foothills MODEL FOREST
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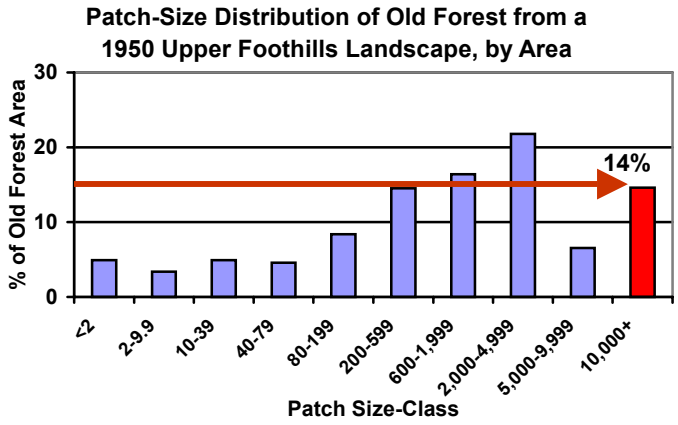
Natural Disturbance Program Quicknote #25

March 2004 *By: David W. Andison*

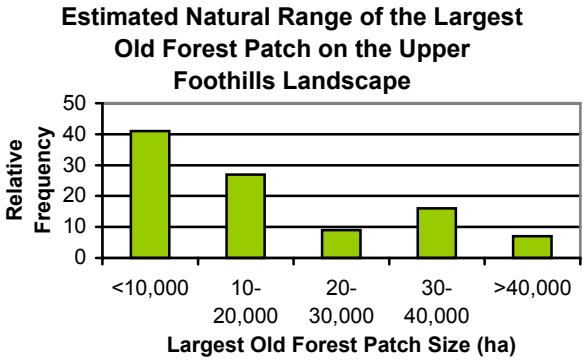
Learning New Tricks From Old Forests

One of the simpler, and more common natural pattern measurements is the size-class distribution of different types of patches on a given landscape. This metric is commonly applied to disturbances (see Quicknotes #4, 7, and 13), but is also often used to describe the condition of old forest. For example, a "natural" patch-size distribution for old forest is given below for an Upper Foothills landscape in west-central Alberta. The data in this case suggest that the majority of the area of old forest is accounted for by patches larger than 1,000 hectares, and old forest patches larger than 10,000 hectares are natural phenomena.



However, it is important to keep in mind that while these data may represent natural conditions, the distribution is still only a single snapshot in time. To get a sense of how variable old forest patch sizes might be naturally, consider that the shape of the distribution depends largely on the number and size of the largest patches. For example, the area in the largest patch size-class (in red in the adjacent figure) represents 14% of the old growth by area, but just a single patch in our data. So, just how variable is the size of this largest patch?

Using disturbance dynamics simulation modelling, the size of the largest old forest patch was tracked for 100 landscape "snapshots". The results (in the adjacent figure) suggest that the largest old forest patch on an Upper Foothills landscape is anywhere from 2,000 to over 50,000 hectares. Furthermore, the size of the largest old forest patch is inversely related to the level of recent disturbance activity. In other words, during periods of high fire activity, there is far less chance of large patches of old forest surviving.



So how does this relate to patch size distributions? It means that about 41% of the time historically, the red bar representing area in old forest patches over 10,000 hectares probably did not exist. On the other hand, there were times when the height of the red bar was likely much higher than shown from 1950.

Although crude, this example demonstrates well the dangers inherent in single patch size distributions. While the 1950 old forest distribution given above is natural, one can imagine a wide range of other equally legitimate frequency distributions, including everything from severely truncated, to strongly biased towards larger patches. The problem is not that single size-class distributions are not "real", but rather that single distributions alone cannot represent natural patterns. Lacking data to generate alternative distributions, understanding how, where, and why a given distribution varies must be taken into account as well. In this case, we know that 1) the 1950 snapshot roughly represents median historic conditions, 2) the most sensitive (or variable) part of the distribution is the upper end, and 3) much of the variation in the distribution is caused by changes in the disturbance rates or frequencies.

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