**AVI Timber Productivity Rating Calculation and Validation**

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In order to standardise the way TPR is calculated for AVI stands, a set of ArcGIS tools have been developed to both calculate TPR and validate it. This document describes the rules used by these tools.

# TPR Calculation

TPR calculations are performed using a set of formulas as documented in the AVI 2.1 standards manual. The formulas have been implemented using a Python script that can be run from ArcGIS. TPR is calculated for forested stands greater than 5 meters high. Any forested stands less than 6 meters high must have an interpreted TPR. The rules that have been implemented for the TPR calculator are as follows:

1. If a forested layer is less than 6 meters in height, no calculation will be performed on that layer.
2. Photo year is used as the base year in determining the Breast Height Age. This requires that all AVI feature classes have a populated PHOTO\_YR field in order to obtain this value.
3. The Breast Height Age is calculated by taking the photo year and subtracting the ORIGIN of the layer. An adjustment value based on the species type is then subtracted from this value to obtain the age. For instance, and stand with a leading species of 'SW', 'SE', 'FD', 'FB', 'FA' is considered a White spruce/fir species type and an adjustment value of 15 years is used. If the resulting Breast Height Age is less than 1 then no TPR calculation can be performed on the layer and an interpreted TPR will be required.
4. Prior to calculating the Breast Height Age the ORIGIN is adjusted if needed. Since origin is normally reported by decade, the midpoint of the decade is used for the origin value in TPR calculations. For instance, if the origin of the layer is 1930 then 1935 would be used as the origin in the TPR calculation. It is assumed that if the origin of a stand ends in 0 than it represents a decadal origin and the adjustment will be applied. If it does not end in 0 than it is assumed to be a known origin and its value will be used as is.
5. If the stand is Complex then the mid-point height (recorded height) is used when calculating TPR.
6. In addition to calculating the pure TPR value of a layer, additional rules are applied in consideration of other AVI standards. These include the following:
   1. If a layer can have its TPR calculated then it will clear any I (interpreted TPR) flags in the Existing Stand Data field for that layer.
   2. It the stand is multi-storied and the understory species 1 is the same as the overstory species 1 then the understory TPR will be forced to be the same as the overstory.
   3. If the stand is multi-storied and one of the layers is forested while the other is non-forest vegetated then the non-forest vegetated layer is assigned the TPR from the forested layer.
   4. If the stand is multi-storied and one of the layers is forested while the other is anthropogenic vegetated CPR then the anthropogenic vegetated layer is assigned the TPR from the forested layer.
   5. If the stand is multi-storied and one of the layers is forested while the other is naturally non-vegetated NMB then the naturally non-vegetated layer is assigned the TPR from the forested layer.

# TPR Validation

To allow you to focus on setting TPR values for your AVI feature class, the AVI validation functions have been incorporated into the tools. The rules used for validation are as follows:

1. Any forested layer greater than 5 meters and able to have a TPR value calculated will use this calculated TPR in comparison with the recorded TPR, if they are different an error message is generated. Note that the I (Interpreted TPR flag) from the Existing Data field will be ignored since all stands greater than 5 meters now require a calculated TPR.
2. All forested layers will require a TPR
3. All non-forest vegetated layers require a TPR
4. Any naturally non-vegetated layers classified as NMB require a TPR.
5. Any anthropogenic vegetated stands classified as CPR require a TPR.
6. TPR must be one of: 'G','M','F','U'
7. When a stand is multi-layered and the overstory species 1 is the same as the understory species 1 then the understory TPR must match the overstory TPR.
8. If a stand is multi-layered and one of those layers is forested and the other is non-forest vegetated, anthropogenic vegetated CPR, or naturally non-vegetated NMB then the TPR of this non-forest layer must match that of the forested layer.