

MainProjDBH

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To run the code the data “table_DBH_live_counts_71-03.csv” is required in the data directory and working directory should be Code.

There are some handy funtions to examine the data: PlotSite(Site) and PlotPlot(Site,Plot) will give bar charts from year 2 aggregated dbh measurements. DBH(Site,Plot) will give the dbh counts for a plot and In(Site,Plot) will give the index for a plot.

Introduction

The purpose of this exploration is to examine the use of the various metrics calculated from the DBH class interval and frequency distribution measurements to generate which correlate with time since disturbance. The successional effect therefore expressed via the metric should correlate with species richness.

All the dbh data is imported from DBH_live_counts. This is filtered to just look at year 2. Since there are multiple species, each plot has multiple lines per DBH class per plot. These were therefore aggregated, so that this analysis is ignoring species.

The dbh classes in the raw data are recorded in 5cm intervals, class 1 is 5-10cm, class 2 is 5-10cm.

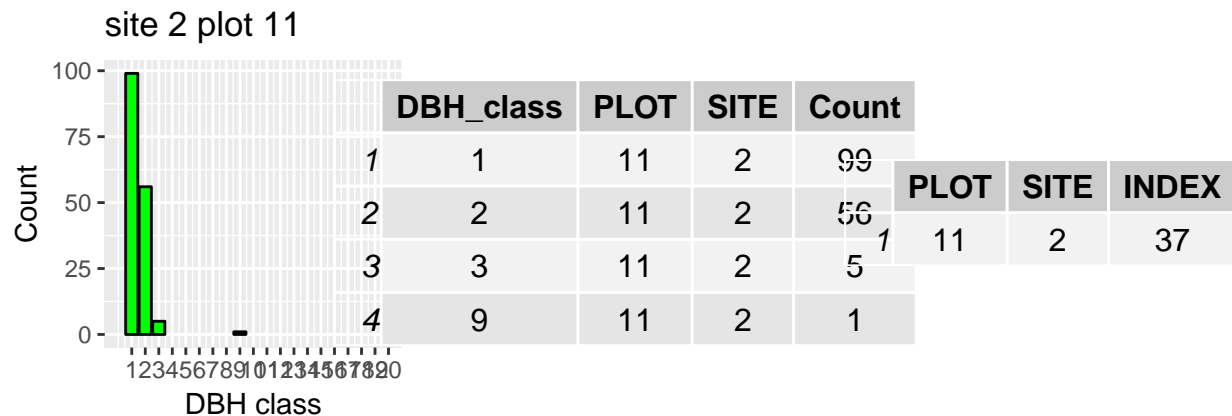
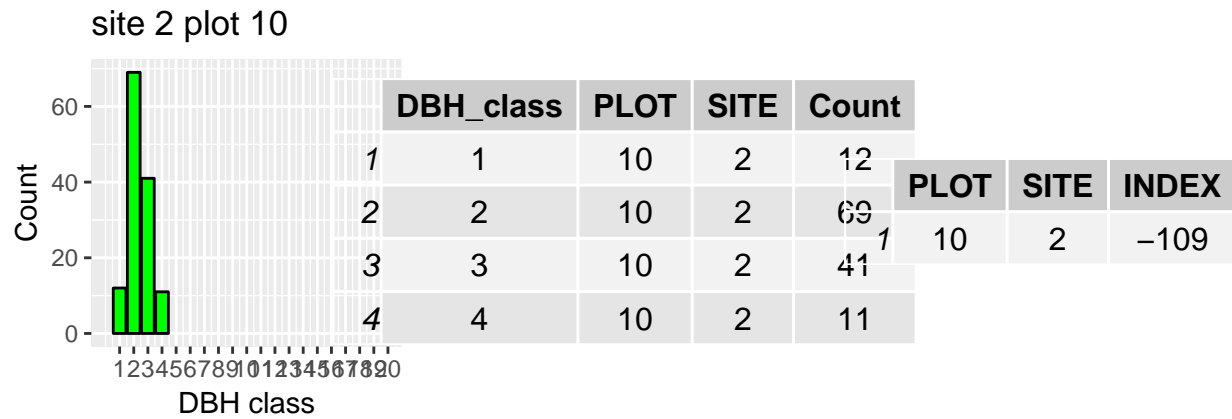
(I havent found much literature on using DBH in this way. Buchholz, 1978, DBH distribution analysis of different species to infer succession, Lorimar 1983 looked at finding even aged stands, but on looking at dbh frequency distribution says “Weibull parameter shape paameter reflects the degree of skewness, but is not highly sensitive to horizontal displacement of mode from median”, he uses a symmetry index which depends on the mode,and therefore only useful for unimodal data)

Running sum of differences

First, the sum of running differences in count between adjacent DBH classes is trialled. Using this calculation it can be seen that a high frequency of small dbh classes would be the first term in the sum. Subsequent subtractions of smaller values would result in a large positive value. A large positive would then represent an early succussion with lots of young saplings. The reverse would occur for a mature plot and a large negative number would be found.

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## Joining, by = c("PLOT", "SITE")
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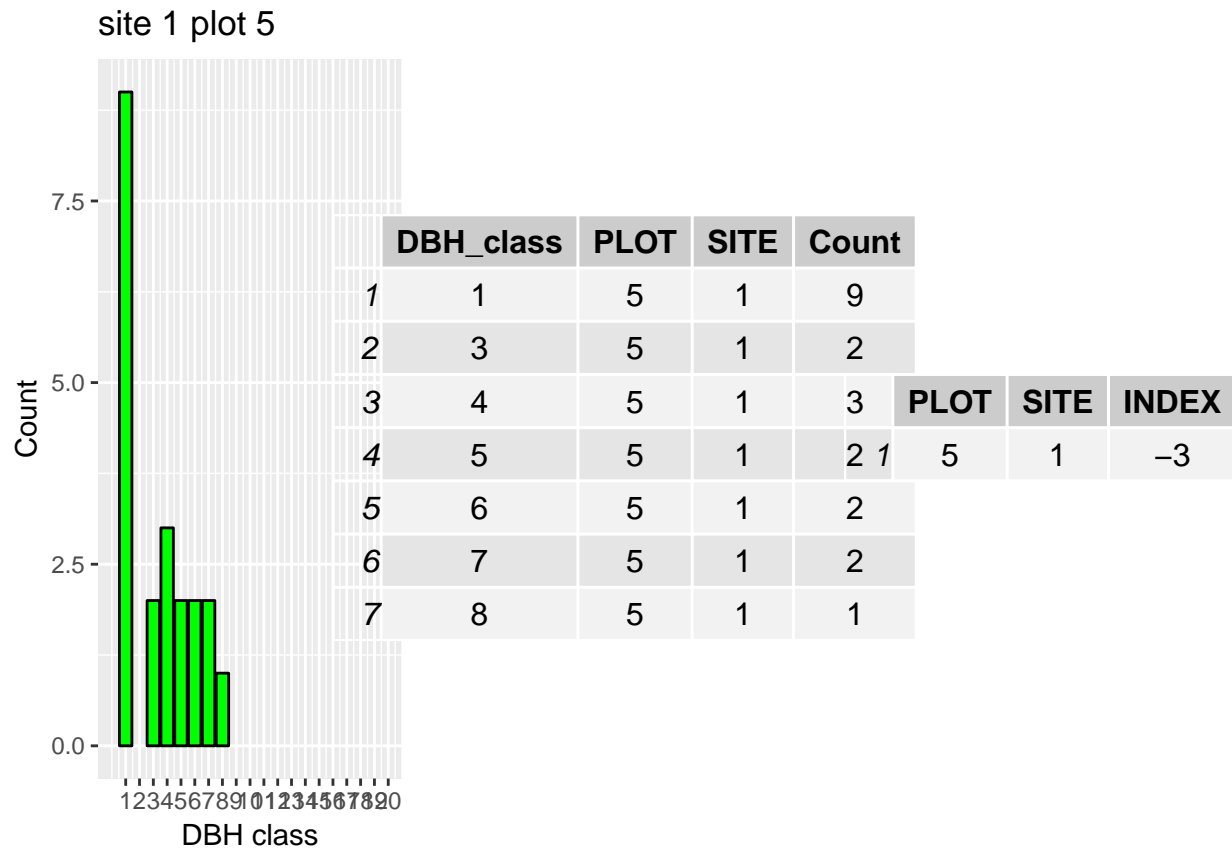
Consider site 2 plots 10 and 11



Plots 10 and 11 have lots of smaller trees, and therefore a similar time since an opening event. But they have indices of - 109 and 37 respectively. Plot 10 site 2 has the most negative index of all the plots, so we would want this number to imply a long time has occurred since an opening event, which it does not.

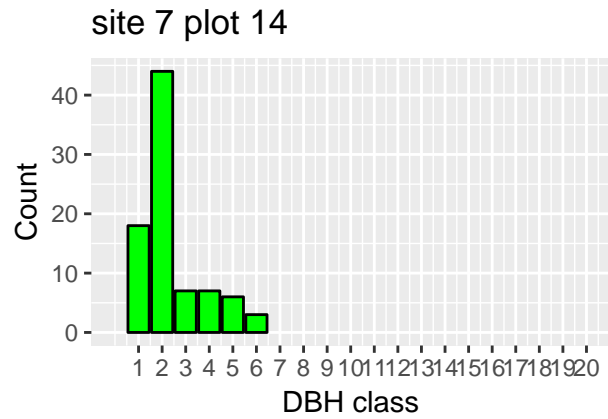
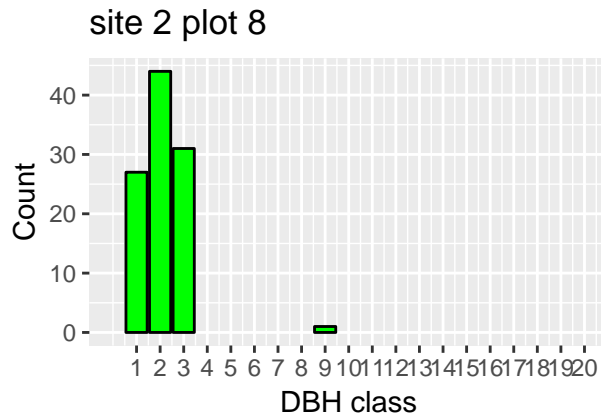
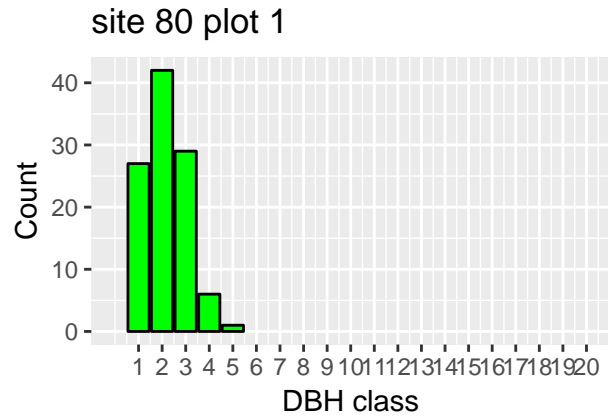
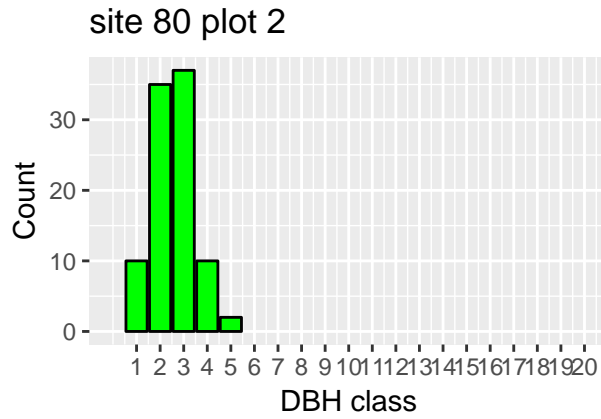
Looking at the counts, plot 10 has 12 in the first category and 69 in the next, therefore the first subtraction gives a relatively large negative value, the remaining values, all being smaller, result in a large negative index.

A negative can occur in a right skew distribution if the count of trees in the first class is low, for example, Site 1 Plot 5



This shows that the subtraction works if there are successively fewer counts in each class, and if the sum of the counts in the classes above class 1 are less than those in the first class. The most negative indices occur for sites with a large number of trees in dbh class 2, which is greater than, or similar to the number in class 1.

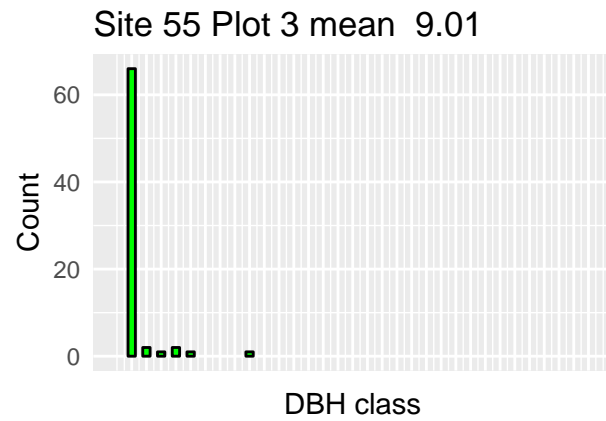
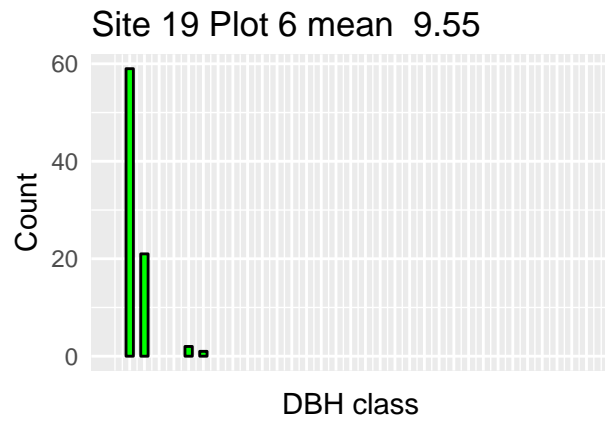
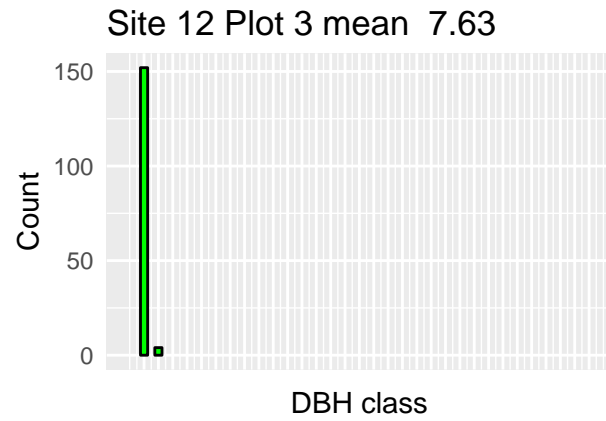
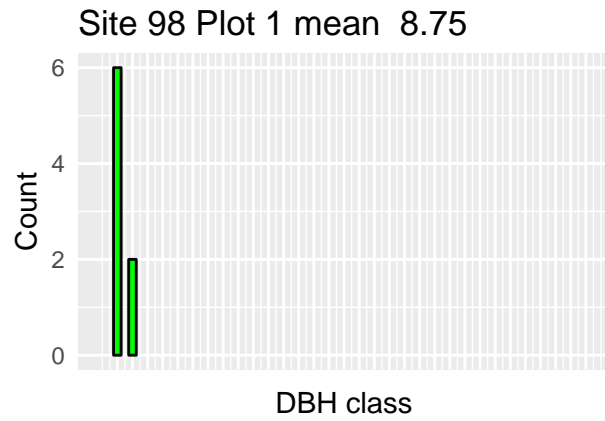
##	DBH_class	PLOT	SITE	Count	INDEX
## 10	1	10	2	12	-109
## 293	1	2	80	10	-74
## 292	1	1	80	27	-51
## 8	1	8	2	27	-49
## 39	1	14	7	18	-49
## 156	1	12	37	2	-45



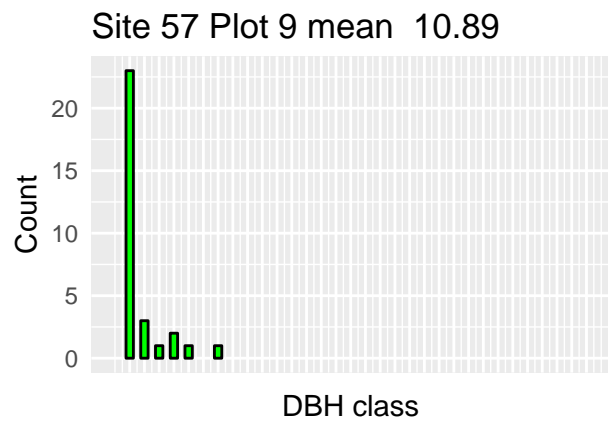
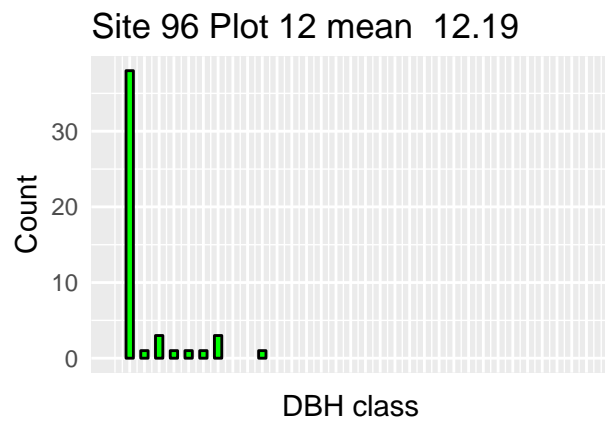
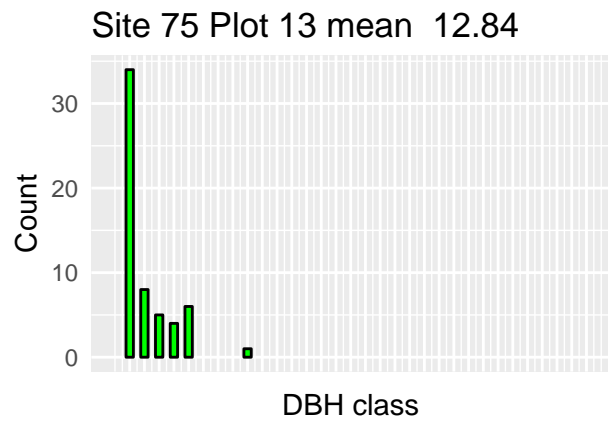
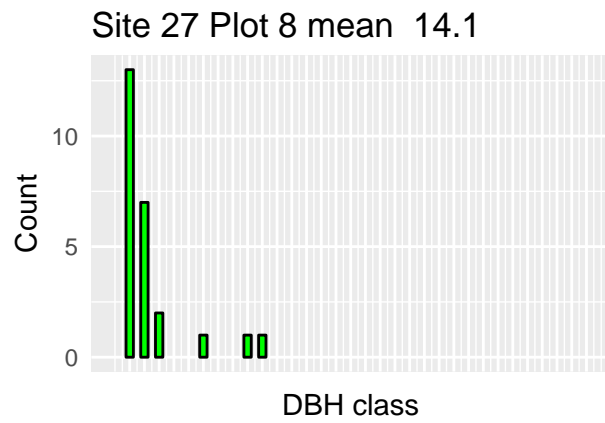
The above graphs show the plots with the four most negative indices. In each case it can be seen that combining the classes would resolve the problem. It could be argued that this is a valid solution because we are looking for a large number of small trees of a similar size, and for that size to drop of rapidly. The 5cm intervals used here are arbitrary, and very narrow.

The mean as a metric

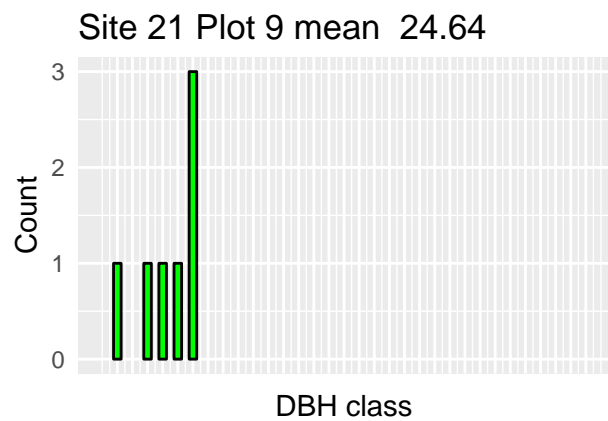
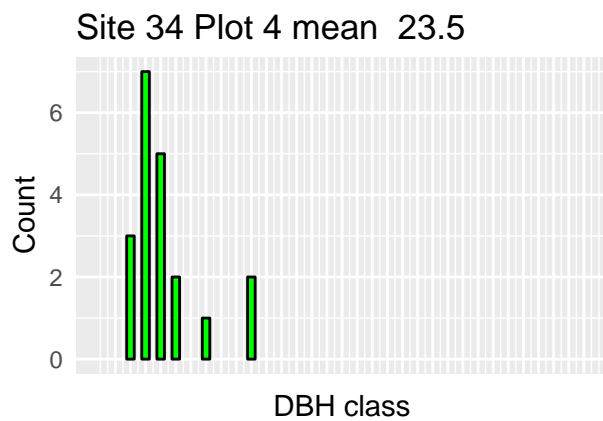
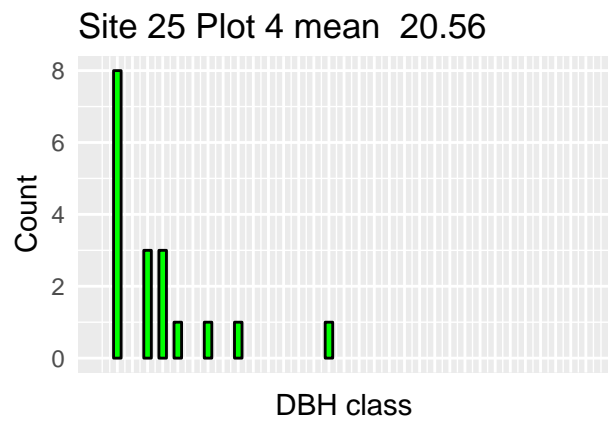
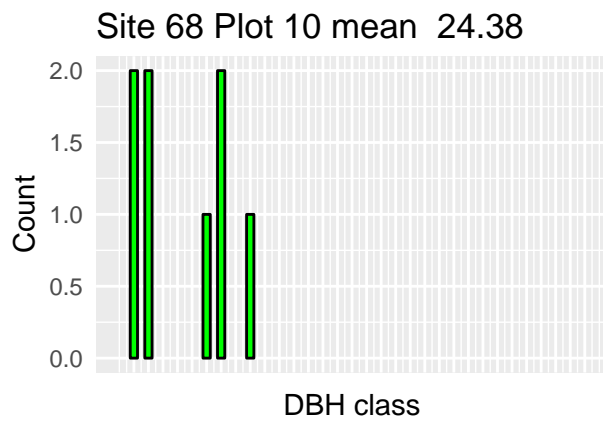
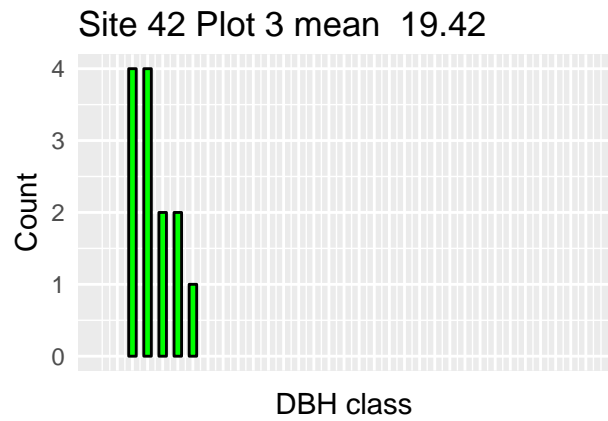
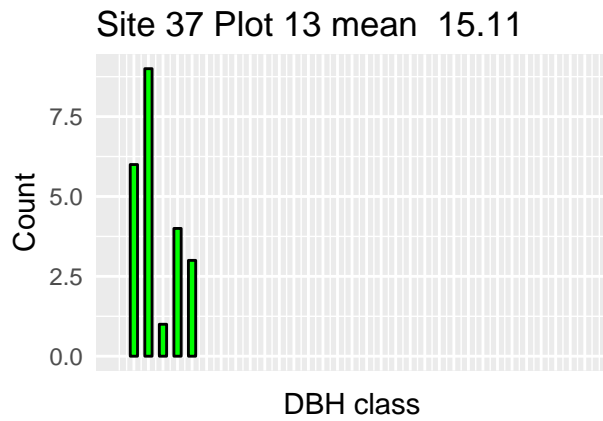
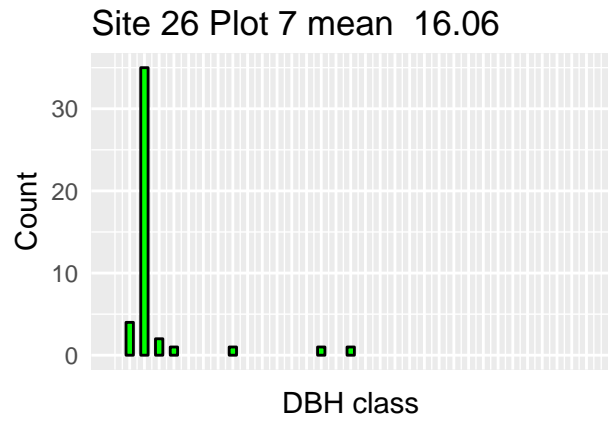
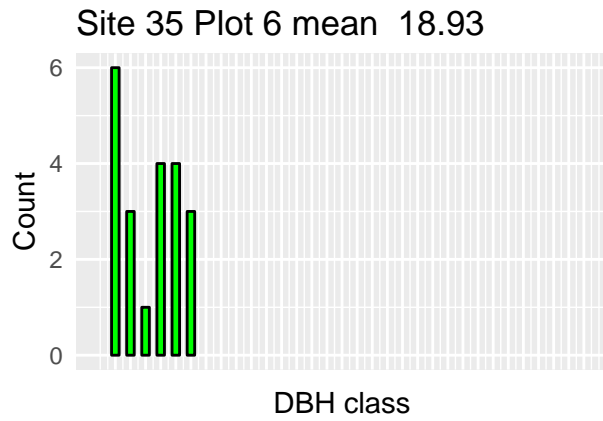
Plots of plots with mean less than 10

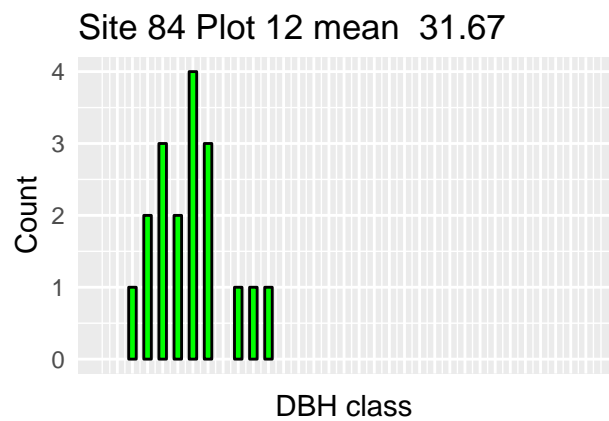
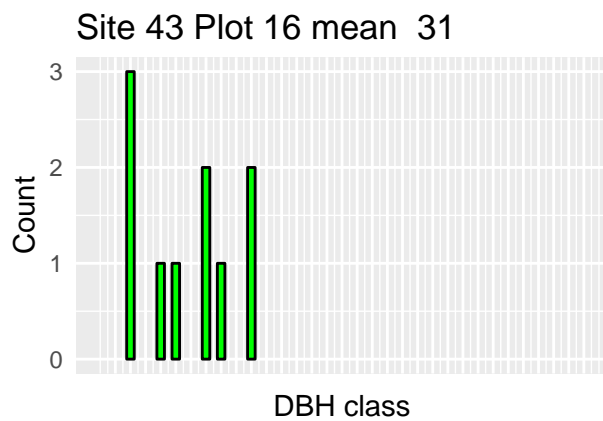
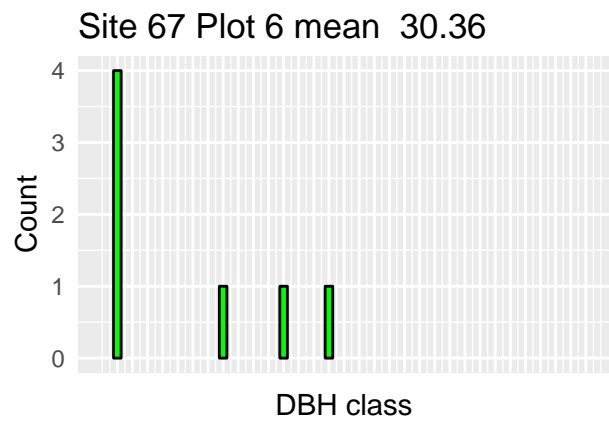
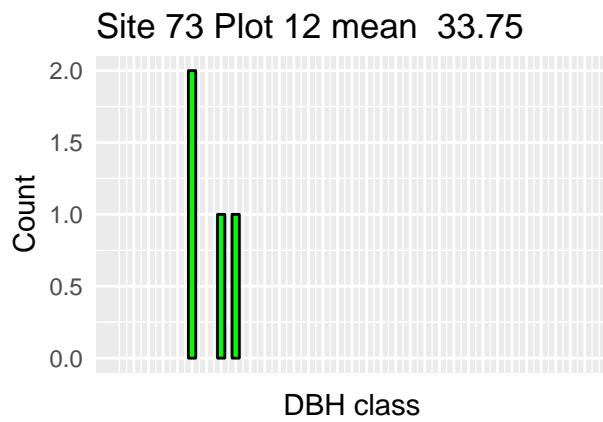
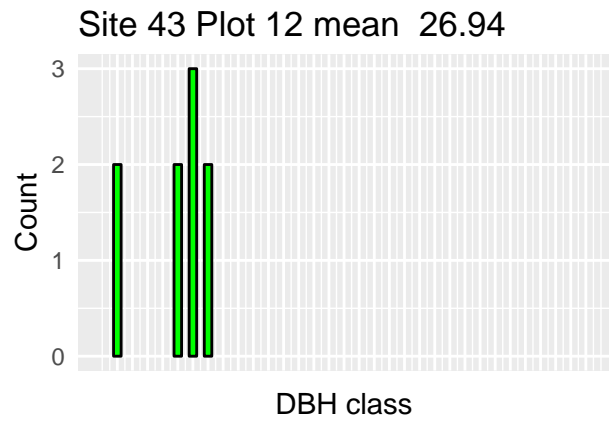
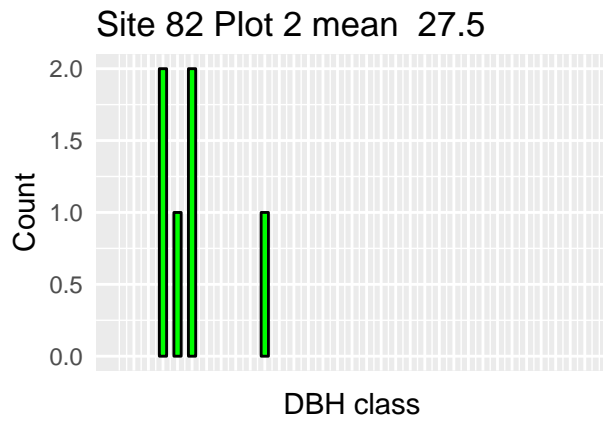
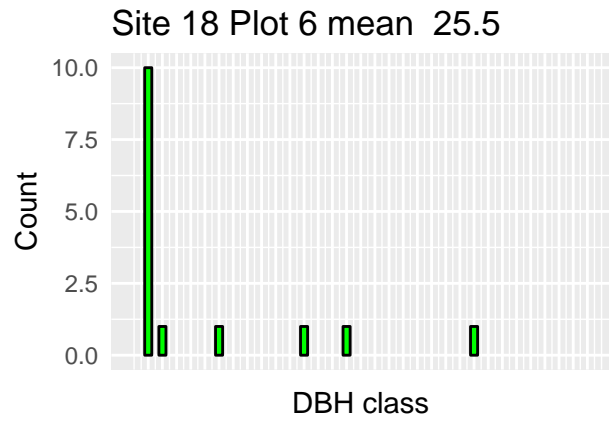
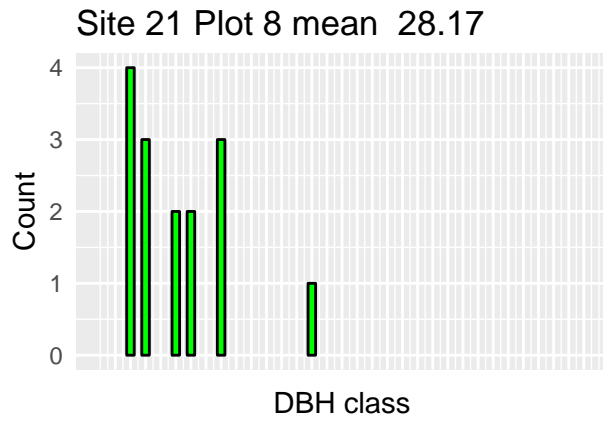


For a mean below 10 the graphs demonstrate a pattern consistent with lots of young saplings and a recent opening event.



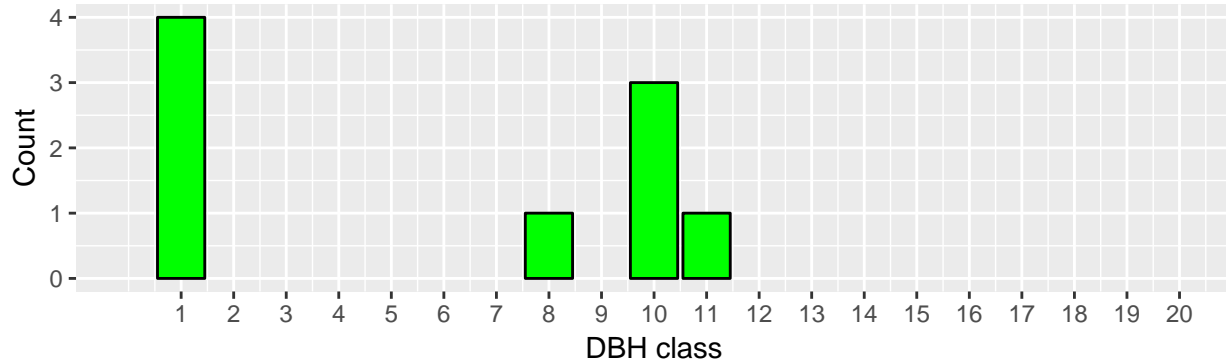
For means between 10 and 15 the frequency of trees in the next DBH classes increases



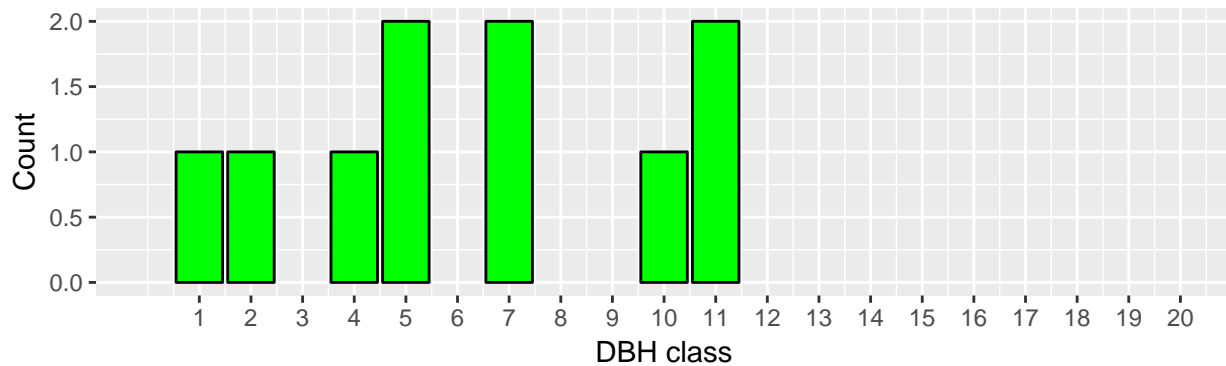


With low means, because the mean is in or near the lowest dbh class, the distribution will be right skewed and fit the desired criteria of representing a plot with lots of young trees and few older ones. When we consider larger means there are more distributions that could give that mean, and whether or not they reflect the time since an opening event is less clear. Consider Site 85 plot 4 and Site 86 plot 12.

site 85 plot 4



site 86 plot 12



These have similar means, but would we be able to say they represented plots that had similar time since event. Site 85 plot 4 with its right skew and some saplings could be in an early successional stage, whereas Site 86 plot 12 looks more mature.

The mean may not be a metric that clearly correlates with time since event.

Symmetry index

Lorimer and Krug (1983) suggest that neither the shape parameter of the Weibull distribution nor the coefficient of skewness are very sensitive to the displacement of the media from mode, and hence are not useful metrics for describing the dbh distribution. They suggest a symmetry index defined as

$$I_s = \frac{(mode - X_l)}{(X_{0.95} - X_l)}$$

Where

$$X_l$$

is the lower threshold diameter and

$$X_{0.95}$$

is the 95th percentile. However, much of our data is multimodal, which makes this metric less clear.