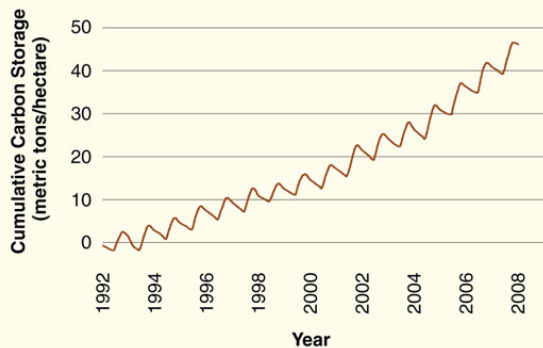
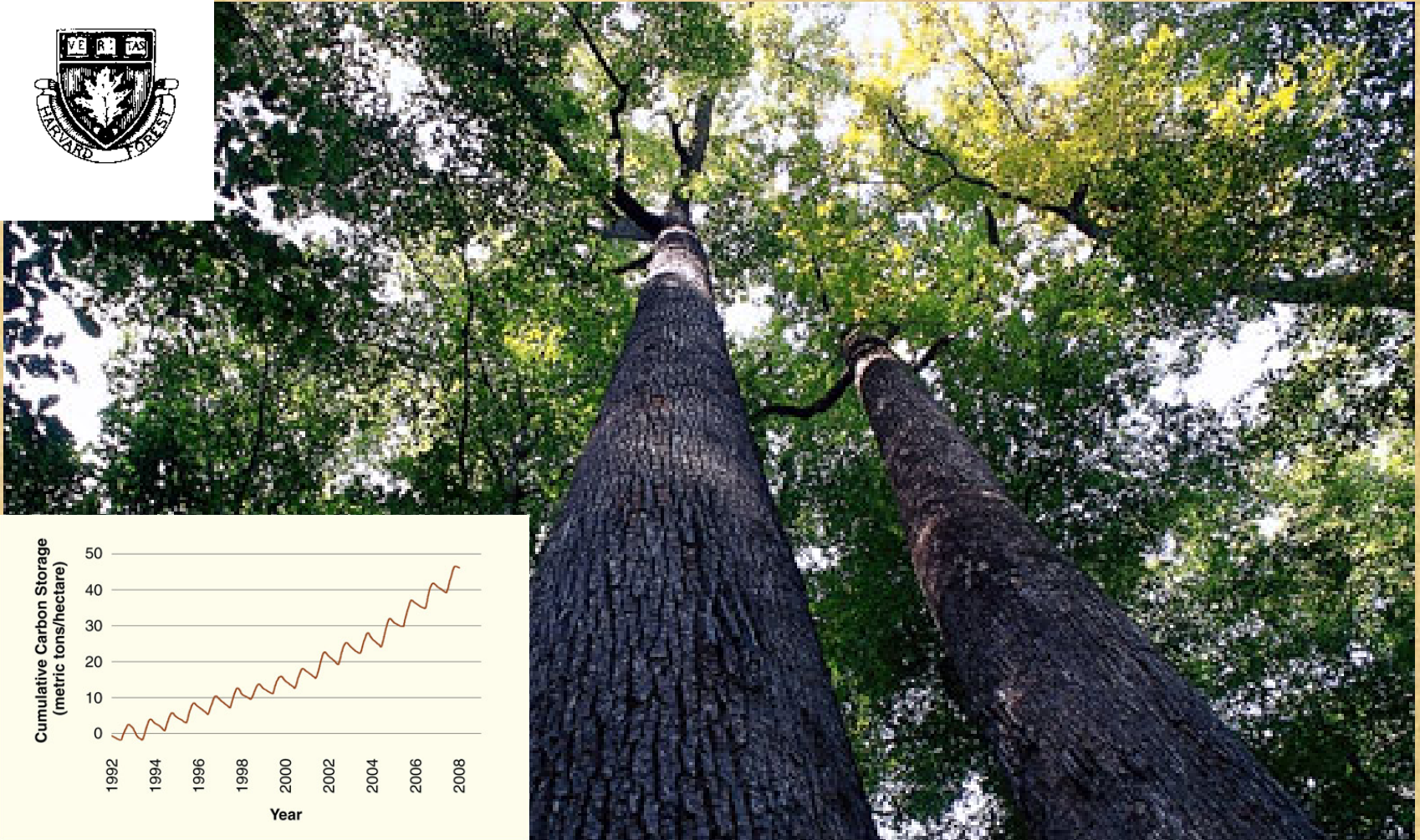


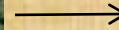
Our Changing Forests

Harvard Forest Schoolyard Project

August 22, 2019



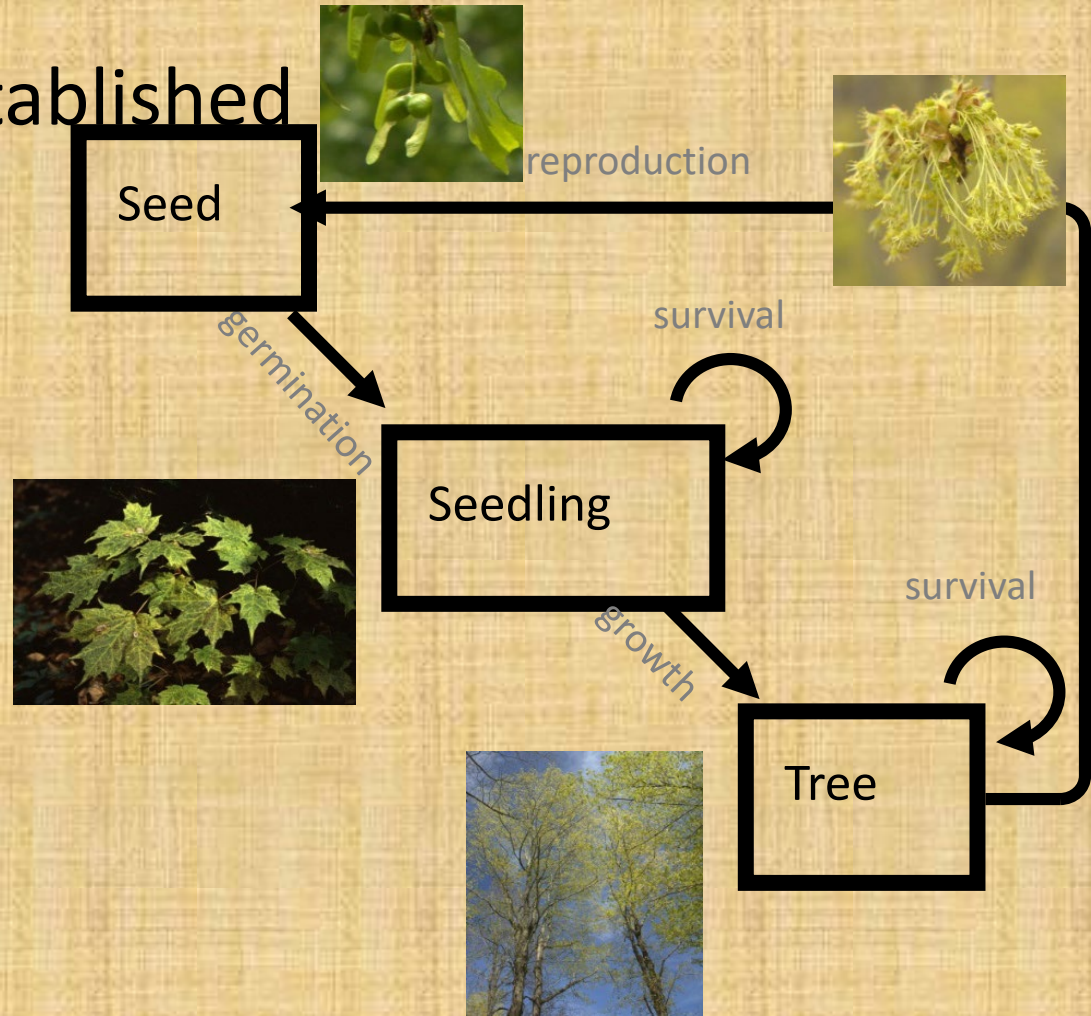
1. How do forests change?
2. What are the implications of forest change?
3. How do we measure forest change?



1. How do forests change?

Slowly:

- New trees get established
- Trees grow
- Trees die



1. How do forests change?

Rapidly: Disturbance

Background

Weather – ice, snow, wind, hurricanes

Pre-colonial

Fire, in some places

Colonial – Early Industrial

Forest clearance (lumber, farming, cities)

Fire

Modern

Forest regrowth

Forest fragmentation

Atmospheric pollution

Pest outbreaks

Future

Climate change

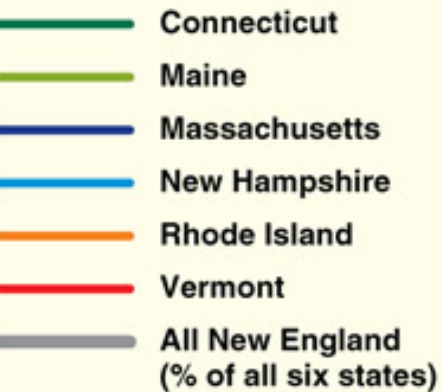
Development

Pollution

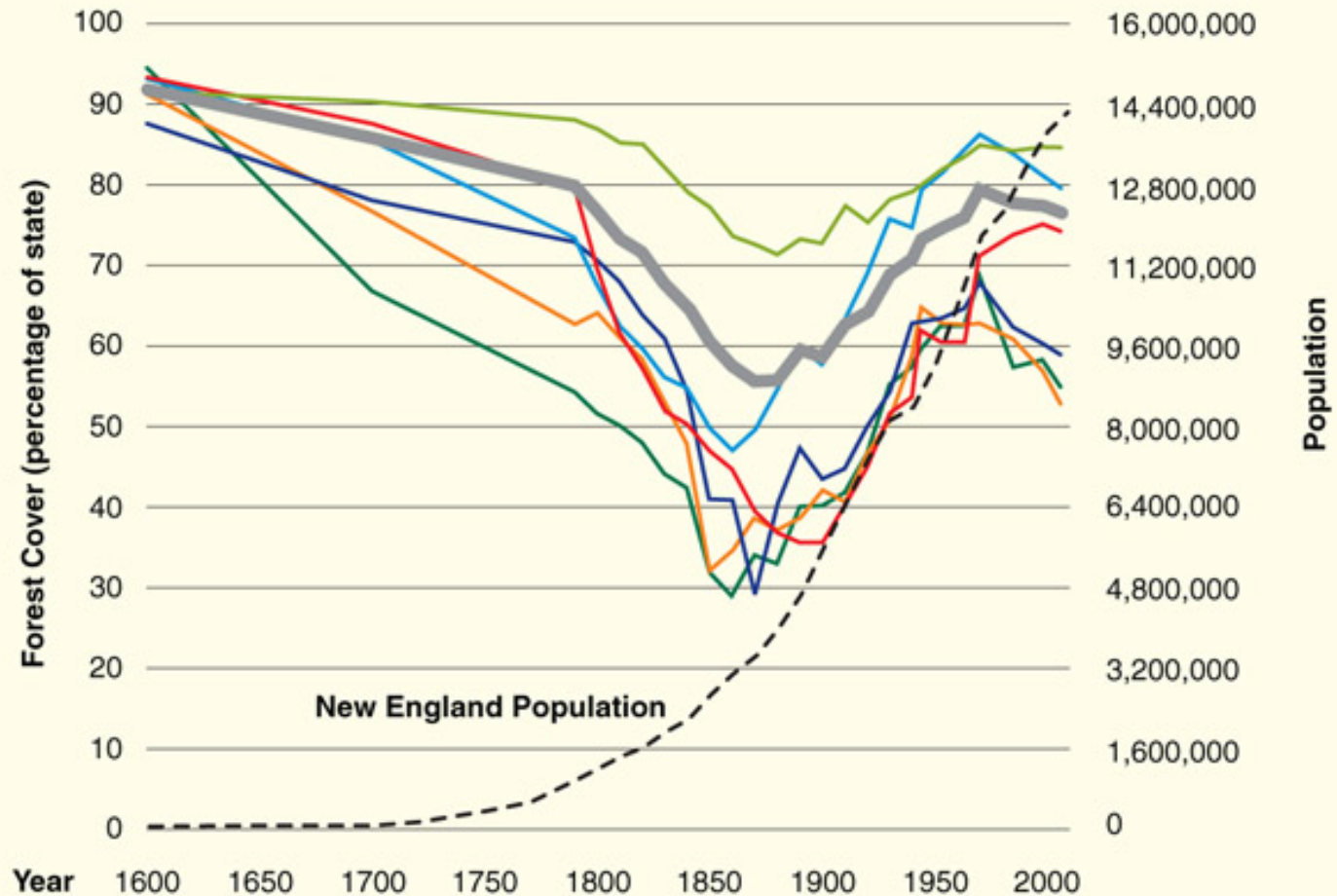


1. How do forests change?

Rapidly: Disturbance



New England Forest Cover and Human Population



2. Implications of forest change

- Species composition



2. Implications of forest change

- Forest structure

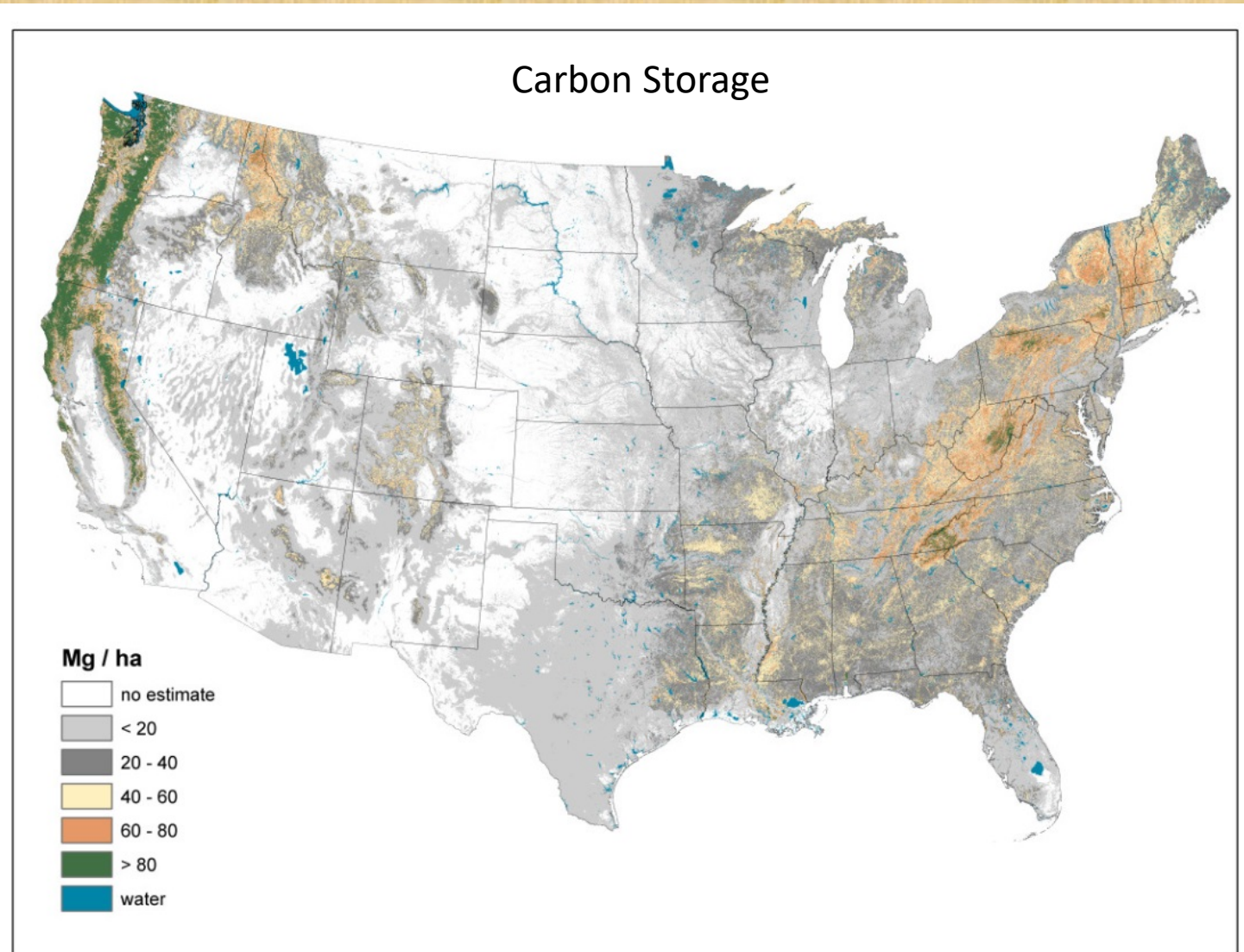
carbon



carbon

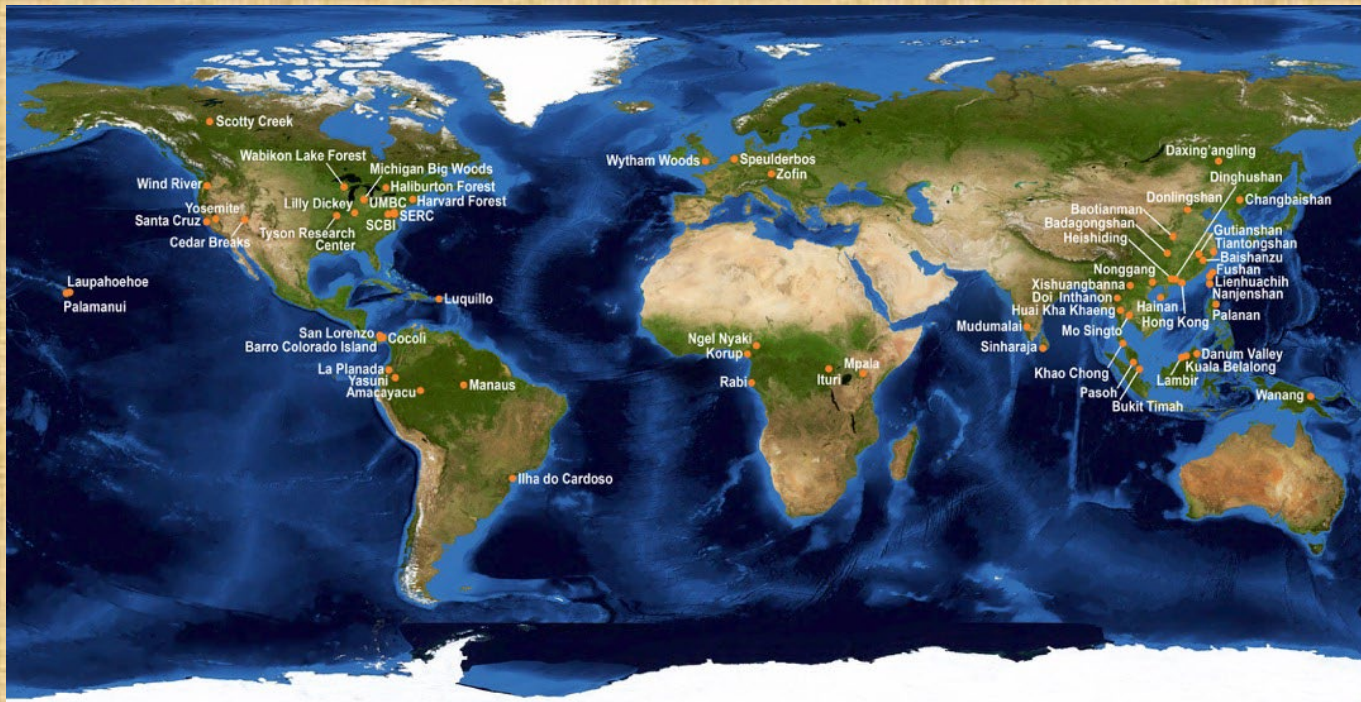


2. Implications of forest change

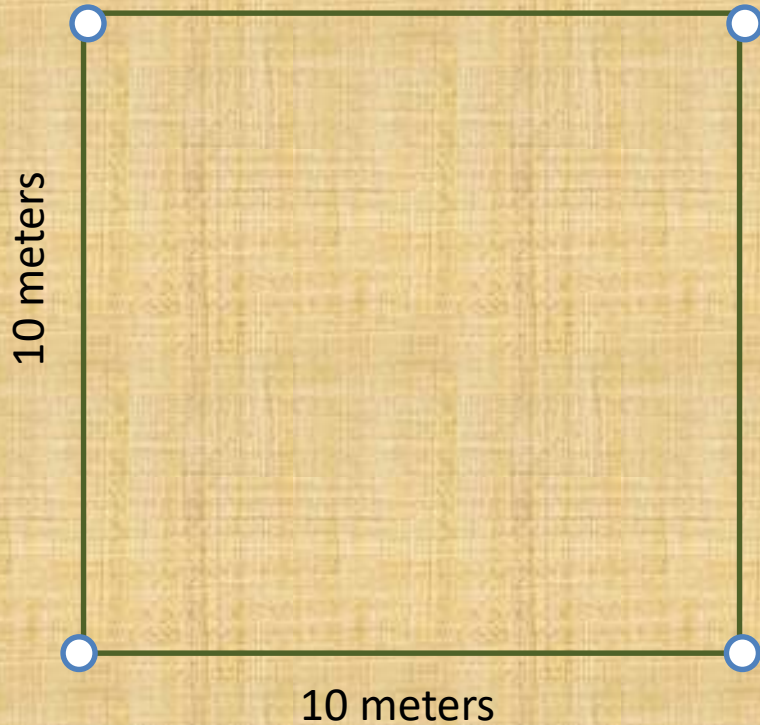


3. How do we track forest change?

- Plots
- Used by ecologists, conservationists, land managers around the world



Changing Forests Protocol



Year 1

1. Establish and permanently mark at least one 10 x 10 meter square plot
2. Measure all trees and shrubs at least 2.5 cm in diameter
 - a. record species
 - b. record the tree diameter at "breast height"
 - c. record whether alive or dead
 - d. mark each stem with a numbered tag
3. Record field site characteristics about the plot

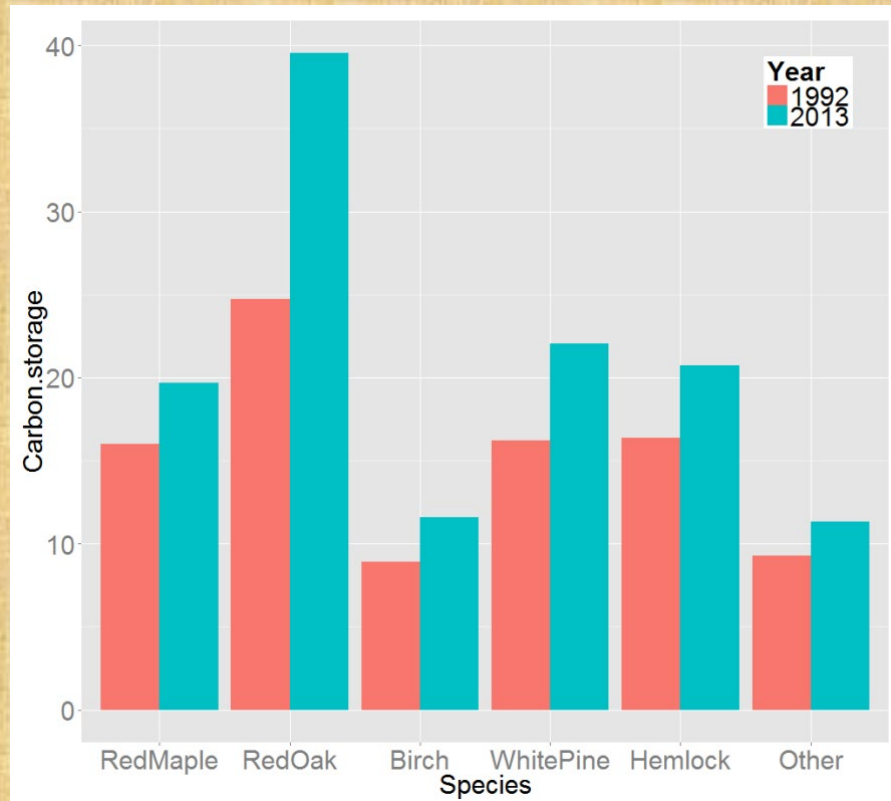
Year 2

Establish 2nd 10 x 10 meter plot



Changing Forests Protocol

- Return to each plot every 2-3 years and repeating tree measurements.
- Comparing initial measurements to subsequent measurements to determine change over time



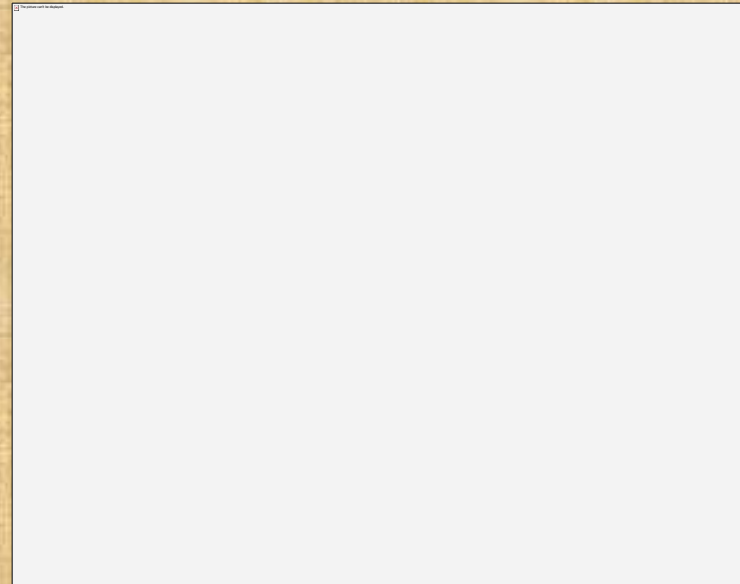
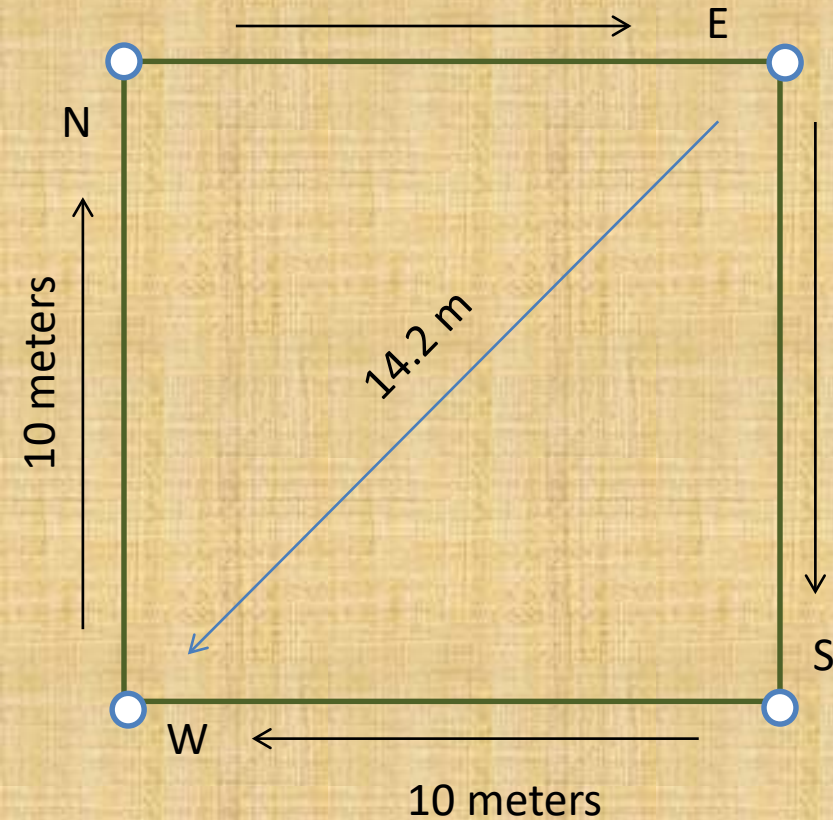
Where do you put your Plot?

- What forest do you have available near your school?
- What type of forest do you want to study? (old, young, hemlock, oak etc.)

Hints:

- At least 8-10 trees in the plot
- Not too conspicuous
- Basic Monitoring (schoolyard): examines what is changing in the plot, but does not address why changes are occurring)
- Comparative or Question Driven Monitoring (advanced): how is a particular disturbance changing the forest

Laying out the Plot



Hint: set up two sides of the square and then check the diagonal (14.2meters). Find where 14.2 meters meets up with 10 meters in corner. Repeat with diagonal for other two sides.



Data Sheet-Field Site Description

Harvard Forest Schoolyard Ecology
Our Changing Forests

Field Site Description Sheet

School Name: _____ Date (month, day, year): _____

Teacher Name: _____

Plot Number _____

Survey Number _____

Time Start: _____ Time End _____

Plot Location: *County* _____ *State* _____ *Town* _____

GPS *Coordinates*: Lat _____ Long _____

Additional Directions Plot: _____

Data Sheet-Field Site Description

Topography/Physical Features:

1. *Landscape position* – Check one:

ridge/hilltop

hillside

dry flat

wet flat

rolling upland

2. *Slope* – Check one:

none

slight

moderate

steep

3. *Aspect* _____°

4. *Water in Plot* – Check one or more:

stream

temporary stream

flooded area

vernal pool

5. *Rock Cover in Plot* – Check one:

<1%

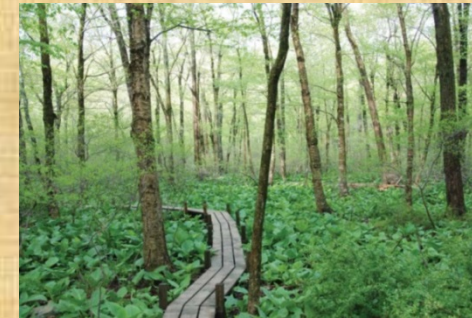
1-5%

6-25%

26-50%

51-75%

>75%

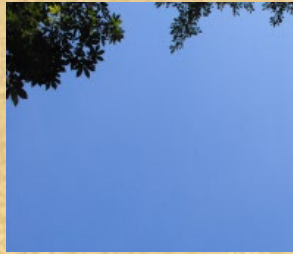


Data Sheet-Field Site Description

Forest Canopy Characteristics:

- *Canopy Cover Estimate* : (Check One)

1-25%,



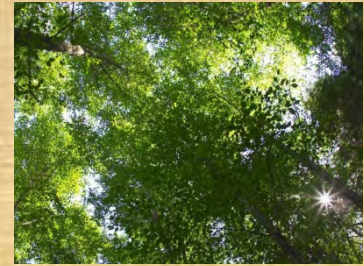
25-50%,



51-75%



76-100%

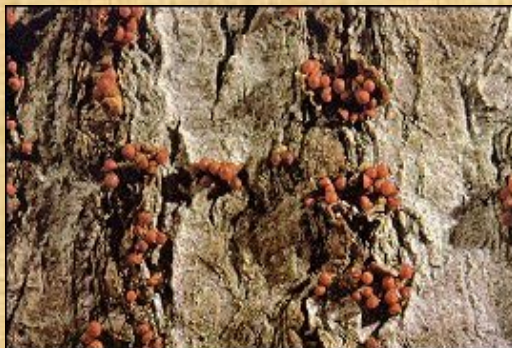


Data Sheet-Field Site Description

Evidence of Disturbance:

1. *Forest Pests and Pathogens in Plot:* Check one or more:

- | | | |
|---|---|--|
| <input type="checkbox"/> Hemlock Woolly Adelgid | <input type="checkbox"/> Gypsy Moth | <input type="checkbox"/> Ash Yellows |
| <input type="checkbox"/> Asian Long-horned Beetle | <input type="checkbox"/> Beech Bark Disease | <input type="checkbox"/> Emerald Ash Borer |
| <input type="checkbox"/> Hemlock Borer | <input type="checkbox"/> other _____ | <input type="checkbox"/> None |



Data Sheet-Field Site Description

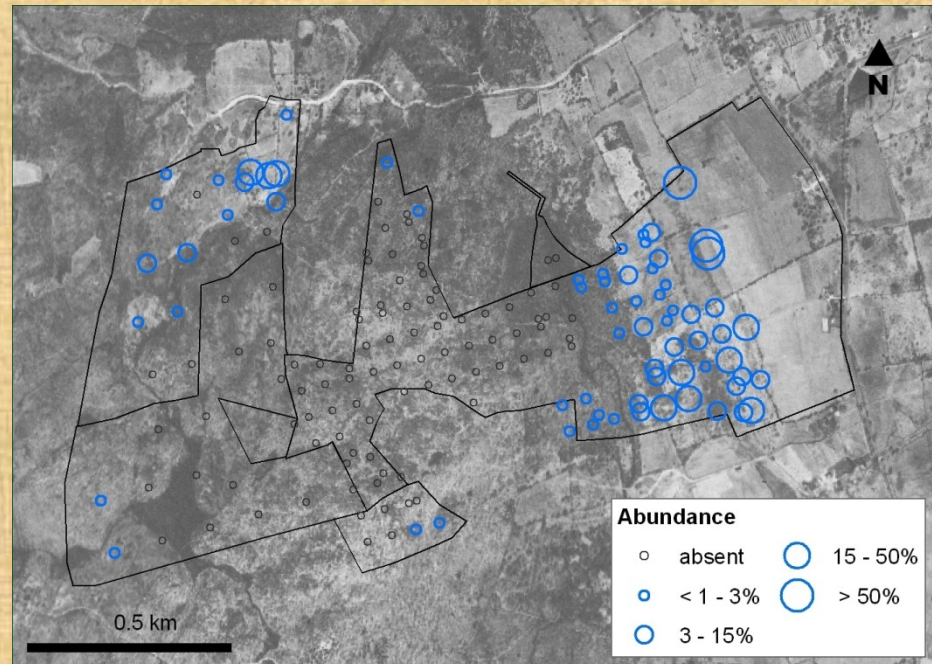
Evidence of Disturbance:

2. *Human Activity in or Near Plot*: Check one or more

- cut stumps
- forest road
- barbed wire
- other _____

- footpath
- building
- open field
- None

- stone wall
- cellar hole
- skid trail



Data Sheet-Field Site Description

Evidence of Disturbance:

3. *Weather Events in Plot*: Check one or more

- uprooted trees snapped trees large downed branches
 fire scars river flooding other _____ None

4. *Downed Woody Debris Cover in Plot* (pieces at least 10 cm in diameter):

Check one:

- <1% 1-5% 6-25% 26-50%
 51-75% >75%

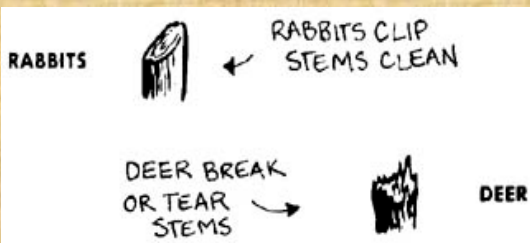


Data Sheet-Field Site Description

Evidence of Disturbance:

5. *Wildlife Sign in Plot:* Check one or more

- | | | |
|--|---|--|
| <input type="checkbox"/> deer pellets | <input type="checkbox"/> moose pellets | <input type="checkbox"/> deer/moose browsing |
| <input type="checkbox"/> moose bark-stripping | <input type="checkbox"/> deer antler rubs | <input type="checkbox"/> tree girdling [porcupine] |
| <input type="checkbox"/> beaver felled tree | <input type="checkbox"/> woodpecker hole | <input type="checkbox"/> bear claw marks on beech |
| <input type="checkbox"/> rabbit/porcupine browse | <input type="checkbox"/> other _____ | <input type="checkbox"/> None |



Data Sheet-Field Site Description

Evidence of Disturbance:

6. *Invasive Plant Species in Plot:* Check One or More:

Garlic Mustard

Oriental Bittersweet

Japanese Barberry

Burning Bush

Multiflora Rose

Honeysuckle

Autumn Olive

Buckthorn

Japanese Stilt Grass

Other

None



Tree Identification Number	Tree Species	Diameter at Breast Height (DBH) Record all stems \geq 2.5cm DBH	Condition (living, dead)
####	Chestnut Oak	45.6	Alive



Measuring the diameter of unusual stems

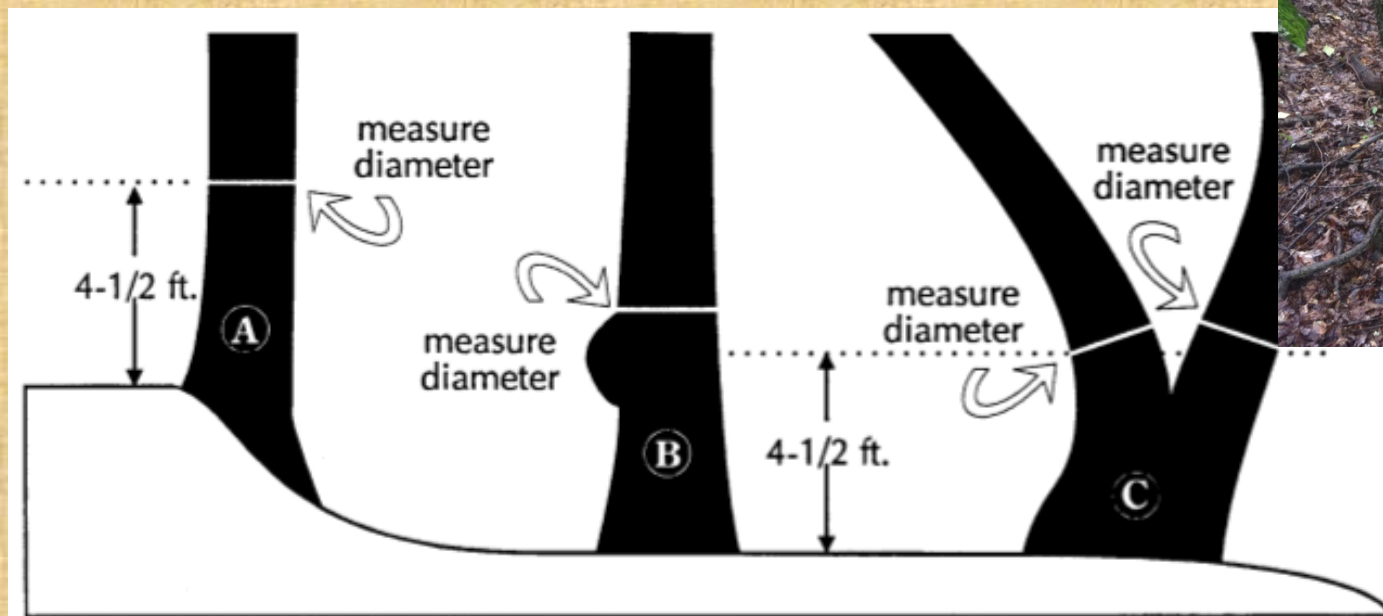


Figure 2-1. Measure stem diameter at breast height (DBH)