

Equations For Scaling Of Cover Results

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Acquiring CONUS-wide predictions of absolute cover of needle-leaved trees: Old version

Step 1: Get model predictions

$$\begin{aligned}percNLTree_{GS} &\sim \text{climate} + \text{weather} + \text{soils} \\percNLTree_F &\sim \text{climate} + \text{weather} + \text{soils} \\percBLTree_{GS} &\sim \text{climate} + \text{weather} + \text{soils} \\percBLTree_F &\sim \text{climate} + \text{weather} + \text{soils} \\absTotalTree_{GS} &\sim \text{climate} + \text{soils} \\absTotalTree_F &\sim \text{climate} + \text{soils}\end{aligned}$$

Step 2: Scale ecoregion predictions to be CONUS-wide

$$\begin{aligned}percNLtree_{CONUS} &= (P(GS) * percNLTree_{GS}) + (P(F) * percNLTree_F) \\percBLtree_{CONUS} &= (P(GS) * percBLTree_{GS}) + (P(F) * percBLTree_F) \\absTotalTree_{CONUS} &= (P(GS) * absTotalTree_{GS}) + (P(F) * absTotalTree_F)\end{aligned}$$

Step 3: Scale the CONUS-wide predictions to sum to 1

$$perNLtree_scaled_{CONUS} = \frac{percNLtree_{CONUS}}{percNLtree_{CONUS} + percBLtree_{CONUS}}$$

Step 4: Convert these predictions of proportions to absolute cover

$$absNLtree_{CONUS} = perNLtree_scaled_{CONUS} * absTotalTree_{CONUS}$$

When we use substitution to combine these equations, we get:

$$absNLtree_{CONUS} = \frac{[(P(GS) * percNLTree_{GS}) + (P(F) * percNLTree_F)]}{[(P(GS) * percNLTree_{GS}) + (P(F) * percNLTree_F)] + [(P(GS) * percBLTree_{GS}) + (P(F) * percBLTree_F)]} *$$

$$[(P(GS) * absTotalTree_{GS}) + (P(F) * absTotalTree_F)]$$

Acquiring CONUS-wide predictions of absolute cover of needle-leaved trees: New version

Step 1: Get model predictions

$$percNLTree_{GS} \sim climate + weather + soils$$

$$percNLTree_F \sim climate + weather + soils$$

$$percBLTree_{GS} \sim climate + weather + soils$$

$$percBLTree_F \sim climate + weather + soils$$

$$absTotalTree_{GS} \sim climate + soils$$

$$absTotalTree_F \sim climate + soils$$

Step 2: For predictions of proportions, scale them so that they sum to 1

$$percNLtree_scaled_{GS} = \frac{percNLtree_{GS}}{percBLtree_{GS} + percNLtree_{GS}}$$

$$percNLtree_scaled_F = \frac{percNLtree_F}{percBLtree_F + percNLtree_F}$$

Step 3: Convert these predictions of proportions to absolute cover

$$absNLtree_{GS} = percNLtree_scaled_{GS} * absTotalTree_{GS}$$

$$absNLtree_F = percNLtree_scaled_F * absTotalTree_F$$

Step 4: Convert these predictions of absolute cover by ecoregion to be CONUS-wide

$$absNLtree_{CONUS} = (P(GS) * absNLtree_{GS}) + (P(F) * absNLtree_F)$$

When we use substitution to combine these equations, we get:

$$absNLtree_{CONUS} = (P(GS) * [(\frac{percNLtree_{GS}}{percBLtree_{GS} + percNLtree_{GS}}) * absTotalTree_{GS}]) + (P(F) * [(\frac{percNLtree_F}{percBLtree_F + percNLtree_F}) * absTotalTree_F])$$