Fertilization & Wood Density

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Background

- Studies have shown:
  - Significant decline in DF wood density 3-4 yrs after fertilization, rebound to normal density levels thereafter (Erickson and Harrison, 1974)
  - Significant decline in DF wood density 8 yrs after fertilization (Nippert et al, 2001)

Why is this Important??

- Traditional log grade specs based on:
  - branch size, sweep, scarring, and decay
  - However, markets are now beginning to include additional characteristics to specify the wood properties they require. For instance,
    - stiffness, strength, ***density***, spiral grain, extractives content, and consumption of energy for processing

Mauricio and Murphy, 2007

Current DF Grading by Wood Density

- LC - Low class (300-399 kg/m^3)
- MC - Middle class (400-499 kg/m^3)
- UC - Upper class (500-600 kg/m^3)

- *Market Results:*
  - Net returns for LC pulp were ~28% lower than MC
  - UC pulp net return was 32% higher than MC
  - MC lumber log returns were 9% greater than LC
  - UC lumber log returns were 4% greater than MC
  - Premium price = High wood density

Mauricio and Murphy, 2007

Impact of Forest Fertilization

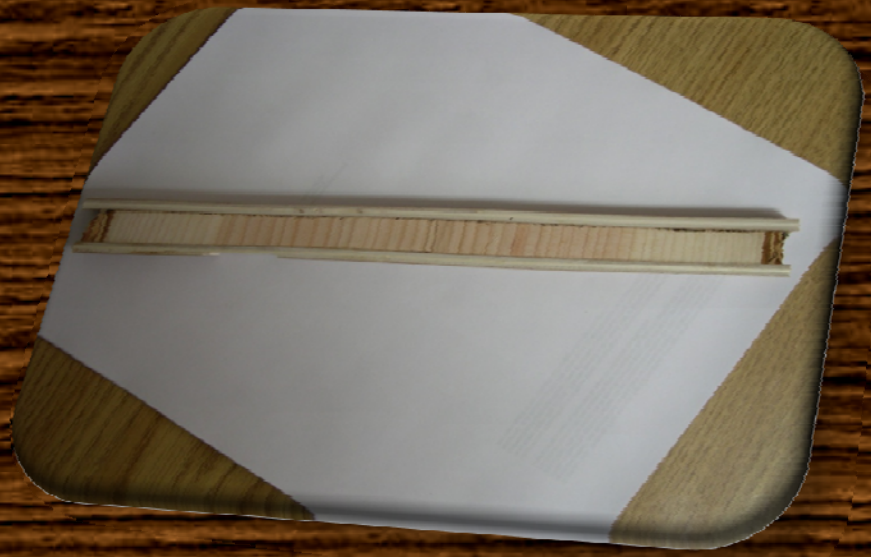
- Will forest fertilization decrease wood density to the point where it affects wood quality and markets?

Study Design

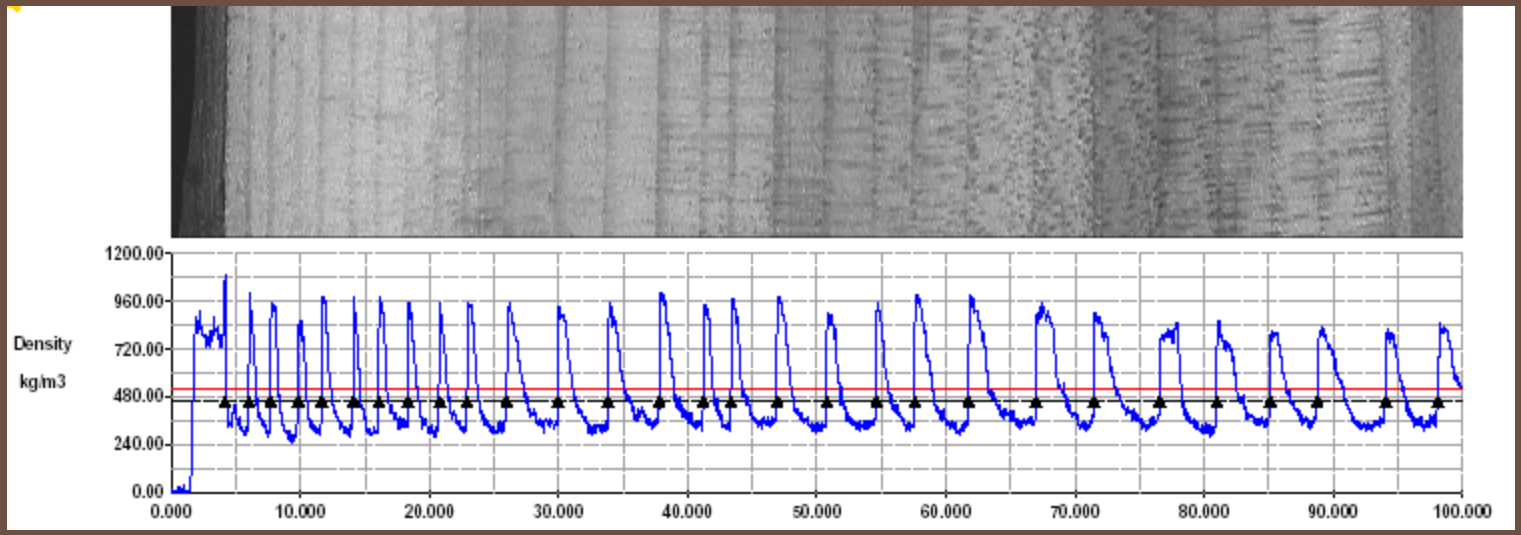
- Two DF stands selected for sampling
  - Mt. Harris (NE OR): early rotation – 20 yrs
    - Fertilized @ 12 yrs
  - Tollgate (NE OR): mid rotation – 40 yrs
    - Fertilized @ 24 yrs
- Fertilizer Treatments:
  - Control
  - 200 lbs N/ac, 90 lbs S/ac

Study Design

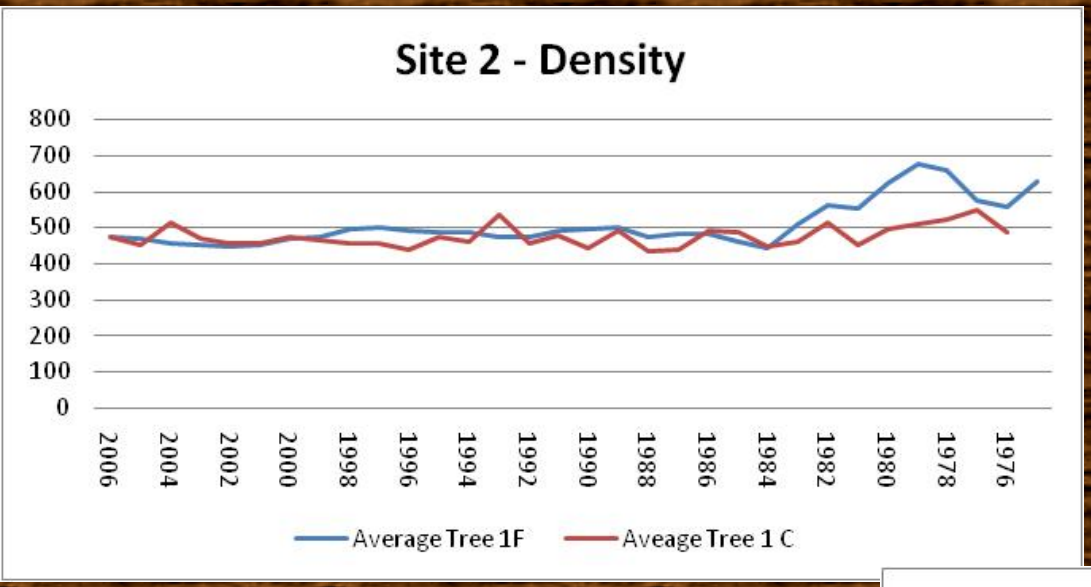
- Two trees were selected per treatment
- Two disks were obtained from each tree
- Each disk was dried and processed for analysis with X-ray densitometer

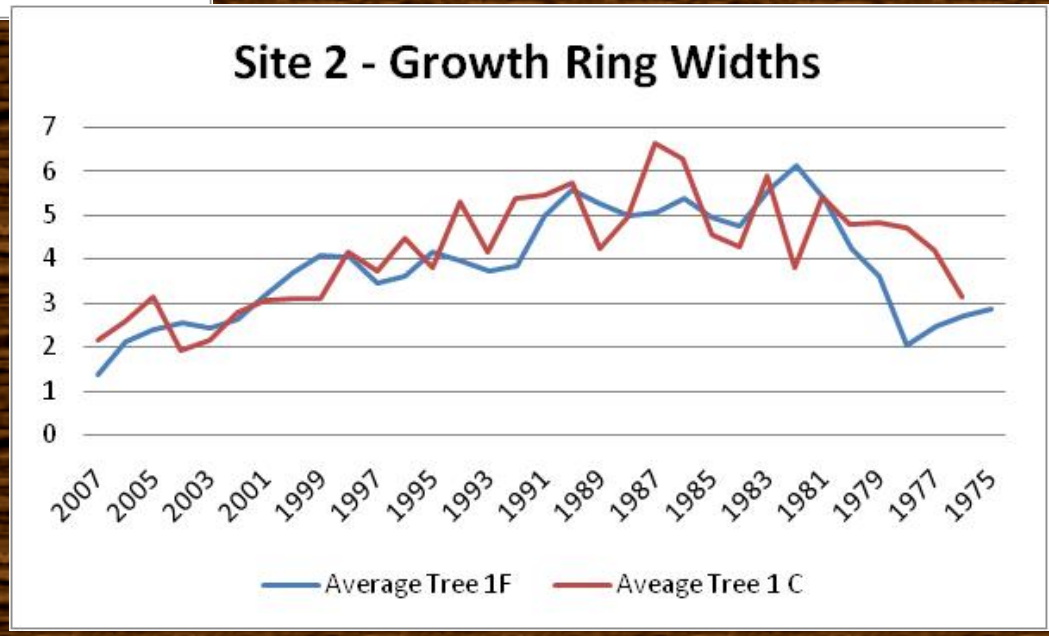


Density Scan

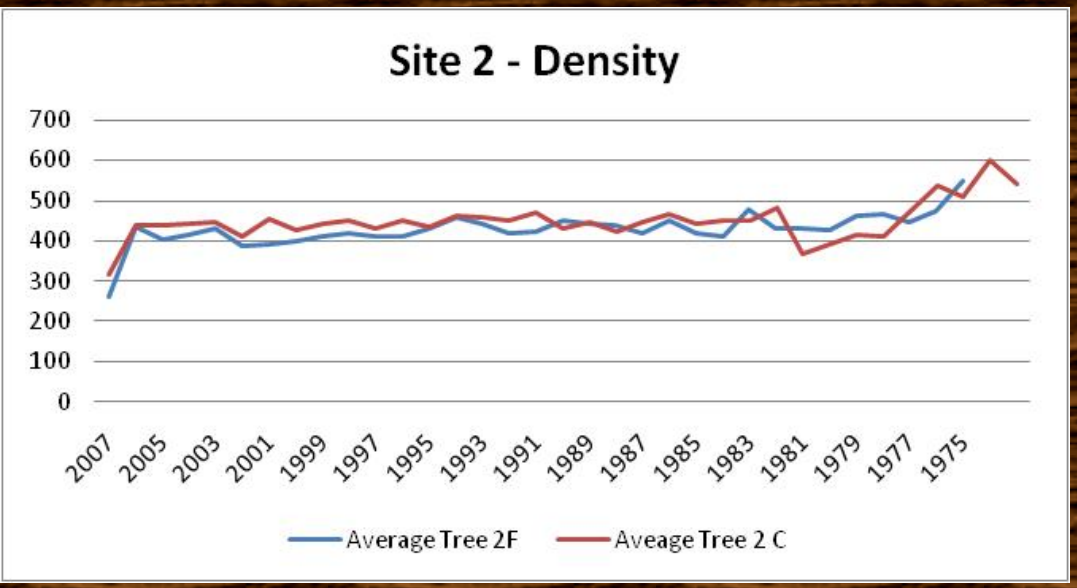


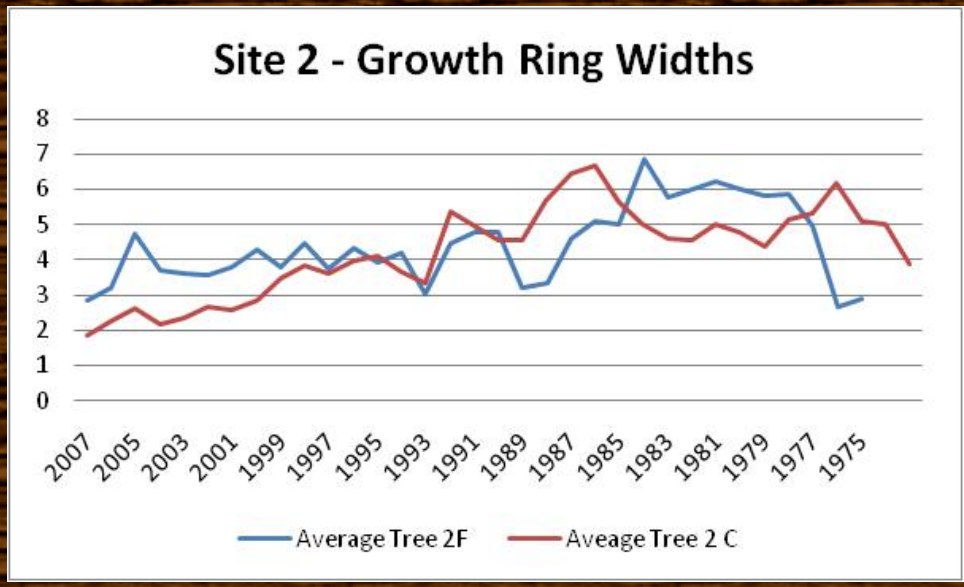
Results – Tollgate-1



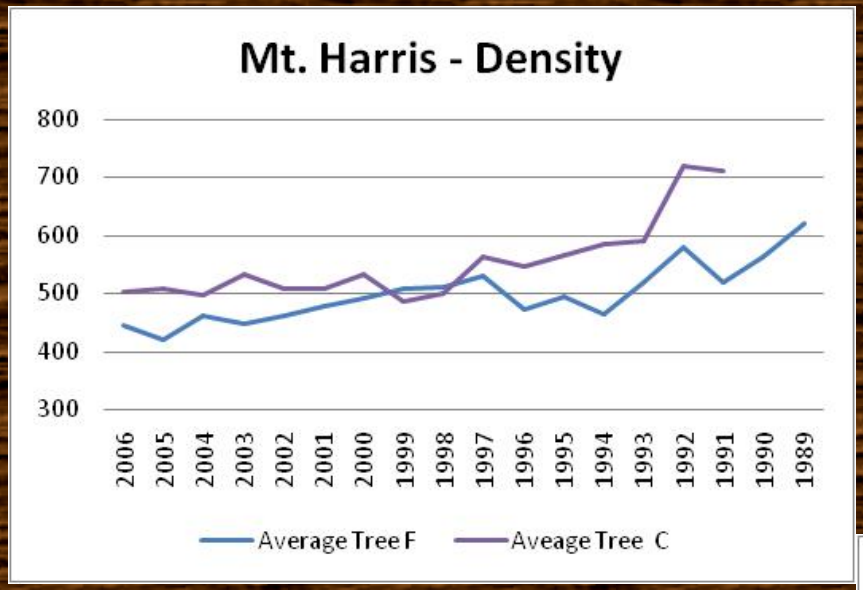


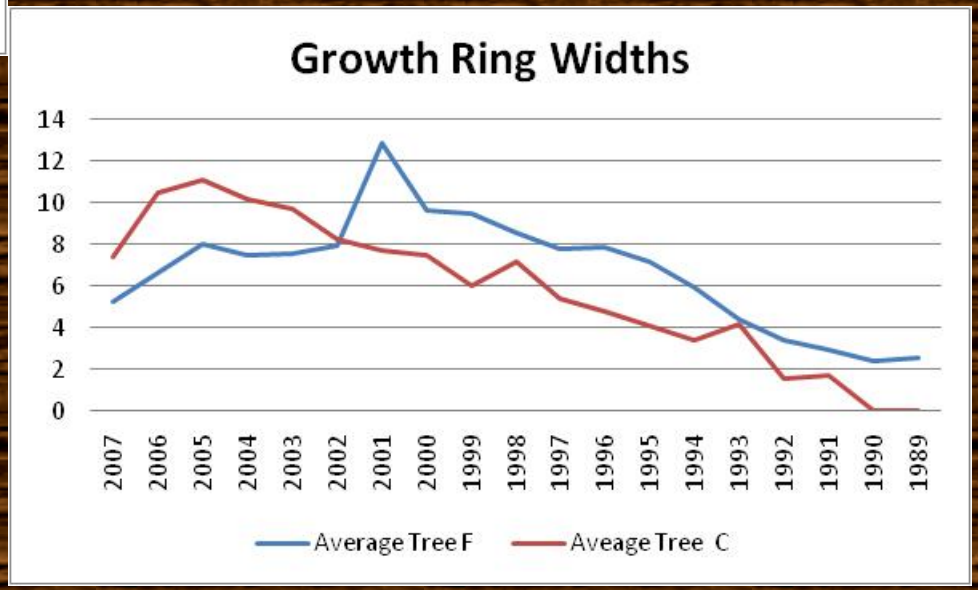
Results – Tollgate-2





Results – Mt. Harris





Inland Douglas fir density

Recent study in Bitterroot Valley, Montana

- Low class (300-399 kg/m^3) 8%
- Middle class (400-499 kg/m^3) 85%
- Upper class (500-600 kg/m^3) 7%

Conclusions

- Need to learn current density characteristics of Inland Douglas Fir
- Assess the impact of fertilization that increases growth rate
- Need to determine if altering growth rate affects other wood quality characteristics