#### **College of Agricultural, Consumer and Environmental Sciences**

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## Range Monitoring during Drought Part II

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**Extension Range Management Specialist** 

The College of Agricultural, Consumer and Environmental Sciences is an engine for economic and community development in New Mexico, improving the lives of New Mexicans through academic, research, and Extension programs.

## **Monitoring Methods**

- RAM is not the only method of monitoring available
- Quick, Easy, DEFENSIBLE

## **Monitoring in General**

- > Objective
- ➢ Repeatable
- Quantifiable

		RaD	AR - Rang	eland Da	ata Anal	ysis & Re	ecord	
Producer	Name:		Jo Rancher	·	Pasture Na	ime:	North 40	
Date:			12/20/2019	)	Collector N	lames:	Casey	
Transect	Number:		1		GPS Coord	inates:	-112.83 N, 38.5 W (1	20°)
	This is a te	st message						
Notoci	for assessr	nent						NM
Notes:	of the rang	geland cond	lition				5	STATE
	and a mon	itoring reco	ord					
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Bare Grou	Ind		25.0		Co	mmon Nam	e Perce	nt
Litter			39.0			BOGR1	5	
Vegetatio	n		13.0			BOCU	3	
Rock (>3/-	4")		23.0			Arist	2	
			100.0			LYPH	2	
				Forage Co	mposition			
Comm	on Name	Symbol	%	Avg. Heigh	nt (inches)	Minim	num Stubble Height Guid	lline
Blue	Grama1	BOGR1	41	2.	5	0.75		
Thre	eawns	Arist	19	5.	4	2.5		
Commo	n Wolftail	LYPH	16	4.	3	2.5		
Sideoa	ts Grama	BOCU	14	7.	4	4		
Little E	Bluestem	SCSC	5	13	.0	4		
Pine D	ropseed	BLTR	4	6.	5	4		
Soil Mois	ture Depth	6 ±	1.4 inch(s)	Annua	l Forage Bio	mass	1400 ± 70 lbs per acr	e
				Pho	tos			





## Drought Webinar: Monitoring Part I review

- Drought can decrease rangeland grass abundance by greater than 50 %
- Numerical (quantitative) monitoring can decrease the variability of forage estimates
- Rapid Assessment Methodology (RAM) is a quick effective monitoring strategy that can be tailored to producer time availability
- Not all measurements needs to be taken (3 stage approach)
- The data entry and production of an assessment record needs to be simple and easy (RaDAR).



## Data collected. Now what?





## Data collected. Now what?

- Entering the data
- Interpretation of Record
- Management Decisions

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12		Cover %	6			Vegeta	ation Cover Co	mposition												
13	Bare Ground		#DIV/0!		Co	mmon N	lame	Percent												
14	Litter		#DIV/0!			#N/A		#N/A												
15	Vegetation		#DIV/0!			#N/A		#N/A												
16	Rock (>3/4")		#DIV/0!			#N/A		#N/A												
17			#DIV/0!			#N/A		#N/A												
18			1	Forage Cor	mposition															
19	Common Name	Symbol	%	Avg. Height	t (inches)	Mi	inimum Stubble	e Height Guidlin	e											
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2	Producer Name:		Jo Rancher	r n	Pasture Na	ame:	N	lorth 40													
о Л	Date:		12/20/2019	9	Collector I	vames:	112 02 N 2	Casey	<u> </u>												
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12		Cover %	6			Vegetation	Cover Comp	position													
13	Bare Ground		25.0		Co	ommon Name	;	Percent													
14	Litter		39.0			BOGR1		5													
15	Vegetation		13.0			BOCU		3													
16	Rock (>3/4")		23.0			Arist		2													
17			100.0			LYPH		2													
18		1	1	Forage	e Composition																
19	Common Name	Symbol	%	Avg. H	Height (inches)	Minimu	um Stubble H	leight Guidline													
20	Blue Grama1	BOGR1	41		2.5	0.75															
21	Threeawns	Arist	19		5.4	2.5															
22	Common Wolftail	LYPH	16		4.3	2.5															
23	Sideoats Grama	BOCU	14		7.4	4															
24	Little Bluestem	SCSC	5		13.0	4															
25	Pine Dropseed	BLTR	4		6.5	4															
26																					
27	Soil Moisture Depth	6 ±	1.4 inch(s)	An	nnual Forage Bio	omass	1400 ± 70	lbs per acre													
	Instructio	ns   Input	Kecord	(+)																	

Ready 🔛

## Data Input

		RaDAR - Rangeland Dat	a Analysis & Reco	rd
RaDAR – Data Worksheet	Producer Name:	Jo Rancher F	asture Name:	North 40
Producer Name To Parchart Pasture Name North 40	Date:	12/20/2019	Collector Names:	Casey
Date 12-20-2019 Collector Name(s) Casty	Transect Number:	1	SPS Coordinates: -11	2.83 N, 38.5 W (120°)
Transect Number 1 GPS Coordinates - 61700, 307-	This is a test	message		
Pasture Size (acres) 2240 Measurements 0 10	Notes: for assessme	:nt		IN IVI
1 2 3 4 5 6 7 8 9 25 8 1.25	of the rangel	and condition		STATE
B 5 L 5.5 B 2.5 B 3 B 6 L 4 V 10 B a Barl Boarl	and a monitor	oring record		
Arist Arist Bogri Bogri Lyph Lyph Boch Bogri Dogi -	Biomass Availabil	ity Pasture	Size	Stocking Rate
11         12         13         14         15         16         17         18         19         20 (clip)           11         12         13         14         15         16         17         18         19         20 (clip)           12         1         2         1         2         2         1         2         1	2000.0 ± 353.6	vs/acre 2240 a	icres	188.8 acres/AUY
Right Board Juph Board Juph Juph Juph Juph Board Board		Cover %	Vegetation Co	ver Composition
Dege - 1001 - 111 - 11 - 12 - 20 - 30	Bare Ground	25.0	Common Name	Percent
21 22 23 24 25 26 27 28 27 30 20 21 21 22 23 24 25 26 27 28 25 R 15 V 35 R 2	Litter	39.0	BOGR1	5
B 5.5 B 2 L 3.5 L 4 V 9 L 3 B a 3 D 10 U 00 140h	Vegetation	13.0	BOCU	3
Bogri Begri 14ph Dogri Bogri Dogri Dogri Marini	Rock (>3/4")	23.0	Arist	2
31 32 33 34 35 36 37 38 39 40 (clip)		100.0	LYPH	2
BHLTRHBYL3.5LTR3.5B2B3L4		Forage Com	position	
Board Boan arist arist lyph Boan arist arist Boan Board	Common Name Sy	ymbol % Avg. Height	(inches) Minimum S	stubble Height Guidline
17 48 49 50	Blue Grama1	BOGR1 41 2.5	0.75	
41 42 43 44 43 40 47 R H L 3.5	Threeawns	Arist 19 5.4	2.5	
Saca Rock arist Board Roard Juph arist arist Board	mon Wolftail	LYPH 16 4.3	2.5	
	res de la companya de	BOCU 14 7.4	4	
51 52 53 54 55 56 57 58 59	destem destem	SCSC 5 13.0	4	
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- Basic Record Information (TOP)
- Biomass Availability
- Potential Stocking Rate
- Ground Cover Percentages
- Vegetation Composition (from ground cover)
- Forage Composition (from all plants)
- Soil Moisture Depth
- Annual Forage Biomass (Pasture Potential)
- Photo-Points

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		RaD	AR - Rang	eland Da	ata Analy	sis & R	ecord	
Producer	Name:		Jo Rancher		Pasture Na	me:	North 40	
Date:			12/20/2019	)	Collector N	ames:	Casey	
Transect	Number:		1		GPS Coordi	nates:	-112.83 N, 38.5 W	(120°)
	This is a te	st message						
Notor	for assessr	nent						NM
Notes:	of the rang	geland cond	ition					STATE
	and a mon	itoring reco	ord					
Bio	mass Availa	bility		Pastur	e Size		Stocking Ra	ate
20 ±	00.0 ± 353.6	lbs/acre		2240	acres		188.8	acres/AUY
		Cover %	,			Vegetatio	n Cover Composition	
Bare Grou	Ind		25.0		Co	mmon Nam	ne Pe	rcent
Litter			39.0			BOGR1		5
Vegetatio	n		13.0			BOCU		3
Rock (>3/-	4")		23.0			Arist		2
			100.0			LYPH		2
				Forage Cor	nposition			
Comm	on Name	Symbol	%	Avg. Heigh	nt (inches)	Minin	num Stubble Height G	uidline
Blue	Grama1	BOGR1	41	2.	5	0.75		
Thre	eawns	Arist	19	5.	4	2.5		
Commo	n Wolftail	LYPH	16	4.	3	2.5		
Sideoa	ts Grama	BOCU	14	7.	4	4		
Little E	Bluestem	SCSC	5	13	.0	4		
Pine D	ropseed	BLTR	4	6.	5	4		
Soil Mois	ture Depth	6 ±	1.4 inch(s)	Annua	I Forage Bio	mass	1400 ± 70 lbs per	acre
				Pho	tos			





## **Basic Record Information**

		RaDAR - Rangelan	d 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°)
	This is a test me	essage			
Neter	for assessment				NM
Notes:	of the rangelan	d condition			STATE
	and a monitori	ng record			

## **REPEATABILITY!**



## **Biomass Availability & Stocking Rate**





#### **Standard Calculation**

Biomass X Pasture Size 26 lbs X 365 days

= acres per animal unit year (AUY)

<u>Biomass X Pasture Size</u> 26 lbs X <mark>61 days</mark>

# = acres per animal unit (AU) in a given amount of time

Biomass X Pasture Size 40 lbs X 365 days Biomass X Pasture Size 20 lbs X 365 days

= acres per animal unit year (AUY);
adjusting for animal & forage type,
location, slope, closeness to water

See Holechek et al. 2011 "Range Management: Principles and Practices".



#### **Standard Calculation**

<u>Biomass X Pasture Size</u> 26 lbs X 365 days

= acres per animal unit year (AUY)

<u>Biomass X Pasture Size</u> = acres per animal unit day (AUD) 26 lb per day

See Holechek et al. 2011 "Range Management: Principles and Practices".



#### > Used to determine soil stability an erosion potential

- > as bare ground increases, erosion potential increases
- litter is an indicator of soil organic matter
- more vegetation cover the better

	Cover %	Vegetation Cover Co	omposition
Bare Ground	25.0	Common Name	Percent
Litter	39.0	Blue Grama1	5
Vegetation	13.0	Sideoats Grama	3
Rock (>3/4")	23.0	Threeawns	2
	100.0	Common Wolftail	2

Earaga Composition



#### Species composition as a percentage of vegetation cover

- Certain species are more palatable to livestock (more desirable for grazing)
- > Certain species are more drought tolerant
- Certain species can be indicators of range health

	Cover %	Vegetation Cover Co	mposition
Bare Ground	25.0	Common Name	Percent
Litter	39.0	Blue Grama1	5
Vegetation	13.0	Sideoats Grama	3
Rock (>3/4")	23.0	Threeawns	2
100.0		Common Wolftail	2

Earaga Composition



#### Species composition as a percentage of all forages

- Certain species are more palatable to livestock (more desirable for grazing)
- > Certain species are more drought tolerant
- Certain species can be indicators of range health

		100.0		LIFII	۷.			
Forage Composition								
Common Name	Symbol	%	Avg. Height (inches)	eight (inches) Minimum Stubble Height				
Blue Grama1	BOGR1	41	2.5	0.75				
Threeawns	Arist	19	5.4	2.5				
Common Wolftail	LYPH	16	4.3	2.5				
Sideoats Grama	BOCU	14	7.4	4				
Little Bluestem	SCSC	5	13.0	4				
Pine Dropseed	BLTR	4	6.5	4				
Sail Maistura Danth	с <u>-</u>	1 1 inch(c)	Annual Earago Dic	macc	$1400 \pm 70$ lbs par acro			





- Indicates water holding capacity in times of dry conditions (drought)
- Indicates available moisture for plants
  - > May be dry on top but moist deeper
  - Survival of deeper rooted forages

Soil Moisture Depth	6 ±	1.4 inch(s)	Annual Forage Biomass	1400 ± 70 lbs per acre
			Bİ.	





- ➢ NOT UTILIZATION!!!
- Estimates the potential annual forage production

Soil Moisture Depth	6 ±	1.4 inch(s)	Annual Forage Biomass	1400 ± 70 lbs per acre		
Bhotos						





## UTILIZATION

- Can be used for short-term assessment and management changes but should NOT be used as a sole source in regulator standards.
- Highly dependent upon stocking rate, timing of grazing, livestock distribution, and forage type (individual vs. diverse community), environmental fluctuations...
- Gives a relative estimate of "use" (i.e., 40%) but SHOULD include other measurements (stubble height, ground cover, species composition) to develop management plans/regulations.
- Compare with multiple years (trends) to estimate stocking rates (greater than 7 years)



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## **Monitoring during Drought**

- Short-term management decisions
  - Temporary stocking rate adjustments
- Long-term management decisions
  - Increase/decrease targeted forage species
  - Record of effort towards management objectives
  - Conflict resolution (Insurance Policy!)

Droducer	Namo	A A THE ADDRESS OF A DRESS OF A D	lo Dancher		Docture No	mai	1 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	North 40	
Producer	Name:		Jo Rancher		Pasture Na	ame:	ne: North 40		
Date:	and the second		12/20/2019	,	Collector	vames:	es: Casey		
Transect	Number:		1		GPS Coord	inates:	-112.83 M	N, 38.5 W (120°)	
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Notes:	es: for assessment								
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	and a mor	itoring reco	ora						
BIO	mass Availa	bility		Pastur	e Size			Stocking Rate	
20	00.0 : 353.6	lbs/acre		2240	acres			188.8 acres/A	
		Cover %	,			Vegetatio	n Cover Co	omposition	
Bare Grou	Ind		25.0	5.0 Common Nar		ommon Nam	ne Percent		
Litter			39.0			BOGR1		5	
Vegetatio	n		13.0		BOCU			3	
Rock (>3/4	4")		23.0		Arist		2		
			100.0		LYPH			2	
				Forage Cor	nposition				
Comm	on Name	Symbol	%	Avg. Heigh	nt (inches)	Minin	mum Stubble Height Guidline		
Blue (	Grama1	BOGR1	41	2.	5	0.75			
Thre	eawns	Arist	19	5.	4	2.5			
Commo	n Wolftail	LYPH	16	4.	3	2.5			
Sideoa	ts Grama	BOCU	14	7.	4	4			
Little E	Bluestem	SCSC	5	13	.0	4			
Pine D	ropseed	BLTR	4	6.	5	4			
Soil Mois	ture Depth	6 ±	1.4 inch(s)	Annua	l Forage Bio	omass	1400 ±	70 lbs per acre	
				Pho	tos				
					5	* _	2		





## **Monitoring Methods**

- RAM is not the only method of monitoring available
- Quick, Easy, DEFENSIBLE

## **Monitoring in General**

- > Objective
- ➢ Repeatable
- Quantifiable

		RaD	AR - Rang	eland Da	ata Anal	ysis & Re	ecord		
Producer Name:			Jo Rancher		Pasture Name:		North 40		
Date:			12/20/2019			lames:	Casey		
Transect	nsect Number: 1				GPS Coord	inates:	-112.83 N, 38.5 W	(120°)	
	This is a te	st message							
Notoci	for assessr	nent						NM	
Notes:	of the rang	geland condition						STATE	
	and a mon	itoring reco	ord						
Bio	mass Availa	bility		Pastur	e Size		Stocking R	ate	
20	0.00	lbc/acro		2240	acros		100 0	acros/ALIV	
Э	£ 353.6	ibs/acre		2240	acres		100.0	acres/AUT	
Cover %						Vegetation Cover Composition			
Bare Grou	Ind		25.0		Co	mmon Nam	ne Percent		
Litter			39.0			BOGR1		5	
Vegetatio	n		13.0		BOCU		3		
Rock (>3/-	4")		23.0		Arist			2	
			100.0			LYPH		2	
				Forage Co	mposition	2			
Comm	on Name	Symbol	%	Avg. Heigh	nt (inches)	Minin	imum Stubble Height Guidline		
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Little E	Bluestem	SCSC	5	13	.0	4			
Pine D	ropseed	BLTR	4	6.5 4		4			
Soil Mois	ture Depth	6 ±	1.4 inch(s)	Annua	l Forage Bio	mass	1400 ± 70 lbs per	acre	
				Pho	tos				





## **Management Decisions**

Drought in New Mexico

► 43% of the time in the Southwest

- ≥27% of the time in the Southern Great Plains
- ➢Other sources estimate 66%

OR:

- ➢Generally 3 out of every 10 years
- Even more in the Southwest





Food processing during (photosynthesis)

Food storage during drought

Light to Conservative grazing during drought has a 66% higher survival rate than moderate to heavy stocking rates





Light and Conservative grazing during drought produced on average 50% more forage than did heavy grazing and only a 25% reduction compared to 5year average Kipple & Costello 1960







QU	<b>EST</b>	ION	<b>IS</b> ?

				1				
		RaDi	AR - Rang	eland Da	ita Anal	ysis & R	ecord	
Producer	Name:		Jo Rancher		Pasture Na	Name: North 40		
Date:			12/20/2019	)	Collector N	lames:	Casey	
Transect I	Number:		1		GPS Coord	inates:	-112.83 N, 38.5 W (120°)	
This is a test message								
for assessment							NM	
Notes:	of the rang	geland cond	ition				STÂTÊ	
	and a mon	itoring reco	ord					
Bio	mass Availa	bility		Pastur	e Size		Stocking Rate	
20	00.0	11 . /		2240			100.0	
3	353.6	lbs/acre		2240	acres		188.8 acres/AUY	
Cover %				Vegetation Cover Composition				
Bare Grou	Ind		25.0		Common Name		e Percent	
Litter			39.0		BOGR1		5	
Vegetatio	n		13.0			BOCU	3	
Rock (>3/4	4")		23.0		Arist		2	
			100.0		LYPH		2	
				Forage Cor	nposition		•	
Comm	on Name	Symbol	%	Avg. Heigh	t (inches)	Minii	mum Stubble Height Guidline	
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Pine D	ropseed	BLTR	4	6.	5	4		
Soil Mois	ture Depth	6 ±	1.4 inch(s)	Annua	Forage Bio	mass	1400 ± 70 lbs per acre	

Photos



