RESPONSE ASSESSMENT OF TWO 1979 OPERATIONAL
FERTILIZATION BLOCKS OF LODGEPOLE PINE
IN THE COOP FIRE OF THE LAKES DISTRICT

WORKING PLAN

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November, 1987
INTRODUCTION

In the spring of 1979 the Lakes District of the Prince Rupert Forest Region operationally fertilized 124 ha of age class 2 lodgepole pine. The fertilized blocks were concentrated in the Coop fire approximately 26 km southeast of Burns Lake. Urea fertilizer was applied aerially by helicopter at a rate of 200 kgM/ha.

Plots monitoring the response of this operational fertilization were not established at the time of treatment (1979). By destructive sampling followed by measurement of appropriate variables (i.e. height DBH, radial increment, internodal length, needle weight, volume measurements) some assessment of response to a treatment can be obtained. Both handthinned, rowthinned spaced P1 stands were fertilized in the 1979 fertilization, however no controls were established within or adjacent to the fertilized blocks at that time. Without an unfertilized control assessment of response can only be made on the combined fertilization + spacing activity, not independently. In some situations suitable controls can be found after the fact by locating ecologically and environmentally similar stands close to the treatment areas. Controls established in this manner should have comparable stocking, age class, current growth characteristics and species composition to the treated areas. There are many assumptions which must be made when controls are established several years after an operational activity has occurred. A method used by Ballard and Majid (1984) will be used to determine the relative response of a rowthinned stand to fertilization with N @ 200 kg/ha.

Since the original fertilization treatment in 1979, most of the operational units have been thinned further (i.e. sanitize spacing, row thinned areas subsequently thinned by hand to a target stocking level) or re-fertilized (K. Vantine pers. commun.) , thus spacing + fertilizer response in these blocks cannot be made. However, assessment of the 1979 urea fertilization response is still possible in 2 of the 7 blocks have not been assessed.

Brockley and Yole (1985) measured 1 handspaced unit of this 1979 operational fertilization and found a small increase in radial increment (13%). In that study, five year pre and post treatment radial increment was compared in order to assess response to fertilization. Nutrient deficiencies other than N (e.g. S, B) were identified as possible reasons for poor response in addition to moisture deficiencies. Nutrient deficiencies in addition to N have been identified through foliar analysis in stands within the vicinity of the 1979 operational fertilization (Yole, unpublished data).

No assessment of operational fertilization response in rowspaced stands has been attempted thus far in the region. Since both row and handspaced stands will likely be given the highest priority for fertilization in the future within the Lakes District, response information in these thinning regimes is immediately required.

The radial increment in the 5 year period before (1974-1978) and after (1980-1984) the 1979 operational fertilization period was compared for each treatment and to a control (thinned only) stand located close to the fertilized blocks.
OBJECTIVES:

Sample discs and measure the 5-year pre and post radial increment response of 2 thinned stands of P1 which were included within the 1979 operational fertilization in the Lakes District.

Compare response of different thinning methods (rowthinning vs. handthinning) in combination with urea fertilization applied at a rate of 200kgN/ha.

Assess the independant effect of N-fertilization by comparing the radial increment response between a fertilized + rowthinned stand as compared to the radial increment for unfertilized, rowthinned control.

Determine the current foliar nutrient status and relate this to fertilization (+ thinning) response.
A total of 8 operational units ranging in size from 5.5 ha to 27.9 ha were fertilized with urea-N in March, 1979 in the Coop Fire of the Lakes District. All treatment units had undergone thinning in 1978 (either row or handspacing) prior to fertilization.

Response to the original 1979 fertilization is possible in only 3 of the blocks originally fertilized and spaced in 1979 as a result of recent disturbance to the original blocks. The blocks selected for assessing fertilizationm response include a 27.5 ha rowthinned area (1979 operational Unit #8, opening # 93K3-11) and a 23.5 ha handspaced area (1979 operational units 4B and 4C combined, opening # 93K3-14 and 15) both relatively close to the Hanny and Augier Forest Road junction just north of Coop Lake (Figure 1). These two areas were thinned in 1978 and fertilized in 1979.

An unfertilized rowthinned stand (opening # 93K3-12 row-thinned in 1978) was selected as a control for this assessment approximately 1.5km east of Coop Lake (Figure 1). Although there is considerable distance between the control and fertilized blocks, pre and posttreatment environmental and stand conditions are similar enough to enable comparison between this rowthinned control and the rowthinned X fertilized block (Unit 8). One can only assess the response of Unit 4 (handspaced) as a combined spacing + fertilization effect, while Unit 8 can be monitored for urea fertilization response independantly and/or in combination with thinning by utilizing the control. There are no handspaced stands available in the immediate area which can be used as a handspaced, unfertilized control.

The study area is located within the SB5el biogeoclimatic variant. The soils of this area are sandy textured Dystric Brunisols and Brunisolic Gray Luvisols. Both vegetation and soils of the study sites suggest conditions slightly drier and poorer than mesic.
MEASUREMENTS

Through field reconnaissance, 2 P1 stands would be selected which had been juvenile spaced in 1978 and operationally fertilized in 1979. In addition field reconnaissance would attempt to locate control stands in areas close to the fertilized stands and having similar ecological, stand and site characteristics to the fertilized blocks. Ideally, for comparative purposes, a rowthinned and handthinned area would be located within the fertilized and control areas.

Response measurement will be made by systematic random sampling of 30 individual trees distributed throughout a treatment block. Trees will be picked along parallel transects at 20 meter intervals and felled using a chainsaw. Foliar samples can be collected from the upper third live crown of each sample tree and bulked together to form a composite sample for nutrient analysis. Healthy codominant and dominant trees should be sampled, free of obvious disease or scarring. A 3.99 meter plot should be established at 10 to 15 of the sample tree locations and the number of live and cut stems counted to determine pre- and post thinning stocking levels. Height and DBH will be measured on these same 10 to 15 sample trees to give an average height and DBH in 1987. If possible height should be measured at at 5-year intervals before and after fertilization.

Discs can be cut at DBH (1.3 m) from each of the 30 sample trees per block. Assessment of fertilizer and/or spacing response from each sample tree can be made by measuring the 5-year radial increment for the period before (1974-78) and after fertilization (1980-84). Two radii per disc (one radii at right angles to the other) will be measured and the average determined.

Foliage samples should follow procedures outlined in the Silviculture Manual. Samples are kept frozen until drying facilities are available. Foliage is then placed in paper bags and dried in a forced-air convection oven (Research Lab, Smithers) at 70-80 C for 8-10 hours or until needles break when bent. Dried foliage should be sent to Pacific Soil Analysis Inc. in Vancouver for chemical analysis. Cost of foliar analysis is ~ $36/sample which should include all nutrients, including total S, and needle weight.

Simple comparison of means of radial increments before and after fertilization will be performed by using the student's T-test. Percent radial increment response comparing rowthinning alone vs. rowthinning + fertilization combined will also be determined.

Disc sampling and foliar analysis should proceed at the end of the 1987 growing season, approximately mid-October.