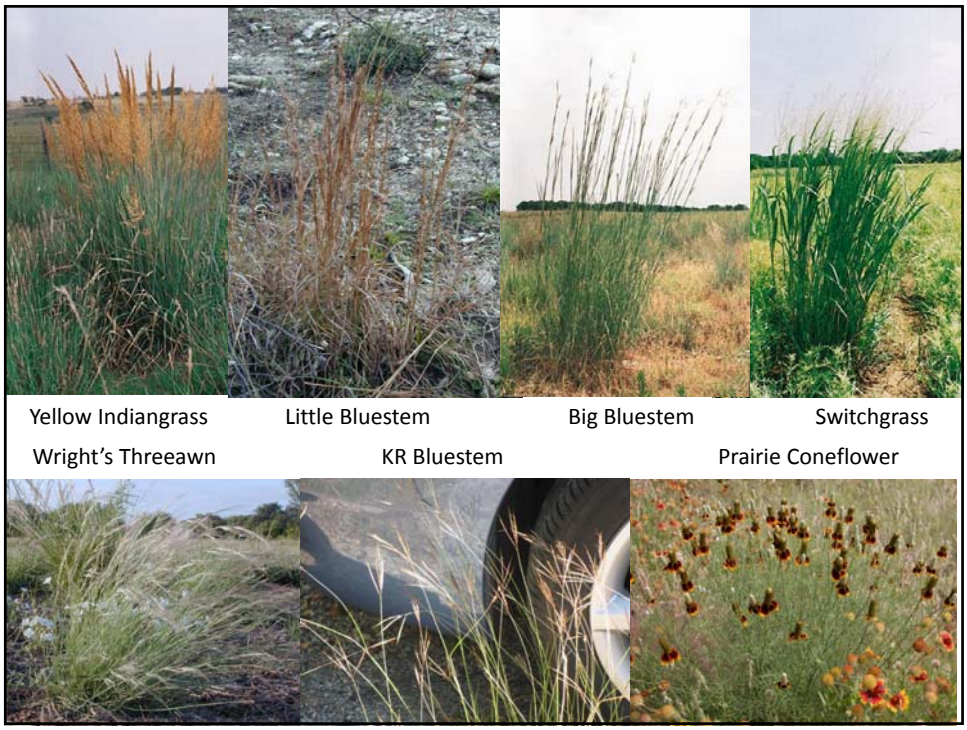
Balancing Supply & Demand
TEXAS A&M
AGRILIFE
EXTENSION

What is “Job One”?


Yellow Indiangrass
Little Bluestem
Big Bluestem
Switchgrass
Wright's Threeawn
KR Bluestem
Prairie Coneflower

Stocking Rate vs. Carrying Capacity

- Stocking rate
  - Acres allotted to an animal
  - Acres/animal unit/year
- Carrying capacity
  - Stocking rate possible w/o resource damage
  - Numbers ***not set in stone***, only guidelines

Carrying Capacity/Stocking Rate Considerations

Take Half-Leave Half

- Take half
  - 25% to livestock
  - 25% to trampling, insects, decay
- Leave half
  - Protect soil
  - Plant vigor & protection

Animal Unit

- relates different animals to a common base – forage consumption. An animal unit is the number of animal(s) which consume **26 pounds** of forage (DM) per day.

1,000 lb cow
5 sheep
6 goats
7 deer
17 jackrabbits
52 free-range hens

"Animal Unit"

	wt.
Aoudad	200
Axis	160
Blackbuck	75
Fallow	130
Mouflon	120
Red Deer	450
Sika	145
Whitetail	100
Cattle	**1000**
Sheep	90
Spanish goat	90
Boer X goat	135

from *Exotics on the Range*, Mungall & Sheffield, 1994

"Animal Unit"

	wt.	intake
Aoudad	200	0.035
Axis	160	0.035
Blackbuck	75	0.04
Fallow	130	0.035
Mouflon	120	0.035
Red Deer	450	0.03
Sika	145	0.035
Whitetail	100	0.035
Cattle	**1000**	**0.026**
Sheep	90	0.04
Spanish goat	90	0.04
Boer X goat	135	0.04

from *Exotics on the Range*, Mungall & Sheffield, 1994

"Animal Unit"

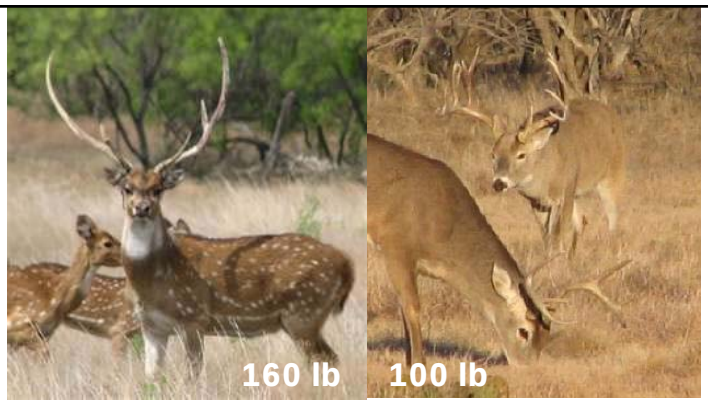
	wt.	intake	lb/day
Aoudad	200	0.035	7.00
Axis	160	0.035	5.60
Blackbuck	75	0.04	3.00
Fallow	130	0.035	4.55
Mouflon	120	0.035	4.20
Red Deer	450	0.03	13.50
Sika	145	0.035	5.08
Whitetail	100	0.035	3.50
Cattle	**1000**	**0.026**	**26.00**
Sheep	90	0.04	3.60
Spanish goat	90	0.04	3.60
Boer X goat	135	0.04	5.40

from *Exotics on the Range*, Mungall & Sheffield, 1994

"Animal Unit"

	wt.	intake	lb/day	AUE	hd/AU
Aoudad	200	0.035	7.00	0.27	3.7
Axis	160	0.035	5.60	0.22	4.6
Blackbuck	75	0.04	3.00	0.12	8.7
Fallow	130	0.035	4.55	0.18	5.7
Mouflon	120	0.035	4.20	0.16	6.2
Red Deer	450	0.03	13.50	0.52	1.9
Sika	145	0.035	5.08	0.20	5.1
Whitetail	100	0.035	3.50	0.13	7.4
Cattle	**1000**	**0.026**	**26.00**	**1.00**	**1.0**
Sheep	90	0.04	3.60	0.14	7.2
Spanish goat	90	0.04	3.60	0.14	7.2
Boer X goat	135	0.04	5.40	0.21	4.8

from *Exotics on the Range*, Mungall & Sheffield, 1994



Daily DM intake	**5.6 lb**
Head/AU	**4.6**

Daily DM intake	**3.5 lb**
Head/AU	**7.4**

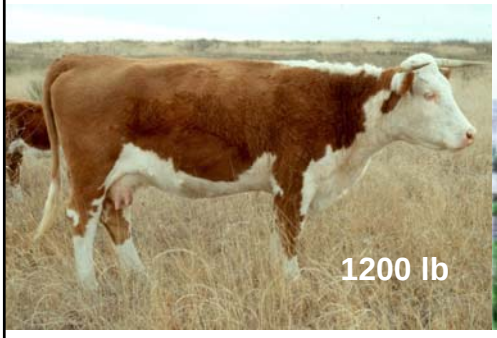
1 AU consumes = 26 lb DM/day

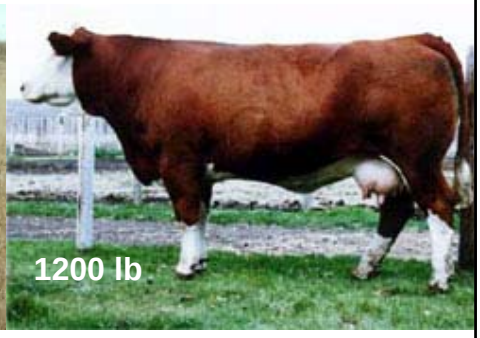
Daily DM intake	**4.0 lb**
Head/AU	**6.4**

Daily DM intake	**7.2 lb**
Head/AU	**3.6**

1 AU consumes = 26 lb DM/day

How many 1,000 lb cow's are out there?





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Stocking Rate Considerations

Animal Size

- Proper stocking rate (carrying capacity) example:
  - **30 ac** animal unit/year
- Animal unit (1000-lb cow w/ calf)
  - Expected forage demand, **26 lbs/day (0.026 x BW)**
- 1200-lb cow
  - Forage demand, 1200 lbs x **0.026 = 31 lbs/day**
  - Animal unit equivalent (aue), 31 lbs ÷ 26 lbs = 1.2 aue
  - Stocking rate, **30 ac/AUY x 1.2 aue** = ***36 ac/cow***

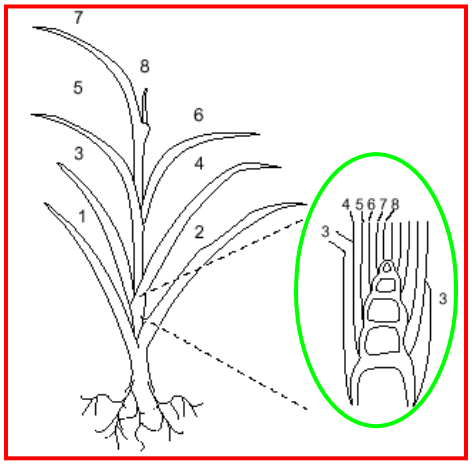
Stocking Rate Considerations

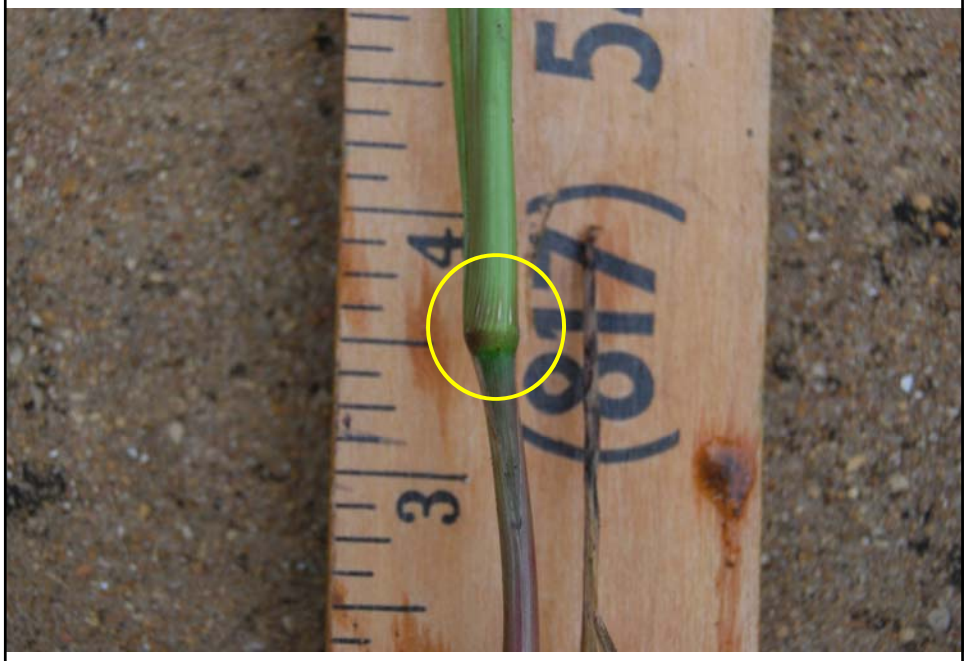
Animal Productivity

- Proper stocking rate (carrying capacity) example:
  - **30 ac** /animal unit/year
- 1150-lb cow, weaning **500-lb calf**
  - Forage demand, 1150 lbs x **0.026 = 30 lbs/day**
  - Animal unit equivalent, 30 lbs ÷ 26 lbs = 1.15
  - Stocking rate, **30 ac/AUY x 1.15 aue = 35 ac/cow**
- 1150-lb cow, weaning **570-lb calf**
  - Forage demand, 1150 lbs x **0.03 = 35 lbs/day**
  - Animal unit equivalent, 35 lb ÷ 26 lb = 1.35
  - Stocking rate, **30 ac/AUY x 1.35 aue = 40 ac/cow**

How Grasses Grow

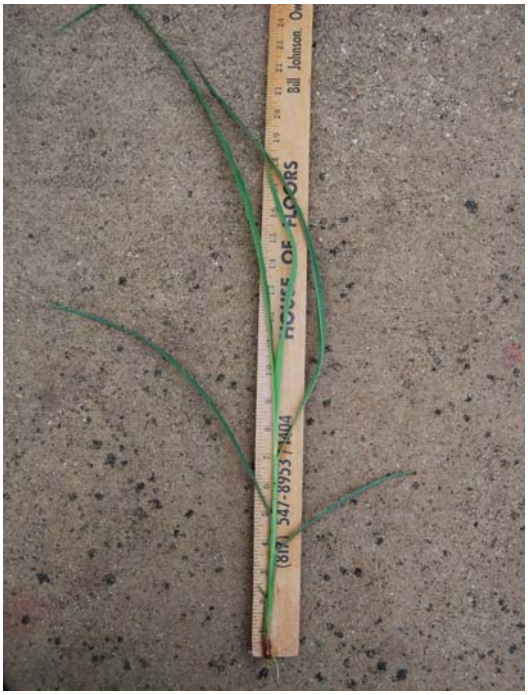
- ❸ Growing point
  - close to ground
    - protected
    - produce leaves 1-2 yrs
  - elevated
    - unprotected
    - eaten/makes seedhead: dies



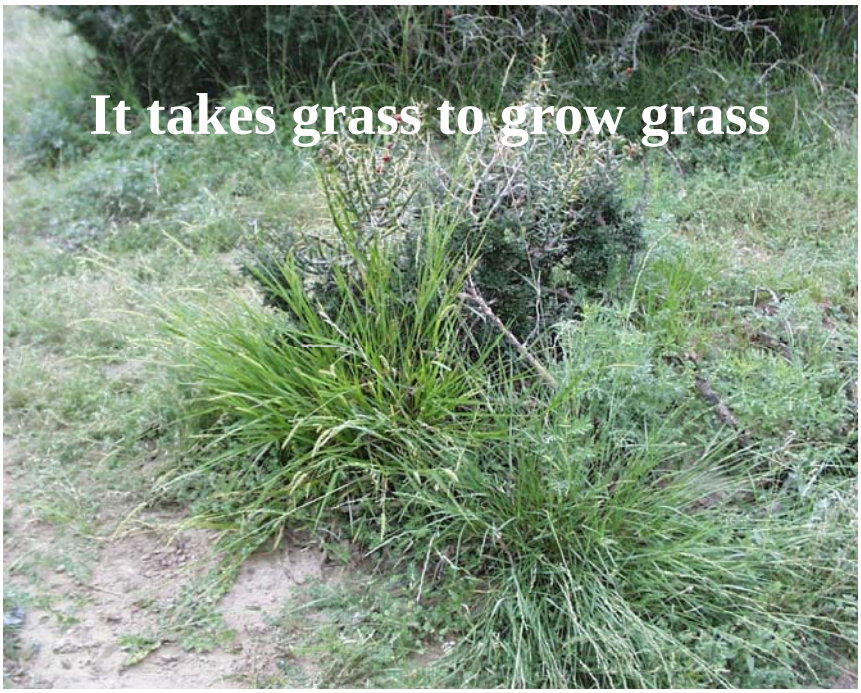


Growing Point Elevation & Grazing Resistance

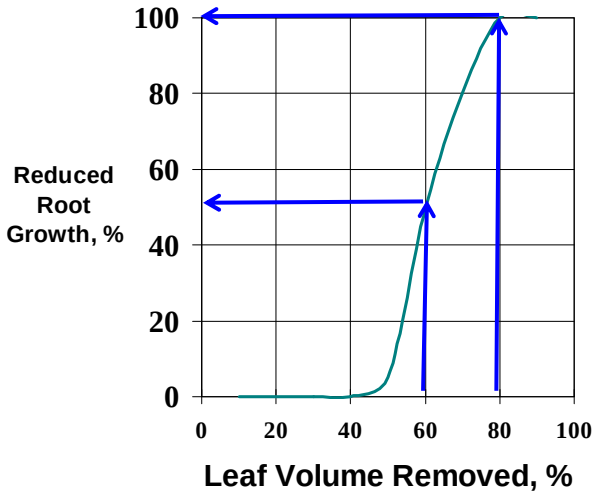
Grass species	Growing point elevation/ reproductive tiller ratio	Grazing resistance
Buffalograss	Remain close to ground	High
Little bluestem	Elevation late w/ large number reproductive tillers	Moderate
Sideoats grama	Elevation late w/ large number reproductive tillers	Moderate
Switchgrass	Early	Low
Yellow Indiangrass	Early	Low
Johnsongrass	High number reproductive tillers	Low


(817) 347-8953 / 1404
HOUSE OF FLOORS
Bill Johnson. Ow

6
7
8
8953 / 1404



Leaf Removal & Root Growth

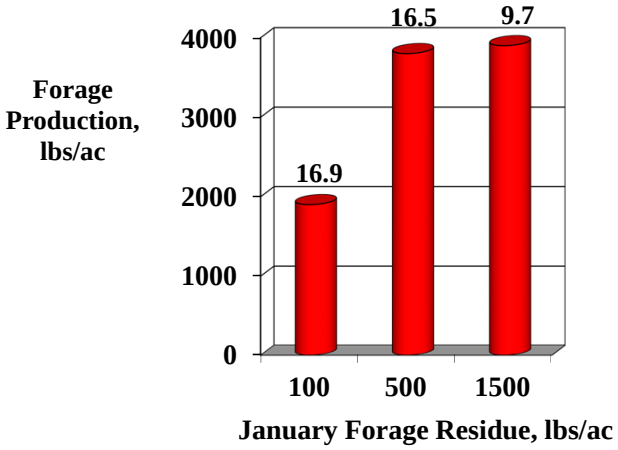


Heavy, Frequent Defoliation

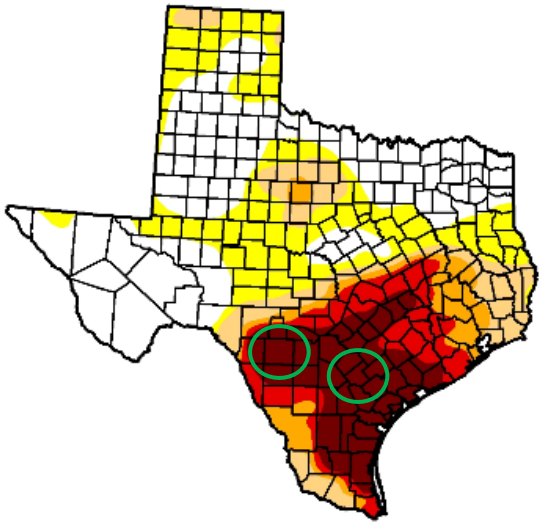
- Reduces
  - root growth & size
  - water infiltration
  - water absorption
  - nutrient absorption
- Loss of competitive advantage

Grazing Management

Forage Residue & Rainfall Effectiveness



July, 2009 drought
U.S. Drought Monitor

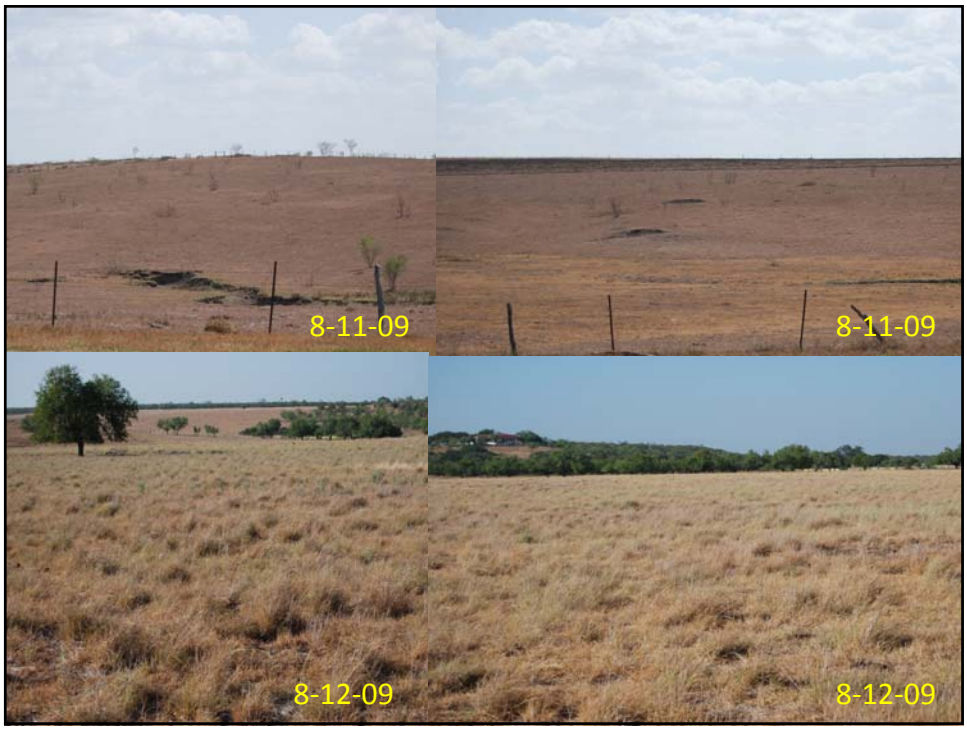


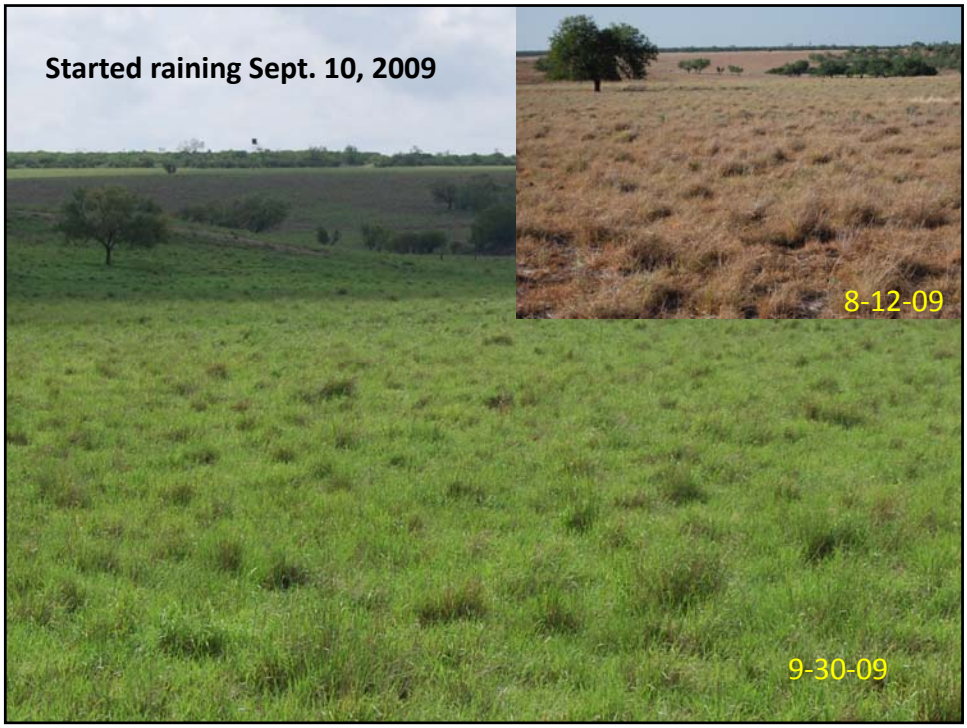
July 7, 2009

8-11-09

8-12-09

8-12-09


8-11-09
8-11-09
8-12-09
8-12-09

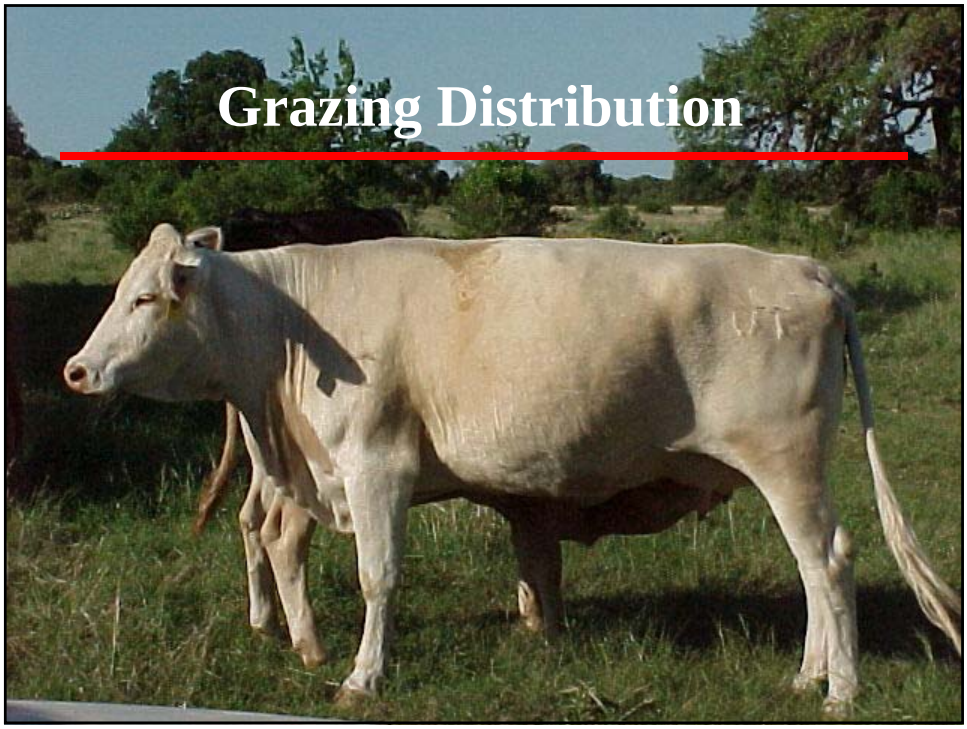

Started raining Sept. 10, 2009
8-12-09
9-30-09

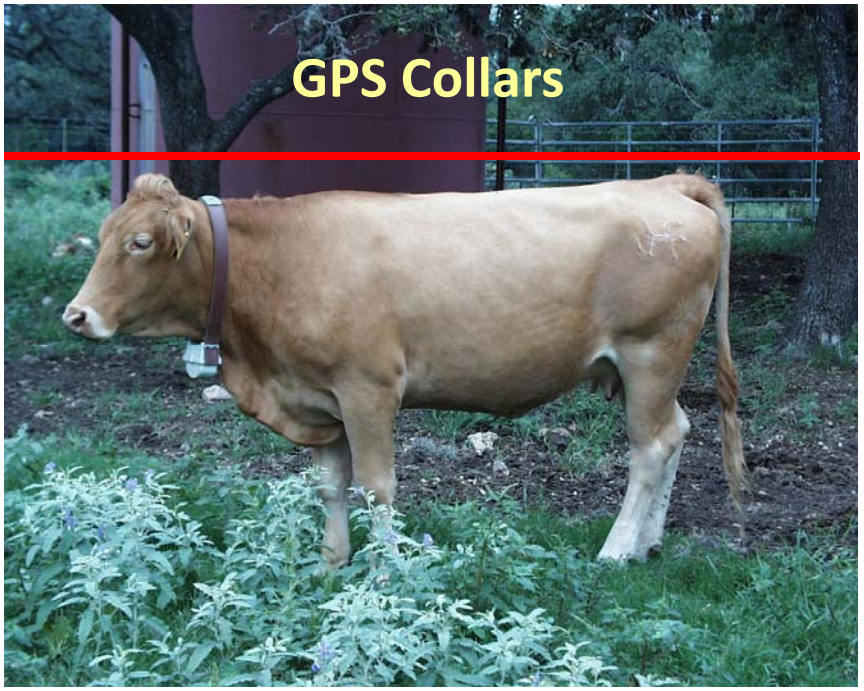
8-12-09
9-30-09

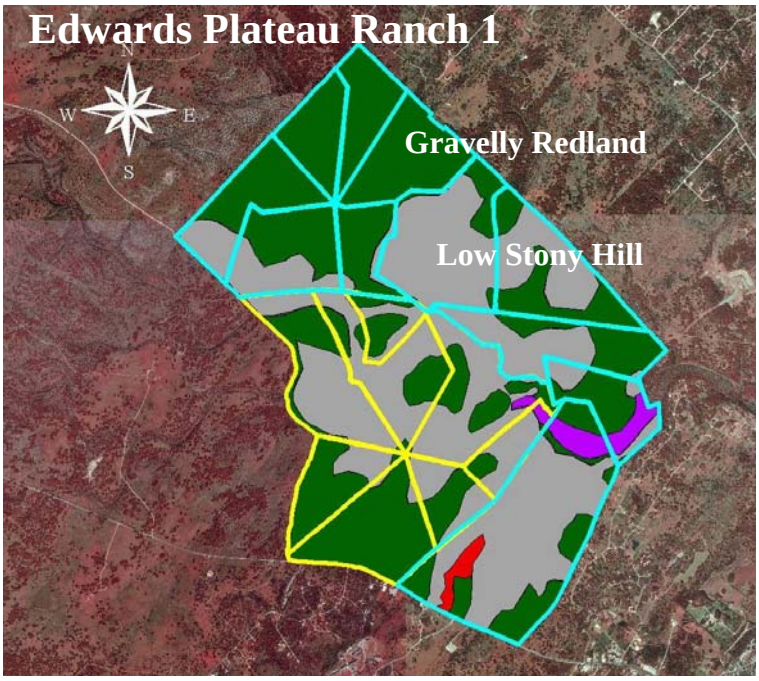
10-1-09

10-1-09

Give Grass a Chance to Recover

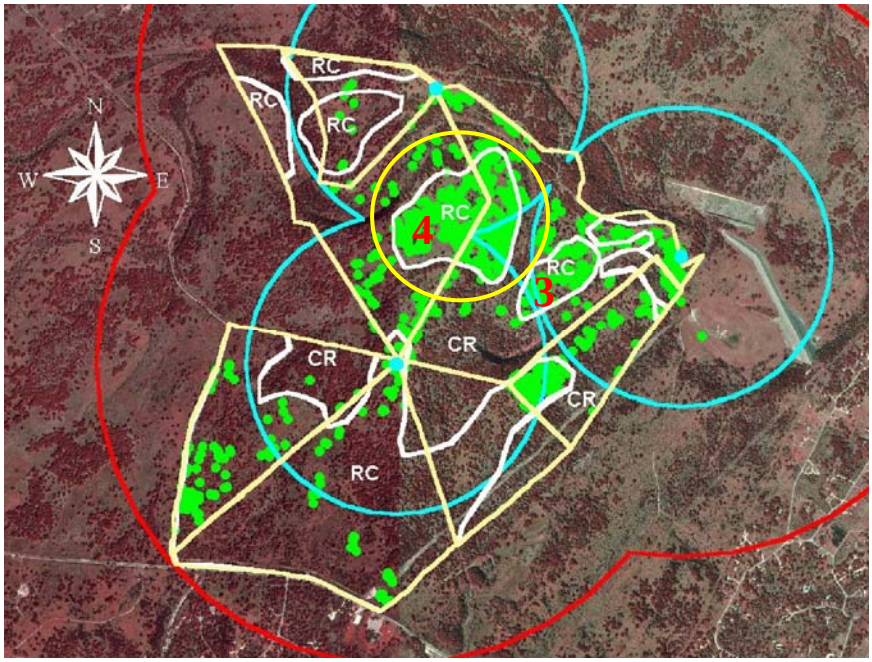

Grazing Distribution


GPS Collars



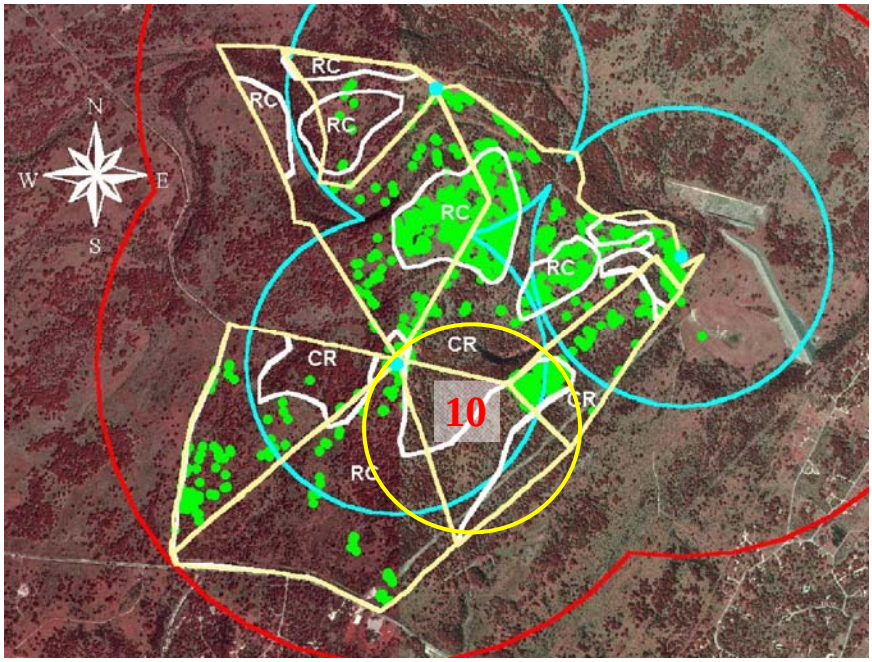
Cattle Ecological Site Preference

Herd	Gravelly Redland:Low Stony Hill Ecological Site Use
Spring-calving	2.4 to 1
Fall-calving	2.9 to 1

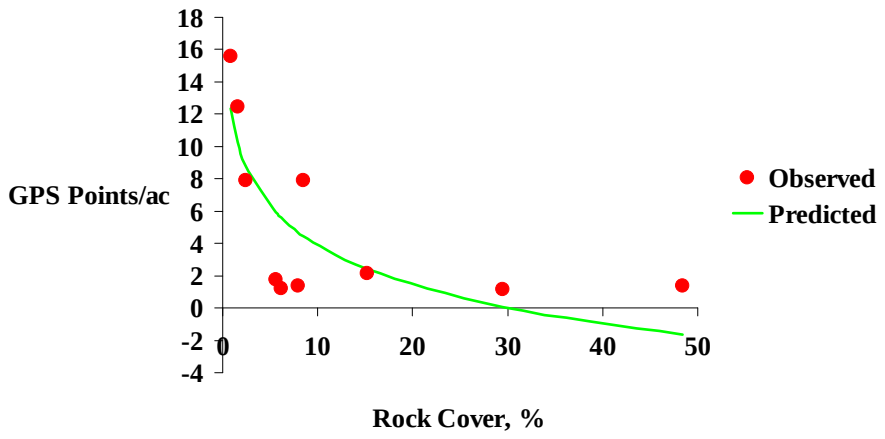


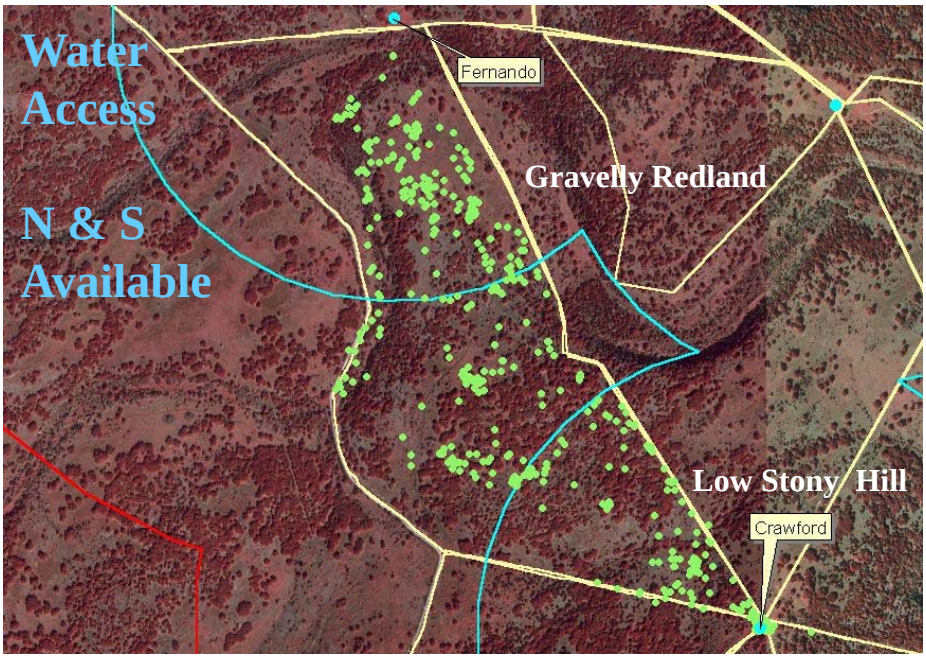
Map Location & Site-use Comparisons

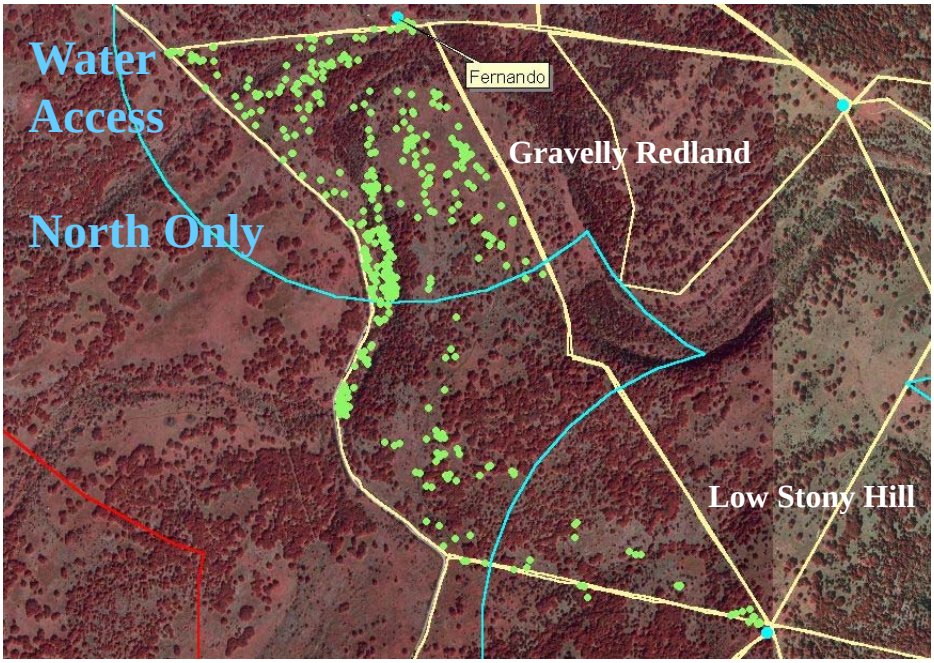
Trial	Map Location	Total Points, %	GR Points, %	Available Area, %
April	3&4	38	50	9
Mid-Aug	4	48	80	12

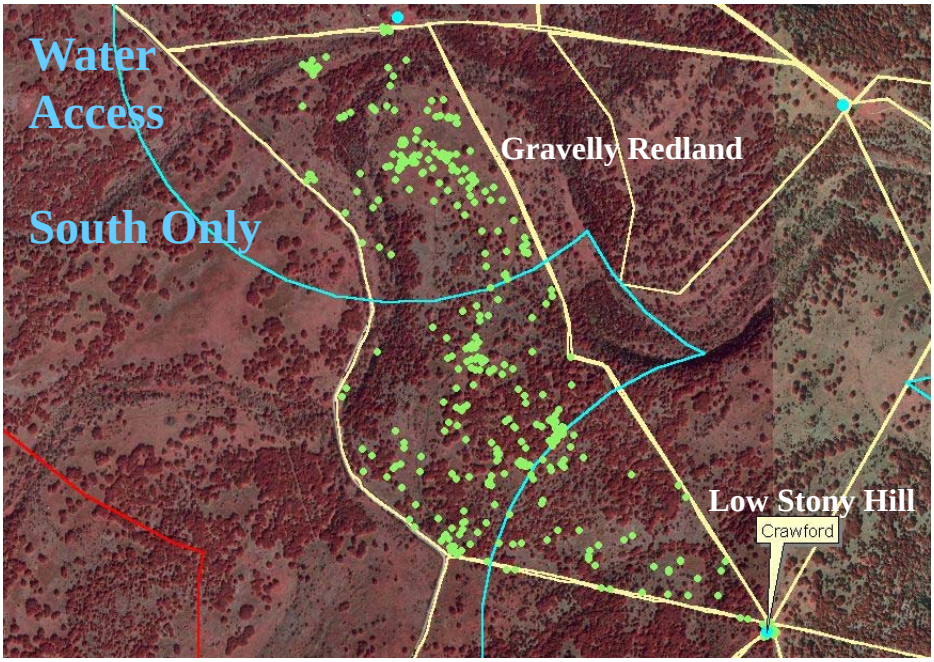

N
W
E
S
RC
RC
RC
RC
RC
CR
CR
CR
10
RC

Rock Cover & Pasture Use





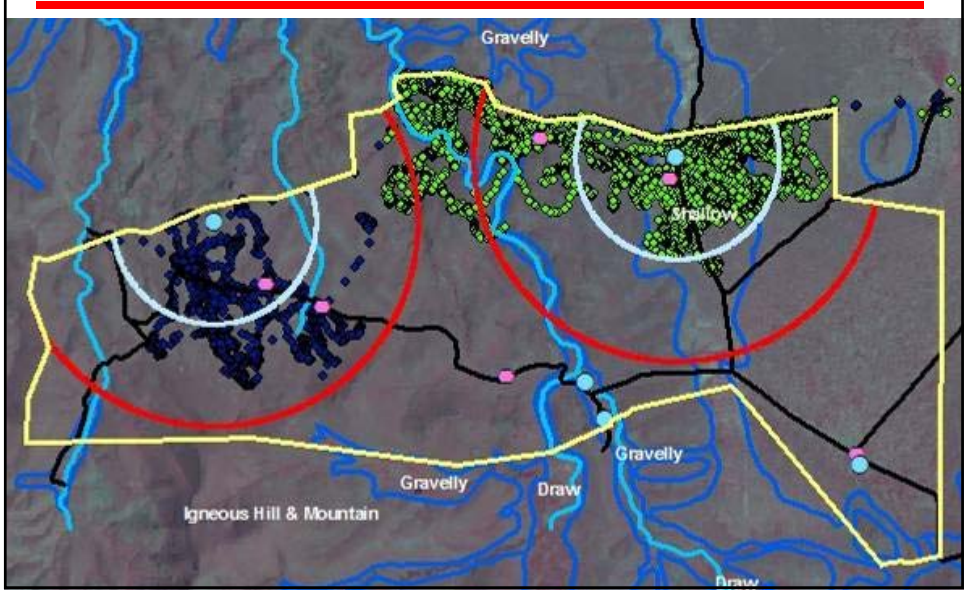

Water
Access
North Only
Fernando
Gravelly Redland
Low Stony Hill

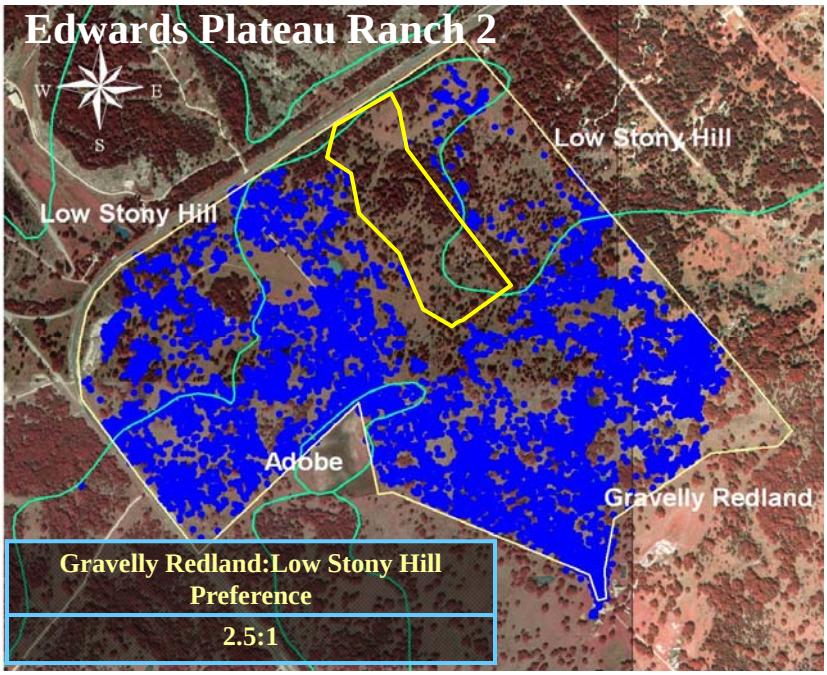

Water
Access
South Only
Gravelly Redland
Low Stony Hill
Crawford

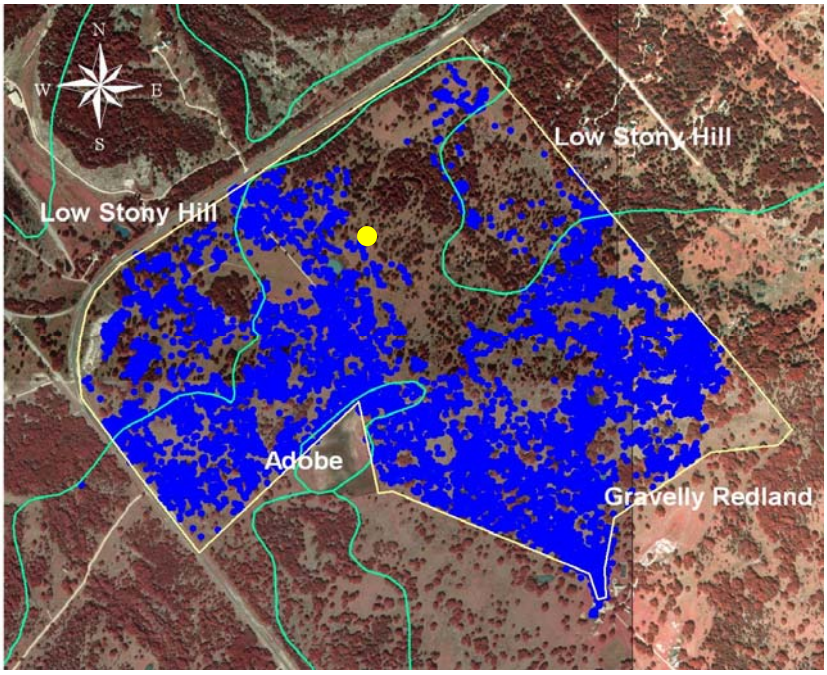
Water Access & Pasture-use Summary

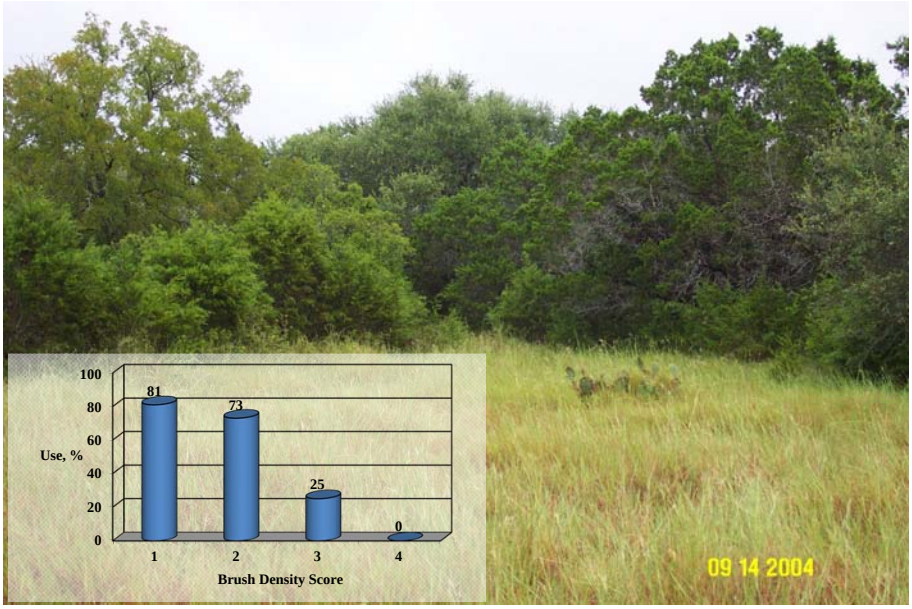
	Fall-calving Herd Points/ac	
	Gravelly Redland : Low Stony Hill	p
North & South	2.5 to 1	0.0008
North	3.8 to 1	<0.0001
South	1.9 to 1	0.0317

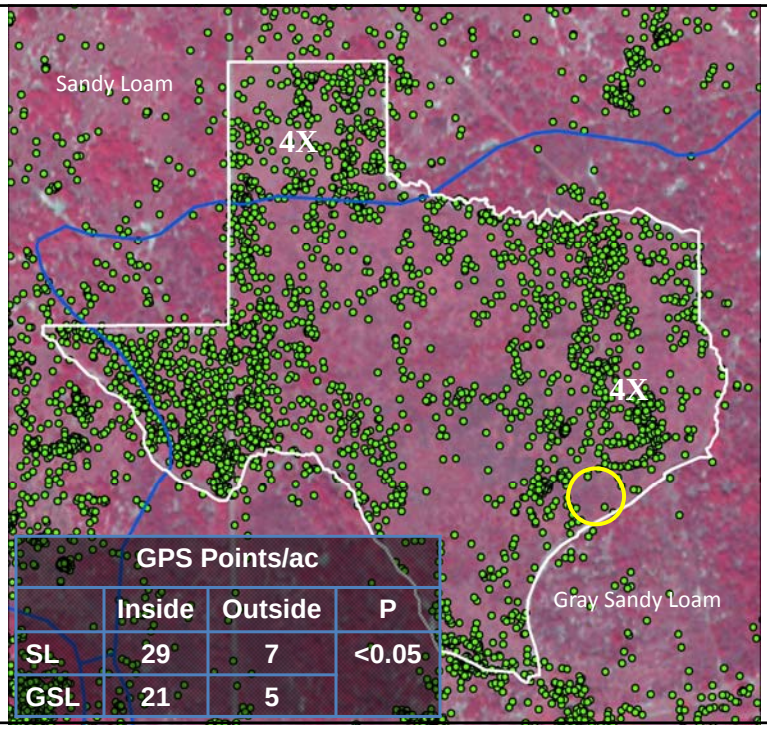
Water Access
West Texas Ranch




Edwards Plateau Ranch 2
W
E
S
Low Stony Hill
Low Stony Hill
Adobe
Gravelly Redland
Gravelly Redland:Low Stony Hill Preference
2.5:1


N
W
E
S
Low Stony Hill
Low Stony Hill
Adobe
Gravelly Redland


100
80
60
40
20
0
Use, %
81
73
25
0
1
2
3
4
Brush Density Score
09 14 2004

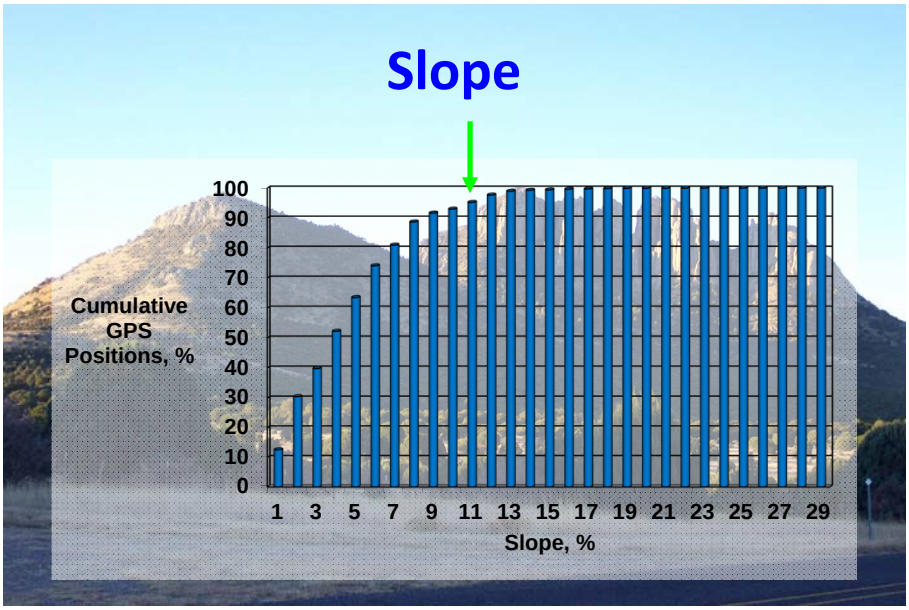


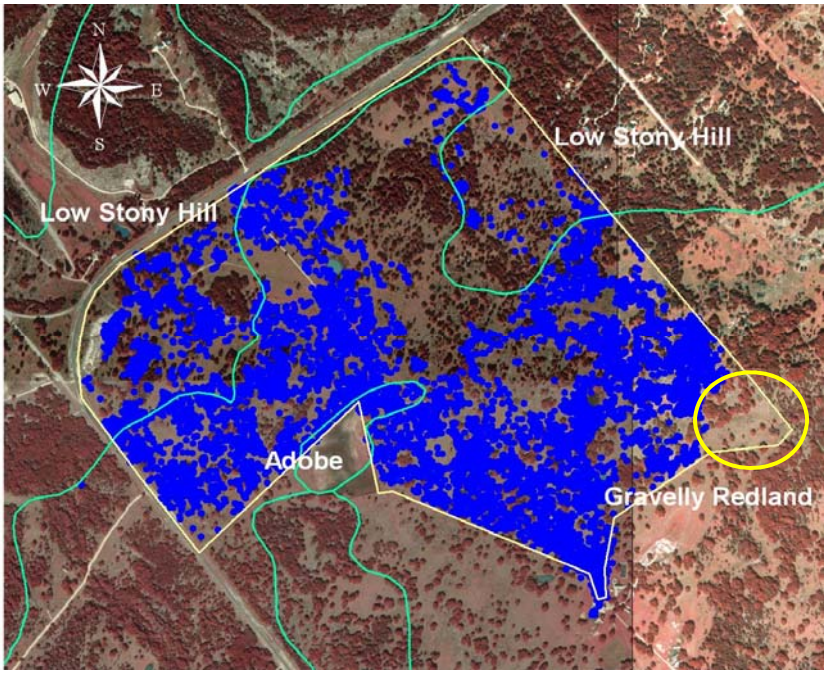
GPS Points/ac			
	Inside	Outside	P
SL	29	7	<0.05
GSL	21	5	

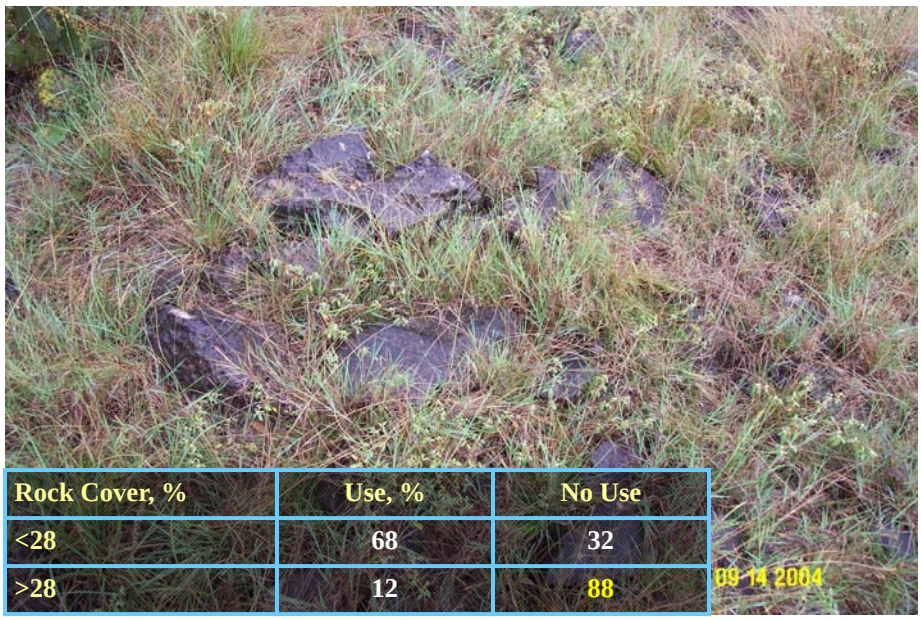
Forage Preference

Grazed and Ungrazed Area Dominant Grass Species (>30% frequency)

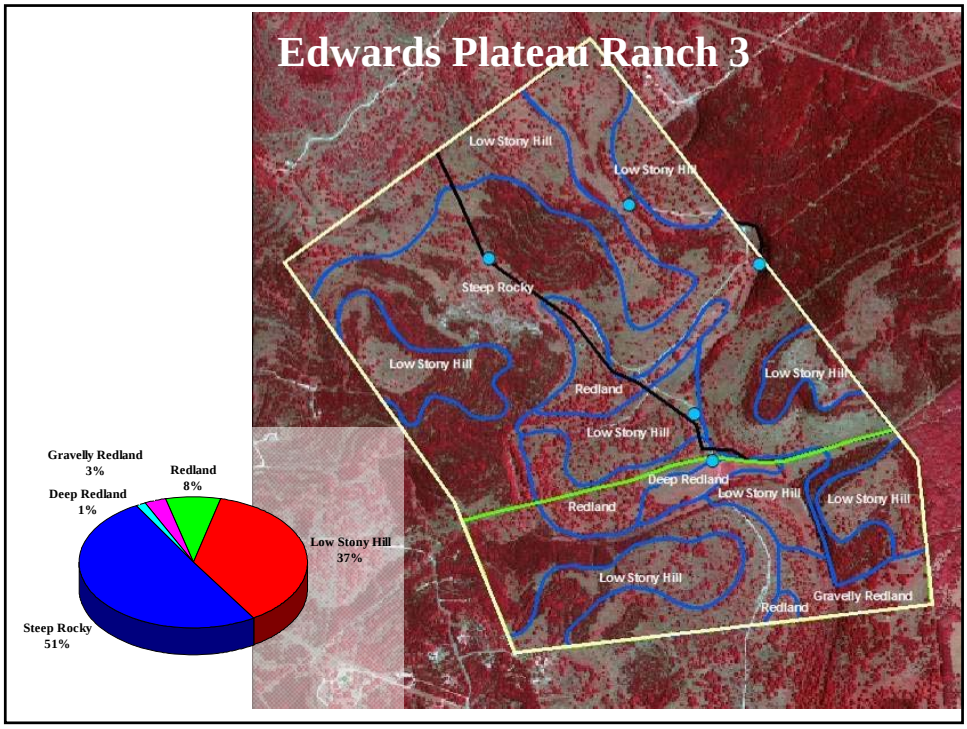
Grazed	Ungrazed
Fringed signalgrass	Threeawn spp.
Hairyseed paspalum	
Halls panicum	
Hooded windmillgrass	
Plains bristlegrass	
Southern witchgrass	

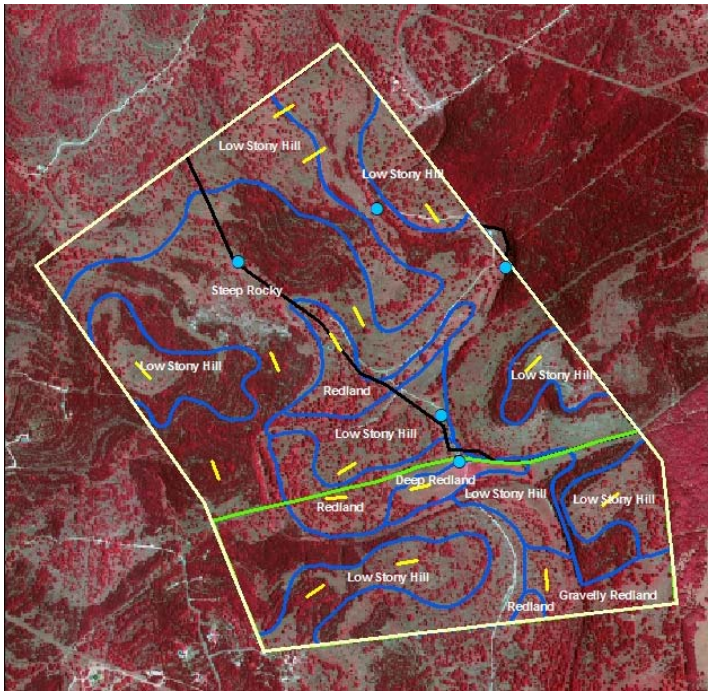

Slope
Cumulative GPS Positions, %
100
90
80
70
60
50
40
30
20
10
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29
Slope, %


N
W
E
S
Low Stony Hill
Low Stony Hill
Adobe
Gravelly Redland



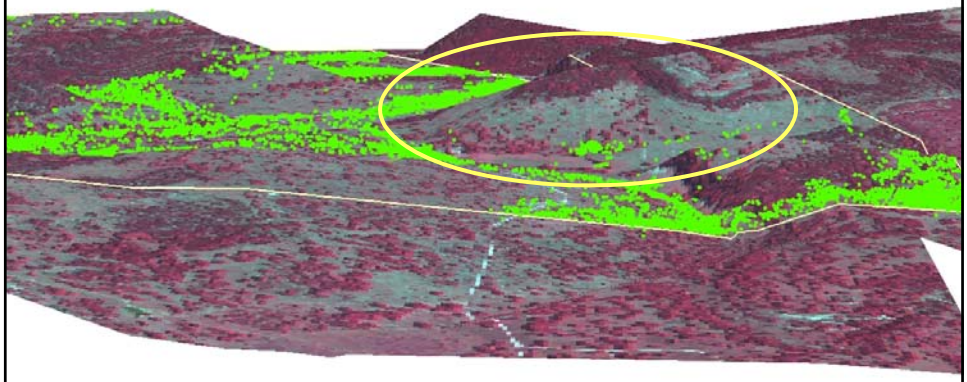
Rock Cover, %	Use, %	No Use
<28	68	32
>28	12	88

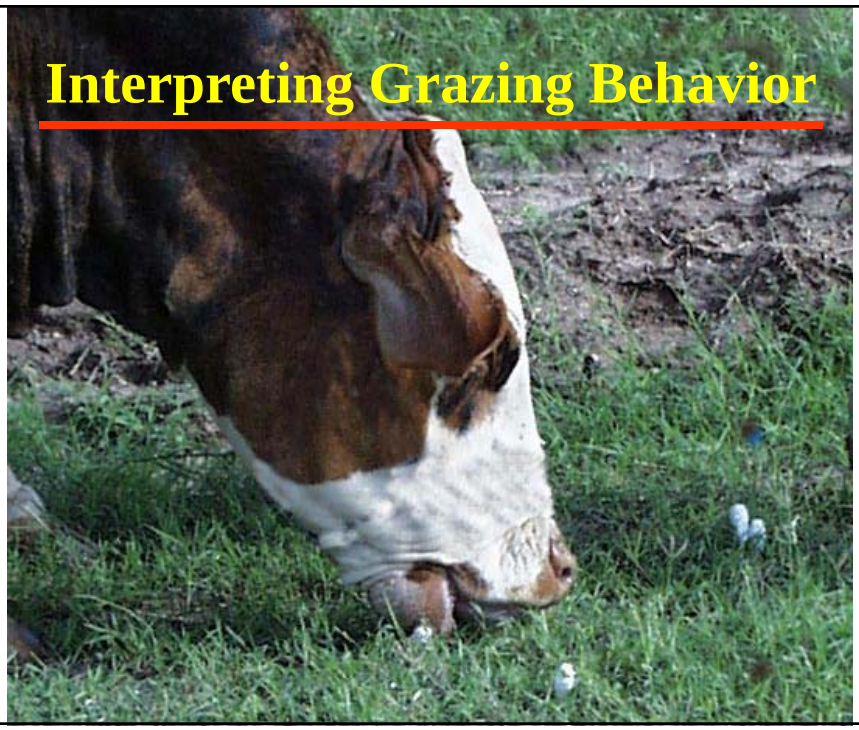

Edwards Plateau Ranch 3
Low Stony Hill
Low Stony Hill
Steep Rocky
Low Stony Hill
Redland
Low Stony Hill
Low Stony Hill
Deep Redland
Low Stony Hill
Low Stony Hill
Redland
Low Stony Hill
Gravelly Redland
Redland
Gravelly Redland 3%
Redland 8%
Deep Redland 1%
Low Stony Hill 37%
Steep Rocky 51%


Low Stony Hill
Low Stony Hill
Steep Rocky
Low Stony Hill
Redland
Low Stony Hill
Low Stony Hill
Deep Redland
Low Stony Hill
Low Stony Hill
Redland
Low Stony Hill
Gravelly Redland
Redland

Edwards Plateau Ranch 3-D View w/ GPS Locations

- 39% area used
- 41% GPS points on 9% area
- SR: 21 ac/cow
- Effective SR: 9 ac/cow





What Do Grazing Animals Want?

Young Green Leaves
(First)

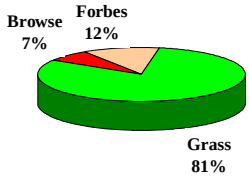
Mature Green

Green Stem

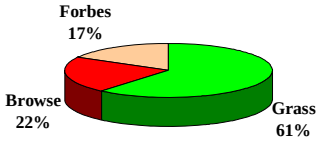
Mature Dry

Dry Stems
(Last)

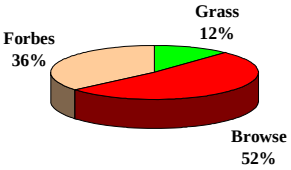
Comparative Annual Diets



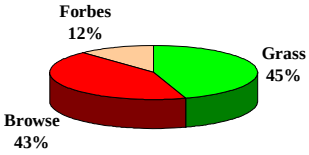
Cattle



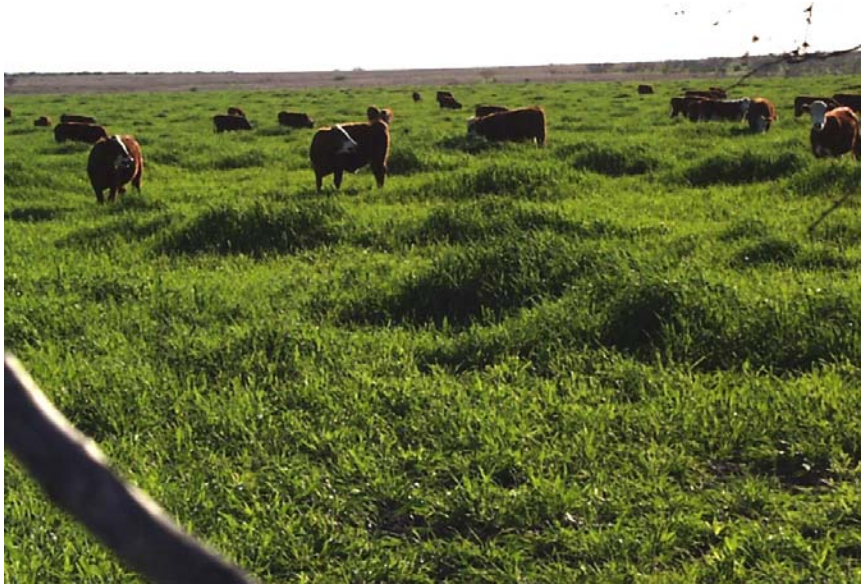
Sheep



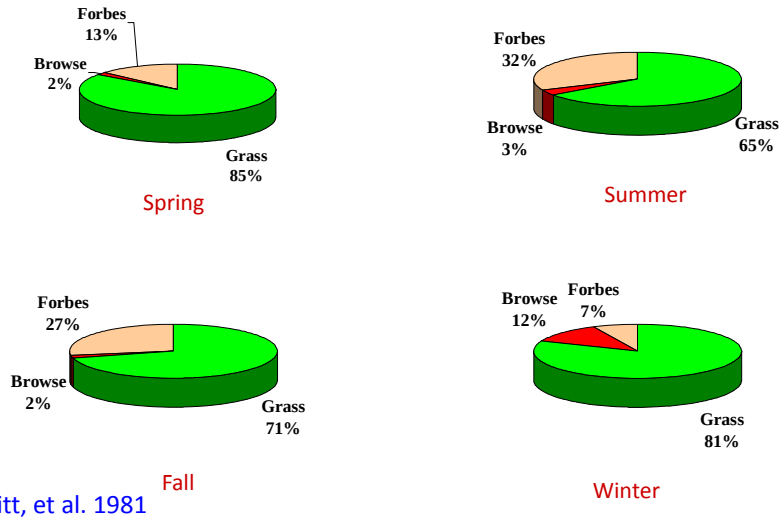
White-tailed deer

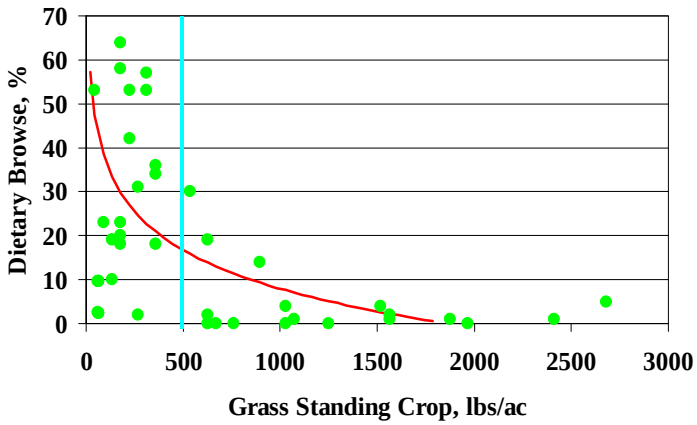


Goats



Seasonal Cattle Diets in South Texas



Everitt, et al. 1981

Dietary Browse & Grass Standing Crop