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 rotters
- Bottom rotters
- Live rotters
- Dead rotters
- White rotters
- Brown rotters
- 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
- Basal area: 121 ft²/ac or 28 m²/ha
- 448 trees/ha
Woody Debris Post Mastication

- Control
- Lop & scatter
- Mastication
- Grapple pile

- Bark tight
- Bark loose
- No bark
- Rotten
- <7.6 cm
Forest Floor Nutrition
Nitrogen
No Statistical Difference

Total Nitrogen percent

Control  Lop & scatter  Mastication  Grapple pile

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

![Graph showing Woody Debris 2-Yrs Post Mastication with categories: Control, Lop & scatter, Mastication, Grapple pile.](image)

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

- **Lop & scatter**
  - Bark tight
  - Bark loose
  - No bark
  - Rotten
  - < 7.6 cm

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

- **Grapple pile**
  - 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 ft²/ac or 9 m²/ha

Pre-mastication
Post-mastication

- Bark tight
- No bark
- Brown Cubical Rot
- < 7.6 cm
- Bark loose
- Rotten
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
Burning
Post-mastication

• Lower duff
  – Moisture > 100%
  – Temperature
    $< 40^\circ F; < 5^\circ C$
9-months Later

Chunk and Burn
Economic Evaluation

US Dollars/acre

Mastication

6 mo.

Prescribed fire

3 yrs

Grapple pile

2 yrs

Average

Maximum

Minimum

Grapple

Slash

Admin

Burn

Mastication

Admin

Slash

Fire Line

Burn
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