Forest Monitoring 2023

Guide to create code of summary stats

Use **cleanedmerged csv** for all calculations

**Treatment Year (NEWLY ADDED FEB 2024)**

For each plot, have the code identify the year that is in column “treatment year”. If there is an NA, then code should identify this as “Unknown”.

Example:

Plot FM\_BL\_116\_2023: 2021

Plot FM\_BL\_137\_2023: Unknown

**Basal Area**

[output: value for the plot]

* Calculate this for each plot which can be identified using column labeled ‘new plot key’
* Include **only LIVE, ADULT trees.** Exclude saplings (which have a DBH measurement) and exclude seedlings which won’t have a DBH measurement. Use the column “size class” to determine if it is adult, sapling, seedling.
* Exclude dead trees using column labeled “alive or dead”
* For each live, adult tree, convert DBH (cm) to inches by dividing value by 2.54
* Square the DBH in inches
* Calculate the basal area for each the tree (square feet) by multiplying DBH in inches by 0.005454
* Sum the basal area values for all the live trees to give you the basal area of the 1/5th acre plot
* Multiply by 5 to get the basal area per acre

(Trace’s note: I would calculate this per tree within the plot and then expand to a per-acre single value for the entire plot. The standard forestry equation is (0.005454 x (DBH in inches)^2 = basal area of tree). Our data has DBH in cm so we would have to convert to inches before using the equation. The sum across all trees in the plot would give us basal area for a 1/5th acre and then we would need to multiply by 5 to get a per acre value.)

Example

See excel example for Plot FM\_BL\_116\_2023

***Basal area per acre for plot is 21.28 square feet per acre***

**Dominate Tree Species for Adult, Live Trees**

[output: common name of tree with highest percent composition for each plot]

Within a plot, what tree species is most common from the adult, living trees (overstory trees)?

Example

FM\_BL\_116\_2023: White Fir (50%), Ponderosa Pine (30%)

See Excel

One way to do this

* *A. Calculate total # of live, adult trees in a plot*:

Within a plot (column labeled ‘new plot key’), use column ‘alive\_dead’ and column “size class” to count how many LIVING, ADULT trees there are in the plot. We do not want to include dead trees and don’t include saplings or seedling.

* *B. Calculate # of live trees for each species in a plot:*

Using **just the LIVE,ADULT trees** in a plot, count the number of live, adult trees there are for **each** species using column ‘tree species’.

* *C. Calculate the percent composition of live trees in a plot by species:*

Divide B by A and multiply by 100% to provide the percent composition by species with the plot.

* *D. Identify species code with highest percent:*

Have the code identify which tree code in the plot has the highest percent composition value and what the percent value is

* E. *Identify what common name is associated with the species code*

Have the code identify 1) what the common name is of the species code with highest percent composition (See code guide below) and 2) the percent composition of it. If the highest percent composition is 50 or less%, have the code identify the second highest percent composition and include it in the final result.

* Final results would look like “White Fir(50%), Ponderosa Pine (30%)

GUIDE (may need to double check spelling and codes)

PSME: Douglas fir

PIPO: Ponderosa Pine

POTR: Aspen

PIEN: Engelmann spruce

JUSC: Rocky Mountain Juniper

ABLA: Subalpine fir

ABCO: White Fir

**Average DBH**

{output: average numerical value in inches)

* There is specific column called “dbh\_cm\_tree” which has already excluded the saplings and seedling, but it includes dead trees, which we need to exclude
* Within a plot, focus on the adult, living trees. Exclude dead trees using column labeled “alive or dead”.
* Convert the DBH in column “dbh\_cm\_tree” for each living tree in the plot to inches by dividing by 2.54.
* Average for all the adult, live trees in the plot. (Make sure that sapling and seedlings are excluded and not recorded as 0 or something as that will mess up average).

Example for plot FM\_BL\_116\_2023

See excel

***Average DBH in inches for plot is 8.58 inches***

**Average Height**

{output: average numerical value in feet)

* Within a plot, focus on the adult, living trees. Exclude dead trees found in column labeled “alive or dead”. Must exclude dead trees because there is a measurement for them but we don’t want to include it.
* Saplings and seedling are already excluded from the column “total\_height\_m\_tree”
* Take the height for each adult, live tree in the plot that is in meters (found in column labeled “total height m tree”) and convert to feet by multiplying by 3.28084.
* Then take average for all trees in plot. (Make sure that sapling and seedlings are excluded and not recorded as 0 as that will mess up average).

Example- see excel

***Average tree height in plot is 29.00 feet***

**Regeneration Present or Absent?**

Within a plot, were saplings or seedlings found? If so, then regeneration is present. If not, then regeneration is not present.

[Output should be “Regeneration Present” or ”Regeneration Absent”]

* Within a plot (use column labeled “new plot key” to identify all rows in a plot), does the column “size class” have saplings or seedlings?
* If saplings or seedlings are present in size class column, then code should say Regenerate Present
* If no saplings and no seedling were found in size class column, then code should say Regenerates Absent.

Example for plot FM\_BL\_116\_2023: Regeneration Present

Example for plot FM\_CS\_92\_2023: Regeneration Absent

**Dominate Regeneration Species**

Within a plot, if saplings or seedling were found, what tree species is most common and what is it’s percent composition?

This only needs to be done for plots that have the result of “Regeneration Present” in the above metric. For plots that have a results of “Regeneration Absent”, have the code spit out “Regeneration Absent” for this dominate regeneration species metric too.

For all plots that have regeneration present:

* *A. Calculate total # of live saplings found in the plot*

Within a plot (column labeled ‘New Plot Key’), use column “alive or dead” and then column “size class” to count number of alive saplings within the plot.

Example: Plot FM\_BL\_116\_2023 has 1 alive sapling

* *B. Calculate total # of seedlings found in the plot:*

Within a plot (column labeled new plot key), count total number of seedlings found by summing the values in column called “numbers\_of\_seedlings”

Example: Plot FM\_BL\_116\_2023 has 2 seedlings

* C. *Calculate total # of seedlings and saplings found in a plot*

For each plot, add the total number of live saplings from step A. to total number of seedlings from step B to tell us the total number of regeneration plants found (saplings and seedlings)

For example, Plot FM\_BL\_116\_2023 has 1 live sapling and 2 seedlings so it has a total of 3 regeneration plots

* D. *Calculate total # of live saplings by species in the plot:*

Within the plot, count the number of live (column “alive or dead”) saplings (column “size class’) there are for each species (column “Tree Species”)

Plot FM\_BL\_116\_2023 has a ABCO

* E. *Calculate # of seedlings by species for each plot:*

Within the plot, count the number of seedlings (column “number of seedlings”) for each species found in the column “Tree Species”). Each species has it’s own row for seedlings.

Plot FM\_BL\_116\_2023 has 1 PIPO and 1 ABCO

* F. *Add # of saplings by species to # of seedlings by species for each plot:*

Within each plot, add the value from D and value from E for each species to tell us how many regeneration plant individuals were found for each species.

See excel for example if needed

* G. *Calculate percent composition by species for understory plants with the plot*

Divide value found in step F for each species by total number of regeneration plants in the plot (value calculated in step C) and multiply by 100% to provide the percent composition by species within the plot.

* *H. Identify species code with highest percent:*

Have the code identify which species code in the plot has the highest percent composition value and what the percent value is.

For example, for plot FM\_BL\_116\_2023, ABCO is the code for the species with greatest percent of 66.66%

* I. *Identify what common name is associated with the species code*

Have the code identify what the common name is of the species code with highest percent composition (See code guide below) and shows us 1) the common name and 2) the percent.

GUIDE (may need to double check spelling and codes)

PSME: Douglas fir

PIPO: Ponderosa Pine

POTR: Aspen

PIEN: Engelmann spruce

JUSC: Rocky Mountain Juniper

ABLA: Subalpine fir

ABCO: White Fir

* If the highest percent composition is 50 or less%, have the code identify the second highest percent composition and include it in the final result.

**Seedling Per Acre Metric (NEWLY ADDED MAR 2024)**

{output: Number of seedlings per acre for each plot}

* Within a plot (column labeled “new plot key”), count the number of seedlings found. This was already calculated for metric above so maybe you can build for that. For example, 2 seedling were found in plot FM\_BL\_116\_2023.
* Take the total number of seedlings for the plot, and multiply it by 50 to give you the number of seedling per acre

So for plot FM\_BL\_116\_2023, it would be 2x50 = 100 and result would be 100 seedings per acre.

**Damage Present**

*INSECT DAMAGE*  
Is damage from insect present in either the overstory or understory?

* Within a plot, is there damage from insects? Find this out by looking at the column labeled “insect\_presence”. If **any of the rows** in a plot have a 1 in the “insect\_presence” column than damage was present. If it all 0s then no damage.
* If a 1 is in the insect\_column for any rows in a plot, have the code say “Insect damage present”
* If within the plot, there is no damage from insects (all 0s in that column), then have the code say “No insect damage”

Example

FM\_BL\_116\_2023: Insect Damage Present

*LIST DAMAGE*

* We want to create a list of all the disease and damage present in a plot. We don’t need to know how many trees had it right now but just if the aliment was present.
* Within a plot, use column “what if any disease damage present” to create a list of all the aliments occurring in the plot.
* We should remove the repeat of the same word. As in we don’t need the list for the plot to say bark beetle 3 times.

Example

FM\_BL\_116\_2023: Spruce budworm, mechanical damage, bark beetle, galls,

**Browse Present**  
Within a plot, is there damaged from browsing animals present in the plot?

* Within a plot, is there damage from browsing animals? Find this out by looking at the column labeled “browse\_presence”. If **any of the rows** in a plot have a 1 in the “browse\_presence” column than browse was present. If it all 0s then no browse present.
* If a 1 is in the brose\_column for any rows in a plot, have the code say “Browse Present”
* If within the plot, there is no browse present (all 0s in that column), then have the code say “No Browse Present”

Example

FM\_BL\_116\_2023: No Browse Present