



# **BC Operational Forest Fertilization Program - *Comparison of Traditional and Alternative Protocols***



Francesco Cortini *PhD RPF*



- The effect of fertilization over a 5-year period was investigated
- An earlier report indicated that the variability between plots was often too great to detect a treatment effect
- A sub-sample of treatment units was selected in 2014
- Two protocols were tested: *Traditional and Alternative*





## **Traditional Protocol**

- Sample plots within fertilized and untreated areas
- DBH was recorded for each tree prior to the fertilization treatment (2009) and again five years later (2014)

## **Alternative Protocol**

- Based on tree cores similar to Brockley 2010\*
- Sample trees ha DBH approx. Quad. Mean Diam.
- Two separate Spp. per unit

\*Brockley, R.P. 2010. Assessing the fertilization response potential of subalpine fir (*Abies lasiocarpa*): a retrospective study. B.C. Min. For. Range, Victoria. Ext. Note 93.



# Results Example

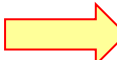
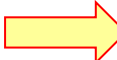
## Traditional Protocol – Prince George Area

Tr. Unit	Tr.	BA (cm <sup>2</sup> ) 2009	BA (cm <sup>2</sup> ) 2014	BA Growth (cm <sup>2</sup> )	BA Difference (cm <sup>2</sup> )	BA Growth (%)	BA Difference (%)	Relative % Diff.
208	C	328.8	371.6	42.8	<b>18.6</b>	13.0%	<b>8.6%</b>	<b>43.5%</b>
	T	284.6	346.0	61.5		21.6%		
401	C	610.5	677.9	67.5	<b>66.5</b>	11.1%	<b>17.3%</b>	<b>98.5%</b>
	T	472.2	606.1	133.9		28.4%		
404	C	606.3	687.3	81.0	<b>-15.4</b>	13.4%	<b>5.1%</b>	<b>-19.0%</b>
	T	355.5	421.2	65.7		18.5%		
407	C	163.8	184.8	21.0	<b>28.4</b>	12.8%	<b>13.5%</b>	<b>135%</b>
	T	187.7	237.1	49.4		26.3%		
415	C	344.5	364.0	19.5	<b>43.4</b>	5.7%	<b>4.7%</b>	<b>222%</b>
	T	608.7	671.6	62.9		10.3%		



# Results Example

## Alternative Protocol – Prince George Area

<i>Treatm. Unit 401</i>	$A_f$ (cm <sup>2</sup> )	$B_f * av(A_u/B_u)$ (cm <sup>2</sup> )	$A_f/B_f$	$A_u/B_u$
 <i>Fdi</i>				
n	30	30	30	30
Mean	<b>112.21</b>	<b>101.74</b>	<b>1.25</b>	<b>1.12</b>
CV <sup>a</sup>	0.23	0.21	0.15	0.13
Difference	10.47 <sup>b</sup> (10%)		0.13 <sup>b</sup> (12%)	
Parameter	av( $R_f$ )		I	
Equation <sup>c</sup>	5		6	
 <i>Sx</i>				
n	30	30	30	30
mean	<b>38.45</b>	<b>27.94</b>	<b>1.35</b>	<b>1.00</b>
CV <sup>a</sup>	0.55	0.46	0.30	0.26
Difference	10.51 <sup>b</sup> (38%)		0.35 <sup>b</sup> (35%)	
Parameter	av( $R_f$ )		I	
Equation	5		6	

Note: B, pre-fertilization stem Basal Area increment (2005-2009); A, post-fertilization stem Basal Area increment (2010-2014); u, unfertilized; f, fertilized

a Coefficient of Variation

b Reject H<sup>0</sup>

c Equation 2:  $av(R_f) = av(A_f) - av[(B_f) * av(A_u/B_u)]$ ; Equation 3:  $I = av(A_f/B_f) - av(A_u/B_u)$



## Conclusion

- **Despite the large observed variability in pre- and post-fertilization, the results suggest that the alternative protocol is more consistent than the traditional protocol**
- **Thus the alternative protocol provides a more rigorous approach that is better suited for the BC Operational Forest Fertilization Program.**

