Course Woody Debris Estimation

The estimation of course woody debris (down logs on the forest floor) was pioneer by the forest fire community, in terms of forest fuel sampling. Since that time we have learned that estimation of course woody debris is important in nutrient cycling and as wildlife habitat.

This can be estimated several ways. One of the conceptually simplest is to **layout a fixed area plot** and then measure the length and end diameters of all pieces of course woody debris in the plot. While this approach is simple in concept is can be difficult to implement in the field especially in areas of large load of course woody debris such as after cutting operations of after tornados.

An alternative approach is that proposed by Van Wagner (1968) and previously by Warren and Olsen (1964). Van Wagner (1968) presented the following rules to apply this method.

1. Lay a line of **known length (*L*)** across the area to be studied.
2. Record the **diameter (*d*)** of every piece of wood intersected at the point of intersection.
3. If the sample line crosses the end of a piece, tally only if the central axis is crossed.
4. If the sample line passes exactly through the end of a piece's central axis tally every second such piece.
5. Ignore any piece whose central axis coincides with the sample line.
6. If the sample line crosses a curved piece more than once, tally each crossing.

Piece length and crossing angle need not be recorded.

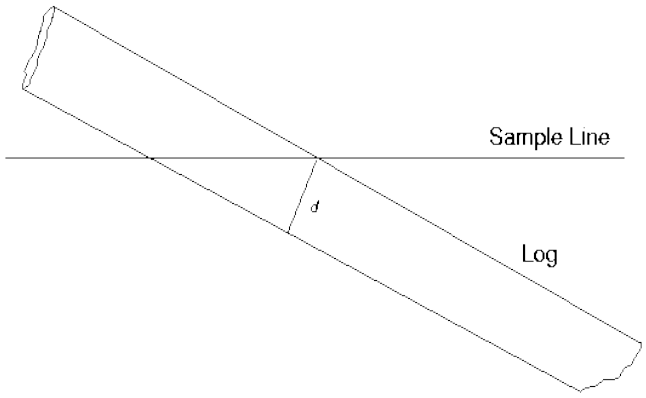

Figure 1. an example of how to measure the down log on the transect

Formula

The basic formula, when all factors are in the ***same units*** (e.g. diameter in feet, length in feet, volume in cubic feet per square foot).

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$$V = \frac{\pi^2 \sum_{i=1}^{n} d_1^2}{8L}$$

where:

V is volume of wood per square foot
d is piece diameter in feet
L is length of sample line in feet

If weight is desired the volume estimate is simply multiplied by the specific gravity of the wood:

$$W = \frac{\pi^2 s \sum_{i=1}^{n} d_i^2}{8L}$$

where:

W is weight per unit area
S is specific gravity

This method has some assumptions:

1. **The pieces are cylindrical.** However the presence of taper probably introduces no error.
2. **All pieces are horizontal.** However, the vertical angle can be quite large before the error is serious.
3. **The pieces are randomly oriented.** Bias in orientation can be corrected by special factors determined in field trials(see Warren and Olsen, 1964) or by running sample lines in two or more directions.

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Also See:

Van Wagner, C. E. 1968. The line intersect Method in forest Fuel Sampling. *Forest Science* 14(1):20-26.

Warren, W. G. and P. F. Olsen. 1964. A line intersect technique for assessing logging waste. *Forest Science* 10:267-276.

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