Weight Scaling and Reporting

Things to Know and Consider

FBRI Implementation

By popular request, FPS Reports include weight and number of cords as alternative yield parameters in addition to cubic and board-foot content. Both green weight and # of cords may be localized by species for any specific forest location by the Inventory Forester. Dry weight is defined by specific gravity (oven-dry weight) for each species in the FBRI Regional Library based on published documents from across the country. While green weight may be localized (adjusted) by the Inventory Forester, dry weight is expected to remain constant in the Library.

Value may be assigned by weight with usage of the Species (and Sorts) table(s) functionality. Portions of a tree may be differentially valued by weight, cubic or board content depending on species, dimension, defect and log position in the tree.

Merchandizing typically breaks a tree into logs beginning at the butt and moving up the tree to a pre-specified minimum diameter inside bark (dib). Nominal log lengths are assumed until the minimum dib is reached which often results in a partial log (less than nominal). The Inventory Forester may elect to ignore this partial log if less than some pre-defined minimum length (log_min) is found.

Reporting Value Differences

In recent years there has been increased desire to report the amount of wood content above this minimum dib as additional pulp or cubic content. This “top wood” component is often characterized as wood less than 5-inch dib but greater than 2.5-inch dib (or some other pair of diameters).

Some Inventory Foresters have attempted to set the minimum dib for log merchandizing to this smaller limit. This has resulted in less than satisfactory reporting abilities because saw-logs and top-wood become intermixed in the reports.

Recommendations for Value Sorts

Apply FPS reporting by setting the saw log minimum dib using the Species table log_dib parameter. Set the top wood minimum dib using the Srt1_dib parameter. Since the Srt1_dib is smaller than the Log_dib, then saw log merchandizing will stop at the Log_dib limit but continue to compute additional content to the Srt1_dib limit. The content of each component of the tree may be differentially valued by weight, cubic, cord or board dimension.

Assigning Value as Wood Products

Weight scaling of truck loads of logs has become popular in recent years likely due to the efficiency with which a loaded truck may move through scale stations and record the quantity of delivered logs. It obviously takes considerably less time to run a truck across a weight scale compared to a piece-by-piece assessment of cubic or board content. At a log yard the gross weight of the truck and logs are recorded on entry and then gross weight of the empty truck is recorded on exit. There is no question that this provides efficiency for the trucker.

However, applying weight scaling alone or weight scaling with a sample scale of cubic or board content carries certain assumptions that are often overlooked. These assumptions affect value to the land owner much more significantly than to the trucker. If the truck hauls 10,000 pounds, then payment to the driver is for hauling 10,000 pounds. Costs and values are within the same dimensions.

When logs are not pre-sorted by value at the harvest unit landing, then weight scaling may become a problem for the land owner. This is not a concern where all extracted wood is assigned a single value per unit (weight, cubic, cord or board) and all units use a single definition. An example of differential units is applying different weight ratios to different product loads such as saw logs or pulpwood.

In general, if a truck load is made up of logs of differential value to the land owner or log-yard owner, then weight scaling is not appropriate as a basis of setting value.

Preferred Basis for Valuation:

1) The most definitive basis for assigning value is cubic content. Net of defect cubic content provides higher resolution if value differences become significant with regard to quantity of defect.
2) Board-foot scale is secondary to cubic because of its inherent inconsistencies compared to current log merchandizing technologies.
3) Weight scaling and tallies of numbers of cords are least reliable as a consistent basis to assign value. These parameters are not directly measureable in a timber stand prior to harvest and are, at best, poorly estimated.

Valuation of a load of logs, a stand of trees, or an entire forest depends on the basic parameters which were *measured*, not estimated. In the forest these parameters are species, diameter at breast height (dbh), tree height, and sometimes tree taper. From taper measurements, or more often taper model profiles based on dbh and height, the log position diameters and lengths are estimated. On a truck or in a log yard, the log position diameters and lengths may be measured or at least individually estimated by piece.

All cubic, board, weight and cord content of wood are *estimated* from observations of diameter and length. None of these parameters are ever measured.

- Cubic content uses length and diameters at both ends of the log.
- Board content uses length and diameter at the small-end of the log.

- Weight uses the sum of a truck load of logs in weight divided the sum of cubic volume (usually) to determine a conversion ratio for valuation on that truck. Weight is then estimated in forest and stand reports using these weight-over-volume ratios as an average of some previous and unknown number of truck load observations.

Weight is not a tree-specific or log-specific parameter as is customary with cubic and board content estimation. Therefore, it is not as precise a basis for assigning value as is customary with cubic or board content.

Net versus Gross – Weight/Volume Ratios

Use of weight to assign value becomes less precise when cubic or board content on a net-of-defect basis is used to determine the weight over volume ratio from truck loads. This is especially troublesome when subsequent users (foresters, planners, land owners, log-yard owners) lose track of the basis from which the ratio was determined originally. This situation is so common that it creates a primary justification to not use weight for inventory reporting or valuation at all.

More often than not, weight ratios are being applied without knowledge of their origin. Consider the following discussion. Since a cubic-foot of water weighs 62.4 pounds and wood floats on water; then why are there so many weight ratios in common use which estimate wood weights at levels more than 62 pounds per cubic foot? This may be appropriate for paying a truck driver for a load of logs, bark, rocks and ice; but is it appropriate (precise, without bias, consistent) for assigning land owner values? If you use a weight ratio to assign value, do you know the basis from which it originated? Most likely not! Is it documented or retrievable? If not, why are weight ratios being used?

Numbers of Cords

All of the discussion about valuation based on weight is equally appropriate to valuation based on numbers of cords. Cord content becomes even less reliable since it is never actually observed as a measureable unit at any point in the transition from standing timber to final product. It is a measurement unit being applied without definition.

Summary

As stated earlier, if a truck load is made up of logs of differential values to the land owner or log-yard owner, then weight scaling is not appropriate as a basis for setting value.

When a timber stand or forest is made up of trees of differential values to the landowner, then weight ratios derived from truck scales is not appropriate as a basis of setting value. Most likely, the ratio was derived from truck-load averages. As a result, these ratios are not specific to a species, a log size (diameter or length), or to a degree of defect in a log. When values are variable in a forest by any of these factors (species, size, defect), then a composite weight ratio has significant bias.

Recommendations

The most robust, precise and consistent tree and log parameters for assigning value is the trio of cubic volume, surface area and length within each value class (species, size, defect). This trio was introduced by Lew Grosenbaugh in 1954 for estimating wood product values using VSL (volume, surface, length). These VSL parameters have been computed in all FPS inventory and growth report writers since they were introduced by Lew Grosenbaugh. Should someone desire to obtain precise estimates of product values, then VSL is the preferred basis to transition from truck, timber stand or forest to value.

If VSL conversion to value factors are not available to you, then review the Preferred Basis for Valuation as discussed on the second page.

James D. Arney, Ph.D.
Senior Biometrician
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