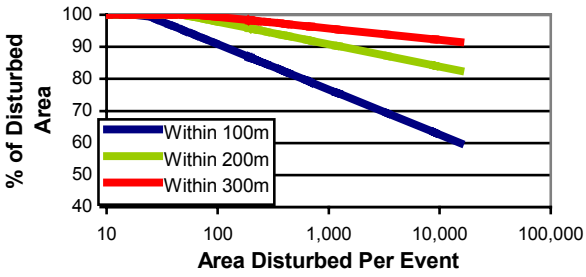
92% of burnt areas within 100m of edges or islands.



67% of burnt areas within 100m of edges or islands >2 ha.



Percent of Disturbed Areas Within a Specified Distance From Undisturbed Forest



Larger fires have less of their area near un-burnt patches, but even 1,000 ha fires average 77% of their area within 100m of islands or edges (compared to just 11% for a 1,000 ha circle with no islands). Even fires 10,000 ha in size have an average of over 84% of their area within 200m of un-burnt forest (see Fig above).

This simple exercise of combining what we already know about the key spatial elements of a disturbance event allow us to begin making critical links between pattern and process. In this case, distance to undisturbed forest is relevant for seed dispersal for tree species with heavy seeds (such as white spruce), survival and dispersal of slow moving species (such as beetles), and, forage, nesting, and predator flight functions for other resident species. These are all fundamental biological functions.

Making the pattern-process link also allows us to evaluate the relative importance of different pattern elements. For example, the contribution of very small islands to spatial complexity is significant. In the 680 ha fire shown on the left, 92% of the area is within 100m of undisturbed forest (box B). However, only 67% of the area is within 100m of undisturbed forest areas larger than two hectares (box C). This clearly demonstrates the (biological) risks of disregarding small islands. It also suggests that area (of residuals) is not necessarily more important than density. Similar arguments could be made for simplifying the shapes of disturbed patches, or clustering the spatial distribution of islands.

Perhaps the most powerful lesson demonstrated here is that no natural pattern is irrelevant.

For more information on this or other ND Quicknotes, please contact: Dr. David Andison, Bandaloop Landscape Ecosystem Services, Tel.: (604) 939 – 0830, Email: andison@bandaloop.ca, or visit www.fmf.ab.ca