Introduction

Thinning is the technique that more than any other distinguishes intensive silvicultural practice and is the primary means by which productivity of stands can be increased beyond what might be achieved under purely natural conditions. Thus, appreciation and understanding of thinning procedures requires knowledge of many fundamentals basic to silviculture.

Recognition of crown classes and evaluation of relative crown position is important to many silvicultural practices. The crown classes most commonly used are dominants, codominants, intermediates and overtopped. You should know the definitions and be able to interpret and distinguish crown classes from previous discussions.

Objective

The objective of this exercise is to compare thinning methods as to the material removed and effect on the residual stand.

Field Location

35-year eastern white pine plantation, Oak Ridge Forestry Experiment Station

Equipment

Field data forms, diameter tapes, flagging, reel tape, clinometer, prism

Field Procedures

Week 1

1. Divide into field crews as designated by the instructor

2. Lay out a square one-fourth acre plot (104.3’ by 104.3’)

3. Designate a corner of your plot for re-identification, i.e., be able to find that corner when you return the next lab period
4. Determine plantation spacing.

5. Measurement of trees
   a. Make a preliminary determination of basal area using a prism
   b. Map the remaining trees on your plot with columnar paper
   c. Record diameter (nearest inch) and crown class (overstory or subordinate) for each tree
   d. Select a subsample of any 3 overstory trees (dominant/codominants) and measure: total height and height to base of live crown

   **Accurate and efficient collection of data this week will facilitate your work next week! We will only use the following crown classes ---- overstory and subordinate. WHY?**

6. Determine site index from table in literature on web

7. Determine before 2nd week
   e. Mortality per acre for the past 35 years based on the original planting
   f. Basal area per acre --- add BA for each tree measured in the plot, then put on a per acre basis. Compare to your prism measurement.
   g. Volume per acre (volume tables in handout)

**Week 2**

Relocate your one-fourth acre plot.

A. Conduct a low thinning of moderate intensity by marking cut stems with flagging. **Description**: Trees are removed from the lower crown classes, some codominants can be removed, especially those of poor form. Remaining trees should be mostly dominant and codominants
   1. Record flagged trees from the low thinning on your tally sheets.

B. Conduct a free thinning. **Description**: A combination of low and crown thinning to release potential crop trees; residual basal area should be about 80 to 100 square feet/acre.
   1. Record flagged trees from your free thinning on your tally sheets

C. Conduct a mechanical or row thinning. **Description**: Remove every 3rd row. This can be solely done from the tally sheet and field marking is not necessary.
D. Conduct a row/combination thinning. Description: After the row thinning, trees are thinned from remaining rows following “free” thinning techniques, primary to leave evenly spaced dominant and co-dominant trees.

E. Evaluate adjacent hardwood stand and compare with EWP plantation. A small measurement plot (one-tenth acre) may be necessary to compare basal area and volume parameters.

Office Procedures

A. Stand parameters

1. Construct a stand table (1.0-inch diameter classes) for the original stand and the residual stand after each thinning procedure (on a per acre basis). A stand table contains # of trees by diameter class.

2. For each thinning method and the original stand, calculate the (a) number of stems, (b) basal area, (c) diameter of a tree of mean basal areas, (d) volume (per acre basis). Do calculations for cut material and residual stand.

3. For each thinning method, calculate the ratio of residual mean diameter to cut mean diameter. Use diameters calculated in 2c above.

4. The information calculated in 2 and 3 above should be compiled into a single summary table.

B. Crown Classes

1. Calculate the percentage of stems in each crown class (overstory and subordinate) for the original stand, the cut material in each thinning method, and the residual material after each thinning method. Calculate # in each crown class and get % of total.

2. Compile this information into a single table for comparison.

C. Diameter Distributions

1. For each thinning method, draw on a common set of axes the diameter distribution curve for the original stand and that of the residual stand after thinning.

2. Indicate the removed material on each of the four illustrations.
D. Other measurements

1. Determine the average height and average live crown ration for the overstory trees.

2. Determine site index.

Report

A. Content

1. Discuss each thinning method as to the material removed and the effect of the residual stand. Discussion should include: (a) stand parameters, (b) crown classes, (c) diameter distribution, (d) expected growth response, and (e) economic considerations. Data should be presented on an ACRE basis, NOT on a plot basis.

2. Compare thinning methods as above. In your comparison of thinning methods, discuss the advantages and disadvantages of each method based on your data. *Example* --- low thinning did not reduce BA enough to release crop trees; low thinning might not be economical, etc.

3. Since we did not thin to a prescribed diameter, volume or basal area, use the stocking charts to determine stocking of the present stand and the stocking of the stand following each of the thinnings. Based on your data for each thinning method, should more trees be left or more trees be cut.

4. In light of the description and comparison of thinning methods, recommend the method you feel is best suited to the current stand conditions and assuming a sawlog rotation. Give adequate justification for your selection.

5. Compare the plantation to the adjacent hardwood stand. What are the differences, especially in structure and form? Give hypotheses on how the plantation could have been more efficiently managed. What regeneration options are available if objectives are to (a) convert to hardwoods or (2) remain in white pine?

B. Format

1. The report should be presented in acceptable format.
2. Crew leaders will include field tally sheets in their report.

2. All figures and tables must be adequately labeled.

3. Your main objective should be to interpret the data and discuss the results in relation to the principles we have discussed. Use your textbook as a reference! Your report will be evaluated for accuracy, neatness, completeness, interpretation and understanding of the data you have collected.

Three (3) articles are on reserve concerning eastern white pine and may be accessed on the web. The authors are (1) Leak, (2) Della-Bianca and (3) Balmer and Williston The one by Leak is missing a page. That page will be given to you in lab. It contains a stocking chart.

You will also be given a volume table (cubic feet) in lab.

LAB REPORTS are due on Nov. 9 and 10