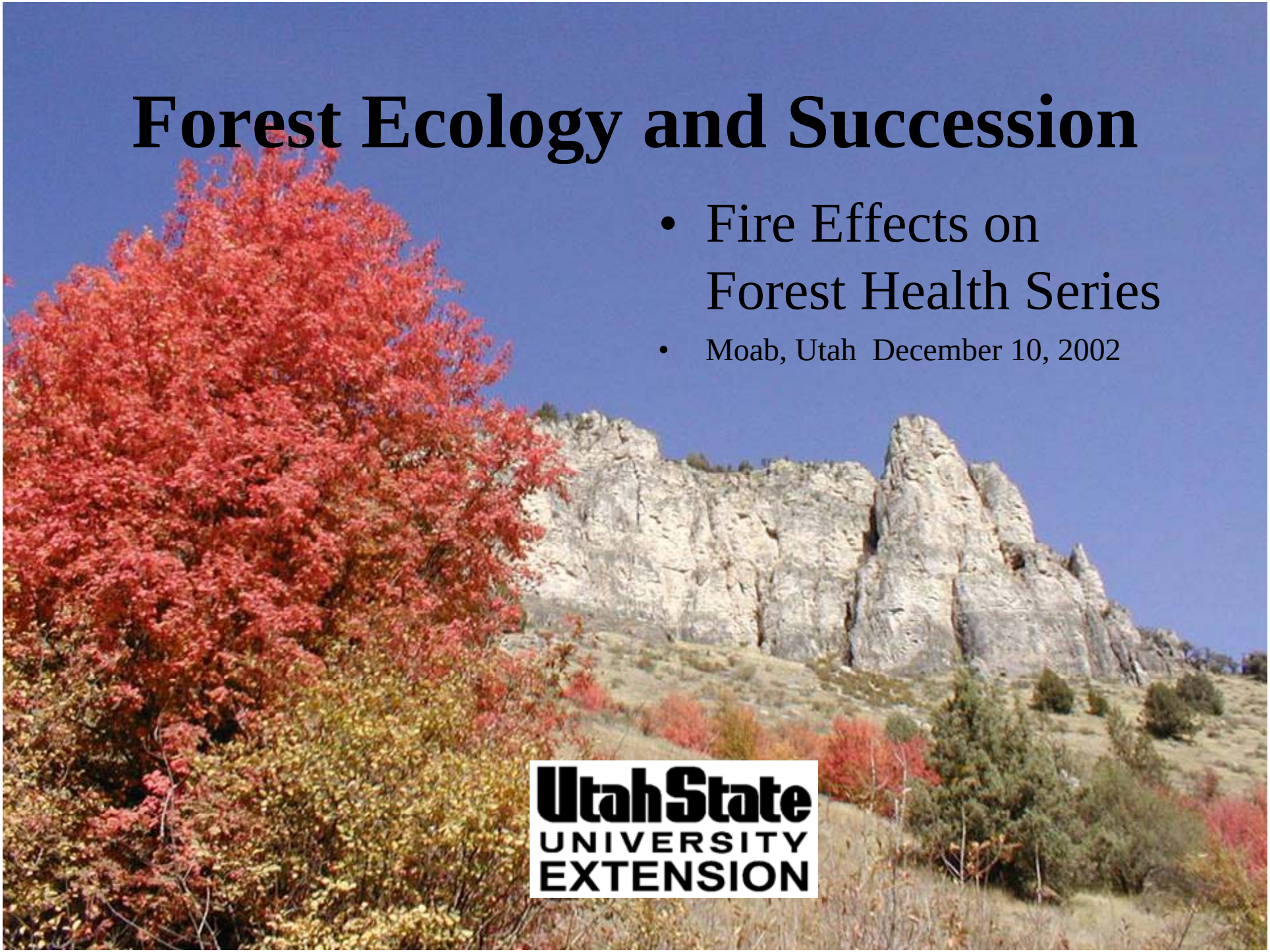
Forest Ecology and Succession

- Fire Effects on Forest Health Series
- Moab, Utah December 10, 2002



Succession Happens

Definition

- **Succession:** The gradual replacing of one plant community by another

- Forests are dynamic; always changing
- One of the most important parts of ecology

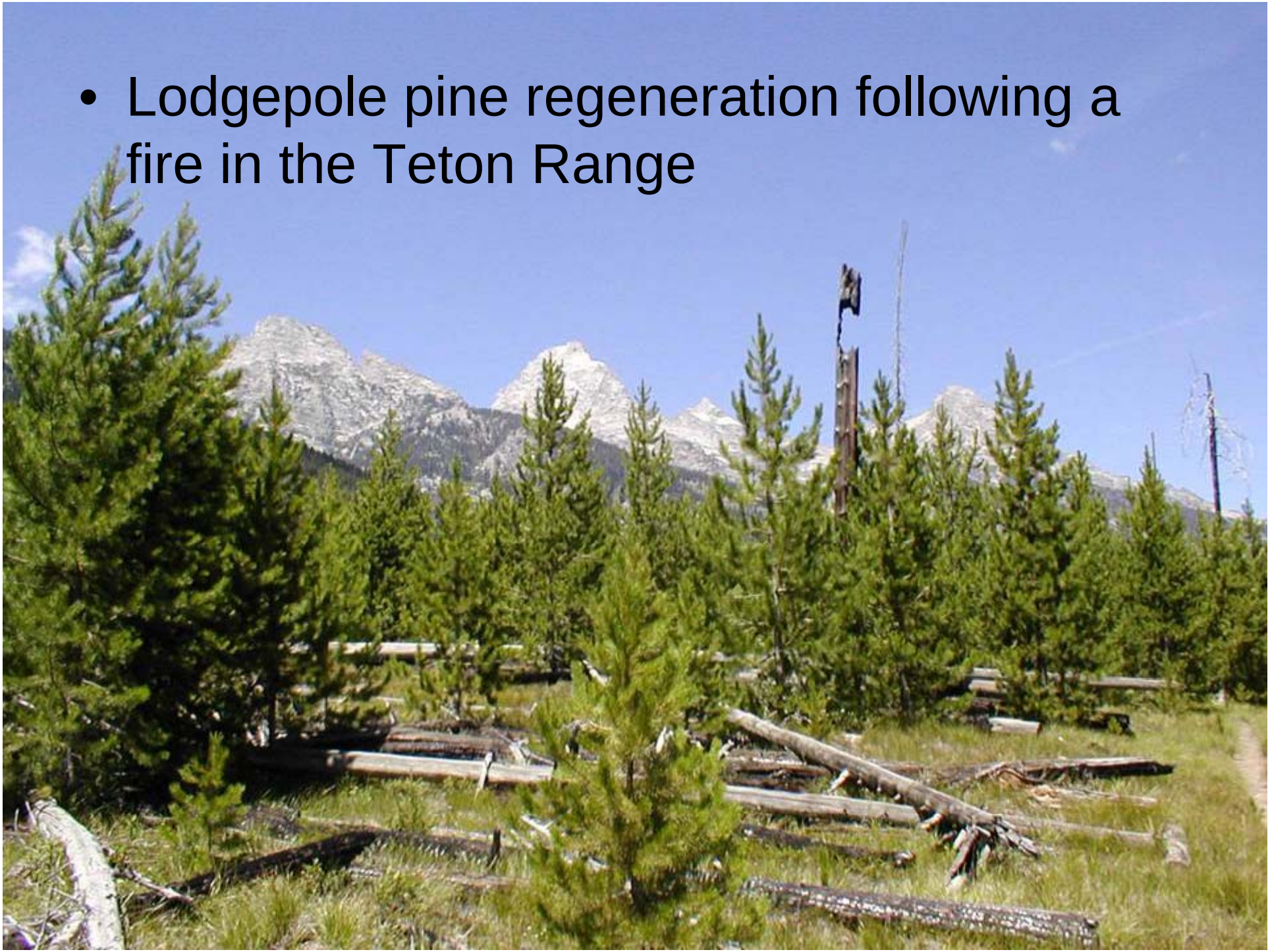
There is a balance over time between succession and disturbance

- Succession without disturbance may lead to catastrophic disturbance

Plant Communities: Pioneers vs. Shade Tolerant, or Pine vs. Fir

- Not all evergreens are created equal
- All Pinaceae Family, but not all pines

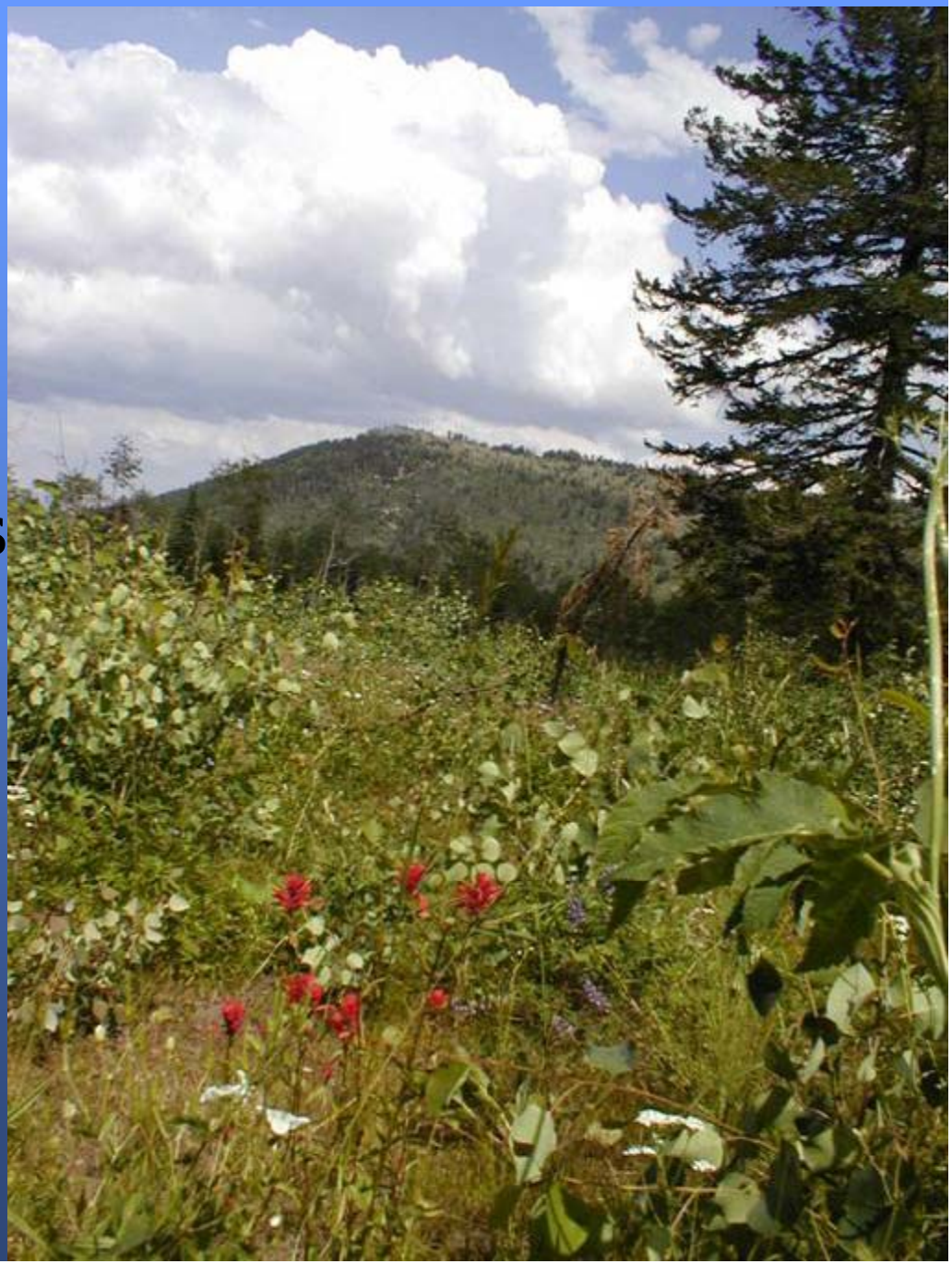
Pines are Pioneers


• Lodgepole pine regeneration following a fire in the Teton Range

Limber Pine

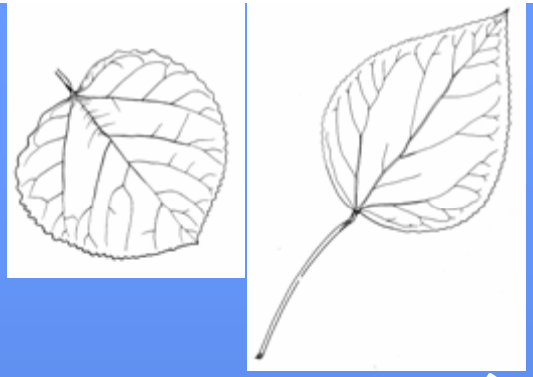
Pioneers

- Tolerate direct sun
- Follow disturbance
- Establish themselves

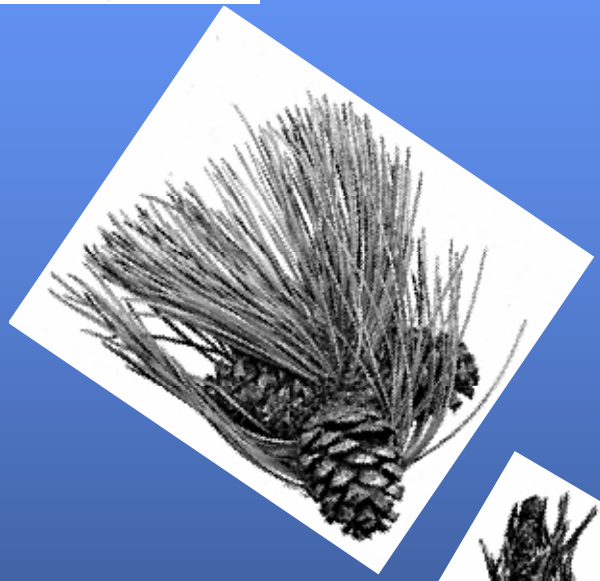


Quakies are Pioneers

- Aspen



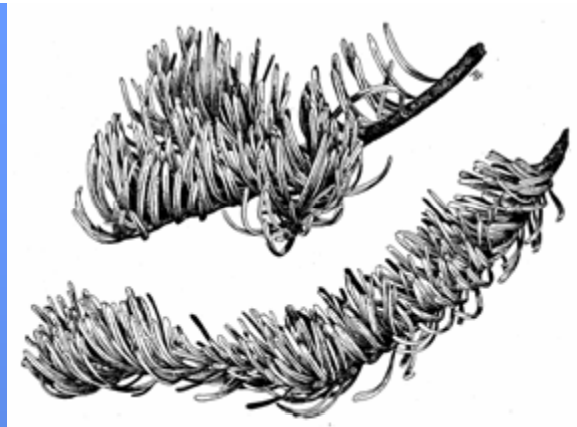
- Ponderosa Pine



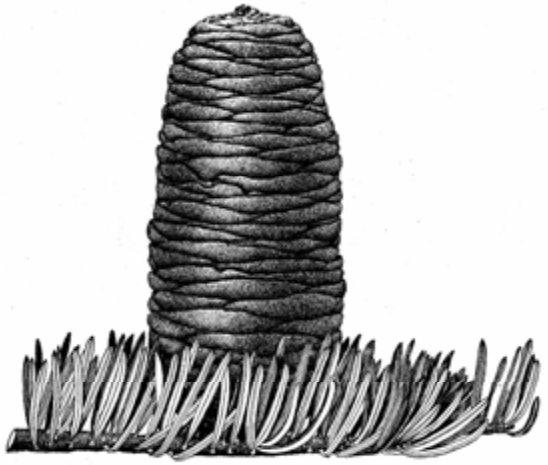
- Lodgepole Pine

Shade Tolerant Fir

- Subalpine fir



- White fir



- Douglas Fir

Fir needles (with frost damage)

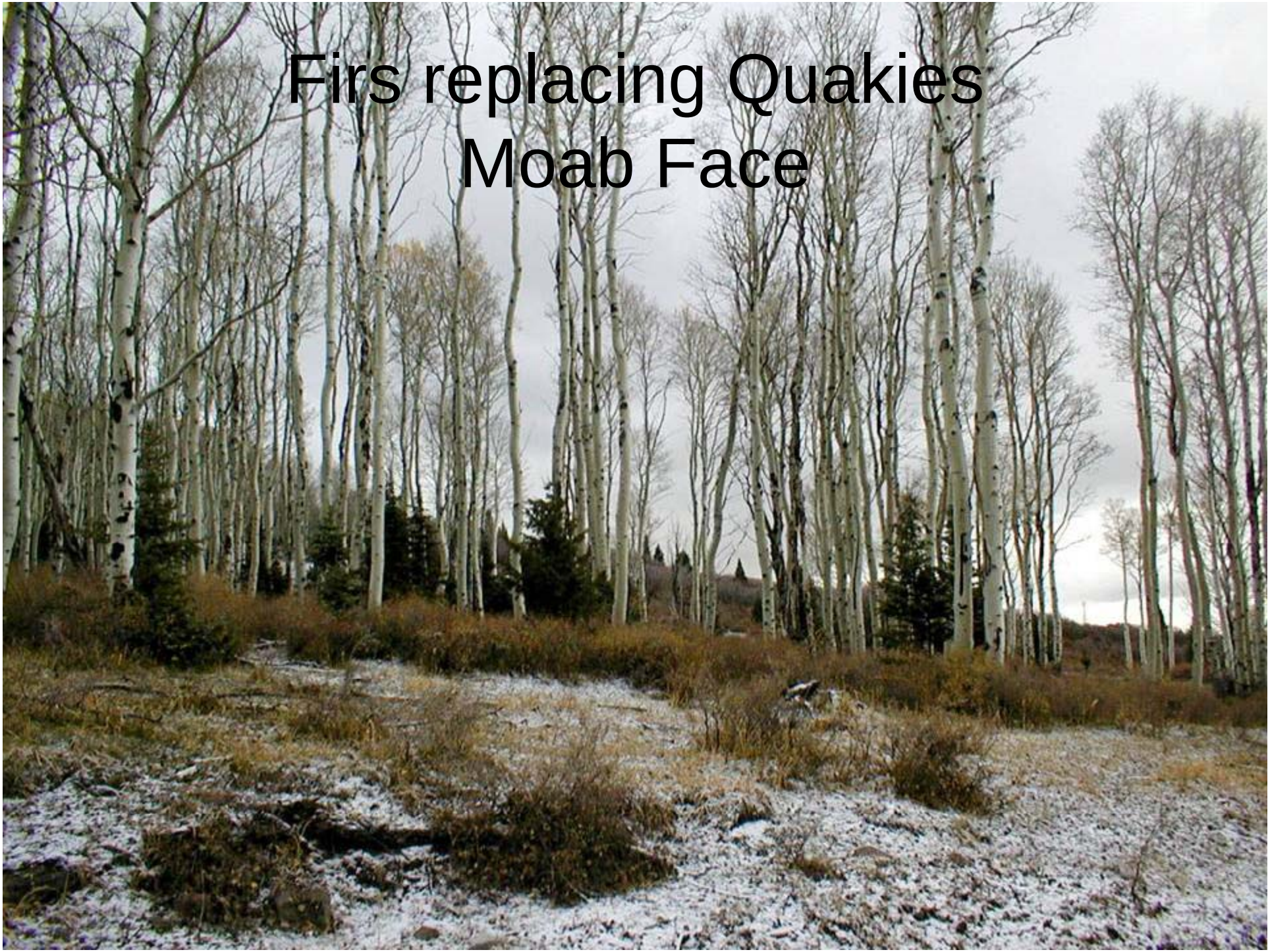
Firs Replacing Pines

Succession Examples

Shade Intolerant Pines

Shade Tolerant Firs

Firs replacing Quakies


Firs replacing Quakies
Moab Face

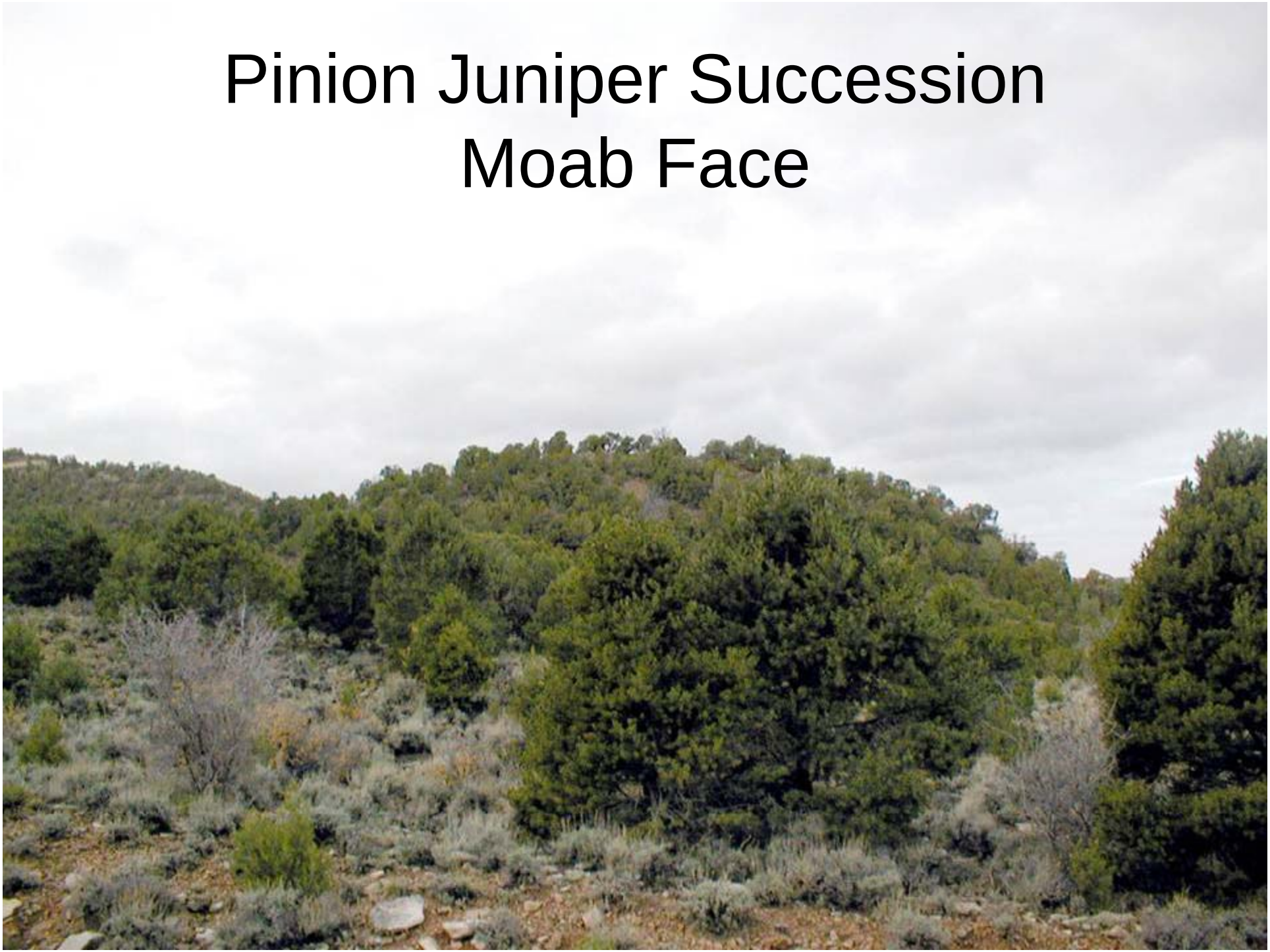
MOAB 31
MINERS BASIN 3
PINHOOK BATTLEGROUND 2

Final Stages

Sub alpine Fir Overtaking Aspen Northern Utah

- White fir under Douglas-Fir

Pinion Juniper Succession
Moab Face



- Lack of disturbance leads to less diversity, less stability

Natural Disturbances

- In Utah: Fire and Insects primarily
- Secondary disturbance agents:
- Avalanches, floods, wind-throw, mud slides

Spruce Beetle Epidemic, Dixie National Forest

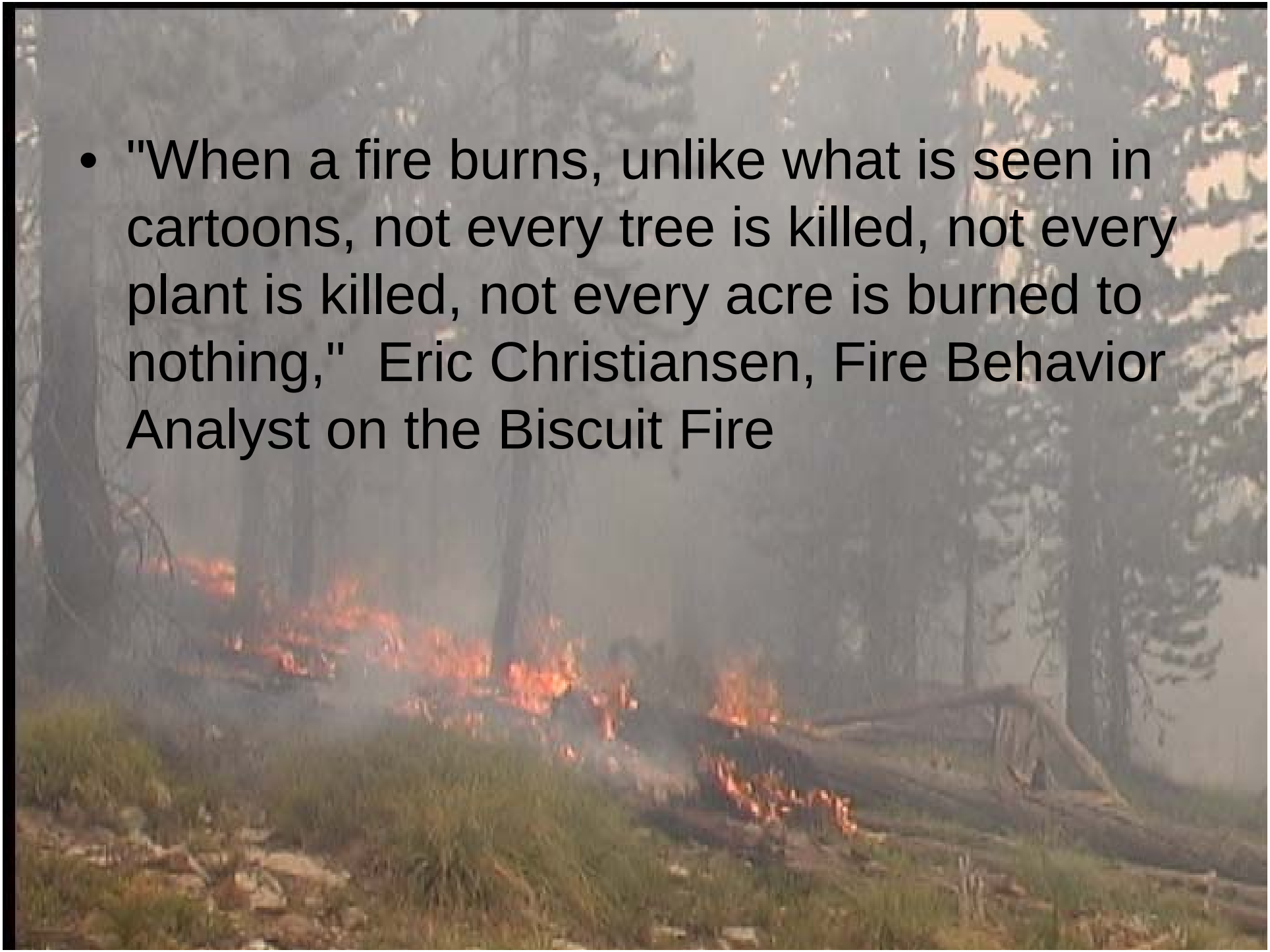
- Hurricane Hugo

No Human Disturbance May Lead to More Natural Disturbance

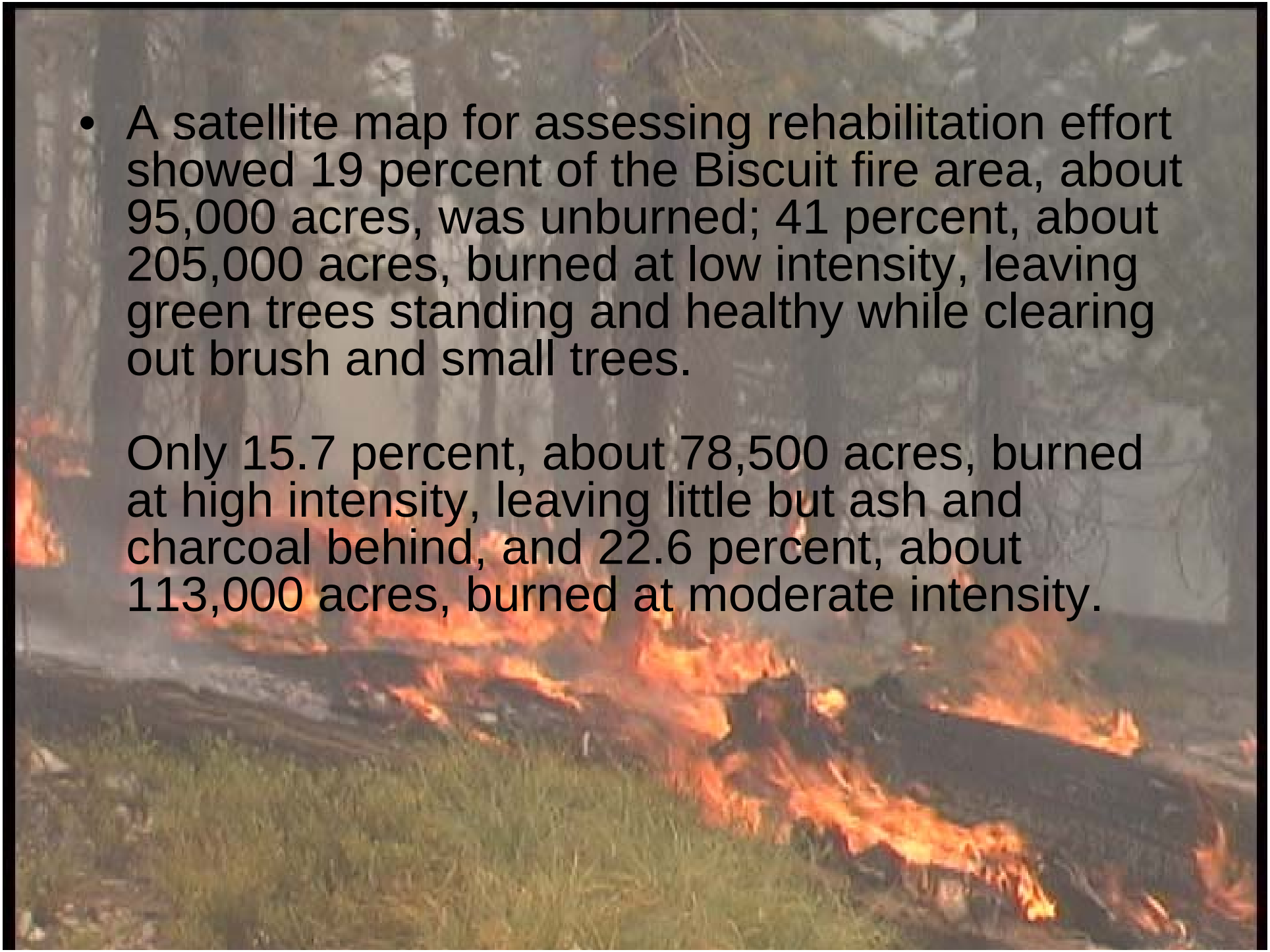
Root Diseases

Extreme
Wildfire

Fire Effects



- "When a fire burns, unlike what is seen in cartoons, not every tree is killed, not every plant is killed, not every acre is burned to nothing," Eric Christiansen, Fire Behavior Analyst on the Biscuit Fire



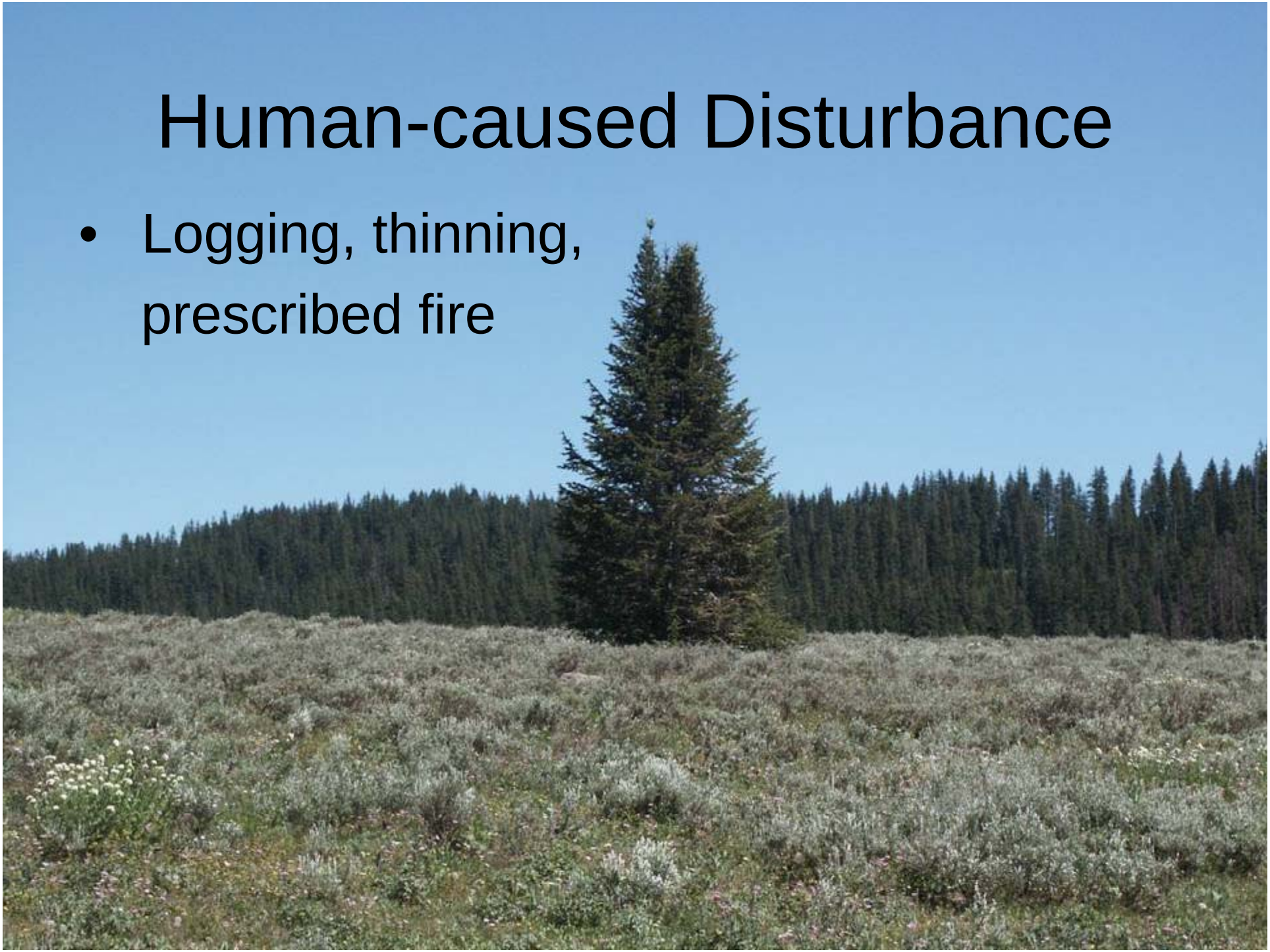
- A satellite map for assessing rehabilitation effort showed 19 percent of the Biscuit fire area, about 95,000 acres, was unburned; 41 percent, about 205,000 acres, burned at low intensity, leaving green trees standing and healthy while clearing out brush and small trees.

  Only 15.7 percent, about 78,500 acres, burned at high intensity, leaving little but ash and charcoal behind, and 22.6 percent, about 113,000 acres, burned at moderate intensity.

- "The worst thing that we could have is to be so enamored of our forests that we eliminate the processes that change them," said Tom Atzet, the U.S. Forest Service ecologist on the Biscuit Fire.

Human-caused Disturbance

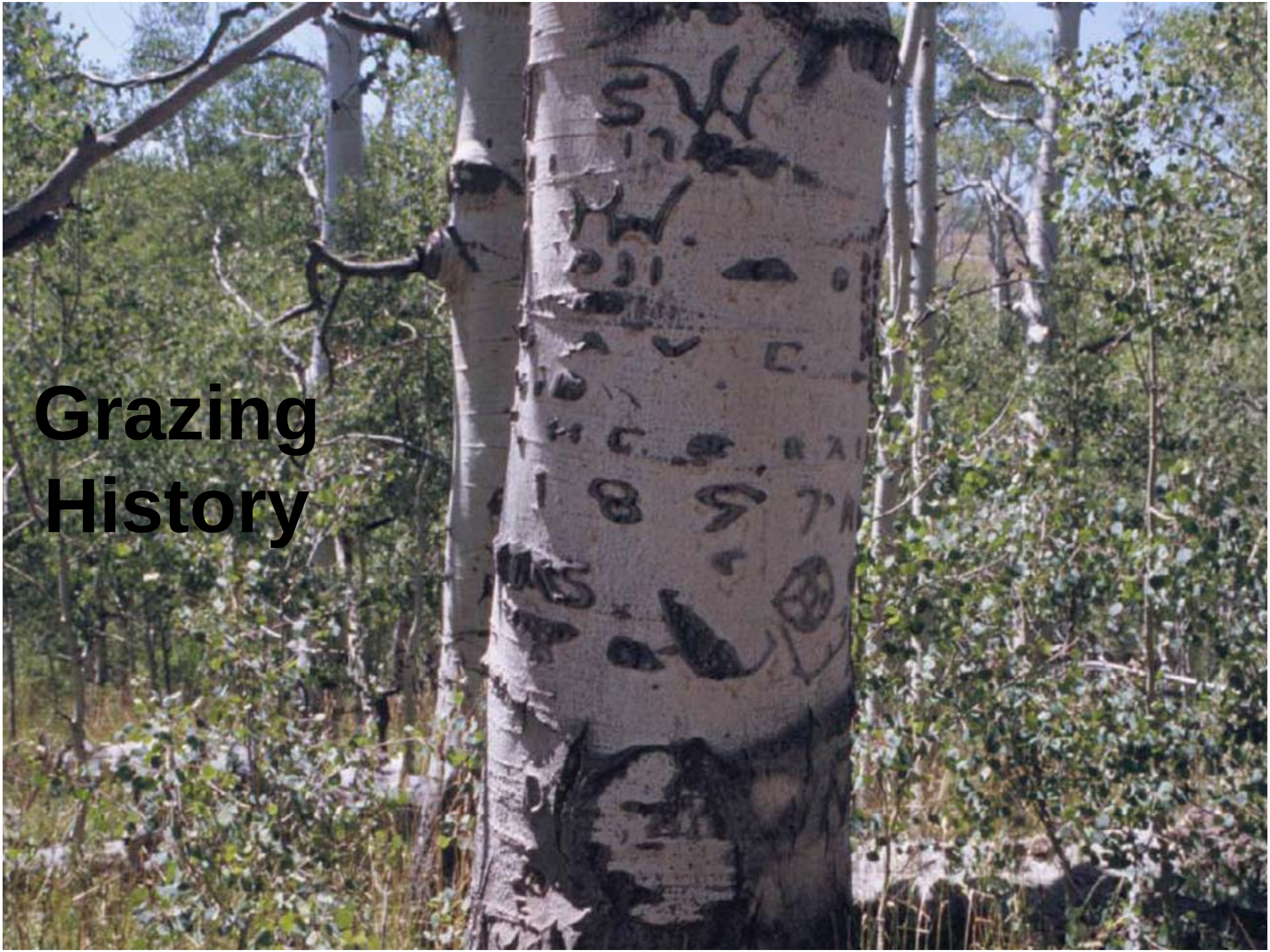
- Logging, thinning, prescribed fire

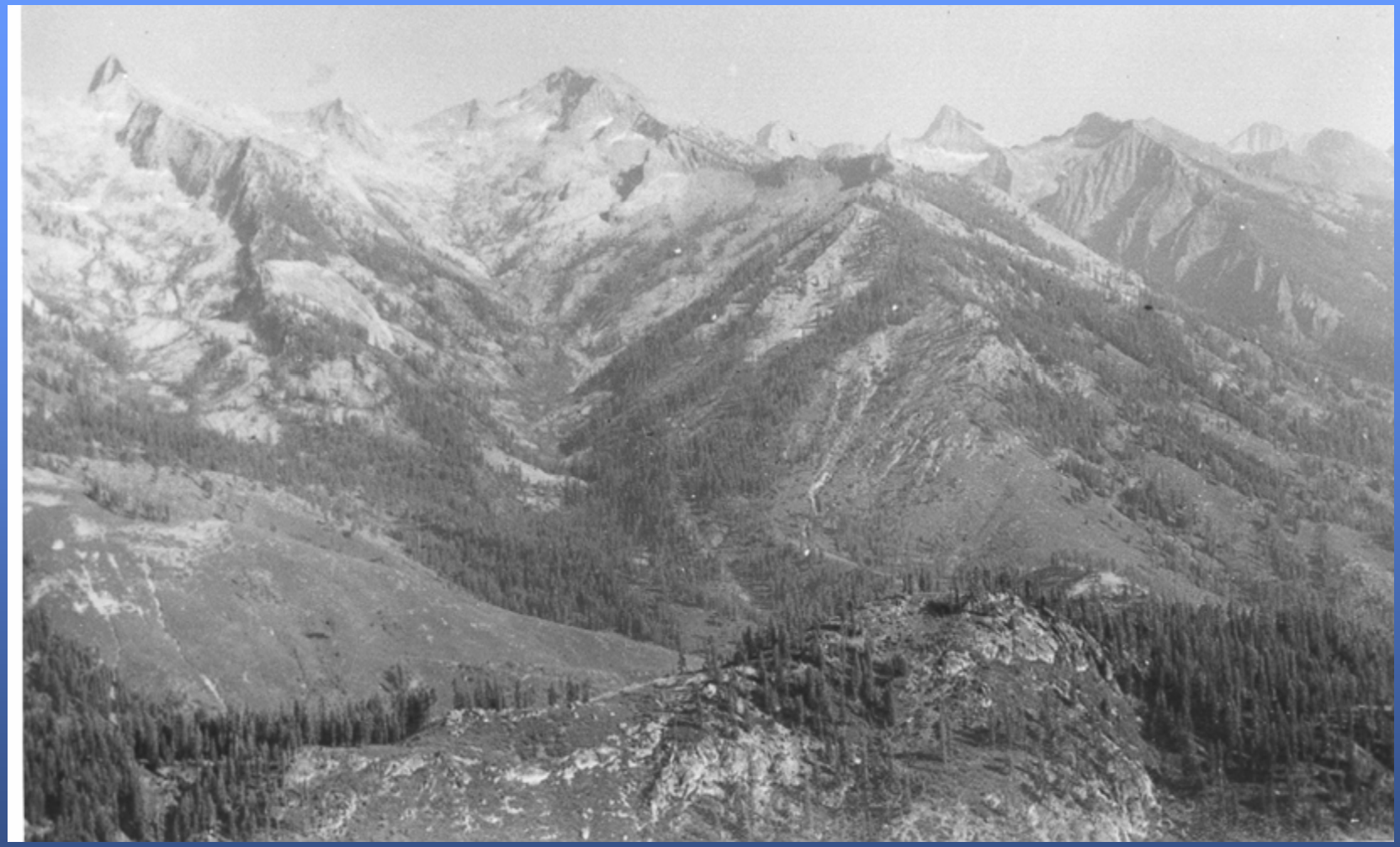


Disturbance
History

The 1902 Wasatch Survey: Diary of A. F. Potter

- July 3, 1902- …much cutting of timber has been done and no large trees remain.

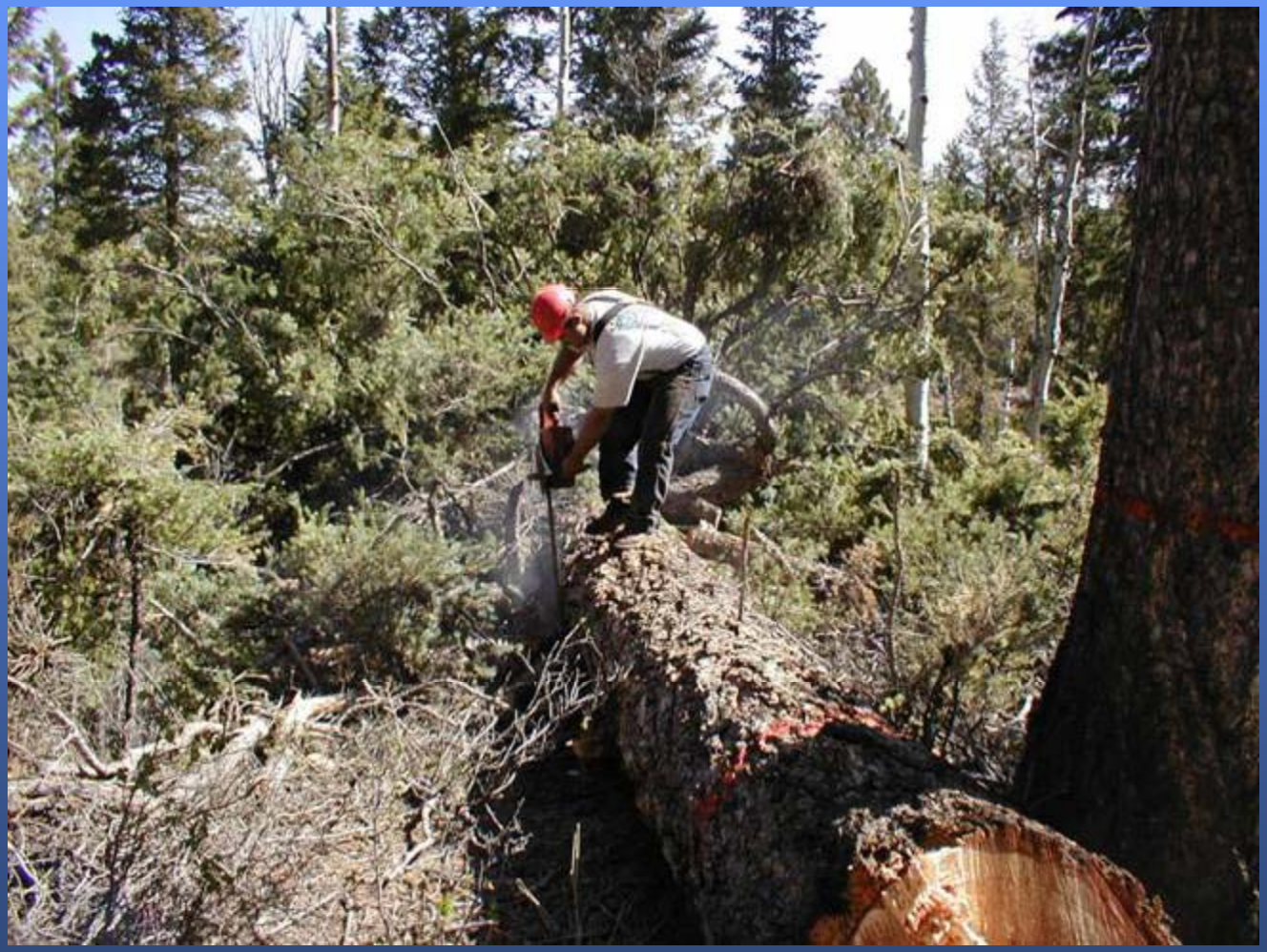

Grazing
History



George Gruell repeat photography: 1894

George Gruell repeat photography:
1994

Past Activity = Management



Choices between Proactive and Reactive Management

Do Nothing
Often the best choice

Management Alternatives

Thin from
Below

Restoration

Fire Use

Wildland-Urban Interface

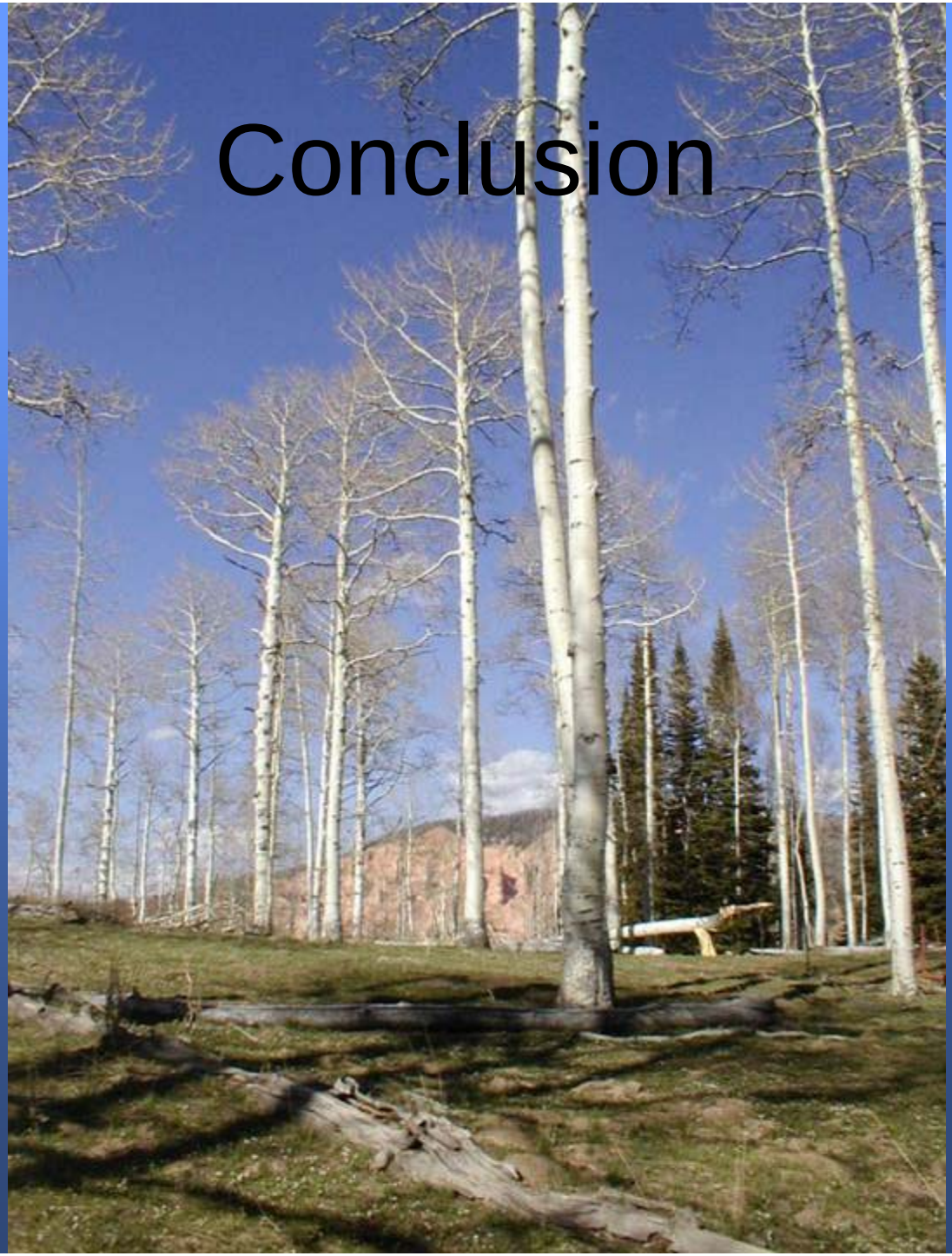
- Changes idea of sustainability

Rick Wilking / Reuters

Photo
Jack Cohen

Management Examples

Buffalo Java

ICM
EQUIPMENT
CAT

Conclusion