Post-fire Vegetation Response by Ecological Site in Nevada

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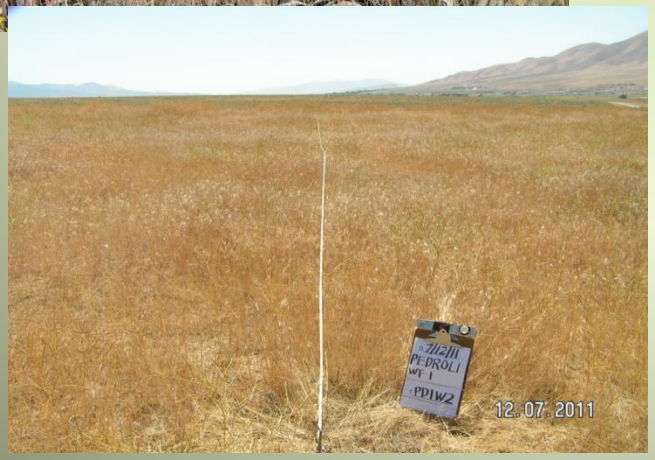
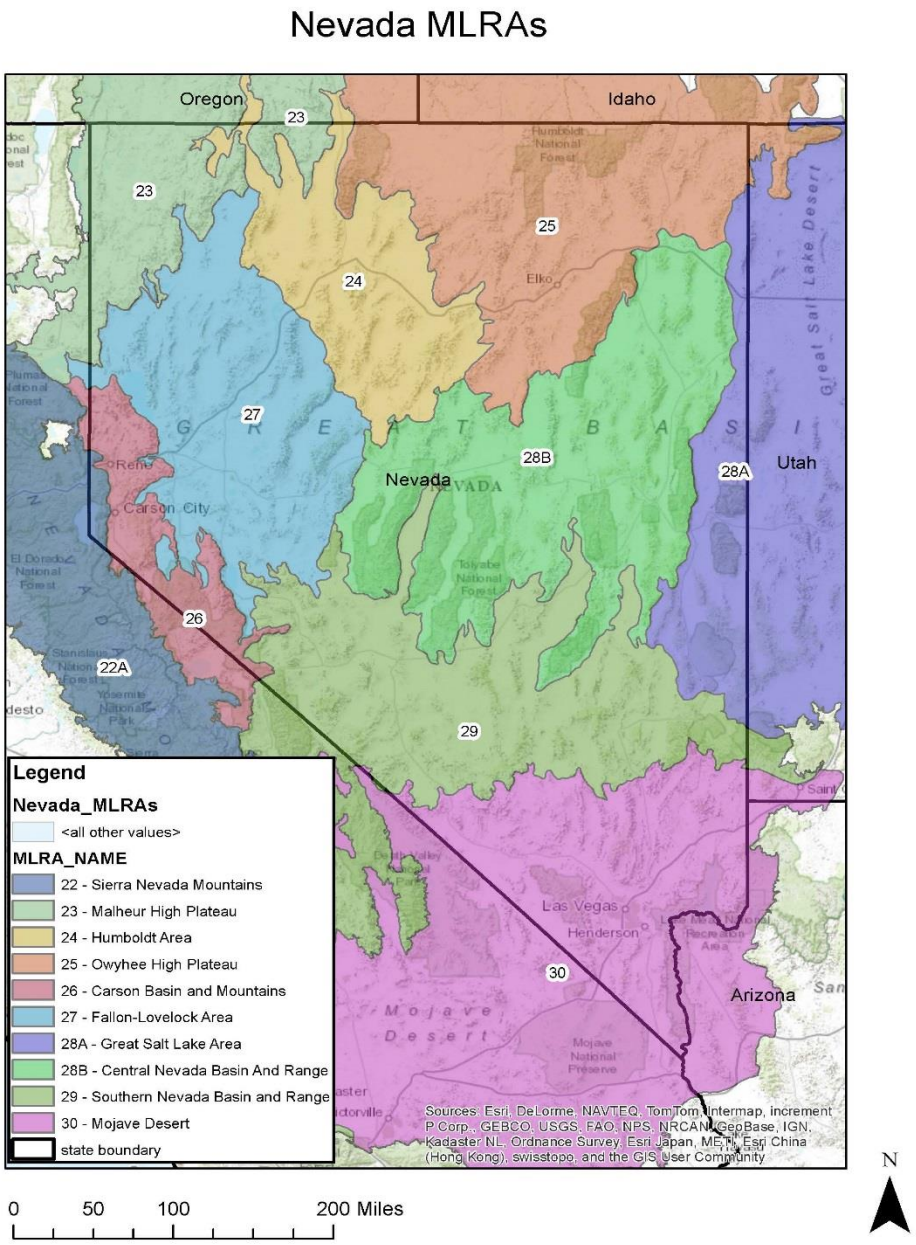


Nevada - Major Land Resource Areas

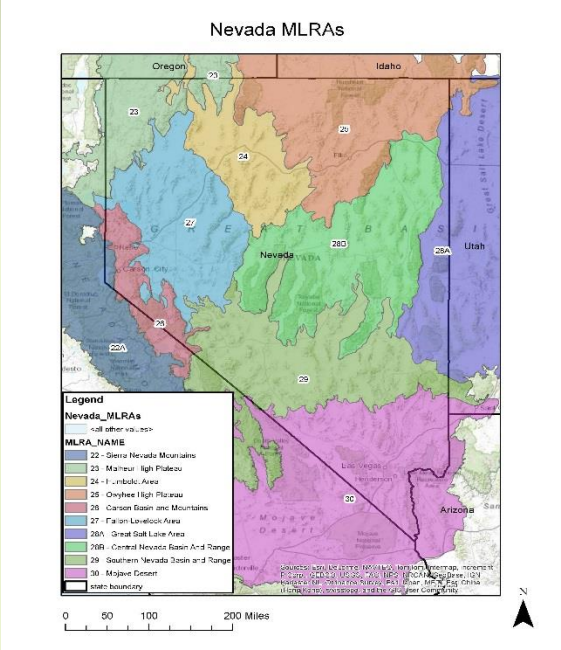
- MLRA 28A & 28B
  - 310 Field notes / 190 ES*
- MLRA 26
  - 32 Field notes / 104 ES
  - 91 NV sites, 13 CA sites
- MLRA 25
  - 115 Field notes / 69 ES
- MLRA 24
  - 79 Field notes / 54 ES
- MLRA 23
  - 93 Field notes / 84 ES

*ES = ecological site



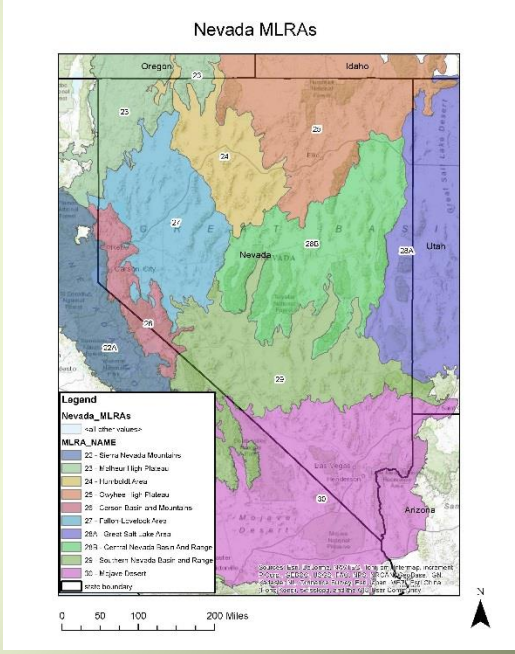
MLRA Descriptions

- **MLRA 23 – Malheur High Plateau**
  - Elevation 3900 – 6900 ft; mts- 9000 ft.
  - Gently sloping to steep plateaus, basins and valleys
  - Young andesite, basalt
  - Volcanic ash-influenced soils
  - 6 to 12 inch ppt; 57 inches in mountains
  - Aridisols and Mollisols
  - Mesic soil temperature; aridic or xeric soil moisture
  - Mixed or smectitic mineralogy
- **MLRA 24 – Humboldt Area**
  - Elevation 3050 to 5900 ft; mts - 8850 ft.
  - Wide valleys filled with alluvium and lacustrine materials
  - Playas
  - 6 to 12 inch ppt; 40 inches in mountains
  - Aridisols are dominant
  - Mesic soil temperature; aridic soil moisture
  - Mixed mineralogy



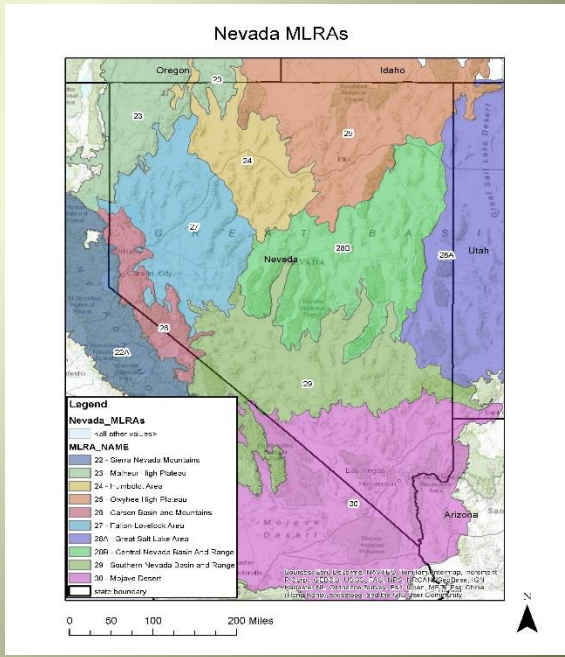
MLRA Descriptions

- **MLRA 25 – Owyhee High Plateau**
  - Elevation 3000 to 7550 ft; mts – 9840 ft.
  - Rolling plateaus; gently sloping basins; few narrow valleys
  - Volcanic rock and limestone deposits
  - 7 to 16 inch ppt; 40+ inches in mountains
  - Aridisols and Mollisols
  - Mesic or frigid soil temperature; aridic or xeric soil moisture
- **MLRA 26 – Carson Basin and Mountains**
  - Elevation 3900 to 6500 ft = valleys; mts – 13,100 ft
  - Wide basins bordered by alluvial fans and uplifted mts
  - Granite (Sierra foothills), andesite and basalt, ash (CA)
  - 8 to 14 inch ppt in valleys; up to 36 inches in mts
  - Aridisols, Entisols, Mollisols
  - Mesic or frigid soil temp.; aridic or xeric soil moisture
  - Mixed or smectitic mineralogy



MLRA Descriptions

- **MLRA 28A – Great Salt Lake Area**
  - Elevation 3950 to 6560 ft; mts – 11,150 ft.
  - Nearly level basins; widely separated mountain ranges
  - Alluvial valley fill and playa lakebed deposits (glacial Lake Bonneville)
  - 5 to 12 inch ppt; 49+ inches in mountains – occurs during growing season
  - Aridisols, Entisols and Mollisols
  - Mesic or frigid soil temperature; aridic or xeric soil moisture
  - Mixed mineralogy
- **MLRA 28B – Central Nevada Basin and Range**
  - Elevation 4900 to 6550 ft = valleys; mts - 11,900 ft
  - Wide basins bordered by alluvial fans and uplifted mts
  - Andesite and basalt and carbonate rocks
  - 4 to 12 inch ppt in valleys; 8 to 36 inches in mts
  - Aridisols, Entisols, Mollisols
  - Mesic or frigid soil temp.; aridic or xeric soil moisture
  - Mixed or carbonatic mineralogy



MLRA Differences

- **MLRA 23**
  - 59% of sites visited had BRTE present
  - Preliminary –11% had an Annual State
- **MLRA 24**
  - 70.5% of sites visited had BRTE present
  - 83% of the ecological sites had an Annual State
- **MLRA 25**
  - 37% of sites visited had BRTE present
  - 41% of ecological sites had an Annual State
- **MLRA 28A & 28B**
  - 52% of sites visited had BRTE present
- **MLRA 28A**
  - 45% of sites had an Annual State
- **MLRA 28B**
  - 51% of sites had an Annual State

Volcanic ash influenced soils

Lacustrine soils
Lightning frequency

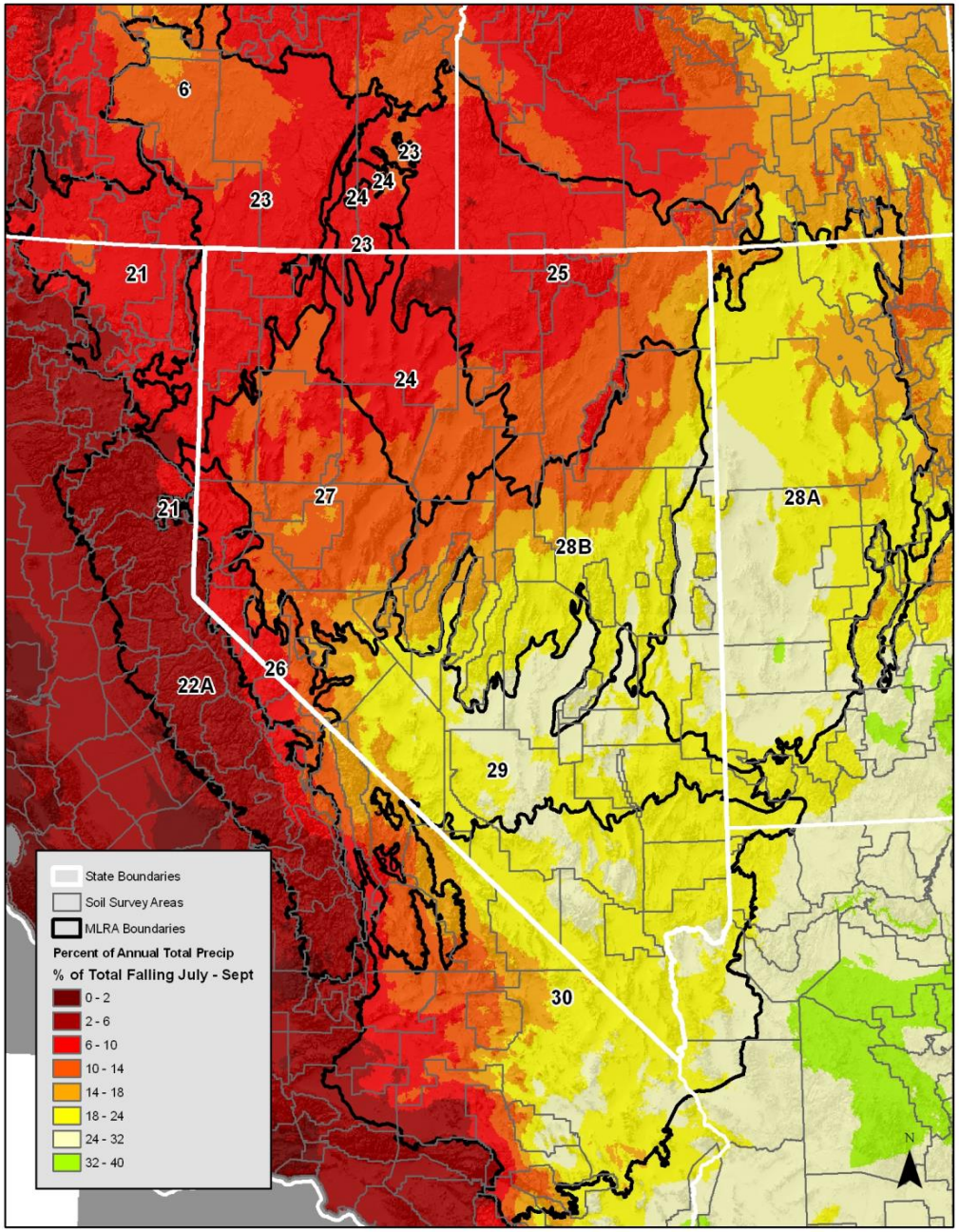
<u>Mixed Bag</u>
Ppt pattern
Soil chemistry
Soil moisture
Soil temp.
Lightning frequency

MLRA Differences

Why the difference?

- Precipitation patterns: lightning, winter/summer
- Parent material
- Soil properties – ash, chemistry, organic matter
- Soil temperature and soil moisture regimes
- Fire history – multiple burns

Percent of Total Precipitation Falling in Summer

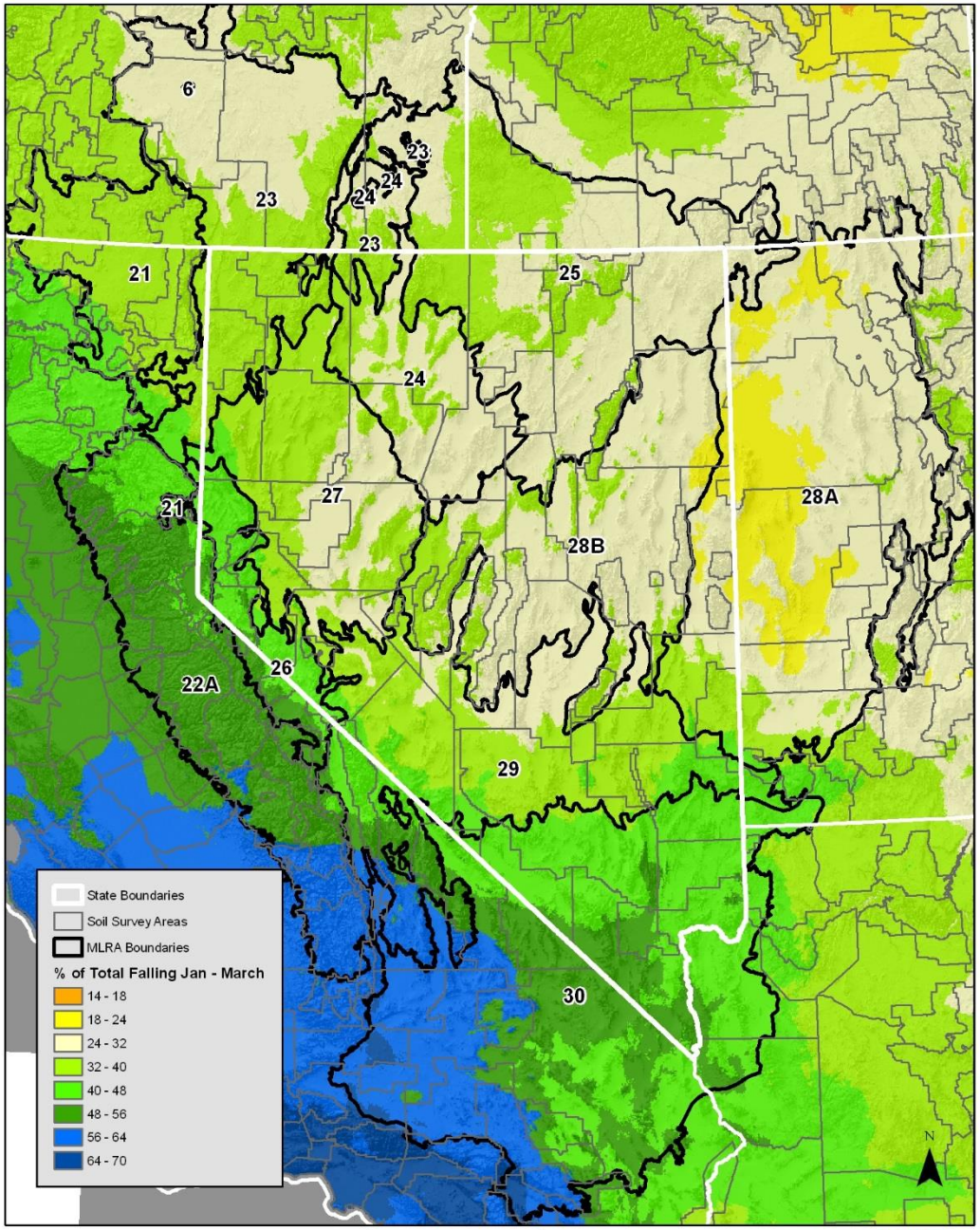


Souce: Daymet U.S. Data Center

0 25 50 100 Miles

NRCS

Percent of Total Precipitation Falling in Winter



Souce: Daymet U.S. Data Center

0 25 50 100 Miles

NRCS

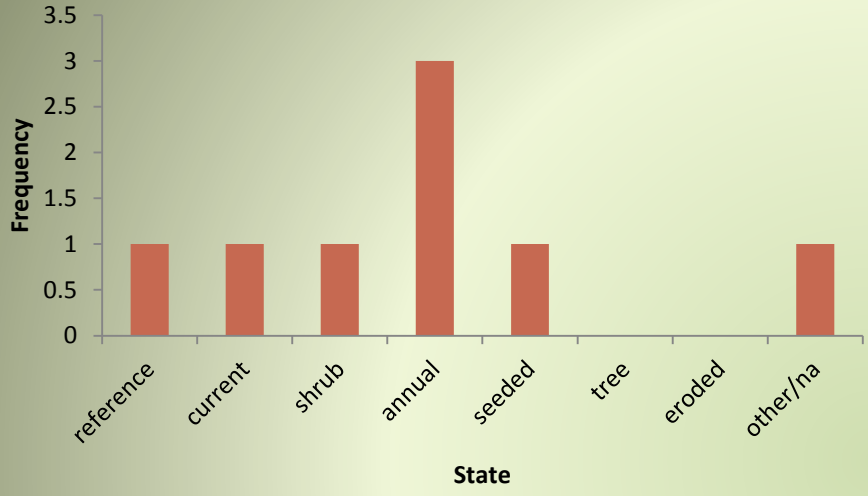
Precipitation at Climate Stations

Station	Winter (ins.) (% of total)	Spring (ins.) (% of total)	Summer (ins.) (% of total)	Fall (ins.) (% of total)	Winter/ Spring	Summer /Fall	Average Annual (ins.)
Winnemucca (MLRA 24)	2.68 32%	2.57 31%	1.16 14%	1.83 22%	5.25 64%	2.99 36%	8.26
Elko (MLRA 25)	3.18 33%	2.74 29%	1.54 16%	2.09 22%	5.92 62%	3.63 38%	9.56
Ely (MLRA 28B)	2.23 23%	3.14 32%	2.10 22%	2.25 23%	5.37 55%	4.35 45%	9.72
Cedarville, CA (MLRA 23)	4.7 38%	3.41 27%	1.32 11%	3.07 25%	8.11 65%	4.39 35%	12.50
Reno (MLRA 26)	3.14 43%	1.74 24%	0.90 13%	1.44 20%	4.88 68%	2.34 32%	7.22

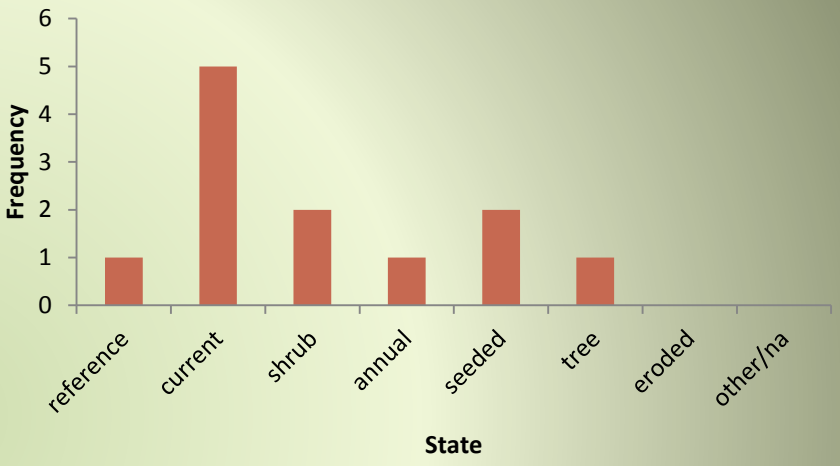
Spring-Mar, Apr, May; Summer-Jun, Jul, Aug; Fall-Sept, Oct, Nov; Winter-Dec, Jan, Feb

MLRA 28

Burned Sites
Soil Temperature
Mesic
N=8



Burned Sites
Soil Temperature
Frigid
N=12



Ecological Dynamics
Response to Disturbance

Fire #1: injures or kills plants; may cause soil damage

Fire #2: eliminates residual plants; conversion to weed dominated

Fire #3: plant cover significantly reduced; wind erosion

Fire History – the past 30+ years

MLRA	Notes	One burn	More than one
23	93	19	1
24	79	23	5
25	115	37	3
26	32	8	1
28A & 28B	310	20	0

MLRA 23

Ashy Sandy Loam 10-12
Lost Wildfire 2012 CP 2.2
Bitner soil series – ashy, glassy, mollic epipedon, mesic, aridic
Bluebunch wheatgrass/ Thurber needlegrass dominant

Clayey 10-14 – second burn
Rush Fire July 2012
Horsebrush/cheatgrass/ medusahead
Brubeck soil – slickensides
Mesic, aridic

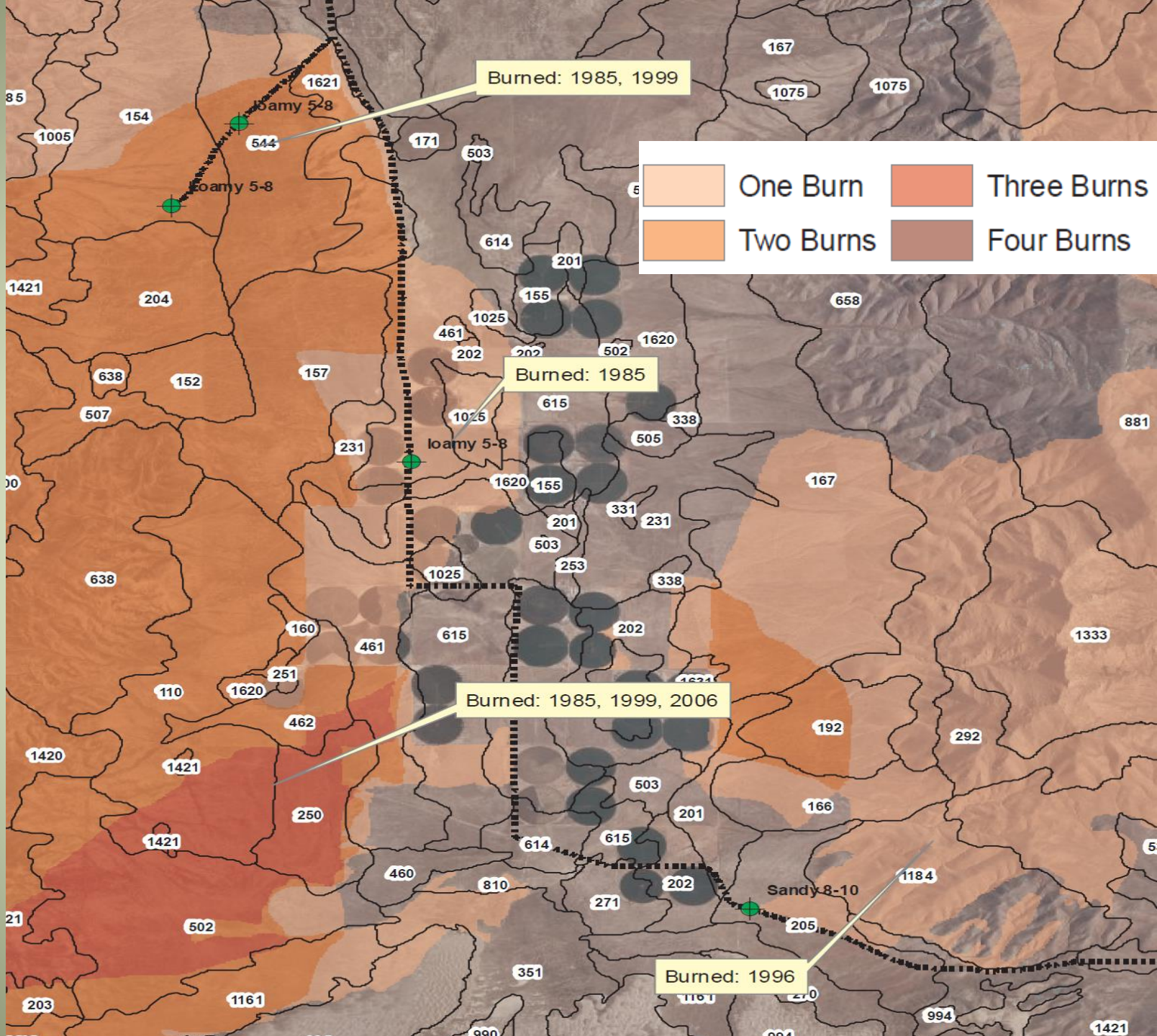
MLRA 23

Loamy 8-10"
South-facing slope
Holloway Fire – August 2012
Trunk soil series – fine, argillic, mesic, aridic

Species Composition (2013/2014)
PF – 7% / 38%
PG – 17% / 18%
AF – 17% / 11%
Shrubs – 7% / 11%
BRTE – 52% / 22%

Post fire: grazed in July each year

MLRA 24


Burned: 1985, 1999
Burned: 1985
Burned: 1985, 1999, 2006
Burned: 1996
One Burn
Two Burns
Three Burns
Four Burns
loamy 5-8
loamy 5-8
loamy 5-8
Sandy 8-10

MLRA 24

Loamy 8-10"

Wyoming big sagebrush / Sandberg Bluegrass

Fire

Sandberg Bluegrass

- **Sandberg Bluegrass competes**
- **Do not seed**
- **Graze early spring following fire**

MLRA 24

Loamy 5-8"
Shadscale / Indian Ricegrass

Multiple Fires

- Bur buttercup / shadscale
- Tumble mustard / cheatgrass
- Severe wind erosion

Loamy 8-10"

MLRA 25

- Seeding success good
- Sagebrush re-establishes

But not always

MLRA 25

Disturbance History Matters

Loamy 10-12"

- ✓ **Wyoming big sagebrush/Crested Wheat**
- ✓ **Burned Seeding**
- ✓ **2x burned (20 years)**

Granitic Slope 10-12"
1974 Wildfire
Crested wheatgrass seeding
Seeded State

Granitic Slope 10-12"
1984 and 2009 wildfires
Annual State

MLRA 28B – Prescribed Fire

Gravelly Clay 12-14"
2012 - North-facing slope
Minor occurrence of cheatgrass
Segura soil – mollic, argillic, frigid, aridic

2014- Same location – two years later dominance of cheatgrass

Post-Fire Responses and Resilience

- MLRA differences – soils, precipitation patterns, fire frequency
- Pre-fire vegetation communities/fire severity
- Timing of fire (summer/fall)
- Post-fire precipitation
- Post-fire management

Post-fire Management with Cheatgrass*

- Mechanical: Use tillage with disc or plow to bury seed after cheatgrass emerges in spring
- Revegetation: Consider reseeding with desirable species
- Grazing management: Late fall and early spring grazing to reduce seed production - leave residue amounts of 300 to 500 lbs/ac.
- Chemical: Aerial or ground broadcast spray with appropriate herbicides.

*Field Guide for Managing Cheatgrass in the Southwest, *USFS – TP-R3-16-04, Sept. 2014*

Post-fire Management with Medusahead*

- Reduce seed production for 2-3 years with multiple management techniques:
  - Mechanical: mowing, tillage
  - Grazing management: timing, intensity
  - Chemical
  - Prescribed burning: plants are still green
  - Revegetation: early successional species (AMTE)
  - Biocontrol: research with fungus (smut)

*Medusahead Management Guide, Kyser, et al 2014


Questions?