Forest Fires in the US West and Mechanical Fuel Treatments

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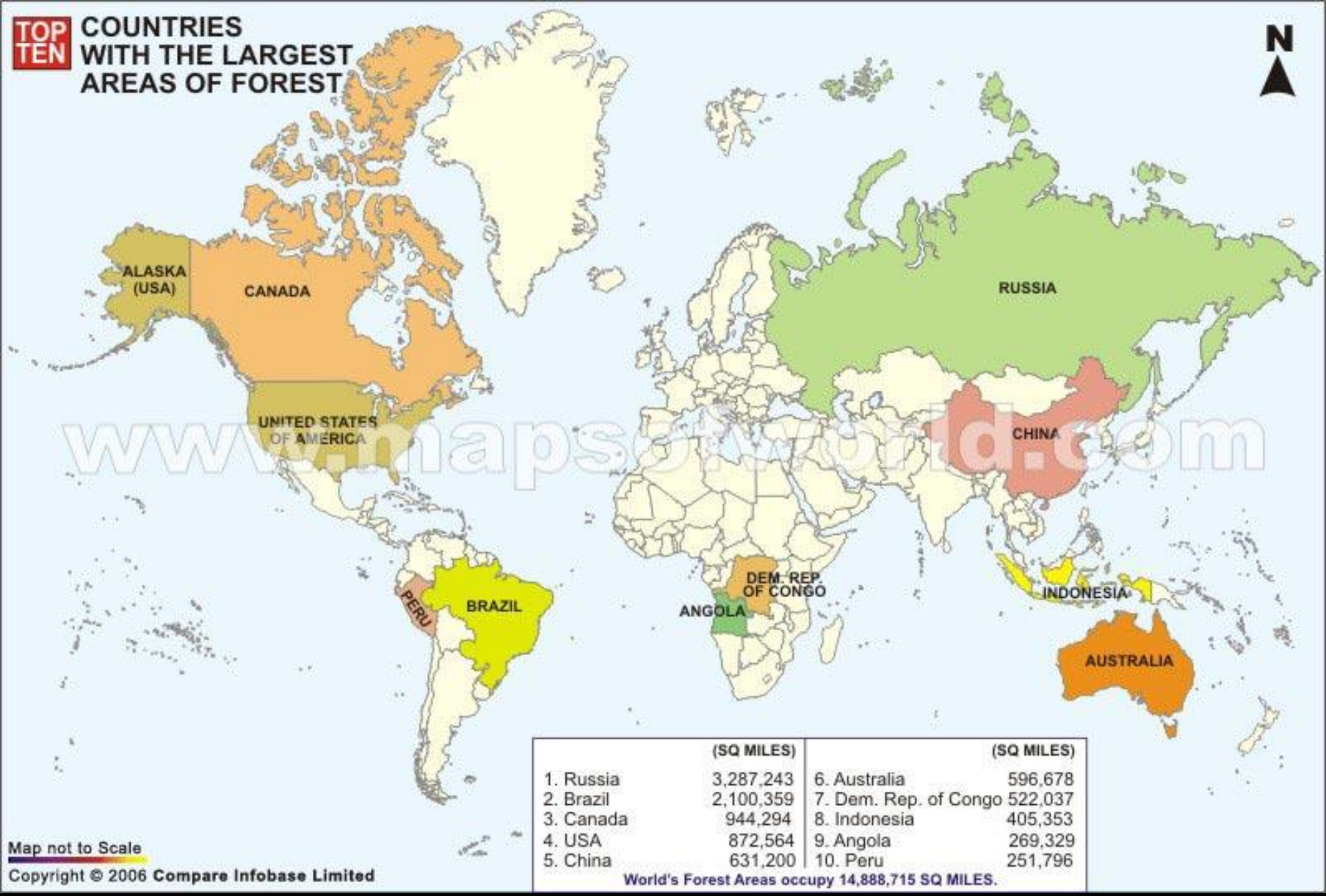


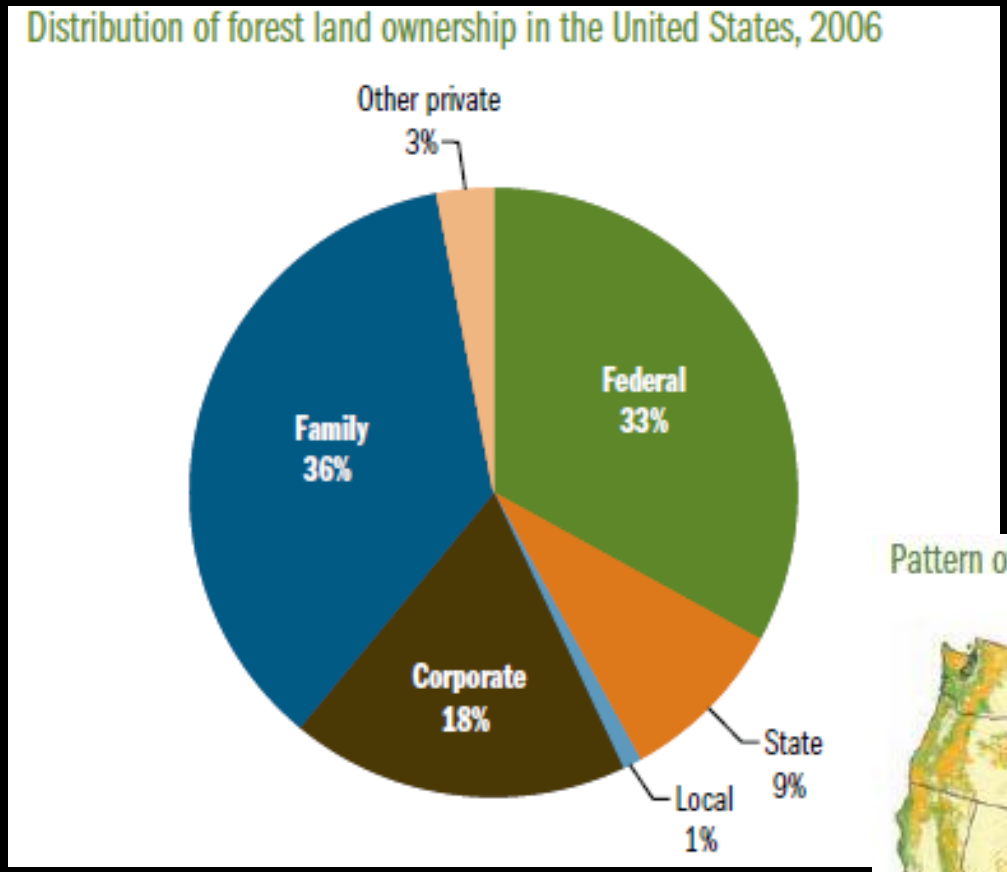
Source: http://www.mapsofworld.com/world-top-ten/countries-with-most-largest-area-of-forest.html

US forest in a world context

- 5% of the world population
- 8% of the world forest land
- Largest producer and consumer of forest products
- Major importer of softwood lumber
- Extensive use of wood in housing

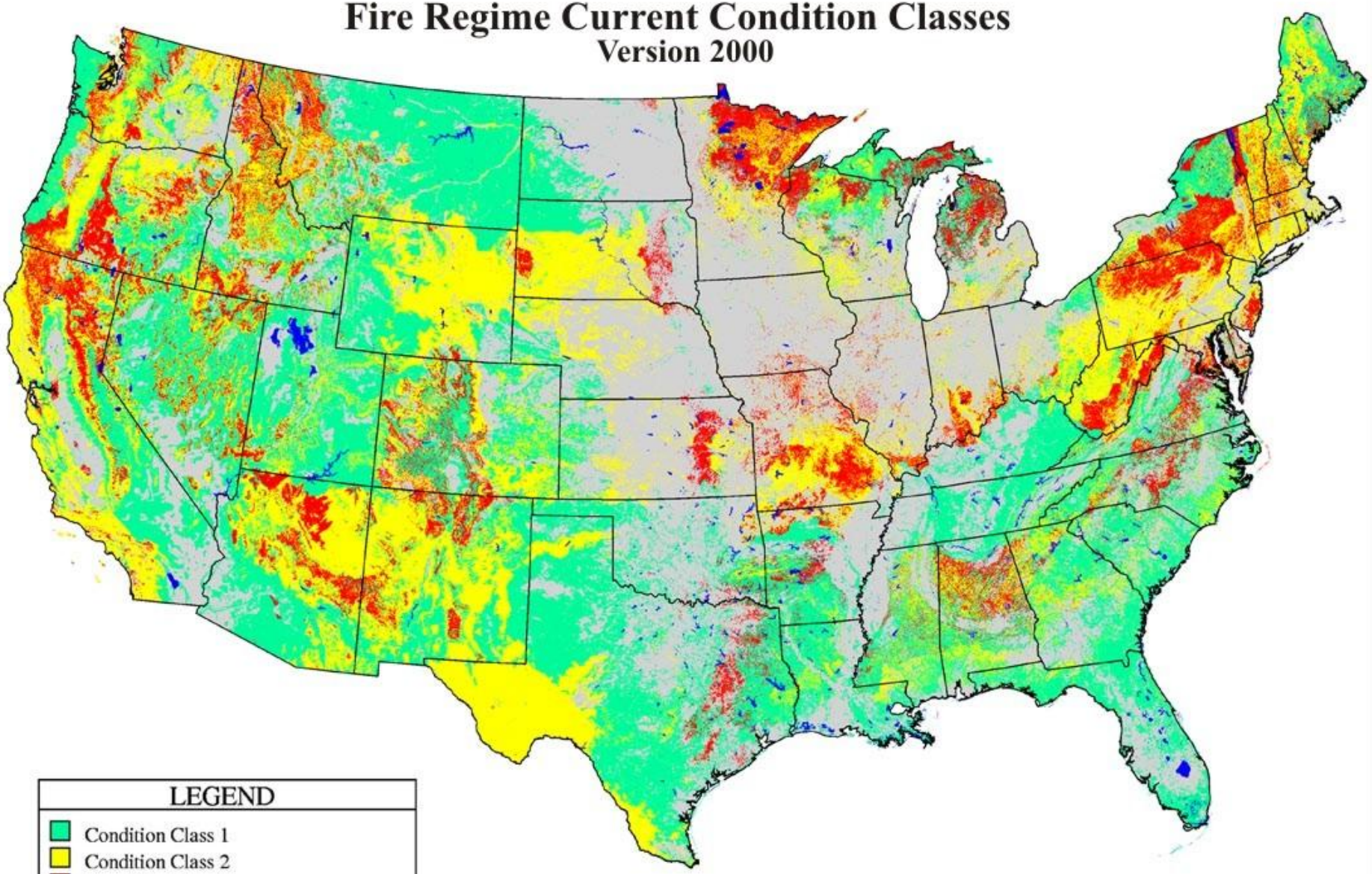
Source: U.S. Forest Resource Facts and Historical Trends (2010)

Forest ownership in the US



미국 산림 면적 : 3억 2백만ha
남한 산림 면적: 640만 ha

Fire Regime Current Condition Classes
Version 2000



Fires in California (2006)

Photo: Lucy Salazar

What Are Our Options?

- No Treatment
- Mechanical Thinning Only
- Prescribed Burning Only
- Prescribed Burning Combined with Mechanical Thinning
- Mastication

Prescribed Burning???

Prescribed burning – Cost Effective!!!

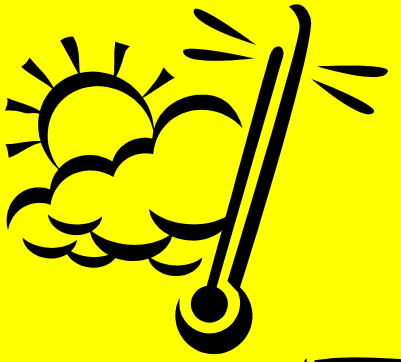
Treatment	Cost Range	Benefit	Problem	Products
Method	Per Acre			
Mechanical Thinning Only	$400-$800	No smoke	High cost	Yes
Prescribed Burning Only	$35-$300	Low cost	Restricted use	No
Combined Cut/Pile/Burn	$100-$750	Low access	Burning limitations	No

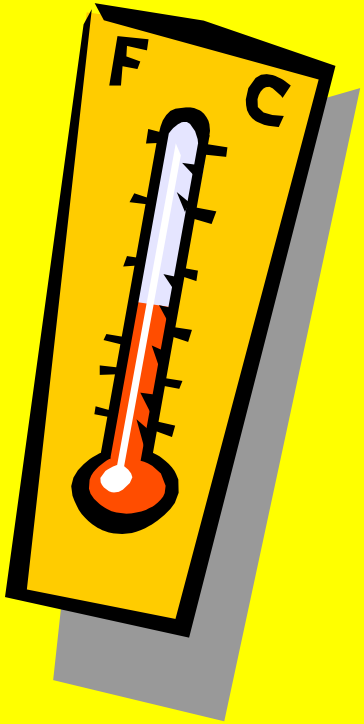
(Rummer, 2005)

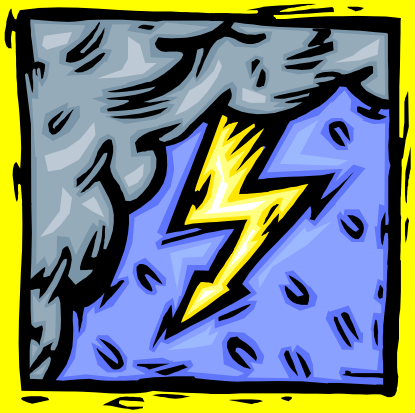
Prescribed fire - Factors to consider

- Fuel type
- Fuel moisture
- Temperature
- Relative humidity
- Wind
- Season

Is It A Burn Day?







Smoke Management

Risk of Escape

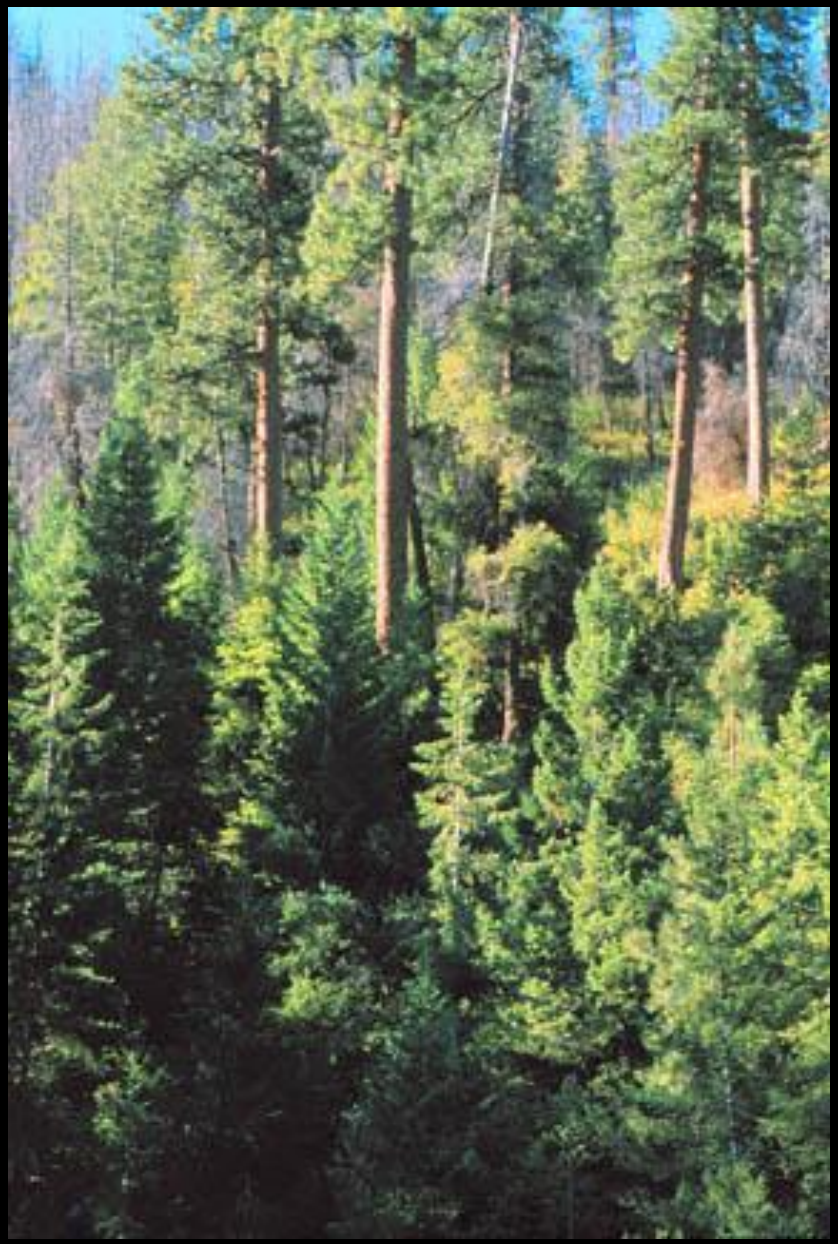
Mechanical Fuel Treatments

Before

After

Before

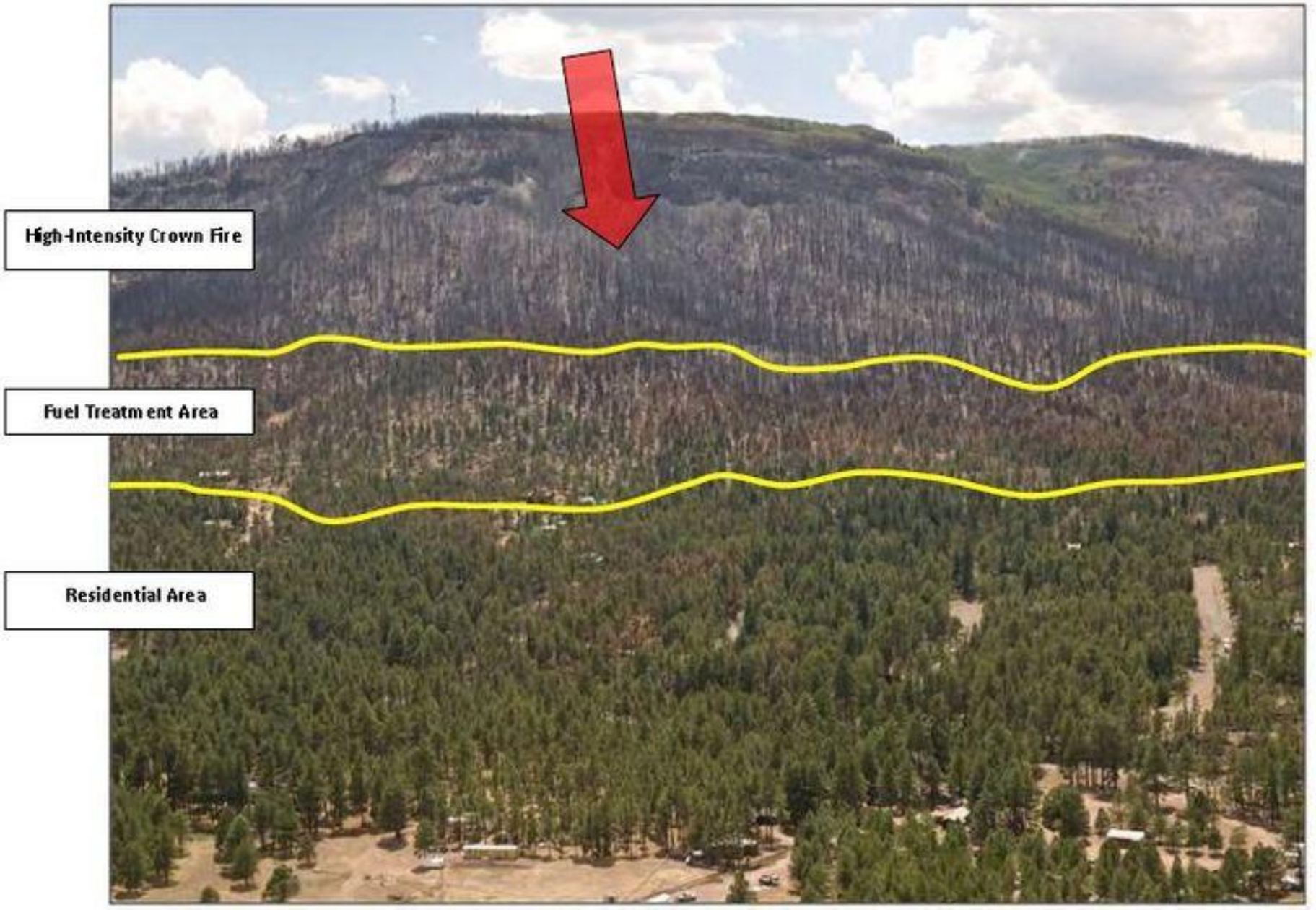
After



Restoring historical ecosystems

Fire behavior
in a thinned forest

Forest survived



http://wildfire.blog.nfpa.org/2011/08/

Harvesting System & Equipment Options for Mechanical Fuel Treatments

Whole Tree Harvesting

Cut-To-Length

Skyline Yarding

Helicopter Yarding

Wildland Urban Interface (WUI)

Small-scale operations for WUI

Mastication

Types of Equipment

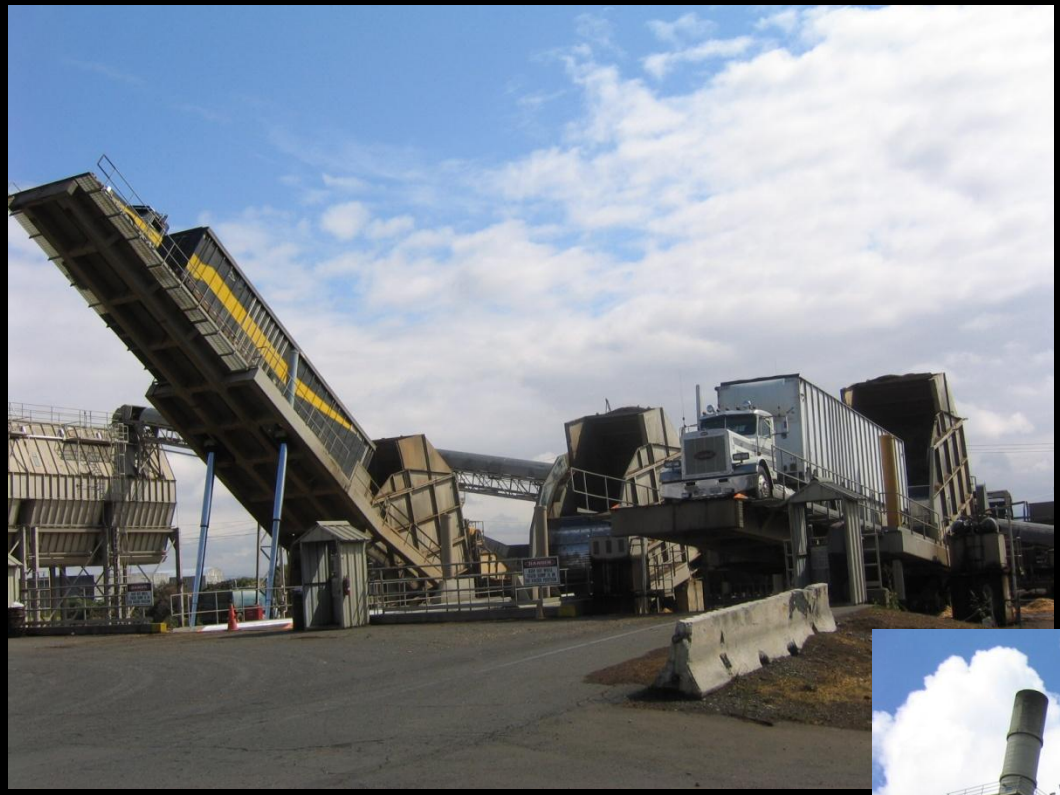
Types of Equipment

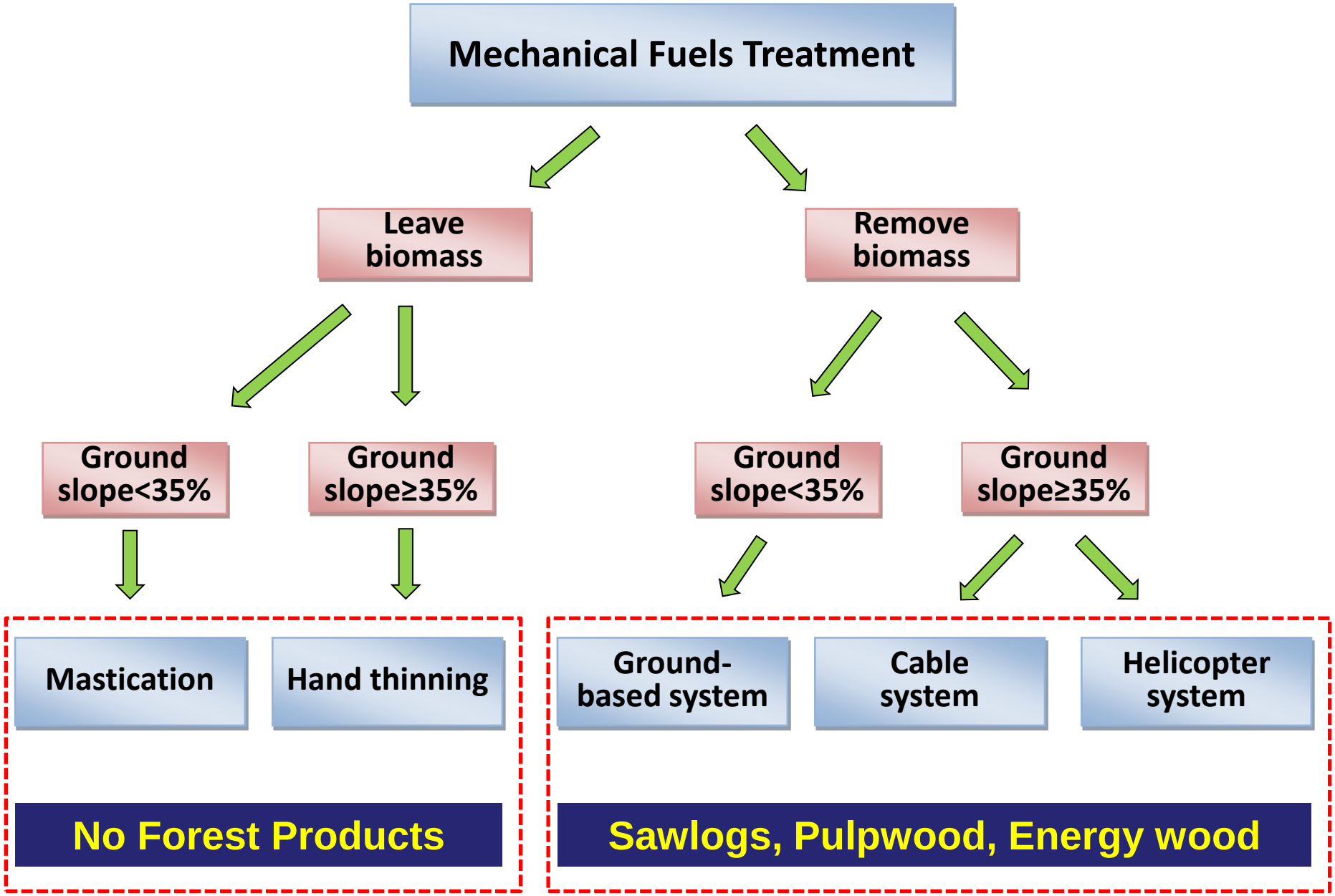
Utilization and Economics

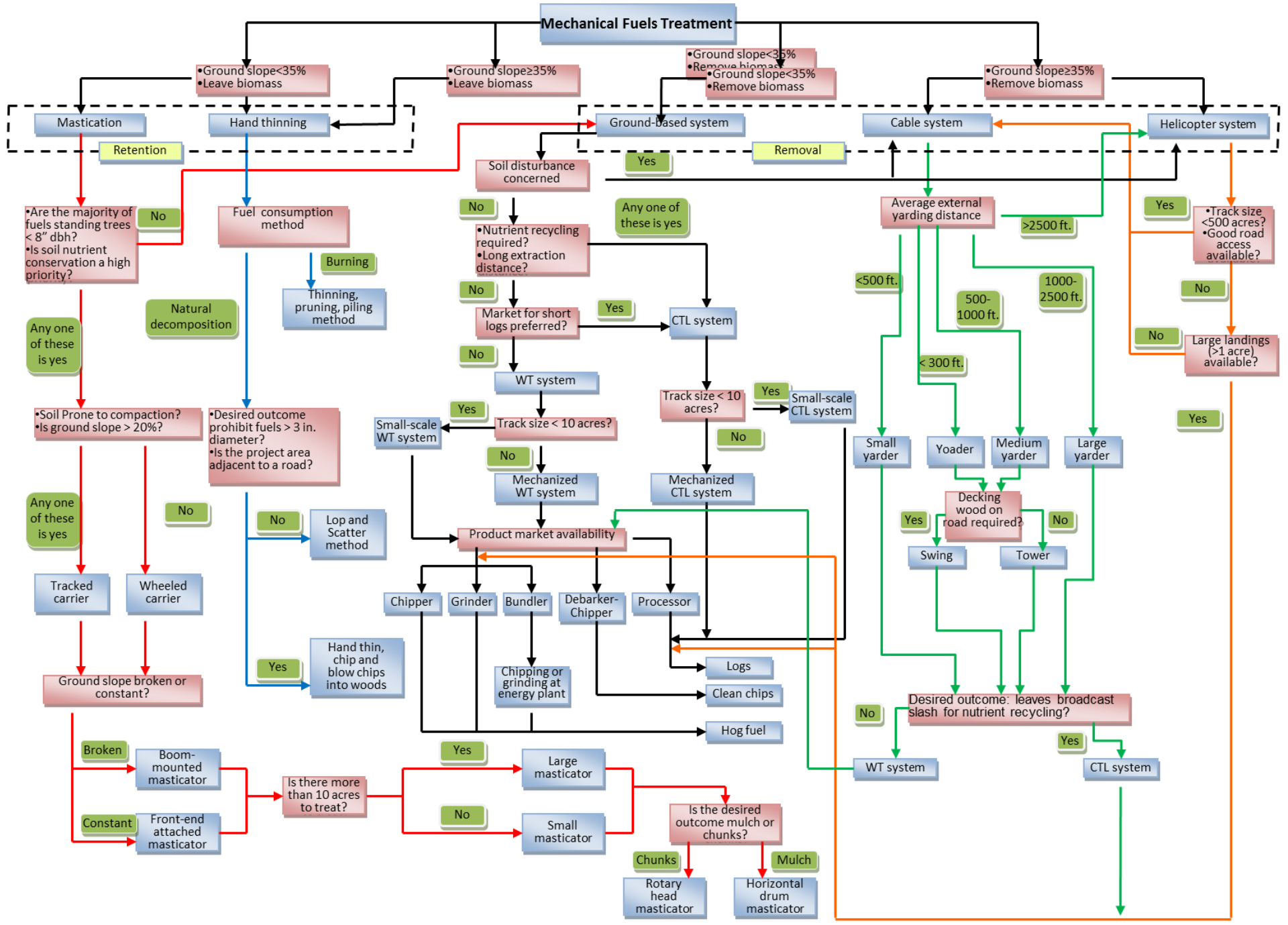
- ✓**Can we utilize small diameter logs and forest biomass resulted from mechanical fuel treatments?**
- ✓**What are major factors affecting economics on small wood & forest biomass harvesting and utilization?**
- ✓**What is the maximum distance that is economically feasible to haul forest biomass for energy?**


Small-diameter logs

In-woods Chipping




Mechanical Fuels Treatment
Leave biomass
Remove biomass
Ground slope<35%
Ground slope≥35%
Ground slope<35%
Ground slope≥35%
Mastication
Hand thinning
Ground-based system
Cable system
Helicopter system
No Forest Products
Sawlogs, Pulpwood, Energy wood


Mechanical Fuels Treatment
•Ground slope<35%
•Leave biomass
•Ground slope≥35%
•Leave biomass
•Ground slope<35%
•Remove biomass
•Ground slope≥35%
•Remove biomass
Mastication
Hand thinning
Retention
Removal
Ground-based system
Cable system
Helicopter system
•Are the majority of fuels standing trees < 8" dbh?
•Is soil nutrient conservation a high priority?
No
Fuel consumption method
Burning
Thinning, pruning, piling method
Natural decomposition
Any one of these is yes
Soil disturbance concerned
Yes
No
Any one of these is yes
•Nutrient recycling required?
•Long extraction distance?
No
Market for short logs preferred?
Yes
CTL system
No
WT system
Track size < 10 acres?
Yes
Small-scale CTL system
No
Mechanized CTL system
Yes
Small-scale WT system
Track size < 10 acres?
No
Mechanized WT system
Average external yarding distance
>2500 ft.
<500 ft.
500-1000 ft.
1000-2500 ft.
< 300 ft.
Small yarder
Yoader
Medium yarder
Large yarder
Decking wood on road required?
Yes
No
Swing
Tower
Yes
•Track size <500 acres?
•Good road access available?
No
Large landings (>1 acre) available?
Yes
•Soil Prone to compaction?
•Is ground slope > 20%?
Any one of these is yes
No
Tracked carrier
Wheeled carrier
Ground slope broken or constant?
Broken
Constant
Boom-mounted masticator
Front-end attached masticator
•Desired outcome prohibit fuels > 3 in. diameter?
•Is the project area adjacent to a road?
No
Lop and Scatter method
Yes
Hand thin, chip and blow chips into woods
Product market availability
Chipper
Grinder
Bundler
Debarker-Chipper
Processor
Chipping or grinding at energy plant
Logs
Clean chips
Hog fuel
Is there more than 10 acres to treat?
Yes
Large masticator
No
Small masticator
Is the desired outcome mulch or chunks?
Chunks
Rotary head masticator
Mulch
Horizontal drum masticator
Desired outcome: leaves broadcast slash for nutrient recycling?
No
Yes
WT system
CTL system


Questions?