Natural Areas Prescribed Fire Program

Outline

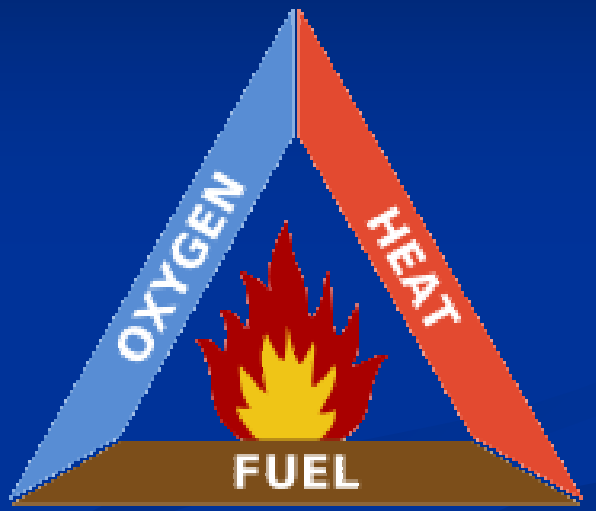
- My Background
- Fire Basics
- Fire Terms
- Fire an Ecological Process
- History of Fire
- WUI Assessments
- Natural Areas and Prescribed Fire
- The Nature Conservancy
- Funding
- Role of Fire with the Natural Areas
- The Volunteers' Role

My Background

- Graduated from CSU in 2006
- Degree in Forestry Minor in GIS
- Wildland Firefighter for Seven Years
- May 2007 start with Natural Areas

Fire Basics

- Fire Triangle



- Combustion
  - $CH_2O + O_2 + \text{heat} \rightarrow CO_2 + H_2O + \text{energy}$

Fire Terms

- Heat Transfer- The physical process by which heat energy moves to and through unburned fuel. There are three different methods:
  - Conduction - The transfer of heat from one molecule of matter to another.
  - Convection - The transfer of heat resulting from motion of air or fluid
  - Radiation – The transmission of heat energy by electromagnetic waves passing from a heat source to an absorbing material

Fire Terms

- Ground Fire – Fire that consumes the organic material beneath the surface litter.
- Smoldering – Fire burning without flame and barely spreading
- Creeping – Fire burning without flame and barely spreading
- Running – Fire spreading rapidly with a well defined head
- Surface fire – Fire that burns surface litter, debris, and small vegetation

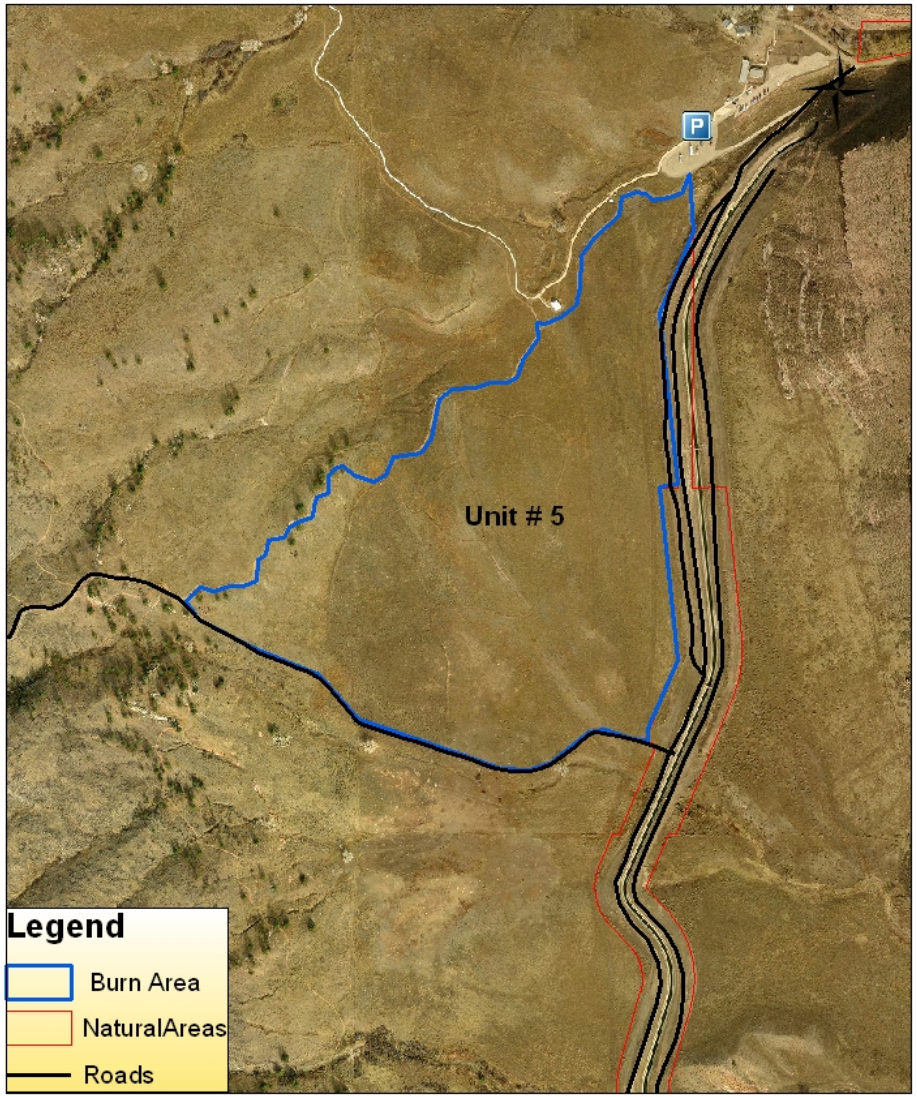
Fire Terms

- Head fire – Fire that is burning with the dominate wind
- Backing fire – Fire that is burning against the dominate wind
- Crown fire – Fire that advances from top-to-top of trees or shrubs less independently of surface fire
- Torching – Fire moving from surface fuels into the crowns of individual tress, but not necessarily from crown to another
- Spotting – Fire producing sparks or embers that are carried by the wind; starts new fires beyond main fire

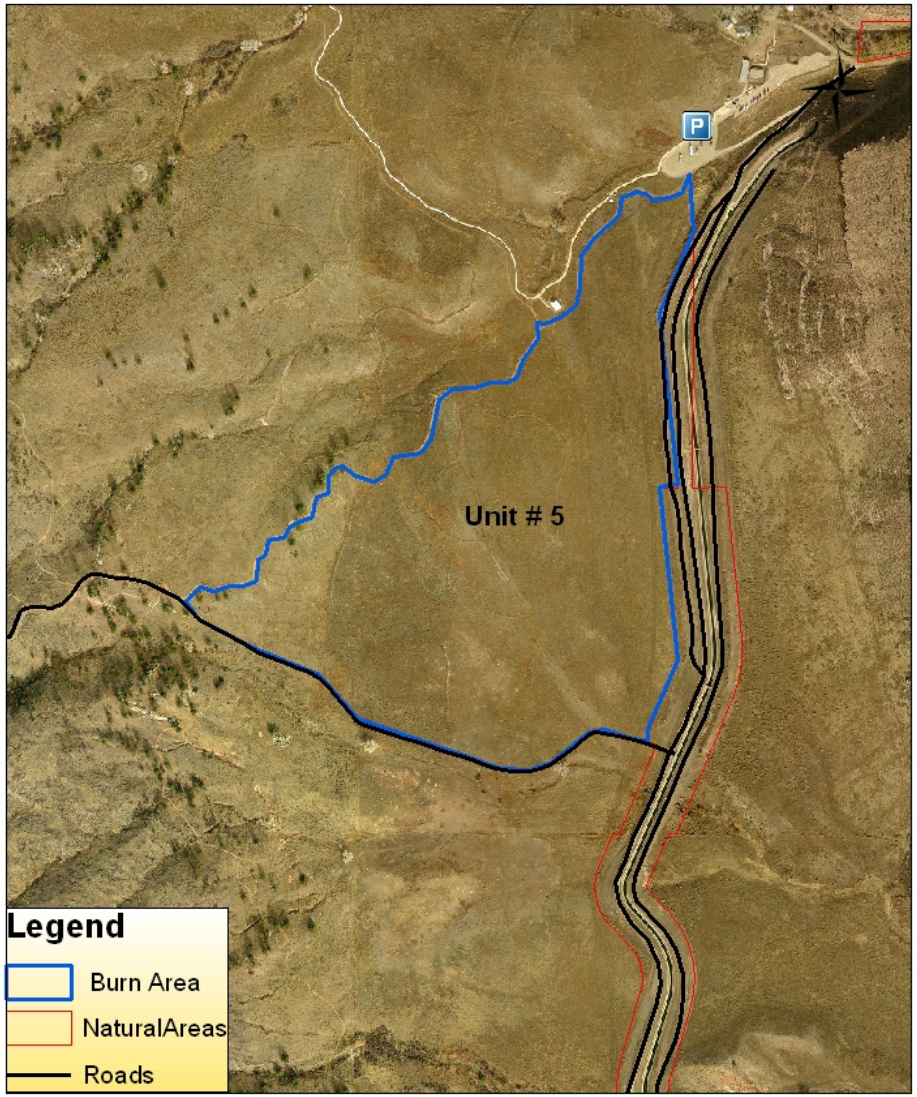
Fire Terms

- Fire Intensity – The rate of heat released per foot of fire front per second. Btu/ft/second
- Fire Severity – The ecological effects of a specific fire to a ecosystem

Bobcat Ridge Prescribed Burn Phase II



Bobcat Ridge Prescribed Burn Phase II

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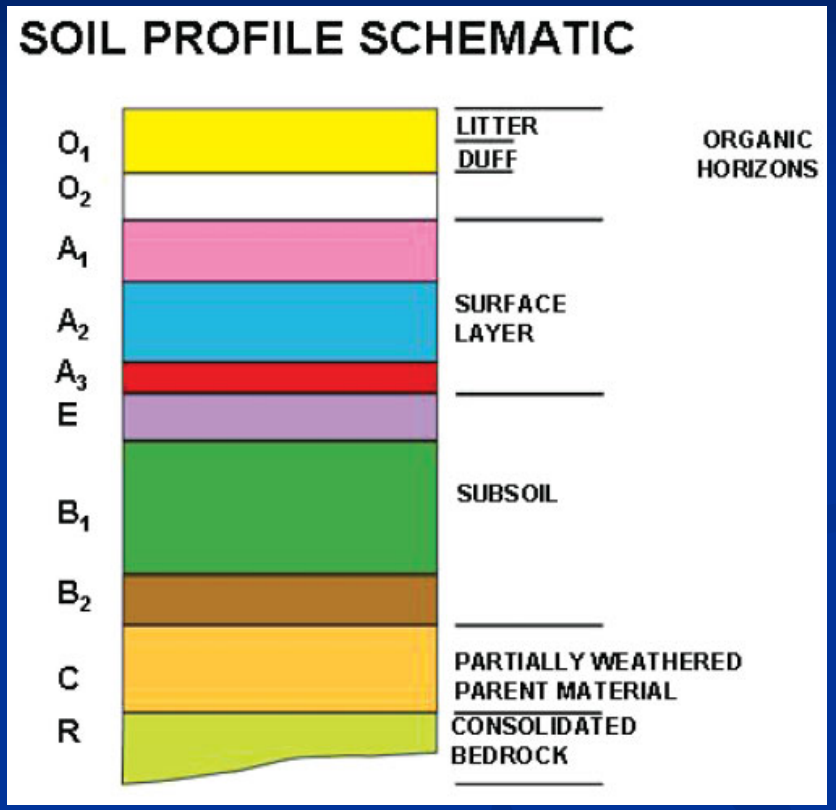
Videos

Fire Ecology
Soil

- Soil Horizons
  - O-Organic Horizon
  - A-Mineral Soil



Fire Effects on Soil

- Fire Severity depends on the following:
  - The length of time fuel has had to accumulate between fires.
  - The properties of the fuel i.e. size, flammability, moisture content, and so on.
  - The effect of fuels on fire behavior during the ignition and combustion of these fuels.
  - Heat transfer in the soil during the combustion of aboveground fuels and surface organic layers.

Measuring The Fire Severity of Soil

- Visual assessments of vegetation, litter, duff, and upper soil horizons can be used to estimate surface heating and used to classify fire severity as low, moderate, or high. The higher the heat radiation into the soil the greater the change of soil properties.

Measuring The Fire Severity of Soil

- Once fire severity is established it can be used to estimate soil temperature.
- Once the approximate soil temperature is known the changes of the soil properties can be estimated. This can tell you things like the loss or gain of soil nutrients.

Fire Effects on Soil

- Breakdown of soil structure
- Reduction or loss of soil organic matter
- Reduced moisture retention and capacity
- Development of water repellency
- Offsite erosion

Fire Effects on Flora

- The likelihood of plant tissue being killed by fire depends upon the amount of heat it receives.
- Plant mortality is often the result of injury to several different parts of the plant.
  - Aerial Crown Mortality – Scorching of leaves and limbs
  - Stem Mortality – Girdling of cambium layer of plant
  - Root Mortality – Loss of feeder roots

Vegetative Regeneration

- Sprouting is a means by which many plants recover after fire. Shoots can originate from dormant buds located on plant parts both above and below ground. These plant parts are located on different places on the plant depending on the species.

Seedling Establishment

- Seedbank – The supply of seeds present on a site is composed of transient and persistent seeds. These seeds can be found in litter layer, soil layer and the tree canopy.

Plant Adaptation

- Fire Intolerance – Many of these plants tend to be highly flammable and are destroyed completely by fire. Some species may disappear after a fire, others have adapted to fire and some have fire-activated seed banks that germinate, grow and mature rapidly following a fire.

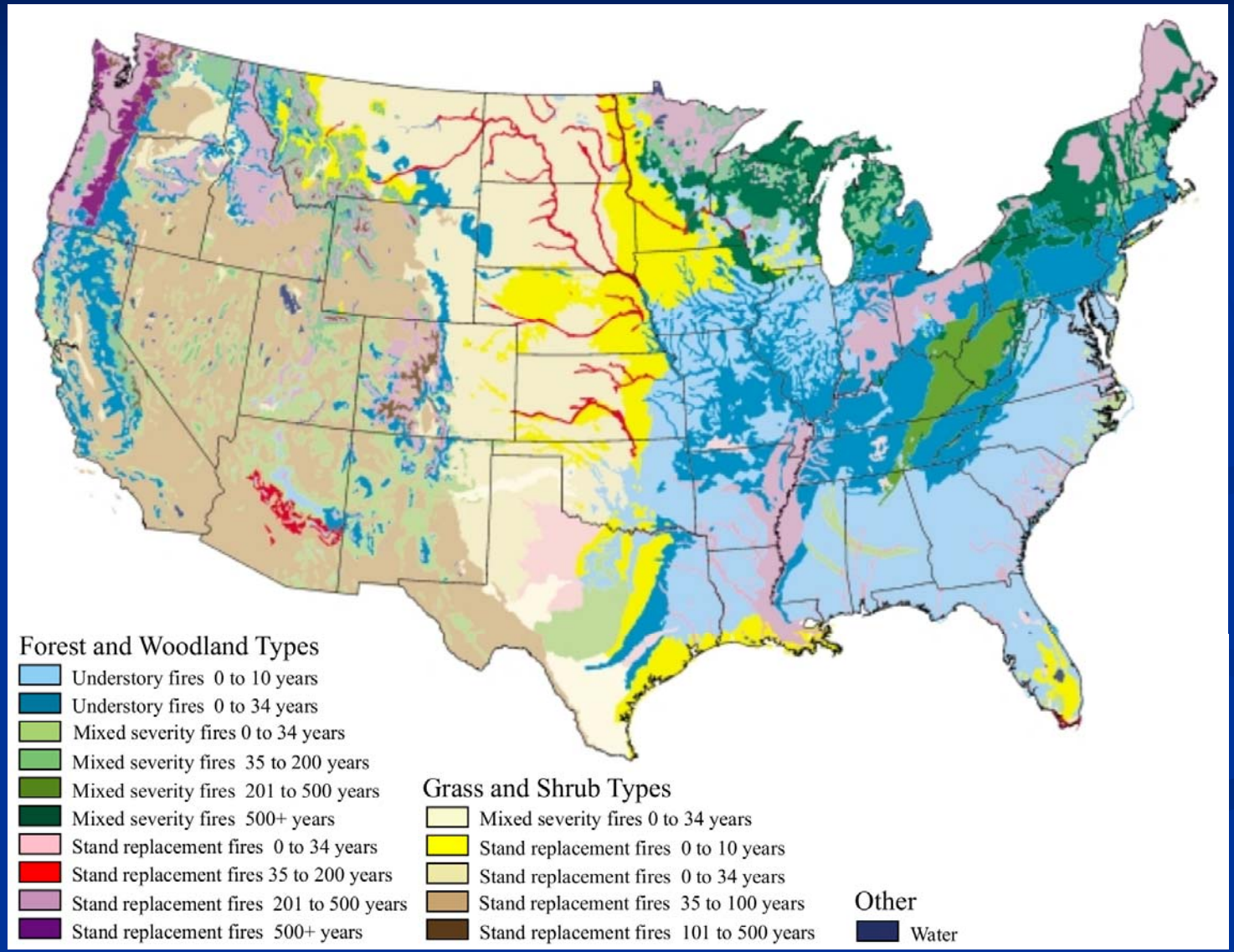
Fire Stimulated Germination

- Some plant species require a heat source to germinate
  - Some Lodgepole Pines have serotinous cones

Photos courtesy of Oregon State University, Dept. of Horticulture.

Prescribed natural crown fire in lodgepole, Jasper National Park.Photo by Dave Smith, ©Parks Canada

Fire Regimes



The History of Fire

- There is evidence that early hominids who appeared in eastern Africa used fire for cooking 2.5 million years ago.
- During the Paleolithic and Mesolithic ages fire was used extensively for what had been termed "fire-stick farming". This terms implies using fire for a variety of reasons: clearing ground for human habitats, facilitating travel, killing vermin, hunting, and many others.

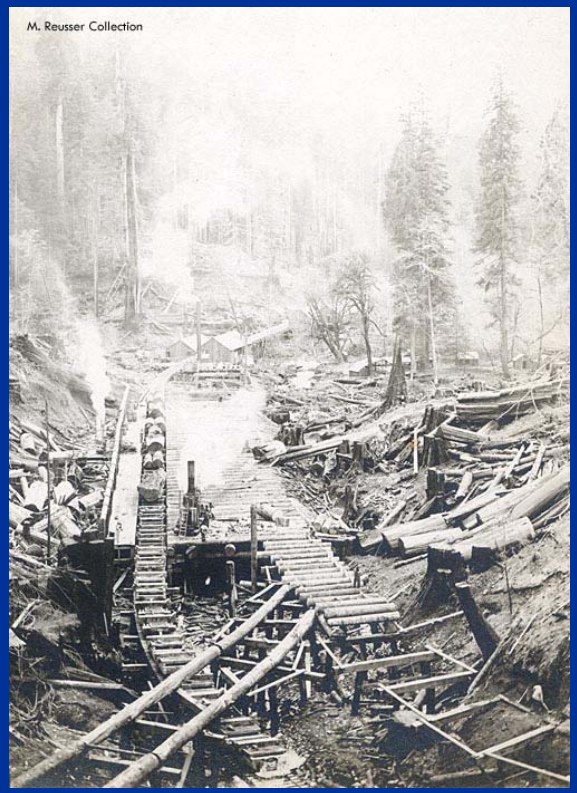
Pre-European Native Americans Fire Uses

- Hunting
- Crop Management
- Insect Collection
- Pest Management
- Improve growth and yields

- Fireproofing areas
- Warfare and signaling
- Economic extortion
- Clearing areas for travel
- Felling trees
- Clearing riparian areas

History of Wildfire Suppression in the U.S.

- In the late 1800s most forest mangers believed that fire should be suppressed at all times. The biggest reason was fire was a threat to the timber industry.



Wisconsin 1871 Peshtigo Fire

Killed More than 1,500 People

Great Fire of 1910 in Montana and Idaho

Burned more than 3,000,000 acres and destroyed many communities and killed 86 people

History of Wildfire Suppression in the U.S.

- In 1935 the U.S. Forest Service creates the 10 A.M. policy
- Beginning in the 1940s firefighters got really good at putting out wildfires. Acres burned went from 30,000,000 acres during the 1930s to around 5,000,000 acres in the 1960s.

Smokey Bear

- In 1944 U.S. Forest developed an ad campaign to help educate the public that all fires were detrimental.
- Early posters of Smokey mislead people in believing most western wildfires were human-caused.

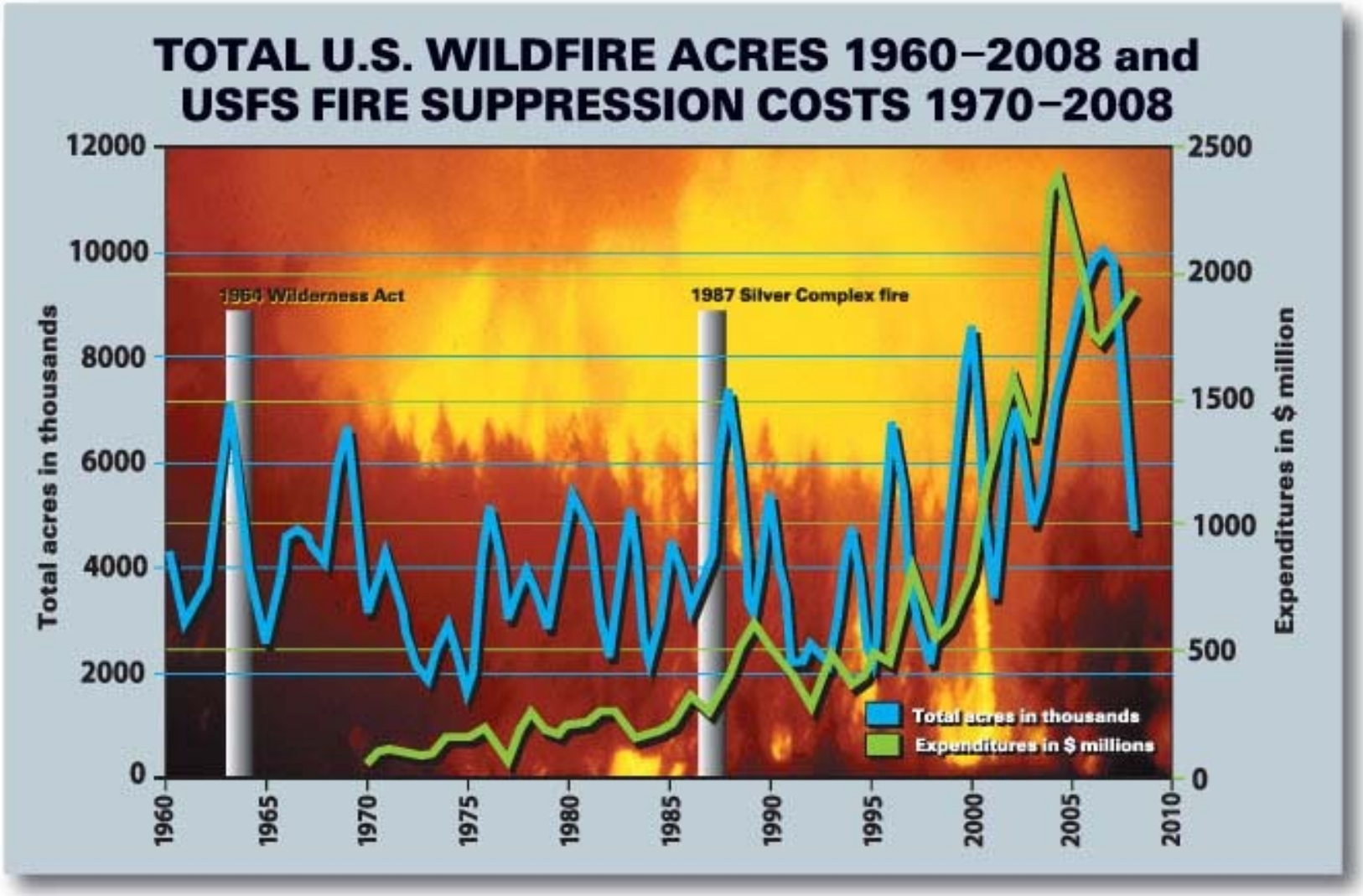
Consequences of Wildfire Suppression

The U.S. Forest Service policy of complete suppression has led to:

- Higher fuel loading
- Bigger and more damaging wildfires
- Ever increasing costs to suppress wildfires

A ponderosa pine stand in the Bitterroot National Forest in Montana in 1909, 1948, and 1989. The increase in vegetation density was attributed to fire prevention efforts since 1895.

(photo from Wikipedia http://en.wikipedia.org/wiki/Wildfire#cite_note-140)


TOTAL U.S. WILDFIRE ACRES 1960–2008 and
USFS FIRE SUPPRESSION COSTS 1970–2008
Total acres in thousands
Expenditures in $ million
12000
10000
8000
6000
4000
2000
0
2500
2000
1500
1000
500
0
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
1964 Wilderness Act
1987 Silver Complex fire
Total acres in thousands
Expenditures in $ millions

Change To Fire Suppression Policy

- 1964 Wilderness Act allowed for the natural processes to occur including fire.
- 1968 the National Park Service recognized fire as an ecological process and fires would be allowed to burn as long as they could be contained in specified fire management units and achieved management objectives.
- 1978 the Forest Service abandoned the 10 A.M. policy in favor of a new policy that encouraged the use of wildland fire by prescription.

Prescribed Fires and Thinning Projects

- Provide/improve habitat for wildlife
- Improve forest and agricultural resources
- Reduce hazardous fuel loading
- Mimics natural processes but under more controlled circumstances

Wallow Fire 2011

Wallow Fire 2011

Long Mesa Fire 2002
Mesa Verde N.P.

Wildland Urban Interface

- WUI assessments of natural areas
- Mowed lines along some natural area boundaries

THE WEEDS HAD TO GO

- On January 3, 2003 the Natural Areas implements it first prescribed fire
- Large amount of Kochia was built up at Kingfisher Point
- Worked with PFA to have this demonstration burn
- It was deemed a success and now we are off and running

Prescribed Burns

- To date we have implemented about 15 burns
- Totaling about 830 acres
- Bobcat Ridge, Arapaho Bend, Butterfly Woods, Soapstone Prairie, etc.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The Nature Conservancy

Protecting nature. Preserving life.™

- The Mission of TNC is to conserve the lands and waters on which all life depends
- The Primary purpose of The Nature Conservancy's Southern Rockies Fire Module is to manage and reintroduce wildland fire into fire adapted ecosystems


E-693

Grants

- 2007 Colorado Western States Wildland Urban Interface Grant
  - Over 30 acres of fuel treatment at three natural areas
  - Three burn plans written
  - One prescribed fire implemented

Grants

- 2010 Community Wildfire Protection Plan Development Project. Supported by the ARRA act of 2009 Through the CSFS
  - Six burn plans written
  - Three prescribed burns implemented
  - City of Fort Collins Natural Areas Department Fire Management Plan written
  - WUI Risk Assessment Plan written

Grants

- Applied for 2012 Western Wildland Urban Interface Grant Program
  - Prescribed Fire Implementation
  - Natural Areas Wildfire Education
  - Wildfire Mitigation and Prescribed Fire Planning

The Role of Fire in Natural Areas

Wildfire

- All wildfires are to be extinguished
- In the future in some situations some wildfires may be allowed to burn

The Role of Fire in Natural Areas

Prescribed Fire

- Prescribed fire is used to mimic a natural disturbance
- Prescribed fire is used as an aid to help in the process of species conversion
- Prescribed fire can help improve wildlife habitat
- Prescribed fire can help improve conditions for rare and threatened plants

Natural Disturbance

- Fire is a natural disturbance that occurs in most terrestrial ecosystems
- Helps determines what plant species are where
- Helps create species diversity
- Some plants need it for reproduction

Species Conversion

- Burning helps remove plant biomass
- Allows for better application of herbicide
- May allow for native species to better compete

Wildlife

- Prescribed fire can help improve wildlife habitat
- Mountain Plovers prefer bare ground
- Help expand prairie dog colonies


© Dave Showalter

Rare and Threatened Plants

- Help improve habitat for these plants
- Makes it easier for the plants to compete with other plants
- Colorado Butterfly Plant (*Gaura neomexocana spp. coloradensis*)
- Ute Ladies' Tresses (*Sprianthes diluvialis*)

Colorado Butterfly Plant

Ute Ladies' Tresses

Photos Provided by
Crystal Strouse

Volunteers' Role with Prescribed Burns

- Talk with the public to explain the reasons for the prescribed burns
- Keep people out of the burn area
- Notify a Natural Areas staff if someone enters the burn area

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Questions ?