

# RANGELAND MANAGEMENT, AN ART AND A SCIENCE

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BLM San Pedro Rangeland Forum

7-27-13

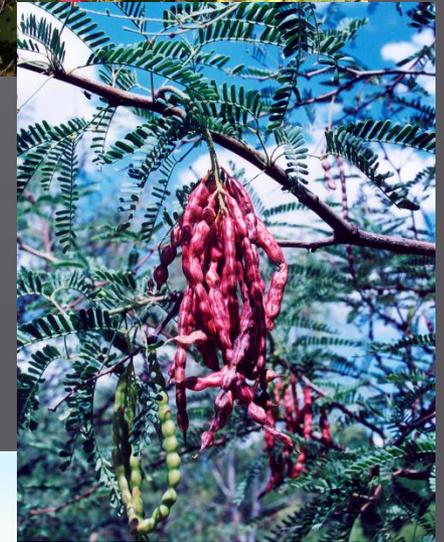
# What is Rangeland?

- ▣ Rangeland is land on which the native vegetation is predominantly grasses, grass-like plants, forbs or shrubs. It includes most deserts, grasslands, shrublands, alpine areas and savannahs. Society for Range Management, 1989.
- ▣ Uncultivated land that will provide the necessities of life for grazing and browsing animals. (Holechek, Pieper & Herbel 1998)



# Rangelands Provide

- ▣ Renewable natural resources
  - ▣ Plants (primary producers); food, forage, fuel, fiber, building materials, medicinal and cultural uses, wildlife habitat, soil formation, soil protection, biological diversity



# Rangelands and water

- Rangeland watersheds produce runoff that affects the hydrology of springs, creeks and rivers.
- Runoff water from rangelands is captured in hundreds of ways to provide water for livestock, humans and wildlife.



# Other Rangeland Uses

- ▣ Open Space
- ▣ Refuge
- ▣ Wilderness
- ▣ Military
- ▣ Conservation
- ▣ Science
- ▣ Recreation
- ▣ Archaeological and Historic
- ▣ Carbon mgmt.



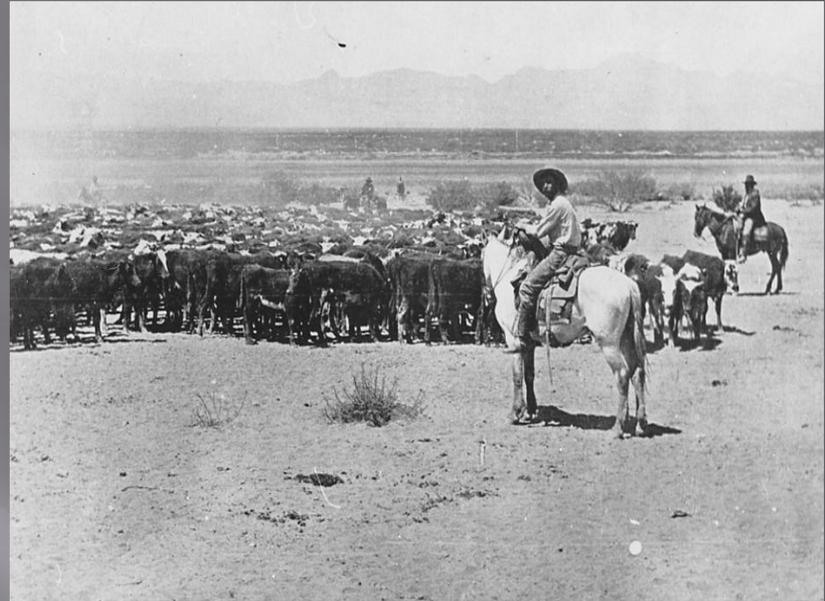
# Rangeland History in Arizona

- ❑ Native American long history in the region, foraging, farming, hunting, trading, later ranching.
- ❑ Ranching in southern Arizona began with Spanish colonization of the northern frontier of Mexico in the late 1600s
- ❑ Kino established new missions in SE Arizona. He introduced : cattle, sheep, goats, wheat, barley and fruit varieties
- ❑ Mexican Land Grants made between 1821 and 1841 (Boquillas etc, to the Elias family from 1827 to 1833)
- ❑ In 1821, with Mexican independence, the Spanish program of pacification ended and by 1850, Apaches drove people off the land grants
- ❑ The Mexican - American war ended with the treaty of Guadalupe Hildago in 1848 and later the Gadsen purchase in 1854, to bring Arizona under US government control
- ❑ After the US Civil War the Army regained control of Arizona and Anglo settlement began in earnest



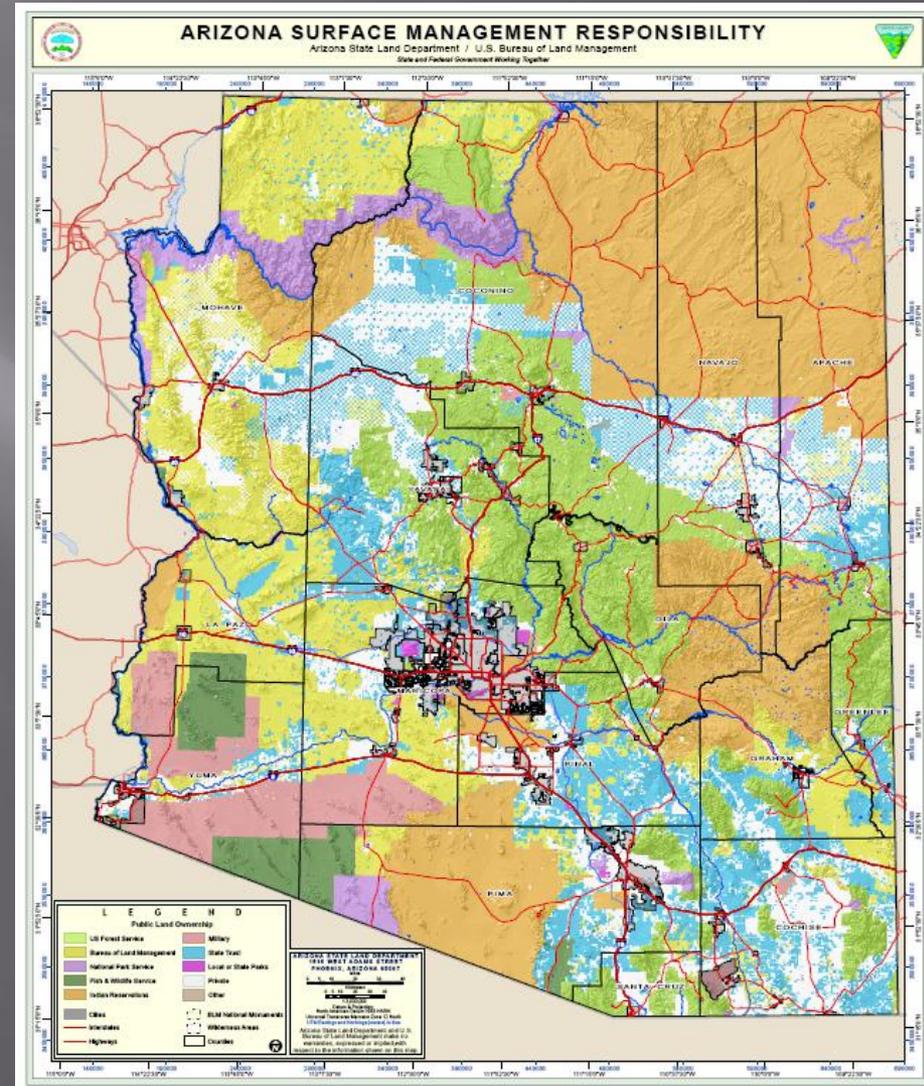
## Open Range and grazing in commons

- After 1854 all lands not secured by title become lands in the public domain
- Large ranchers and homesteaders alike could put livestock on the public land.
- Ranchers brought an European mentality with them into an arid and unpredictable environment.
- Investors from the eastern US fueled the speculation in livestock.
- By 1891 it was estimated there was over 1 million head of cattle in southern Arizona
- Drought in 1891-92 resulted in the death of over half the livestock in the area.
- Rangelands were devastated



# Arizona Statehood in 1912

- Arizona selects land from the public domain beginning in 1914 (four sections per township)
- State land adjudicated to Arizona ranchers beginning in 1916 commensurate with their private holdings and water locations controlled.
- 9.2 million acres of State Land was selected
- 12.2 million acres of public domain that later became BLM land



# Drought and Markets

- ❑ Collapse of beef markets after WW1
- ❑ Severe drought in 1920-21
- ❑ No market, no rain
- ❑ US Agriculture Service intervenes and buys cattle for dollars a head and slaughters them to avoid further damage to the range
- ❑ Severe drought in the 1930s, Soil Conservation Service formed



Cattle to be slaughtered in Deming, NM in 1921

# Taylor Grazing Act of 1934

- ❑ Established the US Grazing Service (later the Bureau of Land Management, 1946) to administer grazing and other public land uses on the public domain in Arizona.
- ❑ Ranch boundary fencing begins across much of the region.
- ❑ CCC crews construct much new fencing on federal lands.
- ❑ Private and state lands are fenced by the ranchers finishing as late as the 1950s.



1935-36 fence on top of the Babaquivari mountains ; built by the O'Odham CCC crews.

# Conservation

- Arizona Soil and Water Conservation Districts formed in 1942 under State Law
- Arizona's 41 conservation districts are legal subdivisions of state or tribal government. They link private landowners, local units of government, state or tribal agencies and the federal government in a unique cooperative relationship.
- Districts (now called Natural Resource Conservation Districts, NRCs) are established and governed by local landowners
- Arizona conservation districts include rangelands within their boundaries, 1954
- Soil Conservation Service hires range conservationists to work on non-federal lands in Arizona, 1956



# Ranching and Range Management, the Production Era

- ▣ Ranching and Rangeland Management in the 50s and 60s focused on developing ranges for maximum production of livestock products; hopefully, within the capabilities of the land



# Environmental Changes in the 70s and 80s

- ▣ New Federal legislation like the ESA (1973), Clean Water Act (1972), NEPA (1969), FLPMA (1976).
- ▣ Federal agencies react with livestock reductions and land swaps to consolidate ownership and facilitate better management.
- ▣ Management plans and grazing systems implemented.



New fencing and livestock rotation on the Palo Alto Ranch in the Altar Valley

# Rancher and Collaborative Groups Form in the 90s and 2000s

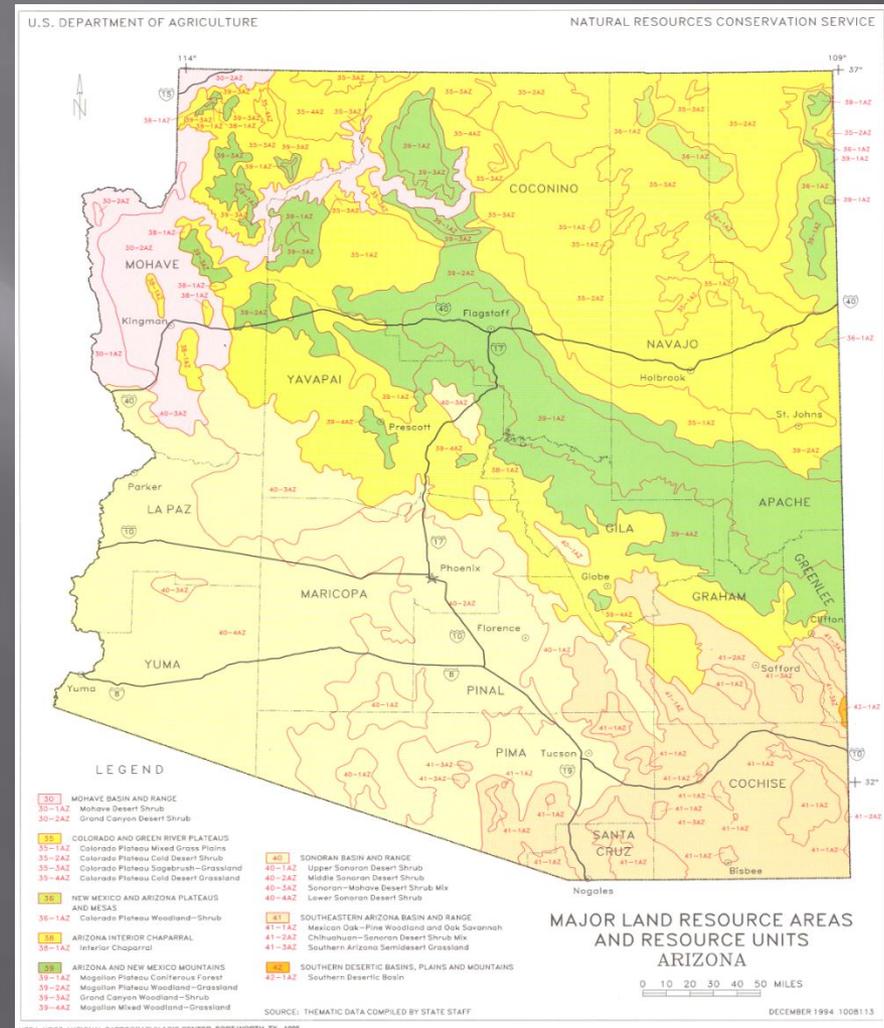
- ❑ Malapais Borderlands Group, 1+ million acres in AZ, NM and Mexico, to deal with land development, environmental, fire and border issues.
- ❑ Altar Valley Conservation Alliance, 11 Ranchers on ½ million acres in southern Pima County to deal with the Pima County Sonoran Desert Conservation Plan.
- ❑ Sonoita Valley Planning Partnership, to assist BLM in planning and management of the Las Cienegas area.
- ❑ Redrock Watershed Group, Several ranchers in the Canelo Hills and San Rafael Valley, to effectively deal with USFS issues.



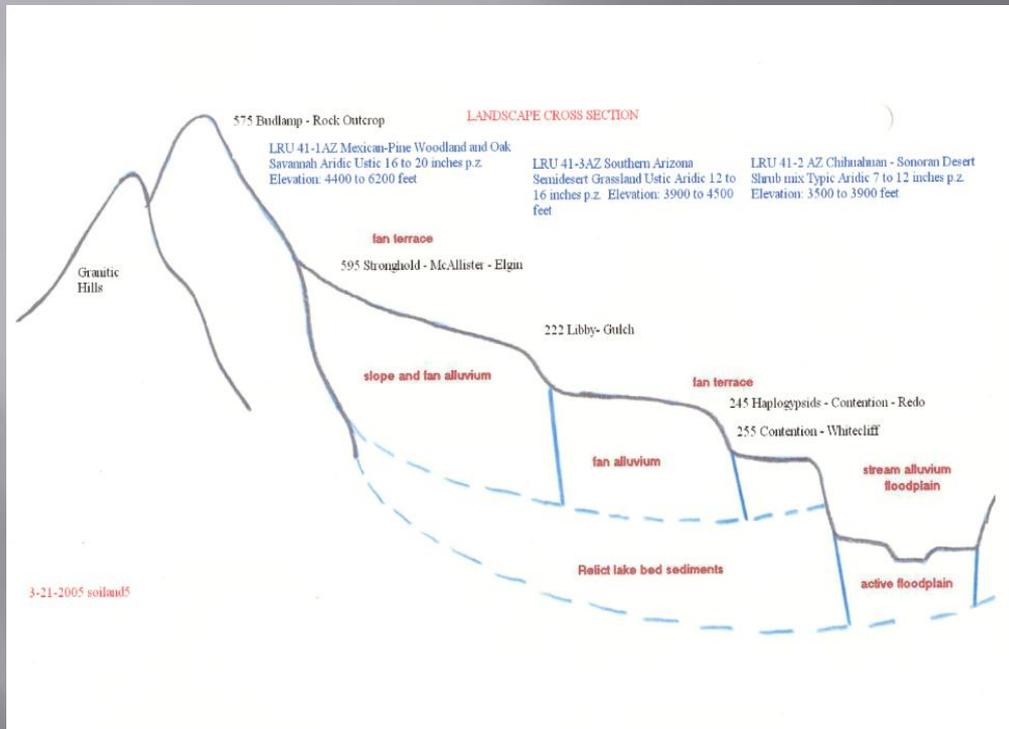
Altar Valley Conservation  
Alliance science tour

# Rangeland Technical Guides Evolve to Meet the Needs

- MLRA – Major Land Resource Area – MLRAs represent ecosystems in Ariz. An ecosystem is a naturally interacting community of plants, animals and their surrounding environment.
- Ecological Sites are units of land within MLRAs that have similar soils and which can produce a certain kind and amount of vegetation
- Ecological sites are components of life-zones within ecosystems. They are useful for land inventory, classification and management.



# Soil Scientists work out the basic soil – landscape relationships



From Adams Peak looking west to the San Pedro River



# Soil series are described and correlated within the National Cooperative Soil Survey



# Range Specialists work with soil scientists to compare and describe the plant communities on the soils being mapped



# Reference Area and Historic Information is used



Border monument # 138, 1893

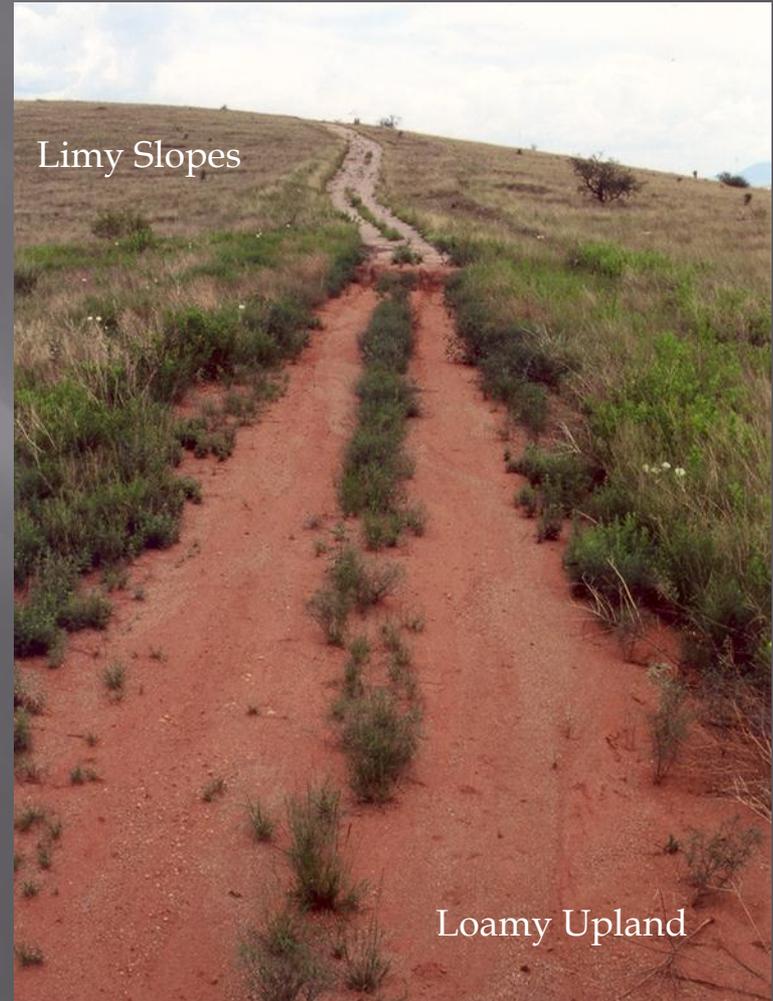


Border monument # 138, 1983



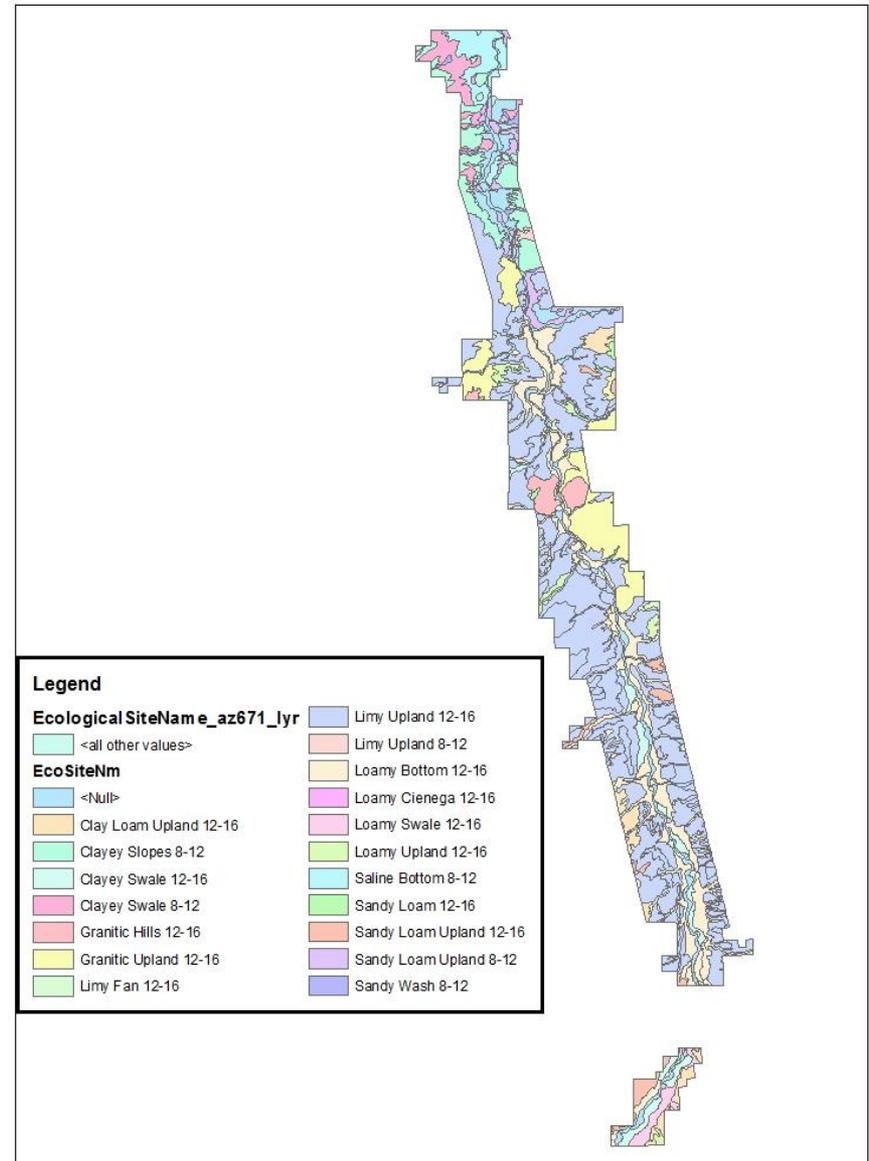
# Information in Ecological Site Descriptions (ESDs)

- Information on the potential plant community (best we have been able to find to date)
  - What is best? the highest production, the most plant cover and the highest biotic diversity found on a site to date.
- Interpretations for major land uses like wildlife and grazing management, recreation and other natural products.
- Climatic information
- Soils description, physiography, hydrology, growth curves, vegetation structure and cover
- Associated and similar sites
- Type locations and site documentation



# Ecological Sites along the San Pedro

- Soils from “Soil Survey of Cochise County, Douglas – Tombstone Part” USDA, Natural Resources Conservation Service, 2001
- Ecological Site Descriptions from USDA, NRCS Ecological Site Information System, ESIS



# Rangeland Vegetation and Monitoring

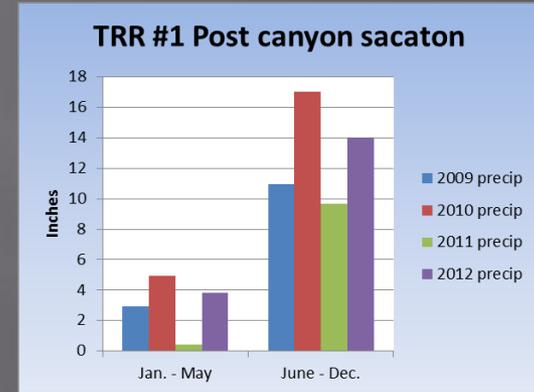
- ▣ Locations must be representative
- ▣ Location must be accessible
- ▣ Should be repeatable
- ▣ Should involve minimal bias
- ▣ Not research
- ▣ Used to learn and make management decisions
- ▣ It is hard, dirty work
- ▣ It is time consuming
- ▣ It is expensive
- ▣ It often does not get done!



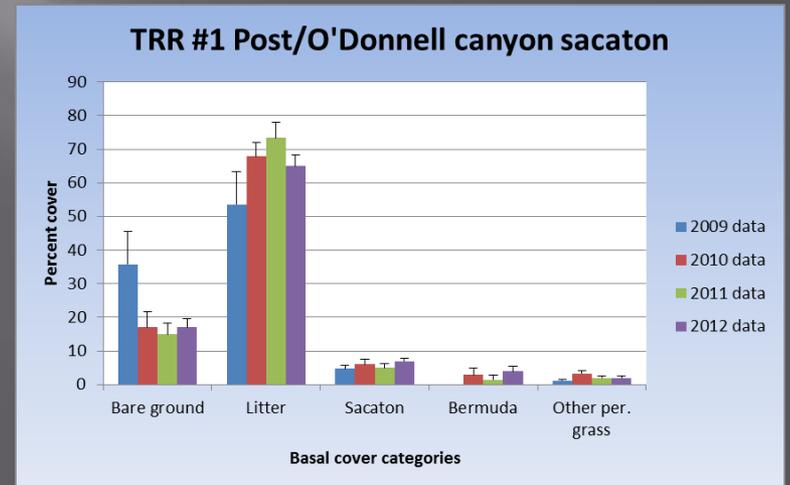
# Why Monitor?



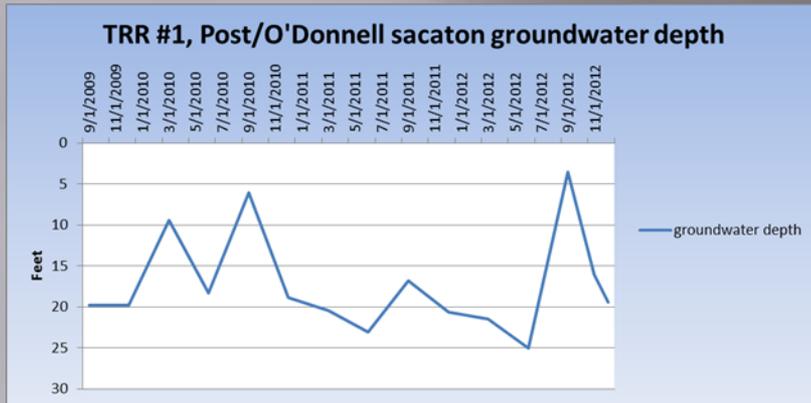
Linda Kennedy and Ron Tiller at ARR #1, 8-10-09



ARR #1 transect line after Canelo fire, 6-1-09,



# Audubon Research Ranch, Management, ARR #1 Post Canyon/O'Donnell Sacaton



Research Ranch, Post Canyon sacaton 8-10-09



Research Ranch, Post Canyon flood 7-8-12



Research Ranch, Post Canyon sacaton 11-7-12

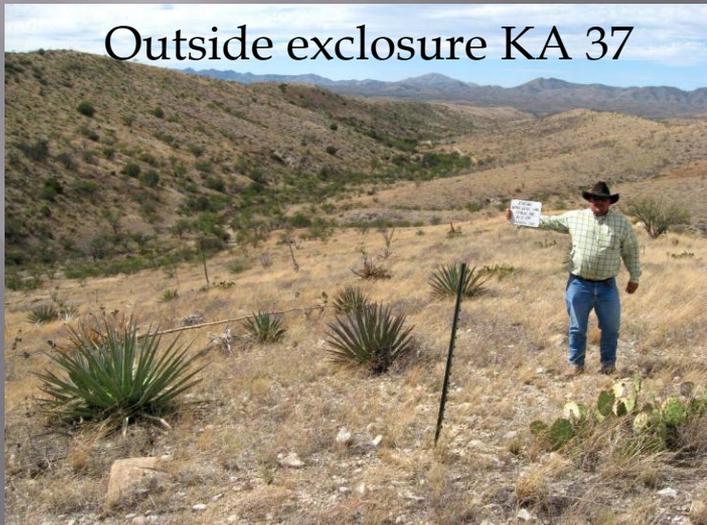
# Empire Ranch Adaptive Management

Utilization in the Upper Woods Canyon, Apache Pasture KA 38 & 37



Forage crop, Woods Canyon, 10-5-09

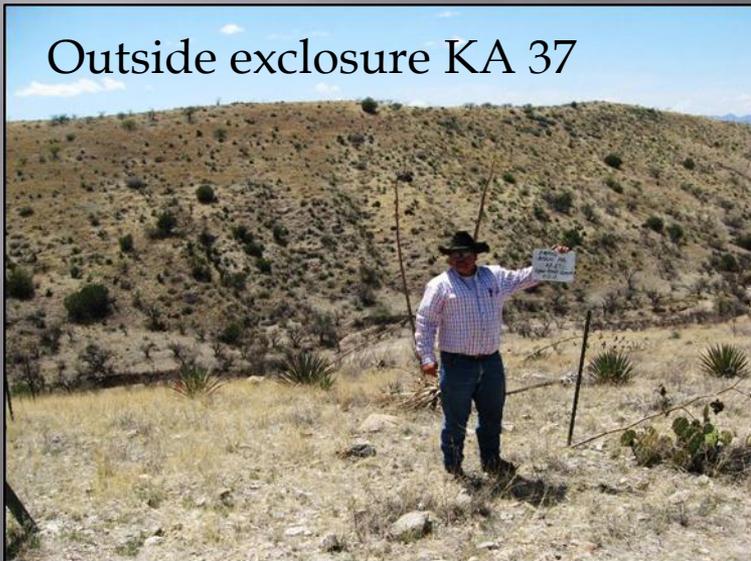
Utilization after winter use, 3-11-10



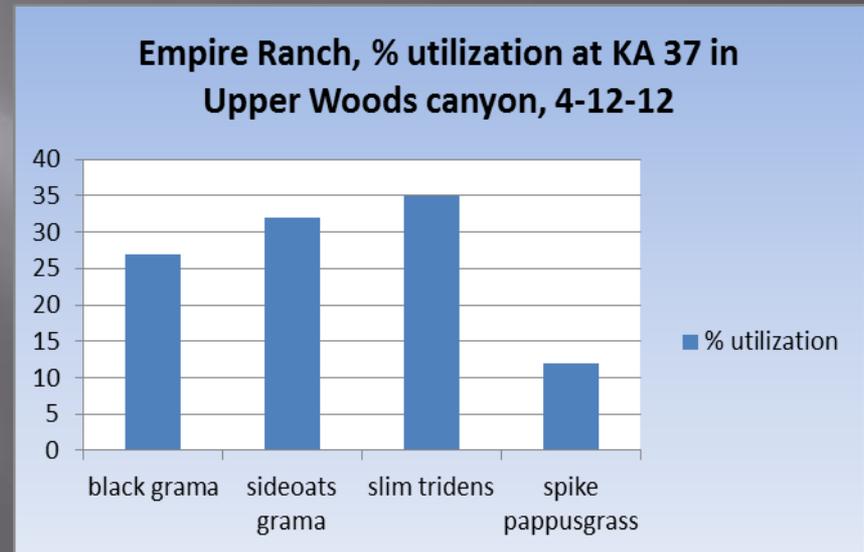
# Apply Management, Monitor, Improve Management



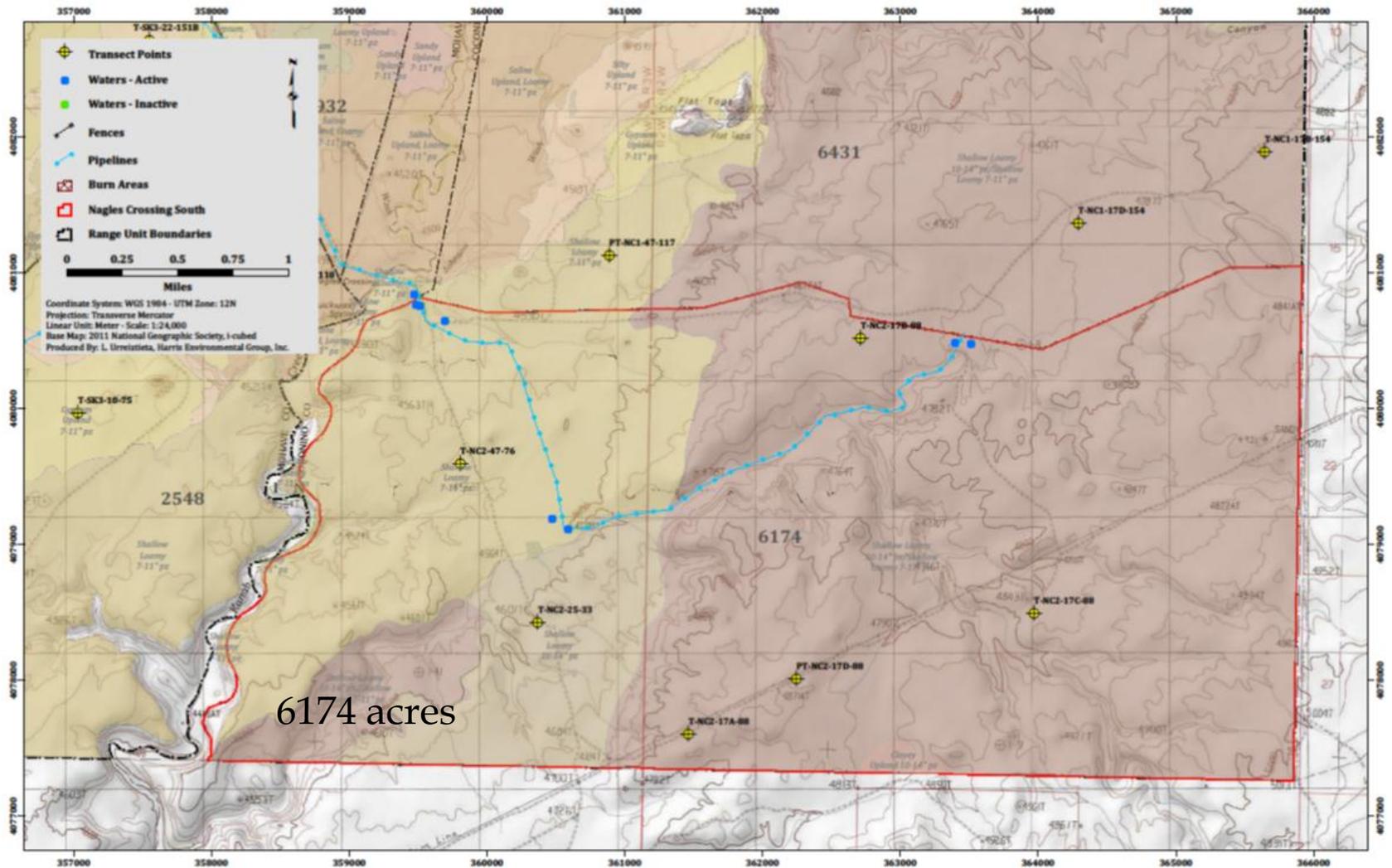
Forage crop, Woods Canyon ,



Utilization after winter use , 4-12-12



# Rangeland Inventory, an example



# Systematic sampling of ecological sites by transects for plant species production and total production and cover

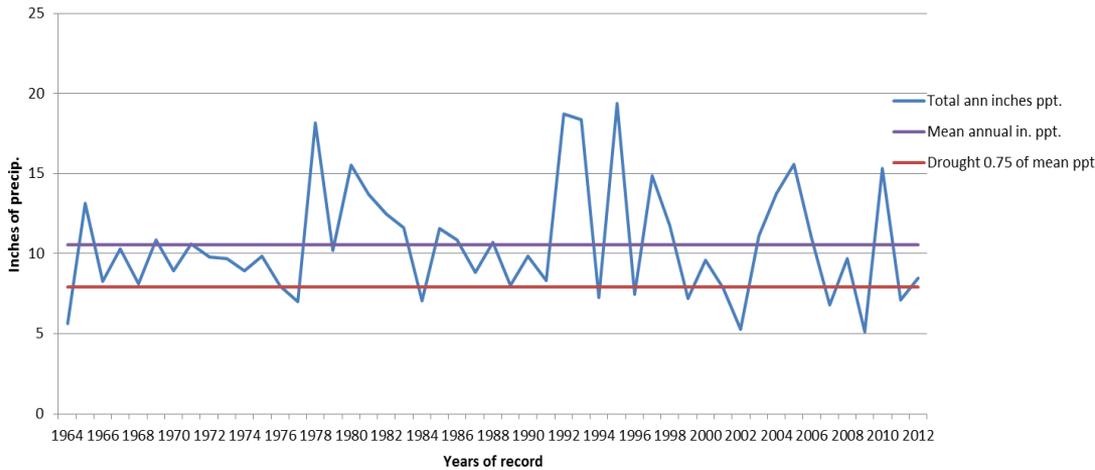


# Summarize results

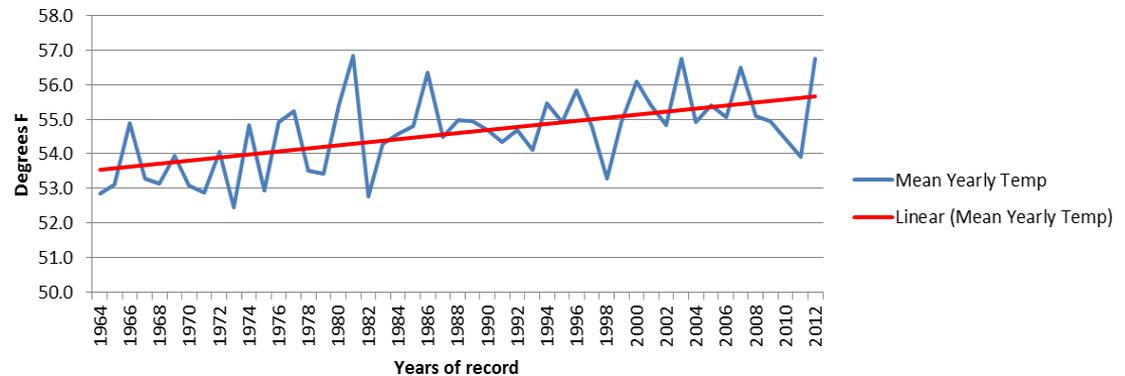
- ▣ For each ecological site
  - Calculate pounds per acre by forage species and by utilization factor (from 20-50%) for each species
  - Rule of thumb – use no more than 50% of the plants green tissue (by weight) each year to keep plants healthy and allow them to reproduce)
  - Multiply by acres of the ecological site
  - Adjust for % slope and distance from water
  - **An Animal Unit Month is equal to the amount of forage needed for one animal (1000 lb. cow and calf) for one month (AUM)**
  - In Arizona we use a figure of 1000 lbs (air dry) of forage for one AUM
  - Determine AUMs available for that year
  
- ▣ Repeat for the other ecological sites in pasture
- ▣ Get total AUMs for pasture for that year
- ▣ Modify recommendation based upon climatic trends, current stocking levels and apparent rangeland trends

# Climate and Rangeland Trend

Pipe Springs Nat. Monument, 1964 - 2012, annual precip.



Pipe Springs Nat. Monument, 1964-2012, Mean Yearly Temperature,



# Calculate Stocking Rate

- ▣ Ecological Site A –
  - 4012 acres
  - 156 lbs/ac useable forage (air dry)
  - $156 \times 4012 = 625872 \text{ lbs} / 1000 = 626 \text{ AUMs}$
- ▣ Ecological Site B –
  - 1480 acres
  - 59 lbs/ac useable forage (air dry)
  - $59 \times 1480 = 87320 \text{ lbs} / 1000 = 87 \text{ AUMs}$
- ▣ Ecological Site C –
  - 682 acres
  - 30 lbs/ac useable forage (air dry)
  - $30 \times 682 = 20460 \text{ lbs} / 1000 = 20 \text{ Aums}$

**AUM = forage needed for one 1000 lb cow and calf for one month**

**Total AUMS =  $733 / 12 \text{ months} = 61 \text{ cows yearlong}$**

**Sampling done in June-July 2013 was done in an average rainfall year.**

**Modify recommendation based upon climatic trends, current stocking levels and apparent rangeland trends.**

**Recommended stocking at 65% of an average year =  $61 \times .65 = 40 \text{ cows}$**

# Livestock Grazing Management Strategies

- ❑ Fencing and water development to allow for control of grazing livestock
- ❑ Rotation grazing practiced to allow for natural processes (fire, drought) and recovery and reproduction of plants and animals
- ❑ Water locations, salting, herding and supplemental feeding used to distribute grazing across the landscape
- ❑ Livestock management to keep the most productive and efficient animals on the land



# Summary

- ▣ What are Rangelands
- ▣ What they provide for us
- ▣ History of human use of rangelands
- ▣ Technical tools for rangeland classification
- ▣ Monitoring plant communities and climate
- ▣ Adaptive management of rangelands
- ▣ Carrying capacity of rangelands
- ▣ Management Strategies



# Rangeland Web Resources

- ▣ NRCS Ecological Site Descriptions  
<http://esis.sc.egov.usda.gov>
- ▣ NRCS Field Office Technical Guide  
<http://www.az.nrcs.usda.gov>
- ▣ NRCS Soil Survey information  
<http://www.soils.usda.gov>
- ▣ UA CALS, Rangelands West,  
<http://globalrangelands.org/rangelandswest>
- ▣ Society for Range Management,  
<http://www.rangelands.org/>
- ▣ Santa Rita Experimental Range  
<http://www.snr.arizona.edu/infrastructure/srer>
- ▣ Arizona Section Society for Range Management,  
<http://azrangelands.org/>
- ▣ Jornada Experimental Range,  
<http://jornada.nmsu.edu/>
- ▣ Western Regional Climate Center,  
<http://www.wrcc.dri.edu/>