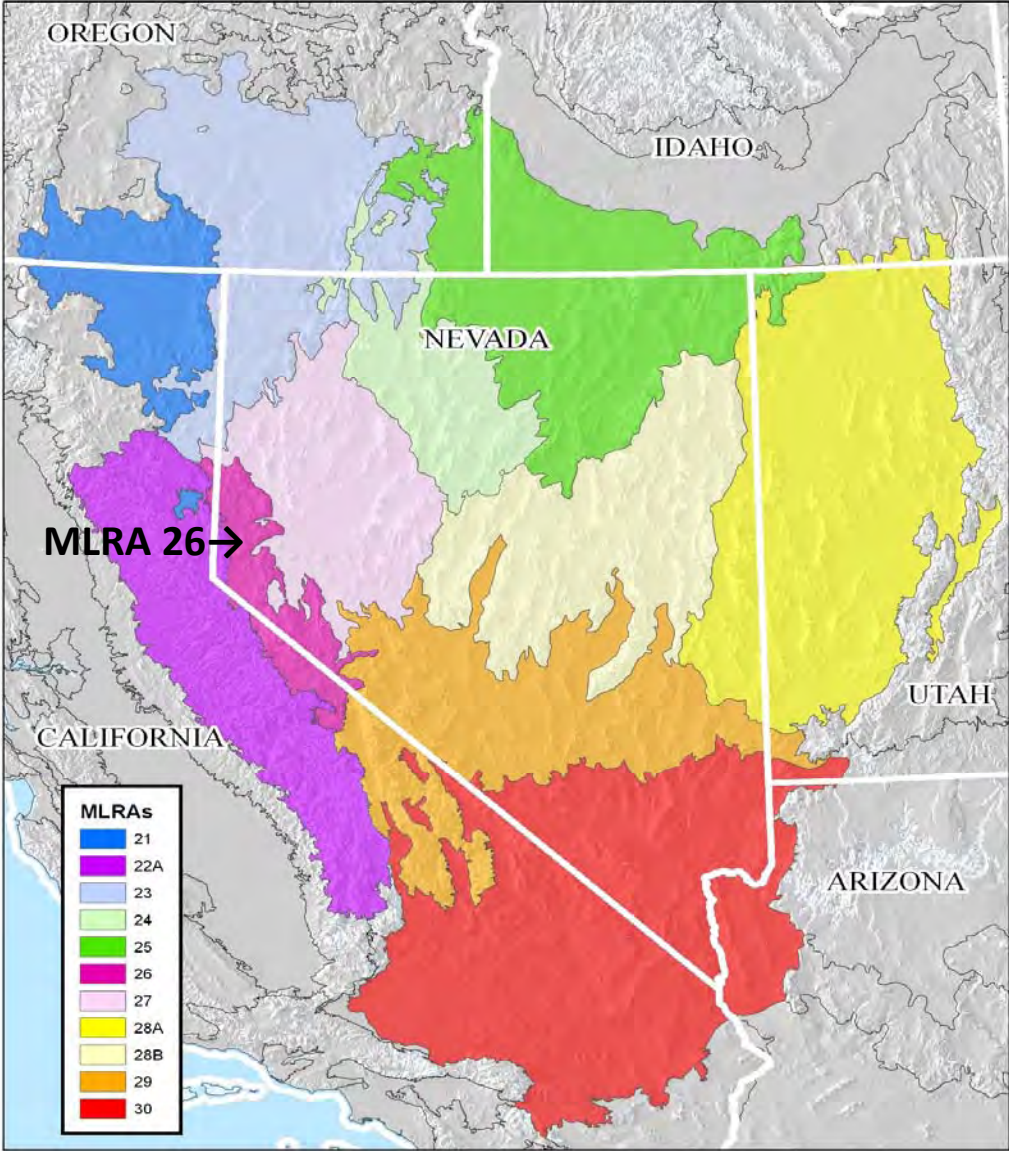


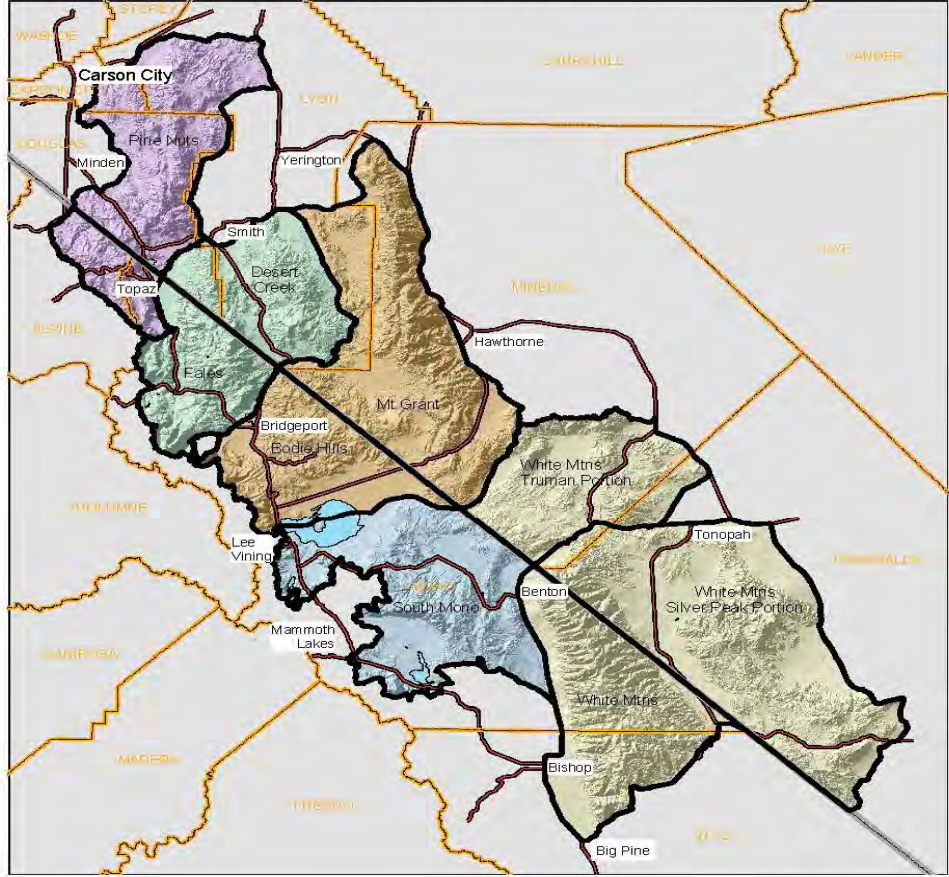
Using Ecological Sites and Soil and Tree Characteristics to Characterize Old Growth and Expansion Woodlands



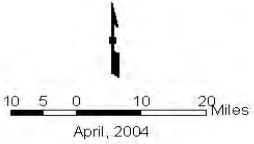
Patti Novak-Echenique
State Rangeland Management Specialist
NRCS - Nevada



Overview of Sage Grouse Management Units within the Bi-State Planning Area of California and Nevada



- Legend**
- Management Unit
 - County Line
 - State Line
 - Highways



MLRA 26 – Carson Basin and Mountains

- Isolated north-south trending mountain ranges – uplifted fault blocks
- Average annual precipitation 5 to 36 inches, majority 8-15 inches
- Elevations 3900 to 13,100 ft.
- Parent material – granitic near the Sierra Nevada range and andesite and basalt in the rest of the area
- Soils – primarily Aridisols and Mollisols
- Mesic, frigid and cryic soil temperature regimes and aridic or xeric soil moisture regimes
- Soils are primarily clayey or loamy and skeletal

Soil Surveys – Bi-State Area

- Report of the Physical Survey of the Carson Valley Soil Conservation District – 1940
- NV 629 Carson City Area – 1970's
- NV 773 Douglas County – late 1970's
- NV 625 Lyon County – late 1970's-early 1980's
- NV 774 Mineral County – mid 1980's
- CA 763 Inyo National Forest – 1980's
- NV 799 Hawthorne Ammunition Plant - 1990
- NV 796 Esmeralda County - 1991
- CA 802 Benton-Owens Valley Area – 1990's
- CA 729 Toiyabe National Forest – 2005
- CA 686 Coleville-Bridgeport – completed 2010

Soil Surveys – Order III Mapping

- Mostly associations or complexes; some consociations and undifferentiated groups
- Scale: 1:20,000 to 1:63,360
- Minimum-size delineation: 1.6 to 16 hectares (4 to 40 acres)
- Surveys are available on Web Soil Survey at 1:24,000 (<http://soils.usda.gov>)

Ecological (Range) Site (2003)

- An ecological site is a kind of land with specific physical characteristics (soil, topography, climate) which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation (NRPH 2003)
- Characteristic soils, hydrology, plants, herbivory, fire regime
- In other words, a kind of land with similar potential.

Ecological Site (2013)

- An ecological site, as described for rangeland, is a distinctive kind of land based on recurring soil, landform, geological, and climatic characteristics that differs from other kinds of land in its ability to produce a distinctive kinds and amounts of vegetation and in its ability to respond similarly to management actions and natural disturbances.

History of Pinyon and/or Juniper Classifications

- 1954 – Society of American Foresters described a Pinyon-Juniper (239) cover type – widely distributed climate type – occurs above the sagebrush and below the interior ponderosa pine
 - When destroyed – this type gives way temporarily to grass or brush
- 1967 and 1976 SCS – National Handbook for Range and Related Grazing Lands – Grazeable Woodlands – A forest land on which understory includes, as an integral part of the forest plant community, plants which can be grazed without significantly impairing other forest values.
- SCS National Forestry Manual 1980 – Forestland – a spatially defined site where the HCPC was dominated by a 25% overstory canopy of trees as determined by crown-perimeter vertical projection.

Determination of Rangelands and Woodlands

- **Interim Guidelines – October 1984 (final 1986):
Determination of Rangeland and Woodland for
Areas of Juniper-Pinyon Woodland and Sagebrush-
Grass Rangeland Transition in Nevada – Key**
 - Mature potential >150 years old juniper and/or pinyon trees > 10% canopy cover
 - Physical evidence of mature potential (harvest, fire)
 - Topographic and/or soil features limit the frequency and intensity of natural fire. Very shallow, rocky, droughty soils typically associated with areas of exposed bedrock. Potential for production of continuous fine fuels (including litter) less than 600 lbs/ac
 - Mature Potential - **Pre-European Settlement (1850's-1860's)**



1997: Range Conservationists and Foresters



United States
Department of
Agriculture

Natural
Resources
Conservation
Service

Grazing Lands
Technology
Institute

Fort Worth, Texas

Inventorizing, Classifying, and Correlating Juniper and Pinyon Communities

To Soils in Western United States



Criteria (1997)

- Forest occurs when trees in the mature (>150 years old)/near mature plant community occupy $\geq 15\%$ canopy cover and are 12-16+ feet tall
- Forest occurs when trees in the mature/near mature plant community occupy 25% or more
- Woody plants < 10 ft in height are generally considered to be shrubs
- Bedrock controlled landforms – hills, mountains
- Topographic and/or soil features limit spread of wildfire

Singleleaf pinyon age classes



Young



Immature



Mature



Climax

Bi-State Pinyon and/or Juniper Woodland Ecological Sites

- 18 woodland sites – totaling 611,000+ acres; 5000-9000 ft.
- Total overstory canopy cover ranges from 10-35% in the Reference Community (Pre-European settlement)
- Criteria used to separate woodland sites:
 - Overstory and understory composition
 - Site index – the relationship of tree height to age
 - Site Class – measure of the relative productive capacity of a site
 - Heights of dominant and codominant trees are used to represent stand height
 - Tree age – largest trees (minimum of three trees)
 - Diameter at Root Collar (convert to basal area) - Site Index curves
 - J Howell. 1940. Pinyon and Juniper, A Preliminary Study of Volume Growth and Yield
 - D.C. Chojnacky. 1986. Pinyon-Juniper Site Quality and Volume Growth Equations for Nevada

Woodland Ecological Sites - Soil Characteristics

- Soils are typically shallow (<20") to bedrock
- Skeletal $\geq 35\%$ rock fragments by volume
- May have a thin (<6 inches organic – mollic epipedon)
- Low available water capacity
- Areas of exposed bedrock
- Slopes typically $>15\%$
- Parent material:
 - Volcanic, granitic, limestone



Jackrock soil series – Lithic Argixeroll

Woodland Characteristics

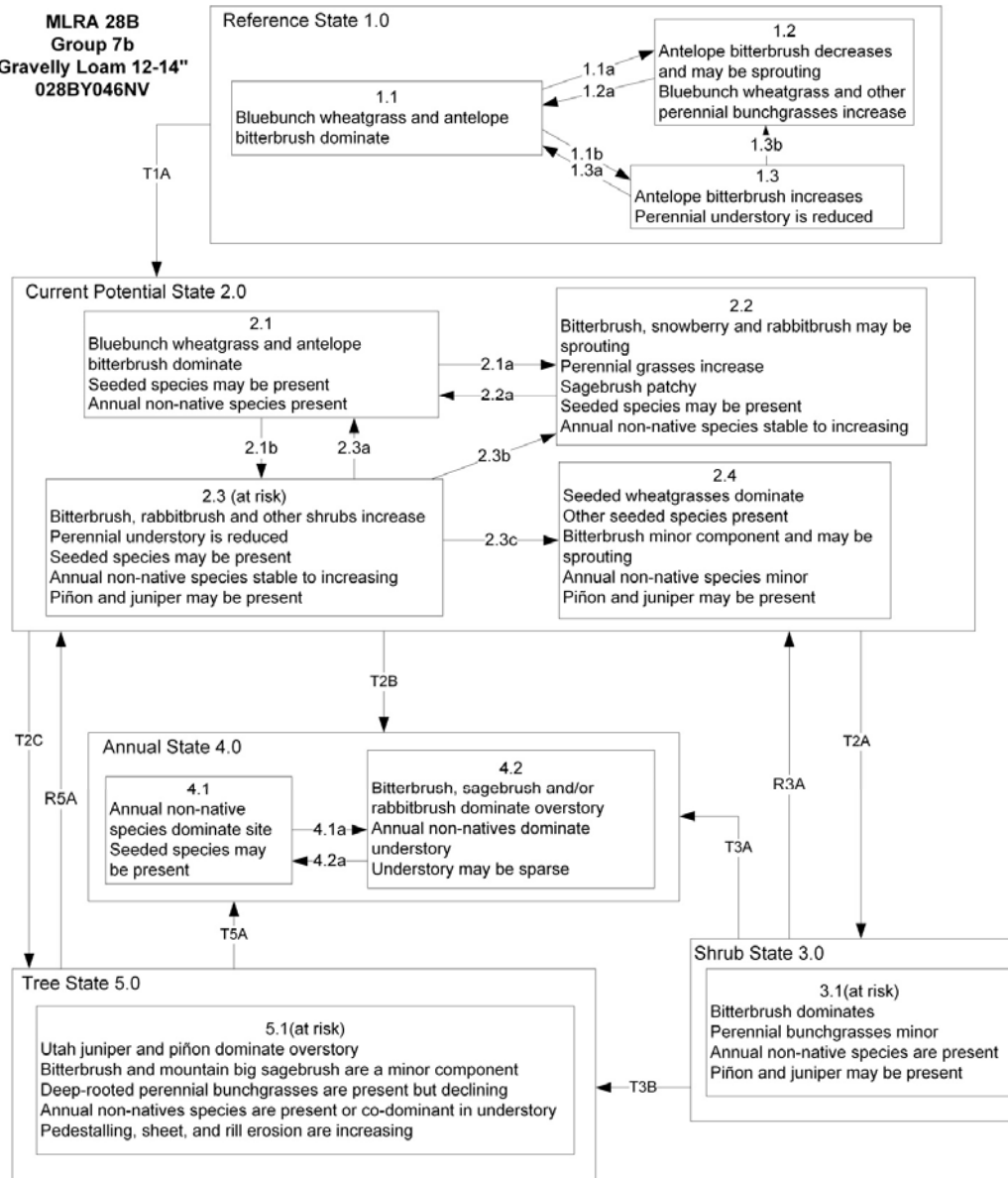
- Mix of mature > 150 years old and late mature trees (300+ years)
- Senescent trees with dead branches
- Deformed or rounded tree tops
- Large diameter lower branches
- Standing dead and down trees – old fire scars
- Understory cover and production varies depending on canopy cover
- Tree bases – single or multi-stemmed
- Diameter at root crown ~15 inches+

Rangeland Ecological Sites

- Rangeland Sites adjacent to woodlands: 2-3% potential production of trees allowed in the site concept = 1 large tree or 5-6 small trees/ac
- Savanna-type sites: scattered old trees typically Utah juniper <10% canopy cover
- MLRA 26 rangeland sites:
 - 26/63 upland sites have PIMO and/or JUOS in the Reference State
 - 4500 – 9000 ft; JUOS lower PIMO highest elevations
 - These sites have a potential for a Tree State in the State and Transition Model



MLRA 28B
Group 7b
Gravelly Loam 12-14"
028BY046NV



Upland Rangeland Ecological Sites – Soil Characteristics

- Shallow to very deep soils
- Loamy skeletal or clayey skeletal
- Argillic horizons – a significantly higher percentage of clay than the overlying material. Evidence of clay illuviation.
- Typically have a mollic epipedon – Dominant color with a value of 3 or less moist and of 5 or less dry and chroma of 3 or less moist. Grass roots contribute more organic matter than tree roots.

Encroached Black Sagebrush site



Report of Woodland Survey – Pine Nut Hills (Reveal 1940)

- Inventoried ~85,000 acres
- Delineated types on basis of species composition, crown density and age class
- Plot data – diameter, height, growth at breast height, age, # of cones
- Sample plots – 75% immature, 20% mature, 4% overmature (entirely pinyon), 1% reproduction (ave dia. 0.5 in, < 5 ft. tall)
- Bulk of pine nuts produced on healthy, immature trees
- Throughout mature and immature stands –overmature trees occur in small groups or isolated trees
- “Pinyon-juniper stands are considered to be low fire hazard as compared with other timber areas”

Pinyon-Juniper Woodlands of the Great Basin

(Tueller et al 1979)

- Pinyon-juniper woodlands mapped using LANDSAT-1 color infrared composites – Nevada 11,674,600 acres
- Macro plots (66 x165 ft) established on 66 mountain ranges – primarily in Nevada; CA – White Mts, Panamint Range; ID – 3 ranges; UT – 21 ranges
- Plots – at least 25 trees/ha with at least one tree in mature age class
- No evidence of recent fire, tree cutting, chaining or cabling
- Total vegetal cover per plot increased steadily between 6000-7200 ft.
- Change in vegetal cover insignificant between 7200-8500 ft
- Lowest ave. relative % cover of JUOS in SW and central Nevada
- At 5200 ft JUOS completely dominant; at 8500+ ft PIMO dominant
- Summer precip ↑ from west to east – the relative amount of JUOS ↑

Pinyon Growth Characteristics

- Reveal (1944): Pine Nut Range “ave. diameter growth maintained at ~1 inch per decade for the first 100 years, decreases to 0.25 inch at the end of the 2nd century. Life span is seldom over 250 years”
- Meeuwig & Budy (1979): Sweetwater Mts. -closed stands 49-60% canopy cover “ave. diameter growth is ~ 1 inch per decade, but that competition not age, is the primary cause of reduction in diameter growth. Life span can be well over 250 years”.
 - Tree #31 – rates of diameter and height growth have not changed appreciably over the past 300 years (tree age 433 years)



Rangeland or Woodland?



Woodlands





Questions?

