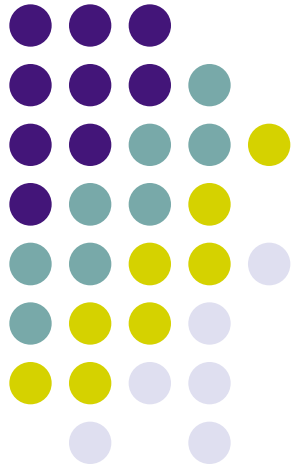
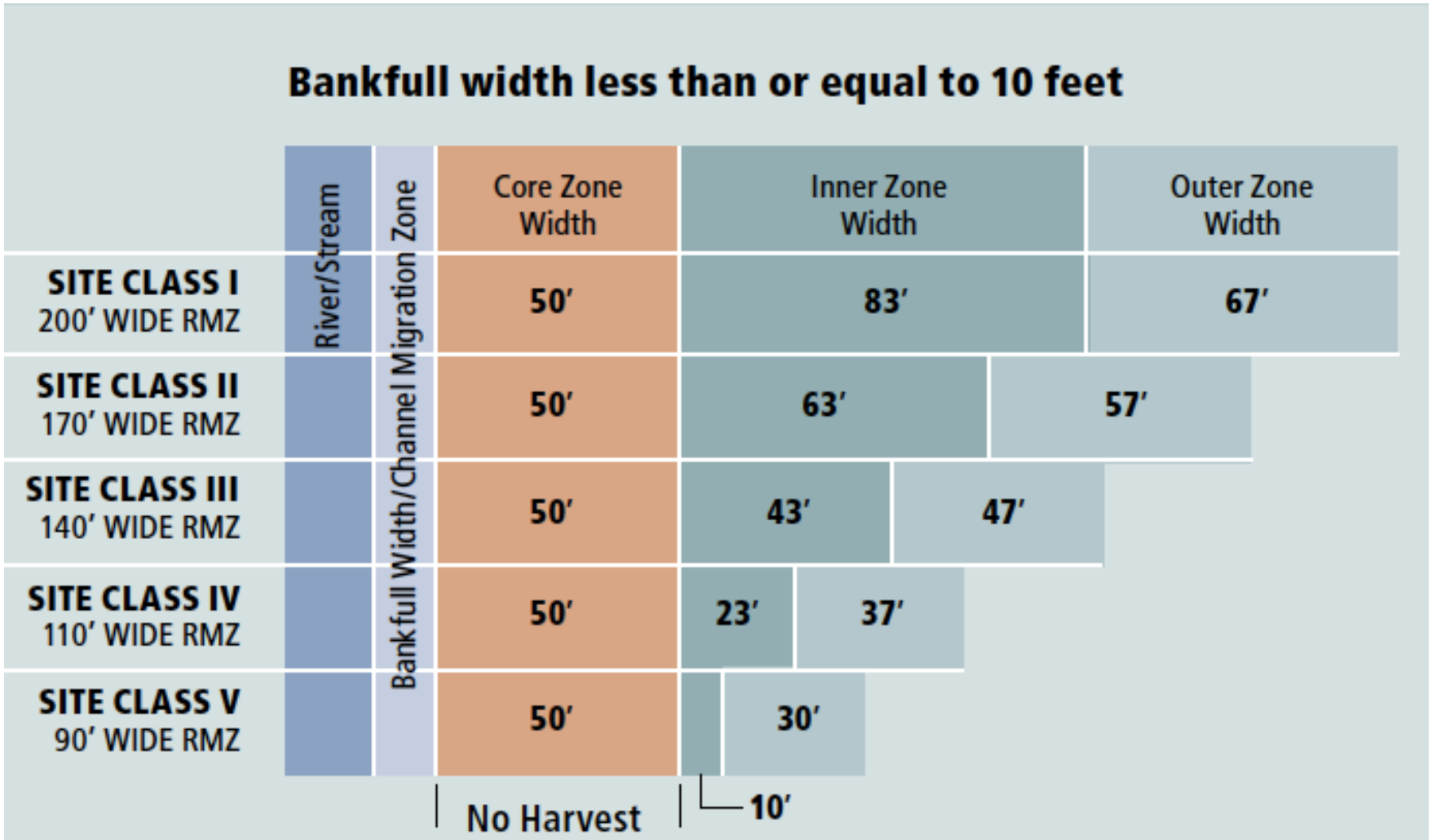
STAND ASSESSMENT: Applications & CFI



ESRM 304

Site Index & Basal Area - An application



Mean DBH & QMD – An Application

Mean DBH : $$\overline{DBH} = \frac{1}{n}\sum_{i=1}^{n} DBH_i$$

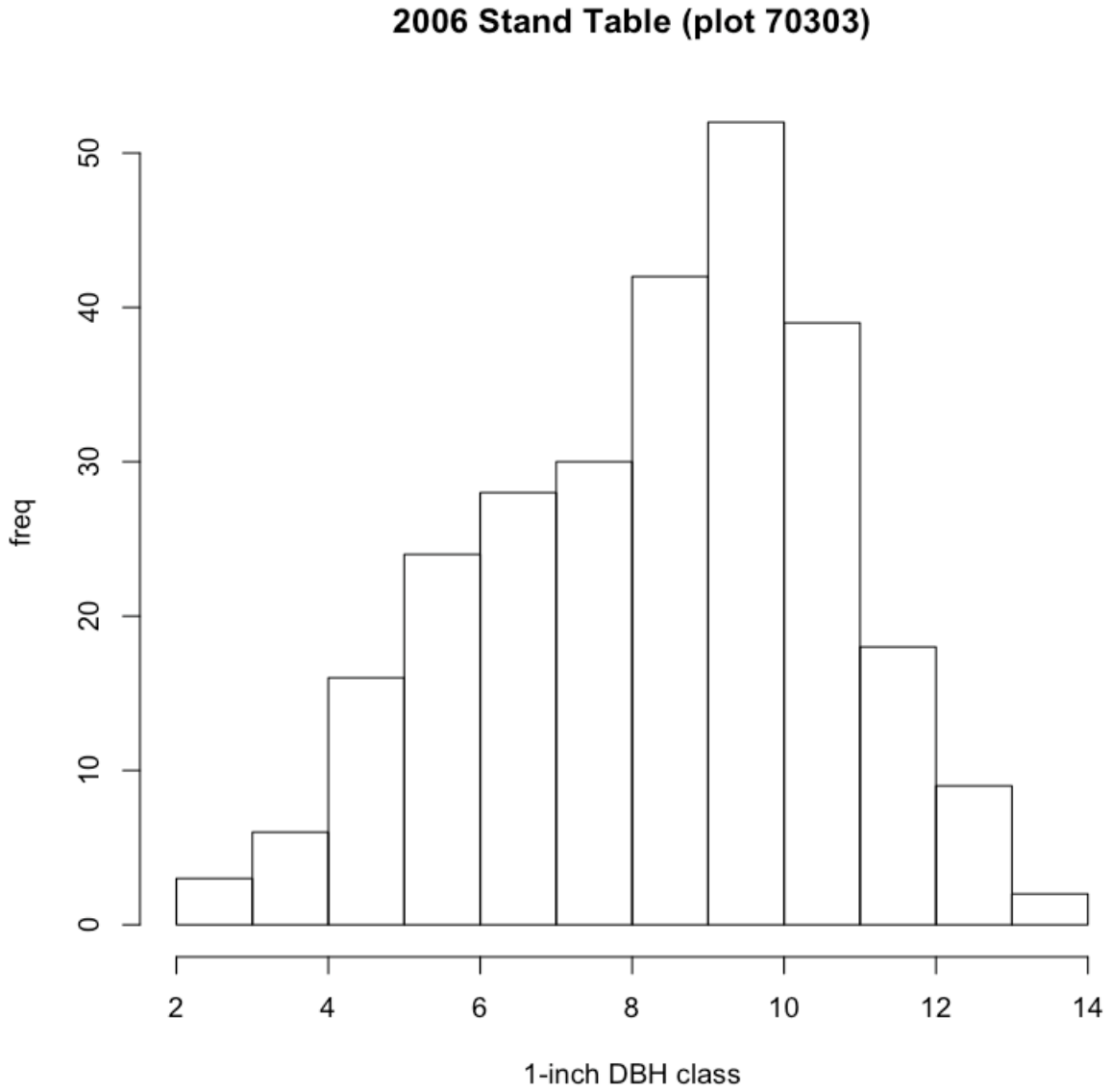
Quad. Mean DBH : $$QMD = D_g = \sqrt{\frac{\bar{g}}{0.005454}}$$

Dispersion of DBHs: $$s^2_{DBH} = \left(\frac{n}{n-1}\right)\left(QMD^2 - \overline{DBH}^2\right)$$

Coefficient of Variation: $$CV_{DBH} = \frac{S_{DBH}}{\overline{DBH}}$$

One view of Stand Structure

- Diameter (size) distributions



AGE & TPA – An Application

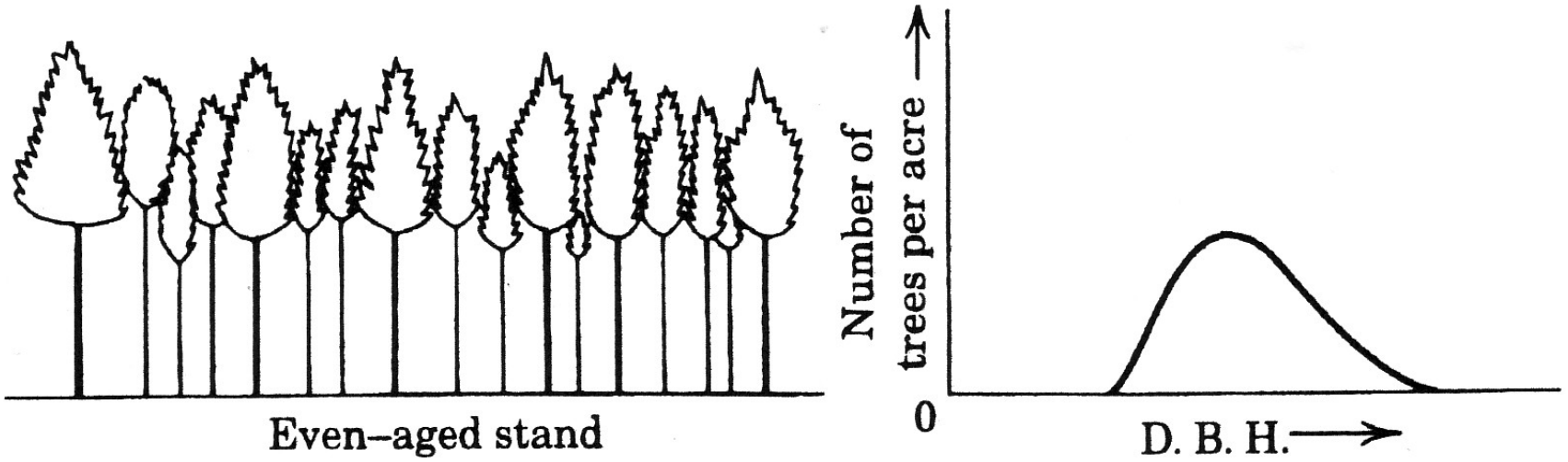
- Structure / Constitution is determined by:
  - Size variability
    - ✓ Diameter
    - ✓ Height
    - ✓ Crown
  - Frequency of occurrence; shape, location of size distribution
  - Age; shape, location of age distribution
  - Spatial arrangement of trees in stand

Forest Structure / Constitution

- Five Typical Stand Constitutions (age structures)
  - Single-cohort (even-aged) stand
  - Single-cohort stratified mixture
  - Two-aged stand
  - Balanced uneven-aged stand
  - Irregular uneven-aged stand
- Represent different life histories & management (stewardship) options / potentials

Five Typical Stand Constitutions

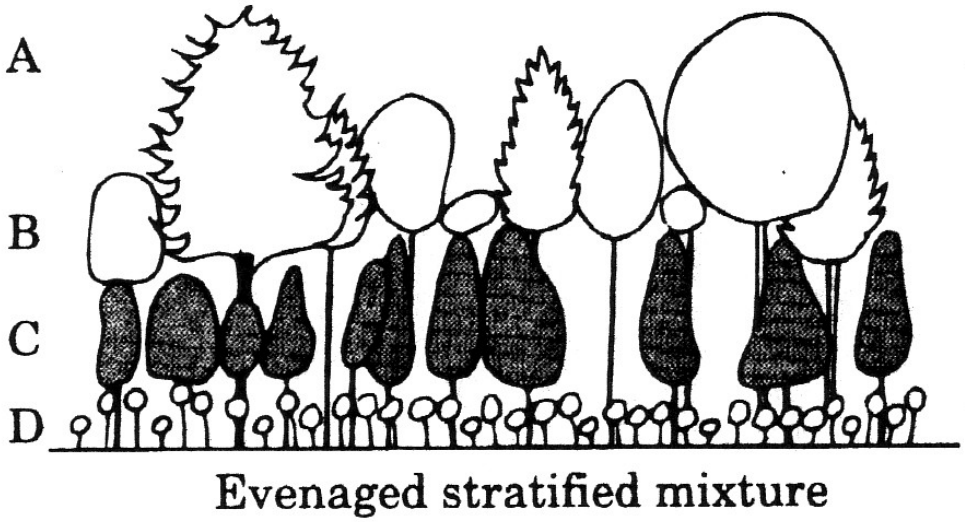
- Single cohort (even-aged) stand

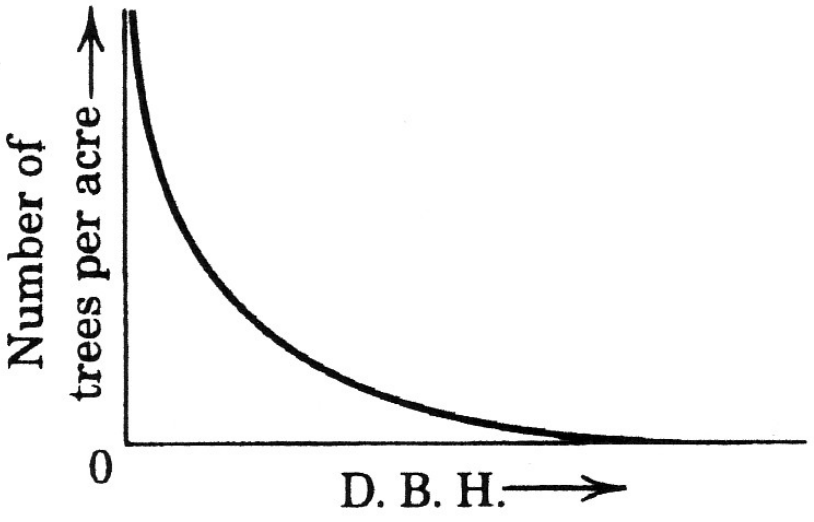


(Smith, et al. 1996)

Five Typical Stand Constitutions

- Single cohort stratified mixture

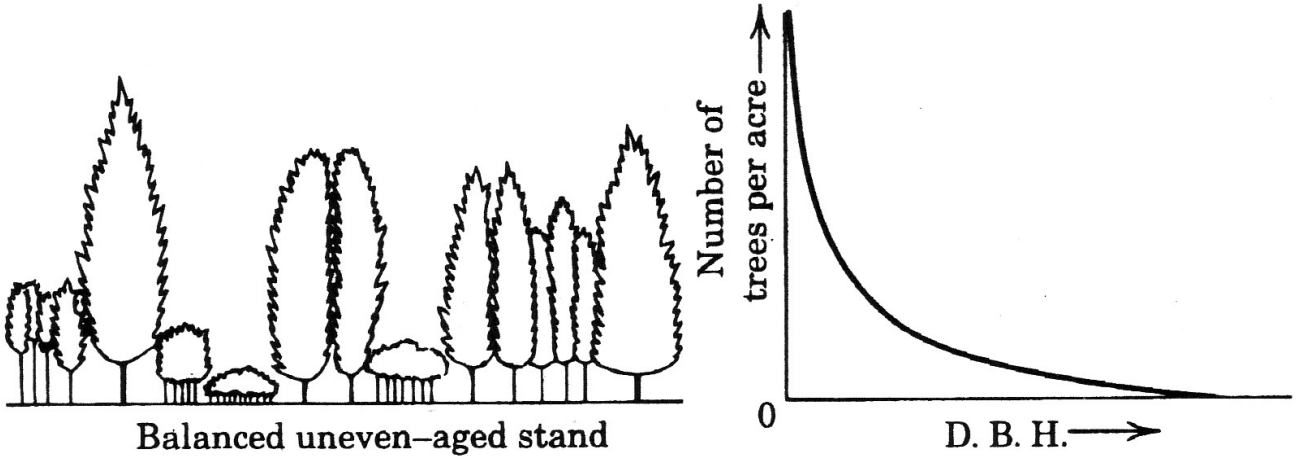




(Smith, et al. 1996)

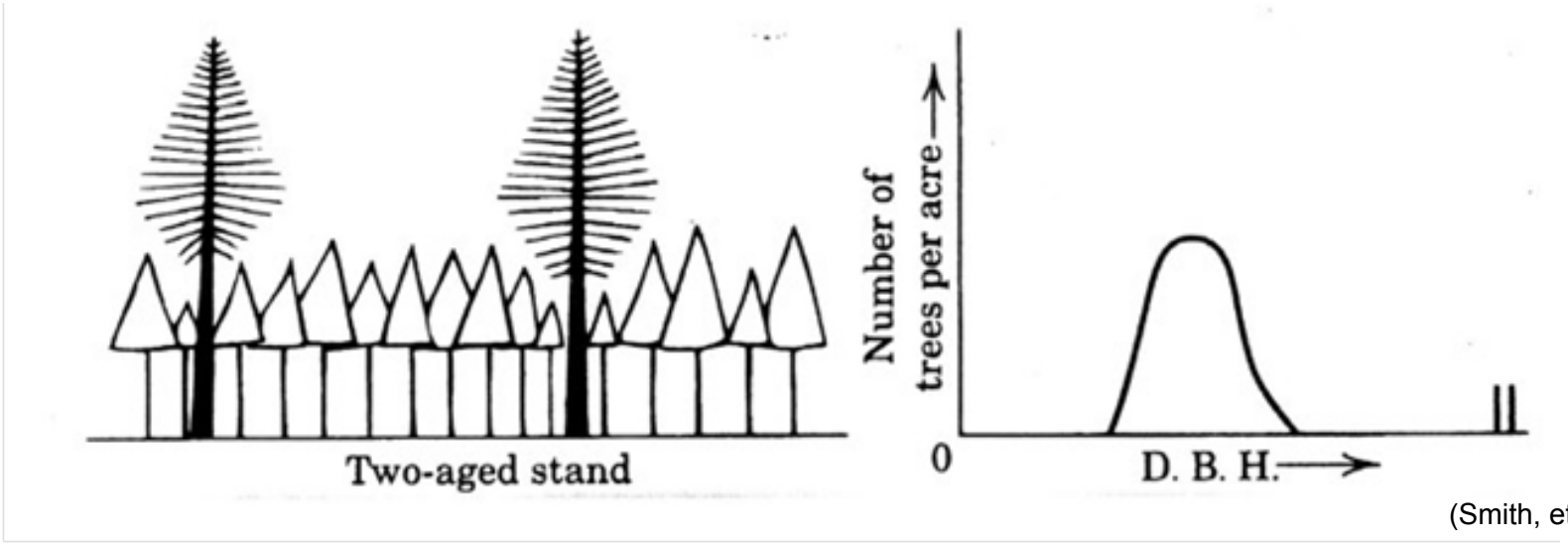
Five Typical Stand Constitutions

- Multi-cohort (uneven-aged) stands



(Smith, et al. 1996)

- Double Cohort (Two-Aged) Stand

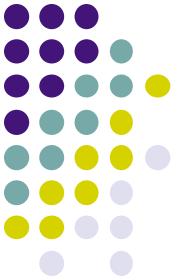


(Smith, et al. 1996)

Continuous Forest Inventory

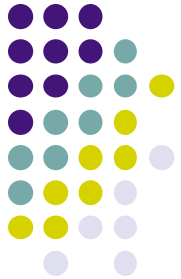
- PURPOSE: Get a complete historical record on forest change - The ONLY way to is to monitor permanently monumented plots
- Data from Permanent Sample Plots (PSP's) is for:
  - Studying how biodiversity, wildlife habitat quality, etc. … change over time
  - Forecasting stand dynamics, i.e., developing and testing forest-change simulation models
  - Studying the effects of cultural practices, insect attacks, weather, climate, etc.
- Chief purpose is to assess change so forest stewards are alerted to potential need for changing practices or policies

Continuous Forest Inventory Attributes



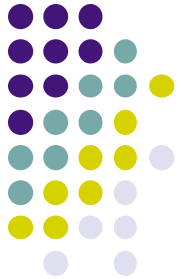
- CFI is generally very low intensity
  - Sampling intensities often range from 0.1% to 1%
  - TSP's will typically be used to supplement PSP's
- CFI plots must be representative of the forest; no special "reserve status"
- Systematic sampling is often used
  - Stratified sampling is often messed up by natural disaster, natural changes in species composition
- Sample size determination is difficult
  - Must be applicable now AND in the future
  - Large enough to be precise for several forest attributes

Continuous Forest Inventory Installation



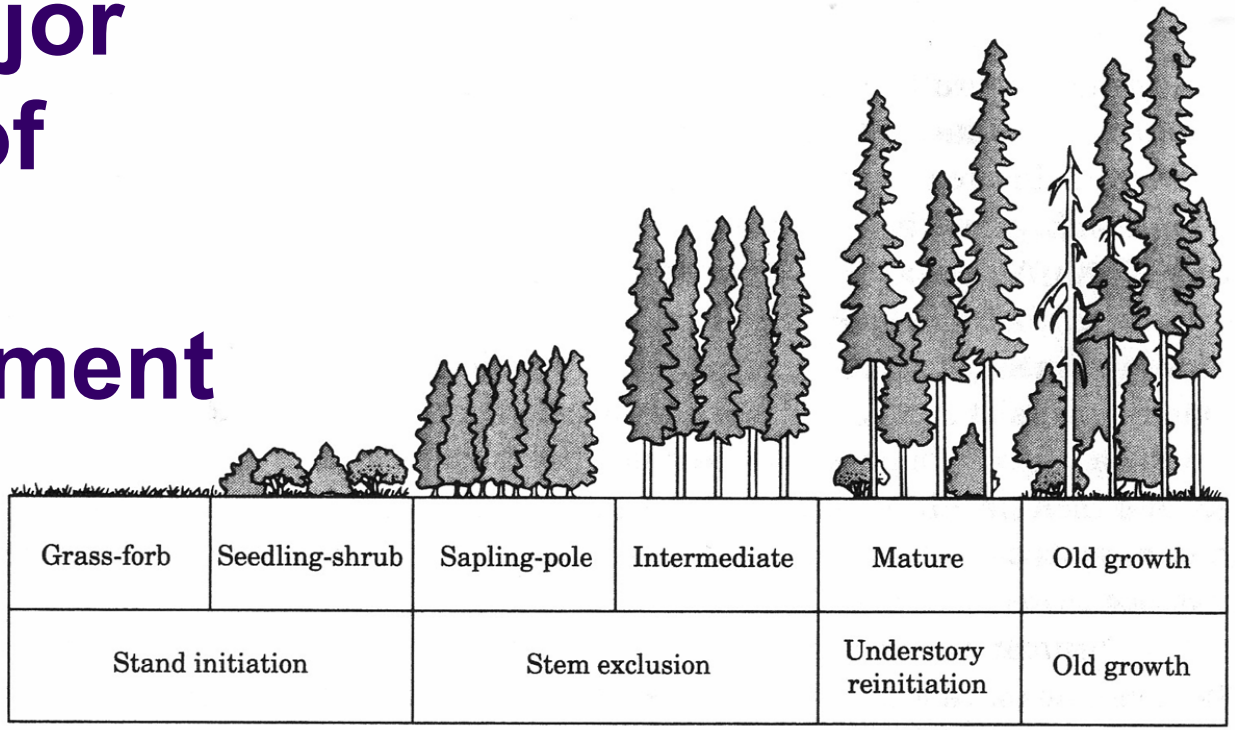
- Plot locations can be placed onto a photomosaic, orthophoto, topographic, or other map of the ownership, then transferred to 9 x 9” photos to take into the field
- Distance & bearing to plot center is determined from the photo or map from a known permanent location (primary control) to avoid bias
- Plot center is marked with aluminum stake, re-bar, or PVC pipe
- Tags on trees in plot are stapled, nailed and / or trees are painted near breast height

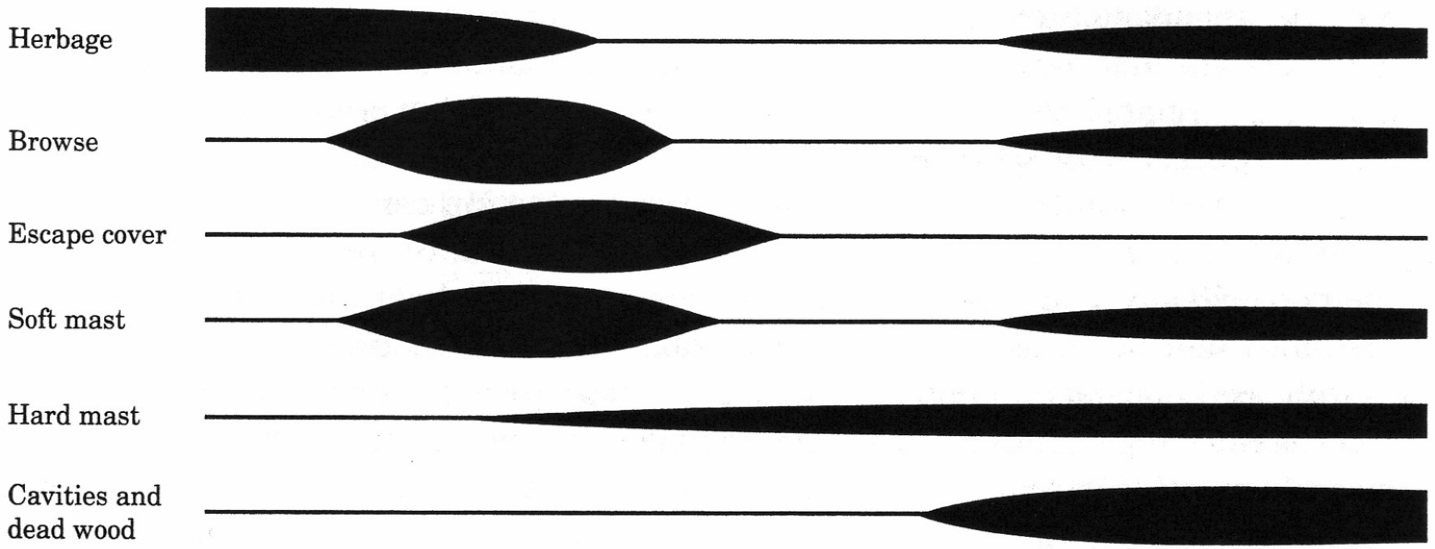
Continuous Forest Inventory Execution



- Measurement interval is typically 3 to 10 years
- Five percent of all plots (randomly selected) are normally “check-cruised” for accuracy
- Repeat measurement cycle is either annual or periodic
  - In a periodic survey, with periodic measurement interval p, EVERY plot is measured every p years
  - In an “annual” survey, 1/p plots will be measured EVERY year

Four major stages of stand development





Summary Remarks

- Measurement data collected from trees in a forest system yields information
  - Forest Structure / Function
    - Five major age constitutions
    - Four major stages of stand development
- Repeated measurement (monitoring) of forest systems is key to assessing real change
- Sound data enables sound stand, forest, and landscape management decisions

Example Exam Questions

Upper canopy vegetation

Q. You are 100 feet away from a tree on flat ground to measure its height. The clinometer reading to the top is 98% and to the base it is -4%. How tall is the tree?

A: H = 100 x [98 - (-4)]/100 = 102 feet tall

Example Exam Questions (cont'd)

- Define Site Index

A: Average height of undamaged, dominant trees of a particular species at a particular index age.

In Washington, index age used in site index charts is typically 50 years west of Cascades, 100 years east of Cascades.