PROCURING BIOMASS IN A CHALLENGING LANDSCAPE: HARVESTING REALITIES

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Outline

Our Organization

- USDA Forest Service, R&D
- Southern Research Station, Research Unit

High Tonnage Feedstocks Project

- Introduction & Study Area
- Methodology
- Results
- Conclusions

Our Organization

President

Secretary of Agriculture

Chief, Forest Service

Deputy Chief, Research

Station Director

Research Work Unit
(Project Leader)

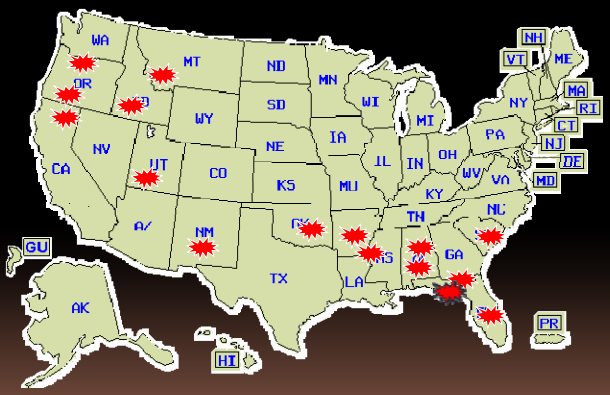
National Forest System

State and Private

International Forestry

Our Organization

Forest Operations Research Unit
National Program



Our Organization

Forest Operations Research Unit

- Forest Operations – Harvesting Systems
- Ecological Impacts of Equipment
- Analysis Tools

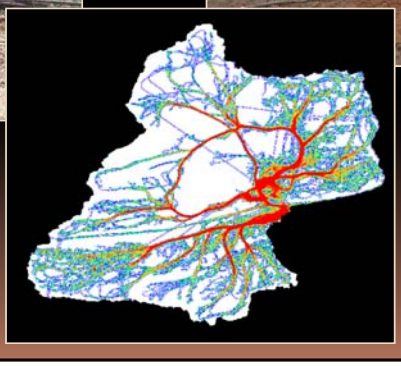
Our Organization

Forest Operations Research Unit

Objective: Estimate costs for felling, skidding and debarking stems for future use in contract negotiations

Our Organization

Forest Operations Research Unit



Our Organization

HIGH TONNAGE FEEDSTOCKS PROJECT

Mix and Match Comparison Study

High Tonnage Feedstocks Project

Introduction

- DOE Funding
- Harvest System Design
  - Feller-Buncher
  - Skidder
- Harvest System Testing
- Small Diameter Stems

High Tonnage Feedstocks Project

Introduction

Tigercat 845D (NF)

Tigercat 630D (NS)

New System Equipment Mix

High Tonnage Feedstocks Project

Introduction

TimberKing 340 (CF)

Cat 525B (CS)

Conventional (Traditional) System Equipment Mix

High Tonnage Feedstocks Project

Introduction

Mix and Match

NF

CF

NF + CS

NF + NS

CF + CS

CF + NS

NS

CS

High Tonnage Feedstocks Project

Study Area

- Crenshaw County, AL
- 12 Acres of 52 Acre Tract
- Felling Plots within Sub-Units

High Tonnage Feedstocks Project

Methodology

Felling

- Mark trees by DBH
- Time-and-Motion Study
  - Record feller-buncher operations using digital video recorders
  - Analyze video using commercially available software
  - Identify Cycle Elements
- Sample trees were measured, weighed, and a regression equation was developed

High Tonnage Feedstocks Project

Methodology

Skidding

- Time-and-Motion Study
  - Record operations using digital video recorders
  - Identify Cycle Elements
  - Analyze video
- Mark, count stems, and collect GPS coordinates on bunches
- Calculate machine costs

High Tonnage Feedstocks Project

Results & Discussion

Felling: Bunch sizes differed based on skidder assignment

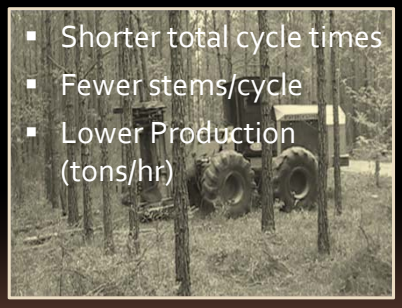
- No Significant Difference in cycle time by bunch size

- Significant Difference in cycle time by bunch

High Tonnage Feedstocks Project

Results & Discussion

Felling: Production



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Results & Discussion

Skidding

- 1-2 bunches/cycle
- Similar total cycle time
- Stems/cycle > NS (bunch size)
- Position and grapple cycle element < NS (design)


Big bunches


Smaller bunches

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Results & Discussion

Balanced Systems

Feller-Buncher	Skidder	Production (gt/SMH)	Cost ($/gt)
1 NF	1 CS	61.0	2.82
3 CF	2 NS	227.5	1.92
1 NF	1 NS	95.9	2.07
2 CF	3 CS	121.1	3.16

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Conclusions

- Balanced systems that included the large grapple skidder (NS) had the highest production rates
- The system using a conventional feller buncher with the large grapple skidder had the lowest cost to produce a ton of wood
- The 'new system' with the tracked feller buncher with shear and the large grapple skidder cost $0.15/ton more than the lowest price system, but only included two machines.
- Moving costs, maintenance time and other factors should also be considered when selecting a harvesting system.

High Tonnage Feedstocks Project

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Thank you
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