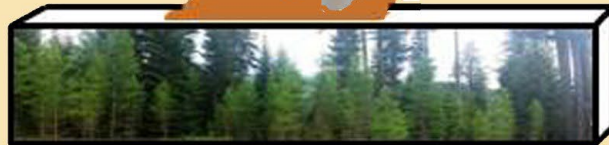


Mastication Tips for Site Preparation



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RMRS-GTR-381

<https://www.fs.usda.gov/treeearch/pubs/57328>

What is a masticator?

When is mastication a good option?

What are the elements that influence cost?

How do I determine which masticator to use?



Vertical Shaft



Horizontal Shaft



Attachments

disk or mower
fixed teeth or blade

Horizontal shaft or drum
Fixed teeth,
swinging hammers, or
ax/knife blade

Boom or front end mounted

Vertical Shaft



Horizontal Shaft



Vegetation

Trees

6 to 8" diameter when boom
mounted

Trees

Up to 30" when boom
mounted

Harvest slash and shrubs

Vertical Shaft



Horizontal Shaft



Piece size and post-treatment condition

Large pieces
Chunks and shreds

Small pieces
Chips

Leaves ragged stumps

Leaves clean cut stumps

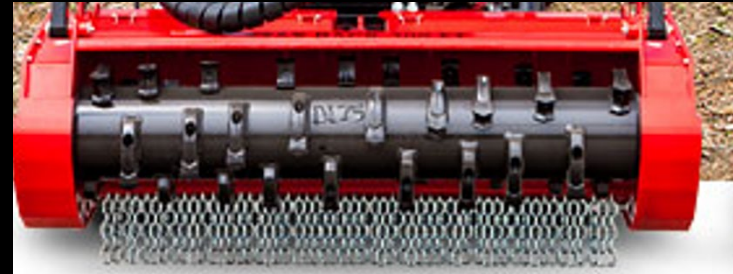
Carrier Machines

Excavators, skid steers, tractors (hydraulic and power take-off)

Vertical Shaft



Horizontal Shaft



Within stand topography

Broken or dissected slopes
Diversity of angles and
aspects

Continuous or similar slope
angle and aspect

Boom mounted provides more options
Front end mounted visit every tree

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Works best for altering biomass for fuels and site preparation!



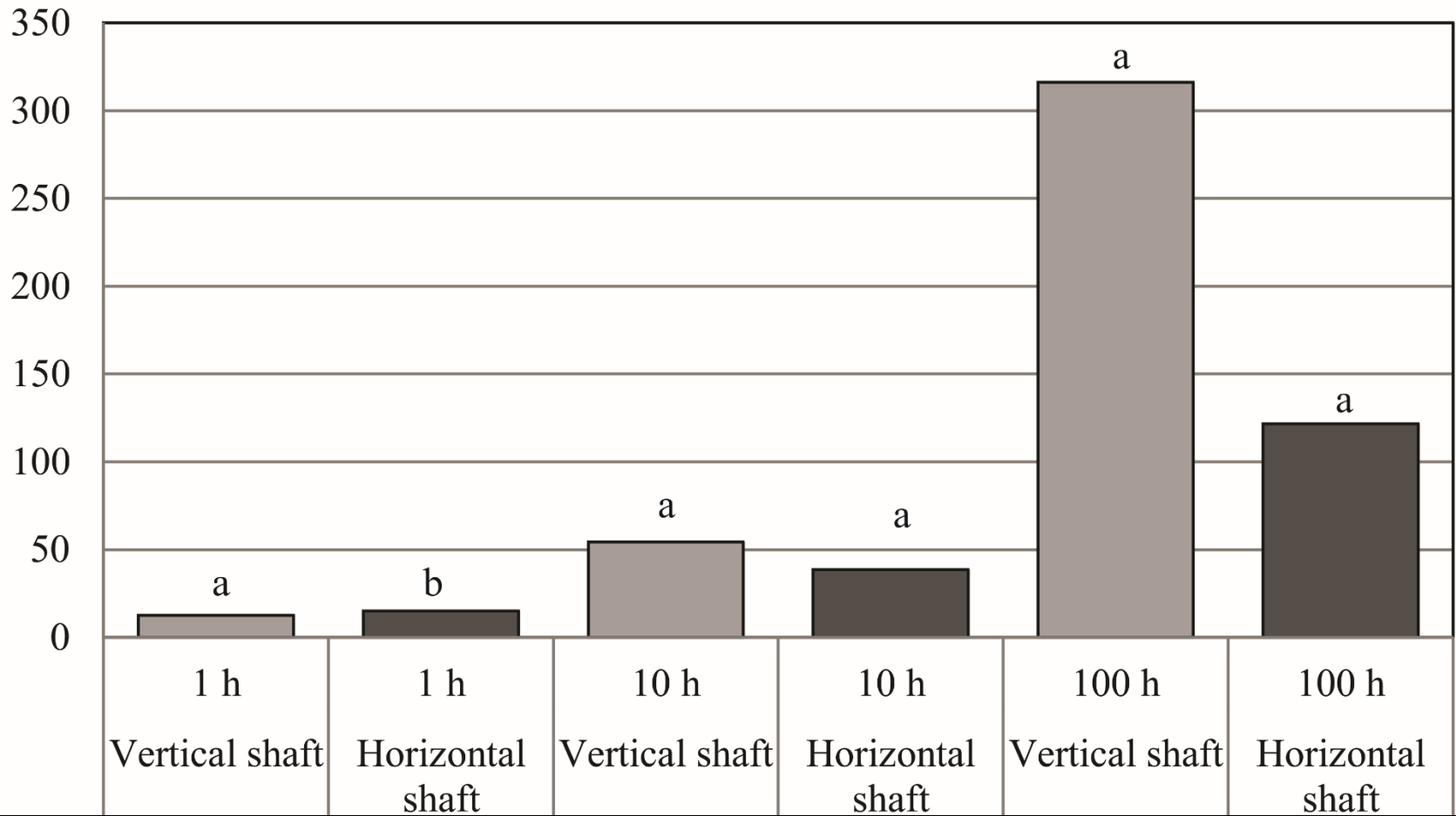
Site
1-hour vary
10 hour do not
100 hour do not



Cutting Head

Average
surface area
(cm²)

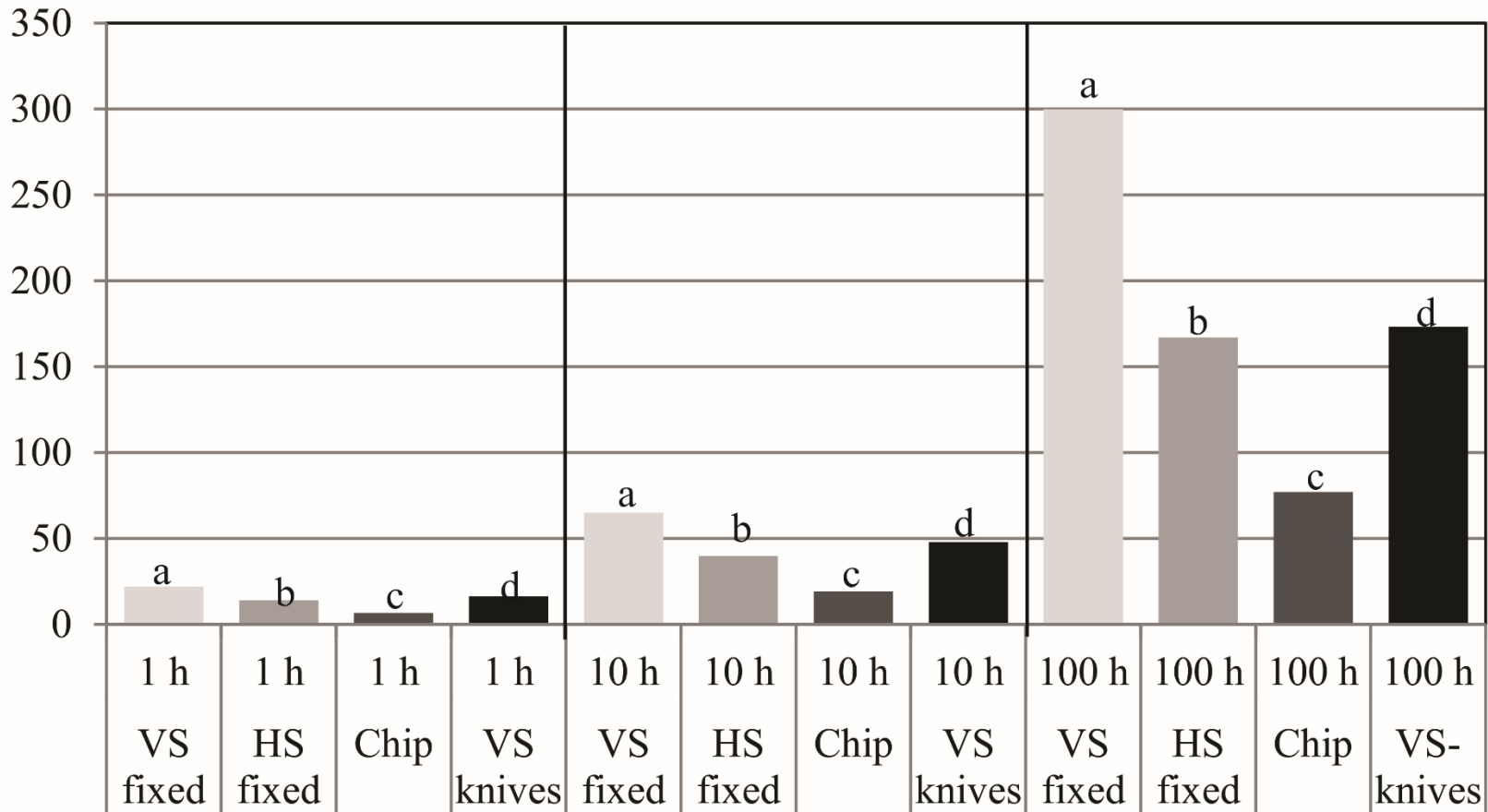
Moist Mixed Conifer



Cutting Head

Average
surface area
(cm²)

Dry Mixed Conifer



VS – Vertical shaft

HS – Horizontal shaft

Site
Preparation
Forest
Floor
Substrate

Masticated

Blackened



Organic



Mineral

Forest Floor Establishment



Species abundance (%)

(%)

60

Chi-square

P=0.0001

40

20

0

Mastication

Organic

Pile&burn

Under burn

Western Larch

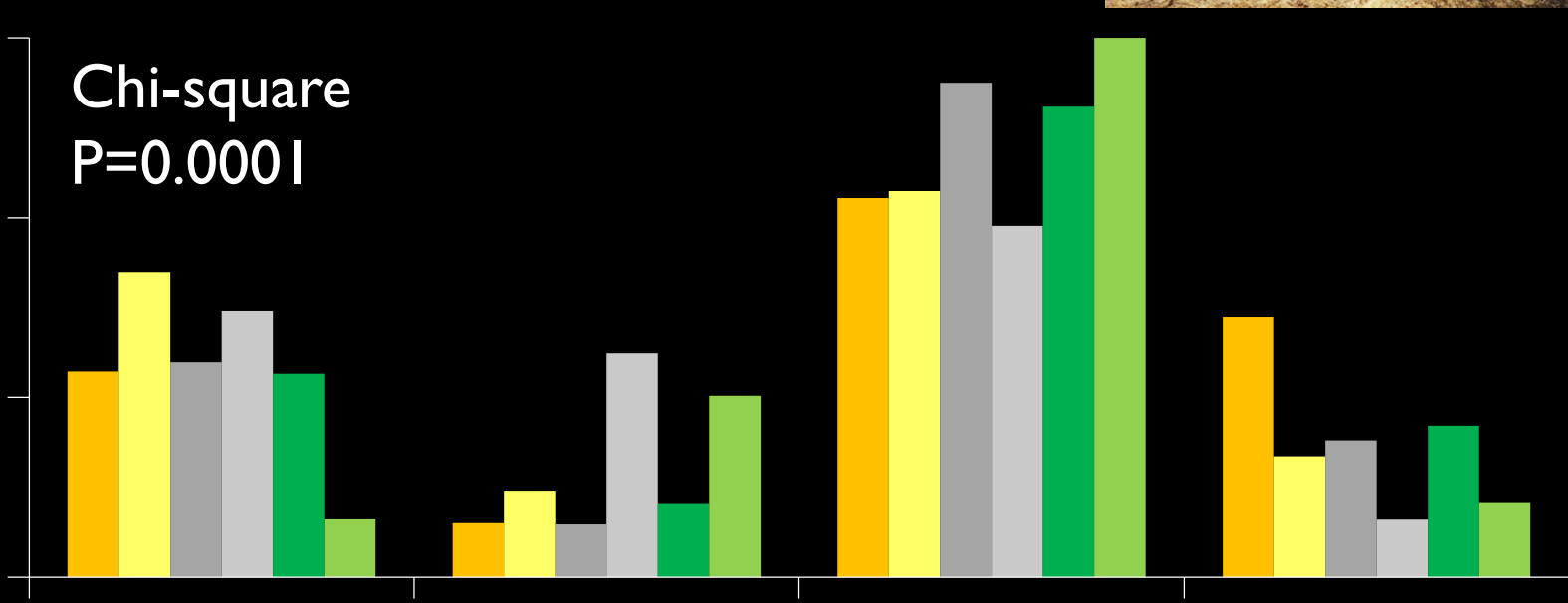
Douglas-Fir

Western Hemlock

Western White Pine

Grand Fir

Western Redcedar



What is a masticator?

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How do I determine which masticator to use?



Cost

It Depends

300 to 400/acre

Increase Cost	Adjust Costs
Machine size ↑	Cheaper than slash, pile, burn
Tree size ↑	One entry vs multiple entries
Fuel load ↑	Avoids removal costs
Complex site conditions	Unable to burn
Creating small pieces	Large pieces
Operator experience	Spot mastication

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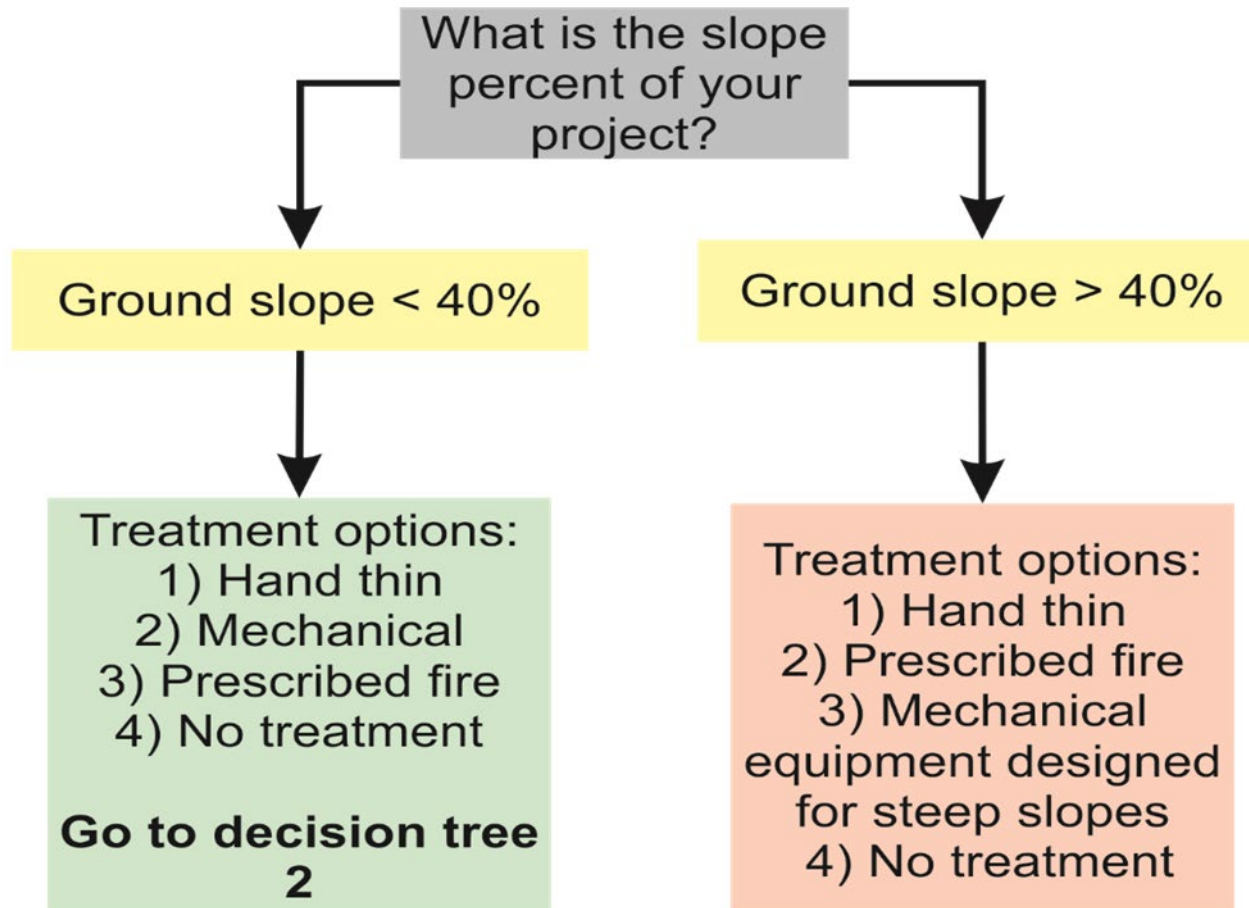
How do I determine which masticator to use?



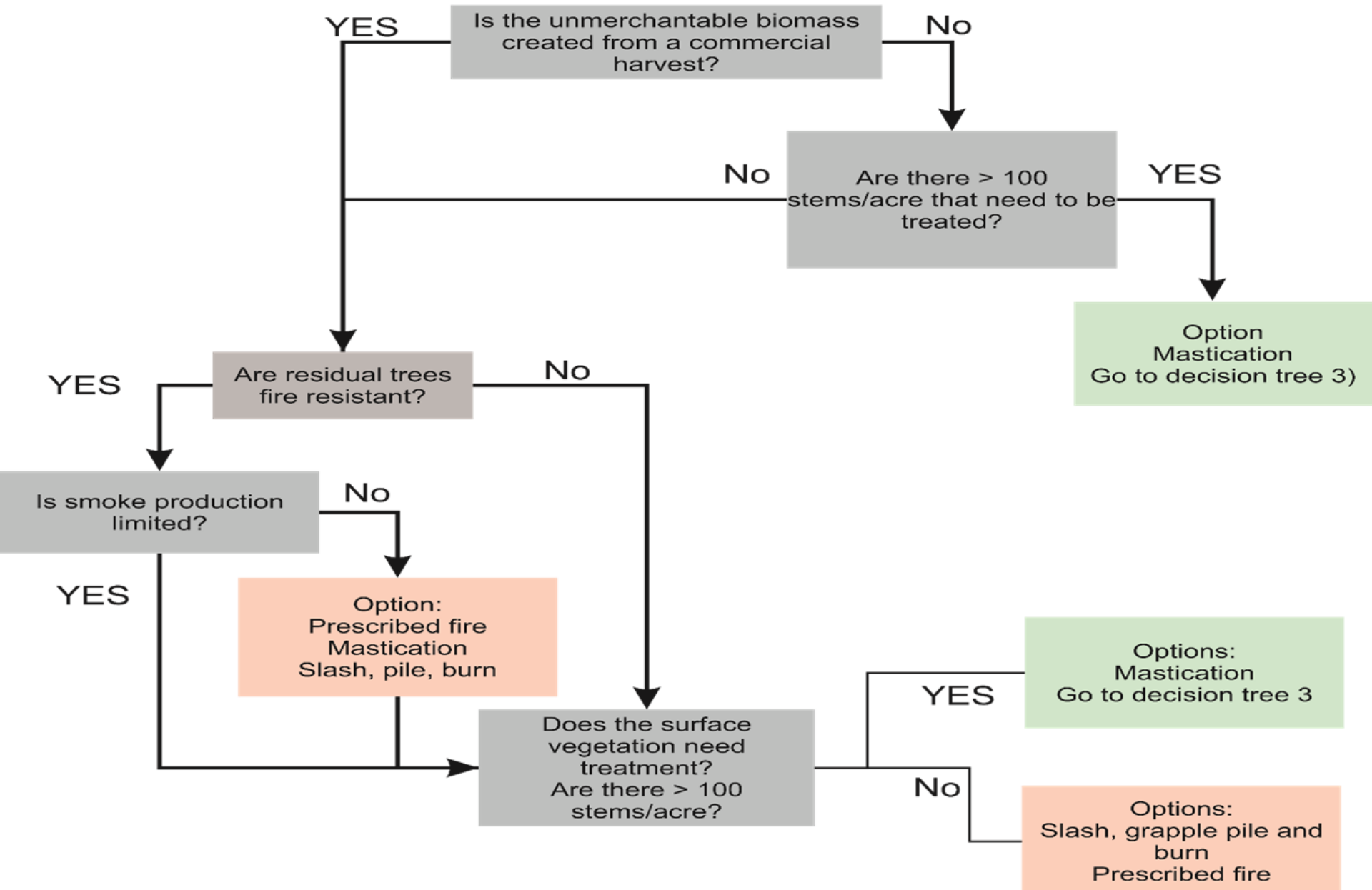
Series of Decisions

Decision Tree 1

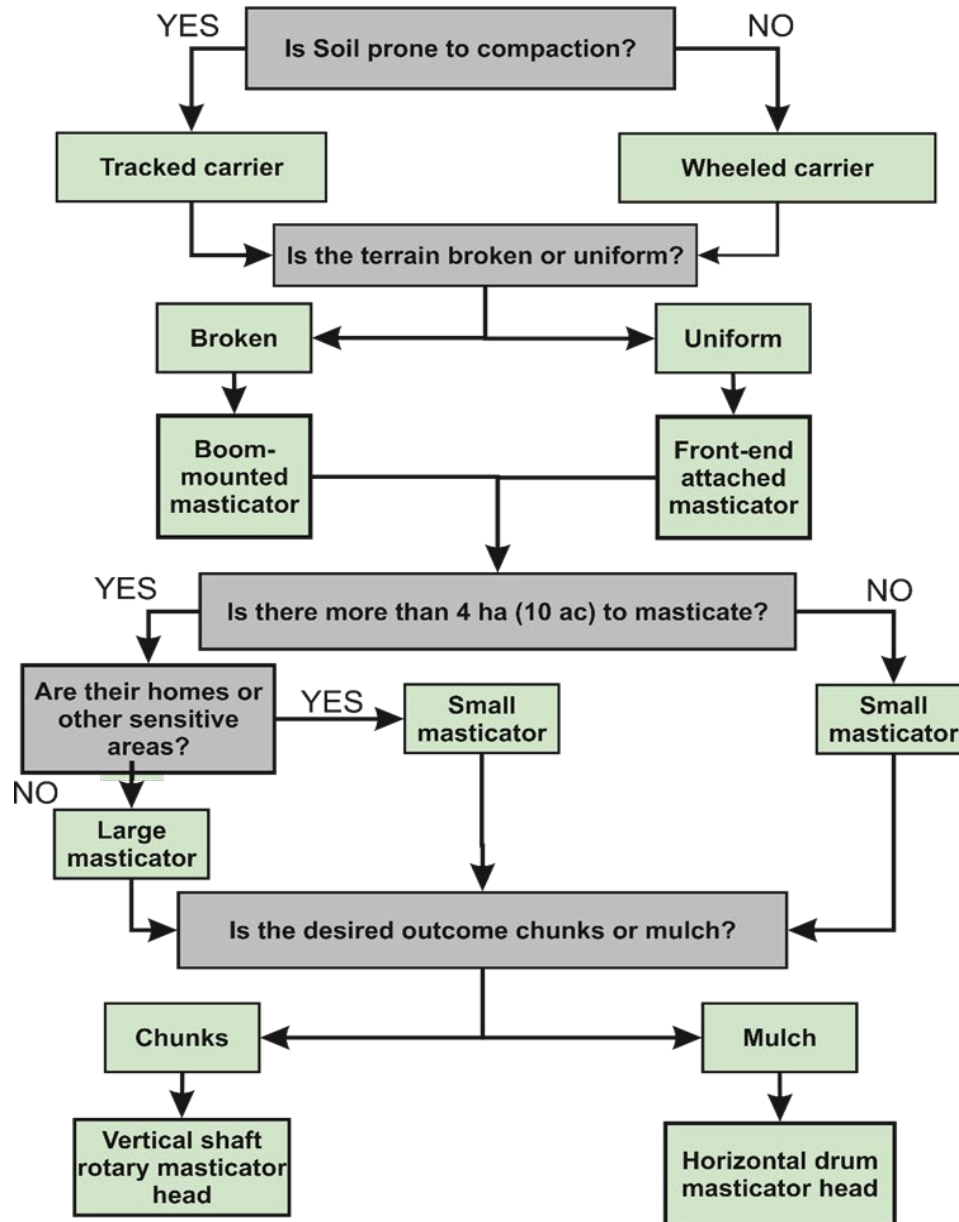
The influence of slope when selecting treatment options



Decision Tree 2 Treatment options for slopes < 40%



Decision tree 3 Mastication Combinations



Important Incidentals

Vegetation

- When depth of masticated biomass $> 4''$ vegetation establishment diminished
- Nonnative plant establishment

Grasslands > shrublands > woodlands > forests

Wildlife

- Effects to wildlife depends on the habitat needs

Important Incidentals

Soils

- No negative effects on soil erosion, compaction, or nutrition.
- Insulated soil decreasing temperature extremes
- Soil moisture was higher

Decomposition

Very resistant: Pacific yew, red mulberry, old redwoods, cedars

Moderate resistant: Douglas-fir, western larch, young redwoods

Slightly resistant: firs, aspen, elms, maples, sweetgum, pines

