3P Sampling

- **3P = probability proportional to prediction**
  - probability of a tree chosen for sampling (i.e. measured)
  - is proportional
  - to its predicted size
  - restated
    - the bigger it is ...
    - the more likely it will be sampled

- **Basics**
  - even people with limited experience
    - can estimate size fairly consistently
    - accuracy is NOT important
    - consistency is the KEY!!

  - advantage is high precision
    - really it's low variability (CV)
      - typically CV for cruising ~60%
      - for 3P ~20%
    - means fewer plots to get a "good SE"

  - overview of field work
    - go to every individual and guess its size
    - compare est. size to a random number (more on this later)
    - **if EGER then measure CAREFULLY**

  - overview of compilation
    - sum all est. values
      - but we don't know "how good" our estimates are
      - so we need a correction ratio (R)
        - R = measured value / est. value
        - R then "corrects" our estimate
    - **Real Total = Est. Total * correction Ratio**

- **Key Points**
  - need to visit each individual (tree)
  - so estimate needs to be QUICK
  - consistency important NOT accuracy
  - due to high precision ... only a FEW samples needed ...
  - ... need to be measured carefully
  - for timber cruising
    - traditional 3P restricted to
      - small areas or corridors
      - marking cruise (selection cuts)
      - 100% cruise is required
    - modified 3P sampling for larger areas

- Example ... BYL

- **Planning**
  - **Some Terms**
    - ∑KPI ... is the total of the estimates
    - (K+Z) ... is the maximum random number

  - **Create the Random Number Table**
    - remember EGER
      - thus the random number table determines when to sample
    - let's talk about chance
      - random numbers 1-100
      - chance of being selected?
        - est. tree size is 20
        - est. tree size is 50
      - likely sample size?
        - 8 trees, each is est. to be 50
        - 8 trees (20, 40, 75, 10, 30, 15, 60, 55)
      - equation for likely sample size is ...
        - n = ∑KPI / (K+Z)
        - emphasize it is the LIKELY sample size (n)
    - Calculate (K+Z)
      - rearrange n = ∑KPI / (K+Z) ...
      - ... (K+Z) = ∑KPI / n

- **Once again, but in order**
  - **Planning**
    - determine sample size
      - est. CV
      - confidence level (95%?)
      - acceptable error (15%?)
    - determine (K+Z)
      - est ∑KPI
      - desired n (from above)
    - generate the random # table
      - calculator (or Excel) to get RAND# (0 - 1)
      - multiply RAND# by (K+Z)

  - **Field**
    - go to each individual (tree) and est. size
    - if EGER then carefully measure

  - **Compilation**
    - Actual Total = Total of estimates * correction ratio = ∑KPI * R
    - Calculate
      - ∑KPI
      - individual R's and ave. R
      - Vol = ∑KPI * ave R
    - stats (CV%, SE% & E%) based on individual R's
    - E% * Actual Total = total E in units ... provides confidence interval