



Range Monitoring during Drought

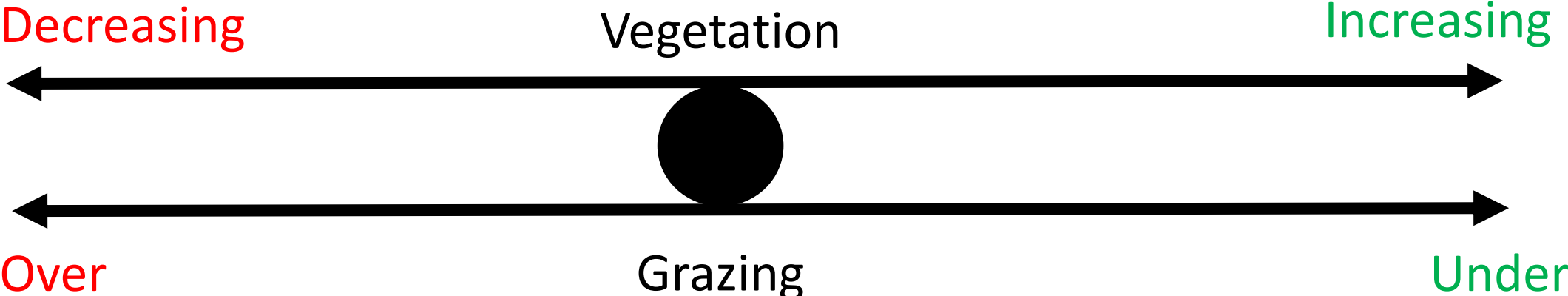
Casey Spackman

Extension Range Management Specialist

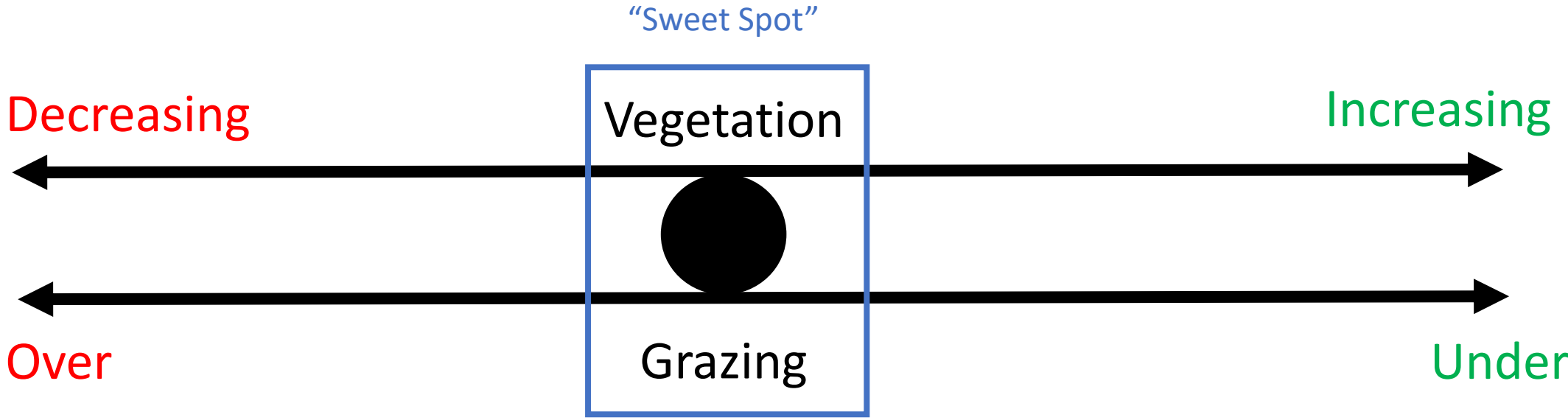
Impacts of Drought

- Severe reduction in forage production (6-7 fold fluctuation).
- High mortality to range grasses whether grazed or not (50% mortality not uncommon).
- **INDIRECT RESULTS-**
 - Soil loss → Loss of productivity

The Vegetation-Grazing Relationship



The Vegetation-Grazing Relationship



BUT HOW DO YOU KNOW WHERE YOUR AT???

Ocular Estimation & Variability



**Time to move the
cows!! Or is it?**



Ocular Estimation & Variability

- As actual cover declines, variability increases
- Drought decreases forage cover and increases variability from ocular estimation

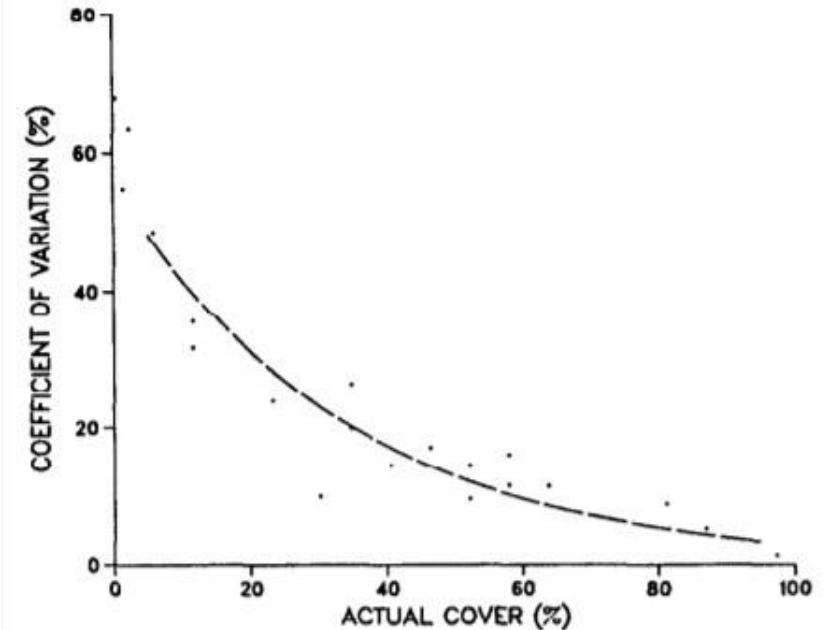
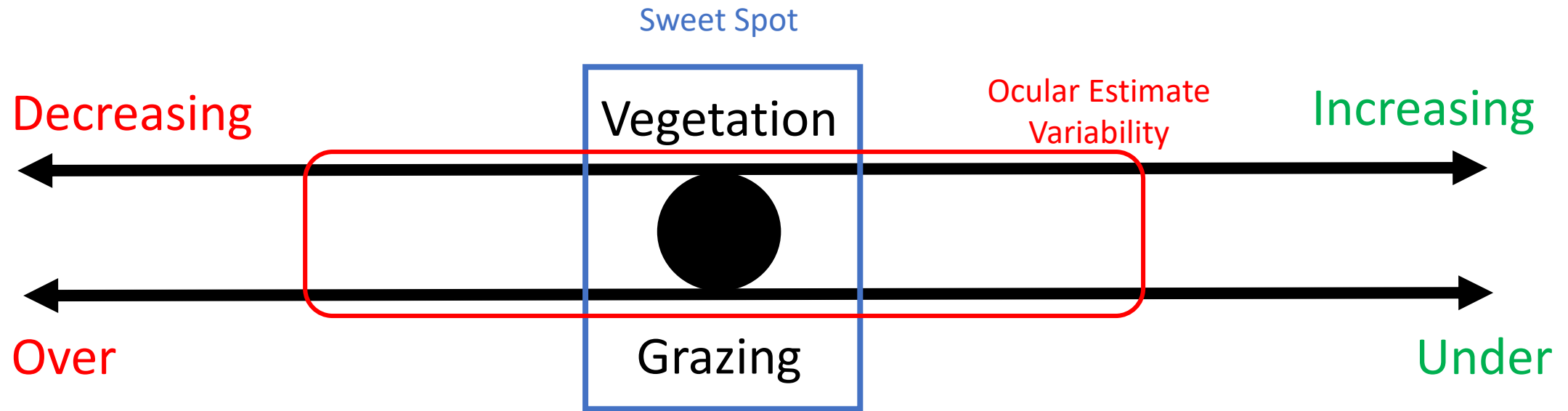


Fig. 1. *The relationship between the coefficient of variation for mean estimated cover and actual cover of a two-dimensional population of artificial paper images.*

- Hatton et al., 1986. "Relationships of the error associated with ocular estimation and actual total cover."

The Vegetation-Grazing Relationship



BUT: THE PRODUCER KNOWS HIS LANDS THE BEST!!!!

Goal of Range Monitoring

- Reduce the variability
- Obtain objective, repeatable, quantitative data
- Estimate plant dynamics and changes over time
 - Species composition
 - Stubble height
 - Forage availability (biomass)

Numerical Data is Critical to Support Non-numerical

RaDAR - Rangeland Data Analysis & Record				
Producer Name: Jo Rancher		Pasture Name: North 40		
Date: 12/20/2019		Collector Names: Casey		
Transect Number: 1		GPS Coordinates: -112.83 N, 38.5 W (120°)		
Notes: This is a test message for assessment of the rangeland condition and a monitoring record				
Biomass Availability		Pasture Size		Stocking Rate
2000.0 ± 353.6 lbs/acre		2240 acres		188.8 acres/AUY
Cover %		Vegetation Cover Composition		
Bare Ground	17	Common Name		Percent
Litter	38	BOGR1		5
Vegetation	13	BOCU		3
Rock (>3/4")	23	Arist		2
	91	BLTR		1
Forage Composition				
Common Name	Symbol	%	Avg. Height (inches)	Minimum Stubble Height Guideline
Blue Grama1	BOGR1	40	2.5	0.75
Threeawns	Arist	19	5.4	2.5
Sideoats Grama	BOCU	14	7.4	4
Little Bluestem	SCSC	5	13.0	4
Pine Dropseed	BLTR	4	6.5	4
Soil Moisture Depth		Annual Forage Biomass		1400 ± 70 lbs per acre
6 ± 1.4 inch(s)				
Photos				



Records



Calving records

Supplementation records

Livestock inventory records

Livestock genetic records

Pregnancy records

Precipitation records

Animal identification records

Pasture rotation records

Financial records

Vaccination records

Did I mention keeping RECORDS?

Rapid Assessment Methodology (RAM)

SRM
Society for Range Management

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By Christopher D. Allison, Jerry L. Holechek, Terrell T. Baker, Jon C. Boren, Nicholas K. Ashcroft, and John M. Fowler

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In the late spring of 2002, rangelands throughout New Mexico were in the third year of severe drought (Fig. 1). In July, ranchers and agency personnel were facing important decisions regarding forage availability, carrying capacity, and length of grazing season on Forest Service lands near Santa Fe.

Figure 1. Total monthly precipitation (January–August) relative to 20-year average for 2000, 2001, 2002 at the Abiquilú Dam, New Mexico, Station from the Western Regional Climate Center. While not site specific, Abiquilú Dam is centrally located to provide an index of precipitation on rangelands surveyed during 2002.

Figure 2. Map of the Santa Fe National Forest in New Mexico.

This article has been peer reviewed.

April 2007 45

RITF Range Improvement Task Force • Report 76

Data Entry, Organization and Analysis for Rapid Assessment Methodology

NM STATE UNIVERSITY
Range Improvement Task Force
Cooperative Extension Service / Agricultural Experiment Station
College of Agriculture and Home Economics

Monitoring Rangelands in New Mexico: Range, Riparian, Erosion, Water Quality, and Wildlife

Report 53

NM STATE UNIVERSITY

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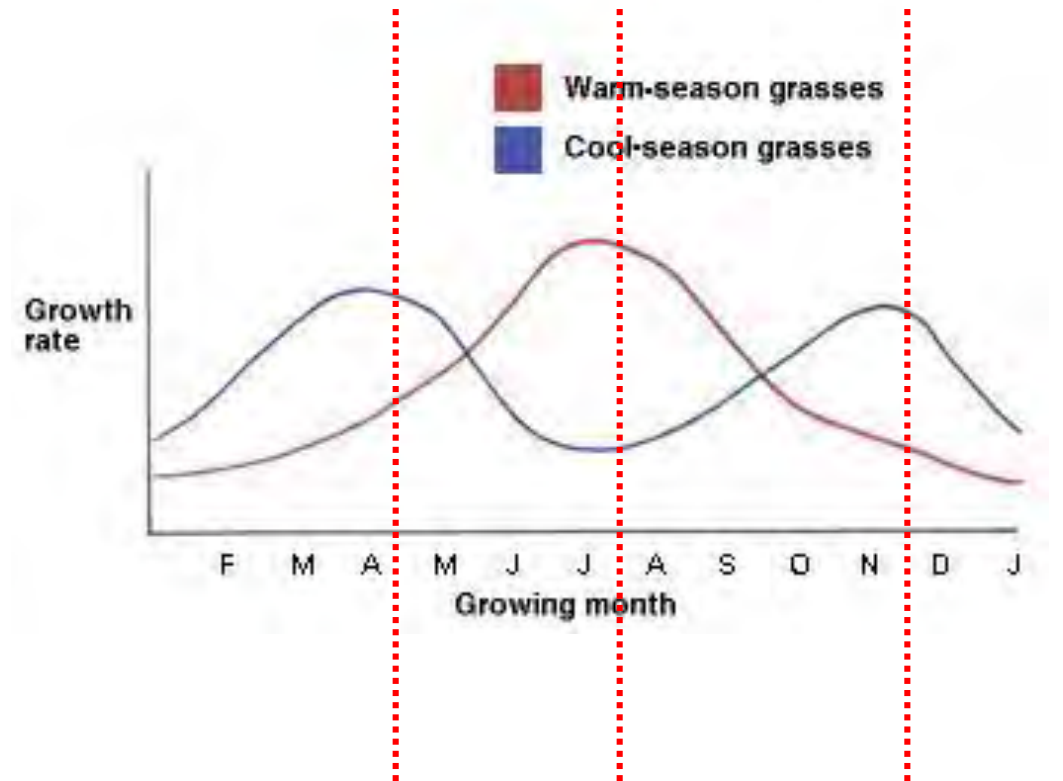
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Watershed Management

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Agricultural Experiment Station
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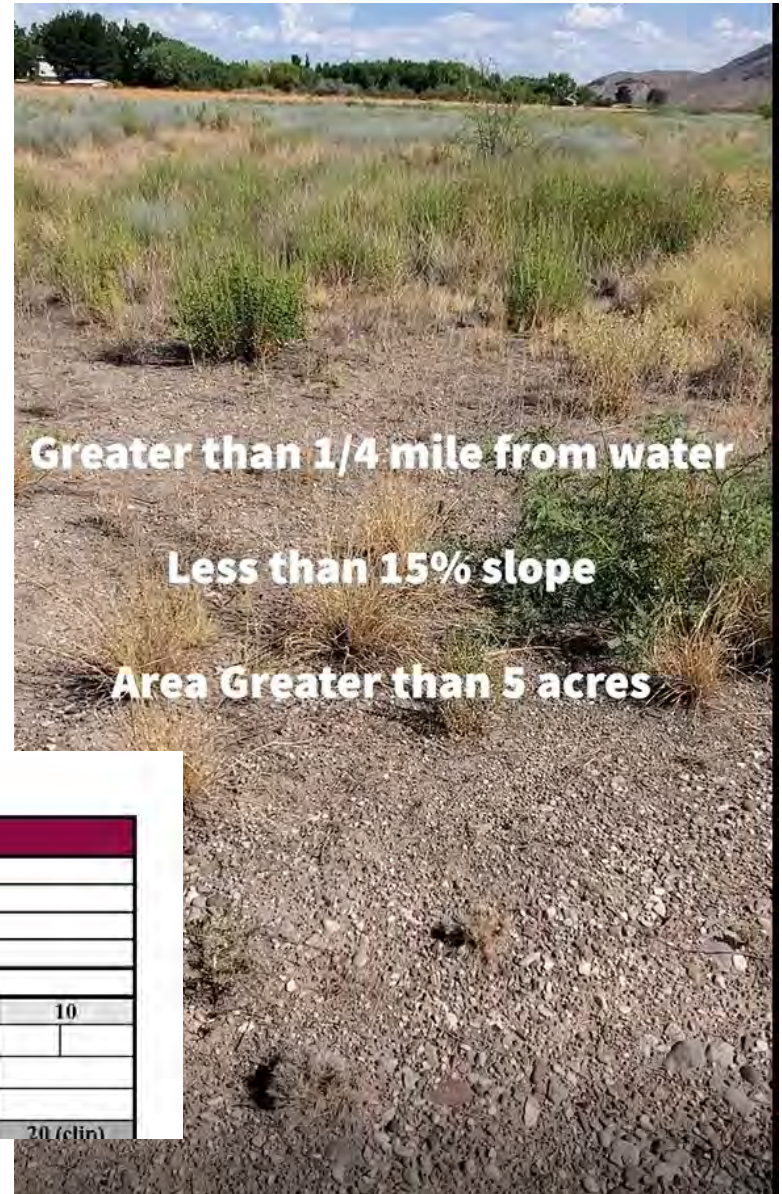
When to monitor?

- Every area is unique!
 - Elevation
 - Forage types
 - Terrain/slopes
 - Precipitation
- In General: when target forage reaches maturity, take measurements



Sharpe and Rayburn, 2019

Where to monitor?



Greater than 1/4 mile from water

Less than 15% slope

Area Greater than 5 acres

RaDAR – Data Worksheet						
Pasture Name						
Collector Name(s)						
GPS Coordinates						
Heading						
Measurements						
4	5	6	7	8	9	10
14	15	16	17	18	19	20 (clin)

What to monitor?

- Photo-points
- Ground cover
- Vegetation height (stubble height)
- Vegetation type (composition)
- Vegetation weight (biomass availability)
 - X5 samples (clip)
- Fecal counts (dot tally)
- Soil moisture depth
- Annual forage potential (biomass)

RaDAR – Data Worksheet									
Producer Name					Pasture Name				
Date					Collector Name(s)				
Transect Number					GPS Coordinates				
Pasture Size (acres)					Heading				
Measurements									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20 (clip)
21	22	23	24	25	26	27	28	29	30
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100 (clip)
Dot Tally		Soil Moisture Depth (inches)			Biomass Availability (grams)			Comment or Notes	
Horse		Annual Forage Biomass (grams)							
Elk		Inside of Cage							
Cattle		Outside of Cage							
Deer									
New Mexico State University – ACES – EASNR					Sampling Hoop Conversion Factor				

Seem daunting?

Monitoring Rangelands in New Mexico: Range, Riparian, Erosion, Water Quality, and Wildlife

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31	32	33	34	35	36	37	38	39	40 (clip)
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60 (clip)
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80 (clip)
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New Mexico State University – ACES - EASNR								Sampling Hoop Conversion Factor	



BE BOLD. Shape the Future.
New Mexico State University
aces.nmsu.edu

Photo-points

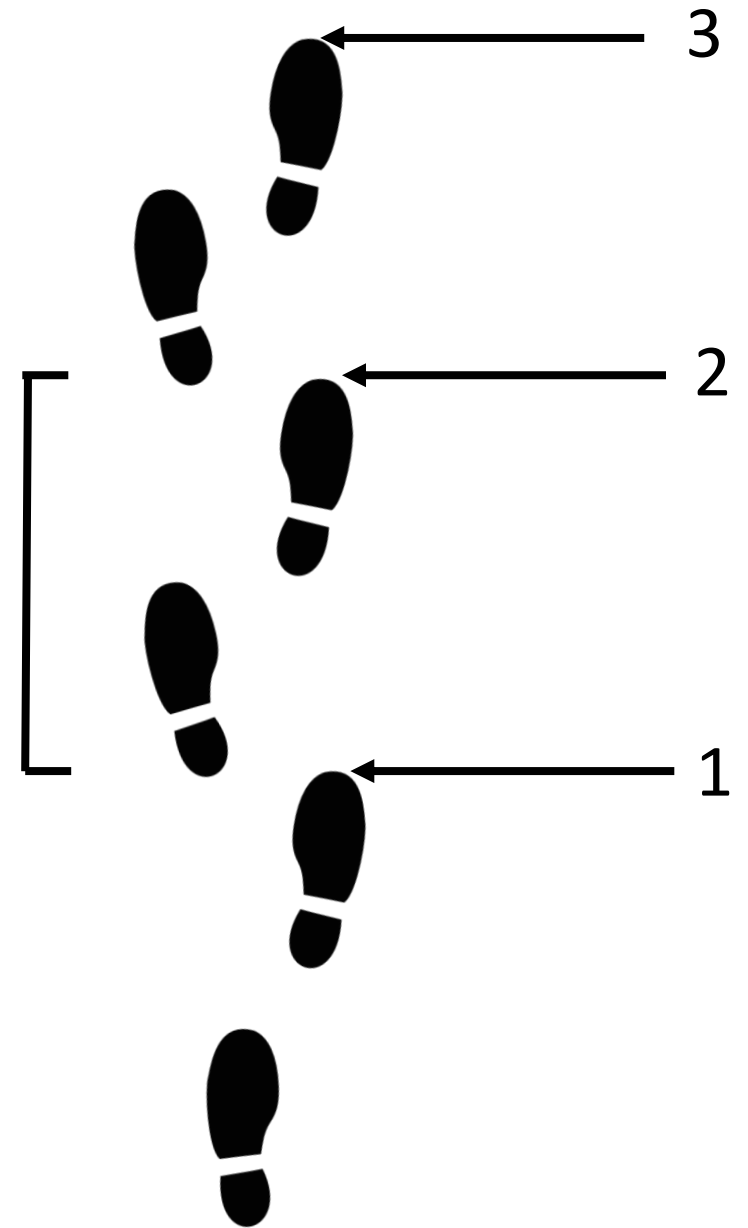
- Ruler
- Whiteboard
- Marker
- Camera



Step-point Transect



Approximately
5 feet



Ground Cover

Record on sheet

- Vegetation = 'V'
- Bare ground = 'B'
- Rock = 'R'
- Plant litter = 'L'



Stubble Height

- If cover is not 'V', go to nearest grass
- Extend last leaf and measure to the tip (not flower head)
- Record height in inches



Composition

Height Classes of Common Species & Minimum Stubble Heights

Extra Short (¾ inch)			Short-Mid (2.5 inches)			Mid (4 inches)		
BOGR1*	Blue Grama*	<i>Bouteloua gracillis</i> *	AGRC	Crested Wheatgrass	<i>Agropyron cristatum</i>	AGIN	Intermediate Wheatgrass	<i>Agropyron intermedium</i>
HIBE	Curly Mesquite	<i>Hilaria belangeri</i>	AGSM	Western Wheatgrass	<i>Agropyron smithii</i>	ARAR	Arizona Threeawn	<i>Aristida arizonica</i>
MUTO	Ring Muhly	<i>Muhlenbergia torreyi</i>	ARIST	Threeawns	<i>Aristida</i>	BLTR	Pine Dropseed	<i>Blepharoneuron tricholepis</i>
			ARPA	Wooton's Threeawn	<i>Aristida pansa</i>	BOCU	Sideoats Grama	<i>Bouteloua curtipendula</i>
			ARPU	Purple Threeawn	<i>Aristida purpurea</i>	BRIN	Smooth Brome	<i>Bromus inermis</i>
			BOER	Black Grama	<i>Bouteloua eripoda</i>	DAGL	Orchardgrass	<i>Dactylis glomerata</i> L.
			FEOV	Sheep Fescue	<i>Festuca ovina</i> L.	DAIN	Timber Oatgrass	<i>Danthonia intermedia</i>
Short (1.5 inches)			PLJA	Galleta	<i>Pleuraphis jamesii</i>	DAPA	Parry's Oatgrass	<i>Danthonia parryi</i>
BOAR	Needle Grama	<i>Bouteloua aristoides</i>	JUNCU	Rush	<i>Juncus</i> spp.	DECA	Tufted Hairgrass	<i>Deschampsia caespitosa</i>
BOGR	Blue Grama	<i>Bouteloua gracillis</i>	KOCR	Junegrass	<i>Koeleria cristata</i>	ELEL	Squirreltail	<i>Elymus elmoides</i>
BOHI	Hairy Grama	<i>Bouteloua hirsuta</i>	KOMA	Praire Junegrass	<i>Koeleria macrantha</i>	FEAR	Arizona Fescue	<i>Festuca arizonica</i>
BRTE	Cheatgrass	<i>Bromus Tectorum</i>	LYPH	Common Wolf tail	<i>Lycurus phleoides</i>	FETH	Thurber's Fescue	<i>Festuca thurberi</i>
CAREX	Sedge	<i>Carex</i> spp.	MUMO	Mountain Muhly	<i>Muhlenbergia montana</i>	MUVE	Screwleaf Muhly	<i>Muhlenbergia straminea</i>
BOBA	Six-week Grama	<i>Bouteloua barbata</i>	MUHL	Muhly	<i>Muhlenbergia</i> spp.	ORHY	Indian Ricegrass	<i>Oryzopsis hymenoides</i>
			MUWR	Spike Muhly	<i>Muhlenbergia wrightii</i>	PHPR	Timothy	<i>Phleum pratense</i>
			POFE	Muttongrass	<i>Poa fendleriana</i>	SCSC	Little Bluestem	<i>Schazachyrium scoparium</i>
Tall (8 inches)			POPR	Kentucky Bluegrass	<i>Poa pratensis</i>	SPCR	Sand Dropseed	<i>Sporobolus cryptandrus</i>
ANDRO	Bluestem	<i>Andropogon</i> spp.	PLMU	Tobosa	<i>Pleuraphis mutica</i>	STIPA	Needlegrass	<i>Stipa</i> spp.

* *Bouteloua gracillis* is placed in extra short when in sod form, and short when in bunchgrass form

Biomass Availability

Utah State UNIVERSITY EXTENSION *electronic publishing*



CALCULATING AVAILABLE FORAGE

Mindy Pratt and G. Allen Rasmussen

Range Management Fact Sheet

May 2001

NR/RM/03

TABLE 5: Range Hoop and Square Conversions and Dimensions

0.96 ft² Plot:

Conversion Factor: Grams collected X 100 = pounds per acre
Radius = 0.55 feet
Circumference of Hoop = 3.5 ft
Dimensions of Square Plot = .98 ft x .98 ft

1.92 ft² Plot:

Conversion Factor: Grams collected X 50 = pounds per acre
Radius = 0.78 feet
Circumference of Hoop = 4.9 ft
Dimensions of Square Plot = 1.386 ft x 1.386 ft

2.40 ft² Plot:

Conversion Factor: Grams collected X 40 = pounds per acre
Radius = 0.87 feet
Circumference of Hoop = 5.5 ft
Dimensions of Square Plot = 1.55 ft x 1.55 ft

- Clip
- Dry
- Weigh (grams)
- Record



Additional Measurements

- Soil Moisture Depth
- Annual Forage Biomass (NOT utilization) from cages
- Fecal Pellet Counts (relative site visit)



Data Input and Interpretation Teaser (Webinar 3)

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Bluestem	SCSC	5	13.0
Spseed	BLTR	4	6.5
Minimum Stubble Height Guideline			
Soil Moisture Depth	6 ± 1.4 inch(s)		Annual Forage Biomass
			1400 ± 70 lbs per acre
Photos			

What's the Time and Money Commitment?

- 30 – 60 minutes to complete and record one transect using RAM
 - Rangeland Data Assessment and Records (RaDAR) automatically tabulates a record as you enter the RAM data
 - Approximately 30 minutes to enter one datasheet
 - Plan to spend \$50 – \$450 per monitoring kit
 - Depends on what you plan to measure
 - Quality of supplies (i.e., garmin gps unit \$200+, pesola scale \$50+)
- TOTAL: 90 min per transect and a \$150 kit**

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