Offsite Trial Reporting Project

**Project background**

Establishment of new off-site species planting trials is likely to become a common practice for informing climate change adaptation. Standardized comparisons, statistics, and graphical output are desired for these projects and for combining with historical trial data from previously established trials.

Deliverables for this project:

1. R functions to summarized and analyze planting data. These are to be written so that they can be easily run each year that we collect data (e.g., 2019, 2020, 2023, 2028, etc…)
2. R Markdown report that calls the functions and summarizes data into a single report.

Datasets: a) Data from 3-year trial of Griesbauer. b) Newly established trial data from 2019.

1. Individual tree measurements: Survival, condition, height by year.
2. Spatial files of trial layout
3. Climate surface data
4. Weather station data
5. Temperature dataloggers

Summaries by:

1. Plot summaries (data by individual 36-tree subplots)
2. Treatment summaries (all equivalent trials by treatment - species/seedlot)
3. Comparison of Treaments by each species
4. Comparison between all treatments (all species/seedlots)
5. Spatial analysis at different scales by treatment

Outputs:

1. Statistical summaries
2. Comparative statistics
3. Graphical output

Notes on data:

1. 2019 condition information. We collected seedling condition for 10 sites. Sites are identified by ‘FID’. For each of these ten sites, we need the following information summarized into a data.frame():
   1. Number of tree ratings (Good,Fair,Poor,Missing) summarized by Site, Tree Species and Seedlot. Example table below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **FID** | **Tree Species** | **Seedlot** | **Rating** | **Number** |
| FID2\_Mesic | Fd | 48678 | Good | 34 |
| FID2\_Mesic | Fd | 48678 | Fair | 45 |
| FID2\_Mesic | Fd | 48678 | Poor | 23 |

And so on…

1. For each site, we have plot maps (see “heat map” tab on attached spreadsheet. These need to be converted into a matrix of some kind to allow us to test for spatial autocorrelation. Each cell in the matrix will contain species, seedlot, and 2019 survival condition. I’m not clear on how to do this in R, but this should be relatively simple from a GIS perspective.
2. 2019 temperature information. We collected hourly temperatures from approximately May to September on several of the sites. For each temperature logger, we would like the following summary:
   1. Identify events in the time series where temperature fell below 0 Celsius. For each event, identify:
      1. Julian date
      2. Number of hours that temperature was below 0
      3. Magnitude (degrees below 0)
   2. Repeat step a, using a threshold of -4 Celsius instead (killing frost).

Output from these two analyses will be shown in appropriate figures (e.g., bargraphs, lineplots). Figures will be created using ggplot2.