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
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
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
Wildland-Urban Interface

- Changes idea of sustainability
Management Examples
Conclusion