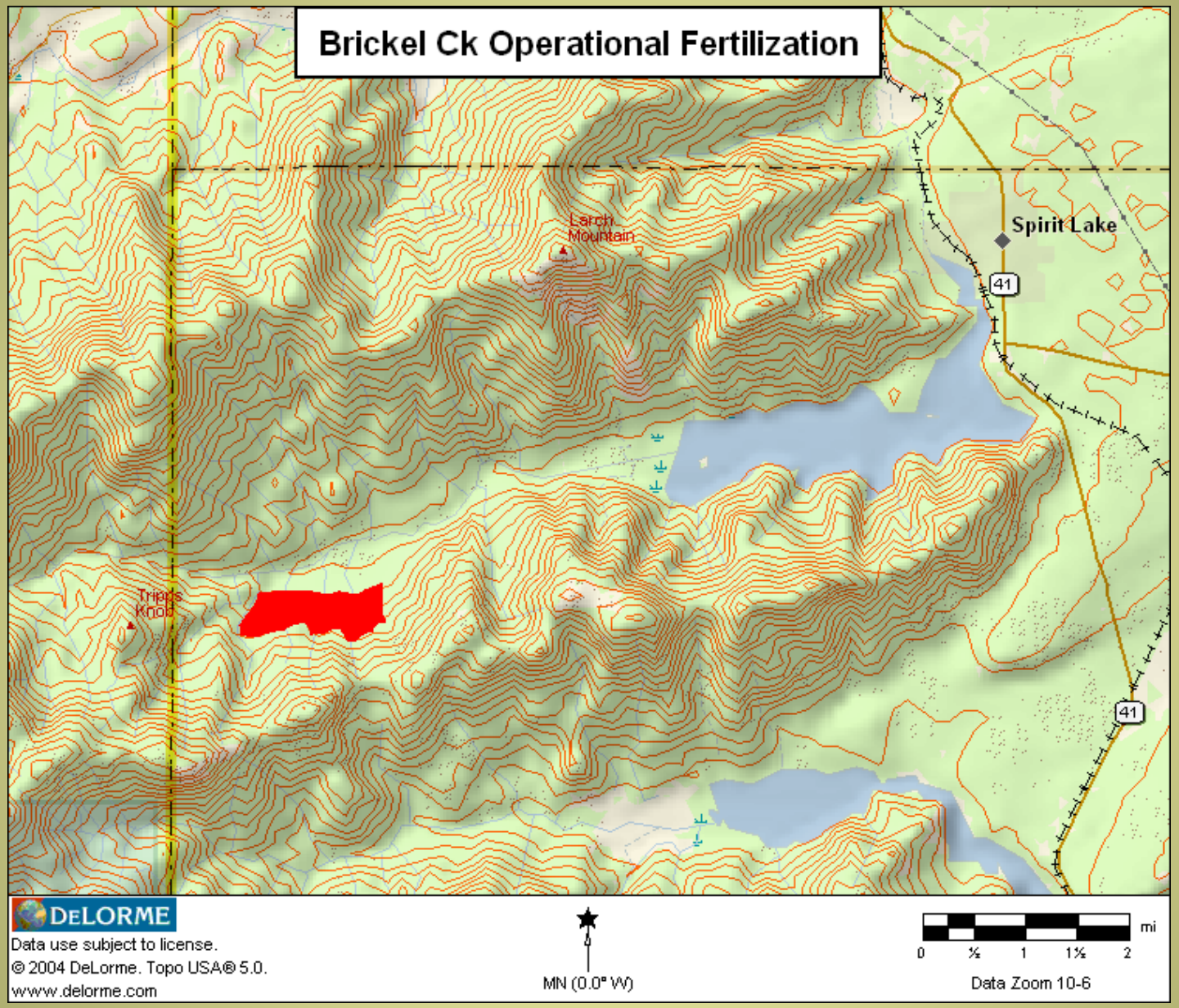
Brickel Creek
Operational Multi-Nutrient Fertilization in North Idaho

Inland Empire Paper Company

Dennis Parent


Brickel Ck Operational Fertilization
Larch Mountain
Spirit Lake
41
41
Trigg's Knob
DeLORME
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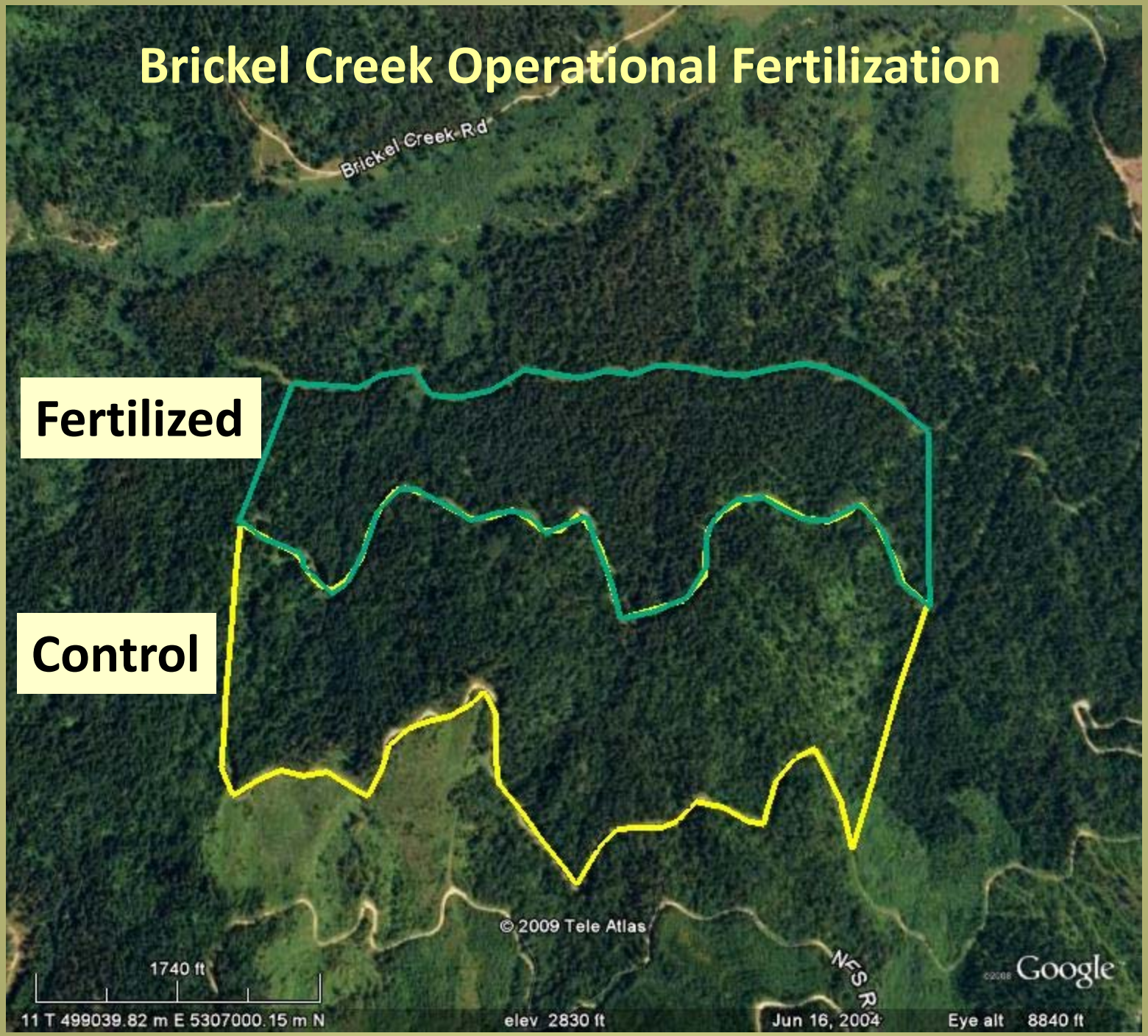
Brickel Creek Operational Fertilization



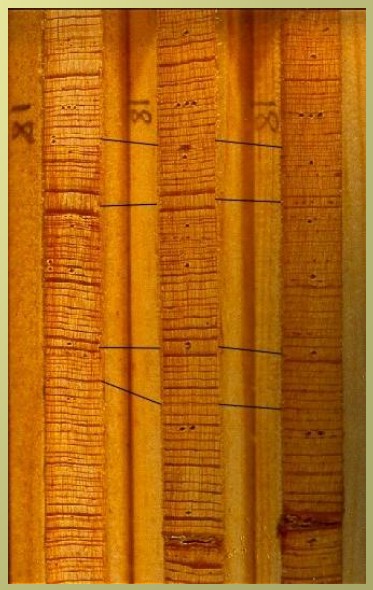
Stand History	
Area	125 acres
Age (2008)	70
Salvage Harvest (1997)	480 MBF
Fertilization (Fall, 1998)	200 lbs./ac. N + 200 lbs./ac. K Cost $116/ac.
Regeneration Cut	??

Stand Characteristics	
Habitat Type	Western Hemlock/Queencup Beadlily
Parent Material	Ash/gneiss/schist Lakebed Sediments
Aspect	N-NE (40 degrees)
Average Slope	20%
Elevation	2850’

2008 Mensurational Characteristics	
Trees per Acre	218
Quad Mean Diameter (in)	12.6
Site Height (ft.)	92
Basal Area (sq/ft/ac)	186
Volume (bd. ft/ac)	29,002
Species Composition (% of Basal Area)	
Western Red Cedar	40
Grand Fir	36
Douglas-fir	14
Western Larch	5
Western Hemlock	5

Study Sampling Design

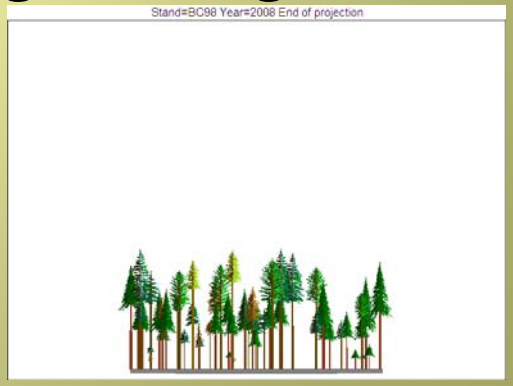
- **15- 1/20 acre fixed area plots were established in both the control and fertilized stands.**
- **Plot trees were measured for heights and diameters to determine basal area and volume estimates.**
- **Individuals trees were selected according to diameter class and species within each treatment stand for increment core sampling.**
- **Tree ring increment cores were used to compute pre- and post-treatment individual tree growth increments. A total of 203 trees were sampled across both treatment stands.**



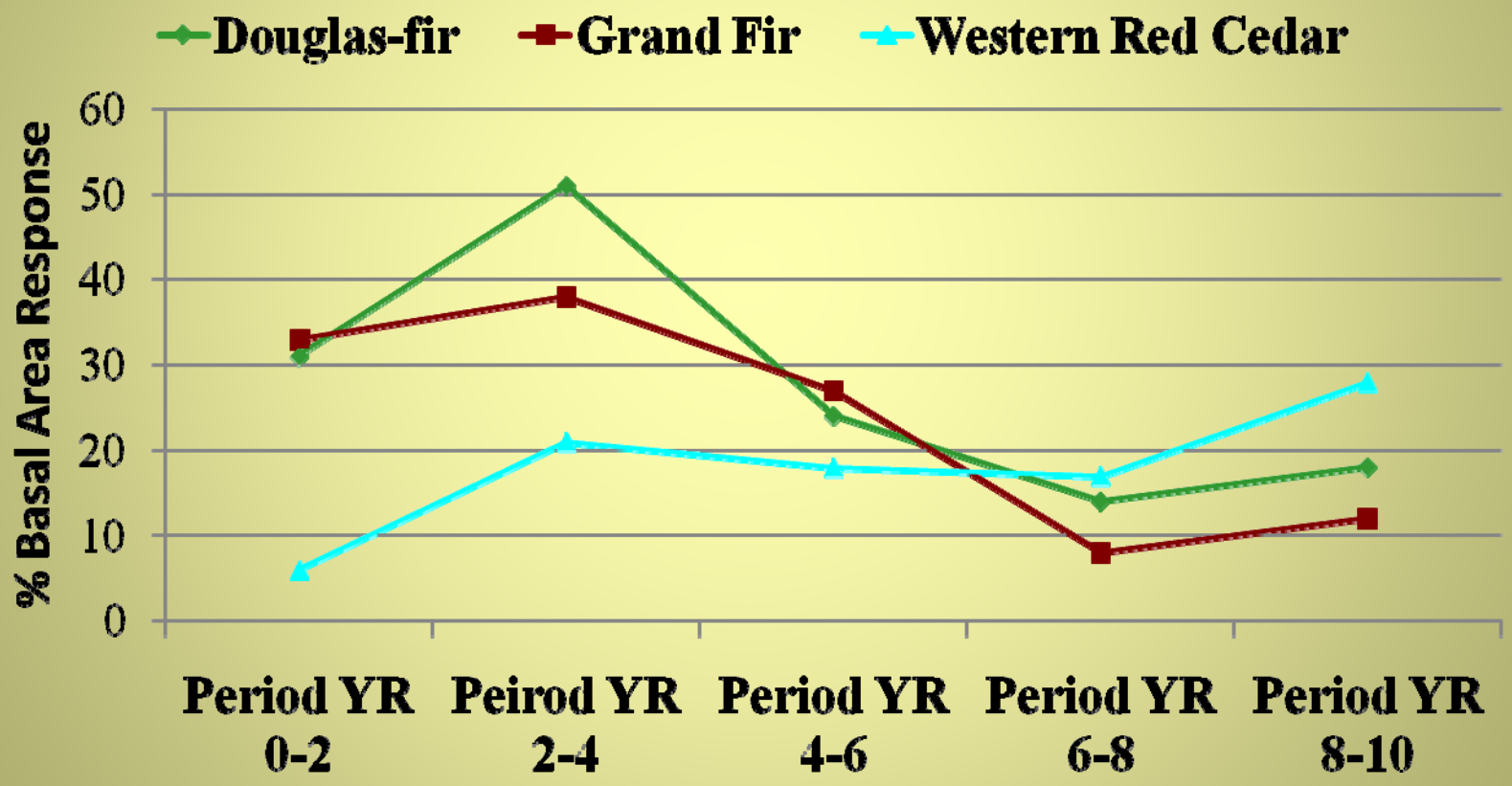
Statistical Analysis and Growth Simulation

- **Basal area increment ratios by species and size class were statistically analyzed to test pre-and post-treatment growth conditions.**
  - **Increment Ratio = Growth increment post-fertilization / Growth increment pre-fertilization**
- **Basal area increment growth for DF, GF and WRC species were analyzed using ANOVA to estimate individual tree treatment effects.**
- **Basal area growth multipliers were used to generate growth projections in the FVS model.**

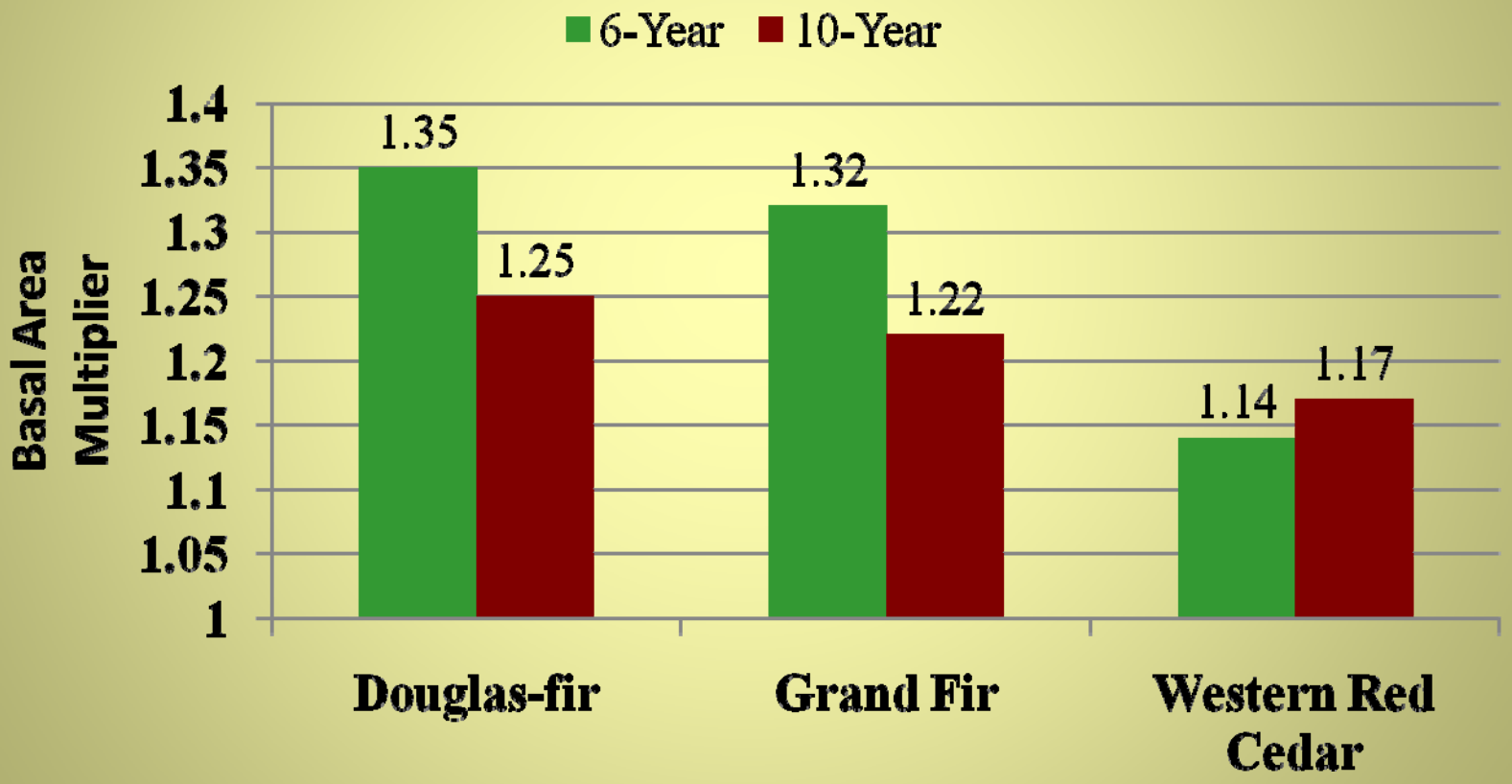
Growth Multiplier = BA increment for fertilized trees / BA increment for control trees



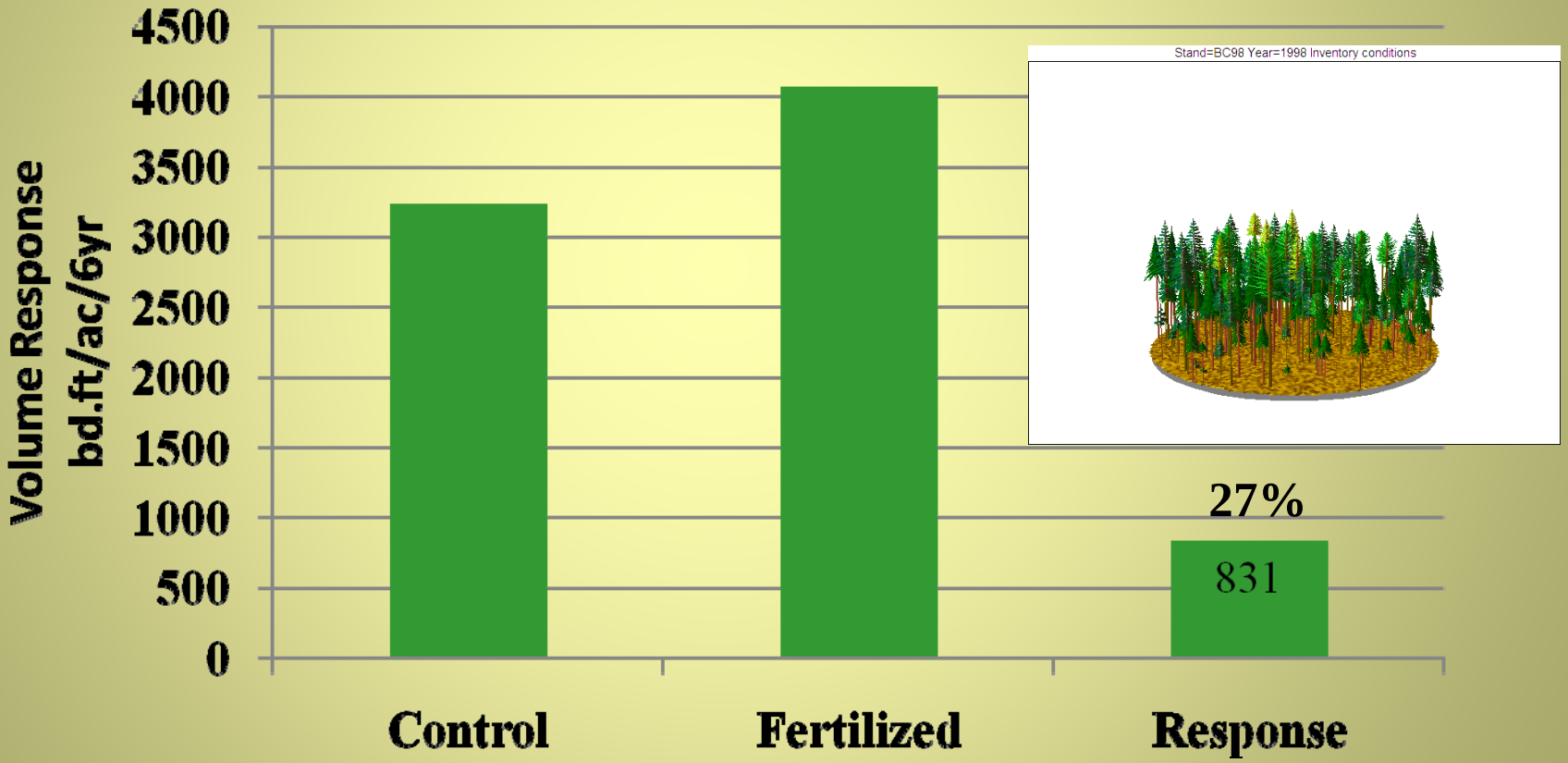
Periodic % Basal Area Growth Response Relative to the Control



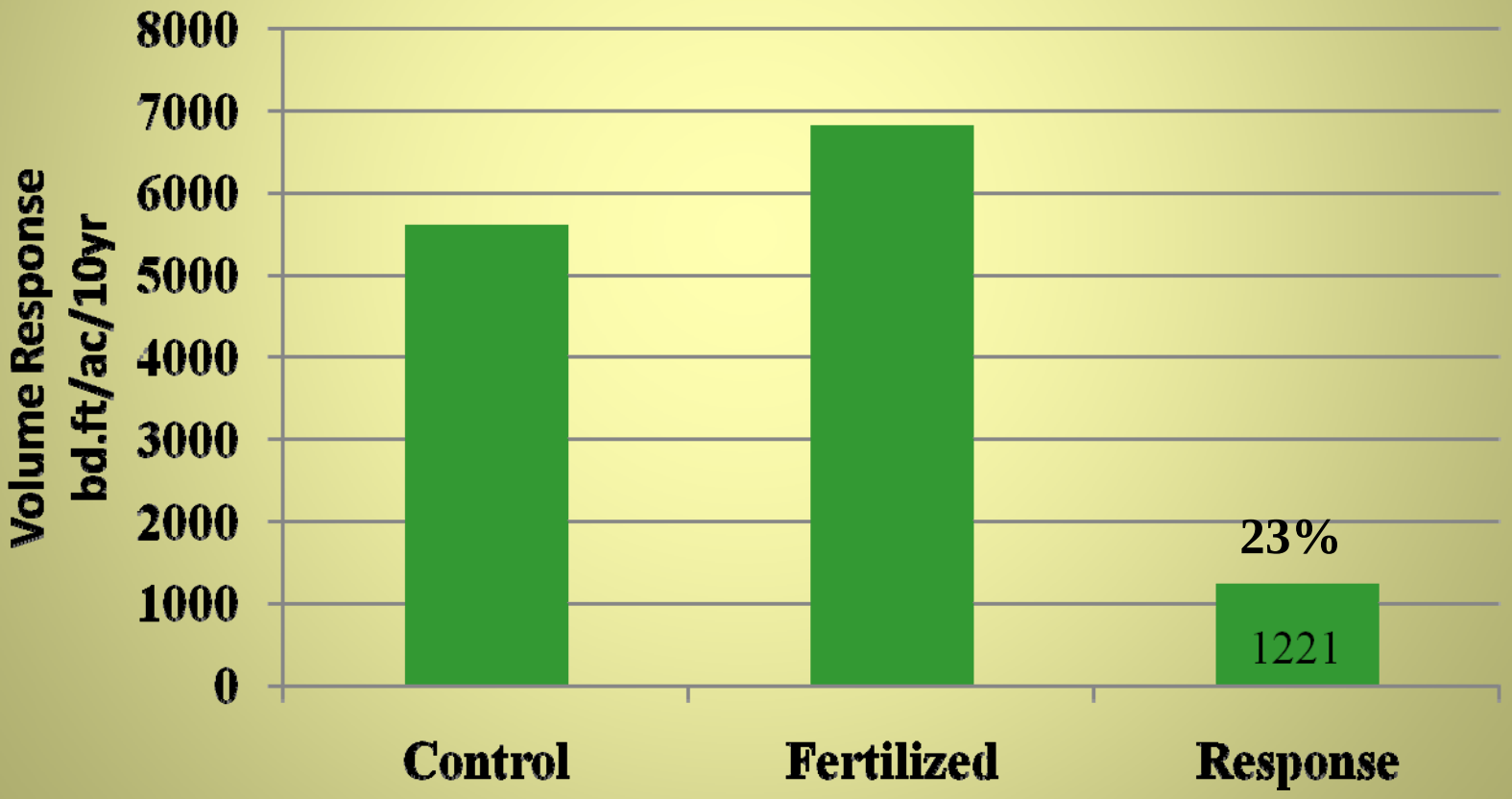
6 and 10-Year Basal Area Growth Multiplier by Species for Brickel Creek Operational Fertilization Site



FVS Multiplier Generated 6-Year Volume Growth for Brickel Creek Operational Fertilization Site



FVS Multiplier Generated 10-Year Volume Growth for Brickel Creek Operational Fertilization Site



Brickel Creek Economic Analysis	
Control (unfertilized) Growth	560 BF/acre/year
Fertilizer Treatment Response	23%
Fertilizer Treatment Cost (2008)	$116/acre
Time to Harvest – Response Duration	10 years
Log Value (net) –Stumpage @ Harvest	$200/MBF
Return on Investment (ROI)	122%
Internal Rate of Return (IRR)	8%

Fertilization – Will It Pay?

- $FV = PV\ (1+i)^t$
- $(FV/PV)^{1/t} - 1 = i$
- $(\$258/\$116)^{1/10} - 1 = i$
- $i = 8.3\%$

Considerations for Fertilization	
Stand Health	Vigorous, disease free
Habitat Types	WC/WH Series GF (wet)
Parent Material	Granite, Basalt……Gneiss/Schist
Soils	Deep Soils and Ash
Species Mix	50% DF/GF, Low PP, WC/WL?
Stand Density (basal area/acre)	Min. 100-120 sq. ft.
Stand Age @ treatment	40-60 years
Stand Growth (minimum)	400-500 BF/ac./yr.
Regeneration Harvest	8-12 years

Current Operational Fertilization Costs

- N-Alone (200lbs. N/ac.) - $135/ac.
- N+K (N+100lbs. K/ac.) - $175/ac.
- N+K+S+B (N+K+80lbs+3lbs. B/ac.) - $195/ac.

*Administration costs not included. Prices will vary depending on project size and distance from supply.

Acknowledgments

Inland Empire Paper Company

Forest Capital Partners

Idaho Dept. of Lands

Intermountain Forest Tree Nutrition Cooperative