

# Fire Behavior and Effects

On

## Alluvial Fans

Fire Behavior and Effects on Alluvial Fans can not be isolated from the broader landscape



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## Alluvial Fans



- ▶ Alluvial Fans are a transition zone for fire behavior due to changes, primarily, of:
  - Fuel
  - Slope
  - Topography

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- ▶ Fuels transition from grasses, to shrubs, to timber
- ▶ Energy Release Components generally increase
- ▶ Flame lengths and mid flame temperatures increase
- ▶ Fire intensity is dynamic and varies throughout the year
- ▶ Tactical opportunities change rapidly

# Fire Behavior and Effects

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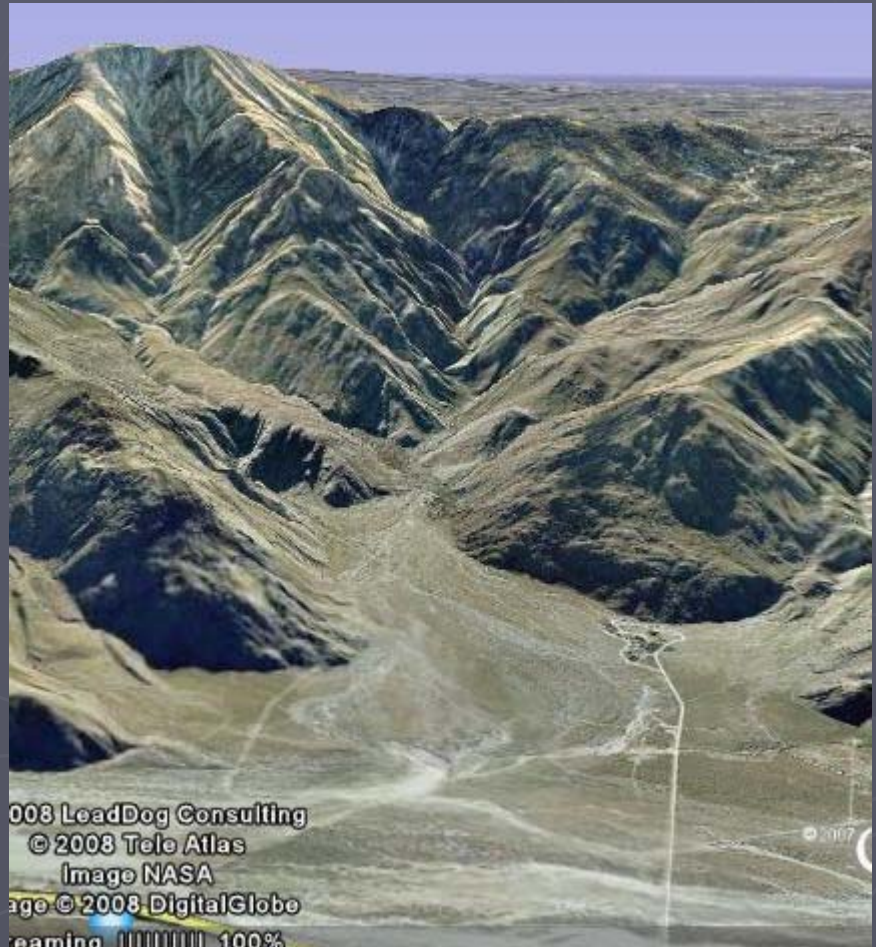
## Alluvial Fans

### ► Slope

- 1<sup>st</sup> tripling of slope, doubles rate of spread
- 2<sup>nd</sup> tripling increases rate of spread 4-6 times

### Topography

- Chimneys
- Aspect





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- ▶ Fire Behavior Rule:
  - Fires burn faster upslope
- ▶ Fire Behavior Rule:
  - Except where they don't
- ▶ Fire Behavior Rule:
  - Fires may burn aggressively even in areas deceptively devoid of fuels

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## Alluvial Fans

- ▶ Fire starts below Snow Creek Village and fans uphill at 1500
  - Slope
  - Diurnal flow
  - Chimney
- ▶ Fire makes aggressive downhill run at 2300
  - Relative warm air mass remains over desert increasing diurnal winds that combine with fire's convection in-draft
  - Venturi at fan apex accelerates wind speed and fire spread
- ▶ Snow Creek Village has now been hit on all sides by fire with the second run more aggressive than first



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- ▶ Fire spreading out down slope across a fan can occur in a limited area or across several miles
  - Snow Creek Village (confined area)
  - Lakeland Village (moderate area)
  - Owens Valley (large area)
- ▶ Fire in canyons that are in alignment with wind direction may spread with the wind regardless of slope.





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- ▶ Fire Behavior is extremely dynamic:



- Slopes are generally 20% or more and classified as Very High Fire Severity
- Land forms that are either adjacent to or upslope can create micro climates altering fire behavior
- Fire defenses have to be designed into developments



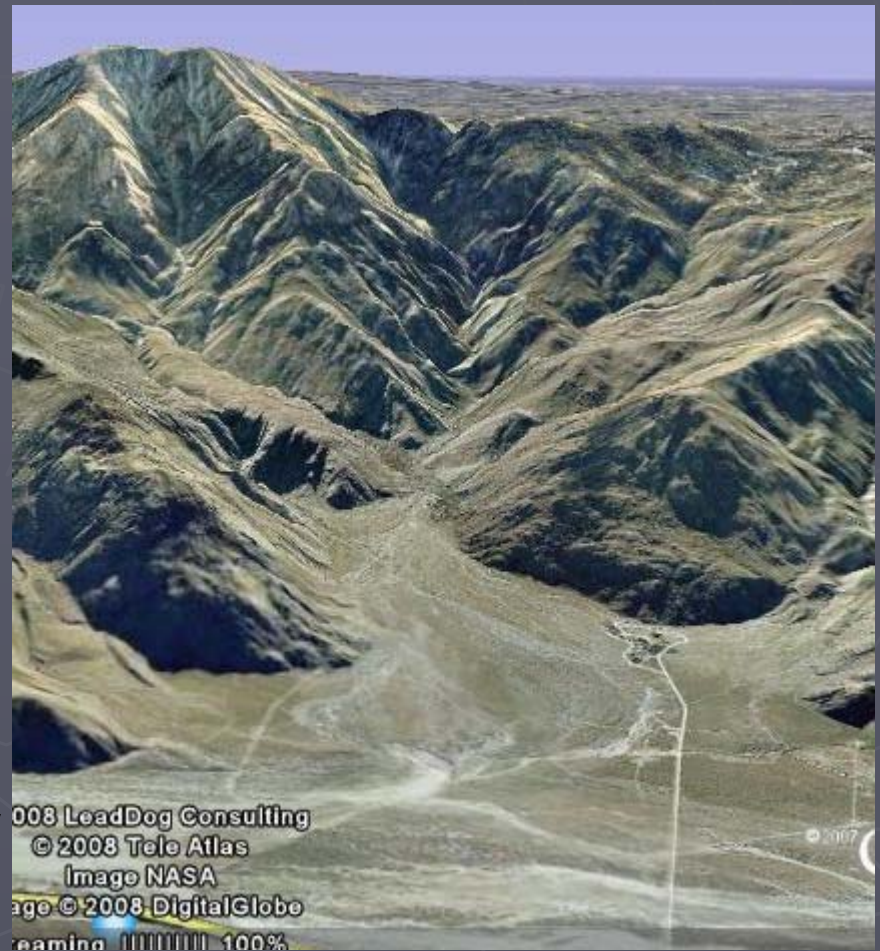
# Tactical Impacts



- ▶ Nationally, up to 60% of development occurs in the Wildland Urban Interface. More people are at risk in a wildfire and in need of evacuation
- ▶ "...evacuation needs often force loss of or compromise perimeter control options." Rhode

# Convergence of Risk

- ▶ A readily defined area where there is an elevated risk from multiple hazards (wildfire, flood, debris flows, earthquakes etc). These risks often overlay areas of environmental sensitivity.
- ▶ Mitigation of one risk may mitigate multiple risks.





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- ▶ There is "Stuff" in the Watersheds, Forests, and upslope communities
- ▶ When it burns, the byproducts are carried down:

- Uranium
- Arsenic
- Formaldehyde
- Barium
- Beryllium
- Copper
- Chromium
- Cadmium
- Lead
- Zinc
- Asbestos
- Pesticides
- Automobile products



# Upslope Measures to Reduce Impacts



- ▶ Ember resistant construction
- ▶ Stand improvement (fuel reduction) to restore watershed and forest health
- ▶ Retrofit Strategies for older communities



# Community Fire Defense Considerations

- ▶ Fire Transfers from wildland to Structures:
  - Direct Flame Contact
    - ▶ Modify fuels to alter length and fire behavior
  - Radiation
    - ▶ Distance and Resistive Building Materials
  - Convection
    - ▶ Site selection, avoid chimneys
  - Ember Cast
    - ▶ Palapas, Patios, Pergolas and Plants



# Questions

