

HARVARD FOREST

Established 1907 Long Term Ecological Research Site since 1988

HARVARD UNIVERSITY



Harvard LTER Schoolyard Program

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

- Lesson Title: **Visualizing the Forest Using graphs**
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- School: Groton-Dunstable Regional High School
- Level: Environmental Science Grades 11-12
- Date: April 9, 2019

Visualizing the Forest Using graphs

A Quick Lesson for Students Prior to Going Out To The Plots

Student assignment
to be completed
using graphs from at
least two plots prior
to going outside.

VISUALIZING THE FOREST FROM GRAPHS

Each graph is representative of data from a plot on campus that measures 1/10th of a hectare. The numbers are scaled up to show amounts per hectare.

ANSWER THE QUESTIONS BELOW IN COMPLETE SENTENCES ON A SEPARATE PIECE OF LINED PAPER AND ATTACH IT TO THIS ONE.

DEFINITIONS

STAND DENSITY BY SPECIES: THE NUMBER OF STEMS OF EACH SPECIES

BASAL AREA BY SPECIES: THE TOTAL AREA OF THE CROSS SECTION OF EACH STEM OF EACH SPECIES

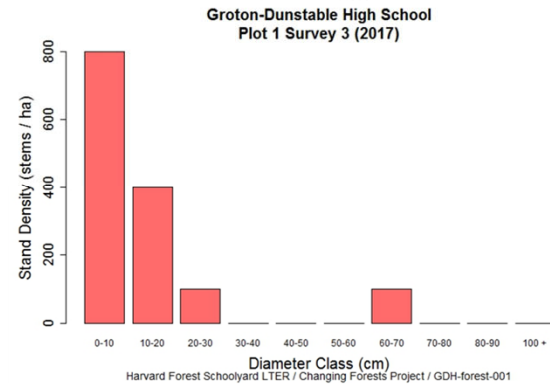
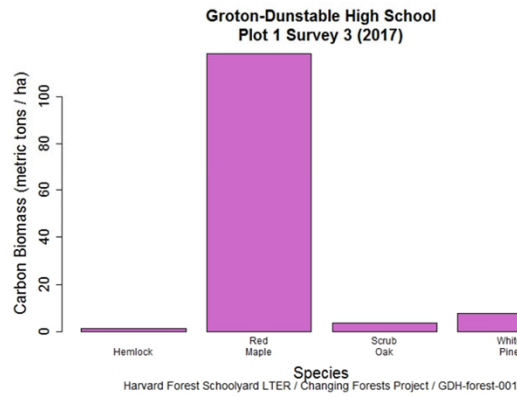
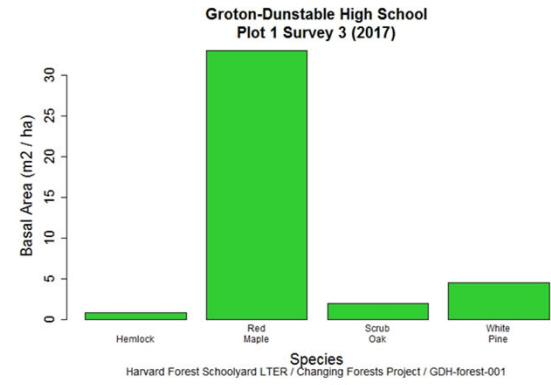
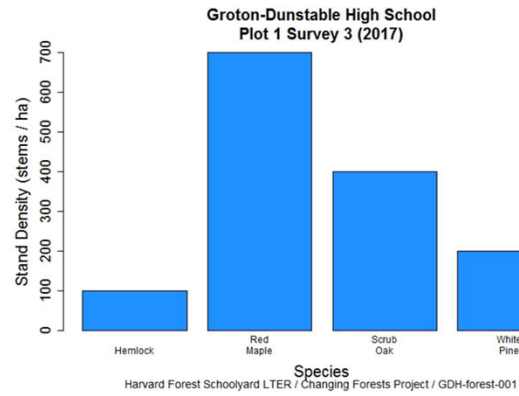
CARBON BIOMASS BY SPECIES: THE TOTAL CARBON BIOMASS FOR EACH SPECIES

STAND DENSITY BY DIAMETER CLASS: THE NUMBER OF STEMS WITHIN A SPECIFIC DIAMETER RANGE

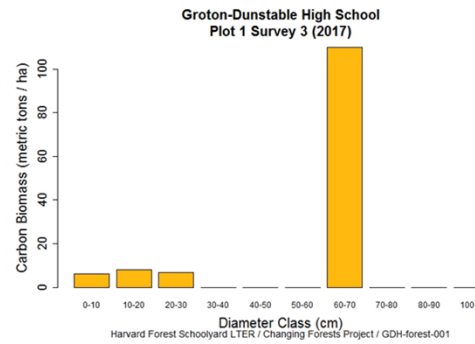
CARBON BIOMASS BY DIAMETER CLASS: THE TOTAL CARBON BIOMASS FOR A SPECIFIC DIAMETER RANGE OF STEM

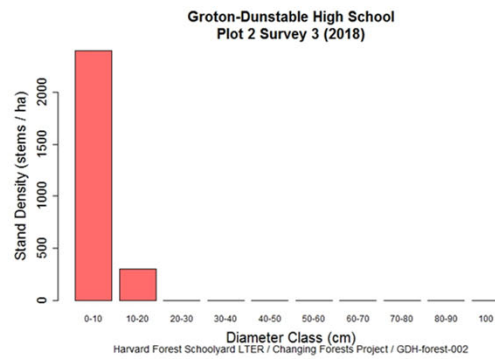
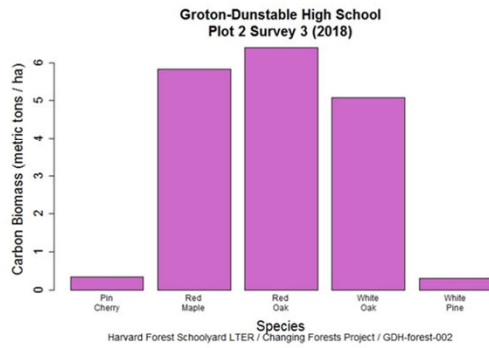
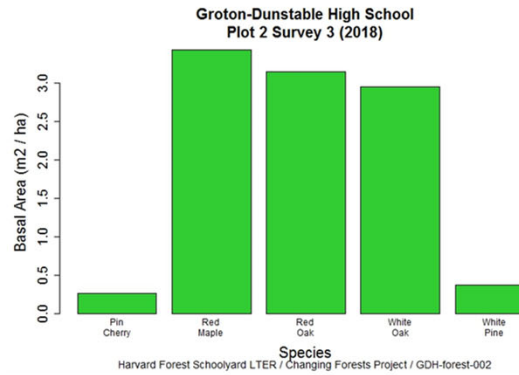
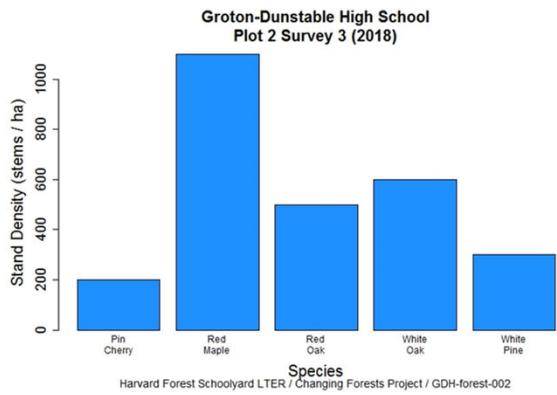
Student Activity

1. LOOK AT THE GRAPHS OF STAND DENSITY BY SPECIES FOR PLOT 1 AND 2. WHICH SITE HAS THE MOST STEMS? COMPARE AND CONTRAST THE SITES ACCORDING TO SPECIES.
2. LOOK AT THE GRAPHS OF BASAL AREA BY SPECIES FOR PLOTS 1 AND 2. WHICH SITE HAS THE MOST BASAL AREA? APPROXIMATELY HOW MUCH BASAL AREA DOES EACH SITE HAVE?
3. COMPARE STAND DENSITY WITH BASAL AREA. DOES THE SPECIES WITH THE MOST STEMS/HA ALWAYS HAVE THE GREATEST BASAL AREA? HOW DO YOU KNOW?
4. COMPARE THE CARBON BIOMASS FOR PLOT 1 AND 2. WHICH SITE CONTAINS THE MOST CARBON BIOMASS? APPROXIMATE THE TOTAL CARBON BIOMASS FOR EACH SITE.
5. PLOT 2 HAS MORE RED MAPLE STEMS THEN PLOT 1 DOES HOWEVER PLOT 1 HAS MORE CARBON BIOMASS IN RED MAPLES THEN PLOT 2. HOW CAN YOU EXPLAIN THIS?
6. COMPARE THE TWO GRAPHS FOR EACH PLOT OF DIAMETER CLASS. DO THE GRAPHS FOR STAND DENSITY RESEMBLE THE GRAPHS FOR CARBON BIOMASS FOR EACH SITE? WHAT DO YOU NOTICE ABOUT THE GRAPHS FOR EACH PLOT?
7. NOW THAT YOU HAVE ANALYZED THE GRAPHS FOR THE TWO PLOTS DRAW AND LABEL A DIAGRAM OR WRITE A DESCRIPTIVE PARAGRAPH ABOUT THE SPECIES, APPROXIMATE NUMBERS, AND SIZE OF THE TREES ON EACH PLOT.

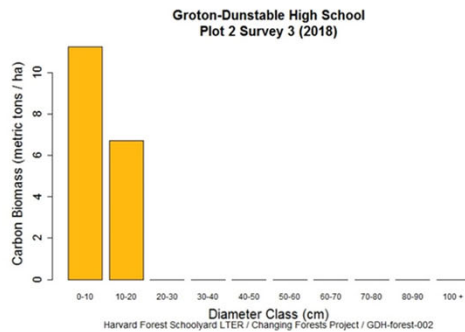


Graphs: Plot 1





Graphs: Plot 2



Sample of student work

Shannon & Molly

1. Plot 2 because the 0-10 diameter bar goes above 2000 but Plot 1 the 0-10cm diameter bar goes only up to 800.

2. Plot 1 has significantly more the Red Maples have over 30 m²/ha and Plot 2 Red Maples go up to 30.

3. Yes, because on all 4 graphs Red Maple is the biggest bar.

4. Plot 1 because they have much bigger trees.

5. The Red Maples in Plot 1 are bigger and contain more carbon.

6. The graphs for Stand density have alot for trees that are 0-10cm and some for 10-20cm, 20-30cm, and a few for 60-70cm. But for the Carbon Biomass plot 1 as a few for 0-10cm, 10-20cm, and 30-30cm and over 100 for 60-70cm for Plot 2 theres a little over 10 for 0-10cm and 7 for 10-20cm.

