

# Post-fire recovery in old-growth, plantation, and salvaged logged mixed conifer forests

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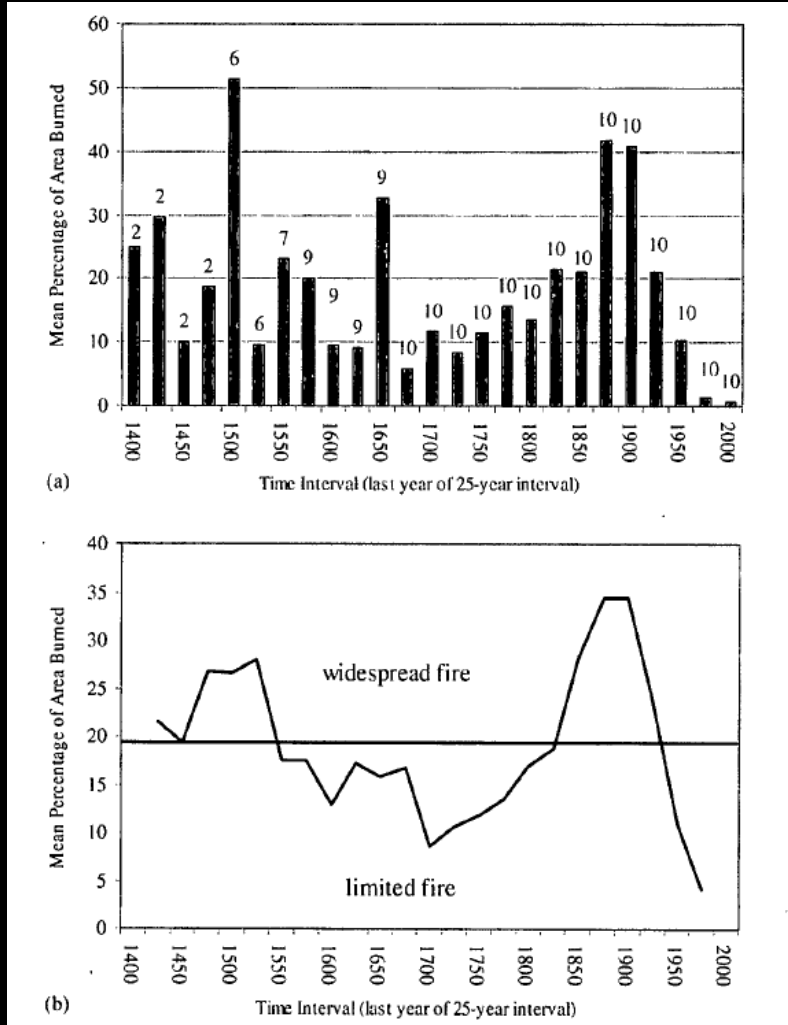
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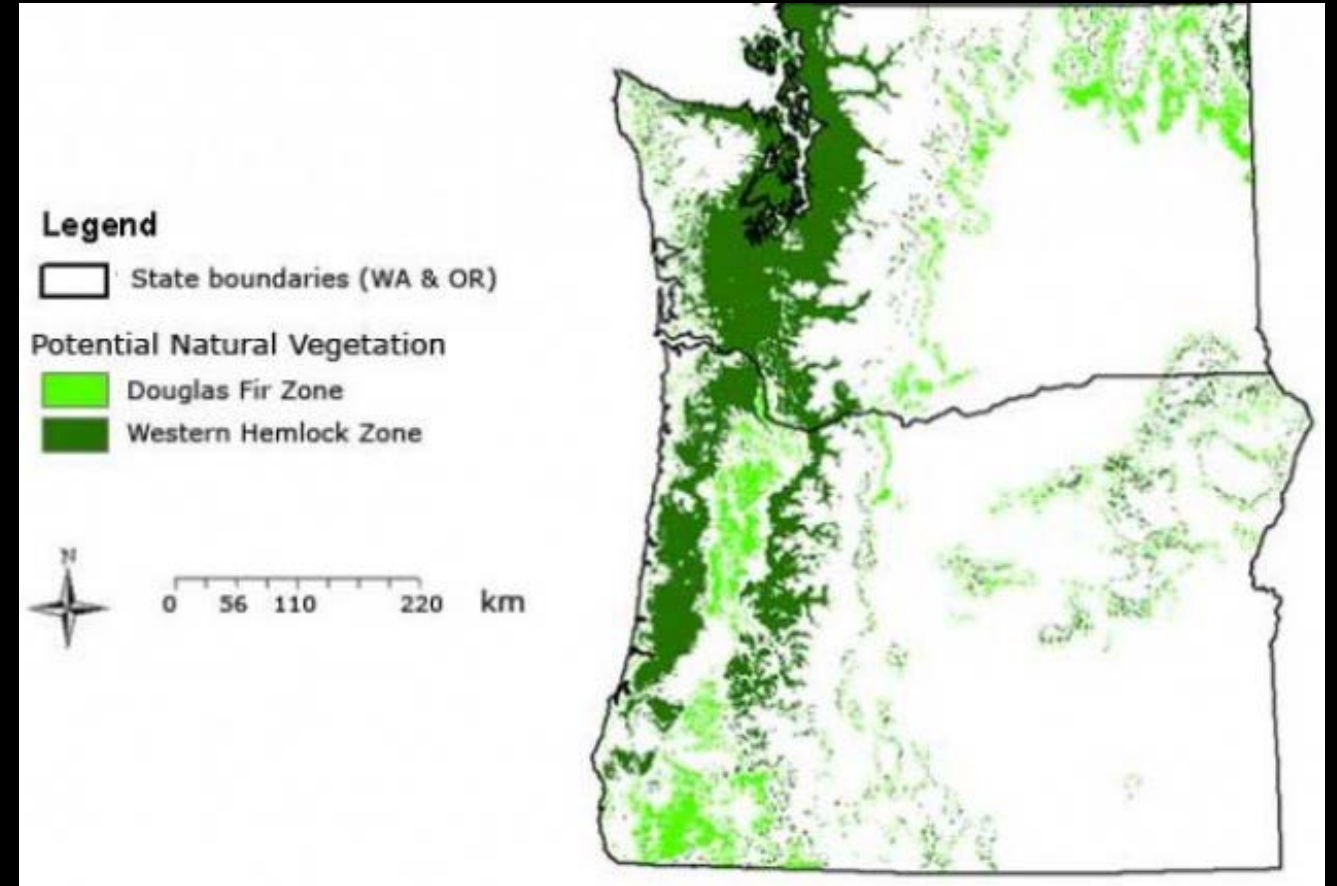


# Fire regimes characterized by variability - Time



Weisberg and Swanson 2003

Mean Fire Return Intervals: 30-200 years (Tepley et al 2013)



Western Hemlock and Douglas Fir Zones of Oregon and Washington  
Adapted from Jan Henderson, USDA Forest Service



# Fire regimes characterized by variability – Type and Frequency



High Severity



Mixed Severity



Low Severity

Infrequent



Frequent



# Multiple Use Forests – Alter Successional Dynamics

- Recreation
- Environmental Services
- Non-timber forest products
- Timber products
  - Pre-fire Plantations
  - Post-fire Salvage Logging

Management activities likely alter patterns of fuel succession





# Current Research

## Objectives

1. Quantify the long-term trajectories of succession, fuels dynamics and potential future fire behavior as influenced by
  - prefire conditions (logged or old growth)
  - fire severity (low, moderate, high)
  - post-fire management (salvage, natural recovery)



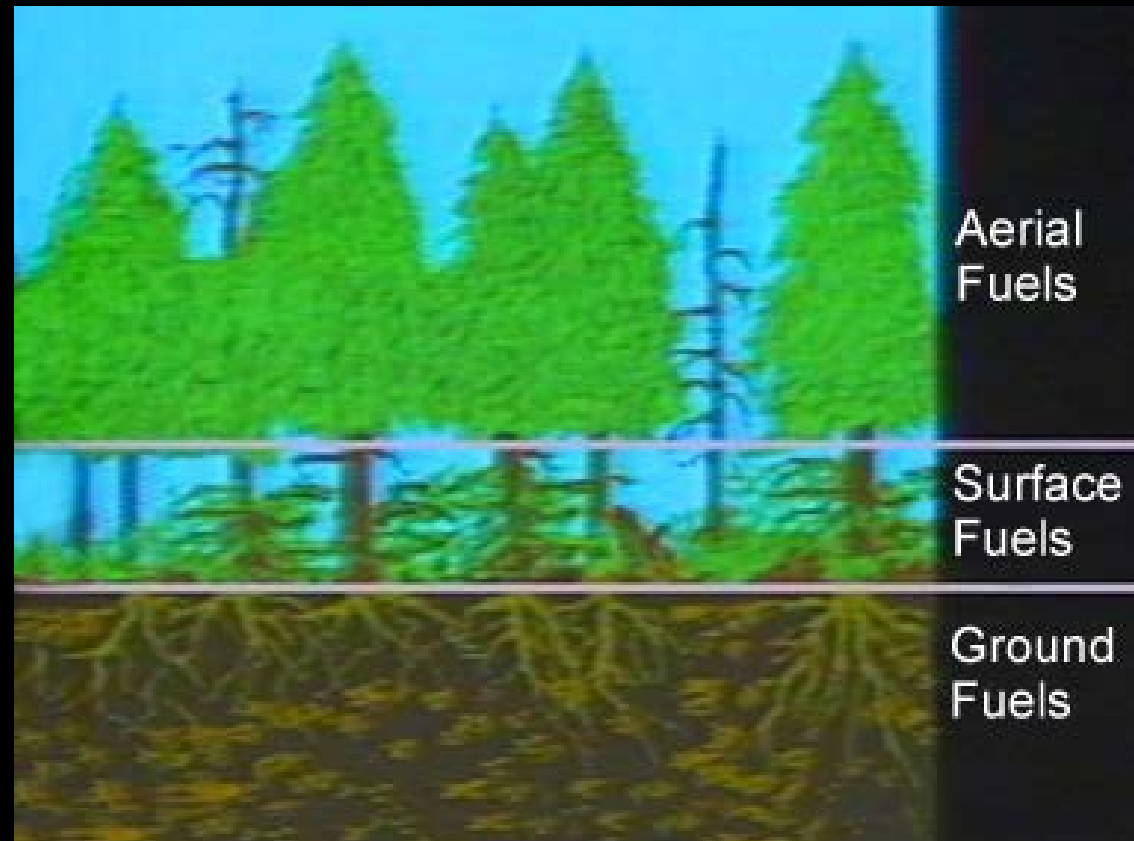


# Current Research

## Objectives

2. Determine how different fuel structures will impact reburn potential

- field fuel measurements
- fire behavior modeling





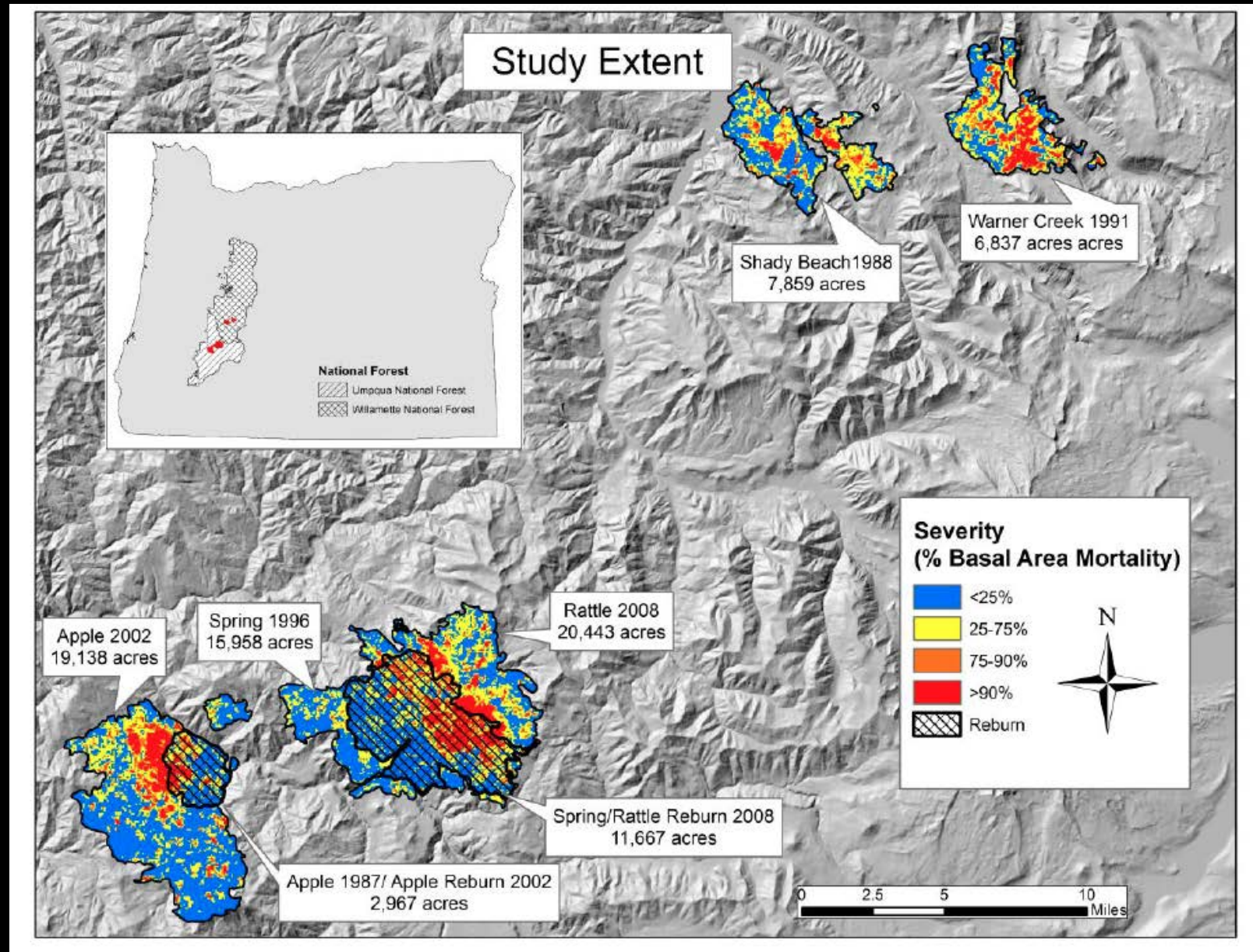
# Mesic Mixed Conifer Forests Western Hemlock Zone

## Willamette National Forest

- Warner Creek Fire 1991 – natural regeneration
- Shady Beach 1988 – salvage and plantation

## Umpqua National Forest

- Apple Fire 2002 – natural, plantation, and salvage
- Spring 1996 or TBD



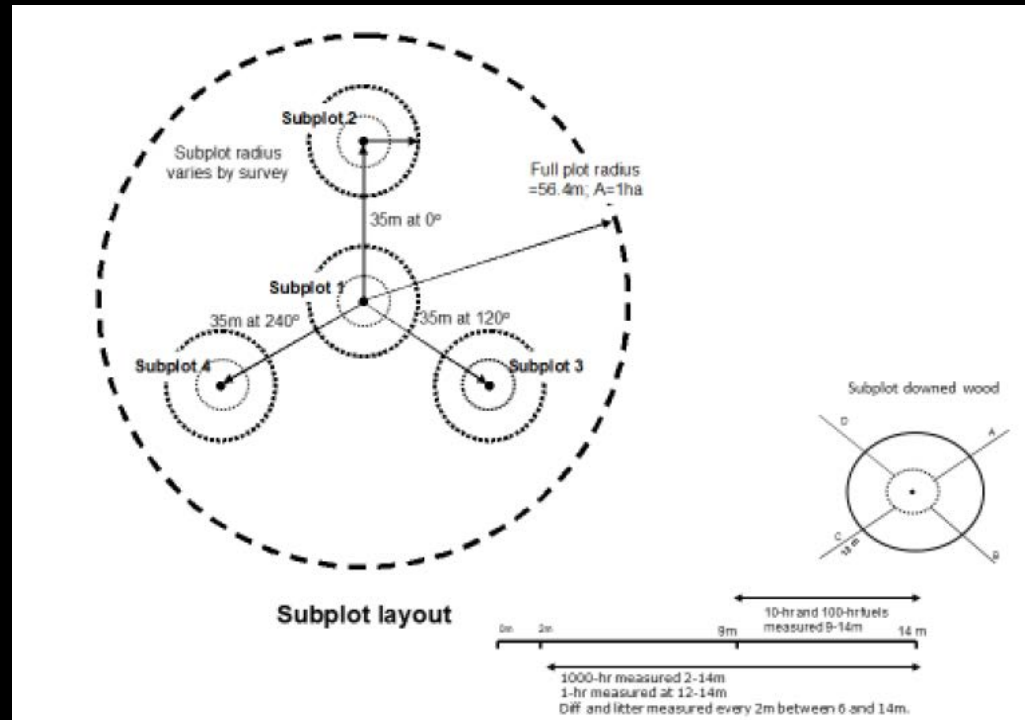


# Methods

5 plots per forest type (Low, Moderate, High, Salvage, Plantation)

2 Fires/Fire Pairs (to date)

Modified FIA plot design







# Methods

- Stand Structure
  - Species, dbh, live/dead
    - Large Trees (>10 cm dbh)
    - Small Trees/Understory (<10 cm dbh)
  - Allometric equations – Biomass
- Fuel Structure
  - Depth and Cover
    - Canopy
    - Subcanopy
    - Understory
    - Shrub
    - Herbaceous
    - Litter/Duff
- Fire Behavior Modeling (Fuel and Fire Tool)
- Year 1 of 3 completed



# Apple Fire – 15 years post-fire

## Canopy Trees (Douglas Fir and Western Hemlock)

	live/ha	mean dbh (cm)	snags/ha	mean dbh (cm)
low	1583	50	732	49
mod	2589	81	2038	62
high	2301	72	2166	73
salvage	0		2229	65
plant	973	31	1879	69





# Apple Fire – 15 years post-fire



Understory <10 cm dbh  
(Shrubs and Young Regeneration)

	live/ha	dead/ha
low	2643	0
mod	9904	158
high	10860	62
salvage	8726	30
plant	22611	53



# Warner and Shady Beach – 26-29 years post-fire



Canopy Trees  
(Douglas Fir and Western Hemlock)

	live/ha	mean dbh (cm)	snags/ha	mean dbh (cm)
low	1798	56	732	49
mod	1130	35	2038	62
high	1895	60	2166	73
salvage	995	31	2229	65
plant	873	27	1879	69



# Warner and Shady Beach – 26-29 years post-fire

Understory <10 cm dbh  
(Shrubs and Young Regeneration)



	live/ha	dead/ha
low	6752	446
mod	17803	1051
high	9904	1752
salvage	19268	1338
plant	5446	318



# Reburn potential – Are the way we are managing our forests changing the next fire?

- More in 2018-19
- Preliminary thoughts – 15 YPF (Apple Fire)
  - More large trees in natural forests – shading effect
  - Low severity plots very low understory – continued low severity patches?
  - Very dense understory in Plantations
    - Increased fuel moisture early
    - Extreme fire behavior late season





# Reburn potential – Are the way we are managing our forests changing the next fire?

- More in 2018-19
- Preliminary thoughts – 26-29 YPF
  - Larger, more trees regenerating in unmanaged high severity
  - Salvage plots very similar to moderate severity
    - Sparse canopy and very dense understory → more severe fire?
  - Plantations –
    - Few, smaller trees AND sparser understory → reduced fire potential?
    - Contrast to Apple – different management?







To be continued.....

- More fires sampled in 2018
- Comprehensive fuel profiles and fire modeling
- Once vs Twice burned
- Fires as barriers to future fire – landscape modeling and management scenario development



# Thanks

- Willamette National Forest
- Umpqua National Forest
- Joint Fire Science Program
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