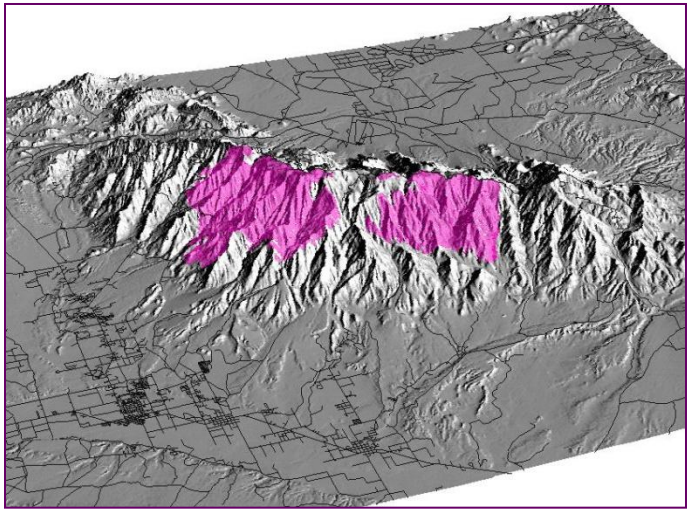
5.1 Introduction to fire management



Review where we've been so far:

- We now understand:
  - Physics and chemistry of combustion
  - Basic fire behavior
  - Elements of fire ecology
  - The fire regime concept, and how fire regimes vary, and some methods of reconstructing them
- Now we put this knowledge to application in managing wildland fire

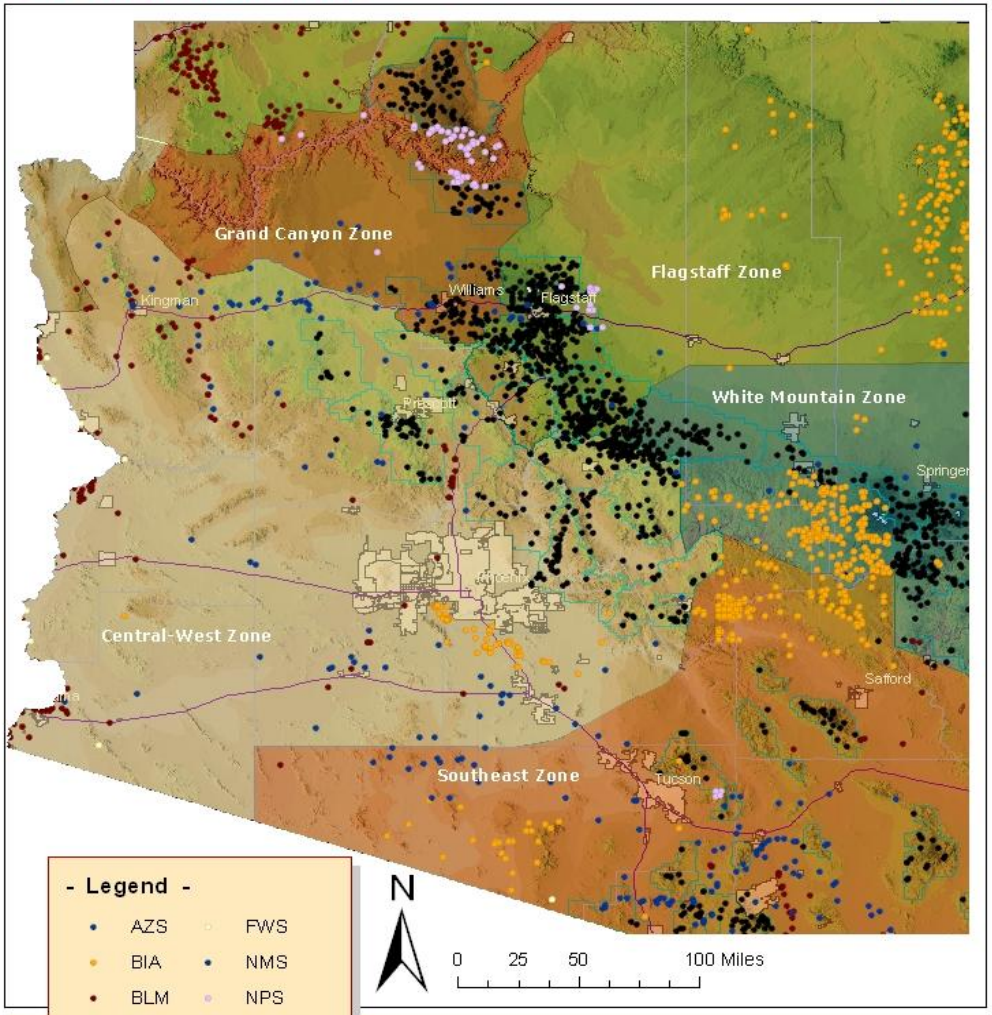
In this unit we will ask:

- What is management?
- Why do we do this?
- How is it done, and what is the science basis?
- Who manages fire?
- Where is fire managed?
- How much does all this cost, and who pays for it?

Overview of this unit (guest lecturers and professionals in red):

- Introduction to management, basic concepts
- Uses of remote sensing
- The real life of a fire manager
- US national fire policy
- Techniques of fire suppression
- Thinning and fuel modification, prescribed fire
- Wildfire use

Arizona Wildland Fires 2003



Produced by the Intelligence Section, Predictive Services Unit

SOUTHWEST COORDINATION CENTER

What are the fundamental fire management options?

1. Prescribed fire (we light it)
2. Wildland fire use (known by many names and with many variations – allow natural ignitions to proceed)
3. Suppression (put them out)
4. Modify fuels

Before we dive in, a TPS:

- Three reasons <u>why</u> we should manage fire
- One good reason why we <u>shouldn't</u>
- Three ideas for what we <u>should</u> do
- One thing we <u>shouldn't</u> do

USDA United States Department of Agriculture

Forest Service

Rocky Mountain Research Station

General Technical Report RMRS-GTR-120

April 2004

Science Basis for Changing Forest Structure to Modify Wildfire Behavior and Severity

U.S. Department of Agriculture Forest Service

April 2004

Technical Editors:

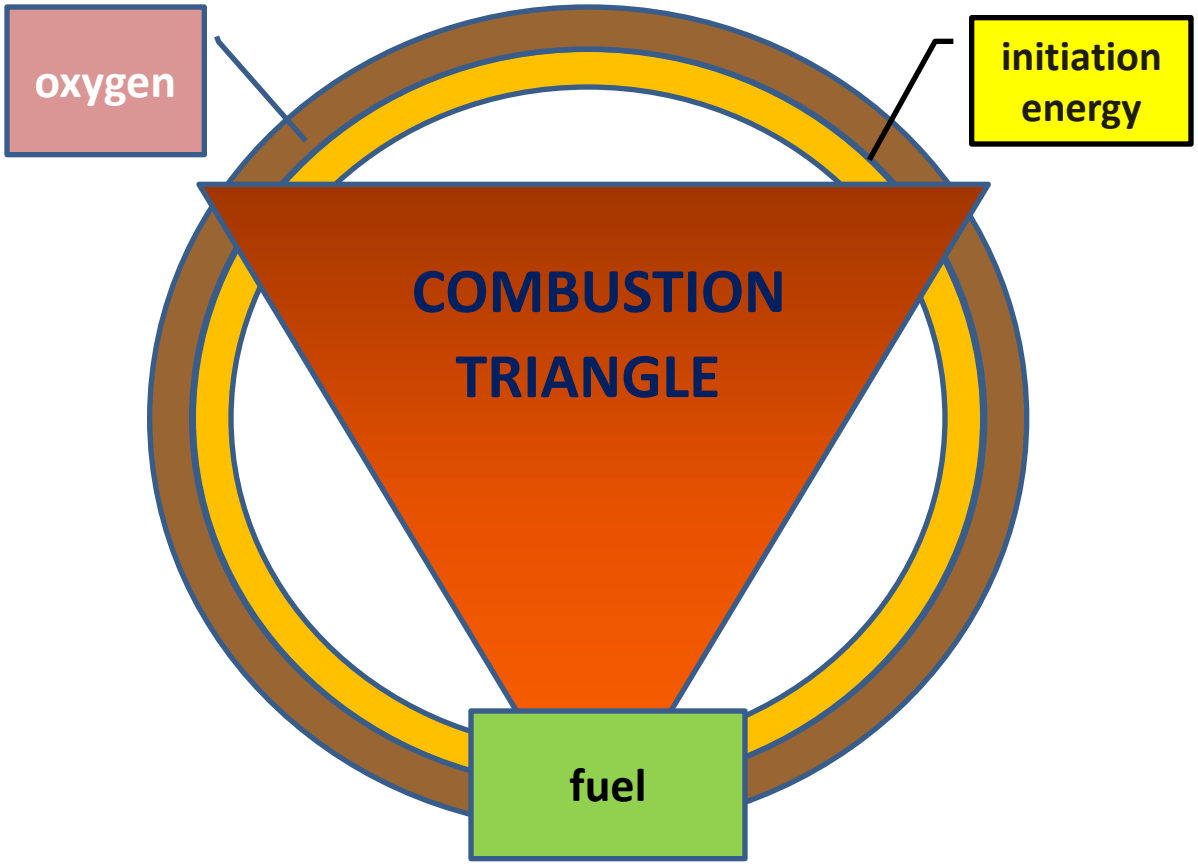
Dr. Russell T. Graham, Rocky Mountain Research Station
Dr. Sarah McCaffrey, North Central Research Station
Dr. Theresa B. Jain, Rocky Mountain Research Station

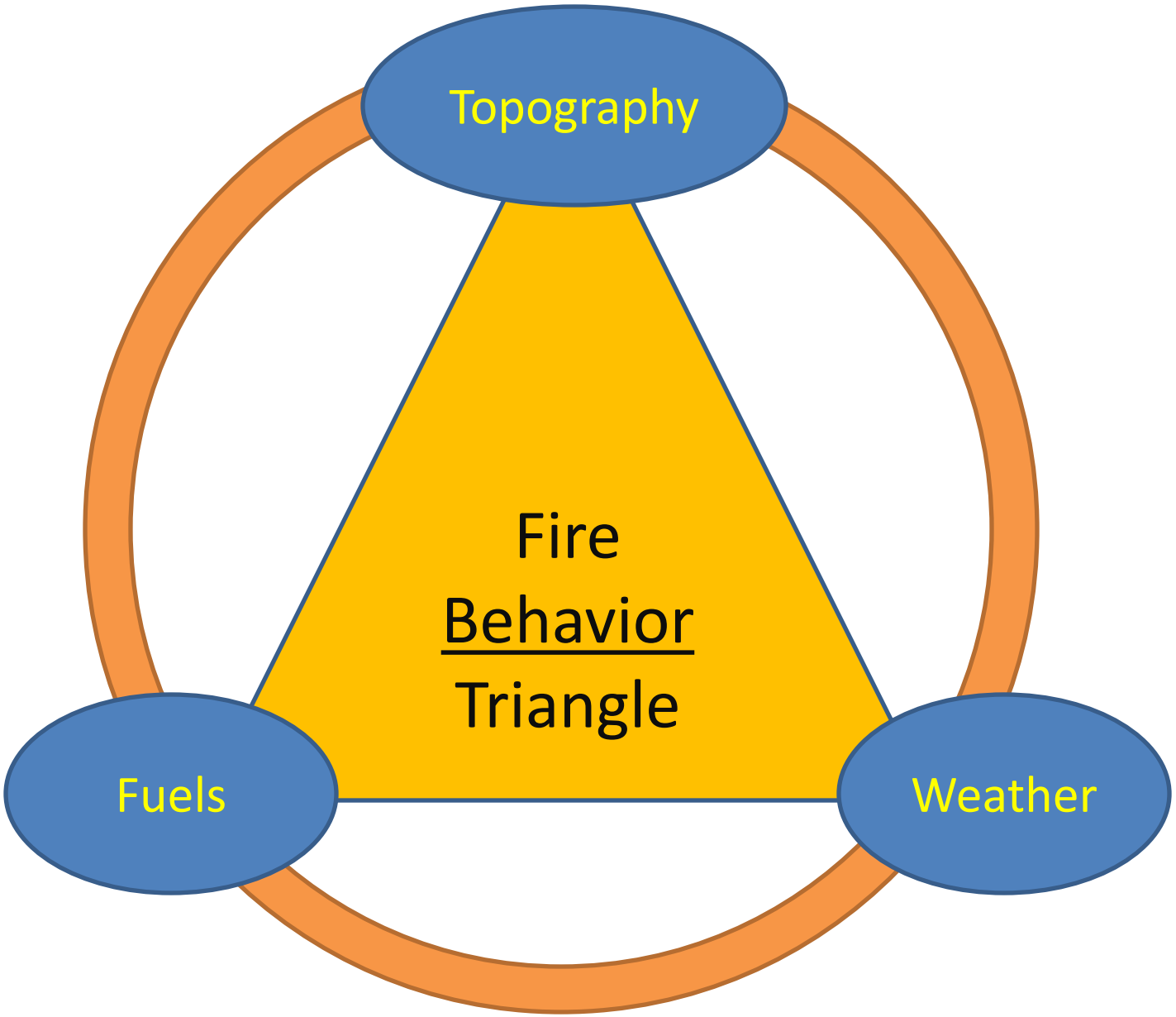
Fire on the Landscape:

Planning for Communities, Fire, and Forest Health

Report of the
Arizona Forest Health Council
September 2008

If we are going to alter fire behavior and effects, where do we intervene?



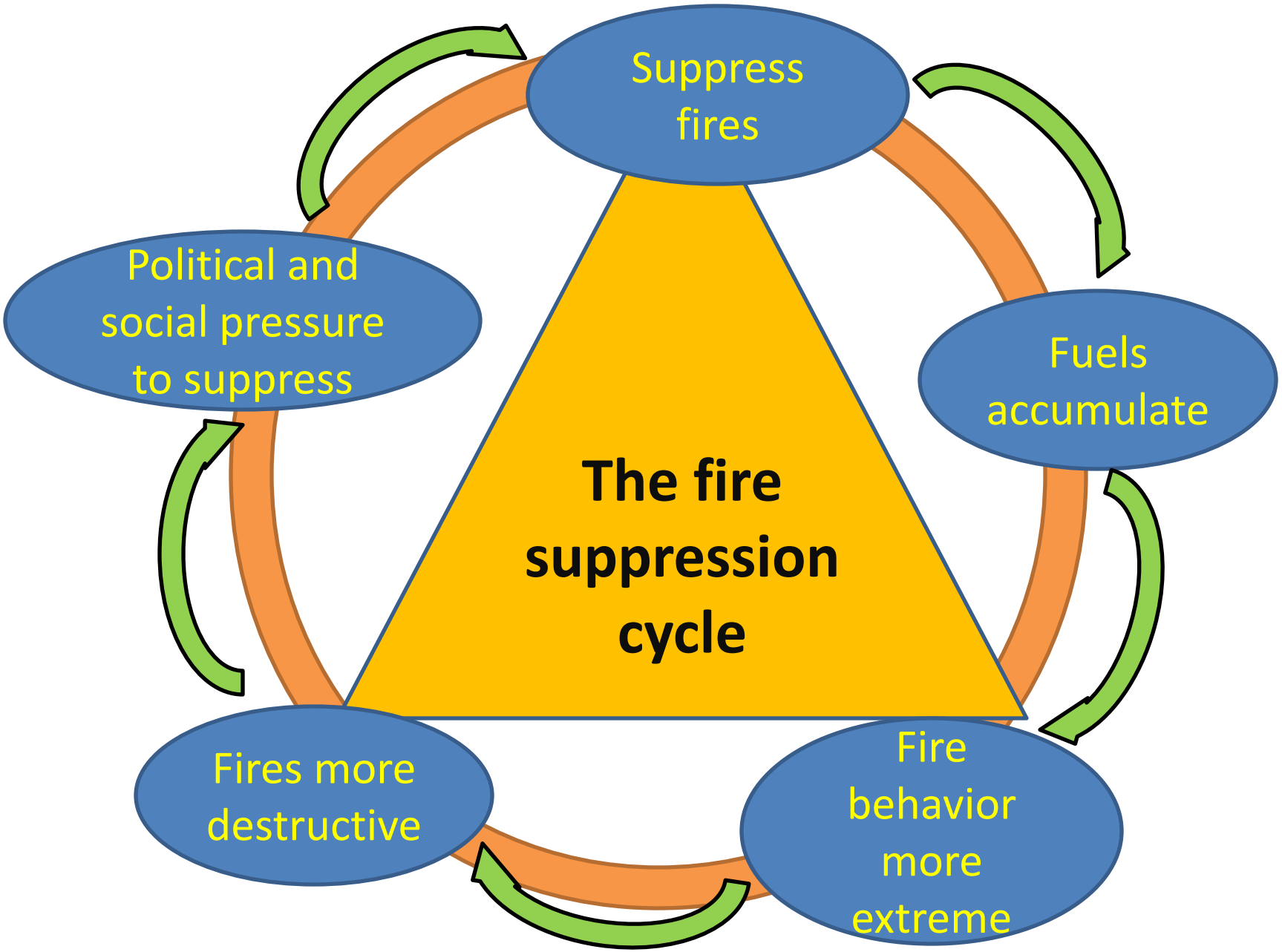

Topography
Fire
Behavior
Triangle
Fuels
Weather

The “fuel paradigm”

- What about fuels can we alter?
  - Load (mass or quantity)
  - Flammability (e.g. fuel moisture)
  - Spatial distribution (e.g. vertical and horizontal continuity)
  - Size and shape

The fire suppression cycle:

- Fires in the US were suppressed for most of the 20th century (following what event?)
- The effect of fire suppression was to increase fuel loads (why?)
- Increased fuel loads altered fire behavior (how?)
- More extreme fire behavior increases the social and political pressure to suppress fires
- *ad infinitum?*


Suppress fires
Fuels accumulate
Fire behavior more extreme
Fires more destructive
Political and social pressure to suppress
The fire suppression cycle

Just to give you an idea of the scale…*

- FY 2008 appropriated $1.2 billion suppression funds for the US Forest Service alone
- Total suppression costs estimated to reach $1.6 billion this year—a $400 million shortfall
- Only option for financing the shortfall is to use "Forest Service transfer authority" (what does that mean?)
- "This direction will impact Forest Service operations, such as national forest programs, capital improvement projects, land acquisitions and partnership grants."
- In other words, stealing funds from every other FS program to feed the fire beast

* Figures for US; data from national memo, "Fire Suppression Costs – Deferring Obligations", 5 August 2008, Office of the Chief

1909

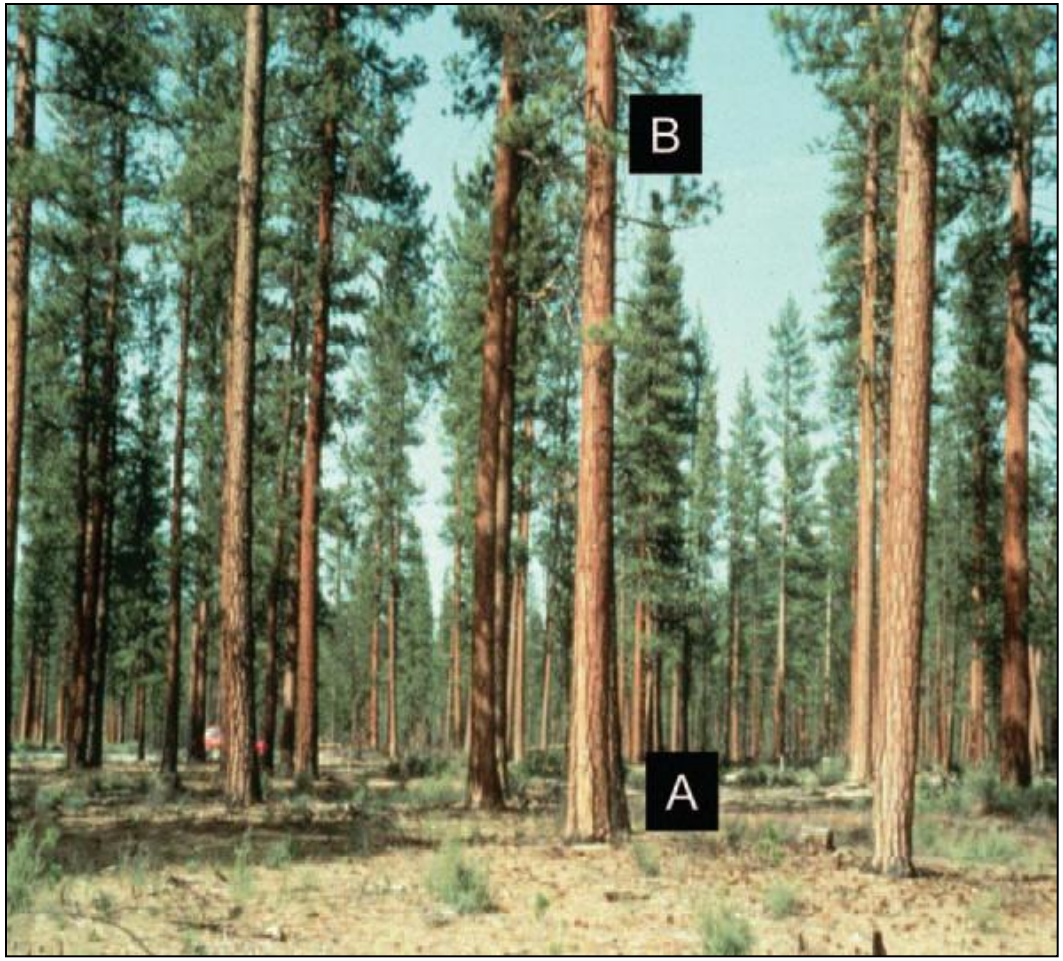
An animated example of fuel accumulation from a ponderosa pine stand after harvest in the Bitterroot National Forest in Montana

1948

1989


1990
Another example: Northern Arizona, Biondi (1999)

What are fuel “treatments”?



Graham *et al.* 2004

- “treatment” typically consists of removing small trees, lower branches, distributing surface fuels
- this reduces fuel load, which reduces flame temperature and height
- this raises “scorch height” and increases the distance that flames have to travel to ignite other fuels

Monument Canyon Research Natural Area, NM


Photo courtesy Ecological Restoration Institute, NAU

Prescribed fire

Example: Cone Fire (northern CA, 2002)

- Blacks Mountain Experimental Forest
- Adjacent thinned and unthinned stands, also prescribed burn areas
- Wildfire ignited in hot, dry, windy late September weather

Key Findings from the 2002 Cone Fire:

- Fire dropped from the crown to the surface within a few feet of entering the treatment units.
- Trees near (but outside) the treatment unit boundary were less likely to survive than those within the unit.
- Survival rates of trees more than 80 feet from the boundary increased dramatically.
- Fire burned with much greater severity outside the Blacks Mountain Ecological Research Project treatment areas.
- Treatments drastically reduced fire severity and subsequent tree mortality inside the treated areas.

Of course, it's not all about ecosystems…

A lot of contemporary fire management has to do with land use

Now into such environments we drop houses, roads, businesses, etc.

Image: US Forest Service

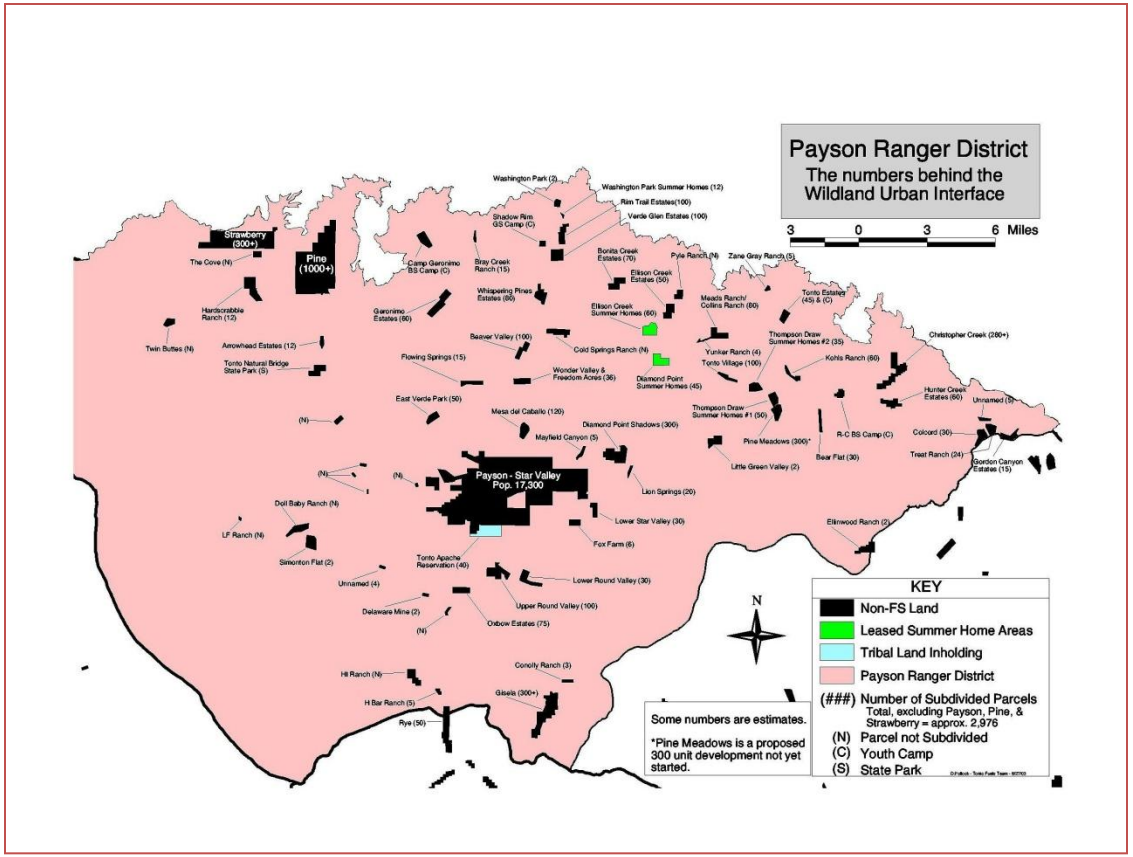
Image: Wisconsin Department of Resources

McMansions…

Image: South Carolina Prescribed Fire Council

Private Inholdings on the Payson District, Tonto NF

Graphic courtesy Tonto NF



- 75 locations within District subdivided into more than 3,000 parcels
- Occupy only 4.7% of acreage but influence management decisions across entire District

Not just a “western” problem…

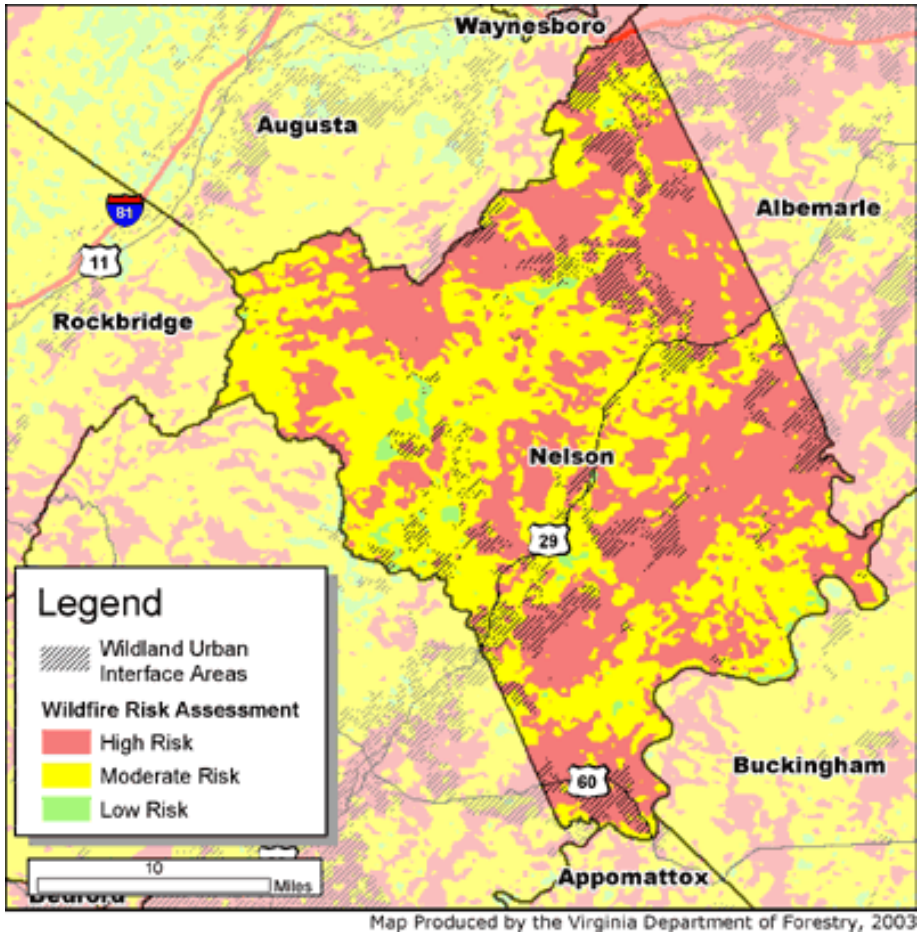
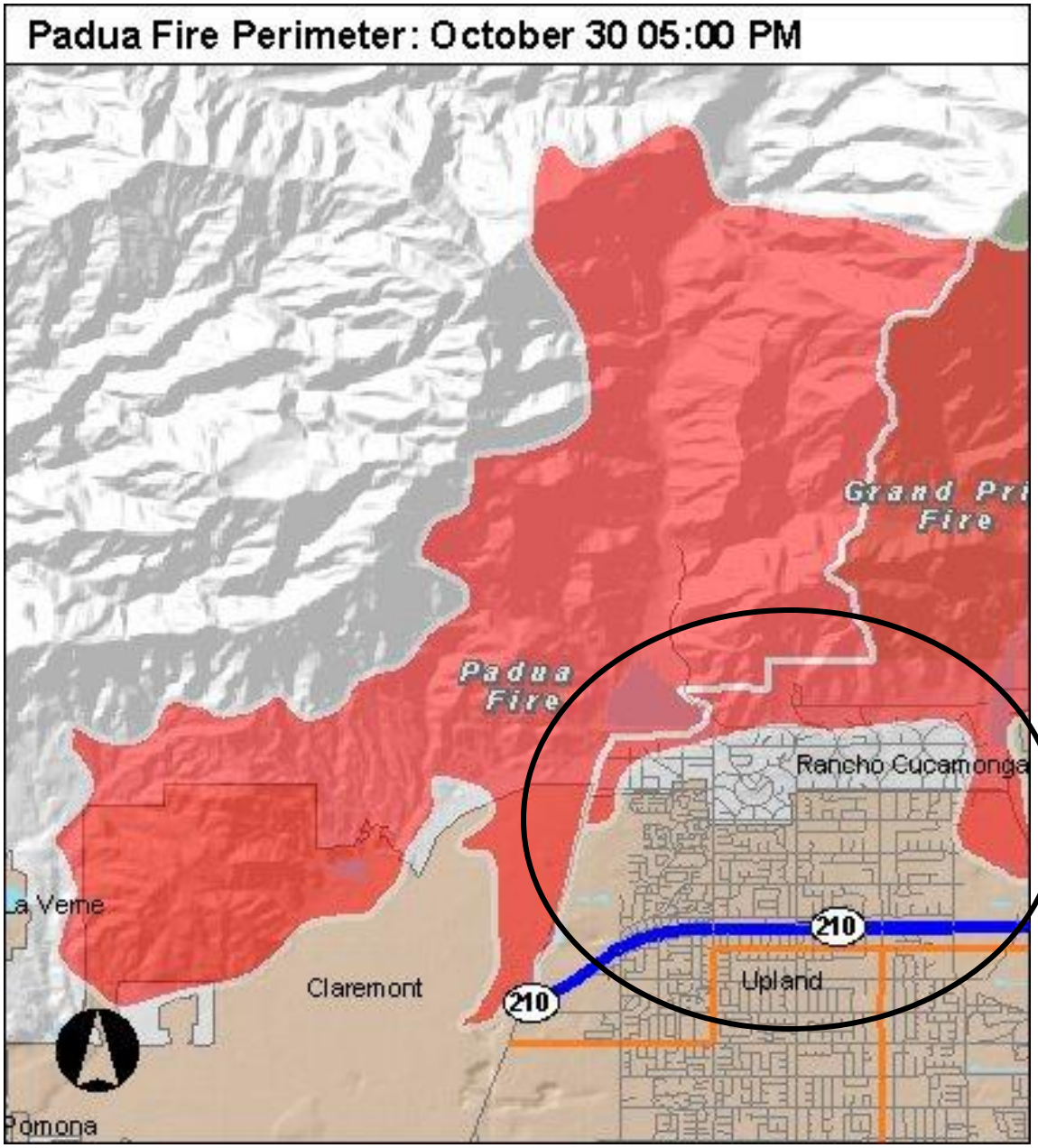
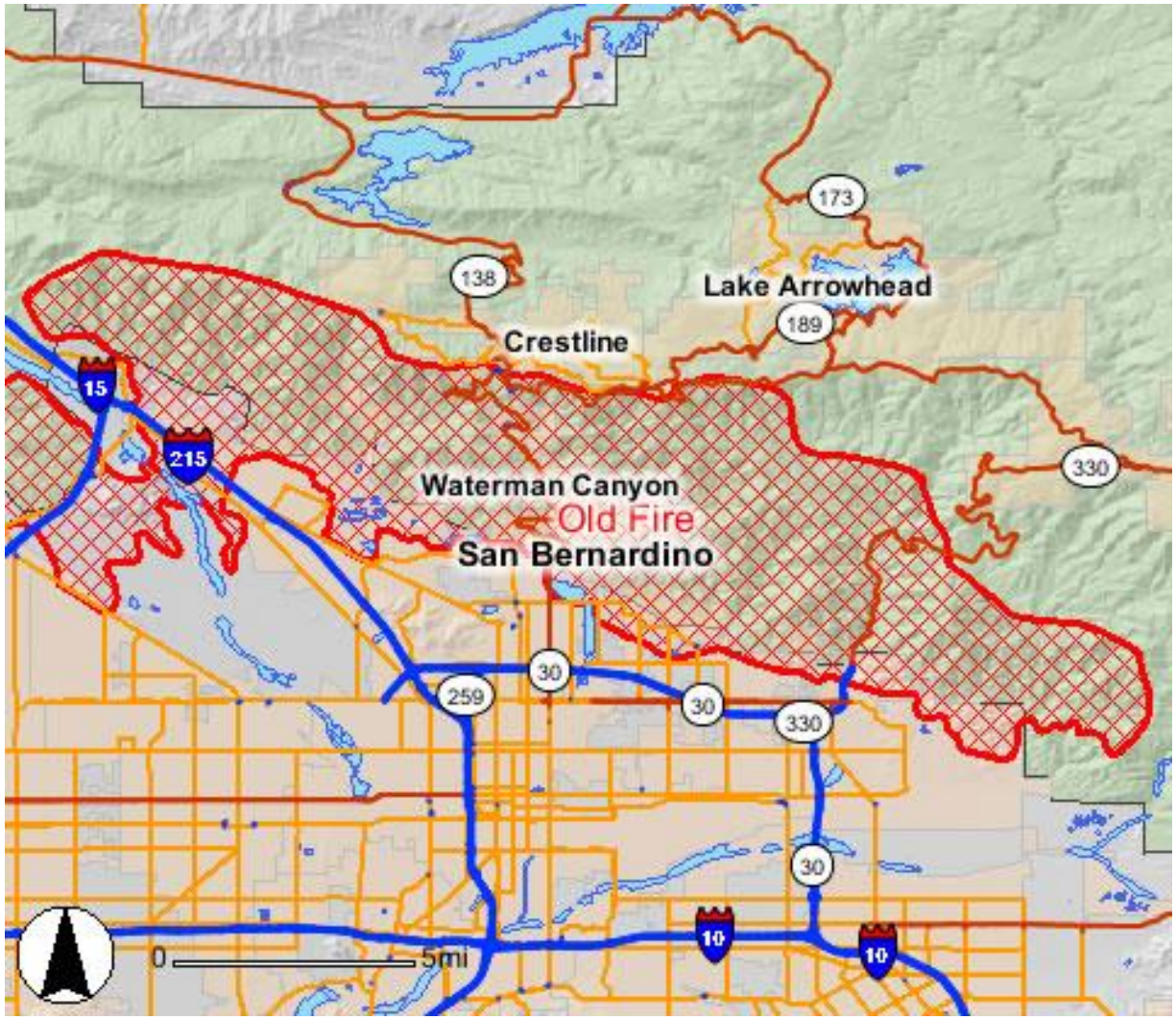


Image: Virginia Department of Forestry



California Mountain Area Safety Task Force, US Forest Service



California Mountain Area Safety Task Force, US Forest Service

The results are predictable:

- Risk to communities
- Firefighters placed at risk to protect contradictory values
- Huge expenditures of public funds
- Distortion of ecosystem management on public lands to protect private property (inholdings and abutters)

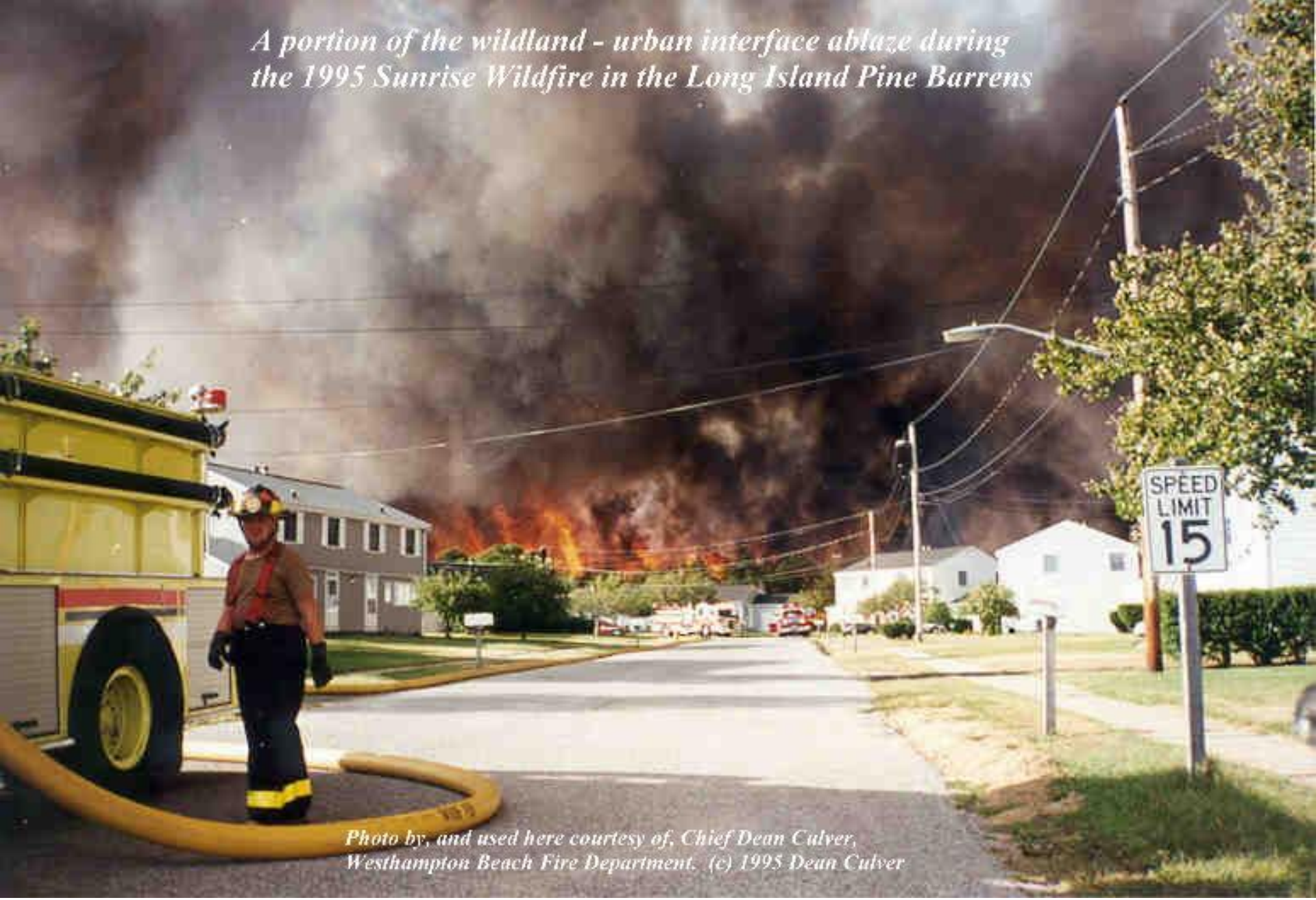


Image: *Central Pine Barrens Wildfire Task Force*, pb.state.ny.us/wtf/sunrise_interface_large.jpg

So fire managers must balance:

- Immediate risk to communities and natural resources
- Costs and risks of intervention (firefighter safety, resource damage, economic cost)
- Costs and risks of doing nothing (community impacts, resource damage, post-fire rehab)
- Public acceptance of management options (e.g. smoke from prescribed fire)
- Complexities of land use and regulations