The Influence of Mastication on Soils and Fuels in Moist and Dry Forests of the Northern Rocky Mountains USA

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Mechanical

Tractor piling

Chipping and Masticating

Grapple piling
Roller Chopping and Chipping

- Create deep compacted layers
- Insulating soil surface
- Slowing decomposition
  - Especially on cool sites
- Destroys
  - Nitrogen fixation
  - Animal habitat
  - Site protection
Place Mastication Within the Context of Decomposition

- Top roters
- Bottom roters
- Live roters
- Dead roters
- White roters
- Brown roters
- Rotter puppies
Slash Chunking To Enhance Decomposition
Moist Forest Wildland Urban Interface Treatments

Harvest Activity Slash and Small Trees

Coarse woody debris
75 Tonnes/ha

448 trees/ha
Basal area 121 ft²/ac or 28 m²/ha
Woody Debris Post Mastication

Control
Lop & scatter
Mastication
Grapple pile

- Bark tight
- Bark loose
- No bark
- Rotten
- <7.6 cm

Tonnage per hectare
Forest Floor Nutrition
Nitrogen
No Statistical Difference

Total Nitrogen percent

Control  Lop & scatter  Mastication  Grapple pile

Litter  Humus  Soilwood  Shallow Mineral
Surface Organic (Duff) Depth
No Statistical Difference
Woody Debris 2-Yrs Post Mastication

Control

Lop & scatter

Mastication

Grapple pile

Tonnes per hectare

Bark tight  Bark loose  No bark  Rotten  < 7.6 cm
Moist Forest Treatments

CWD 36.2 Tonnes/ha

292 trees/ha
Basal area 118 ft²/ac or 43 m²/ha
Young Moist Forest Mastication
Advanced Regeneration

3215 trees/ha
Basal Area 57 ft²/ac; 13 m²/ha
CWD 38.7 Tonnes/ha
Post Mastication Young Forest

670 trees/ha

Basal area 41 ft\(^2\)/ac or 9 m\(^2\)/ha
Post Mastication Planting and Natural Regeneration
Dry Forest Treatments
Non-merchantable Ponderosa Pine

1437 tree/ha
Basal area 112 ft²/ac or 25 m²/ha
Dry Forest Pre-mastication

<table>
<thead>
<tr>
<th>Bark tight</th>
<th>Bark loose</th>
<th>No bark</th>
<th>Rotten</th>
<th>Brown Cubical Rot</th>
<th>&lt; 7.6 cm</th>
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[Graph showing data comparison before and after mastication with different bark conditions.]
Burning Post-mastication

• Lower duff
  – Moisture > 100%
  – Temperature <40° F; < 5° C
9-months Later

Chunk

Chunk and Burn
Economic Evaluation
US Dollars/acre

Mastication 6 mo.
- Average
- Maximum
- Minimum

Prescribed fire 3 yrs
- Average
- Maximum
- Minimum

Grapple pile And burn 2 yrs
- Average
- Maximum
- Minimum

- Grapple
- Slash
- Admin
- Burn

6 mo. 3 yrs
- US Dollars/acre

RMRS
Take Home Messages

- Viable tool in some circumstances
- Not within the historical range of variability
- Can be burned, but must be careful with burn plan
- Effectiveness varies on species and site (shrubs versus trees vs tree species)
- Size matters (chunks rather than chips or small pieces)
A Northern Idaho Moist Forest
Before Blister Rust
70 m tall
110 cm diameter
Western White Pine