Comparison of the productivity of cut-to-length harvesting and fuel-adapted harvesting in a *Pinus radiata* clearfell operation in Western Australia

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Background

- Increasing interest in Australia in using logging residue as biofuel
- Exploration of methods to reduce delivered costs:

Roadside processing

Infield drying

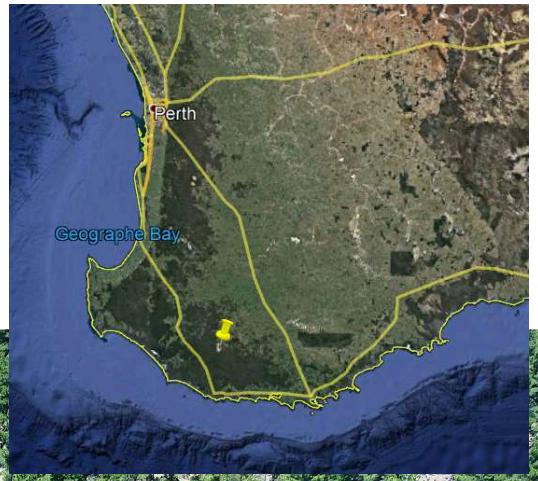
Fuel-adapted harvesting

Trial objectives

- Examine the impact of fuel-adapted harvesting on:
  - Harvester and forwarder productivity & costs (logs)
  - Forwarder productivity & costs (Logging residue)
  - Logging residue yield and quantity of logging residue retained on site
  - Soil compaction

Trial site

- Location: south-west Western Australia
- Age and species: 29 year old *Pinus radiata* plantation
- Mean tree height: 27 metres
- Mean tree volume: 1.2 m^3
- Stems per hectare: 293



Trial setup

- In October/November 2017 half of the 6 ha site was felled and processed using ‘conventional’ harvesting, half using ‘fuel-adapted’ harvesting
- Harvester: John Deere 903KH + Waratah 624C harvester head
- Forwarder: John Deere 1910E
- Five log products were produced – four sawlog types and chiplogs
- Logging residue was extracted by a different John Deere 1910E forwarder and operator

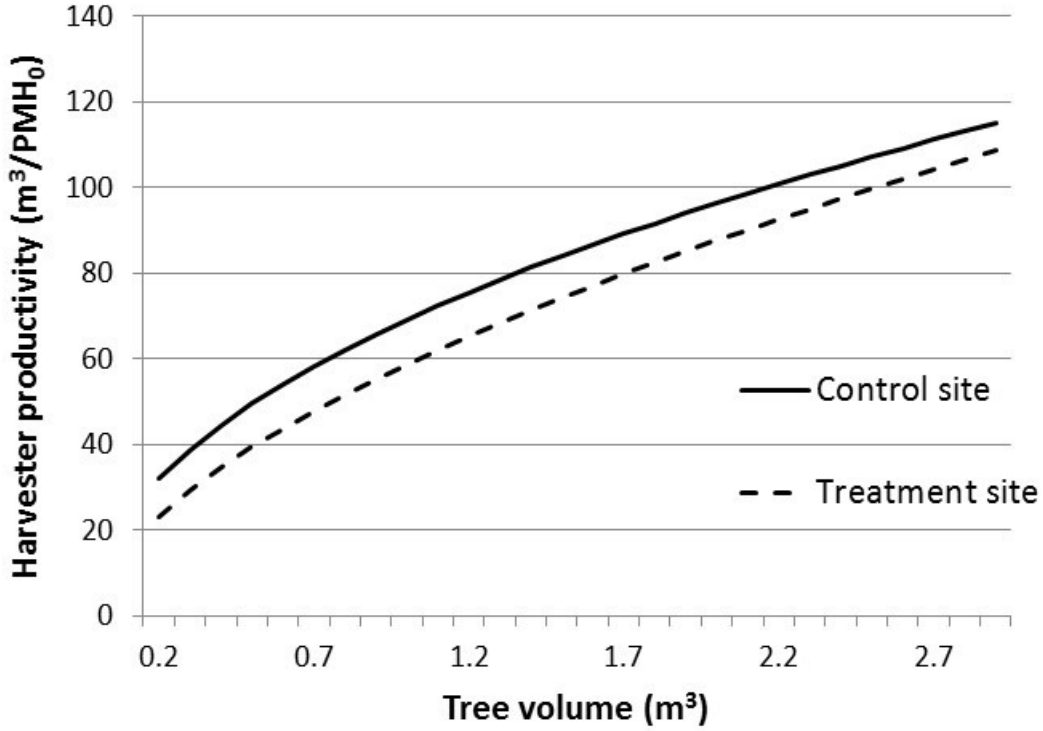
Conventional harvesting

- Cut-to-length at the stump
- Trees felled to the right into remaining plantation
- Processed in front of the harvester leaving residue in harvester's path

Fuel-adapted harvesting

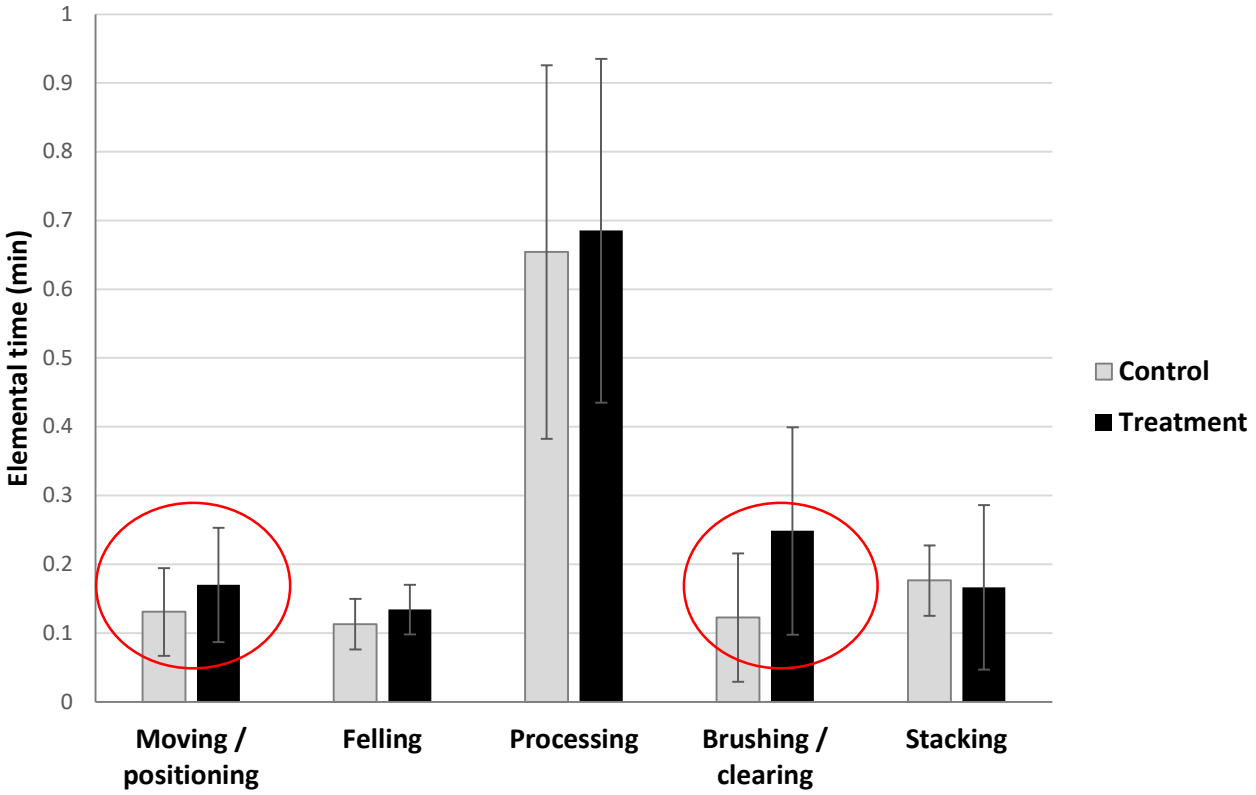
- Cut-to-length at the stump
- Trees felled to the front into remaining plantation
- Processed to the left of the harvester leaving residue and logs in separate piles alongside the harvester's path

Results – Harvester productivity



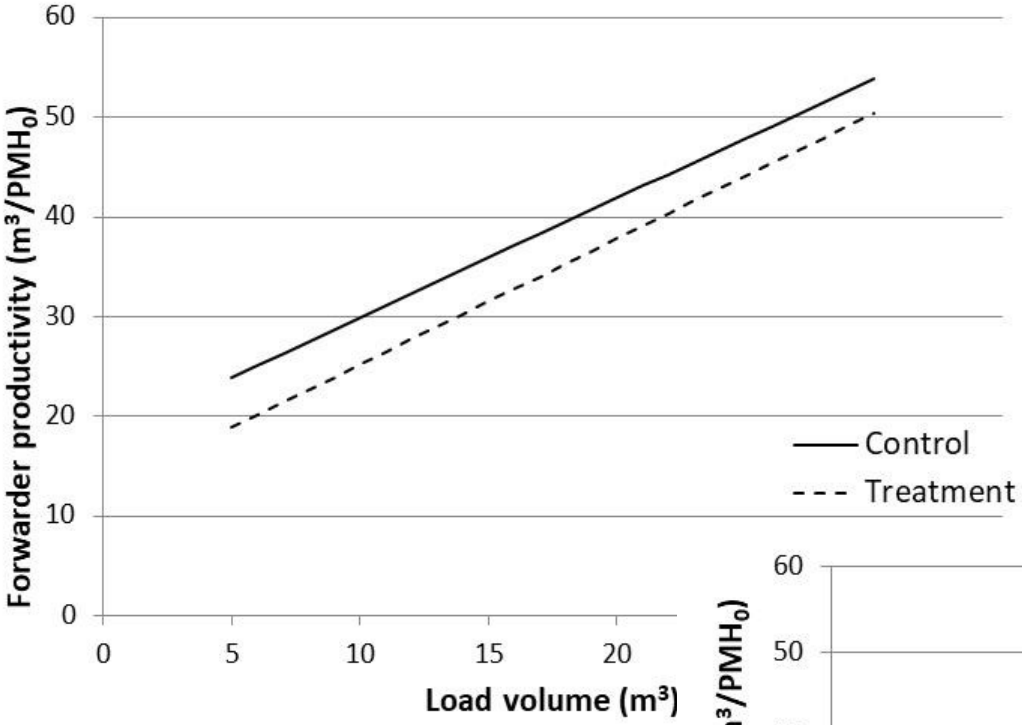
- Harvester significantly less productive on the fuel-adapted treatment site
- ~15% reduction in productivity

Results – Harvester productivity

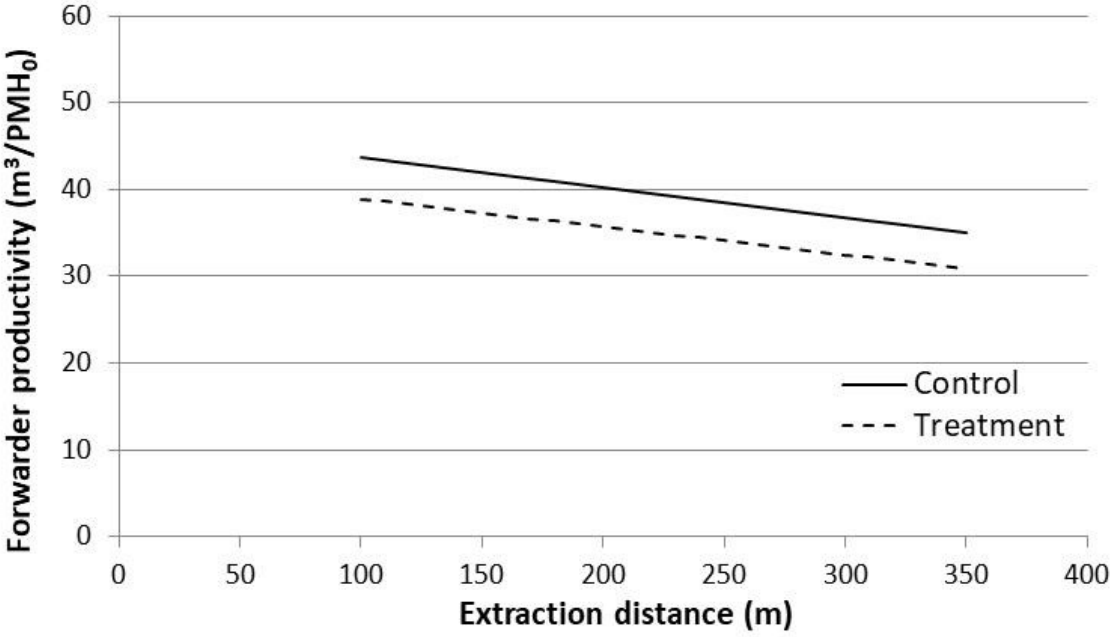


- Operator inexperience with technique
- Operator spent time adding small residue pieces to the piles

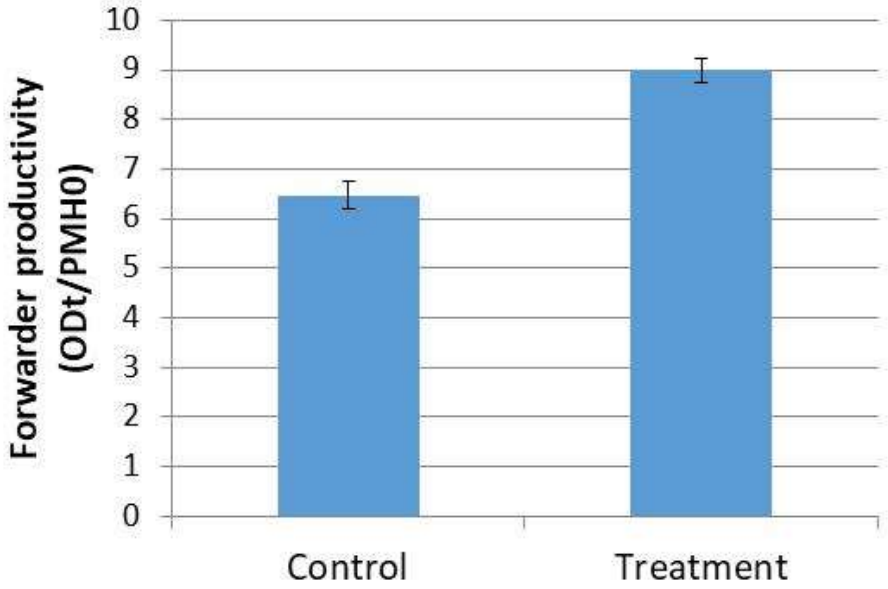
Results – Forwarder productivity – logs

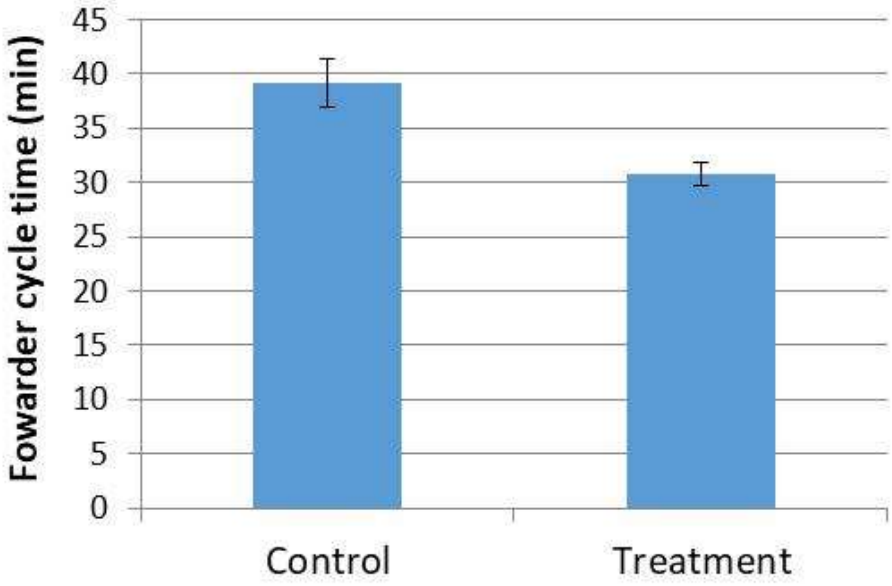


- Forwarder significantly less productive on the fuel-adapted treatment site
- ~11% reduction in productivity

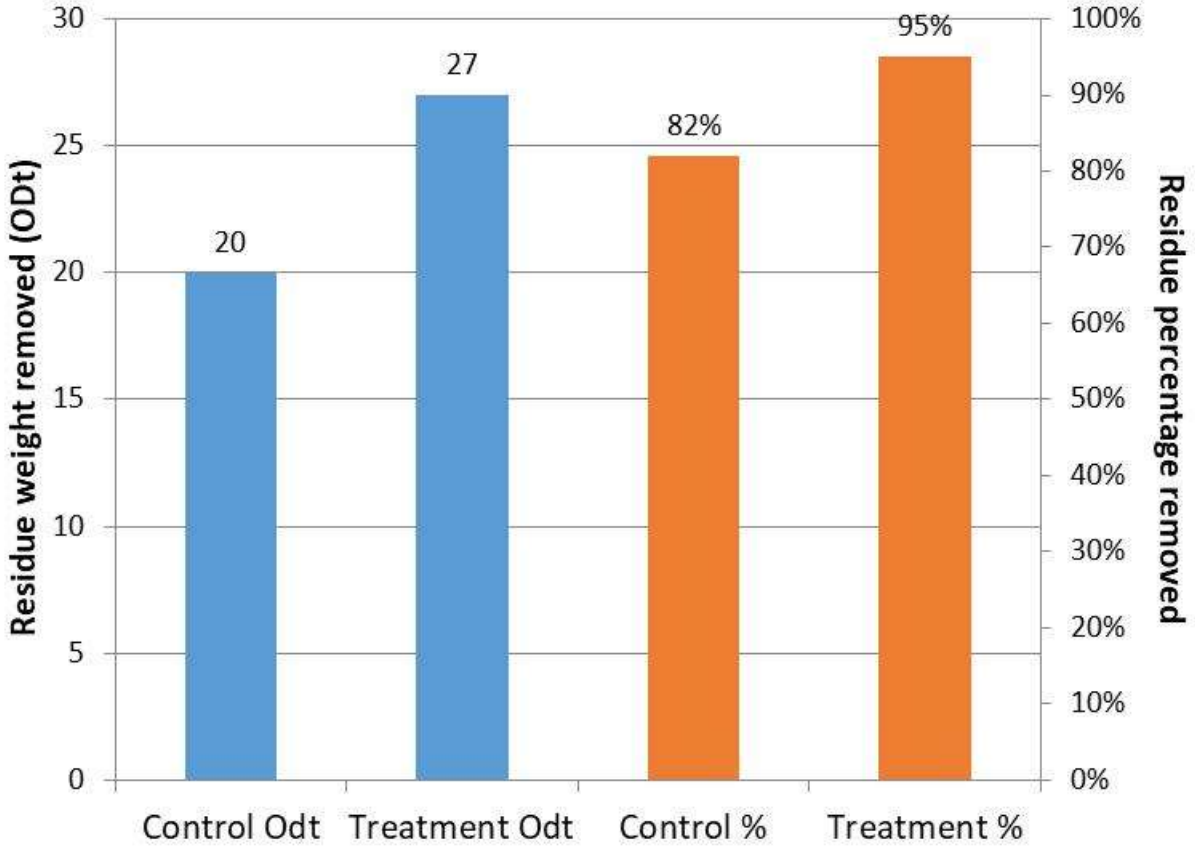


Results – Forwarder productivity – logging residue





Results – logging residue quantity



Summary

- Harvester and forwarder productivity (logs) were significantly reduced in the fuel-adapted trial area
- Operator inexperience was likely to be the major factor in the productivity reduction
- Forwarder productivity (logging residue) was significantly greater in the fuel-adapted area
- Logging residue removal was greater in the fuel-adapted area
  - Nutrient loss?


Thank you!
Any questions?
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