**Methods**

This study tracks tree phenology in Longmont and Fort Collins, Colorado, through observations at 20 sites using the BudBurst app to monitor leaf color change and drop. In addition to phenological data, tree measurements and historical weather data were collected for analysis. The project consists of three/four phases: Data Collection, Data Entry and Processing, and Data Analysis (and potentially Data Interpretation) (Figure 4).

**Study area**

(insert map)

**Field Data Collection**

Data for this study was gathered entirely by the research team through direct observations at 20 sample sites in Colorado (10 in Longmont, CO and 10 in Fort Collins, CO), with no prior data collection beyond annual weather reports. Phenology observations were made weekly using the BudBurst app to track phenological data, specifically leaf color change and leaf drop percentages. To ensure consistency, the research team defined clear criteria for when a tree was considered “done” or completely leafless. A tree was classified as completely clear of leaves when the remaining leaves were 100% brown, crispy, and dead. This was necessary to account for trees that retain some dead leaves throughout winter, which may not drop until the following spring.

In addition to phenological observations, tree measurements were taken, including Diameter at Breast Height (DBH) using measuring tapes, and estimates of tree crown width were made. These measurements allowed the classification of trees into one of three categories: skinny/tall, big/tall, and small.

**Data Entry and Processing**

Once the field data was collected, it was transferred from BudBurst to Excel formats for processing. Crude maps of the data collection sites were initially created using Canva, with plans to refine these maps using a GIS entity in the coming weeks. Historical weather data for the relevant months (August–November) over the last 30 years was compiled into two separate data sheets for each location, with an additional tab specifically for frost data from the past year. All data was organized and stored in Excel, allowing for easy reference and future analysis. Additionally, images of trees at various stages of senescence—showing different sizes, colors, and leaf drop stages—were taken and saved in a dedicated folder for later use in the final report and poster presentation. These images will serve as visual aids to support the quantitative data.

**Data Analysis**  
 At this stage, no formal data analysis or interpretation has been conducted. The collected data, including both tree phenological data and historical weather data, has been stored in spreadsheets and will be analyzed using R and/or Excel. The analysis will focus on identifying potential relationships between tree phenology (such as the timing of leaf color change and leaf drop) and weather variables (such as temperature and frost patterns). The spreadsheets will be cleaned up and organized to ensure that the data is ready for analysis, and several graphs and tables may be created to visualize the timing of leaf senescence in both Longmont and Fort Collins, as well as to explore any correlations between phenological events and weather conditions.

A diagram of a method

Description automatically generated with medium confidence

Figure : displays a potential method outline for our aspen tree phenology research as a flow chart of data collection, data entry & processing, data analysis, and data interpretation & potential outcomes. This method will be used to answer research questions concerning the phenological differences in aspen trees in two different locations along the Northern Front Range of Colorado.