

# Vegetation Modeling to Inform National Forest Management Planning

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## Predicting Future Vegetation Condition at a Landscape Scale



# Ecological Response Units of the Gila



Ponderosa Pine Forest



Gambel Oak Shrubland



Mountain Mahogany Mixed Shrubland



PJ Grassland



Colorado Plateau Great Basin Grassland



PJ Woodland



Mixed Conifer with Aspen



Montane Subalpine Grassland



Juniper Grassland



Mixed Conifer – Frequent Fire



Ponderosa Pine – Evergreen Oak

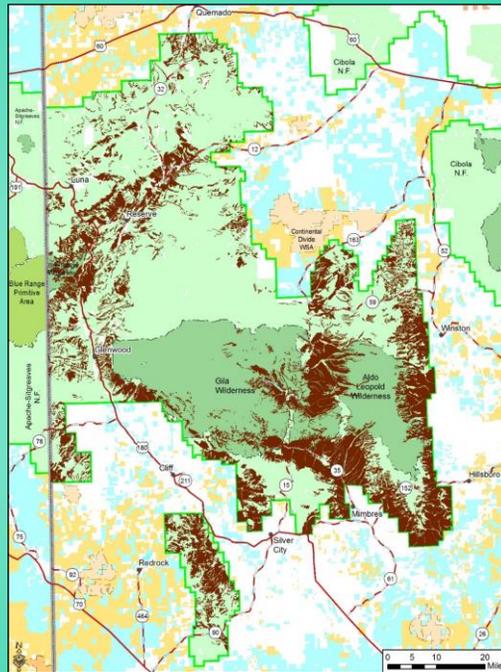


Semi-Desert Grassland

## Pinyon Juniper Woodland



848,442 acres on the Gila National Forest



## Our First Goal, Coarsely Defined

We are trying to characterize, *in broad brush terms*, the differences between various management strategies in whether they move vegetation toward or away from reference conditions.

## State and Transition Modeling

- LANDFIRE models
- The Nature Conservancy
- Integrated Landscape Assessment Project (Oregon State University, Portland State University, federal and non-profit partners)
- USGS, other USFS regions, and many other university researchers
- Conceptually similar to NRCS's Ecological Site Descriptions

## Our Second Goal

We are trying to make predictions at a landscape scale.



## State and Transition Modeling

Early  
Successional  
Forest

Young Forest

Mature,  
Open Forest

Mature,  
Dense Forest

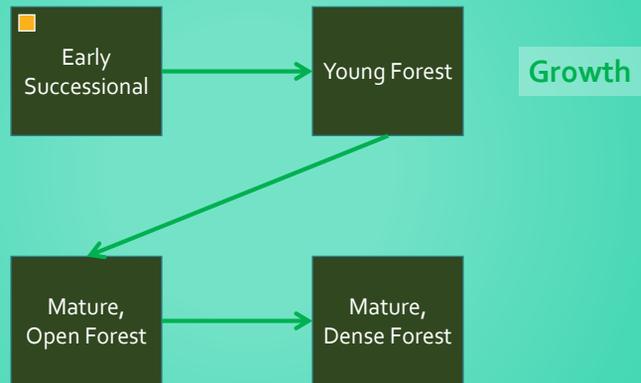
## “State Class” Characterization

- Canopy cover:  
Grass / Forb (<10% canopy cover), Open (10-29.9%), Closed (30%+)
- Diameter class:  
Seedling / sapling (<5” DBH), Small (5-9.9”),  
Medium (10-19.9”), Very Large (20”+)
- Storiedness:  
“Single” = 1-2 stories; Multi-story = 3+ stories.
- Dominance Type

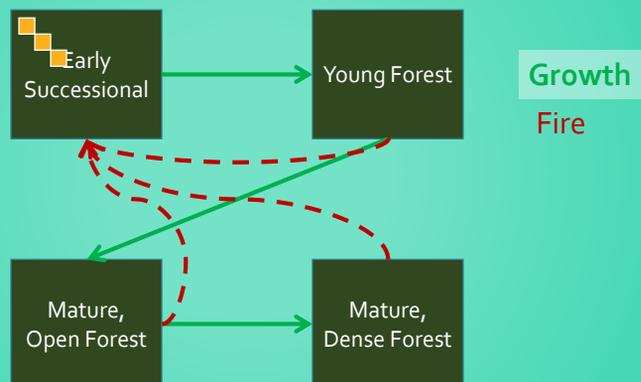
What are the critical processes to include?



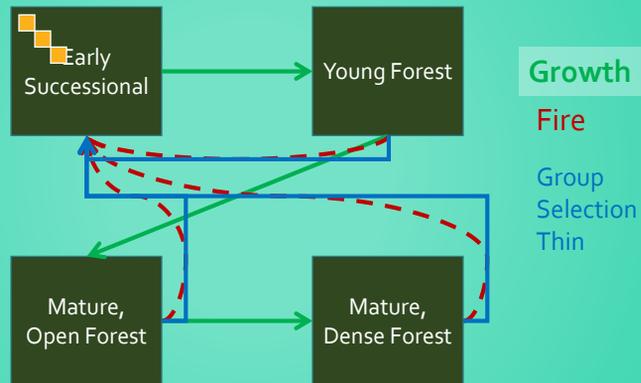
## State and Transition Modeling



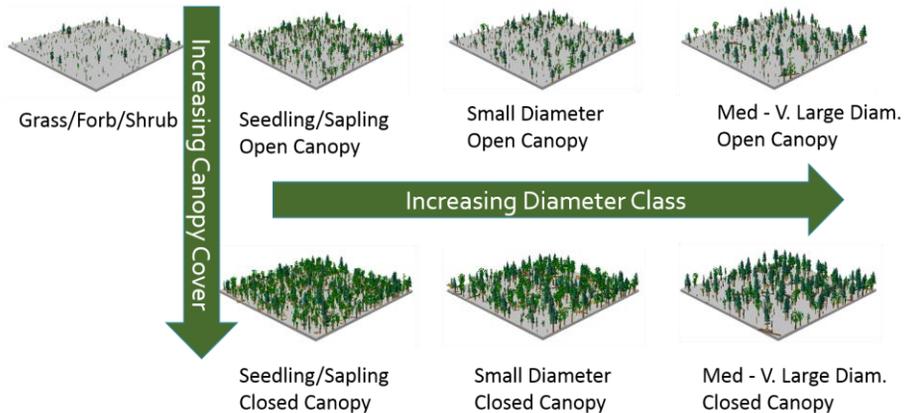
## State and Transition Modeling



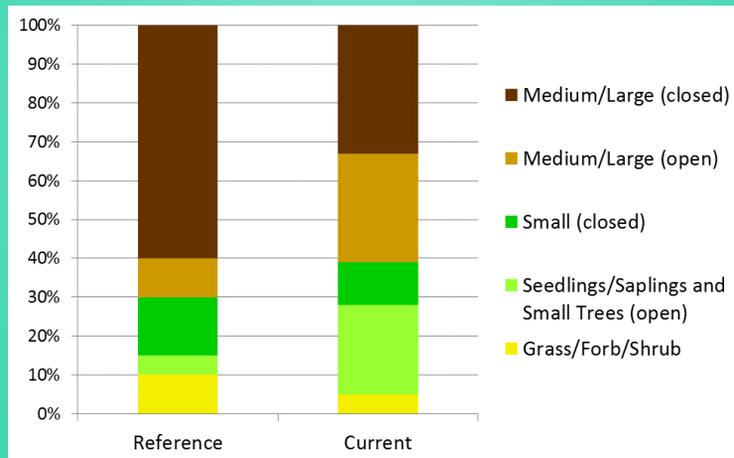
## State and Transition Modeling



## PJ Woodland Model



## Reference and Current State Class Distributions



## Pathways Between States

- Succession

*Growth, mortality, and recruitment*

Source: Forest Vegetation Simulator projections of Forest Inventory Analysis plot data.

- Natural disturbances

*Wildfire, insects, disease, etc.*

Sources: Monitoring Trends in Burn Severity data, USFS Aerial Detection Survey Data, and other information sources.

- Management activities

*Prescribed fire, thinning, fuels treatment, etc.*

Sources: USFS FACTS database, technical expert input

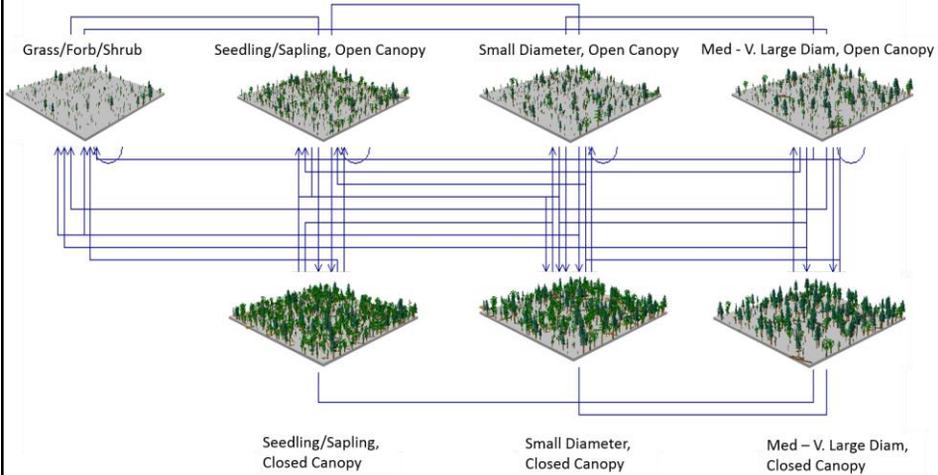
## PJ Woodland Management Scenarios

Assessment phase

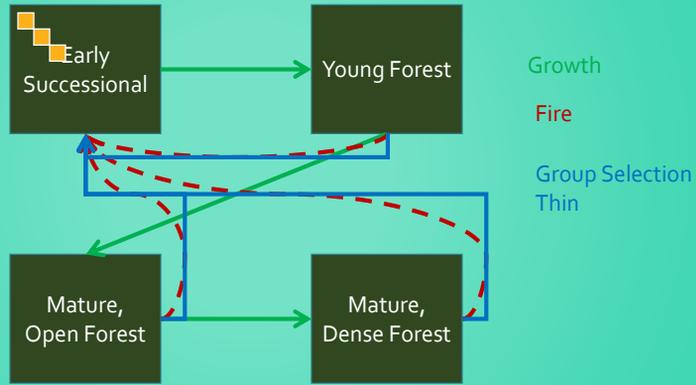
Second phase

Current Management					Management Alternatives
	State Class	Fuels Treatment	Prescribed Fire	Non-Commercial Thin	??
A	Grass Forb Brush	X	X		
B	Seedling – Sapling, Open Canopy	X	X		
C	Small, Open Canopy	X	X		
D	Medium – Very Large, Open Canopy	X	X		
E	Seedling – Sapling, Closed Canopy	X	X		
F	Small, Closed Canopy	X	X	X	
G	Medium – Very Large, Closed Canopy	X	X	X	
Total Annual Treatment Acreage		1,460	1,980	70	??

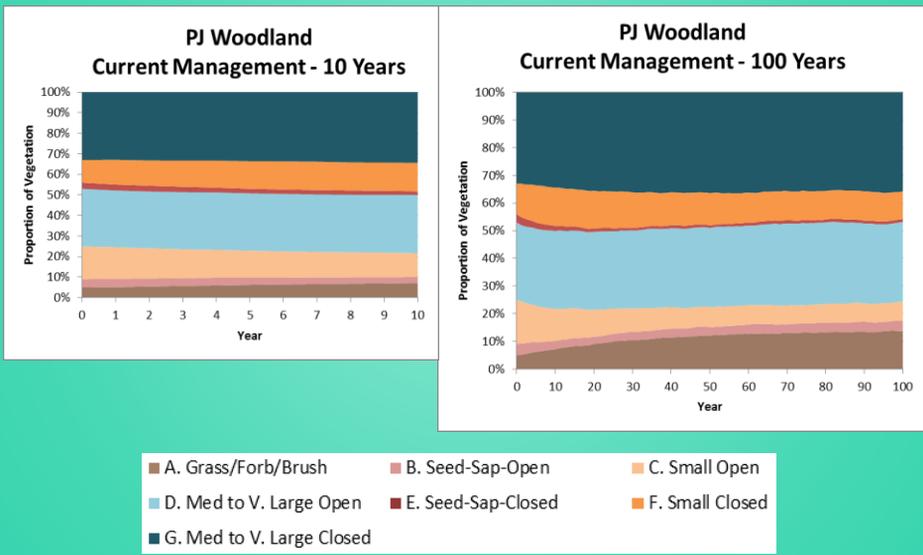
## PJ Woodland Model



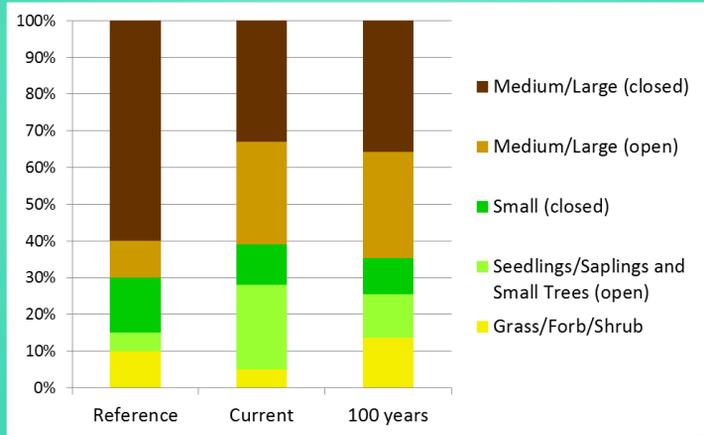
# State and Transition Model Runs...



# PJ Woodland Model Results

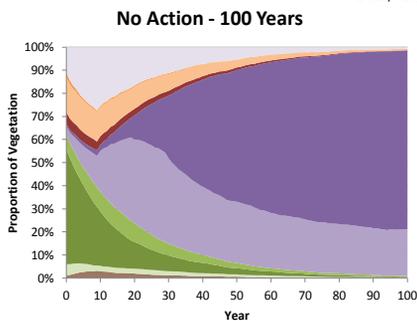
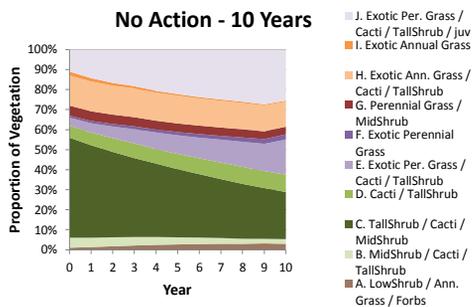


# Pinyon Juniper Woodland Assessment Modeling Results





## Sonoran Palo Verde Mixed Cacti Desert Model Results



## Sonoran Palo Verde Mixed Cacti Desert Management Scenarios

Box	State Class	Initial Acreage	No Action	Proposed Action
			Herbicide & Grubbing	Herbicide & Grubbing
A	Low Shrub / Annual Grass / Forbs	1,141		
B	Mid Shrub / Cacti / Tall Shrub	5,707		
C	Tall Shrub / Cacti / Mid Shrub	59,144		
D	Cacti / Tall Shrub	6,745		
E	Exotic Perennial Grass / Cacti / Tall Shrub	415	X	X
F	Exotic Perennial Grass	311	X	X
G	Perennial Grass / Mid Shrub	5,707		
H	Exotic Annual Grass / Cacti / Tall Shrub	16,602		
I	Exotic Annual Grass	2,283		
J	Exotic Perennial Grass / Cacti / Tall Shrub / Juv.	5,707	X	X
<b>Total Planned Annual Trt. Acreage</b>			<b>500</b>	<b>1,250</b>

## Sonoran Palo Verde Mixed Cacti Desert Model Results

