Appropriate technologies for small scale forest harvesting operations in Tasmania

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Background:

New person to Australia identifies:

- Perceived wealth of resource, both plantation and native
- Apparent lack of small-scale harvesting machinery and expertise
- Contractor and landowner dissatisfaction
Approach taken

- Analysis of resource
  - What is small scale?
  - Plantation characteristics
  - Native forest characteristics

- Review harvest machinery and systems:
  - Local, national, international
  - Felling and processing
  - Extraction
  - Purpose-built machinery
Approach taken

• Conclusions
  • Harvesting systems
  • Matching machinery to forests
    • General recommendations
    • Exceptional circumstances
Characteristics of small-scale forests

- “forest ownership and management by individuals, at a farm or individual property level” McCormack et al, 2000

- Landowners often have multiple objectives

- View from large companies - harvesting contractors and processors:
  - Market less than 100 km
  - Volume greater than 1000 – 2000m³
  - Good access
  - Continuity of work
  - Well trained operator with appropriate machinery
Characteristics of small-scale forests

Plantations

- 4500 individual plantations less than 20 hectares
  - Softwood: high and low productivity
    - <20ha, <0.5m³, <2000m³, poor access, poor quality, P.1986, 34% pruned, 27% thinned
  - Hardwood
    - <20ha, 0.15-1m³, <2000m³, pulp, sawlog, unknown management, < 10 years old.
Characteristics of small-scale forests

• Native forest

• Mature forest
  Majority in highlands, poor quality, low volumes, poor access, 100+ km to market.

• Regrowth
  Wet & dry sclerophyll; very diverse quality, volumes, area, species and access.
Harvesting machinery and systems

Current situation:

- Typically expensive, highly mechanised and high output rates
- $1,000 - $1,500 float charges
- Mismatch of machinery, skills, volumes and access
- Uneconomic to harvest “small scale forests”
Harvesting machinery and systems

- Falling and processing
  - Chainsaw
  - Farm tractor
    - Plus falling head
    - Plus harvesting head
    - Plus processor
  - Small excavator <20t
    - Plus falling head
    - Plus harvesting head
    - Plus processor
Harvesting machinery and systems

- **Extraction**
  - Iron horse & winch/trailer
  - ATVs & winch & self loading trailer
  - Compact 4wd tractors
    - Plus winch
    - Plus self loading trailer
  - Farm tractors
    - Plus grapples or winches
    - Plus self loading trailer
  - Small excavators <20t
Harvesting machinery and systems

• Purpose-built machinery
  • Falling machines
  • Harvesting machines
  • Skidders
  • Forwarders
    • wheeled
    • tracked
  • Cablecranes
    • Highlead
    • skyline
Harvesting machinery and systems

- Farmi tree harvesting system
  - A systematic planned approach for skidders
    - Felling of the trees
    - Positioning of the tractor
    - Preparing to winch
    - Stacking logs
- “A combination of appropriate machinery, work method and especially planning.”
Small-scale systems

• Landowners often advised <10ha is not viable
  • Very few forestry companies willing to harvest due to high fixed costs for small volumes
  • Purchasing and planning time is similar for large volumes
  • Suitable harvesting contractors are often unavailable as they have long-term contracts with major companies
  • Poor access, especially in wet conditions
  • A lack of a coordinated approach
Matching machinery to forests

- Numerous variables
  - Plantation or native
  - Hardwood or softwood
  - Thinning, partial or clearfall harvest
  - Volumes (tree, Ha, total)
  - Access
  - Quality of timber
  - Terrain
  - Landowner expectations
  - Work programs
Machinery recommendations

Considerations -

- Forest characteristics and terrain will determine harvest system
- Machinery manufacturers often subjective
- Model & size determined by volumes (tree/total)
- Haulage problematic – harvesting machines are often used to load trucks
Machinery recommendations

- Small operations
  - Less than 500m³
    - Chainsaw felling and delimming
    - Farm tractor (2wd or 4wd) plus winch and/or grapple
    - Self-loading truck
Machinery recommendations

- Medium – large operations
  500m³ - 2000m³
  - 1 small (approx. 20t) excavator with harvesting head
  - 1 small (approx 12t) purpose-built forwarder
  - 1 trailer unit
Machinery recommendations

- Exceptional circumstances:
  - Large branchy trees and windbreaks
    - Chainsaw and >20t excavator
  - Regrowth thinning (very variable)
    - >20t bush excavator, harvester/falling head, skidder/forwarder
  - Extreme slope, ground conditions and roughness
    - Cable cranes: high lead and skylines
Machinery recommendations

- Key elements to ensure viable small-scale harvesting:
  - Good organisation and coordination for harvesting contractors
  - Machine suitability
  - Use of self-loading trucks
  - Good organisation and coordination for continuity of supply to timber purchasers
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