



## Harvard LTER Schoolyard Program

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

Lesson Title: Changing Forests Project Challenges and Successes 2013-15

Project: Our Changing Forests

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School: Oakmont High School

Level: High School


Date: April 9, 2015



# Changing Forests




# Changing Forests So Far

- 3 seasons of data collection
  - 3 field sites
  - 7 species of tree
  - 61 total trees
  - 116 samples
  - That should make for a great data set, right!?!
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# Current Protocol

- Identify Tree species and ID number and record
  - Find the highest side of the tree
  - Place the DBH stick up to the tree, measure the tree, and record
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# Problems with Data

- ▶ Measurements are extremely inconsistent between groups
  - ▶ Could be due to poor measurements or measuring from different sides of the tree
- ▶ Some trees seem to have shrunk and grown magically!
  - ▶ There is no record of trees that have lost bark, which might explain some of the shrinking on dead trees

# Possible Solutions for Field Protocol

- Field sites are set up with all tags facing the same direction





# So We Could!

- ▶ Have students measure from the tagged side of the tree.



# And!

- ▶ Have students take pictures of their measurements to go into a digital record.



Could be done either as one or two pictures





## Solutions continued...

- Modify data collection sheets so that there is a column for tree damage


Date (MM/DD/YYYY)	Tree ID Number	Species	Living or Dead	Bark Damage

- Considered giving previous years data but am concerned that might cause an accelerated growth of the trees.

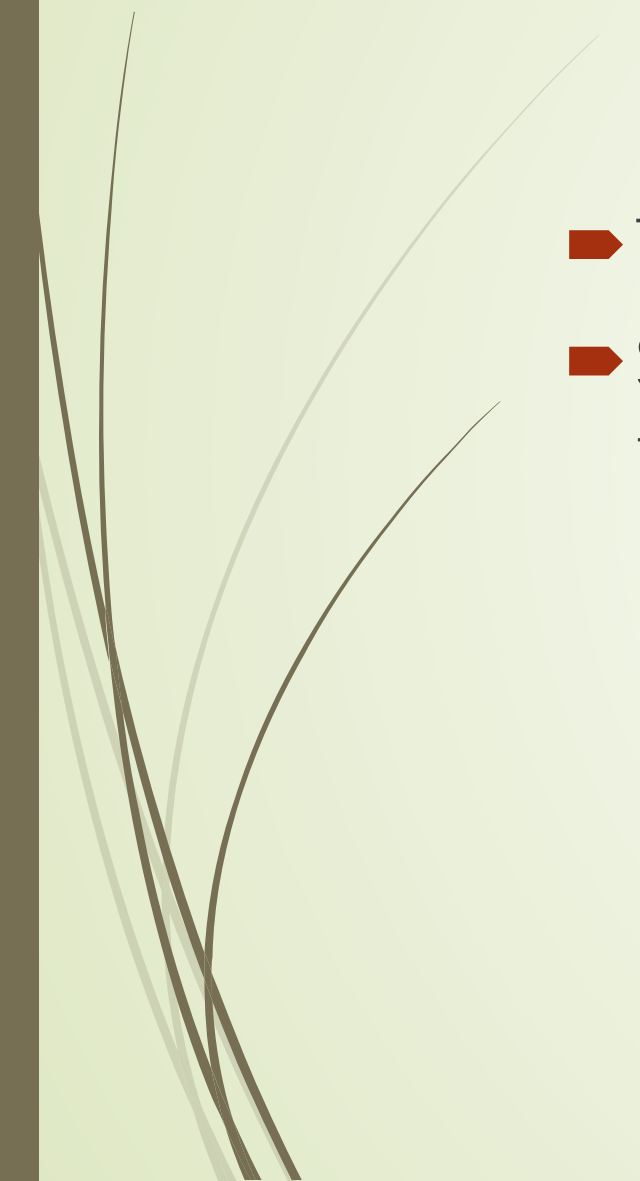


# Updated Protocol

- Identify Tree species, ID number and record.
- Place the DBH stick up to the tree on the side that is tagged.
- Look at DBH height for any bark damage and record if there is any.
- Measure the DBH and record on data sheet and with a picture.
- Write picture number next to entry




# Got the Data, Now What?

- ▶ Time to do some graphing and analysis!
  - ▶ Students need appropriate level graphs to get them engaged in the data analysis
    - ▶ Could be teaching Honors one semester and Essentials the next.
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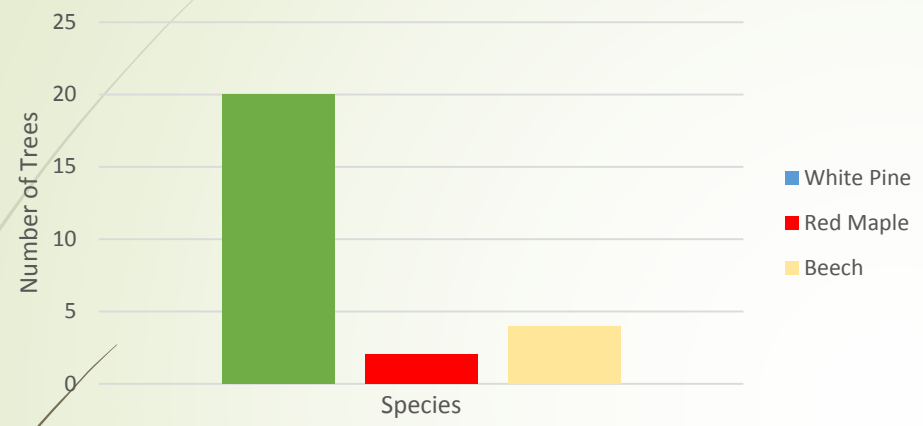
# Simple Graphs

- ▶ Start with paper graphs before going to excel
  - ▶ Graphs that deal with totals
  - ▶ Using multiple smaller graphs to compare data
  - ▶ Look at carbon sequestration of a single trees and compare
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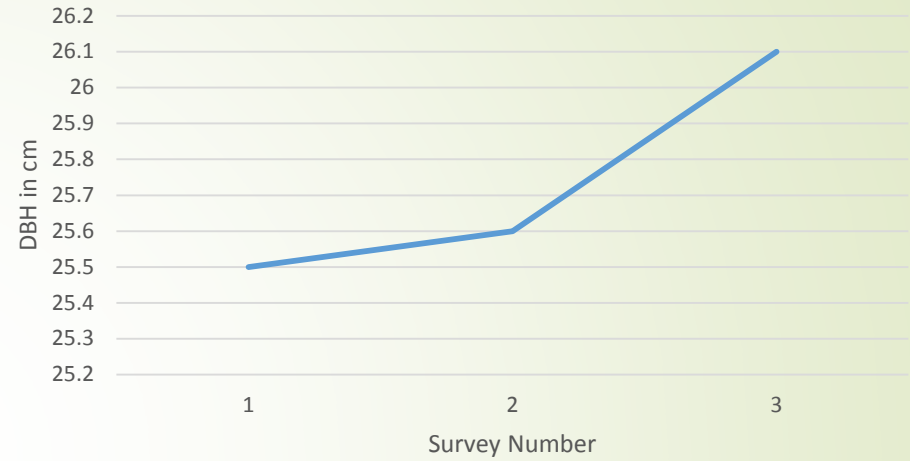




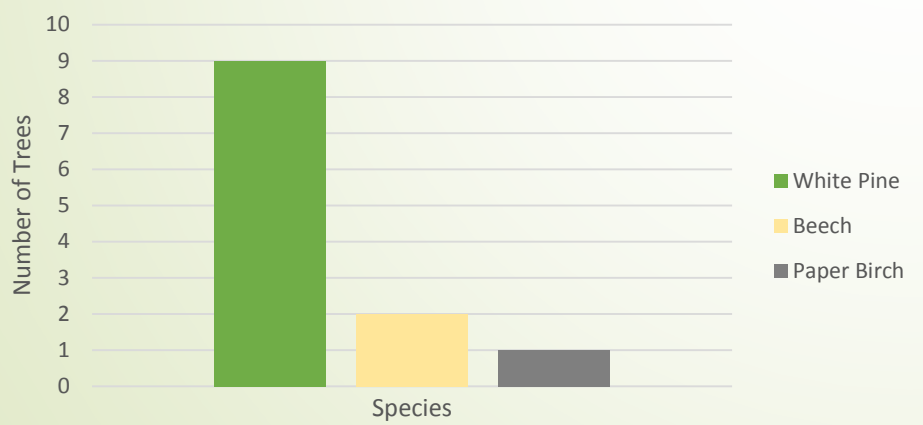
Number of Trees by Species in Schoolyard Phenology Study Plot # 1



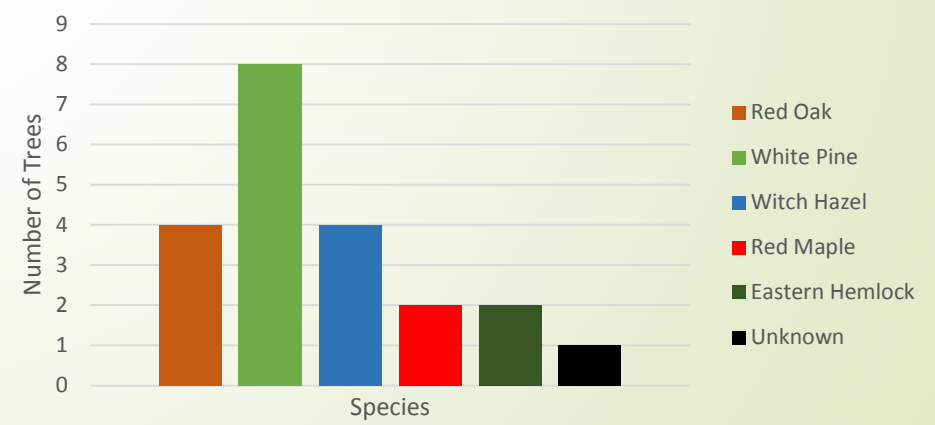
Growth of Tree Number 11 Red Maple



Number of Trees by Species in Schoolyard Phenology Study Plot # 2




Number of Trees by Species in Schoolyard Phenology Study Plot # 3



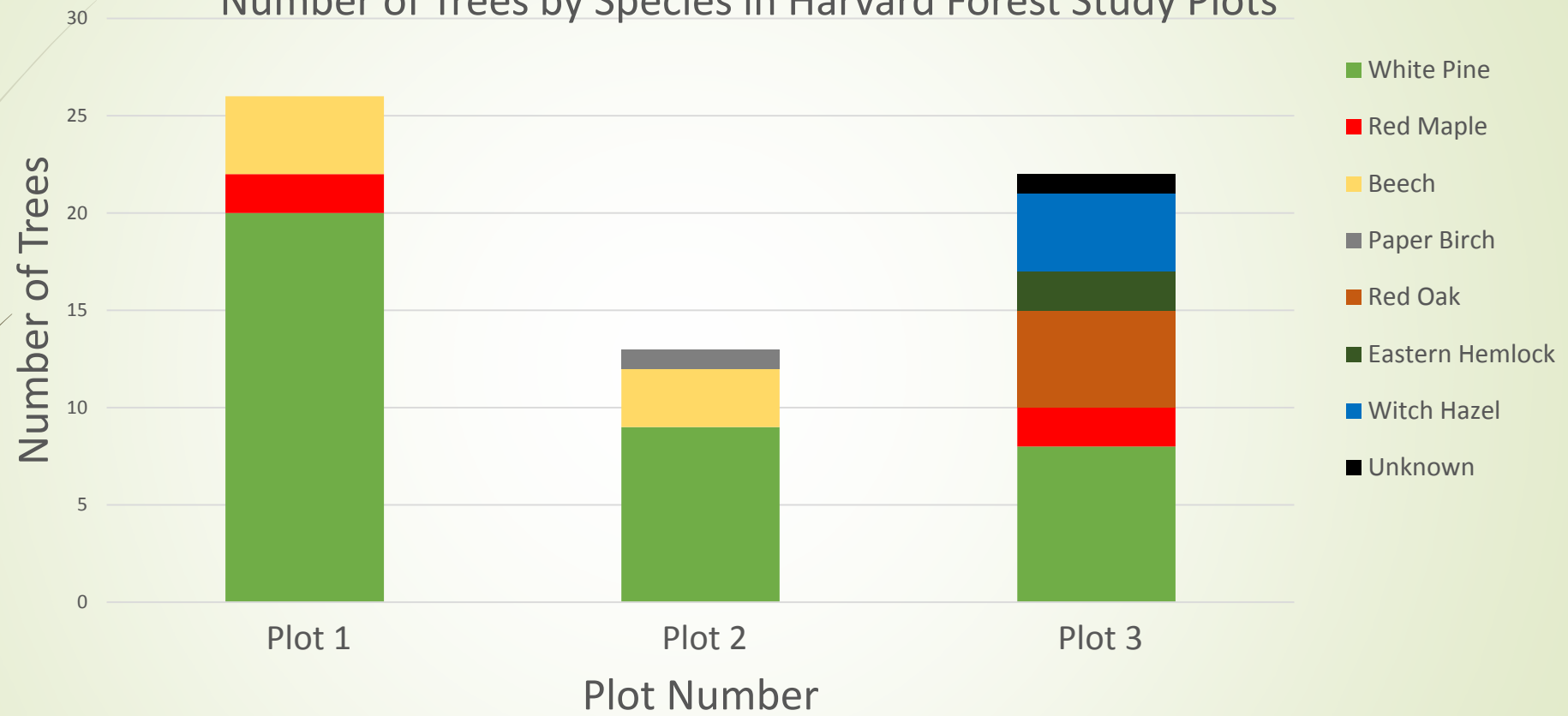


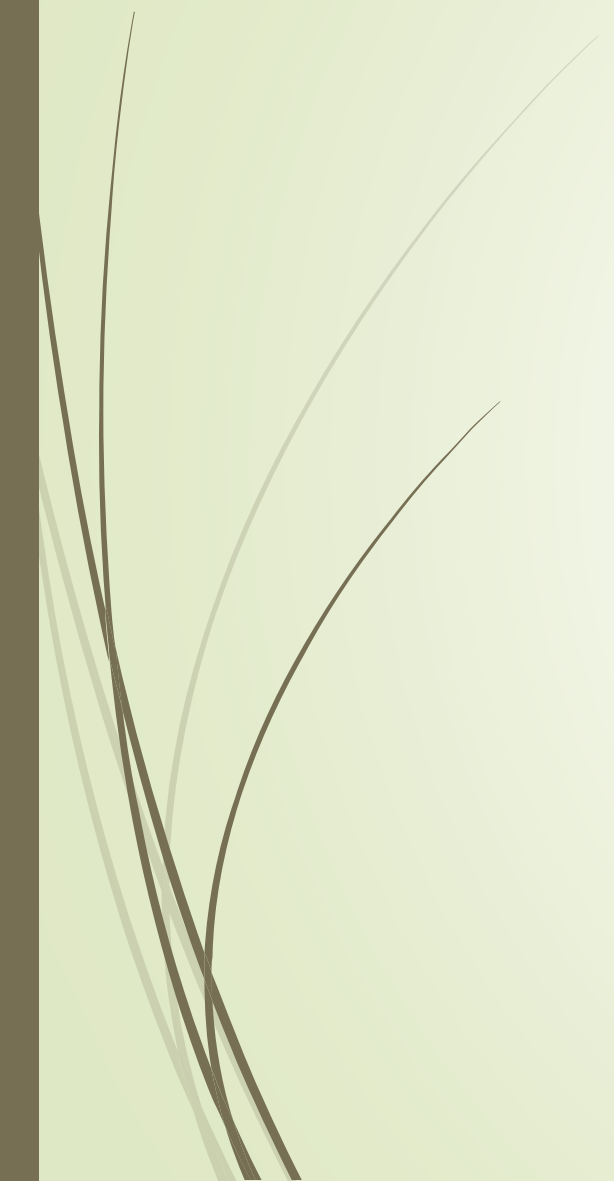
# Advanced Graphing

- ▶ Start Directly on Excel
  - ▶ Work with larger data sets and work with averages
  - ▶ Compile data onto a single graph
  - ▶ Look at total carbon sequestration, sequestration by plot, and by species as well.
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### Number of Trees by Species in Harvard Forest Study Plots





Average DBH of Harvard Forest Study Trees by Species

