

WHY IS GRASS ON THE AGENDA?

ASHLEY HALL, AREA ASSISTANT AGENT
RANGE AND LIVESTOCK MANAGEMENT
GILA AND PINAL COUNTIES



THE UNIVERSITY OF ARIZONA
Cooperative Extension

Outline

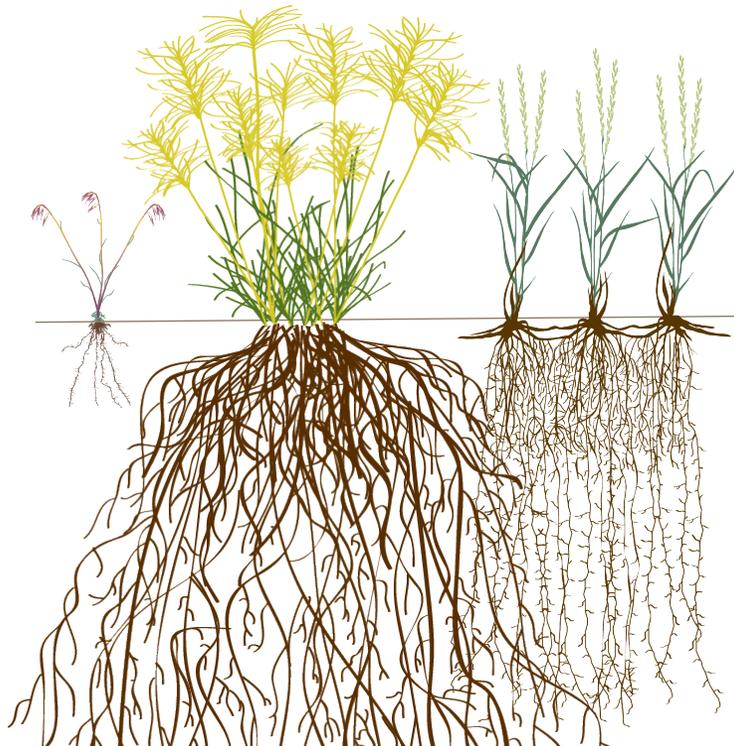
- Plant Life Forms
- Gila County Rangelands
 - Precipitation Driven Cycles
 - Invasive Species
- Current Data on Fire Recovery



Plant Life Forms

grass and grass-like

annual or perennial
warm or cool season



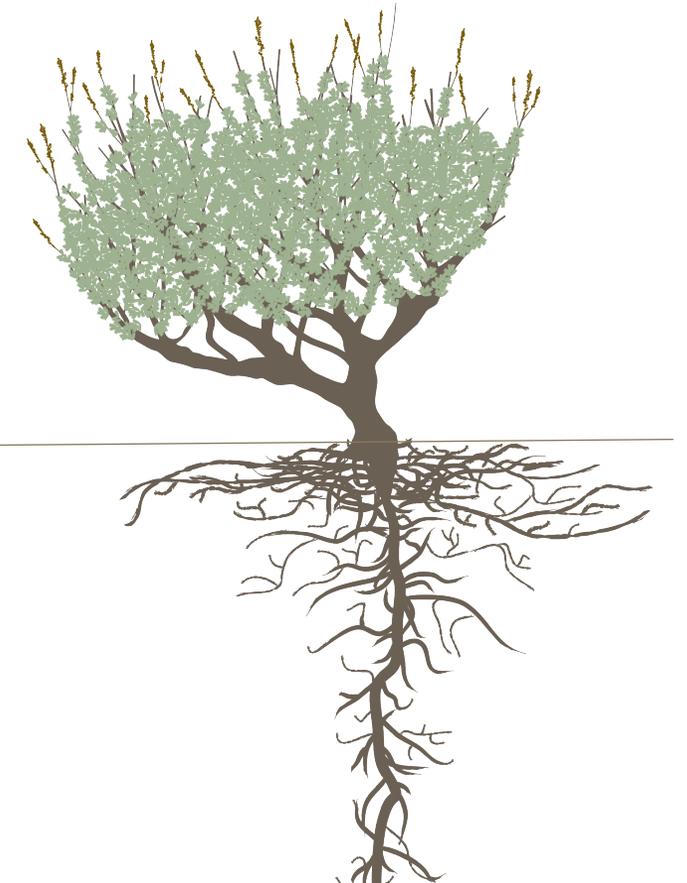
forbs

Annual, biennial, or perennial
warm or cool season



shrubs and trees

perennial
evergreen or deciduous



Life Forms and Fire

- Annual species density and frequency fluctuate greatly with precipitation
- Annuals serve as fine fuels
- Ecological shift from desert to grassland??
 - No.... Precipitation can't support



Invasive Species and Fire

Non-native species are established across the County

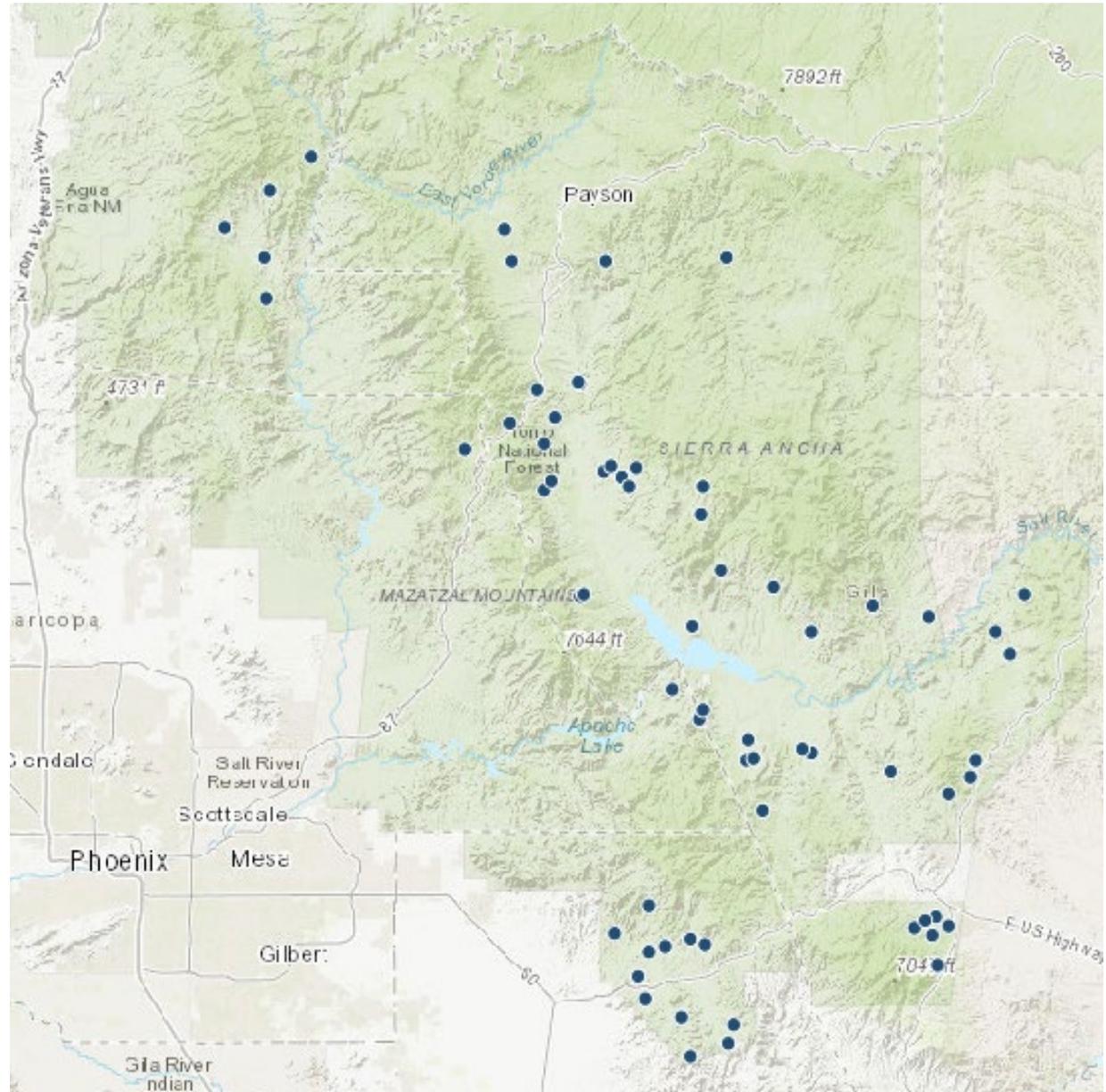
Red brome (*Bromus rubens*)

Stinkgrass (*Eragrostis cilianensis*)

Mediterranean grass (*Schismus barbatus*)

Yellow bluestem (*Bothriochloa ischaemum*)

Stinknet (*Oncosiphon pilulifer*)



New Invasive Species Increasing Fuels



Stinket and YB are known to create increased biomass compared to many of the native perennial grasses and annual forbs

Help Stop the Spread of Invasive Species

Invasive species typically spread along roadways, fields, or residential areas.

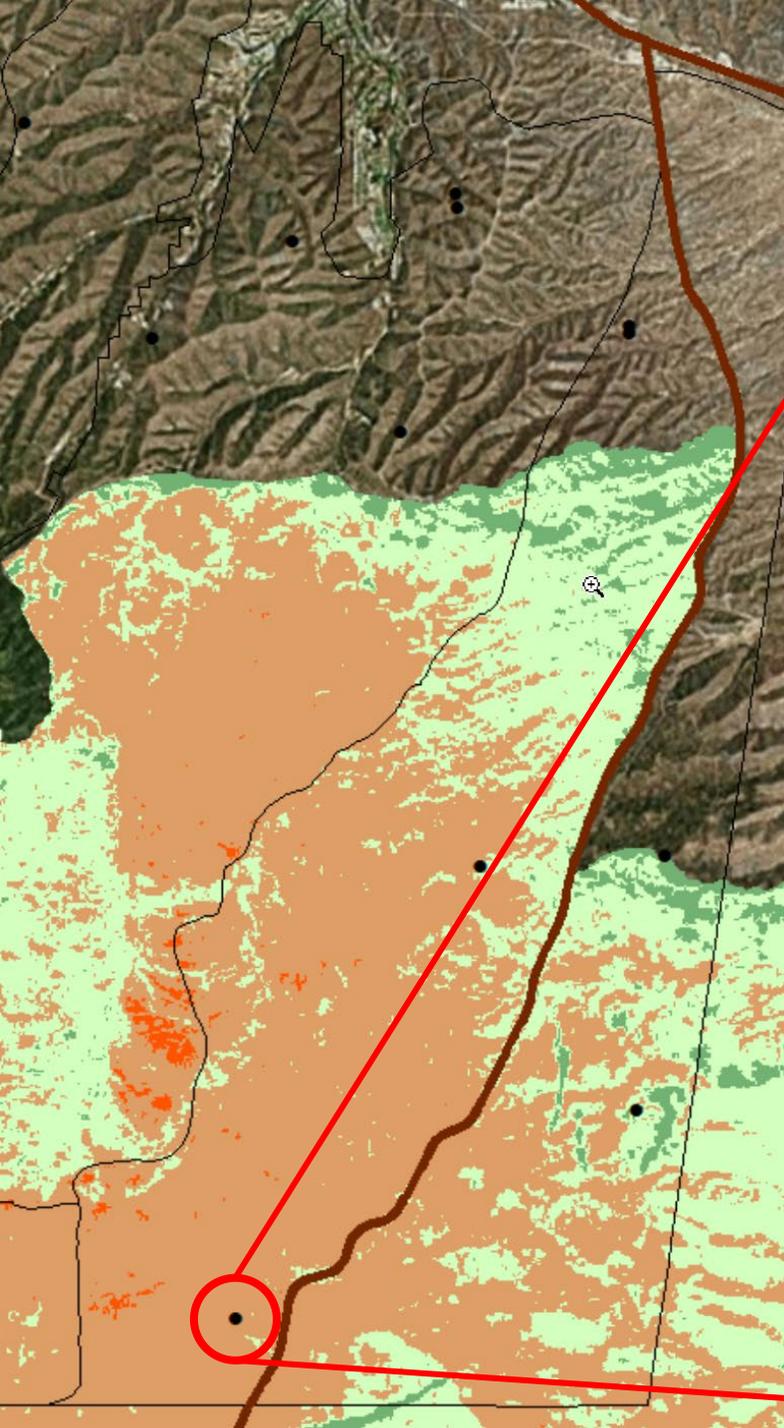
If traveling to/from a new area consider cleaning your hiking boots and tires (vehicle, RV, 5th wheel, UTV/ ATV) to remove any invasive seeds.

Consider purchasing certified weed free hay for your animals. When possible, help educate others about the threat and spread of invasive species.



Vegetation Recovery Post-fire

Moderate Intensity



% Frequency		Quadrat Size: 40x40 cm													
Species		Events													
		KA2		KA2		KA2		KA2		KA2		KA2		KA2	
		11/06/09	11/02/10	10/28/11	11/02/12	10/28/13	11/06/15	10/22/21	11/06/09	11/02/10	10/28/11	11/02/12	10/28/13	11/06/15	10/22/21
cane beardgrass	BOBA3	3 ±3 a ±3 a	2 ±3 a ±2 a	2 ±3 a ±2 a	2 ±3 a ±2 a	1 ±2 a ±2 a	2 ±2 a ±2 a	1 ±2 a ±2 a	3 ±3 a ±3 a	2 ±2 a ±2 a	2 ±2 a ±2 a	2 ±2 a ±2 a	1 ±1 a ±1 a	2 ±2 a ±2 a	1 ±1 a ±1 a
sideoats grama	BOCU	15 ±7 a ±5 ab	12 ±4 a ±5 ab	23 ±9 a ±6 b	20 ±4 a ±5 ab	18 ±5 a ±5 ab	15 ±5 a ±5 ab	11 ±8 a ±4 a	15 ±7 a ±5 ab	12 ±4 a ±5 ab	23 ±9 a ±6 b	20 ±4 a ±5 ab	18 ±5 a ±5 ab	15 ±5 a ±5 ab	11 ±8 a ±4 a
hairy grama	BOHI2	16 ±10 ab ±5 bc	24 ±11 b ±6 cd	28 ±10 b ±6 d	15 ±4 b ±5 bc	16 ±12 ab ±5 bc	13 ±7 ab ±5 ab	5 ±3 a ±3 a	16 ±10 ab ±5 bc	24 ±11 b ±6 cd	28 ±10 b ±6 d	15 ±4 b ±5 bc	16 ±12 ab ±5 bc	13 ±7 ab ±5 ab	5 ±3 a ±3 a
plains lovegrass	ERIN	12 ±10 ab ±5 abc	16 ±10 ab ±5 c	6 ±4 ab ±4 ab	5 ±2 a ±3 a	6 ±6 ab ±3 ab	13 ±6 b ±5 bc	13 ±5 b ±5 abc	12 ±10 ab ±5 abc	16 ±10 ab ±5 c	6 ±4 ab ±4 ab	5 ±2 a ±3 a	6 ±6 ab ±3 ab	13 ±6 b ±5 bc	13 ±5 b ±5 abc
Lehmann lovegrass	ERLE	0 ±2 a	0 ±2 a	0 ±2 a	0 ±2 a	0 ±2 a	0 ±2 a	9 ±8 a ±4 b	0 ±2 a	0 ±2 a	0 ±2 a	0 ±2 a	0 ±2 a	9 ±8 a ±4 b	
green sprangletop	LEDU	1 ±2 a ±2 a	4 ±3 a ±3 a	0 ±2 a	3 ±3 a ±3 a	5 ±4 a ±3 a	5 ±9 a ±3 a	3 ±3 a ±3 a	1 ±2 a ±2 a	4 ±3 a ±3 a	0 ±2 a	3 ±3 a ±3 a	5 ±4 a ±3 a	5 ±9 a ±3 a	3 ±3 a ±3 a
turbinella oak	QUTU2	23 ±18 ab ±6 b	19 ±12 ab ±5 b	20 ±14 ab ±5 b	19 ±12 ab ±5 b	22 ±11 b ±6 b	18 ±11 ab ±5 b	4 ±7 a ±3 a	23 ±18 ab ±6 b	19 ±12 ab ±5 b	20 ±14 ab ±5 b	19 ±12 ab ±5 b	22 ±11 b ±6 b	18 ±11 ab ±5 b	4 ±7 a ±3 a
shrubby buckwheat	ERWR	3 ±2 a ±3 a	4 ±2 a ±3 a	4 ±4 a ±3 a	3 ±5 a ±3 a	1 ±3 a ±2 a	4 ±4 a ±3 a	3 ±3 a ±3 a	3 ±2 a ±2 a	4 ±3 a ±3 a	4 ±4 a ±3 a	3 ±5 a ±3 a	1 ±3 a ±2 a	4 ±4 a ±3 a	3 ±3 a ±3 a
fairyduster	CAER	46 ±14 a ±7 a	48 ±5 a ±7 a	51 ±15 a ±7 a	52 ±5 a ±7 a	47 ±10 a ±7 a	48 ±4 a ±7 a	47 ±13 a ±7 a	46 ±14 a ±7 a	48 ±5 a ±7 a	51 ±15 a ±7 a	52 ±5 a ±7 a	47 ±10 a ±7 a	48 ±4 a ±7 a	47 ±13 a ±7 a
red brome	BRRU2	1 ±2 a ±2 a	1 ±2 a ±2 a	0 ±2 a	2 ±3 a ±2 a	3 ±3 a ±3 a	3 ±3 a ±3 a	0 ±2 a	1 ±2 a ±2 a	1 ±2 a ±2 a	0 ±2 a	2 ±3 a ±2 a	3 ±3 a ±3 a	3 ±3 a ±3 a	0 ±2 a
spurge	CHAL11	7 ±5 ab ±4 bc	9 ±9 ab ±4 bc	1 ±2 a ±2 a	3 ±2 ab ±3 ab	3 ±4 ab ±3 ab	14 ±9 b ±5 c	5 ±3 ab ±3 ab	7 ±5 ab ±4 bc	9 ±9 ab ±4 bc	1 ±2 a ±2 a	3 ±2 ab ±3 ab	3 ±4 ab ±3 ab	14 ±9 b ±5 c	5 ±3 ab ±3 ab
desert Indianwheat	PLOV	51 ±20 b ±7 b	45 ±14 b ±7 b	0 ±2 a	2 ±4 a ±2 a	42 ±9 b ±6 b	5 ±7 a ±3 a	0 ±2 a	51 ±20 b ±7 b	45 ±14 b ±7 b	0 ±2 a	2 ±4 a ±2 a	42 ±9 b ±6 b	5 ±7 a ±3 a	0 ±2 a

perennial
grasses

shrubs

annuals

% Ground Cover														
Species	Events													
	11/06/09		11/02/10		10/28/11		11/02/12		10/28/13		11/06/15		10/22/21	
	1		0		0		0		0		0		0	
	± 1 a	± 1 a		± 1 a		± 1 a		± 1 a		± 1 a		± 1 a		± 1 a
Bare Soil	6		5		4		14		5		2		28	
	± 4 abc	± 3 a	± 3 ab	± 2 a	± 1 a	± 2 a	± 5 c	± 3 b	± 5 abc	± 2 a	± 2 a	± 2 a	± 22 bc	± 4 c
Gravel (1/8" - 3/4")	18		26		25		23		20		40		34	
	± 6 a	± 4 a	± 13 ab	± 4 ab	± 5 ab	± 4 ab	± 8 ab	± 4 a	± 5 a	± 4 a	± 13 b	± 5 c	± 13 ab	± 5 bc
Litter <1/2"	28		20		25		19		26		17		15	
	± 7 a	± 4 d	± 13 a	± 4 abcd	± 9 a	± 4 bcd	± 5 a	± 4 abc	± 6 a	± 4 cd	± 16 a	± 4 ab	± 16 a	± 4 a
Live Basal Veg.	5		2		7		2		3		5		5	
	± 3 a	± 2 a	± 1 a	± 2 a	± 4 a	± 3 a	± 3 a	± 2 a	± 4 a	± 2 a	± 4 a	± 2 a	± 5 a	± 2 a
Persistent Litter	20		25		15		20		23		14		4	
	± 17 ab	± 4 bc	± 19 ab	± 4 c	± 17 ab	± 4 b	± 11 b	± 4 bc	± 10 b	± 4 c	± 11 ab	± 3 b	± 4 a	± 2 a
Rock >3/4"	24		22		26		22		23		23		15	
	± 6 a	± 4 b	± 5 a	± 4 ab	± 9 a	± 4 b	± 7 a	± 4 ab	± 6 a	± 4 b	± 4 a	± 4 b	± 18 a	± 4 a

t-Statistic margin of error where confidence level = 90%

"Exact" binomial margin of error where confidence level = 90%

NOTE: Letters indicate confidence interval overlaps only and do not imply significant differences based on a specific statistical test.

November 2009



November 2010



November 2012



December 2016



February 2018

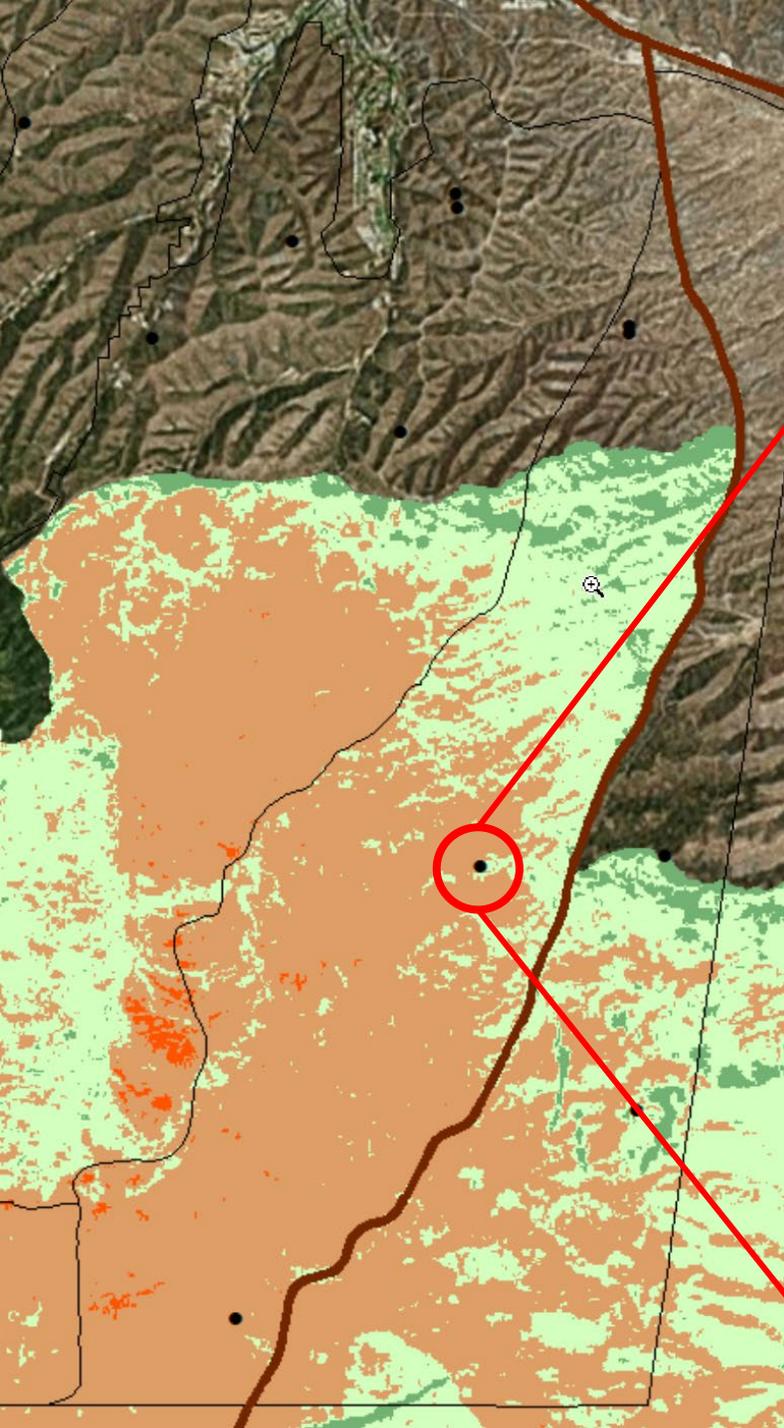


October 2021



Vegetation Recovery Post-fire

Boundary of moderate to light intensity



% Frequency		Quadrat Size: 40x40 cm																		
Species		Events																		
		11/06/09		11/02/10		10/27/11		11/01/12		10/29/13		10/22/21								
hairy grama	BOHI2	3	10	6	5	8	1	± 3 ab	± 3 ab	± 10 ab	± 4 c	± 5 ab	± 3 abc	± 4 ab	± 3 abc	± 4 b	± 4 bc	± 2 a	± 2 a	perennial grasses
Lehmann lovegrass	ERLE	1	0	0	3	4	13	± 3 a	± 2 a	± 2 a	± 2 a	± 6 ab	± 3 a	± 6 ab	± 3 a	± 6 b	± 5 b			
sideoats grama	BOCU	7	5	12	6	8	1	± 5 ab	± 4 b	± 5 ab	± 3 ab	± 7 b	± 4 b	± 4 ab	± 3 ab	± 8 ab	± 4 b	± 2 a	± 2 a	
green sprangletop	LEDU	13	23	3	6	2	15	± 6 bcd	± 5 bc	± 15 cd	± 6 c	± 4 ab	± 3 a	± 4 abc	± 3 ab	± 4 a	± 2 a	± 4 d	± 5 c	
shrubby buckwheat	ERWR	9	7	6	6	6	3	± 6 a	± 4 a	± 3 a	± 4 a	± 4 a	± 3 a	± 4 a	± 3 a	± 7 a	± 3 a	± 4 a	± 3 a	shrubs
fairyduster	CAER	37	38	39	33	33	44	± 14 a	± 6 a	± 9 a	± 6 a	± 9 a	± 6 a	± 6 a	± 6 a	± 9 a	± 6 a	± 14 a	± 6 a	
catclaw acacia	ACGR	0	1	7	4	2	0	± 2 a	± 2 a	± 2 ab	± 11 a	± 4 b	± 6 a	± 3 ab	± 5 a	± 2 ab	± 2 a	± 2 a	annuals	
spurge	CHAL11	20	39	6	5	2	25	± 19 ab	± 5 b	± 22 b	± 6 c	± 8 a	± 3 a	± 3 a	± 3 a	± 3 a	± 2 a	± 6 b		± 6 b
desert Indianwheat	PLOV	63	41	0	4	41	0	± 8 b	± 6 c	± 15 b	± 6 b	± 2 a	± 5 a	± 3 a	± 27 b	± 6 b	± 2 a	± 2 a		
red brome	BRRU2	53	58	39	69	87	0	± 13 ab	± 7 c	± 9 ab	± 6 cd	± 16 a	± 6 b	± 11 bc	± 6 d	± 10 c	± 5 e	± 2 a		

% Ground Cover																		
Species	Events																	
	11/06/09		11/02/10		10/27/11		11/01/12		10/29/13		10/22/21							
Bare Soil	10	7	3	12	7	12	±7 a	±3 b	±5 a	±3 ab	±4 a	±2 a	±6 a	±3 b	±6 a	±3 ab	±11 a	±3 b
Gravel (1/8" - 3/4")	35	24	54	41	47	36	±9 ab	±5 b	±6 a	±4 a	±8 c	±5 d	±9 bc	±5 bc	±6 bc	±5 cd	±8 ab	±5 b
Litter <1/2"	29	47	19	30	26	39	±6 a	±4 b	±10 b	±5 d	±12 a	±4 a	±6 a	±4 bc	±5 a	±4 ab	±18 ab	±5 cd
Live Basal Veg.	3	3	3	2	6	7	±2 a	±2 ab	±3 a	±2 ab	±2 a	±2 ab	±2 a	±2 a	±3 a	±3 ab	±9 a	±3 b
Persistent Litter	11	5	6	2	5	2	±8 bc	±3 b	±5 abc	±2 a	±2 c	±3 ab	±2 ab	±2 a	±6 abc	±2 a	±1 a	±2 a
Rock >3/4"	12	14	16	14	11	4	±5 a	±3 b	±8 a	±3 b	±9 a	±4 b	±5 a	±3 b	±6 a	±3 b	±8 a	±2 a



November 2009



October 2011



November 2012



December 2016



February 2019



October 2021

July 22, 2021



October 22, 2021





Vegetation Recovery Post-fire

Woodbury Fire

% Frequency		Quadrat Size: 40x40 cm											
Species		Events											
		KA6		KA6		KA6		KA6		KA6		KA6	
		01/21/09	12/01/10	11/18/11	12/10/12	01/13/14	01/09/18	01/14/19	12/16/20				
Lehmann lovegrass	ERLE	37 ±12 bc ±8 bc	26 ±12 b ±8 b	36 ±31 abc ±8 bc	42 ±35 abc ±8 cd	31 ±27 abc ±8 bc	50 ±4 c ±7 d	38 ±18 bc ±8 bcd	8 ±2 a ±4 a	perennial grasses			
sideoats grama	BOCU	0 ±2 a	3 ±5 a	1 ±2 a	0 ±2 a	0 ±2 a	0 ±2 a	2 ±3 a	0 ±2 a	perennial grasses			
slender grama	BORE2	18 ±12 abc ±5 cd	11 ±8 abc ±4 bc	21 ±8 c ±5 d	13 ±3 bc ±5 cd	10 ±11 abc ±4 bc	4 ±5 a ±3 ab	4 ±8 ab ±3 ab	2 ±4 a ±2 a	perennial grasses			
shrubby buckwheat	ERWR	8 ±4 a ±4 b	8 ±4 a ±4 b	7 ±7 a ±4 b	5 ±7 a ±3 ab	3 ±4 a ±3 ab	6 ±7 a ±3 b	2 ±2 a ±2 ab	0 ±2 a	shrubs			
fairyduster	CAER	48 ±11 ab ±7 b	49 ±6 b ±7 b	45 ±14 ab ±7 ab	55 ±18 ab ±7 b	52 ±12 ab ±7 b	48 ±3 b ±7 b	44 ±7 ab ±8 ab	33 ±7 a ±8 a	shrubs			
red brome	BRRU2	3 ±6 a ±3 a	79 ±13 b ±5 d	73 ±42 b ±8 cd	77 ±23 b ±8 d	53 ±36 b ±7 b	75 ±4 b ±8 d	1 ±2 a ±2 a	62 ±21 b ±8 bc	annuals			
desert Indianwheat	PLOV	0 ±2 a	26 ±9 c ±8 c	1 ±2 a ±2 a	1 ±2 a ±2 a	0 ±2 a	8 ±5 ab ±4 b	0 ±2 a ±8 bc	15 ±5 bc	annuals			
Forb, annual-Cool	2FA	63 ±36 bcd ±8 de	72 ±5 c ±8 e	29 ±29 ab ±8 c	14 ±8 a ±5 b	67 ±24 bcd ±8 de	5 ±3 a ±3 a	55 ±29 bcd ±7 d	85 ±5 d ±5 f	annuals			
redstem filaree	ERIC8	106 ±42 cd ±2 a	25 ±32 ab ±8 b	148 ±5 d ±2 a	97 ±19 c ±3 d	106 ±38 cd ±2 a	0 ±2 a	66 ±14 bc ±8 c	5 ±5 a ±3 a	annuals			

% Ground Cover																								
Species	Events																							
	KA6 Woodbury 01/21/09		KA6 Woodbury 12/01/10		KA6 Woodbury 11/18/11		KA6 Woodbury 12/10/12		KA6 Woodbury 01/13/14		KA6 Woodbury 01/09/18		KA6 Woodbury 01/14/19		KA6 Woodbury 12/16/20									
	Bare Soil	21	18	21	17	12	25	25	16	±4 a	±4 bcd	±8 a	±4 abcd	±8 a	±4 bcd	±3 a	±4 abc	±5 a	±3 a	±15 a	±4 d	±9 a	±4 cd	±11 a
Gravel (1/8" - 3/4")	24	17	31	21	26	9	16	12	±12 ab	±4 cde	±8 ab	±4 bc	±13 b	±4 e	±7 b	±4 cd	±8 b	±4 de	±4 a	±3 a	±7 ab	±4 bc	±8 ab	±3 ab
Litter <1/2"	36	40	23	35	20	41	45	60	±14 ab	±5 bc	±15 ab	±5 bc	±20 a	±4 a	±13 ab	±5 b	±17 a	±4 a	±16 ab	±5 bc	±10 ab	±5 c	±12 b	±5 d
Live Basal Veg.	6	1	4	6	21	9	2	2	±5 abc	±3 ab	±3 ab	±2 a	±6 abc	±2 ab	±5 abc	±3 ab	±15 c	±4 c	±5 bc	±3 b	±2 a	±2 a	±1 a	±2 a
Persistent Litter	4	12	4	6	6	8	4	5	±4 a	±2 a	±22 a	±3 b	±3 a	±2 a	±5 a	±3 ab	±9 a	±3 a	±8 a	±3 ab	±5 a	±2 a	±4 a	±2 a
Rock >3/4"	9	12	17	17	16	9	9	6	±5 ab	±3 ab	±4 ab	±3 abc	±6 b	±4 c	±10 ab	±4 c	±6 b	±4 bc	±3 ab	±3 ab	±5 ab	±3 ab	±3 a	±3 a

November 2009



November 2011



December 2014



January 2018



January 2019



January 2020





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