



Harvard LTER Schoolyard Program

Teacher Developed Lessons and Documents that integrate
Harvard Forest Schoolyard Ecology Themes into curriculum.

- **Presentation Title:** *Tree Analysis ; Anatomy of a Scientific Paper*
- **Teacher/Author:** Jessica Greene
- **School:** West Springfield Middle School
- **Level:** 8th Grade
- **Date:** April 13, 2011

Team 8-2

Tree Analysis 2011: Buds, Leaves and Climate Change

You have been acting as citizen scientists during this school year as we observed and recorded information on the length of the growing season in our schoolyard. It is now time to analyze our data.

Anatomy of a Scientific Paper:

Professors, researchers, and professional scientists often write research papers to communicate their research. We won't be writing papers as long or complicated as theirs, but we will have the same basic elements. Their papers include:

- Introduction (purpose and general plan)
- Description of Study Area
- Methods (the steps, in detail, taken to conduct the research)
- Results (usually graphs or tables)
- Analysis of Results (what you learned from the graphs)
- Summary

Each person will write a report about their tree's data.

Back On Up

It is important that you remember why we are doing this project before we put much time into our data.

What is our short-term scientific question?

What is our long-term scientific question?

Who do we partner with on this project?

What have you done all year to contribute to this scientific investigation?

Components of a Scientific Paper

Introduction

Includes the following information:

- Purpose of study (why do we do this?)
- Describe the link with Harvard Forest (Dr. O'Keefe's study)
- Short-term Question: When does the growing season end and begin?
- Long-term Question: Is climate change (increased CO₂ in the atmosphere) changing when the seasons change (growing season ends and begins)?

Study Area Description

- Describe the location (proximity to school, roads, and houses)
- Describe geographical location (state, climate, ecosystem, terrain, forest)

Methods

Using the protocol sheets provided by Harvard Forest, describe the general steps we took (in the fall and the spring) to collect our data. Include how many branches were studied, how many buds/leaves on each branch, when data was collected, what data was collected, how often data was collected, etc.

Data Graphs

You will be creating a line graph to show how the trees changed over time. You will do one line for each year of data.

Spring: calculate the values for the

- % buds burst on your tree (for each data collection day)
- Julian days (date)

Fall: calculate the values for the

- % leaves fallen off your tree (for each data collection day)
- Julian days (date)

Instructions:

1. Find your tree's data for the past three years on the spreadsheets.
2. Calculate the Julian Days for dates of data and enter them. It's fine if we took data different numbers of times in different years. NOTE: 2008 was a LEAP YEAR. Use the appropriate chart!
Use the second converter on this page: <http://tinyurl.com/23qf3ky>
3. Calculate and enter in the values for % Leaves Fallen for all years. (%L Fallen on data)
4. You will be graphing the Julian Days (X) and the % Leaves Fallen (Y) for each year. Use a line graph with a different color line for each year.
5. Once your graph is drawn, you must title and label is like this:
 - a. Title: Leaves Fallen (*or Buds Burst*) in the Fall (*or Spring*) at West Springfield Middle School for Tree your# (Species)

- b. X axis: Day of the Year (Time in Julian Days)
 - c. Y axis: Percent of Leaves Fallen (*or Buds Burst*)
 - d. Make sure there is a legend that tells you what year each color line represents.
6. You may color the graphs any way you like, but make them easily readable and professional-looking.

Data Analysis

Using your data, interpret the information to answer your short term question. Remember, the growing season ended when half the leaves had fallen and began when half your buds were burst.

Explain briefly

- how you analyzed the data
- what it means (conclusion to the short-term question)
- how this relates to the long term question we are still working towards

Summary

Summarize everything stated on the poster. Briefly state:

- the question and purpose of the study
- what you spent the year doing
- what type of data you collected
- how we analyzed the data
- what was our conclusion to the short-term question
- what is the next step in future years

Name _____

Group Members: _____

Date: _____ Tree #: ____ Branch Letter: ____

Tree Analysis Paper

Introduction

Study Area Description

Methods

Data Analysis

Summary
