Appropriate Actions for Woodland Management

Goals and objectives of woodland management include an attempt to restore ecosystem function and a more balanced plant community to increase resilience to disturbances.

Citation: Miller et al, 2007, Western Juniper Field Guide, USGS, Circular 1321.

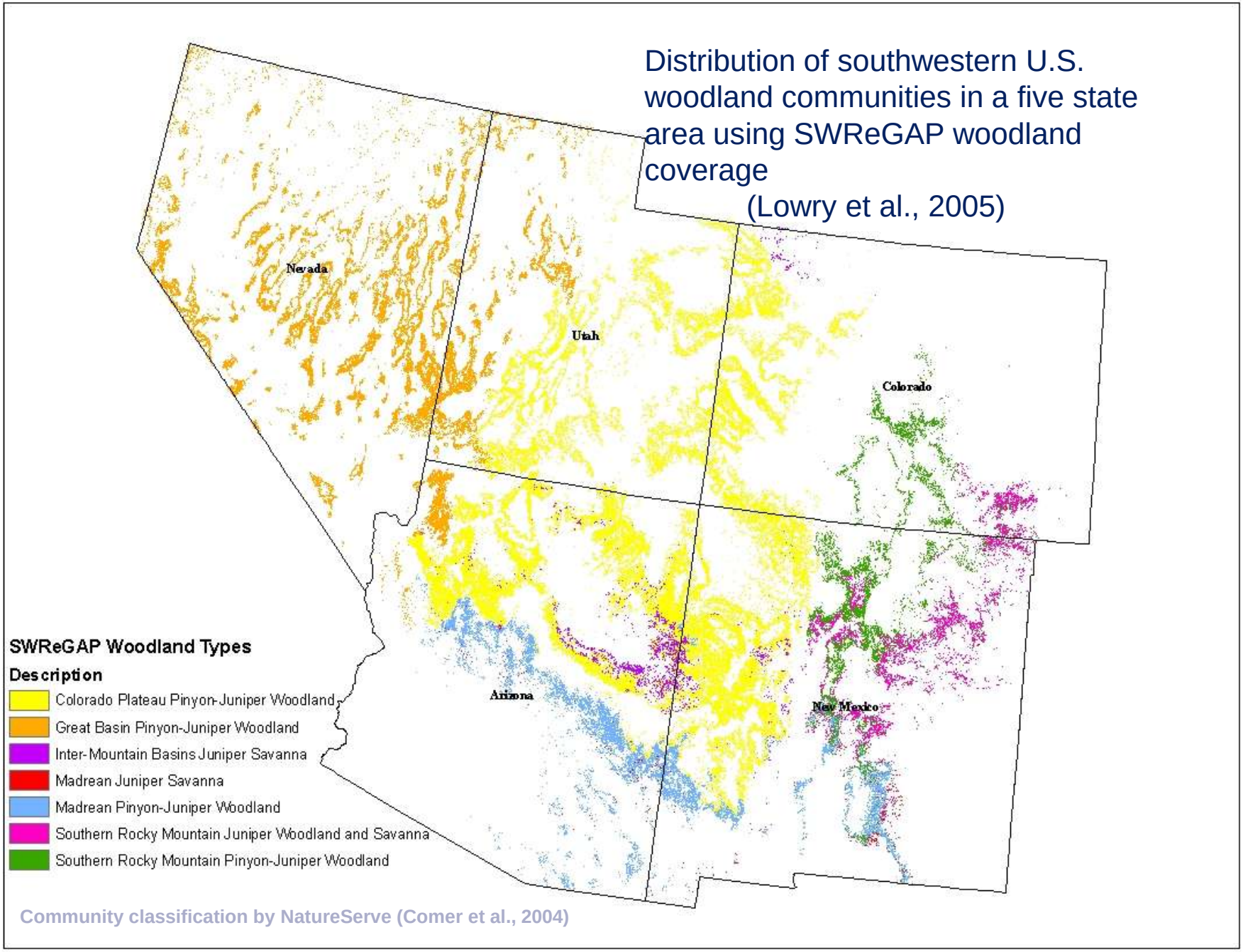
Bureau of Land Management
Division of Lands and Resources
D. Borland-Forester

Several tools to “Classify” Woodlands

- SW ReGap Vegetation classification
- LANDFIRE
- Digital Air Photos
- NRCS Woodland Ecological Sites
- USFS Southwest Region Plant Associations
- Romme et al Classifications
- New Mexico Ecological Principles-P-J Framework

Distribution of southwestern U.S. woodland communities in a five state area using SWReGAP woodland coverage

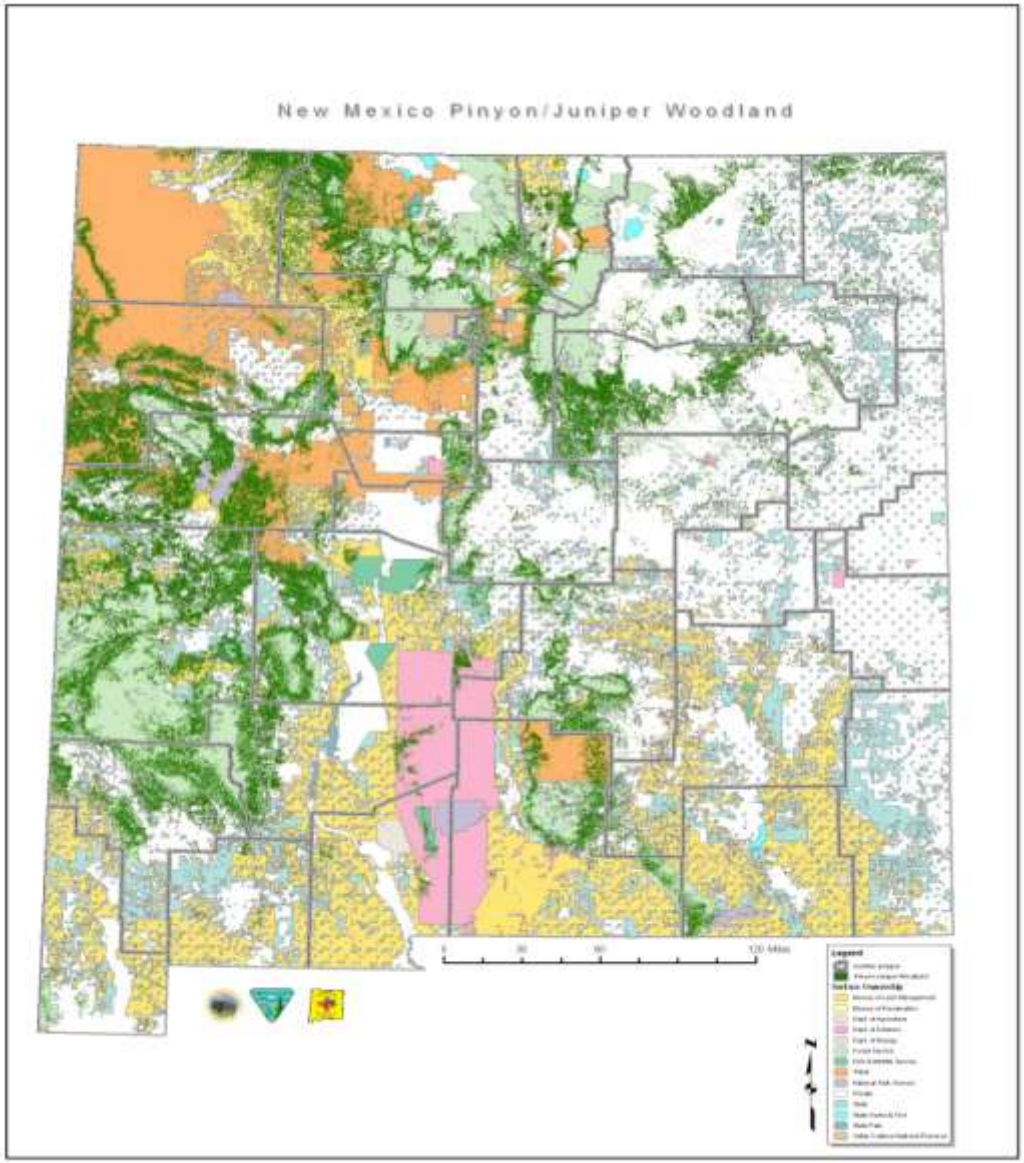
(Lowry et al., 2005)



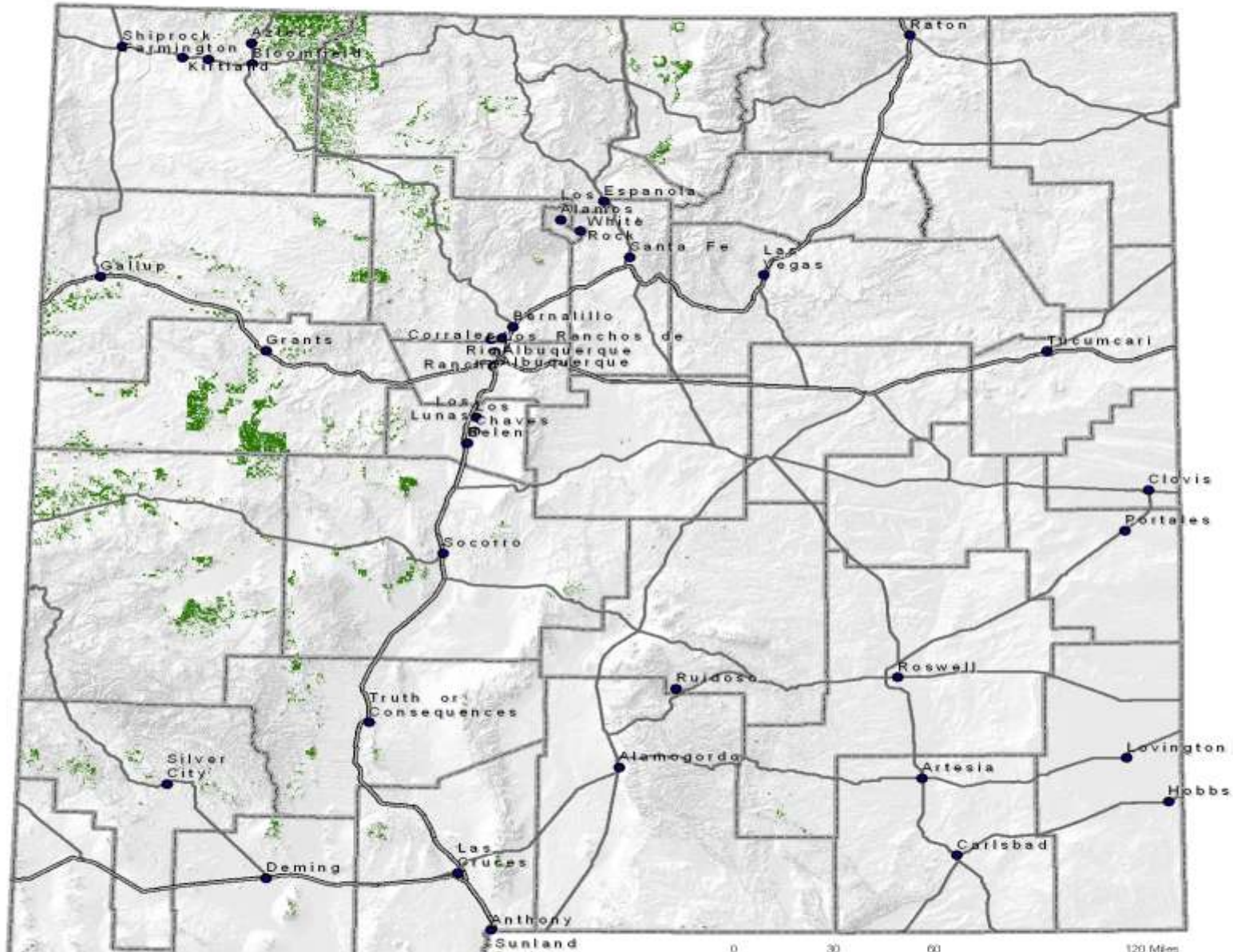
Community classification by NatureServe (Comer et al., 2004)

Woodland Species Distribution

(LANFIRE cover with Ownership)



New Mexico Pinyon/Juniper Woodland Within BLM Land



Alternative Classification
Romme et al. (2008)

Piñon-Juniper Grass Savanna

Photo by Steve Yanoff, TNC

Persistent Woodland

Photograph taken in 1929 of cliff dwellings in the southern portion of Mesa Verde National Park.
Note the dense piñon-juniper forest on the rim above the ruins, a forest that does not look much different from the dense forests of today. (Photo courtesy of Romme and others 2003)

Wooded Shrubland

Photograph taken by Timothy O'Sullivan in 1871 of piñon-juniper shrub woodland near Truxton, Arizona prior to grazing.
(Photo courtesy of Shaw 2006).

Tools for Managers

Key to 5 P-J Types

from Kent Reid, NMFWRI

1a. Deep soils (>14 inches deep), surface generally free of large rock fragments or large amounts of gravel, and capable of producing continuous fine fuels under normal precipitation - **2**

1b. Shallow or transitional soils, surface may be eroded and often is rocky or droughty, and usually not capable of producing continuous fine fuels under normal precipitation – **3**

2a. Most precipitation falls during summer. The oldest trees (possibly >150 years) are older and usually taller than those found in Grasslands – **PJ Savanna or Juniper Savanna**

2b. Season of greatest precipitation can vary. Old trees are very rare and found on microsites that historically would have allowed escape from fire – **Grassland**

3a. Generally on shallow, coarse-textured soils. Most precipitation falls during winter. Piñon and juniper are the dominant species – **PJ Persistent Woodland**

3b. Soil transitional between deep Savanna soils and shallow Persistent Woodland soils – **4**

4a. Bi-modal precipitation pattern. Uneven-aged stands on rolling uplands with persistent, taller trees. Probably common historically, but rare under current conditions – **PJ Open Woodland**

4b. Most precipitation falls during winter. Sagebrush or oak co-dominate with the P-J, but the shrub species may be crowded out under current conditions. This type often found in small patches that can be difficult to map on a statewide scale – **PJ Shrub Woodland**

-Expansion

Recent evidence with photo documentation indicates that Piñon-Juniper species have expanded its range since the late 1800s by encroaching into landscapes once dominated by herbaceous and shrub vegetation.

Woodland expansion affects soil resources, plant community structure and composition, water, nutrient and fire cycles, forage production wildlife habitat, and biodiversity.

HISTORIC CONDITIONS

1899 **1977**

Apparent expansion of one-seed juniper (Juniperus monosperma) in northwest New Mexico during the last century near Acoma Pueblo and Enchanted Mesa, ~100km west of Albuquerque, NM

Photos: 1899, W.H. Jackson; 1977, H.E. Malde;
adapted from online USGS-BRD article by Allen, Betancourt, and Swetnam

HISTORIC CONDITIONS

80 years of change, 1912 (left) to 1996 (right) in Grassland to PJ Savannah
Lincoln County, NM
(Courtesy of Hollis Fuchs, NRCS)

Setting Goals and Objectives

1. What are the desired ecological conditions or how should the site or landscape look in the future?

2. What vegetation changes need to occur to meet functional goals or habitat needs?

Example may be: an increase in browse species and herbaceous vegetation may be needed to increase vertical structure for wildlife.

Part I: Identifying the Current Condition

- What kind of soils are on the site ?
- Soil texture and depth
- How will the soils and physical features affect vegetation establishment and erosion?

-Erosion potential, infiltration rates, percent slope, amount of rockiness

Current Condition

- What is the Potential Plant Association ?

PIED/Bogr
(*Pinus edulis-Bouteloua gracicilis*)

PIED-Quga
(*Pinus edulis-Quercus gambelii*)

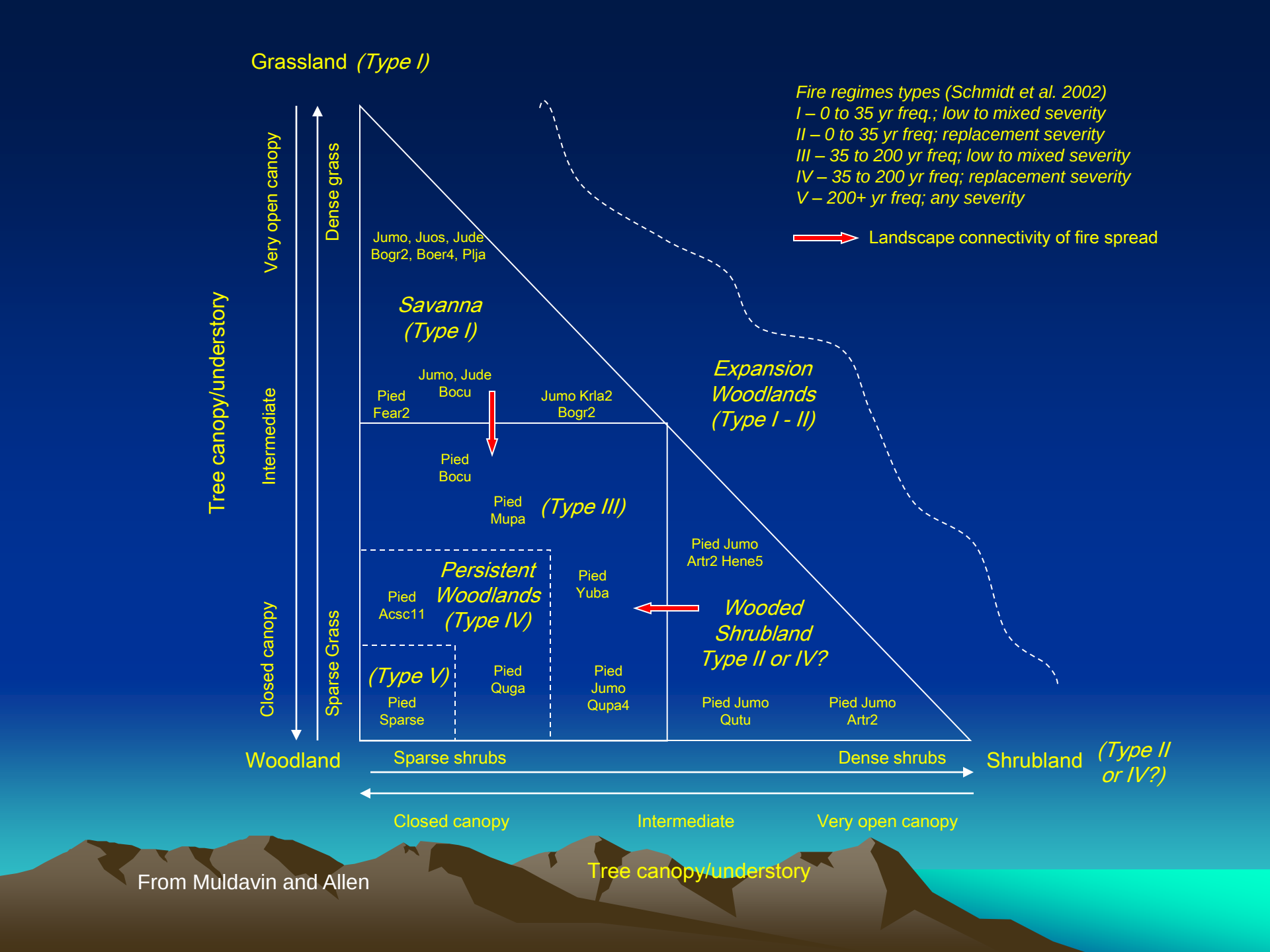
Piñon – Juniper Climate Classes

Climate Class	Elevational Subzone	Dominant or Codominant Species	Plant Association (Examples)
Low Sun Cold (LSC) >50% of annual precipitation In low sun period. (Oct.-March) Soil temperature regime is frigid.	0= typical or open woodlands	Pinus edulis, Juniperus monosperma with some Juniperus osteosperma	Pinus edulis/Artemesia tridentata (Pinyon pine/ big sagebrush
	-1 =low elevation juniper savannas	w/Artemesia tridentata as above except Pinus edulis is absent or accidental	Juniperus osteosperma/Artemisia tridentata (Utah juniper/big sagebrush)
	+1 =high elevation generally closed –canopy woodlands	as 0 above but includes Quercus gambelii.	Pinus edulis/Quercus gambelii (Pinyon/Gambel oak (~14 Plant associations)
…	…	…	…
…	…	…	…

Example for LSC

refer to handout

Is there evidence of old trees (pre-settlement) >150 years


Grassland (Type I)
Fire regimes types (Schmidt et al. 2002)
I – 0 to 35 yr freq.; low to mixed severity
II – 0 to 35 yr freq; replacement severity
III – 35 to 200 yr freq; low to mixed severity
IV – 35 to 200 yr freq; replacement severity
V – 200+ yr freq; any severity
Landscape connectivity of fire spread
Tree canopy/understory
Very open canopy
Intermediate
Closed canopy
Dense grass
Sparse Grass
Jumo, Juos, Jude
Bogr2, Boer4, Plja
Savanna
(Type I)
Jumo, Jude
Bocu
Pied
Fear2
Jumo Krla2
Bogr2
Expansion
Woodlands
(Type I - II)
Pied
Bocu
Pied
Mupa
(Type III)
Pied Jumo
Artr2 Hene5
Persistent
Woodlands
(Type IV)
Pied
Acsc11
Pied
Yuba
Wooded
Shrubland
Type II or IV?
(Type V)
Pied
Sparse
Pied
Quga
Pied
Jumo
Qupa4
Pied Jumo
Qutu
Pied Jumo
Artr2
Woodland
Sparse shrubs
Dense shrubs
Shrubland
(Type II
or IV?)
Closed canopy
Intermediate
Very open canopy
Tree canopy/understory
From Muldavin and Allen

Fire Suppression

Livestock operations

Wood cutting

Other Disturbances Anthropogenic

Recreation (ATV)

“Chaining “ conversion

Land-use development

Part II: Current State of the Site

- What are the factors affecting proper ecological function?

Current state of sites-cont.

- What is the stage of woodland succession and age structure of trees?

Phases-

-trees are present, herbs and shrubs dominant

-trees are co-dominant with shrubs and herbs

-trees are dominant

Vegetative Community Composition

Broom snakeweed and annuals dominate over perennial species identified in potential plant community

Broom snakeweed and annuals on compacted soils results in even lower plant and litter productivity

What are the fuel characteristics and what type of fire will the site support

Are there signs of erosion and overland flow?

What is the current capacity of the
site to capture, store and safely release water?
-Derived from Indicators of Rangeland Health

http://fresc.usgs.gov/products/papers/1385_Pellant.pdf

Loss of Soil Stability

1. Sheet and Rill Erosion
2. Sheet Erosion/
   Rock Armored Surface
3. Gully Erosion

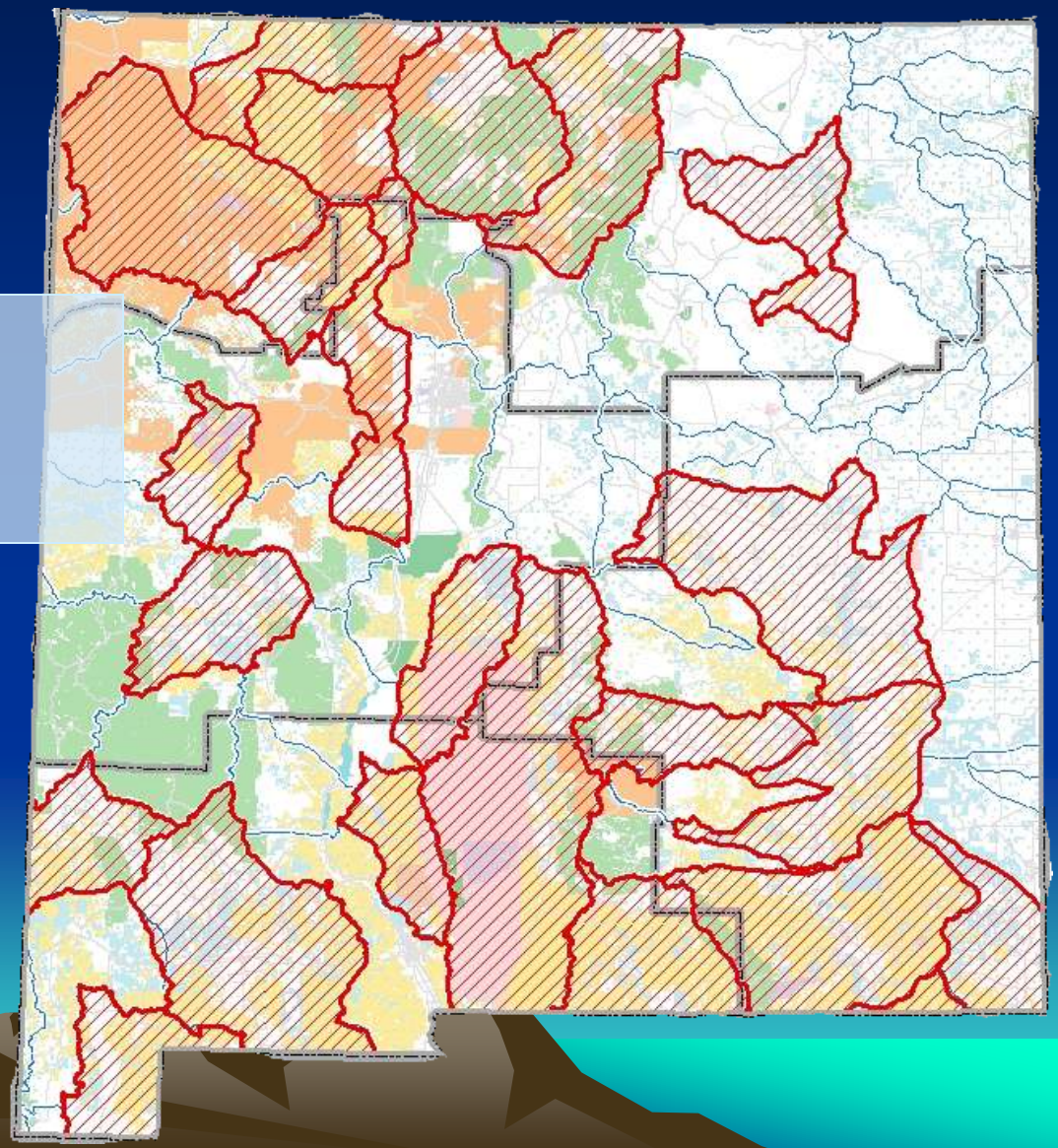
The latest invasive plant, cheatgrass, may be the most dangerous to the integrity of the woodland

- ***Bromus tectorum*, cheatgrass, creates an unprecedented, continuous flashy fuel that may alter (shorten) the fire cycle**
- **This may prevent establishment/recovery of piñon-juniper woodlands and poses a threat to ecosystem integrity**

Floyd et al. 2006. Predicting and mitigating weed invasions to restore natural post-fire succession in Mesa Verde. IJWF. 15:247-259

Restoring New Mexico Landscapes

22 Priority Watersheds



Part III: Landscape Considerations

What are the landscape spatial characteristics of the area to be treated with respect to patch size, edge, and connectedness.

Are there adjacent patches and what is the landscape composition?

How does the site connect to the landscape?

What are the current uses and management activities?

Part IV: Selecting Appropriate Management Action

- Factors that will influence treatment selection

-Fuel Composition and structure

-Plant Composition

-Ecological Site or plant Association

-Sensitive Species

-Objectives

-Size of treatments

-Cost and resources

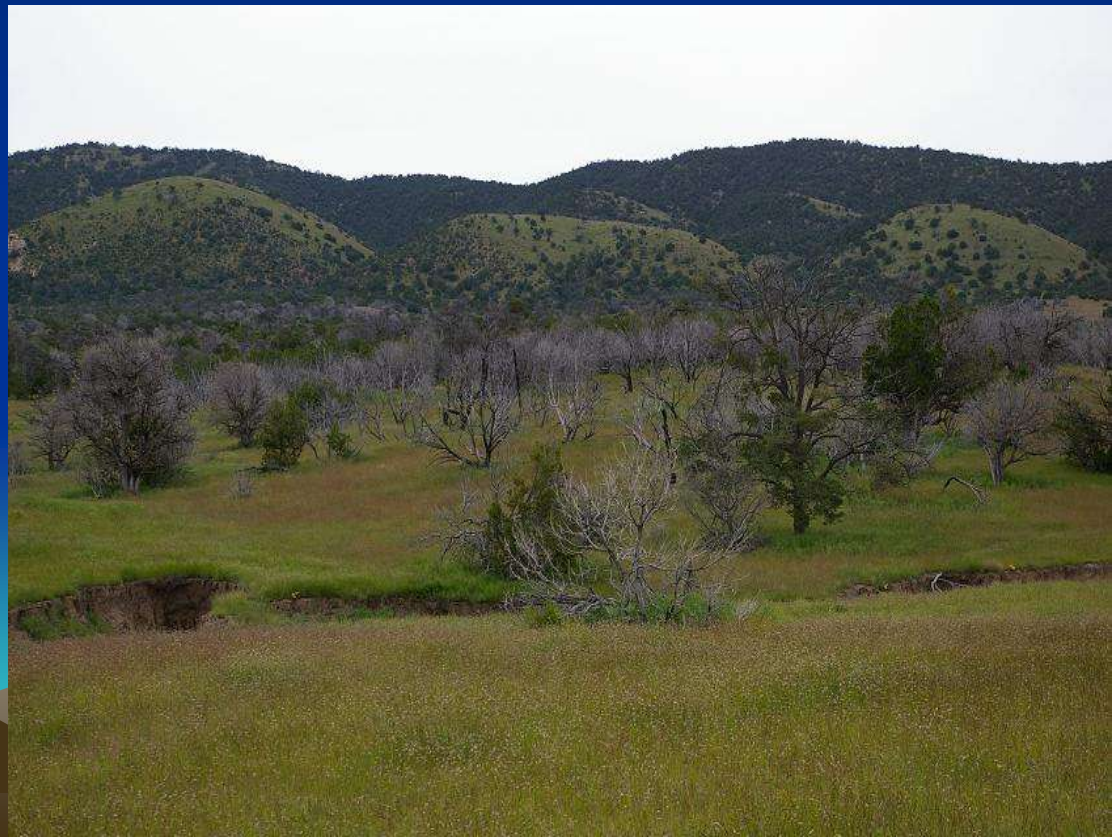
-Social acceptabilty

Mechanical Treatments

Prescribed Fire

Combination of Rx Fire and Cutting Treatments

Chemical treatments



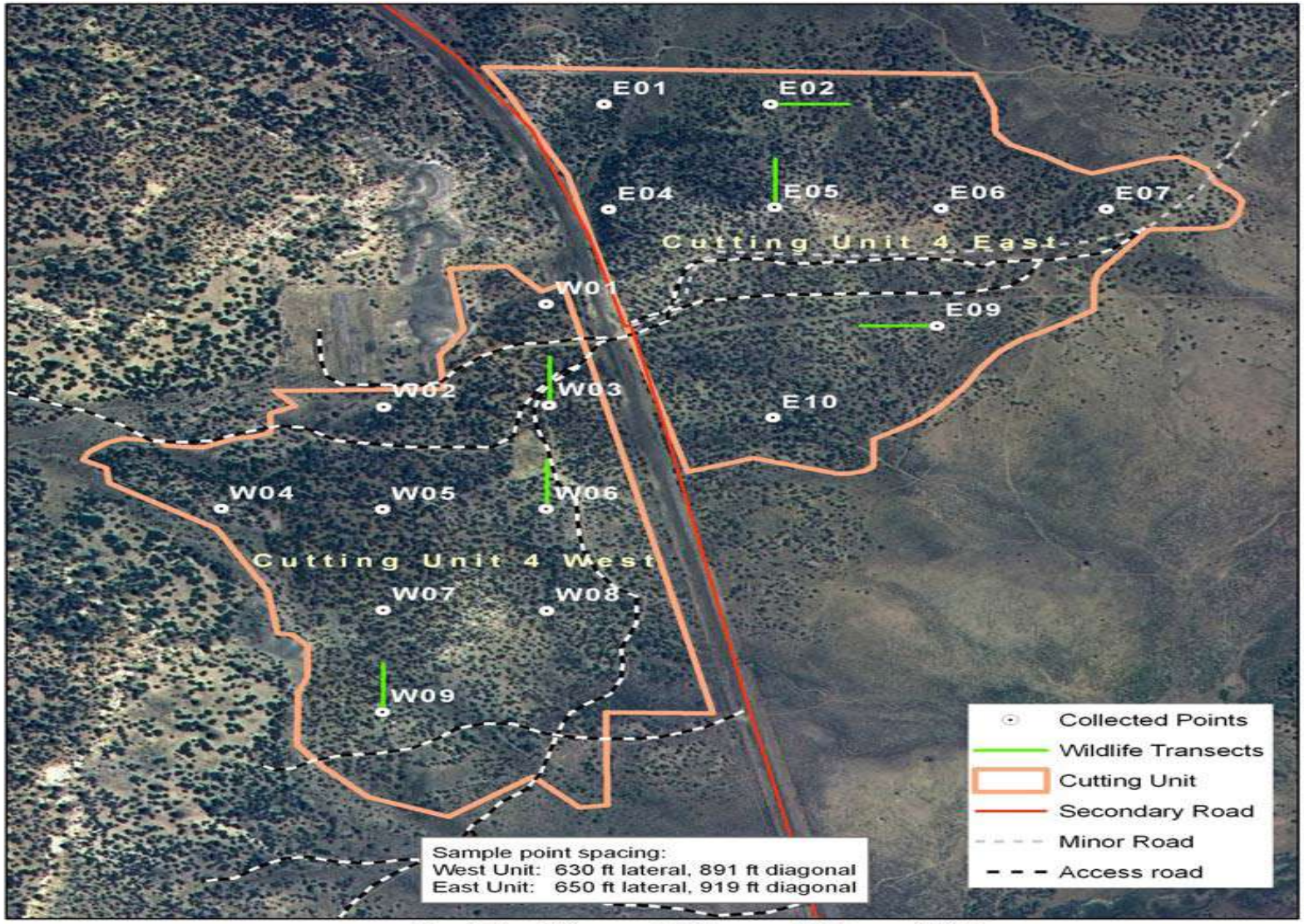
Seeding

How will post-treatment management affect site conditions?

- Monitoring
- Maintenance

Monitoring with NMFWRI

Arroyo Hondo Cutting Unit 4



Monitoring with photo-points

Maintenance

Rest from Grazing

Use of Rx Fire

Restoring New Mexico Landscapes

Restoring New Mexico Landscapes equals Fire Regime Condition Class 1

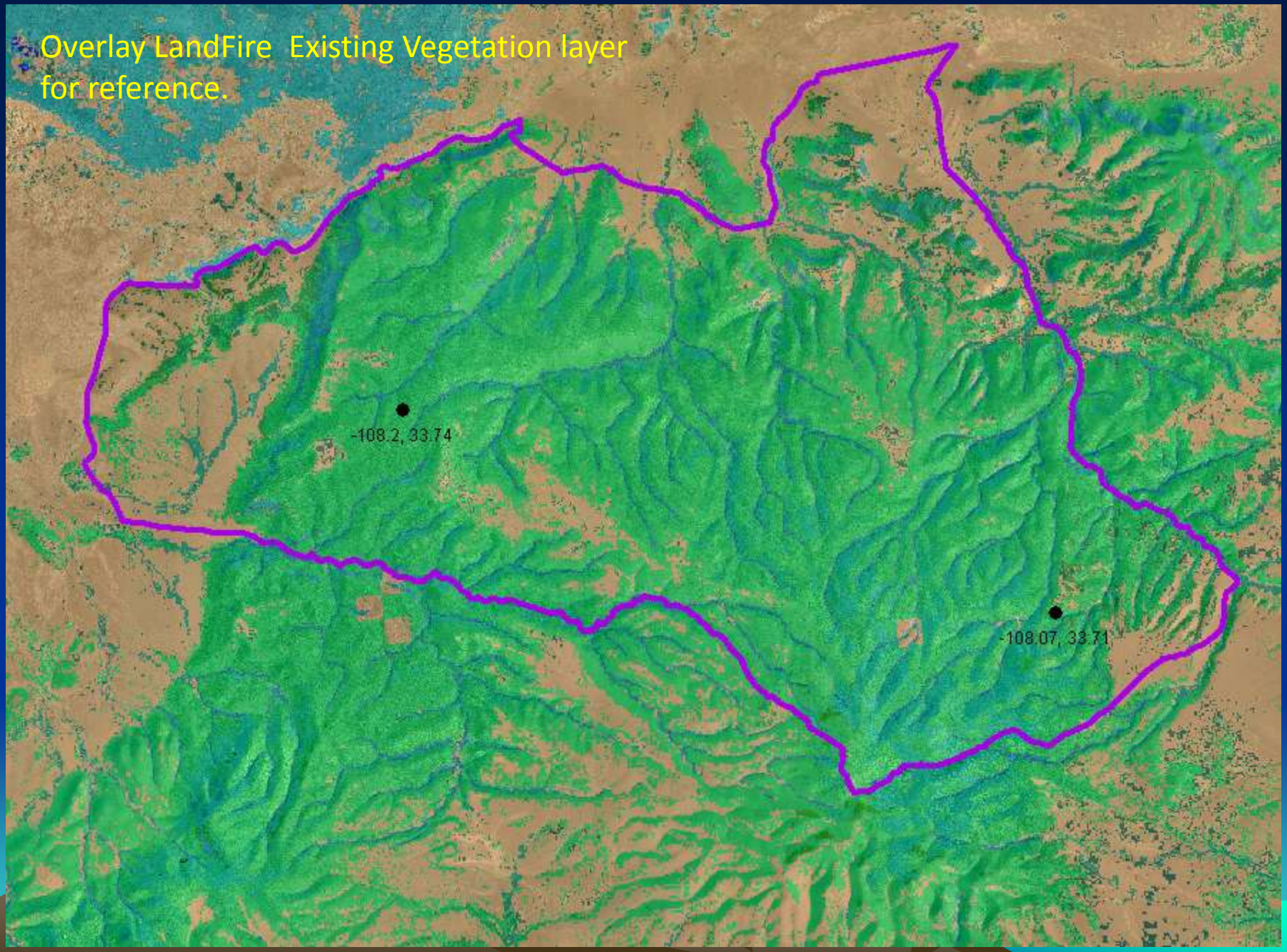
Mapping Example: Using available layers to stratify Woodland vegetation

Al Sandoval

GIS Specialist

BLM

New Mexico State Office


Overlay LandFire Existing Vegetation layer
for reference.
-108.2, 33.74
-108.07, 33.71

LANDFIRE-Schedule Map - Windows Internet Explorer

http://www.landfire.gov/schedule_map.php#

File Edit View Favorites Tools Help

SnagIt

LANDFIRE-Schedule Map

For more information on LandFire Layers visit www.landfire.gov

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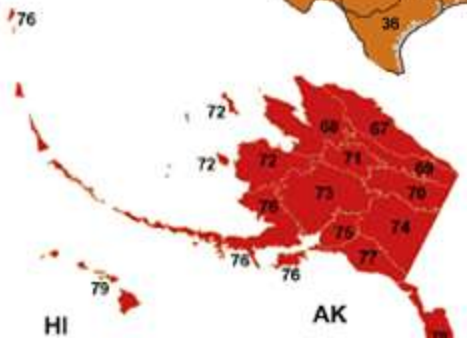
  - Updated Products Schedule
  - Key LANDFIRE Dates
- How to Participate
- Documents
- Training & Technology Transfer

Schedule >> LANDFIRE Mapping Zones by Year of Completion



LANDFIRE National products will be delivered on an incremental basis:

- 2006
- 2008
- 2009

Zone 25: Rio Grande Basin

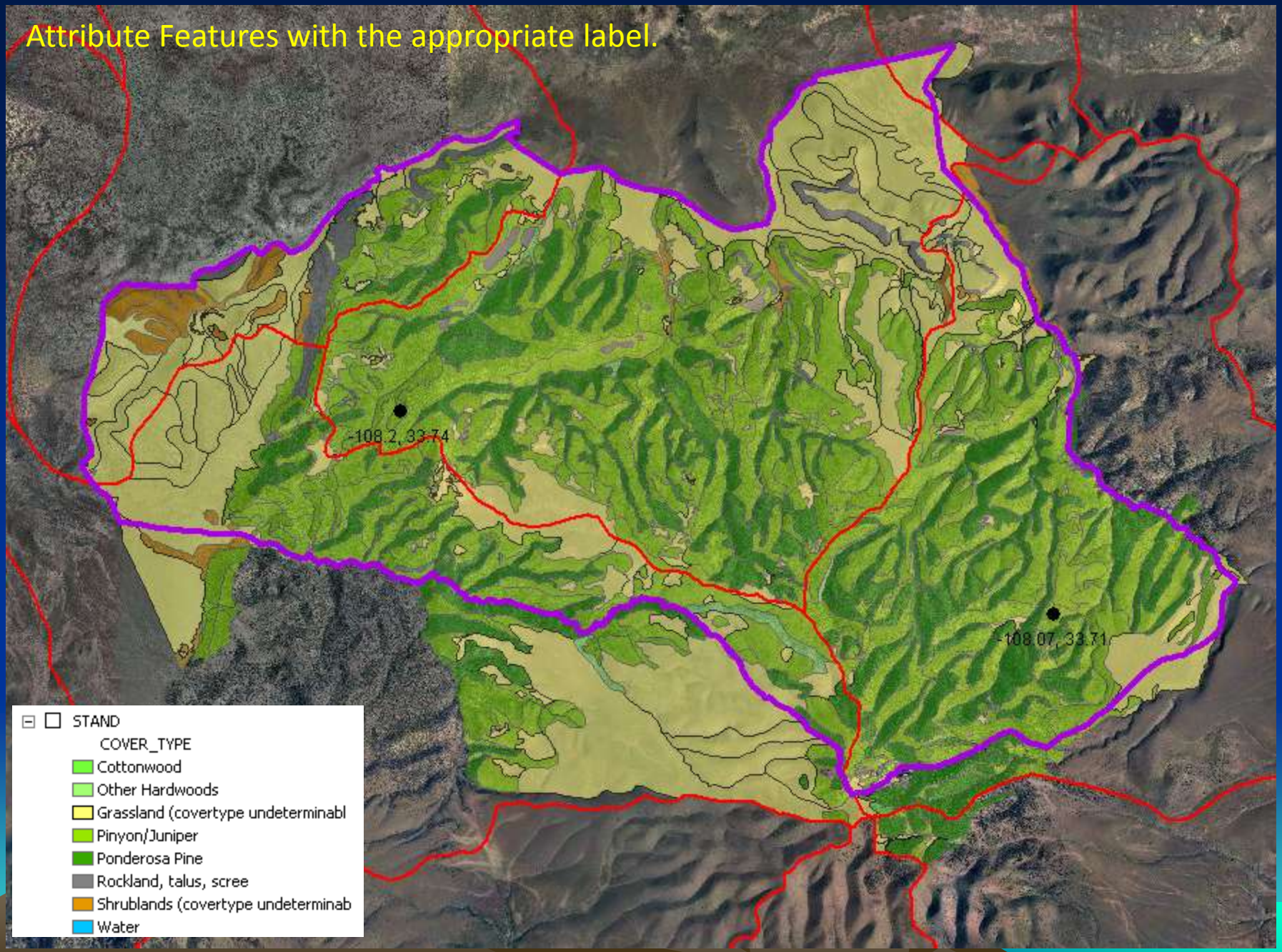
Mapping completion target:	Summe 2007
Vegetation data submission target:	05-FEB
Fuel data submission target:	16-APR

If a target date for data submission has pa and you have field-sampled vegetation or Data to Share, please contact the LANDFIRE Data Administrator as these may be useful in future product update

View a Schedule Table of zones to be mapped by 2008.

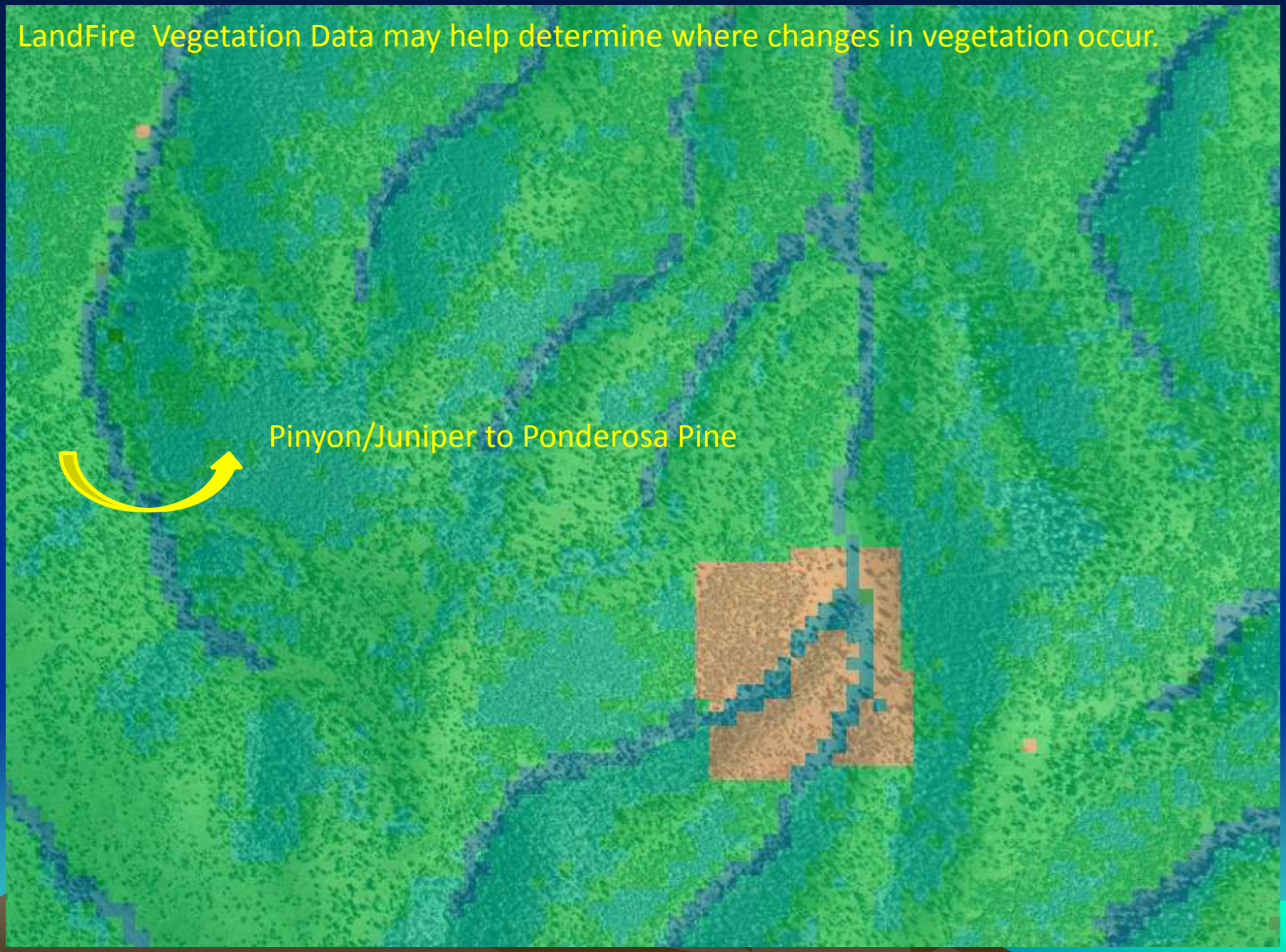
Delineate Vegetation Stands

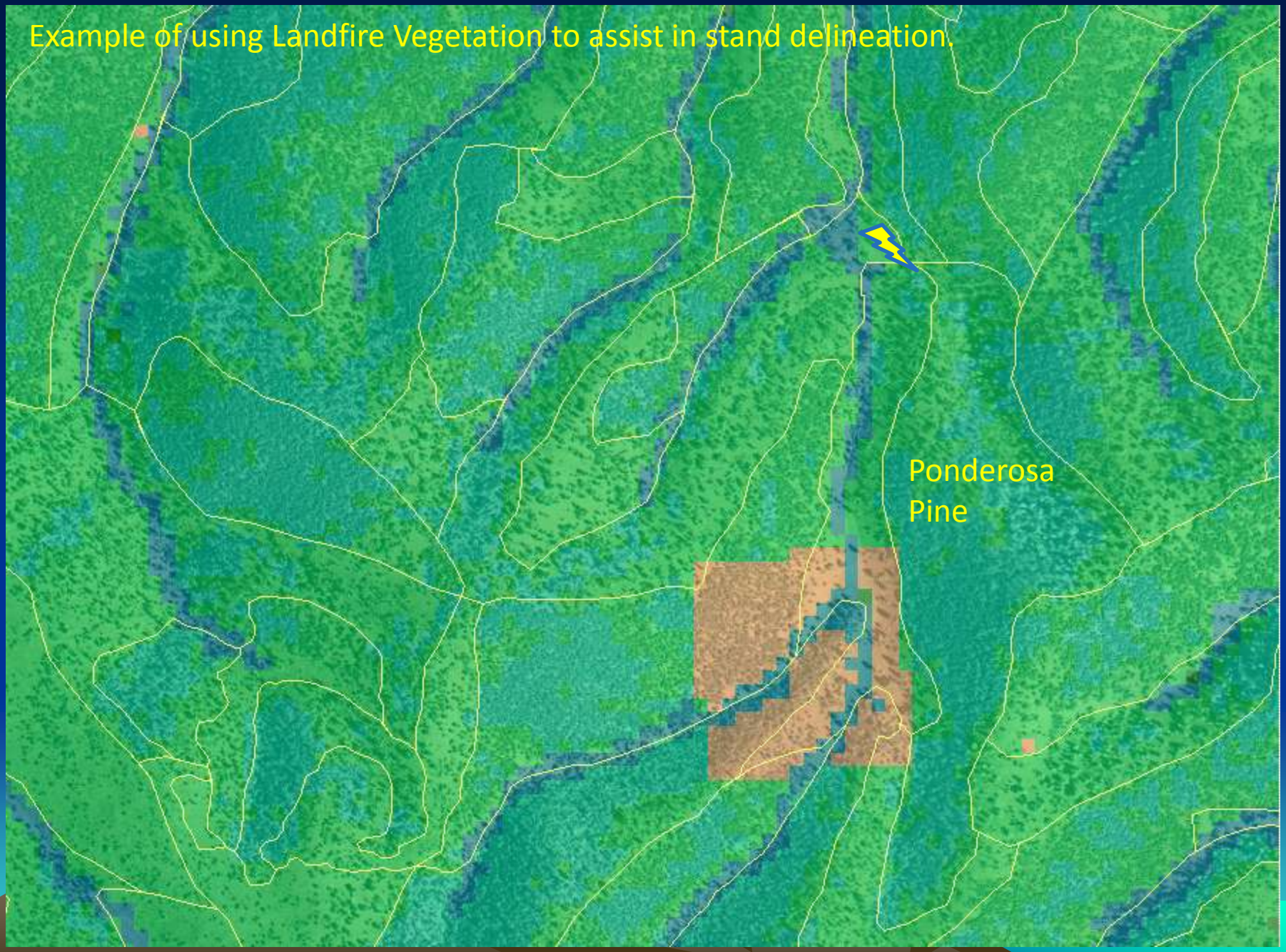
Attribute Features with the appropriate label.

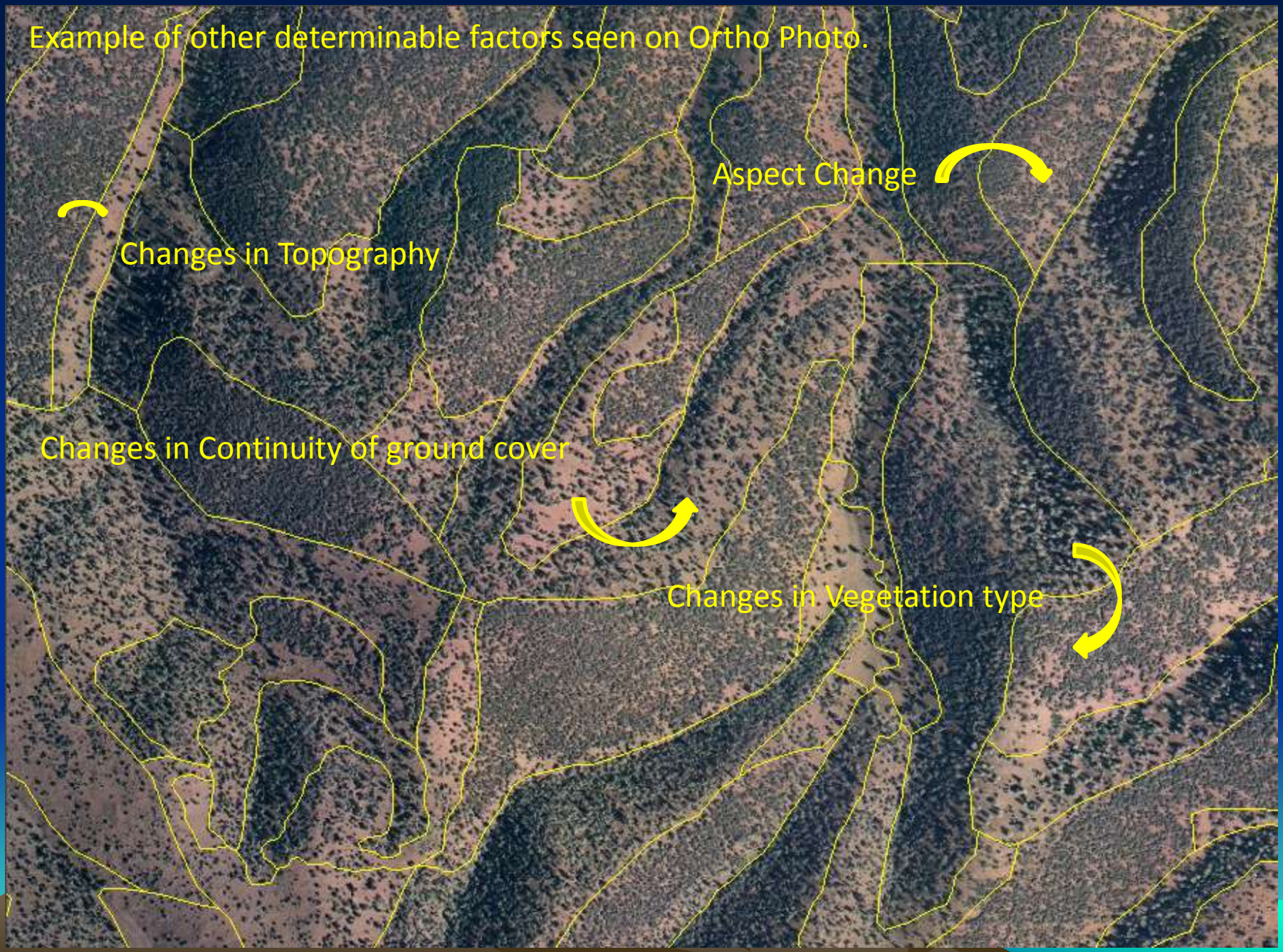


What factors determine how stands are delineated?

- Visible changes in Vegetation Types
- Changes in Aspect
- Changes in continuity (Changes in ground cover)
- Changes in topography
- LandFire Vegetation layer can be beneficial


LandFire Vegetation Data may help determine where changes in vegetation occur.
Pinyon/Juniper to Ponderosa Pine


Example of using Landfire Vegetation to assist in stand delineation.
Ponderosa
Pine


Example of other determinable factors seen on Ortho Photo.
Aspect Change
Changes in Topography
Changes in Continuity of ground cover
Changes in Vegetation type


Result
Polygon Data
Versus


Raster Data