

Understanding and Responding to Drought

Charles Taylor

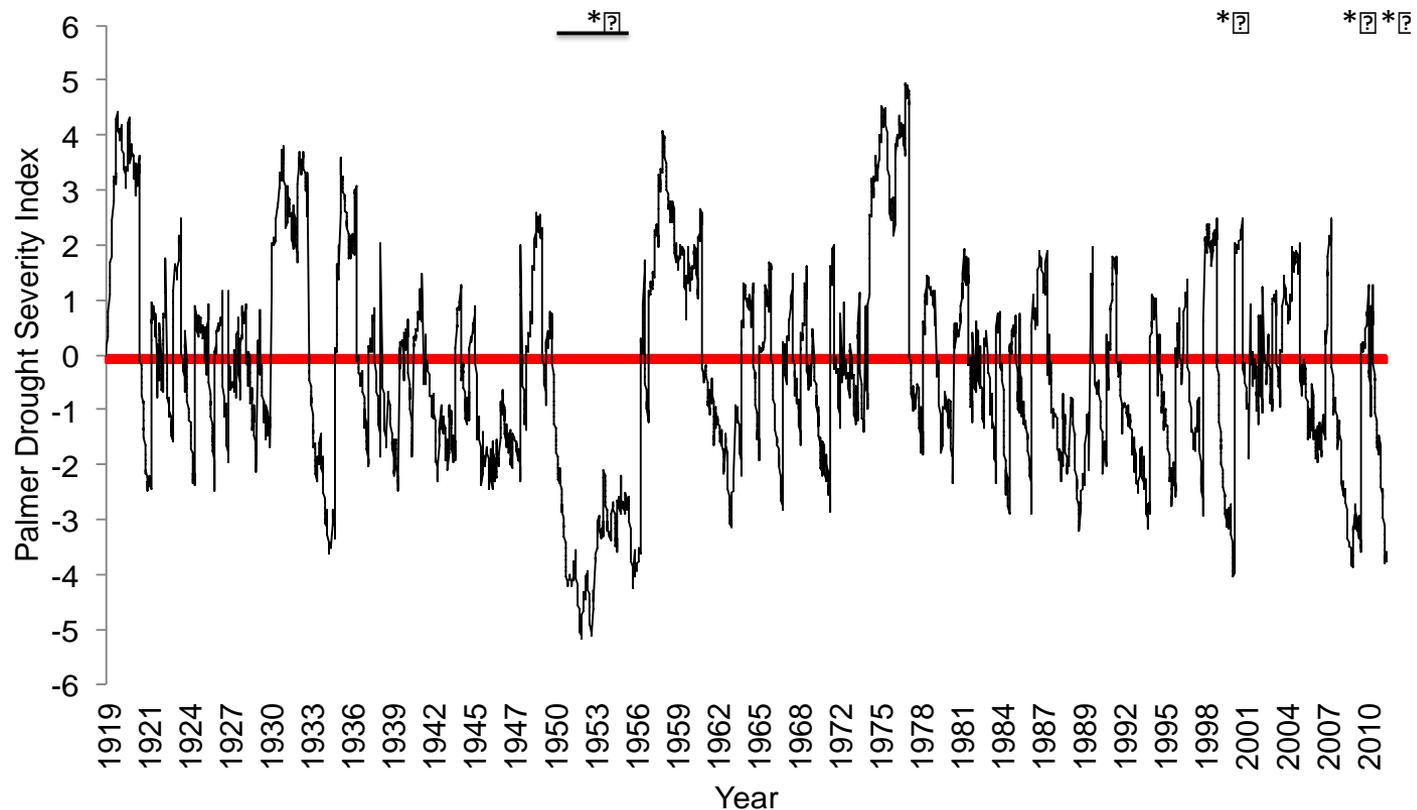
Texas A&M AgriLife Research

Drought – Is an insidious hazard (risk) to ranching

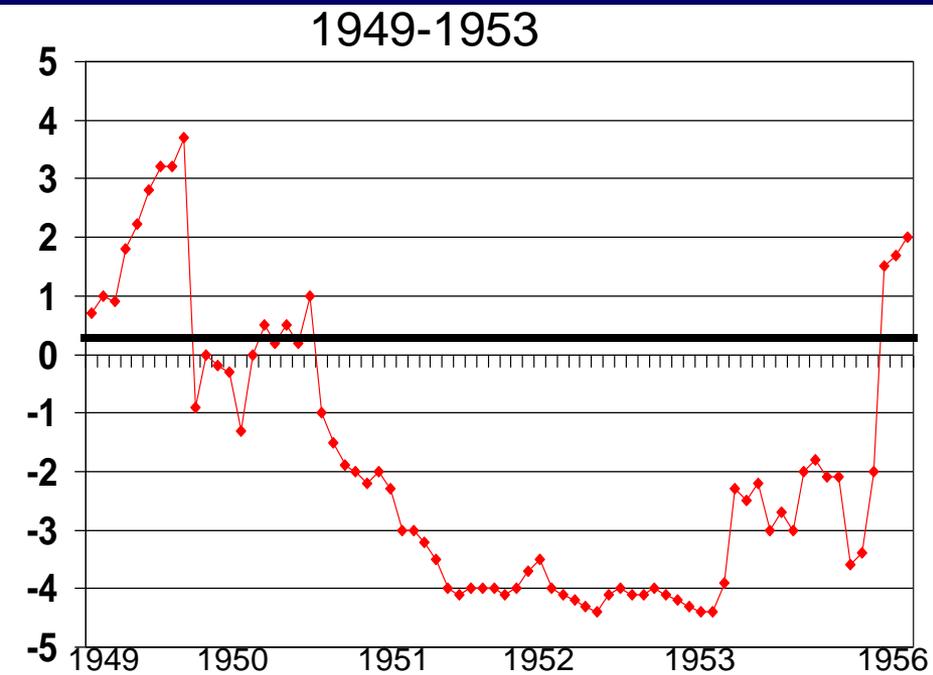
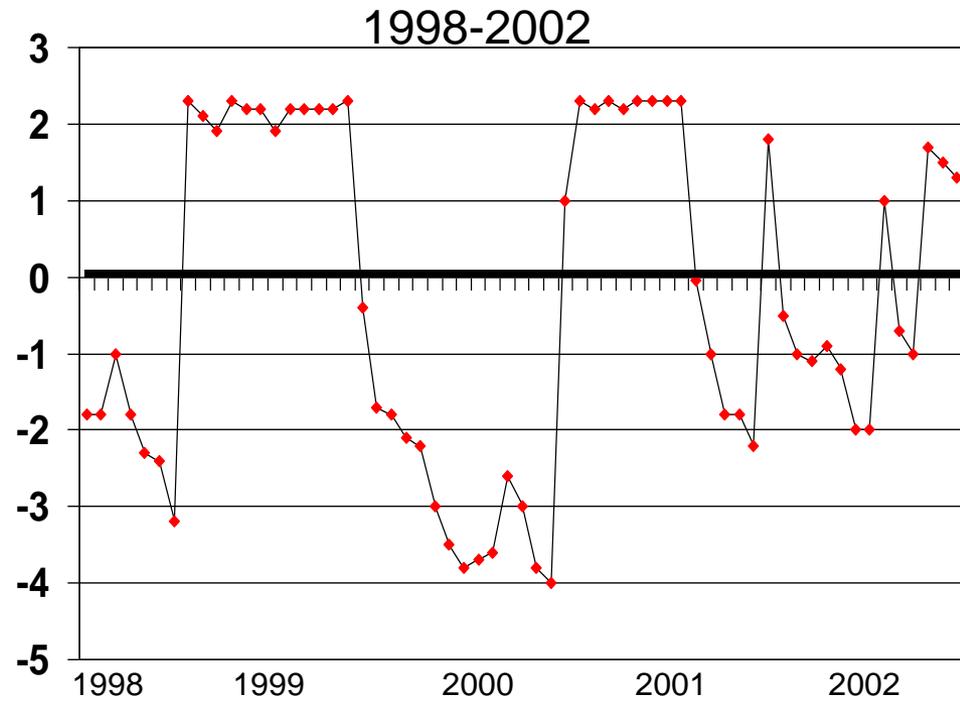


Weekly Palmer Drought Severity Index (PDSI) values for the last 93 years at the Sonora, Texas Agrilife Research Station.

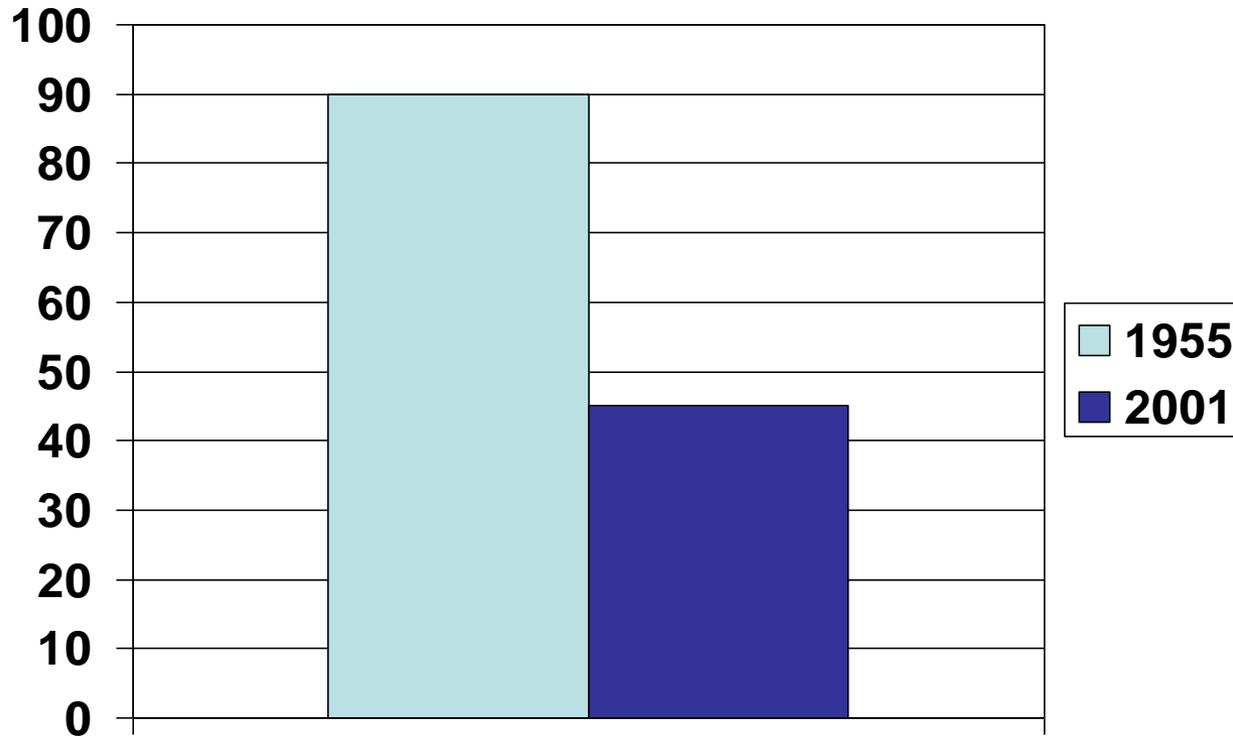
PDSI measures the deficit or surplus rainfall relative to the rainfall needed to maintain adequate soil water content for normal growth of plants (Palmer 1965, PDSI 2003).



Palmer Drought Severity Index values for the years 1949 to 1956 & 1992 to 2002 for the Texas AgriLIFE Research Station-Sonora.



Percentage of long-term plots with perennial grasses for all grazing treatments at the Sonora Experiment Station years 1953 and 2002



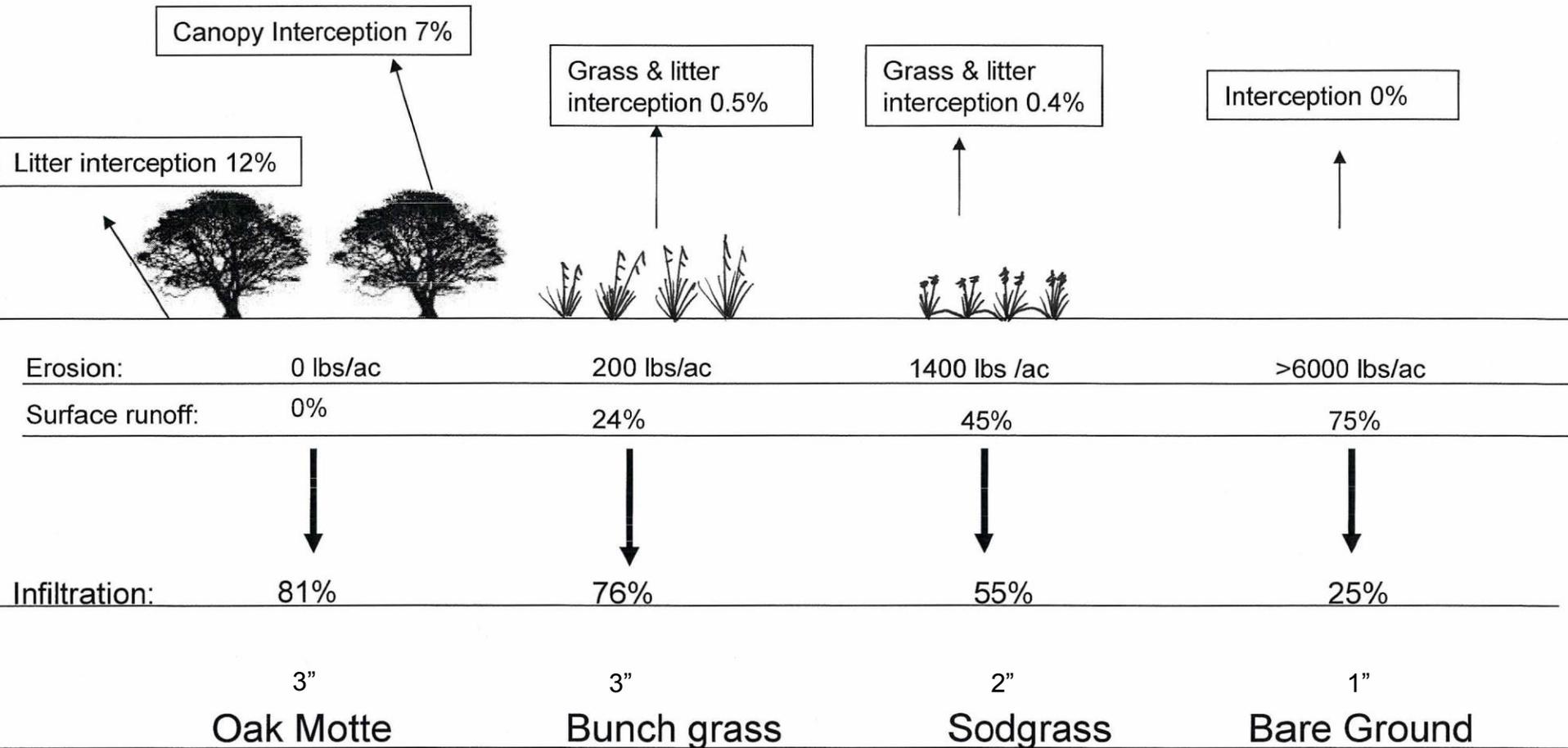
Stocking rate in 1955 was 2x Stocking rate in 2001

1955-Juniper Canopy =1%

2001-Juniper Canopy >40%

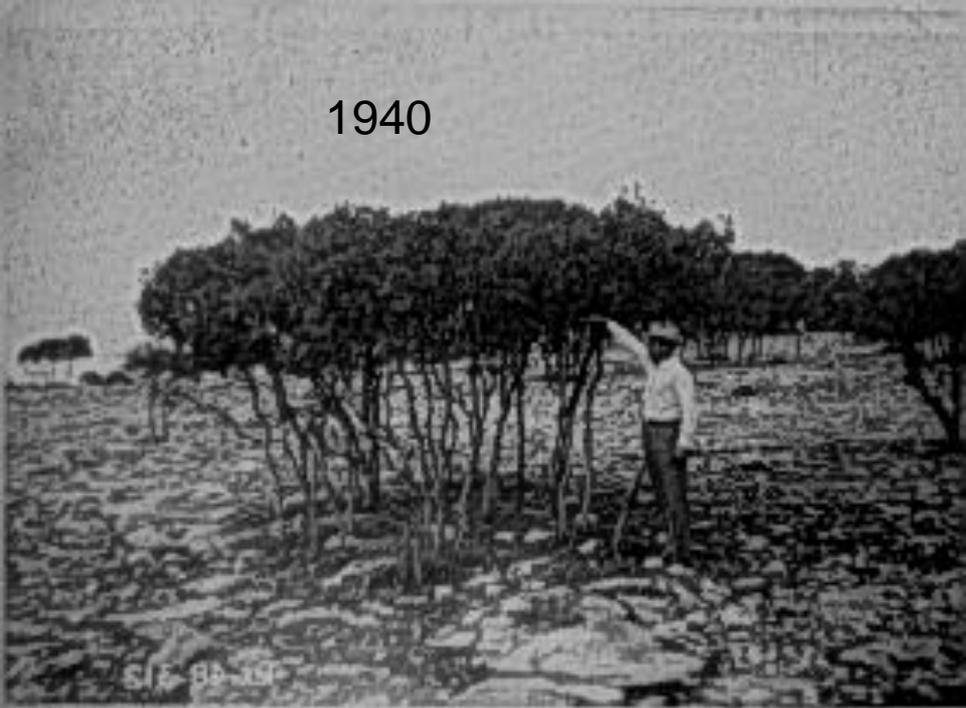
Runoff, infiltration, erosion, and interception from Oak, bunchgrass, sodgrass and bare Ground.

Based on 3.9 inches of rainfall in 30-minutes





1940



1993







Fire

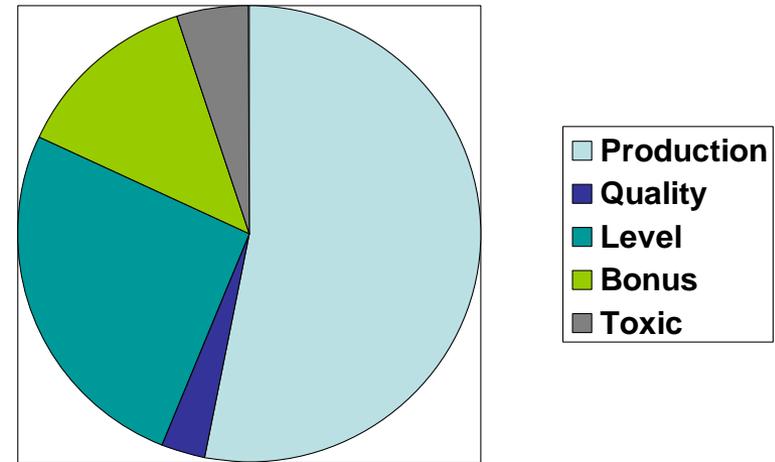
Drought

Grazing/Browsing

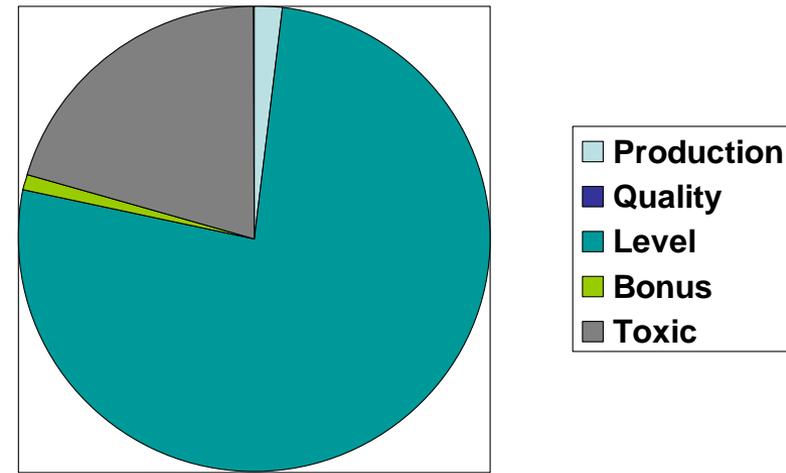
We need to understand our Forage for Livestock/wildlife

- **Production component** – Perennial, warm-season grasses.
- **Quality component** – Perennial, warm-season forbs, legumes and browse plants.
- **Level component** - The combined contribution of evergreen plants (prickly pear, juniper, live oak, Texas Wintergrass, and sacahuista fit into this category).
- **Bonus component** – All desirable annual plants, fruit and mast.
- **Toxic component** – All poisonous plants.

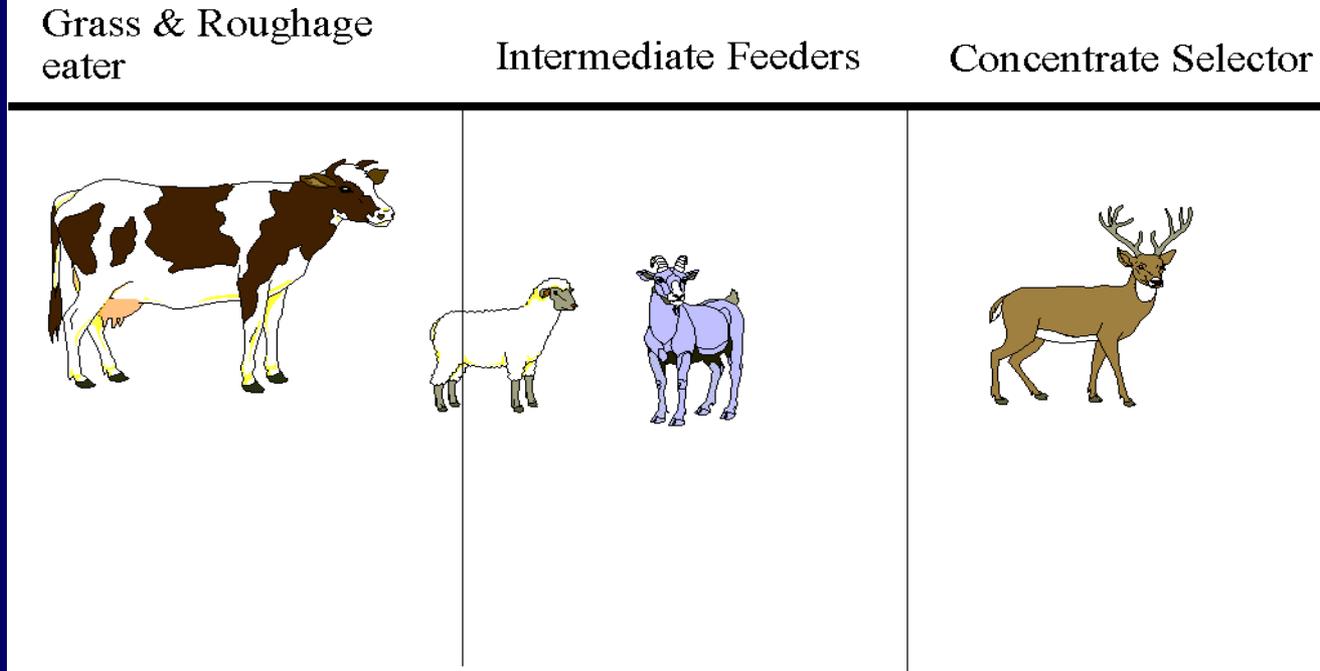
Normal Year



Current Conditions for 2013



Species of livestock Used Ruminant Feeding Types



% Browse in Diet	5	25	50	65
% Grass in Diet	90	50	35	10
Mouth opening	wide	narrow	narrow	narrow
Lips	rigid	flexible	flexible	flexible
Jaw muscles	heavy		light	light
Tongue	thick	thick	slender	slender





Cattle Only
(20-years)

Goats Only
(20-years)



Responding to Drought: Conclusions

1. Stocking rate has to be flexible (balance forage demand with forage supply).
2. Managing for a mixture of kinds and classes of livestock & wildlife offers more flexibility and marketing opportunities.
3. Implement a monitoring system for grazing/browsing” use on vegetation and an estimate of forage production (this information is needed to determine proper stocking rate).
4. Long-term grazing/prescribed fire management plans need to be developed (because the only way to maintain a productive grassland with good forage quality and quantity is to implement a regular burning program).

Parting thoughts

What if the climate is getting hotter and drier?

1. Animal thermal stress will increase
2. Forage quality will decline
3. Woody plant encroachment will accelerate even more.
4. Historical stocking rates may need to be adjusted downward
5. Restoration of fire and grazing/browsing regimes to maintain ecosystem structure, function, and resilience will require the development of a new management paradigm.