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EFFECTS OF PRESCRIBED FIRE ON SOUTHERN APPALACHIAN ECOSYSTEMS

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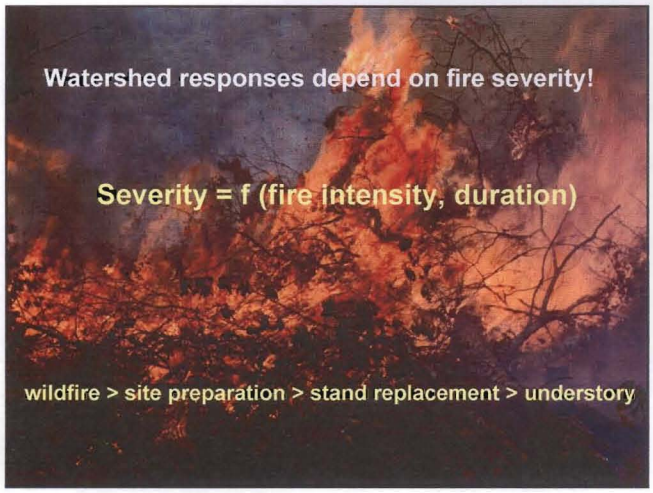
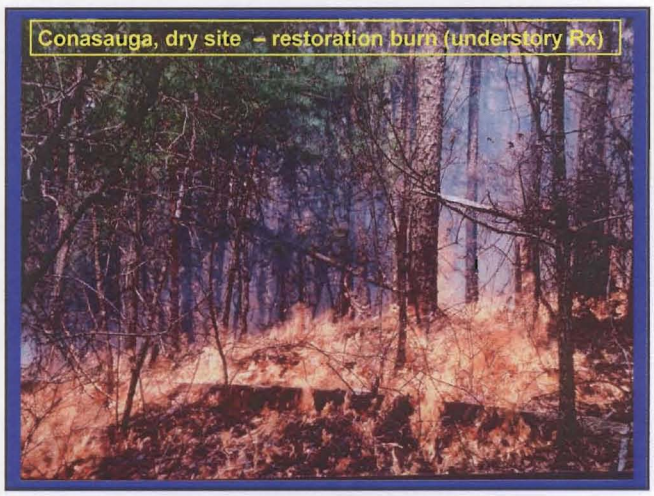
Watershed Response Factors

- Loss of the forest floor litter, duff (humus)
- Overstory mortality – vegetation response
- Sediment and nutrient transport - water quality

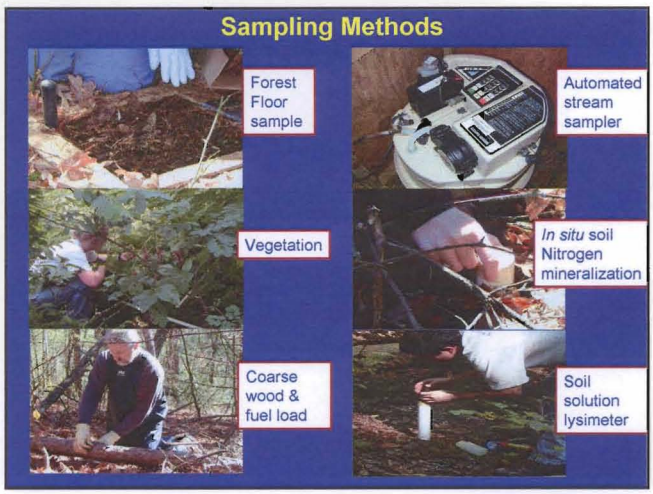
- Rainfall intensity and duration
- Topography
- Vegetation recovery



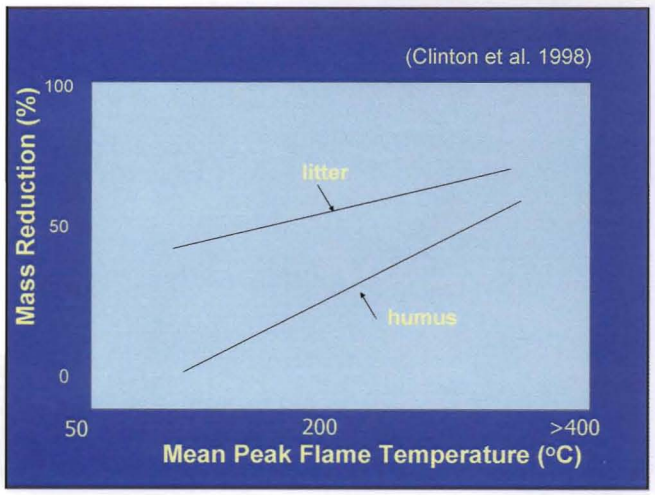
Xeric to mesic hillslope -- stand restoration Rx


Conasauga, dry site – restoration burn (understory Rx)

Mesic site - understory Rx


Sampling Methods
Forest Floor sample
Automated stream sampler
Vegetation
In situ soil Nitrogen mineralization
Coarse wood & fuel load
Soil solution lysimeter

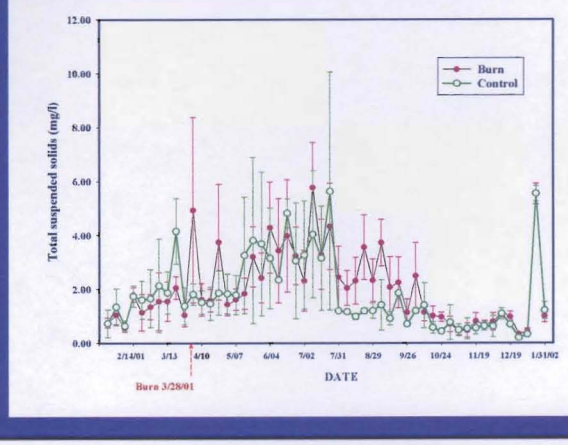
Fire effects on sediment transport



Effect of Fire on Sediment Transport

	Post Fire Increase (kg/ha/yr)
North Carolina	1,250
South Carolina	5,750
Central Arizona	200,000
Southern California	50,000
Central Washington	16,000

Fire effects on water quality

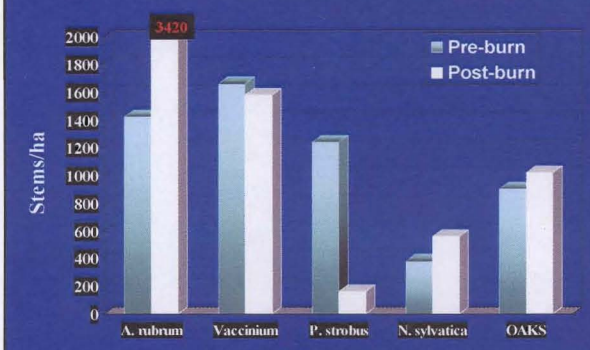


Stream NO_3^- concentrations

State	Fire	Severity	mg L^{-1}	Duration	Reference
NC	Fell+burn	moderate	0.065	30 wks	Knoepp & Swank 1993
NC	Rx	low	0	0	Vose et al. 1999
NC	Wildfire	low	0.10	6 wks	Clinton et al. 2003
MT	Wildfire	severe	0.12 - 0.30	52 wks	Spencer et al. 2003
NC	Wildfire simulation	severe	0.20	--	Vose et al. 2005

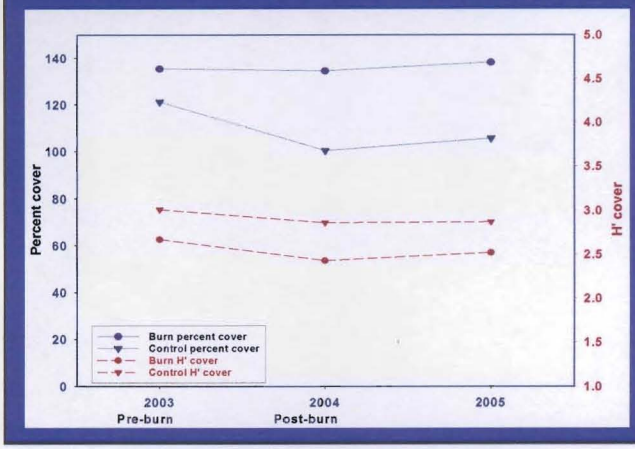
Fire effects on vegetation

Mean density of abundant understory species, Conasauga burn (dry, pine/hardwood).



Note: Vaccinium = V. arboretum, V. corymbosum. **(Elliott and Vose 2005)**

Mesic site – Herbaceous layer percent cover and diversity (H'cover)



Understory most responsive to burning

- **With low-to-moderate intensity fire, overstory mortality occurs in smaller size classes**
- **Understory layer most responsive to burning**
  - **Reduce** *K. latifolia, P. strobus, A. rubrum*
- **Rapid regeneration of** *A. rubrum, N, sylvatica,* **and** *R. pseudoacacia*
- **Rapid regeneration of soft-mast *(Vaccinium, Rubus,* and *Gaylussacia)***
- **Maintain or increase oaks**
- **Understory dormant-season fire, little to no change in herbaceous layer**

Key Points

- Little to no transport of sediment or nutrients offsite
- No negative effect on water quality
- Some positive effects on vegetation
  - Increase yellow pine regeneration, but variable
  - Reduction of fire intolerant understory
  - Increase in diversity
  - Low intensity fires, mesic forests; no negative effect on herbaceous species

Thank you