


Fuels Management in Boreal Forests

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- ◆ Challenges to Fuels Management
- ◆ Fuel Reduction Treatment Types
- ◆ Treatment Effectiveness
- ◆ Prioritizing Treatments
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- ◆ Placement of Treatments




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Fuels Management Objectives

Primary Objectives of Fuels Management:
Modify live and dead fuels to decrease fire behavior of potential wildfires

1. Minimize impacts to protect values of concern
2. Make wildfire response safer

Many fuel treatments meet other forest objectives (wildlife habitat, carbon storage, biodiversity, forest health).



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Selecting Treatment Type

Planning Fuel Treatments

1. Determine the desirable fire behavior under anticipated fire weather condition (typically 90th/95th percentile weather conditions).
2. Identify the fuel profile that needs modified and to what extent it needs modified that would result in the desired fire behavior.

Change Fuel Composition

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Change Fire Behavior

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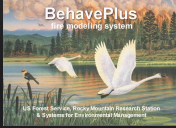
Change Fire Effects

Fire behavior

- ◆ Smoldering
- ◆ Surface fire
- ◆ Spotting
- ◆ Torching
- ◆ Crown fire

Types of fuels


- ◆ Ground: Duff and organic soil
- ◆ Surface: Needle litter, dead woody, grasses, shrubs
- ◆ Crown: Live and dead standing trees.

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Fuel Hazards

- ❖ Surface fuel loadings
- ❖ Ladder Fuels – balsam fuel component
- ❖ Spruce Budworm Impacts
- ❖ Canopy Fuels



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Fuel Reduction Treatment Types

- ❖ Harvesting
- ❖ Mastication
- ❖ Piling and Burning
- ❖ Prescribed Fire

Fuel treatments are most effective when multiple strategies are combined to disrupt the potential for a wildfire to spread and intensify.

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Mastication



Treatment

- Machinery breaks up live and dead fuels.
- Targets surface and ladder fuels.
- Alters the orientation, depth and size of fuels and places them on the ground which increased the rate of decomposition.

Uses

- Smaller treatment areas; production rates are low – 5-10 acres per day.
- Where visuals are a concern; overstory is left intact.

Challenges

- Topography
- Costs
- Availability of contractors and equipment

Effects

- Does not remove biomass so nutrients stay on the site.
- Does not remove shade tolerate species seed source.
- Can limit regeneration of the herbaceous layer if the fuel bed is too dense.

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Piling and Burning

Treatment

- Targets ladder fuels and larger surface fuels.
- Fuels are cut by hand with chainsaws and piles then burned after fuels have cured.

Uses

- Where harvesting the overstory is not desirable.
- Smaller treatment areas.
- Where visuals are a concern (i.e., campground).
- Where other species of concern could be impacted (i.e., pine plantation).


Challenges

- The amount of biomass available creates large or many piles that can impact the overstory.
- Number of piles due to large amount of biomass creates a large workload.
- Cost/acre is high.


Effects

- Does not remove seed source for shade tolerant species.
- Nutrients stay on the site


Pre-treatment (2020)



Cut and piled (2021)



Post pile burn (2022)




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Prescribed Fire

Treatment

- Removes surface and ladder fuels.
- Removes lower branches on overstory trees.
- Alters fuel depth, orientation and loading.



Effects

- Can meet other forest objectives (restoration, site preparation, wildlife habitat).
- Removes seed sources for shade tolerant species that become ladder fuels.
- Thickens up the bark.
- Prepares a seed bed to allow for regeneration.
- Economical if done on a landscape scale.

Uses

- Where mechanical treatments are not feasible or
- Where fire as an ecological component is lacking.
- Where risk to values is lower.

Challenges


- Available burn windows
- Availability of resources to implement
- Risk associated with proximity of values


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Harvesting

Treatment

- Treats ladder and crown fuels, sometimes surface fuels.
 - ❖ Thinning removes a percentage of the overstory while retaining larger trees
 - ❖ Clearcutting removes the majority of the overstory.
 - ❖ Partial cuts remove 30-50% of the overstory.





Uses

- Other objectives can be achieved (i.e., removal of commercial timber)
- Prescribed fire would be difficult to implement (i.e., wetter soils).
- Prescribed fire would be high-risk (i.e., crown fire potential near values at risk).

Effects

- Not all ladder and surface fuels are always treated, even with piling of slash.
- Challenge is balancing economics of harvesting with treatment of fuels.

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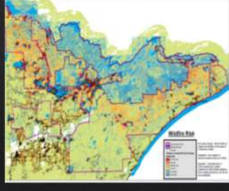
Prioritizing Fuel Treatments

Basic Risk Assessment

- Fuel Model
- Proximity to Values

Quantitative Wildfire Risk Assessment

- Burn Probability
- Fire Behavior
- Importance and Severity of Impacts to Values

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Treatment Placement

Defensible Space

Treatment of vegetation in the immediate zone around infrastructure is the most important factor in minimizing damage during a fire event.

Landscape

Strategic placement of fuel treatment areas, specifically designed to interrupt primary fire spread pathways, will reduce the size and effects of large fires.

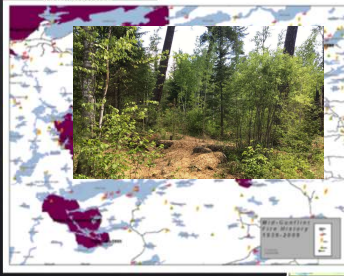

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Understory Treatments in the WUI

Treatments

Shokoshee Fuel Hazard Fire Risk Analysis - Midtrail Area

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Prescribed Fire after Understory Treatments

- ◆ Used where there is a desire to reduce fuel loadings in forest types that historically burned with low to moderate intensity (red and white pine stands).
- ◆ Because stands are so severely departed from natural conditions, multiple treatments are required to meet objectives and minimize impacts.
- ◆ Reduces mortality to overstory
- ◆ May require multiple treatments to achieve fuel reduction objectives
- ◆ Meets other forest objectives such as forest health, restoration, site preparation.



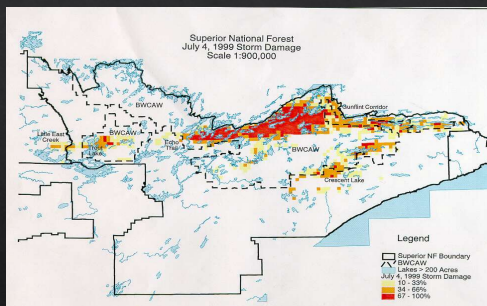
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Storm Damage 1999



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1999 Storm Damage Clean-up



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Treatment Types

- Prescribed Fire
- Salvage Harvesting
- Piling and Burning

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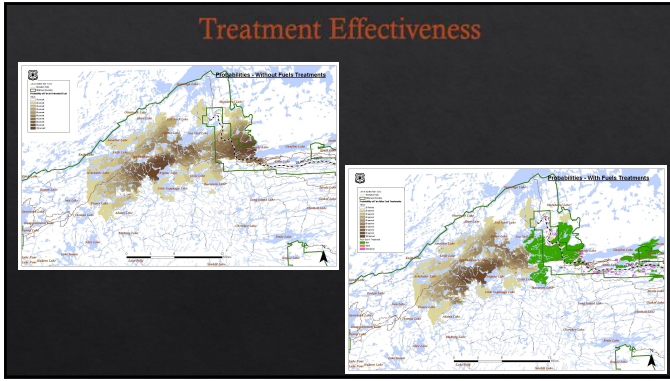
Landscape Prescribed Fire

- Primarily used in wilderness and inaccessible areas.
- Natural barriers as containment lines
- Aerial ignition
- Fall burn windows
- Cost effective

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Treatment Effectiveness

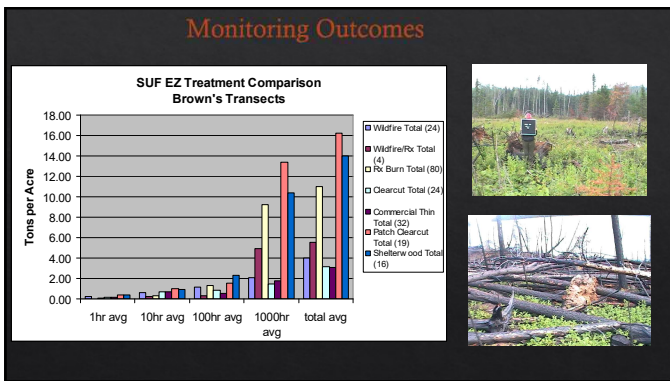
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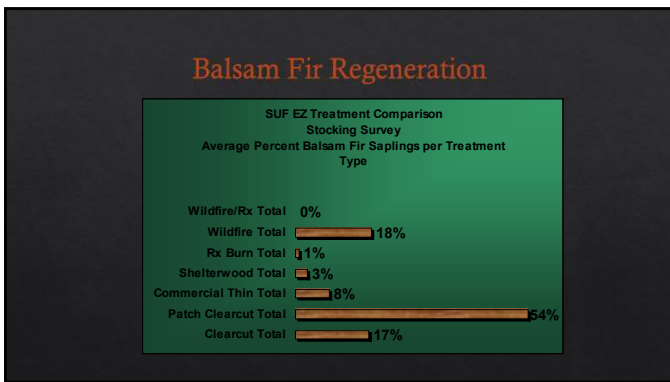
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- Use of different treatment types is needed to address different fuel hazard profiles.
- Treatments may be costly and time intense.
- Prescribed fire is effective at reducing impacts of wildfire.
- Use of multiple treatment is most effective.
- With limited funds/resources need to prioritize where and what treatments to do.
- Need to be creative to overcome challenges.

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