Jemez Mountains Fire Restoration Project

A Public-Private Partnership for Restoration of Fire-Adapted Ecosystems

The Fire Learning Network

A two-year initiative for restoration of fire-adapted ecosystems

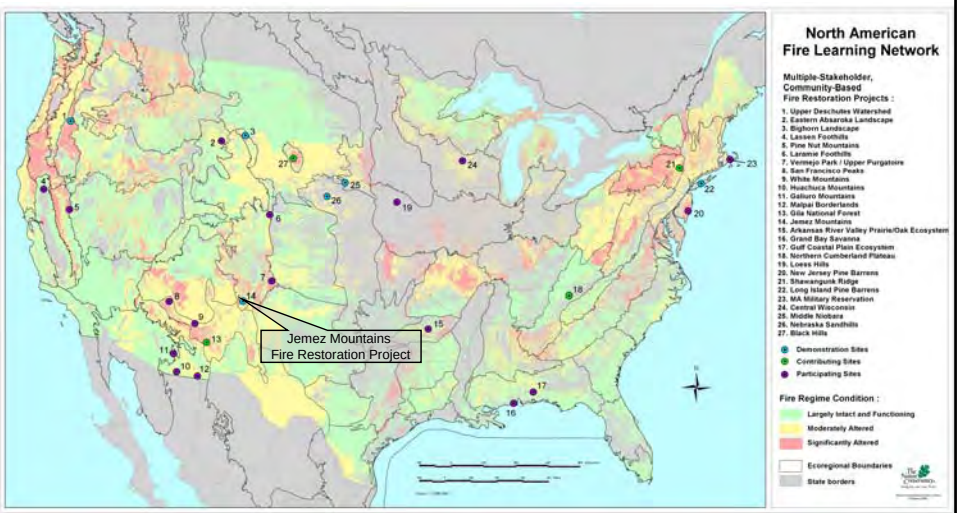
Goals of the Fire Learning Network

- ✓ *Develop the scientific foundation* for landscape-scale fire management
- ✓ *Integrate fuels reduction* with *fire regime restoration*
- ✓ Provide forum to improve fire management planning and implementation through cultivation of *effective public and private partnerships*
- ✓ *Make communities at risk safer*
- ✓ Provide a multi-scale framework for *monitoring* and *measures of success*

FLN Organization

- ✓ 5 focal sites* & 20 participating sites
- ✓ Multi-organization site teams
- ✓ 4 workshops over 2 years
- ✓ Each site team complete assignments that guide the team through the adaptive management process
- ✓ First workshop: Santa Fe, April 2002
- ✓ Second workshop: Bend, November 2002

**Jemez Mountains (NM), Bighorn Landscape (WY), Deschutes Basin (OR), Niobrara Sandhills (NE), LI Pine Barrens (NY)*



Why the Jemez Mountains?

- Unfragmented one million-acre landscape
- Irreplaceable biological diversity
- Fire-adapted ecological systems: *highly altered*
- Ancient cultural heritage
- Extensive scientific knowledge of climate, fire, vegetation and landscape dynamics

Contributors and Partners

Public:

- Santa Fe National Forest
- USDA Forest Service, Southwest Regional Office
- Los Alamos National Laboratory
- US Geological Survey/Jemez Mountains Field Station
- Bandelier National Monument

Academic:

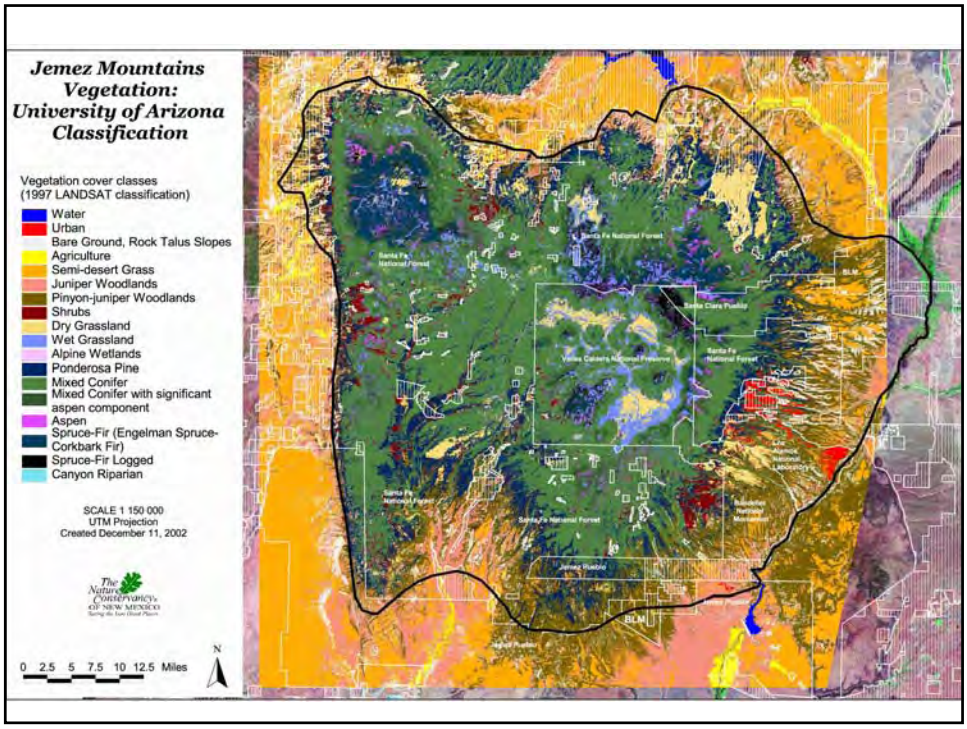
- University of New Mexico Natural Heritage Program
- University of Arizona Tree-Ring Laboratory
- University of Arizona Institute for the Study of Planet Earth

Private:

- The Forest Trust
- The Nature Conservancy

Assignment #1

- Describe and define project landscape
- Identify collaborative goals
- Identify & describe conservation targets: systems and species at risk
- Develop ecological models for key fire-adapted systems



Partner Goals for the Jemez Mountains

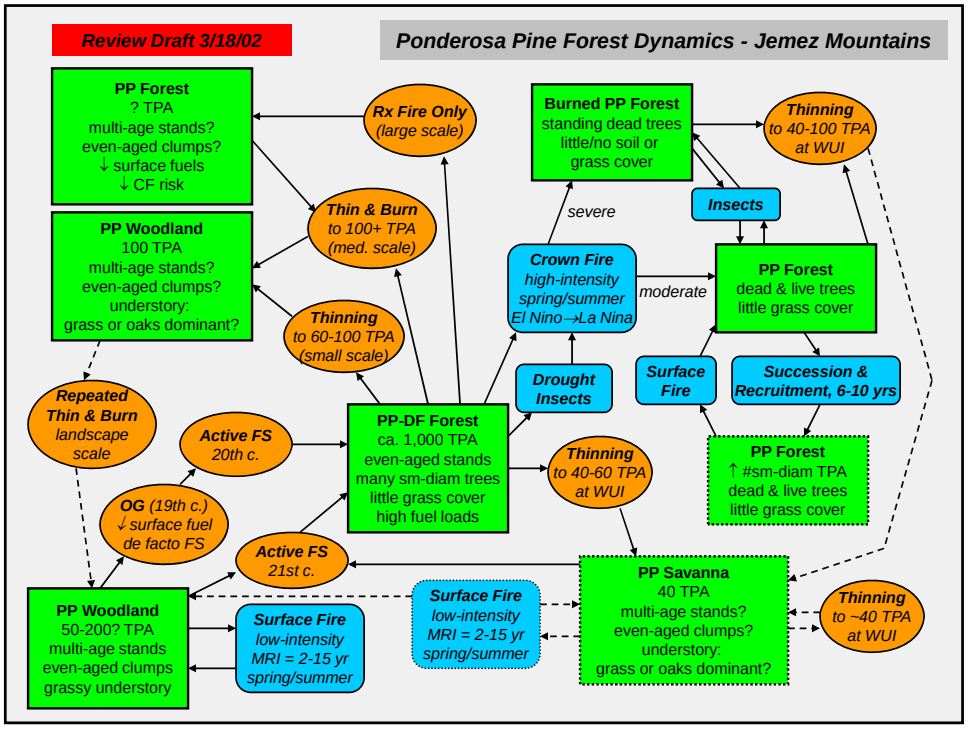
- **Ecological conditions** (including fire regime) in wildlands will be restored to and maintained within their historical range of variation using mechanical thinning and prescribed burning.
- **Fire hazard** to Jemez Mountains communities will be significantly reduced via thinning and prescribed burning of urban-interface forests, and by creation of defensible spaces around homes.
- **Native plants, animals and ecosystems** will be protected and maintain viable populations.
- **Cultural sites** will be protected from fire and erosion damage.
- **Traditional land uses** will be integrated into fire and wildlands management.
- A **small-diameter timber economy** will provide jobs and make long-term forest management sustainable.

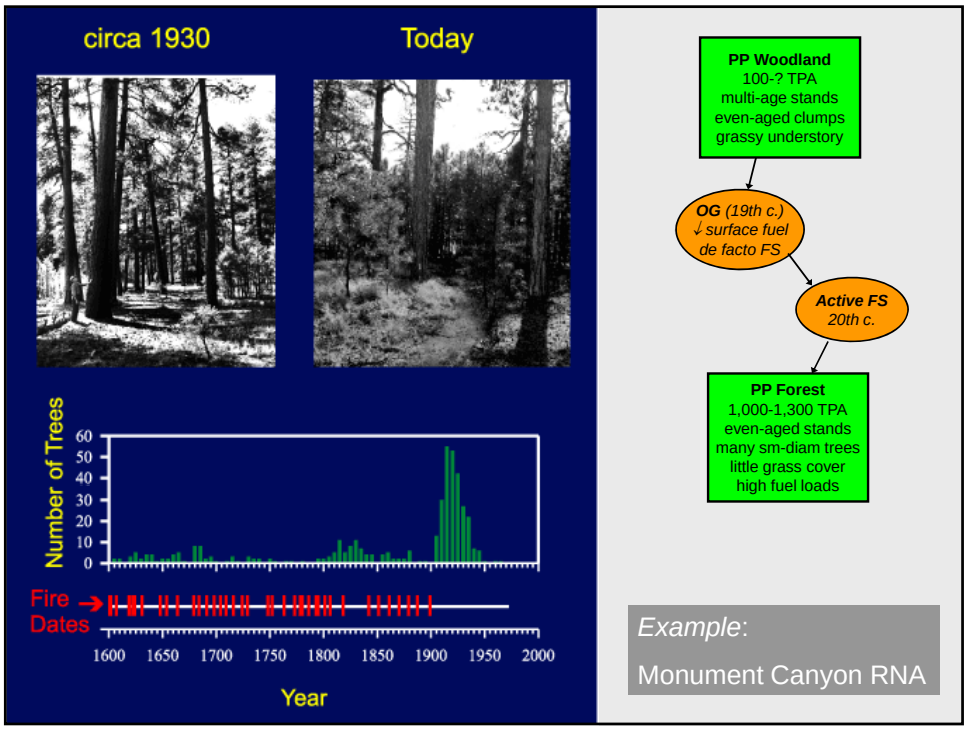
Conservation Targets of the Jemez Mountains

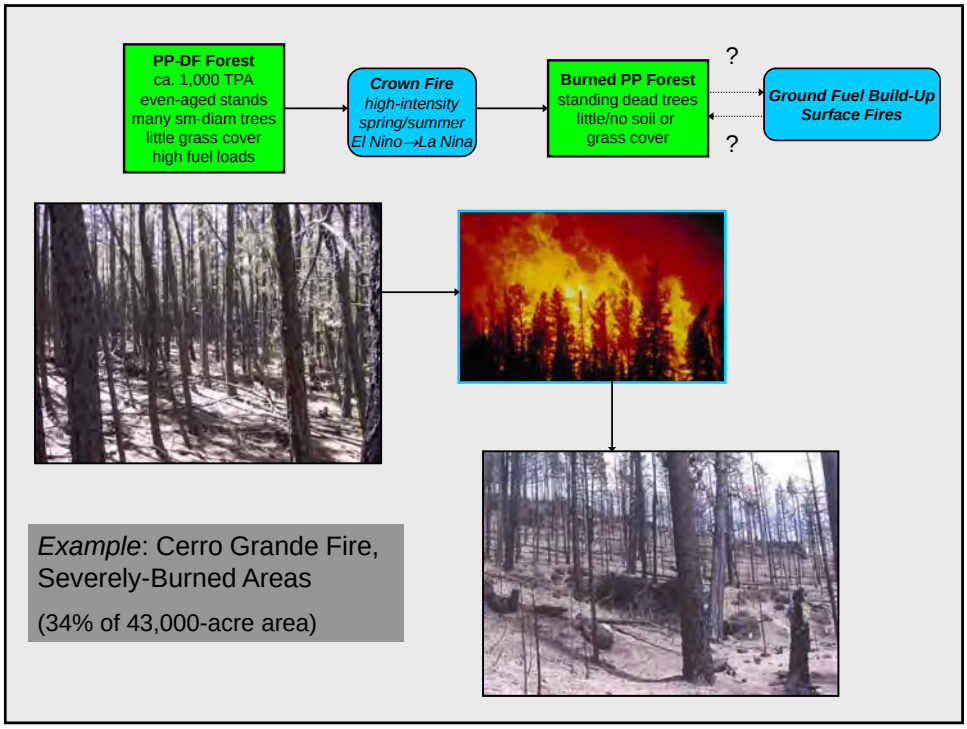
Cover Type	Current Area/Percent		Embedded Targets
Subalpine Grassland	**29,246**	**9**	Subalpine grassland
Mixed Conifer Forest	**125,812**	**37**	Mixed conifer forest American marten Jemez Mountains salamander Mexican spotted owl *Caves*: Black swift *Riparian*: Preble's shrew *Aquatic*: 3 native fish spp., Pacific spiketail dragonfly
Ponderosa Pine Forest/Savanna	**47,691**	**14**	Ponderosa pine forest/savanna Mexican spotted owl *Riparian*: NM jumping mouse *Aquatic*: 3 native fish species
Piñon-Juniper Woodland/Savanna	**68,469**	**20**	P-J woodland/savanna *Grassland/savanna*: Santa Fe stickleaf Gypsum Townsend's aster







Review Draft 3/18/02
Ponderosa Pine Forest Dynamics - Jemez Mountains
PP Forest
? TPA
multi-age stands?
even-aged clumps?
↓ surface fuels
↓ CF risk
Rx Fire Only
(large scale)
Burned PP Forest
standing dead trees
little/no soil or
grass cover
Thinning
to 40-100 TPA
at WUI
Insects
severe
Thin & Burn
to 100+ TPA
(med. scale)
PP Woodland
100 TPA
multi-age stands?
even-aged clumps?
understory:
grass or oaks dominant?
Crown Fire
high-intensity
spring/summer
El Nino→La Nina
moderate
PP Forest
dead & live trees
little grass cover
Thinning
to 60-100 TPA
(small scale)
Drought
Insects
Surface
Fire
Succession &
Recruitment, 6-10 yrs
Repeated
Thin & Burn
landscape
scale
Active FS
20th c.
PP-DF Forest
ca. 1,000 TPA
even-aged stands
many sm-diam trees
little grass cover
high fuel loads
Thinning
to 40-60 TPA
at WUI
PP Forest
↑ #sm-diam TPA
dead & live trees
little grass cover
OG (19th c.)
↓surface fuel
de facto FS
Active FS
21st c.
PP Savanna
40 TPA
multi-age stands?
even-aged clumps?
understory:
grass or oaks dominant?
Thinning
to ~40 TPA
at WUI
PP Woodland
50-200? TPA
multi-age stands
even-aged clumps
grassy understory
Surface Fire
low-intensity
MRI = 2-15 yr
spring/summer
Surface Fire
low-intensity
MRI = 2-15 yr
spring/summer


circa 1930
Today
Number of Trees
60
50
40
30
20
10
0
Fire
Dates
1600
1650
1700
1750
1800
1850
1900
1950
2000
Year
PP Woodland
100-? TPA
multi-age stands
even-aged clumps
grassy understory
OG (19th c.)
↓surface fuel
de facto FS
Active FS
20th c.
PP Forest
1,000-1,300 TPA
even-aged stands
many sm-diam trees
little grass cover
high fuel loads
Example:
Monument Canyon RNA



Assignment #2

- Map current ecological conditions
- Map desired future conditions (DFC)

  (=reference condition=historical range of variation?)
- Develop management scenarios for achieving DFC
- Compare predicted outcomes
- Identify priority areas for short-term action

Fire Regime Condition Assessment for Fire & Ecological Restoration Planning (FRCC-VDDT-HRV)

- Fire regime potential (idealized) vegetation types
- Quantitative state-&-transition models
  (document successional pathways & disturbances regimes)
- Historical range of variation in systems & seral stages
- Current vegetation & fuels condition
  (incl cover type, canopy closure, size class, mortality)
- Comparison of current conditions to reference/HRV
  (fire regime & vegetation-fuel conditions)
- Predict outcomes of management alternatives
- Identify high-priority areas for treatment/restoration

⇨ Change in Approach

- Revisit assumptions & create new products:
  - *Fire histories & fire regime descriptions*
  - *New fire regime classification*
  - *Current land cover map*
  - *New quantitative ecological models*
- Mandate:
  - *"Go slowly to make tracks"*

FRCC-VDDT-HRV Steps

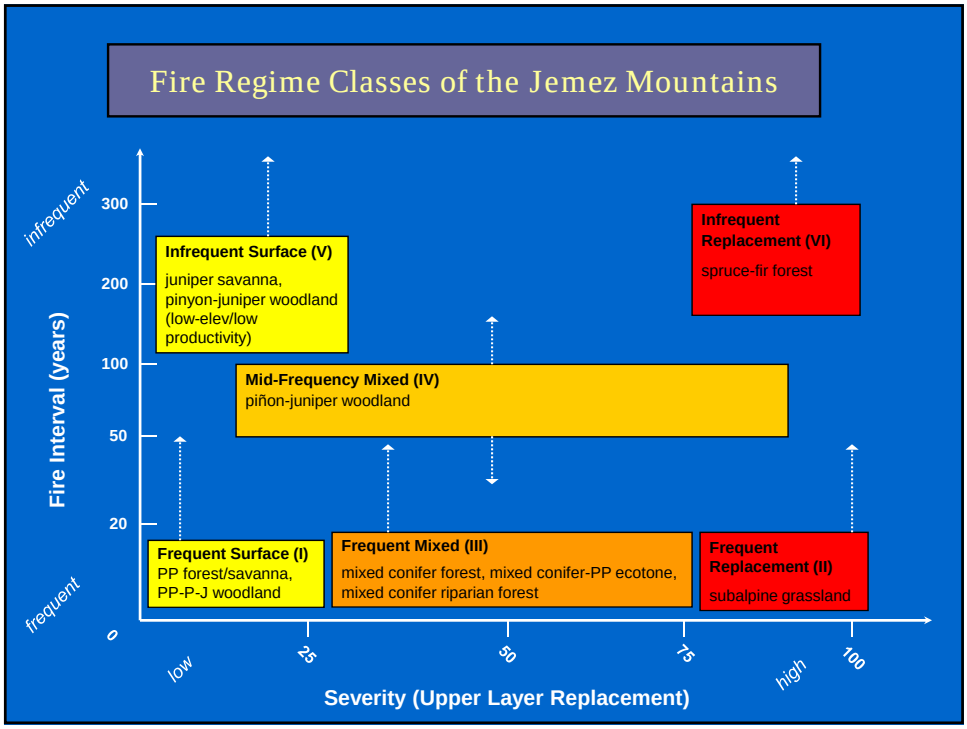
- New products:
  - *Fire histories & fire regime descriptions*

Ecological System
Structural Class/Seral Stage
Mean Fire Return Interval (& range)
Fire Rotation Period
Fire Severity
Fire Behavior (Crown/Surface/Mixed)
Fire Size
Scientific References

FRCC-VDDT-HRV Steps

- New products:
  - *Fire histories & fire regime descriptions*
  - *Fire regime classification*
    - National: 5 classes, only one for MFI < 35 years
    - Jemez: 6 classes, higher resolution for SW

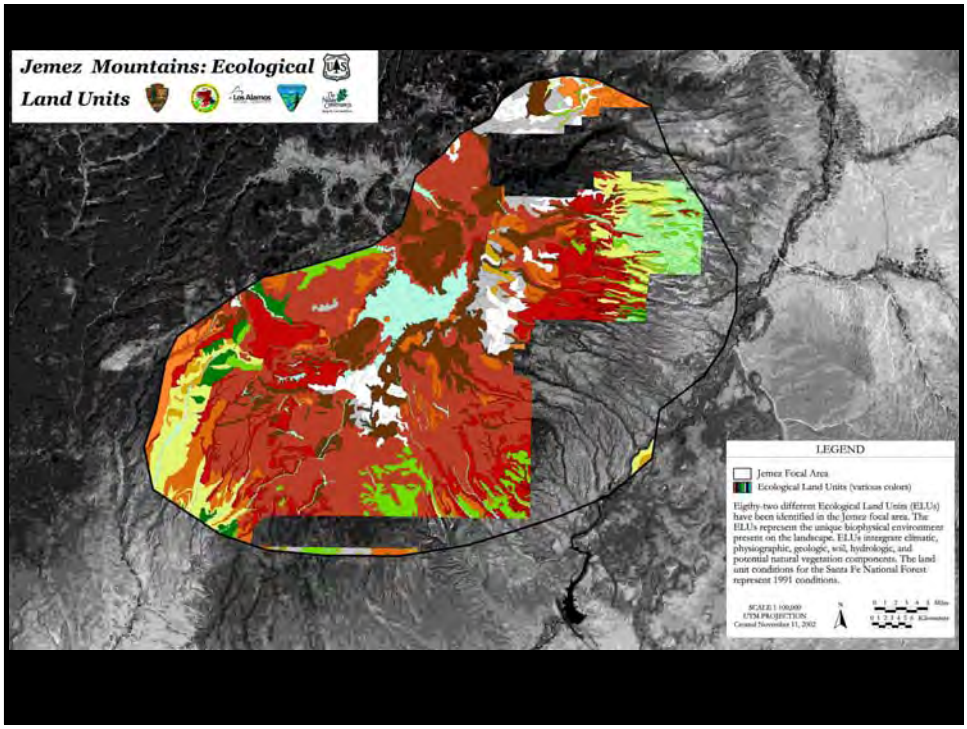
Frequency
Mean Fire Return Interval (& range)
Fire Severity/Behavior (Crown/Surface/Mixed)
Fire Size

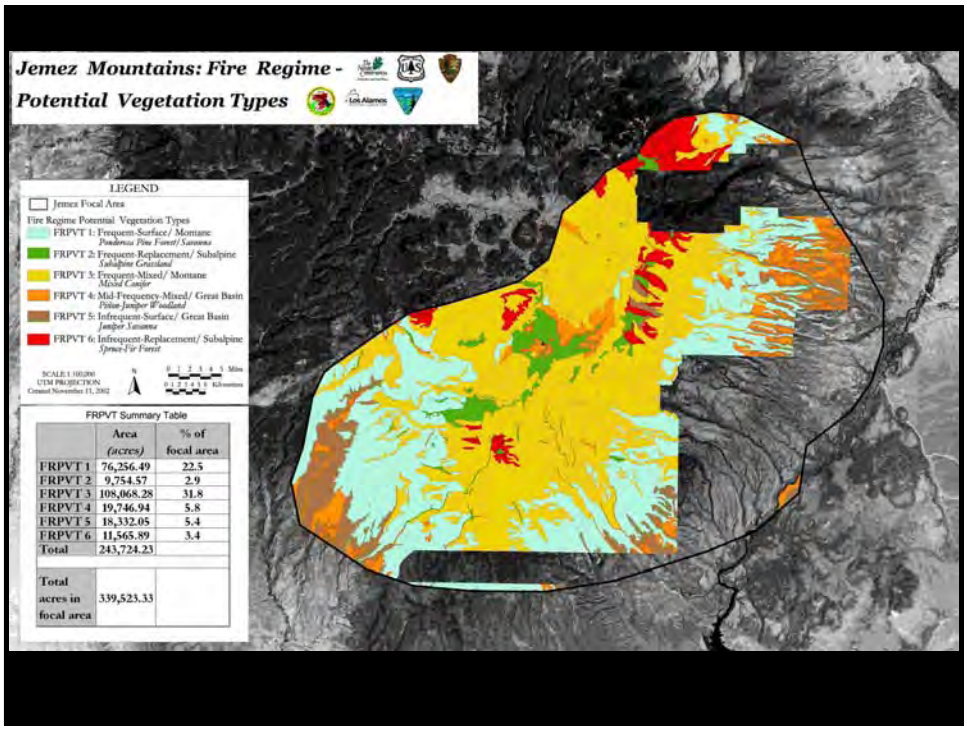


FRCC-VDDT-HRV Steps

- New products:
  - *Fire histories & fire regime descriptions*
  - *Fire regime classification*
  - *Fire regime-potential vegetation type classification & map*

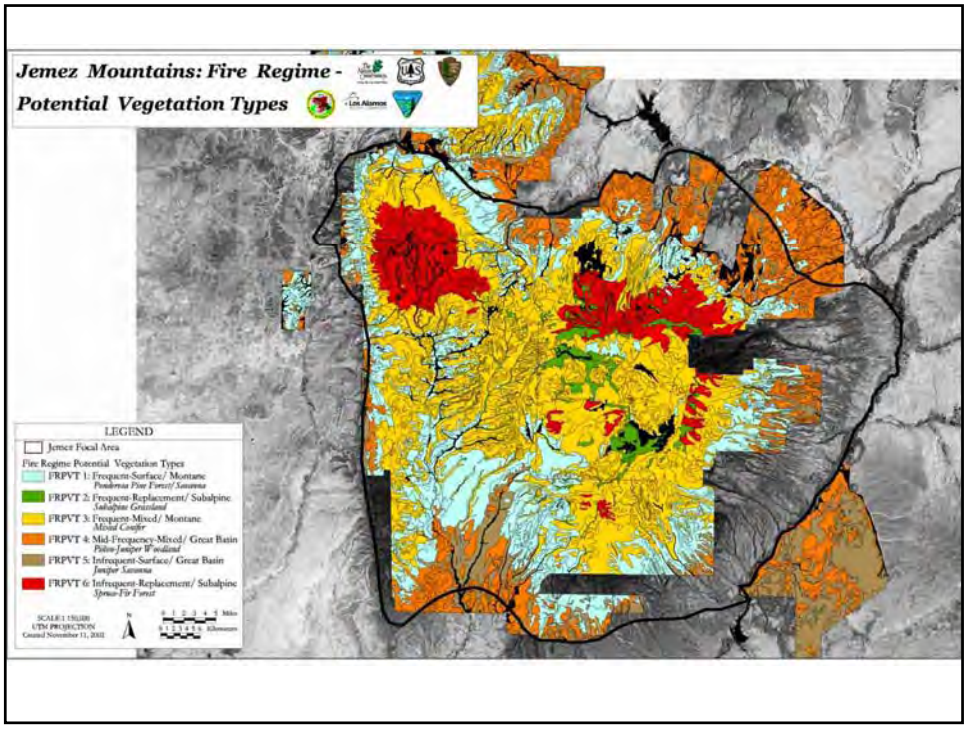
FRPVT Description
Fire Regime Class
Range of Potential Natural Vegetation (including seral stages)
TES Ecological Land Units





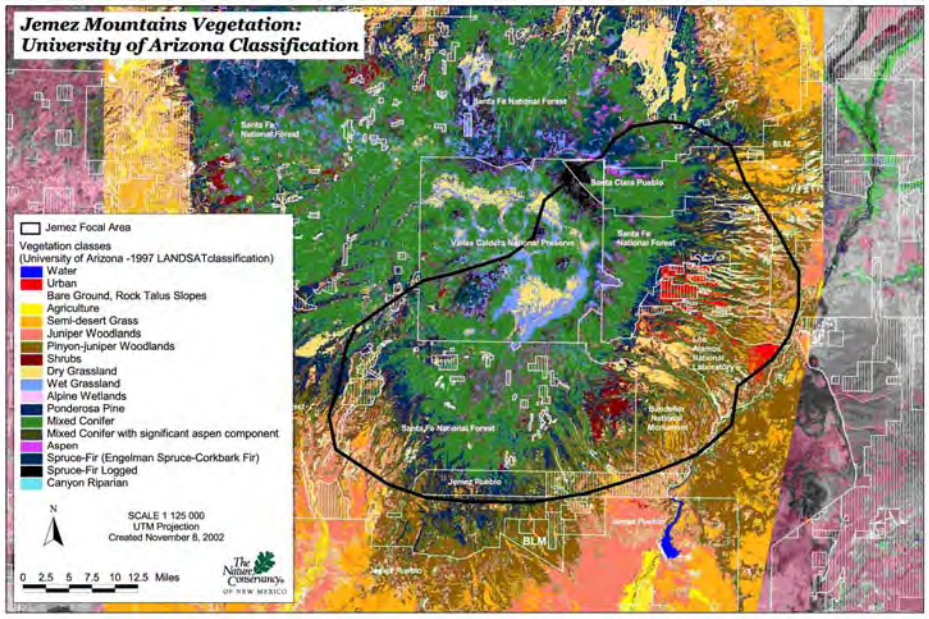
FRPVT Summary Table

	Area (acres)	% of focal area
FRPVT 1	76,256.49	22.5
FRPVT 2	9,754.57	2.9
FRPVT 3	108,068.28	31.8
FRPVT 4	19,746.94	5.8
FRPVT 5	18,332.05	5.4
FRPVT 6	11,565.89	3.4
Total	243,724.23	
Total acres in focal area	339,523.33	

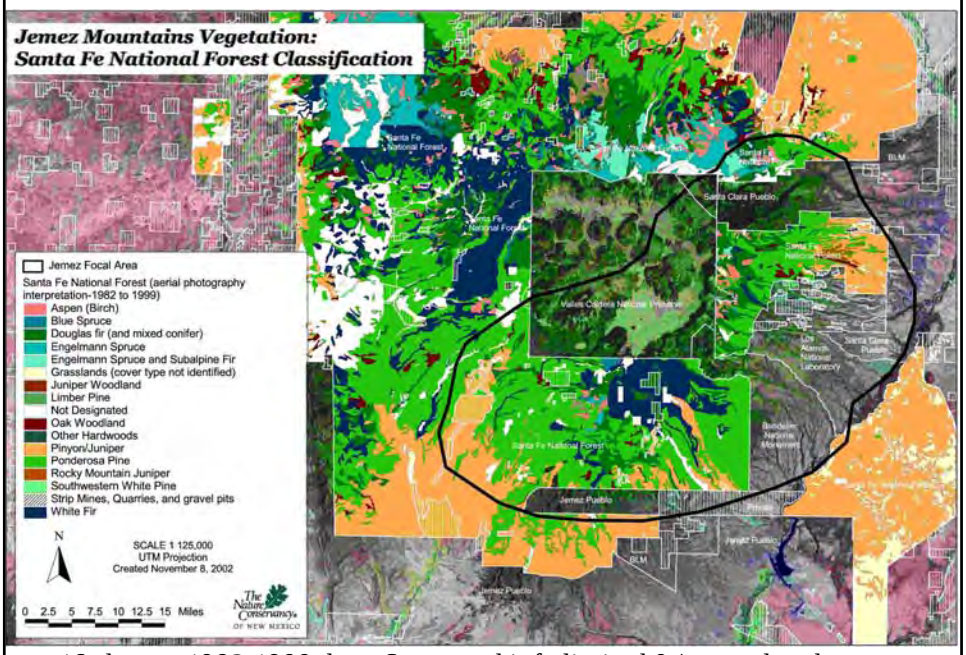


FRCC-VDDT-HRV Steps

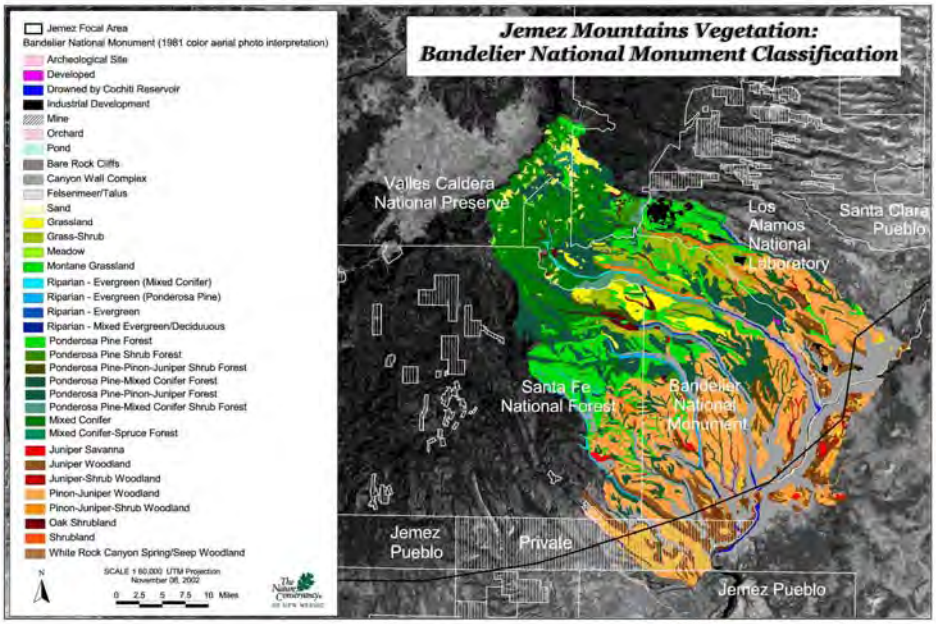
- New products:
  - *Fire histories & fire regime descriptions*
  - *Fire regime classification*
  - *Cover type classification & map*
  - *Fire regime-potential vegetation type classification & map*
  - *Current fuels-vegetation condition (including seral stages or surrogates for use in VDDT modeling)*



18 classes. 1997 data. No structural information.



16 classes. 1982-1999 data. Structural info limited &/or outdated.



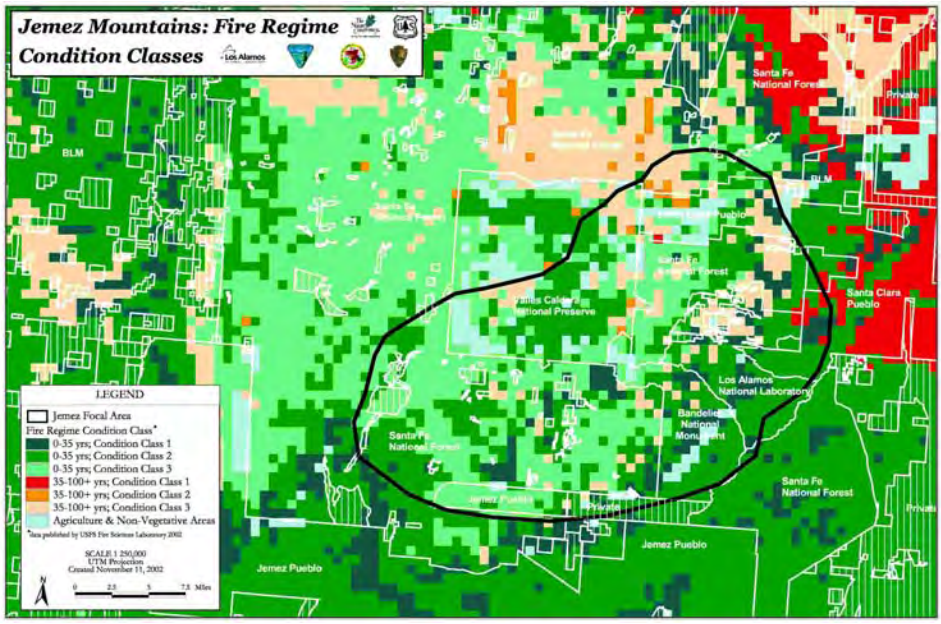
35 classes. 1981 data. Structural information, but dated.

Jemez Mountains Vegetation Classification Crosswalk (November 2002)

University of Arizona - Yool/Miller (1997)	*Santa Fe National Forest - FS Veg (1982-1991)*	*Bandelier National Monument - ECOPATCH (1981)*	*ECOPATCH Code*
Canyon Riparian		Riparian-Evergreen (Mixed Conifer)	REMC
		Riparian-Evergreen (Ponderosa Pine)	REPP
		Riparian-Evergreen	RI-E
		Riparian-Mixed Evergreen/Deciduous	RI-M
Dry Grasslands	Grasslands (cover type not identified)	Grassland (all others)	GRAS
Juniper Woodlands	Juniper Woodland	Juniper Woodland	J
		Juniper-Shrub Woodland	J-S
		Juniper Savanna (5-9% cover)	JSAV
	Rocky Mountain Juniper		
Mixed Conifer Forest	Douglas Fir (and mixed	Mixed Conifer	MC
Mixed Conifer Forest	White Fir	Mixed Conifer	
Mixed Conifer (signif aspen component)			
Mixed Conifer Forest		Mixed Conifer-Spruce Forest	MC-S
Piñon-Juniper Woodlands	Pinyon/Juniper	Piñon-Juniper Woodland	PJ
		Piñon-Juniper-Shrub Woodland	PJ-S
Ponderosa Pine	Ponderosa Pine	Ponderosa Pine Forest	PP
		Ponderosa Pine-Mixed Conifer Shrub	PMCS
		Ponderosa Pine-Piñon-Juniper-Shrub	PPJS
		Ponderosa Pine-Mixed Conifer Forest	PPMC
		Ponderosa Pine-Piñon-Juniper Forest	PPPJ
		Ponderosa Pine Shrub Forest	PP-S

Coming Soon...

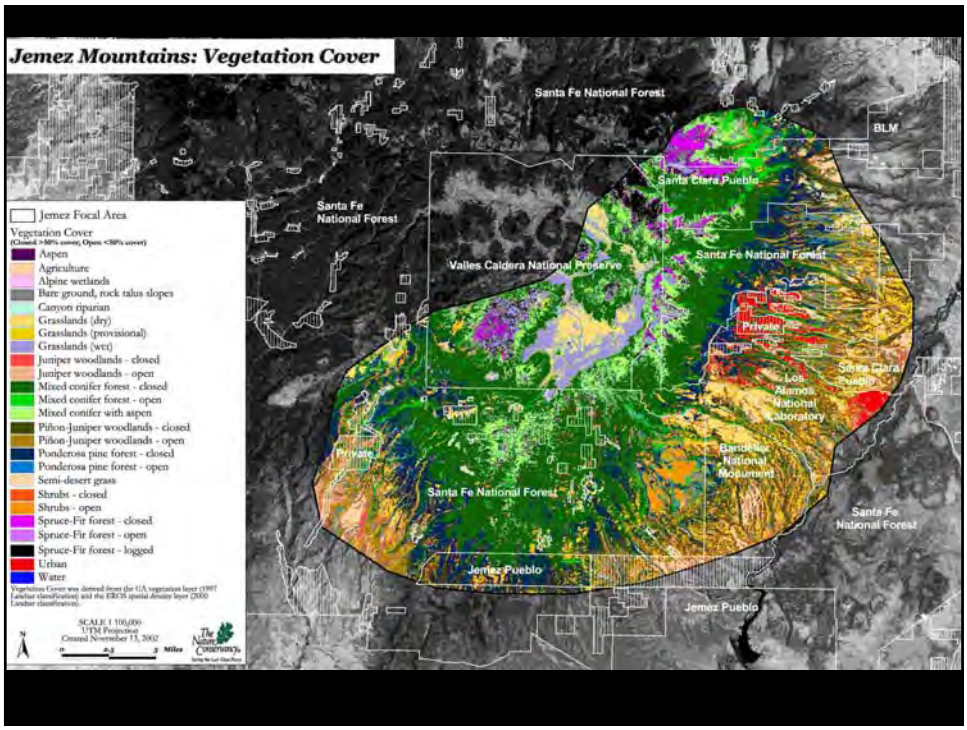
- 2003: New Land Cover Map
  - *Los Alamos National Laboratory*
  - *From 2001 LANDSAT scene & fieldwork*
  - *More detailed than 1997 UA map*
- 2005: New Vegetation Cover Map
  - *NM Natural Heritage Program*
  - *From color aerial photographs & fieldwork*
  - *Most detailed*



Fire Regime Condition of the Jemez Mountains (Focal Area)

Fire Return Interval (years)	Condition Class 1		Condition Class 2		Condition Class 3		Total Acres
	Acres	*% of FRI*	*Acres*	*% of FRI*	*Acres*	*% of FRI*	
0-35+	29,652	11	136,150	49	108,723	40	274,524
35-100+	2,471	6	2,224	5	37,559	89	42,254
100+	0	0	0	0	0	0	0
Non-Veg	0	0	0	0	0	0	22,486
Total	32,123		138,374		146,281		339,264

Derived from data developed by the Rocky Mountain Research Station, Fire Sciences Laboratory, USDA Forest Service: *Coarse-Scale Spatial Data for Wildland Fire and Fuel Management* (see http://www.fs.fed.us/fire/fuelman/).



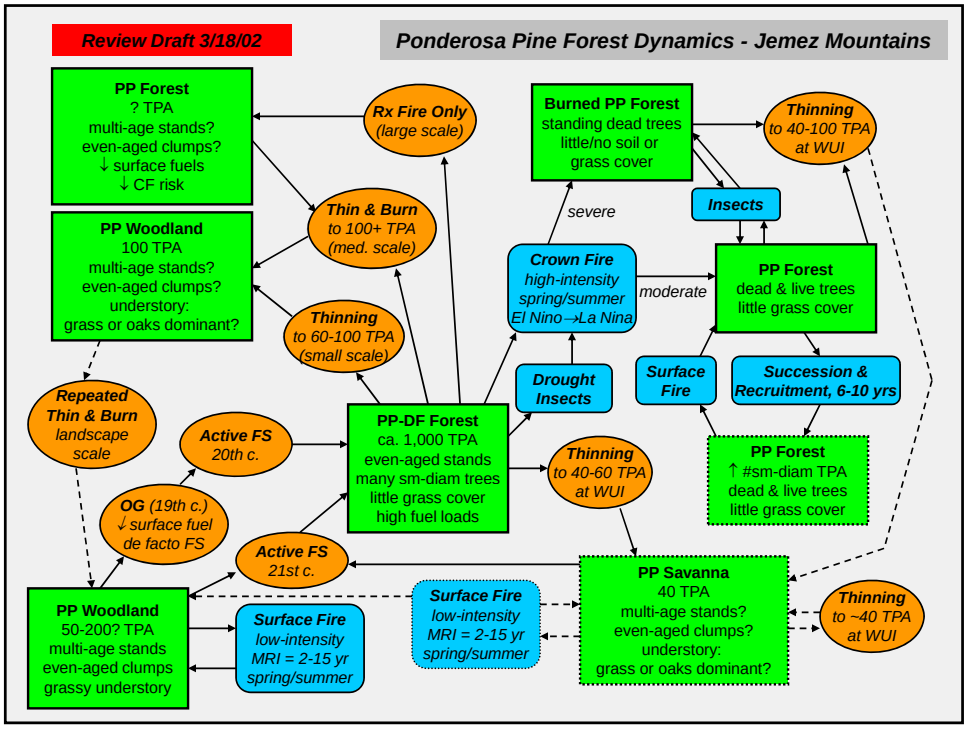
Jemez Mountains Vegetation/Structure Classes

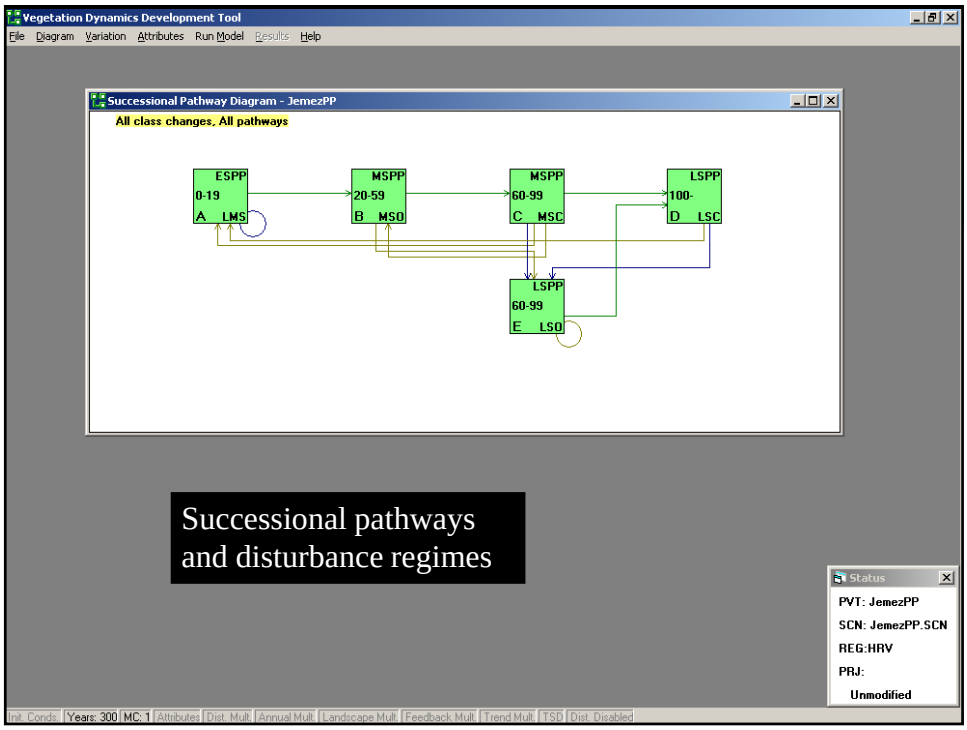
From 1997/2000 classified LANDSAT images.

Class	Area (acres)	% of Focal Area
Mixed Conifer (Closed)	94,131	28
Mixed Conifer (Open)	9,107	3
Mixed Conifer with Aspen	20,512	6
Ponderosa Pine (Closed)	39,874	12
Ponderosa Pine (Open)	6,561	2
Piñon-Juniper Woodlands (Closed)	38,944	11
Piñon-Juniper Woodlands (Open)	14,870	4

FRCC-VDDT-HRV Steps

- New products:
  - *Fire histories & fire regime descriptions*
  - *Fire regime classification*
  - *Cover type classification & map*
  - *Fire regime-potential vegetation type classification & map*
  - *Current fuels-vegetation condition*
  - *New quantitative ecological models*





Successional pathways and disturbance regimes

Today's Workshop

- Revise draft fire regime descriptions
- Revise draft fire regime classification
- Revise draft fire regime/vegetation classification
- Develop state-transition model for Frequent Surface-Montane system (FRPVT 1)
- Identify next steps

Technical Challenges

- Current condition for a large, complex, dynamic landscape

  (fires, drought & beetle mortality, treatments, etc.)
- Optimal scale for analysis & planning *(mountain range, watershed, subwatershed?)*
- Defensible ecological models for identification of HRV and departure from it

  (alternatives: historical accounts, expert opinion)

Next Steps

- Scientific consensus re fire regimes & ecological models via expert workshops
- Scale & target area for analysis
- Method for current condition assessment
- Management scenarios through discussions with managers
- Prediction of management outcomes
- Priorities for short-term action