Forest Inventory

FIELD EXERCISE 4 – Due Fri 4 Mar 2016

OBJECTIVES:

1. Gain field experience establishing fixed- and variable-area plots as part of a multi-resource inventory using a line-plot cruise.
2. To map stand features along an inventory route.
3. To summarize inventory data into estimates of species composition, volume by species, total forest volume, standard error, and to produce stand and stock tables.

OFFICE WORK (pre-FIELD)

PRIOR to collecting data in the field, determine an appropriate sample size for your assigned portion of the forest using the statistical formula for stratified random sampling with proportional allocation. Compute the allocations proportionally to the stands within your assigned forest. Figure out your line-plot cruise route for each stand. Choose a random azimuth for each planned sample point to select the first tarif tree.

FIELD WORK

Equipment: Hand compass, Jake staff, 100-ft (or 200-ft, or both) cloth tape, D-tape, clinometer, Spiegel Relaskop, wedge prism, increment borer, tally sheets, pocket calculator, flagging, indelible ink marker (black).

Procedure: Mark your primary control point with flagging, write on it direction and distance to first point. As you travel along your cruise route, note any significant environmental features along cruise lines, such as forest gaps, disease pockets, windthrow / storm damage, streams, rocks, breaks in slope, etc.) to be mapped precisely and accurately in the written report.

Follow this step once at the first point in each stand:

0. Sighting trees at breast height (4.5 ft), choose a BAF that selects 6 to 8 trees / point, for assessing stand structure. This BAF will be used for every point within the same stand.

Follow these steps on ALL sample points:

1. Sweep the plot with the chosen BAF (using Relaskop or prism) for large trees (DBH>5.5 in.) tallying by species. BE SURE TO CHECK ANY BORDERLINE trees. NOTE: For any given BAF, the Plot Radius Factor (PRF) is found as PRF = $(75.625/BAF)^{1/2}$, so that R, limiting distance is: R (in ft.) = PRF x DBH (in.). Measure slope and aspect of the plot.

2. For all tally trees, also record status (live or dead), DBH (0.1 in). Note damage such as forked boles, crooks, broken tops, etc., and ocularly estimate height to said feature and extent of said feature. Record any other comments (see attached table). For damaged trees, ocularly estimate no. of 32-ft logs to 6" top. If dead, ocularly estimate height of snag. Using pre-selected random azimuth, locate the first tarif tree as the first tree encountered moving clockwise from said azimuth; the second tarif tree will be nearest 180 degrees from said azimuth moving in clockwise direction. Measure total height on TARIF trees and height to live crown (nearest foot). Measure distance from the tree using a tape. BE SURE TO CORRECT FOR SLOPING GROUND (ignore slopes less than 10%).

3. Choose one dominant, undamaged (i.e., no forks, no crooks, etc.) Douglas-fir tree at the point, measure both breast-height age (nearest year) and total height (nearest foot). If none of the trees "IN" at the point qualify, select another suitable Douglas-fir that is less than 1.5 chains from the point. If no Douglas-fir are present in the vicinity, use a different coniferous species.

4. Center a 1/20 acre, fixed area, circular plot (radius = 26.3 ft) at the same point and record species, DBH for every live tree > 10 ft. tall with $1.5 \leq DBH \leq 5.5$ in. Measure height of one randomly chosen tree on this plot.

5. Visually estimate percent cover for understory and lower canopy vegetation, broken down by major life form (moss, grass, fern, forb, or shrub) on a 1/100-th acre plot (radius = 6.6 ft).

FIELD WORK – Addendum

A few points to keep in mind as you conduct the inventory:

- **The "Split" Plot.** If you happen upon a sample point part-way through your cruise on which your chosen structure BAF selects MORE than 12 trees (as sometimes happens if you hit a really dense clump of trees), split the plot in half – measure the "left" half (relative to direction of travel) on odd-numbered points, measure the right half on even-numbered points. Remember to double the tree count for all selected trees during the analysis on these "split" plots. Same for the large BAF when it selects more than 3 trees.

- At points near stand or forest edges be sure to use the **walkthrough** method to determine how many times to "count" the "IN" trees at that point.

- Keep increment borer level when drilling trees at breast-height. Aim for the pith (middle of the tree) by using an entry angle coincident with an overhead branch.

Plot and Tree Enumeration Card **Page**_____ **of** _____

Date _____ Team _____ Forest_____

Compartment _____ Stand_____ Plot _____

Aspect _____ Slope _____ Elevation _____

Plot Area (or BAF) _____ Note(s)_____

Tree	Spp	DBH	Ht	Dist	S (o)	B (%)	T (%)	C (%)	Add-on	Comment(s)

Notes:

COMMENT CODE DETAILS

Comment Code	Comment Detail
AD	ANIMAL DAMAGE
BB	BROKEN BOLE
BD	BEAR DAMAGE
BL	BROKEN LEADER
BN	BLOWDOWN
BR	BROWSED
BS	BASAL SCAR
BT	BROKEN TOP
CF	CAT FACE
CH	CHLOROTIC
CR	CROOK
DI	DISEASED / SICK
DL	DEAD LEADER
DT	DEAD TOP
DY	DYING
ER	EXPOSED ROOTS
FA	FASCIATION
FB	FORKED BOLE
FL	FORKED LEADER
FT	FORKED TOP
GB	DOUBLE BOLE GREW INTO SINGLE
LM	LATERAL MEASURED
ML	MULTIPLE LEADERS
MS	MULTIPLE STEMS
MT	MULTIPLE TOP
PB	PISTOL BUTT
PW	PHELINUS WEIRII
RA	RAMICORN
SI	SINUOUSITY
SS	SUN SCALD
SW	SWEEP
TO	TOP OUT
UR	UPROOTED TREE
WT	WOLF TREE
XL	EXCESSIVE LEAN
MSC	Miscellaneous: Describe what it is

OFFICE WORK (post-FIELD)
Once data are collected, submit one (1) report per crew. The written report for this exercise should be in narrative form with the following section headings:

Title page
- Title and number of exercise
- Course:
- Submitted to:
- Submitted by:
- Date:

Executive Summary
- Legal description of area to nearest "forty" (i.e., quarter(s), section(s) / township(s) / range(s) as per US Public Land Survey)
- Brief Description of each stand (such as stand history (if known), understory vegetation, down woody debris, slope, aspect, site index and site class, disease, general quality of timber, etc.).
- Total (gross) and Sound (net) volume in BF (SV632) per acre for each stand
- Number of trees per acre by species and size (stand table)
- Sound volume by species and size (stock table) in BF (SV632) for each stand
- Statistics (using SOUND volume figures – all species combined) for each stand and the forest
  i) Standard Error in percent (SE%)
  ii) Standard Error (SE)
  iii) 80% Confidence interval
  iv) Obtained Error (E) in percent of the mean
  v) Sample size necessary to obtain +/- 10% Allowable Error with 95% Confidence

Cruise Description & Methods
- Cruise date and type, co-cruiser(s), weather
- Primary control point and secondary control
- Plots (type, size, shape)
- Measurements taken, equipment used
- Minimum merchantable standards and log rule for the volume table utilized
- Species considered, site class
- Description of problems encountered and how resolved

Forest Map

Showing for each stand:
- The cruise line and sample point locations
- Boundaries of timber types (if any encountered)
- Road locations, other permanent features of interest
- Cardinal orientation, scale, date, etc.
- Estimated site index for your sample
- Total stand acreage

Appendix
- example calculations (may be hand written)
- any applicable computer printout (e.g., excel tables)
- copy of field notes
- additional, relevant supportive information