Vegetation Monitoring
La Tortuga Allotment (#6040)
Tucson Field Office
USDI, BLM
August, 2017

Transect Site Summary

Key Area / Pasture	GPS (NAD 83)	Photo	Cover	Freq	DWR	Double Weight Sampling
Key 1	12 S 0462809 UTM 3554918	Y	Y	Y	Y	Y

General Information
Mike McIntire (UA Cooperative Extension) and Peggy Monkemeier (BLM Intern) monitored the La Tortuga Allotment key area on August 29, 2017. This key area received very little rainfall during the monsoon season. It was noted that perennial grasses had very little green-up. There were a large number of dead fluffgrass (*Tridens pulchellus*) and slender grama (*Bouteloua repens*) bases observed.

Methods
Ground Cover
Ground cover is the amount of surface area comprised of bare ground, perennial plant bases, litter, gravel or rocks. Ground cover data, each soil protection category expressed as a percentage of total hits, reflect the amount of litter, vegetative root bases, gravel and rocks available to intercept raindrop impact before reaching the soil and of bare ground exposed to climatic elements. Cover data were collected with each quadrat placement. A single point from the quadrat was consistently the focal point for cover category classification.

Ground cover ground rules established prior to data collection were:
- Three ground cover hits are recorded per quadrat placement. The total number of ground cover hits equals the total number of quadrat placements.
- Litter is dead plant material directly covering the ground, dead perennial vegetative bases, or animal material. If a small stem or piece of litter is not considered large enough to intercept raindrop impact, the hit is the ground covering below it.
- Bare ground is soil with particles up to 1/4"; gravel are particles 1/4"-3" in size; rocks are ≥3".
- Annual forbs are considered litter cover when in contact with the ground and large enough to intercept raindrop impact.

Pace Frequency
Pace frequency is the number of times a plant species is present within a given number of uniformly sized sample quadrats (plot frames placed repeatedly across a stand of vegetation). Plant frequency is expressed as percent presence for each species encountered within total number of quadrat placements, therefore, frequency reflects the probability of encountering a particular plant species within a specifically sized area (quadrat size) at any location within the key area. The total number of frequency hits among all species will not equal the total number of quadrat placements and frequency is insensitive to the size or number of individual plants. Frequency is a very useful monitoring method but does not express species composition, only species presence. Frequency is an index that integrates species' density and spatial patterns.

A 40 x 40 cm. (0.16 m^2) quadrat is used for pace frequency. Ground rules are:

- Species present within the bounds of the sample quadrat are recorded with a single tally.
- If no species are present, no frequency data are recorded.
- Perennial or annual grasses and forbs must be rooted within the quadrat to be counted.
- A grass or forb plant base present under the quadrat frame is considered "in."
- Annual plants, grasses and forbs, are counted whether green or dried.
- Tree/shrub canopy and basal hits are recorded separately. Over time, these parameters can indicate changes in tree/shrub size (canopy) or plant numbers (basal).
- A canopy hit is any part of the tree or shrub that overhangs the quadrat (enters an imaginary vertical projection of the plot frame).
- Quadrat placements are placed at one-pace intervals (2-steps), patterned in transects (straight lines) and are run parallel to each other, generally contouring slope, within the area of one ecological site (vegetation and soil type).

Dry Weight Rank (DWR)

Dry weight rank estimates plant composition on a dry weight production basis. This data collection was made using a 40cm x 40cm plot frame and 100 placements. The three perennial species within a vertical projection of quadrats placed repeatedly (100 times) comprising the most annual biomass production on a dry weight basis are ranked (1st, 2nd, and 3rd most biomass). Multiple ranks are given when less than 3 species are present. For example, if species A and species B are the two species present, ranks of 1 and 3, 1 and 2, or 2 and 3 are given to species A; if only species B is present, it receives a tally for each rank. No tally was recorded at quadrat placements void of perennial species.

Double Weight Sampling

This technique has been referred to by some as the Calibrated Weight Estimate method. The objective of this method is to determine the amounts of current-year above-ground vegetation production on a defined area.

Double sampling requires the establishment of a weight unit for each species occurring in the area to be sampled. All weight units are based on current year's growth.

- Decide on a weight unit that is appropriate for each species. A weight unit could be an entire plant, a group of plants, or an easily identifiable portion of a plant, and can be measured in either pounds or grams.
- Visually select a representative weight unit.
- Instead of weighing the material, save it by securing it with rubber bands so portions are not lost.
- Use this as a visual model for comparison at each quadrat in the transect. Record on the proper forms only the number of weight units. Do not record the estimated weights.
- Weigh each weight unit at the conclusion of the transect. Weighing the weight unit before the conclusion of the transect might influence the weight estimates.
- Convert the weight units on the form to actual weight by multiplying the number of units by the weight of the unit.
- Harvested weight unit material is not saved for determining air-dry weight conversion. Air-dry conversions are determined from clipped quadrats

Results

Key 1

Four transects, 50 quadrat placements each, were run southeast parallel to each other four paces apart. Transect starts at the rock cairn. Ten 21 x 21 ft. plots were randomly placed within the key area and double sampled.

Elevation: 2777 feet

Photo 1. Southeast view of transect direction, Key 1, La Tortuga Allotment, Tucson Field Office, BLM. August 29, 2017.

Photo 2. North view of transect direction, Key 1, La Tortuga Allotment, Tucson Field Office, BLM. August 29, 2017.

Photo 3. East view of transect direction, Key 1, La Tortuga Allotment, Tucson Field Office, BLM. August 29, 2017.

Photo 4. South view of transect direction, Key 1, La Tortuga Allotment, Tucson Field Office, BLM. August 29, 2017.

Photo 5. West view of transect direction, Key 1, La Tortuga Allotment, Tucson Field Office, BLM. August 29, 2017.

Report submitted by:

8/6/2017

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Report reviewed by:

8/30/17

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Attachments:

- VGS report
- Production graphs
- Production data sheets
- Sketch of transect layout
- Species list
- Map

Data Summary

Site Class: BLM || Tucson || La Tortuga

Date: 8/29/2017

Site ID: Key 1

Examiner(s): Mike McIntire, Peggy Monkemeier

% Ground Cover

Species	Transect (#Hits)					% Cover*
	1	2	3	4	Total	
Bare Ground	15	8	10	11	44	7.33
Gravel (1/4" - 3")	88	110	103	99	400	66.67
Litter	34	18	22	34	108	18.00
Rock > 3"	12	14	14	5	45	7.50
Live Basal Veg	1		1	1	3	0.50

% Frequency — 40x40 cm

DWR Wt. Composition — Sample Size = 101

Species		Transect (#Hits)					% Freq*	Rank (#Hits)			Wtd. Sum	% Comp.*
		1	2	3	4	Total		1	2	3		
Woody Species												
whitethorn acacia	ACCO2		1			1	0.50	7	6	6	67	6.63
whitethorn acacia-Canopy	ACCO2	1	5	4		10	5.00					
spicebush	ALWR	1		1	2	4	2.00	2	4	3	25	2.48
spicebush-canopy	ALWR	3		2	1	6	3.00					
triangle leaf bursage	AMDE4	1	2	8	4	15	7.50	13	12	12	127	12.57
triangle leaf bursage-Canopy	AMDE4	2	6	3	3	14	7.00					
shrubby ayenia	AYMI	2		1	1	4	2.00	1	1	2	11	1.09
false mesquite	CAER	1				1	0.50	1	1	2	11	1.09
false mesquite-Canopy	CAER	1				1	0.50					
littleleaf paloverde-canopy	CEMI6	1	1	2		4	2.00					
littleleaf paloverde	CEMI6							4	2	2	34	3.37
staghorn cholla-canopy	CYVE3				1	1	0.50					
ocotillo-canopy	FOSP2		2		2	4	2.00					
ocotillo	FOSP2							2	2	1	19	1.88
rock hibiscus	HIDE		1	1		2	1.00	1	2	1	12	1.19
slender janusia	JAGR	4	2	4	2	12	6.00	3	6	6	39	3.86
range ratany	KRER		1		2	3	1.50	1	1	1	10	0.99
white ratany	KRGR		2	4	4	10	5.00	20	13	20	186	18.42
white ratany-Canopy	KRGR	13	7	5	10	35	17.50					
creosote bush	LATR2	1			1	2	1.00	10	11	10	102	10.10
creosote bush-Canopy	LATR2	7	5	7	9	28	14.00					

Site Class: BLM || Tucson || La Tortuga **Date:** 8/29/2017

Site ID: Key 1

wolfberry	LYPA				1	1	0.50	3	3	2	29	2.87
wolfberry-Canopy	LYPA	2		2		4	2.00					
Engelmann pricklypear-Canopy	OPEN3		2			2	1.00					
Engelmann pricklypear	OPEN3							2	1		16	1.58
jojoba	SICH	1	2	1	2	6	3.00	10	5	5	85	8.42
jojoba-canopy	SICH	8	1	1	2	12	6.00					
Grasses - Perennial												
red grama	BOTR2		3	2	1	6	3.00	2	5	2	26	2.57
Arizona cottontop	DICA8								1		2	0.20
curly-mesquite	HIBE		4			4	2.00	4	4	3	39	3.86
bush muhly	MUPO2	1		1		2	1.00	2	4	4	26	2.57
slim tridens	TRMU		1			1	0.50			2	2	0.20
fluffgrass	TRPU10	1	3	2	8	14	7.00	3	3	4	31	3.07
Forbs - Perennial/Biennial												
spurge	CHAL11	11	3		1	15	7.50	10	12	12	106	10.50
Annuals												
Annual forb(s)	AAFF	20	38	29	30	117	58.50					
Annual grass(es)	AAGG	6	12	13	16	47	23.50					
Unclassified												
Parry's false prairie-clover	MAPA7	2	1	1		4	2.00		2	1	5	0.50

* Number of decimal places does not imply level of precision

Site Class: BLM || Tucson || La Tortuga

Site ID: Key 1

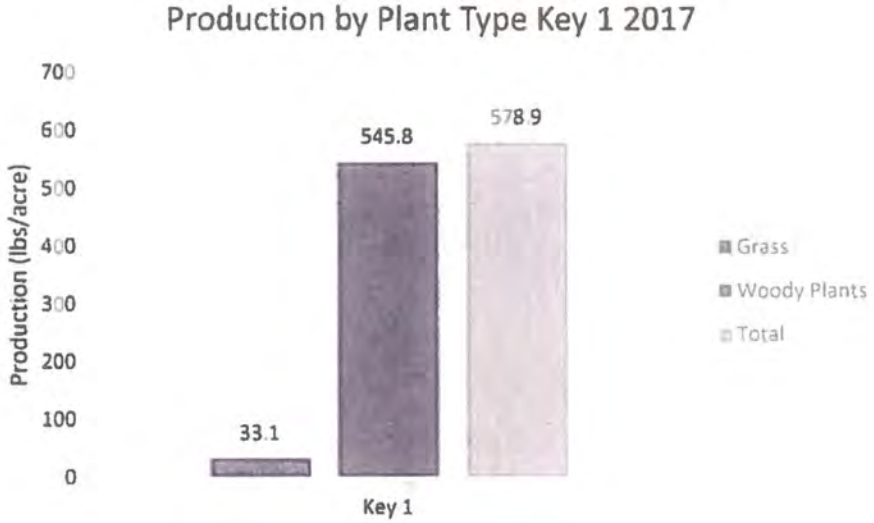
% Ground Cover			Quadrat Size:
Category	Transect		
	04/14/15	08/25/16	08/29/17
Bare Ground	2	9	7
Gravel (1/4" - 3")	42	69	67
Litter	48	12	18
Live Basal Veg.	2	1	1
Rock > 3"	6	9	8

Site Class: BLM || Tucson || La Tortuga **Site ID:** Key 1

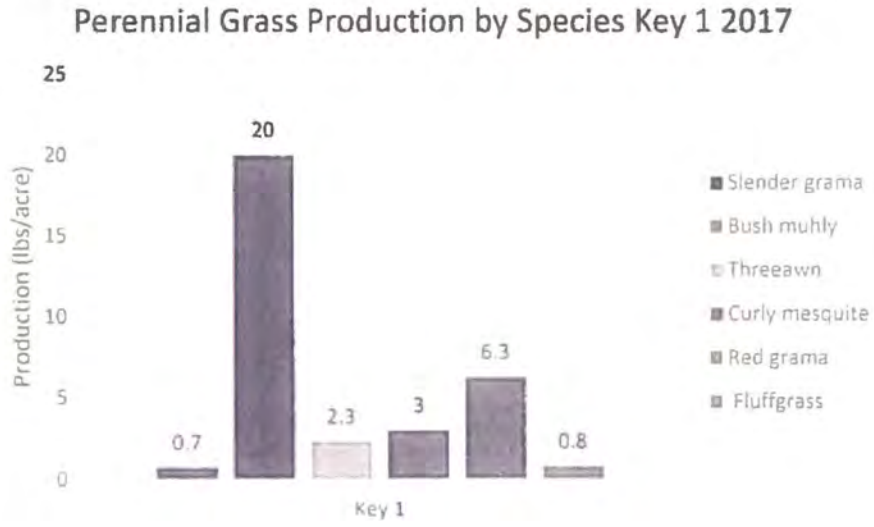
% Frequency	Quadrat Size: 40x40 cm		
Species	Transect		
	04/14/15	08/25/16	08/29/17
Woody Species			
whitethorn acacia	1	1	1
whitethorn acacia-Canopy	5	5	5
spicebush	1	4	2
spicebush-canopy		1	3
triangle leaf bursage	7	7	8
triangle leaf bursage-Canopy	11	13	7
shrubby ayenia		3	2
false mesquite	2	1	1
false mesquite-Canopy	1	3	1
saguaro	1		
littleleaf paloverde		1	
littleleaf paloverde-canopy		2	2
Warnock's snakewood-canopy	1	1	
staghorn cholla		1	
staghorn cholla-canopy		2	1
ocotillo-canopy		1	2
rock hibiscus			1
slender janusia	2	5	6
range ratany-canopy		2	
range ratany			2
white ratany		3	5
white ratany-Canopy		17	18
creosote bush	4	2	1
creosote bush-Canopy	11	15	14
wolfberry	1		1

wolfberry-Canopy	1	1	2
Graham's nipple cactus		1	
Engelmann pricklypear	6	1	
Engelmann pricklypear-Canopy	2	4	1
yerba de venado		1	
jojoba	2	1	3
jojoba-canopy		7	6
woody crinklemat	1		
Grasses - Perennial			
threeawn	1	2	
slender grama		2	
red grama		6	3
curly-mesquite			2
bush muhly	3	3	1
slim tridens	3		1
fluffgrass	21	8	7
Forbs - Perennial/Biennial			
spurge			8
bluedicks	1		
Annuals			
Annual forb(s)	63	38	59
Annual grass(es)	5	6	24
Unclassified			
hoary abutilon		1	
ratany	8		
ratany-Canopy	11		
Parry's false prairie-clover	2		2

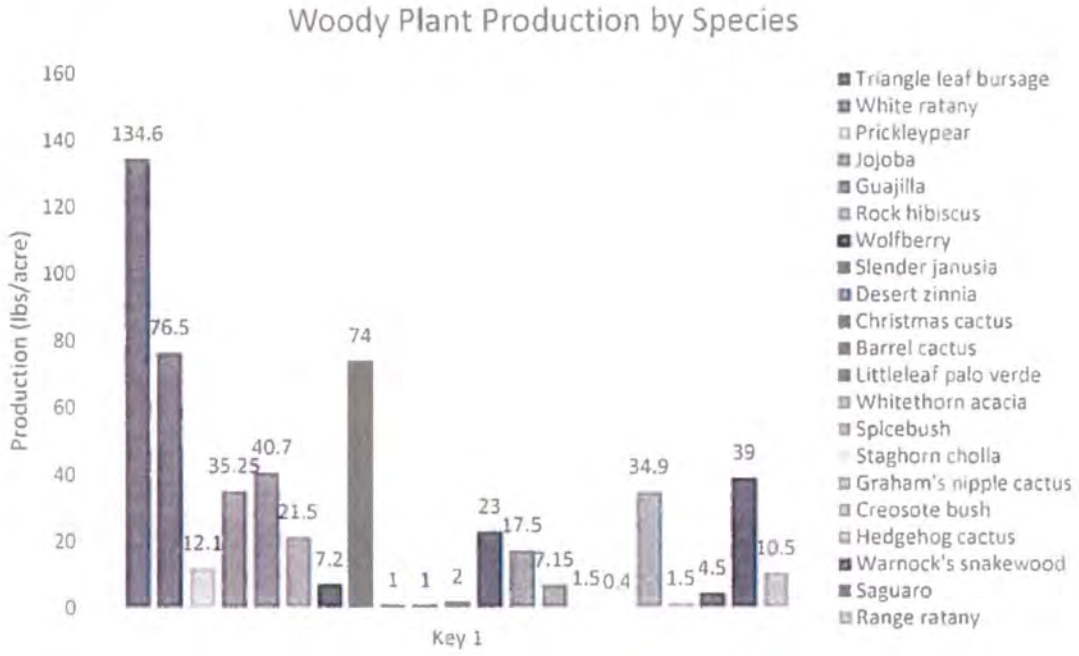
Graph 1. Total production by plant type 2017, Key 1, La Tortuga Allotment, Tucson Field Office, BLM. August 29, 2017.



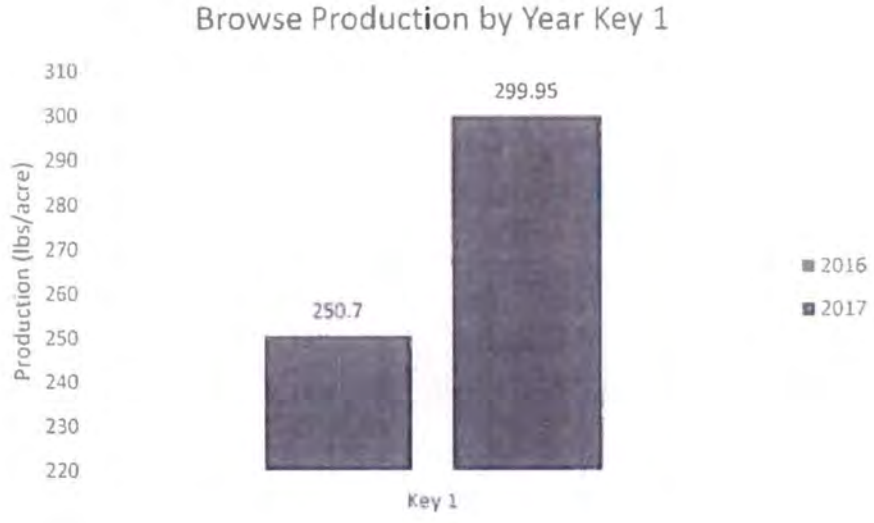
Graph 2. Perennial grass production by species 2017, Key 1, La Tortuga Allotment, Tucson Field Office, BLM. August 29, 2017.



Graph 3. Browse production by species 2017, Key 1, La Tortuga Allotment, Tucson Field Office, BLM. August 29, 2017.



Graph 4. Browse production from September 2016 to August 2017, Key 1, La Tortuga Allotment, Tucson Field Office, BLM.



Graph 5. Grass production from September 2016 to August 2017, Key 1, La Tortuga Allotment, Tucson Field Office, BLM.

Production

Study Number	Trt 1	Date 8/29/17	Examiner Miller M	Allotment Name & Number La Tortuga	Pasture
Transect Location	Peggy M	Quadrat Size 2|x2|FT		Transect Bearing	350

	Plant	Estimated or Clipped Weight Per Species										Wt Clipped Plots			QCF	%Dry	Wt All	Avg	Pct
Plant Name	Symbol	(Circle Plots that are Clipped) (3)										Est	Clip	Dry		Wt	Plots	Yield	Comp
(1)	(2)	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Tlaxcas	1x1		2	17	8	14	14	3	1	4	10	83		.10			8.3	83	
	1x2					2						2		.18			.36	3.6	
	2x2	2	1	6	4	1	6	1		2	1	24		.20			4.8	48	
Lal Tortuga	1x1		3			1	3	1			2	10		.08			.80	8	
	1x2							1		1		2		.15			.30	3	
	2x2	4	1	4		3	2	4	5	1	1	24		.20			4.8	48	
	2x3		1		1			1		1	3	7	4.3	.25			1.75	17.5	
Prickly Pear		15		43	23			16				97	4.85	.25			1.21	12.1	
Tasajillo		1				1				1		3		.41			1.2	12	
Bluegrass				6		1				1		5		.05			.40	4	
	1x1	6	5		2	1				2		24		.08			1.92	19.2	
	1x2	1	4	2	2							9		.15			1.35	13.5	
	2x2		1		1							2		.20			.40	4	
Kochia			1		2							3		.05			.15	1.5	
	1x1	4	5	2					1		1	13		.10			1.3	13	
	1x2	1	1									2		.13			.25	2.5	
	2x2	2		1								3		.15			.45	4.5	
Unknown	2x2	1	1	1								3		.13			.39	3.9	
Sunflower		2	3									5		.05			.25	2.5	
	1x1	8		13	18	9	7					55		.10			5.5	55	
	1x2																		
	2x2		1	1		1			2	4	3	11		.15			1.65	16.5	
	2x3																		
Dalea	1x1	1			1							2		.05			.10	1.0	
Totals																			

Notes (use other side or another page)

Production

Study Number	Date	Examiner	Allotment Name & Number	Pasture

Transect Location	Quadral Size	Transect Bearing

Plant Name	Plant Symbol	Estimated or Clipped Weight Per Species (Circle Plots that are Clipped) (3)										Wt Clipped Plots			QCF	%Dry Wt	Wt All Plots	Avg Yield	Pct Comp
		P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	Est	Clip	Dry					
(1)	(2)											(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Slender grama		4	2	1								7		5			35	2.7	
Buckwheat		4						1	6		3	14		64.5			903	26	
xmas	2x2		1									1		.10			.10	1	
Threeawn			1	2								4		26			104	2.3	
CRUST			7	16								23		6			13.8	3	
Ixria	2FT			1								1		.20			.20	2	
Pelaverde	6FT				1					1		2		.40			.10	8	
	2FT				1							1		.60			.60	6	
Red sterm					1			4		2	3	72		4			2.88	6.3	
Filaree					2			1	7	8		18		1			.36	0.8	
Tejeda	1x1					1						1		.05			.05	5	
	3x3					1			2	7	1	6		.20			1.2	12	
~~Tarr~~	6FT					B						3		~~.225~~			.075	.75	
Wh[illegible]	3FT					1				1		2		.40			.80	8	
Prairie	1x2					1		3	2	1		7		.15			1.05	10.5	
Wolftail	1x1					1				1		2		.07			.14	1.4	
Spiderwort	1x1					1		3	7			11		.065			.715	7.15	
Sleighorn	3FT						1					1		.15			.15	1.5	
Cheesebush	2FT						2					2		.09			.18	1.8	
Whitethorn	1FT						1					1		.05			.05	.5	
Hedgehog	1							15				15		.01			.15	1.5	
Annuals								1	3			4		.01			.04	.4	
Cleosore	5FT							1				1		1.30			1.3	13	
[illegible]	4x4							2	1			2		.80			1.6	16	
[illegible]	4x4							1				2		.30			.60	6	
Totals																			

Notes (use other side or another page)

Production

Study Number	Date	Examiner	Allotment Name & Number	Pasture

Transect Location	Quadrat Size	Transect Bearing

Plant Name	Plant Symbol	Estimated or Clipped Weight Per Species (Circle Plots that are Clipped) (3)										Wt Clipped Plots			QCF	%Dry Wt	Wt All Plots	Avg Yield	Pct Comp
		P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	Est	Clip	Dry					
(1)	(2)											(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Whitetop	2x2							1			1	2		.10			.20	2	
Javeline	3x3								1			1		.19			.19	1.9	
Foxtail	15 In								1			1		.90			.90	9	
Poa	2x2								2		2	4		.10			.40	4	
Cheatgrass	3 In										2	3		.13			.39	3.9	
	6 In								1			1		.02			.02	.2	
Sagebrush	8								4	22		26	2.6	1.5			3.9	39	
Javelina	2x2									1	1	2		.13			.26	2.6	
Whitetop	4 In									1		1		.70			.70	7	
Wolftail	3x3									1		1		.19			.19	1.9	
Totals																			

Notes (use other side or another page)

Totals

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Production

Study Number	Date	Examiner	Allotment Name & Number	Pasture

Transect Location	Quadrat Size	Transect Bearing

Plant Name	Plant Symbol	Estimated or Clipped Weight Per Species (Circle Plots that are Clipped) (3)										Wt Clipped Plots			QCF	%Dry Wt	Wt All Plots	Avg Yield	Pct Comp
		P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	Est	Clip	Dry					
(1)	(2)											(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
A Burseac																		134.6	
White Ratany																		76.5	
Prickly Pear																		12.1	
Jojoba																		35.25	
Gray Hills																		40.7	
Rock Hibiscus																		21.5	
Waltheria																		7.2	
Slender Janusia																		74	
Desert Zinnia																		1	
Slender Sida																		0.7	
Bush Muhly																		20	
Knees cactus																		1	
Threeawn																		2.3	
Curly Mesquite																		3	
Barrel cactus																		2	
Palo verde																		23	
Red erma																		6.3	
Fluffgrass																		0.8	
Waltheria																		17.5	
Range ratany																		10.5	
Spicebush																		7.15	
Stephanomeria																		1.5	
Creosotebush																		34.9	
Hedgehog																		1.5	
Mexillonia																		.4	
Totals																			

Notes (use other side or another page)

Totals continued

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Production

Study Number	Date	Examiner	Allotment Name & Number	Pasture

Transect Location	Quadrat Size	Transect Bearing

	Plant	Estimated or Clipped Weight Per Species										Wt Clipped Plots			QCF	%Dry	Wt All	Avg	Pct
Plant Name	Symbol	(Circle Plots that are Clipped) (3)										Est	Clip	Dry		Wt	Plots	Yield	Comp
(1)	(2)	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Snakeweed																		4.5	
Snakeweed																		3.4	
Totals																		578.9	

Notes (use other side or another page)

Illustration 22

La Tortuga

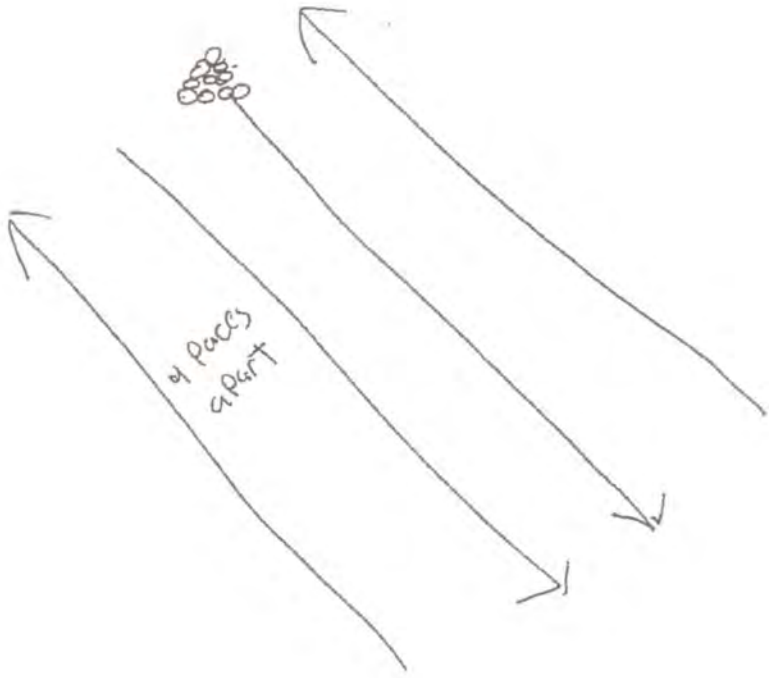
Key

N

4 transects

50 quadrats

each running Southeast

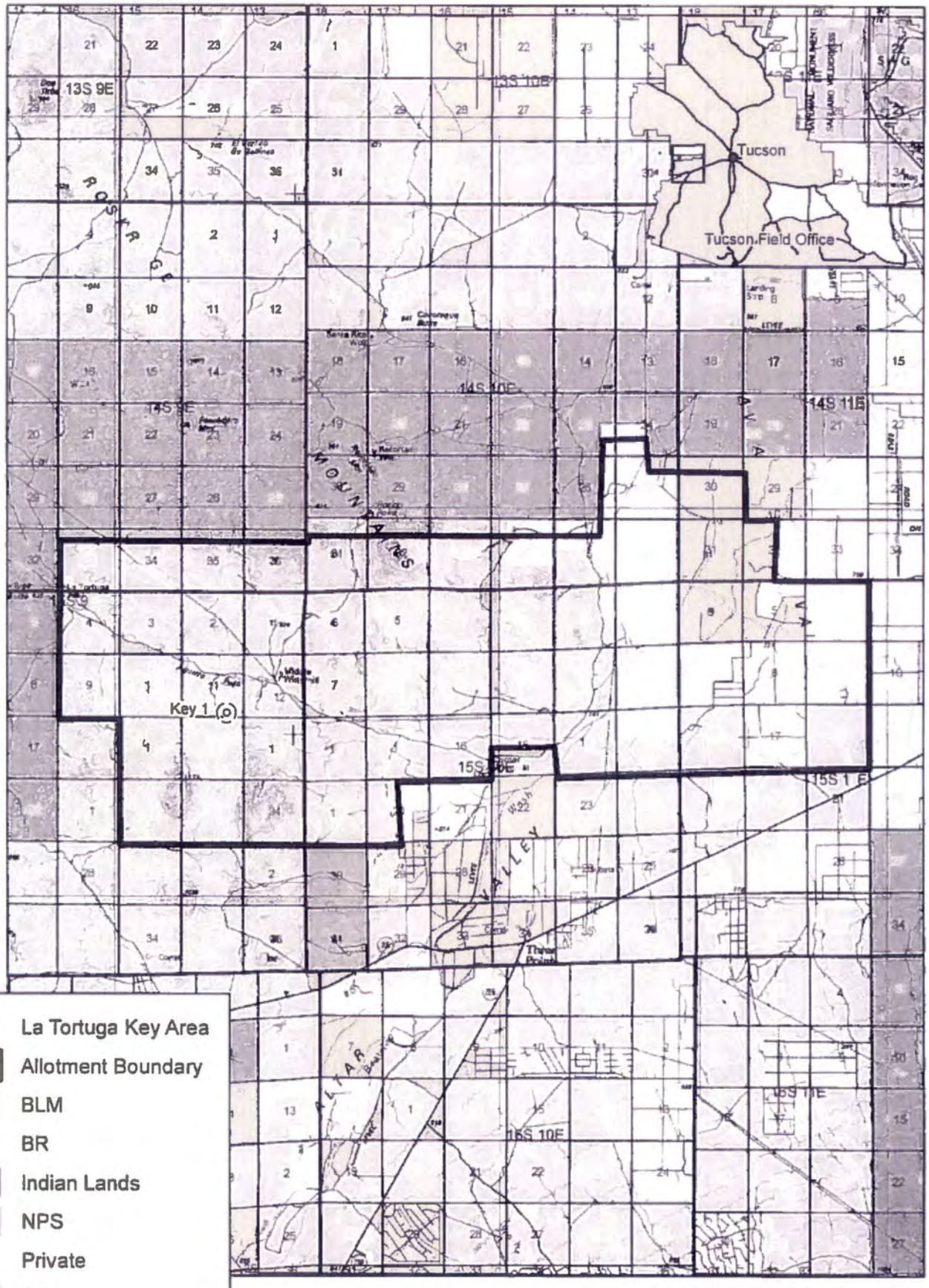


Species List

Allotment: La Tortuga
Date: August 2017

Scientific Name	**Common name**
Perennial Grasses	
Aristida spp.	Threeawn
Bouteloua repens	Slender grama
Bouteloua trifida	Red grama
Digitaria arizonica	Arizona cottontop
Hilaria belangeri	Curly mesquite
Mulenbergia porteri	Bush Muhly
Tridens muticus	Slim tridens
Tridens pulchellus	Fluffgrass
Perennial forbs	
Dichelostemma capitatum	Blue dicks
Hibiscus denudatus	Rock hibiscus
Marina parryi	Parry's false prairie clover
Trees and shrubs	
Abutilon incanum	Hoary abutilon
Acacia constricta	Whitethorn acacia
Aloysia wrightii	Spicebush
Ambrosia deltoidea	Triangle-leaf bursage
Ayenia microphylla	Shrubby ayenia
Calliandra eriophylla	False mesquite (Fairyduster)
Carnegiea gigantea	Saguaro
Cercidium mircophyllum	Littleleaf palo verde
Condalia warnockii	Warnock's snakewood
Cylindropuntia leptocaulis	Christmas cactus
Cylindropuntia versicolor	Staghorn cholla
Echinocereus spp.	Hedgehog cactus
Ferocactus spp.	Barrel cactus
Foquieria splendens	Ocotillo
Janusia gracilis	Slender janusia
Krameria erecta	Range ratany
Krameria grayi	White ratany
Larrea tridentata	Creosote bush
Lycium pallida	Wolfberry
Mammillaria grahamii	Graham's nipple cactus
Opuntia engelmannii	Engelmann pricklypear
Prosopis spp.	Mesquite
Porophyllum gracile	Yerba de venado
Simmondsia chinensis	Jojoba
Tiquillia canescens	Rat eared coldenia
Zinnia acerosa	Desert zinnia

La Tortuga



- o) La Tortuga Key Area
- Allotment Boundary
- BLM
- BR
- Indian Lands
- NPS
- Private
- State
- State Wildlife Area