

BLACK MESA - TREND STUDY NO. 14-13-09

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter

NRCS Ecological Site Description: Semidesert Loam (Wyoming Big Sagebrush), R035XY209UT

Land Ownership: BLM

Elevation: 5,700 ft (1,737 m)

Aspect: Southeast

Slope: 3%

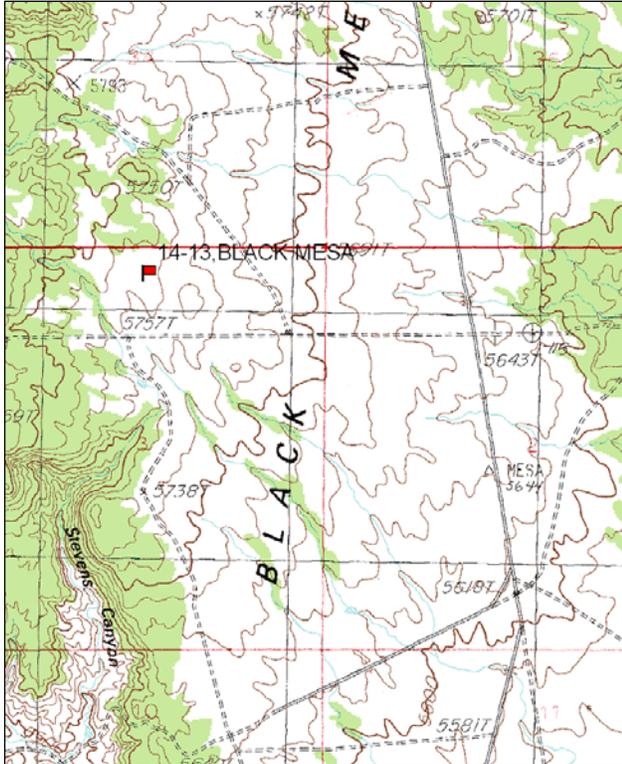
Transect bearing: 163 degrees magnetic.

Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:

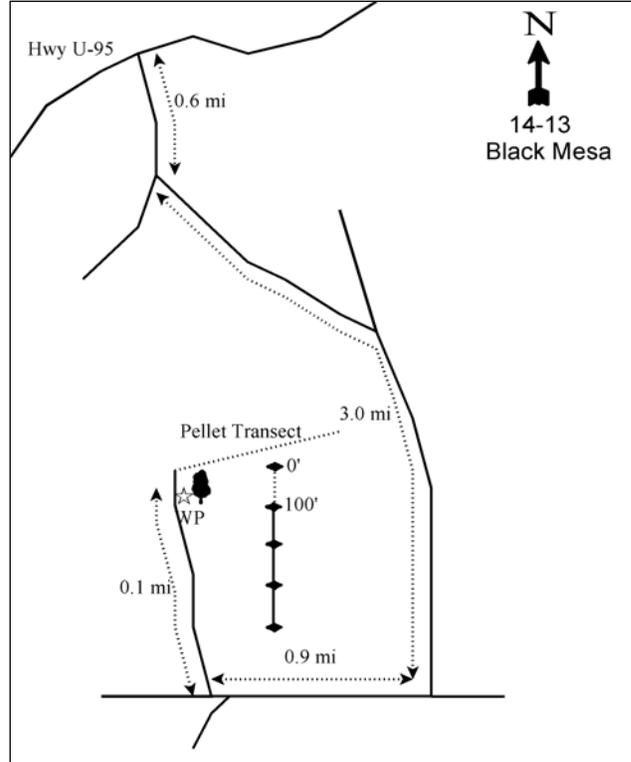
From mile marker 114 on Highway U-95 near Cottonwood Canyon east of Comb Ridge, go 0.5 miles east to County Road #233. Go south on #233 0.6 miles to a fork. Stay left and go 3.0 miles to an intersection (Road #280). Turn right and go 0.9 miles beyond a fork to the left, to a very faint road to the right. Turn right on this faint road before two gullies and go 0.1 miles to a fence post which is six feet from the right side of the road. There is a lone juniper just behind the stake. From this witness post, go about 600 feet (95 paces) at 40°M (following the deer pellet group transect) to the first baseline stake which is located 25 feet south of pellet transect stake #8718 (a 6 inch tall yellow rebar). The baseline stake is a three foot tall green fence post tagged #7822. The transect runs south from the 0-foot baseline stake, with 100 feet between all posts.

Map Name: Hotel Rock



Township: 38S, Range: 21E, Section: 3

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 624339 E 4153317 N

BLACK MESA - TREND STUDY NO. 14-13

Site Information

Site Description: This study is on top of the Black Mesa southeast of Elk Ridge. This is one of the lowest elevation studies (5,700 feet) on the unit, located on a large, flat mesa dominated by open sagebrush flats and pinyon-juniper woodlands. Sign of cattle use has been infrequent and not concentrated on the site during past readings. Pellet group data indicated moderately heavy use by cattle in 1999, but light use since 2004. Historically, a pellet transect on Black Mesa has shown moderate to heavy use by deer, depending on the winter (Jense et al. 1992). Pellet group data taken on the site has indicated moderately high to high use by deer since 1999. Estimated elk use has been light since 1999. Human pressure in the area is generally low, however there are several mining claims staked out near the study area.

Browse: Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the key browse species on the site. The sagebrush population has become overly mature and has been in a steady state of decline since 1994. Sagebrush decadence has been high and recruitment of young sagebrush plants has steadily decreased since 1994. Utilization of sagebrush is mostly moderate with some years of heavy use (Table - Browse Characteristics). Many of the declines in the sagebrush population on the site are attributed to drought combined with abundance of winter annuals drying the soil profile, as well as continued heavy use. The scattered juniper trees in the flat are generally vigorous and could possibly be slowly increasing. Point quarter data has shown an increase in the density and size of juniper trees since 1999 (Table - Point-Quarter Tree Data). The site also contains a population of broom snakeweed (*Gutierrezia sarothrae*), but density has varied with annual precipitation patterns.

Herbaceous Understory: Five perennial grasses and two annual grasses are found on this site. Cheatgrass (*Bromus tectorum*) is a major component of the community, with fluctuating cover and frequency over the sample years. Cheatgrass increased significantly in nested frequency to become the dominant species on the site in 1999 and 2004, but decreased significantly in nested frequency in 2009. Cheatgrass was common in 2009, but was no longer the dominant species in cover. Galleta (*Hilaria jamesii*) is the dominant perennial grass species in cover. Other common perennial grass species include sand dropseed (*Sporobolus cryptandrus*), bottlebrush squirreltail (*Sitanion hystrix*), and needle-and-thread (*Stipa comata*). Forbs are not very diverse with most species being annuals, and none are overly abundant. Total forb cover has been around or less than 1% since 1994 (Table - Herbaceous Trends).

Soil: The soil is a sandy clay loam with a neutral pH and a moderately deep effective rooting depth (Table - Soil Analysis Data). Bare ground cover has been high over the sample years with low vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1986 to 1992 - stable (0):** Differences in density may be related to the larger sample area used in 1992; therefore, trend was determined using other parameters. Decadence of sagebrush increased from 37% to 57%, but poor vigor decreased from 20% to 7%. Recruitment of young sagebrush plants remained similar.
- **1992 to 1994 - up (+2):** Density of the primary browse species, Wyoming big sagebrush, increased by 27% from 2,880 plants/acre to 3,660 plants/acre, and cover increased from 8% to 12%. Decadence in sagebrush decreased to 39%, though poor vigor increased to 22%. Recruitment of young sagebrush plants increased to 26% of the population
- **1994 to 1999 - down (-2):** Density of Wyoming big sagebrush decreased by 42% to 2,140 plants/acre and cover decreased to 5%. Decadence increased to 60% and poor vigor remained high at 22%. Recruitment of young sagebrush plants decreased to 9% of the population.

- **1999 to 2004 - down (-2):** Density of sagebrush decreased by 21% to 1,680 plants/acre, though cover increased slightly to 7%. The population is very unhealthy as decadence increased to 69% and poor vigor increased to 77%. Recruitment of young sagebrush plants constitutes only 1% of the population.
- **2004 to 2009 - stable (0):** There was little change in the density or cover of sagebrush, though decadence decreased slightly to 51% and poor vigor decreased to 28%. Recruitment of young plants remained poor at 1%.

Grass:

- **1986 to 1992 - slightly up (+1):** There was a 16% increase in the sum of nested frequency of perennial grasses with a significant increase in the nested frequency of sand dropseed and needle-and-thread, and a significant decrease in the nested frequency of bottlebrush squirreltail.
- **1992 to 1994 - up (+2):** The sum of nested frequency of perennial grasses increased by 51%, though cover remained similar. There was a significant increase in the nested frequency of bottlebrush squirreltail and needle-and-thread, though there was also a significant increase in the nested frequency of the two annual grasses, cheatgrass and sixweeks fescue (*Vulpia octoflora*).
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial grasses decreased by 58% and cover decreased from 9% to 4%. Cheatgrass increased significantly in nested frequency and cover increased from less than 1% to 12%. Cheatgrass is now the dominant species on the site in cover. There was a significant decrease in the nested frequency of bottlebrush squirreltail and needle-and-thread.
- **1999 to 2004 - slightly up (+1):** There was a 12% increase in the sum of nested frequency of perennial grasses and cover increased to 12%. There was a significant decrease in the nested frequency of cheatgrass and sixweeks fescue, though cover remained high for cheatgrass at 10%.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased by 50%, though cover remained similar. There was a significant decrease in the nested frequency of cheatgrass and cover decreased to 3%. There was a significant increase in the nested frequency of sand dropseed.

Forb:

- **1986 to 1992 - up (+2):** The sum of nested frequency of perennial forbs had over a four-fold increase.
- **1992 to 1994 - down (-2):** There was a 46% decrease in the sum of nested frequency of perennial forbs and cover decreased to less than 1%. Perennial forbs are rare with annual forbs producing nearly all of the forb cover on the site.
- **1994 to 1999 - down (-2):** Perennial forb sum of nested frequency and cover continued to decrease. Annual forbs also decreased substantially in nested frequency and cover.
- **1999 to 2004 - up (+2):** There was a substantial increase in the sum of nested frequency of perennial forbs and cover increased to near 1%. Annual forbs also increased substantially.
- **2004 to 2009 - slightly down (-1):** There was a slight decrease in the sum of nested frequency and cover of perennial forbs with little change in annual forbs. Forbs remain rare on the site.

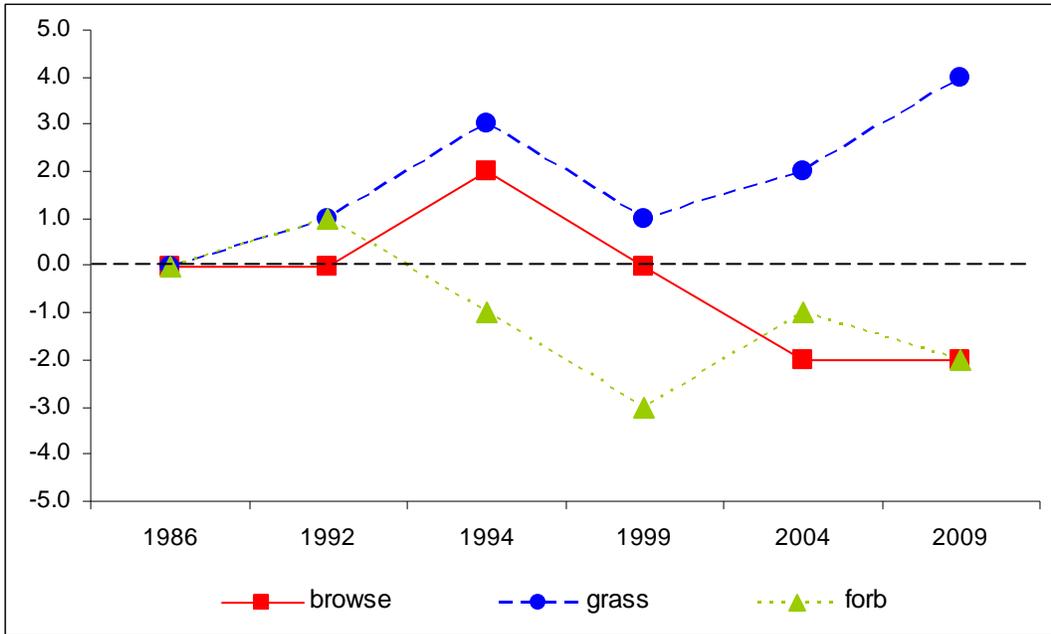
DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 14, study no: 13

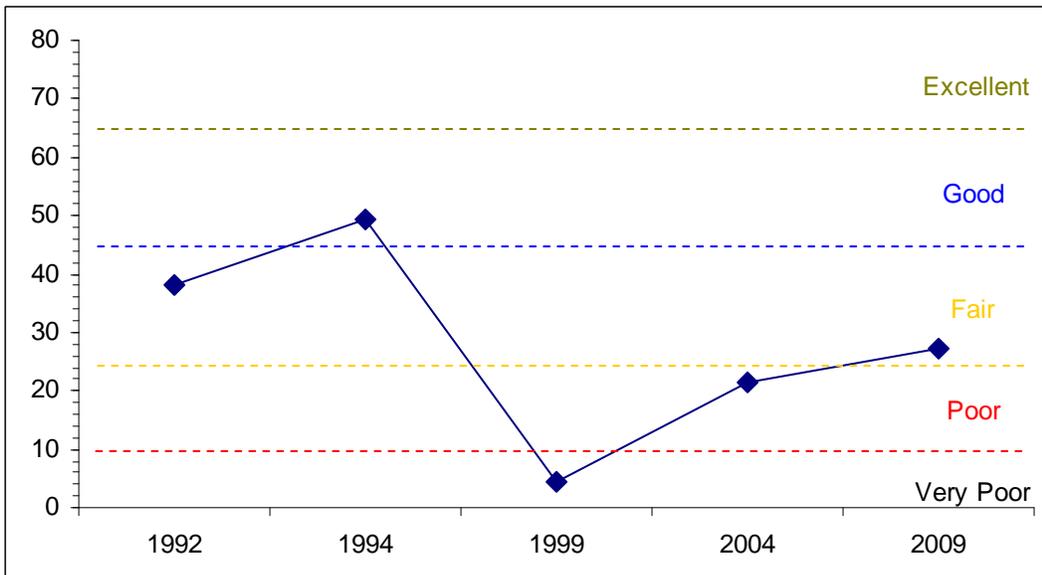
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
92	9.9	-2.1	9.5	18.8	-0.1	2.3	0.0	38.3	Fair
94	15.3	3.3	13.0	17.8	-0.5	0.6	0.0	49.5	Good
99	5.9	0.0	0.0	7.6	-9.3	0.3	0.0	4.5	Very Poor
04	8.3	-5.7	0.5	24.2	-7.5	1.5	0.0	21.3	Poor
09	6.7	-0.3	0.5	21.9	-2.4	1.0	0.0	27.3	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 14, Study no: 13



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
 Management unit 14, Study no: 13



HERBACEOUS TRENDS--
Management unit 14, Study no: 13

Type	Species	Nested Frequency						Average Cover %				
		'86	'92	'94	'99	'04	'09	'92	'94	'99	'04	'09
G	Bromus tectorum (a)	-	a26	b95	e358	d242	c174	.14	.49	12.17	10.00	3.21
G	Hilaria jamesii	a40	ab66	b75	b72	b82	b81	4.26	4.42	3.22	8.26	5.83
G	Oryzopsis hymenoides	-	13	12	2	4	9	.05	.08	.03	.21	.22
G	Sitanion hystrix	c142	b55	c131	a15	ab21	ab26	1.33	2.24	.21	1.35	.45
G	Sporobolus cryptandrus	a-	b27	ab11	a5	ab10	c84	1.74	.39	.01	.36	3.04
G	Stipa comata	a2	b53	c93	b43	b36	ab29	2.02	1.75	.33	1.91	1.39
G	Vulpia octoflora (a)	-	a17	b50	b59	a23	a4	.04	.12	.19	.05	.03
Total for Annual Grasses		0	43	145	417	265	178	0.18	0.61	12.36	10.05	3.24
Total for Perennial Grasses		184	214	322	137	153	229	9.42	8.89	3.81	12.11	10.96
Total for Grasses		184	257	467	554	418	407	9.60	9.51	16.18	22.17	14.21
F	Astragalus convallarius	-	7	5	3	-	-	.09	.04	.03	.00	-
F	Chaenactis stevioides	-	5	-	-	-	-	.01	-	-	-	-
F	Chenopodium album (a)	-	b26	a-	a-	a-	a-	.39	-	-	-	-
F	Comandra pallida	-	13	9	11	6	7	.25	.04	.09	.19	.01
F	Cordylanthus wrightii (a)	-	b58	a-	a-	a3	a2	2.34	-	-	.00	.03
F	Cryptantha sp.	-	-	8	-	-	-	-	.07	-	-	-
F	Descurainia pinnata (a)	-	18	13	3	15	8	.06	.05	.00	.23	.02
F	Draba rectifruca (a)	-	-	b9	a-	a-	a-	-	.05	-	-	-
F	Erigeron sp.	2	-	-	-	-	-	-	-	-	-	-
F	Eriogonum cernuum (a)	-	b22	a2	a-	a-	a-	.13	.01	-	-	-
F	Erodium cicutarium (a)	-	-	-	2	4	-	-	-	.00	.15	-
F	Euphorbia fendleri	a3	a-	a1	a-	a1	b24	-	.00	-	.00	.31
F	Gilia hutchiniifolia (a)	-	b109	a5	a14	a12	a4	.38	.02	.22	.08	.06
F	Lactuca serriola	-	-	6	-	-	-	-	.03	-	-	-
F	Lappula occidentalis (a)	-	b28	b11	a-	b16	b22	.30	.02	-	.18	.10
F	Leucelene ericoides	-	-	-	-	-	-	-	-	-	.00	-
F	Lupinus sp.	a-	c92	a-	a-	b29	a-	.68	-	-	.07	-
F	Lygodesmia sp.	-	-	1	-	-	-	-	.00	-	-	-
F	Medicago sativa	2	-	-	-	-	-	-	-	-	-	-
F	Mentzelia albicaulis (a)	-	b39	a-	a-	a1	a-	.47	-	-	.00	-
F	Navarretia intertexta (a)	-	-	3	1	1	-	-	.00	.00	.00	-
F	Phlox longifolia	ab26	b41	b52	a7	b42	b40	.11	.10	.02	.17	.15
F	Sphaeralcea coccinea	a1	a-	a1	a3	b15	a-	.00	.00	.00	.31	-
F	Tragopogon dubius	-	-	-	-	3	-	-	-	-	.00	-
F	Unknown forb-annual (a)	-	b34	a-	a-	a-	a-	.33	-	-	-	-
F	Unknown forb-perennial	-	-	2	-	-	-	-	.00	-	-	-
Total for Annual Forbs		0	334	43	20	52	36	4.42	0.16	0.23	0.67	0.21
Total for Perennial Forbs		34	158	85	24	96	71	1.16	0.31	0.14	0.77	0.48
Total for Forbs		34	492	128	44	148	107	5.59	0.48	0.38	1.44	0.69

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS--

Management unit 14, Study no: 13

Type	Species	Strip Frequency					Average Cover %				
		'92	'94	'99	'04	'09	'92	'94	'99	'04	'09
B	Artemisia tridentata wyomingensis	57	67	63	47	48	7.89	12.23	4.72	6.65	5.34
B	Ephedra viridis	1	1	1	1	1	.00	.00	.00	.00	.00
B	Gutierrezia sarothrae	51	42	70	72	17	6.96	.57	2.88	6.17	.03
B	Juniperus osteosperma	0	0	0	0	0	-	.85	-	-	-
B	Opuntia sp.	0	1	0	1	1	-	.00	-	.00	.00
B	Yucca sp.	1	0	2	1	1	.63	-	.00	.00	.00
Total for Browse		110	111	136	122	68	15.48	13.66	7.60	12.84	5.38

CANOPY COVER, LINE INTERCEPT--

Management unit 14, Study no: 13

Species	Percent Cover	
	'04	'09
Artemisia tridentata wyomingensis	5.03	6.48
Gutierrezia sarothrae	7.31	.03
Yucca sp.	-	.15

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 14, Study no: 13

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata wyomingensis	1.4	1.5

POINT-QUARTER TREE DATA--

Management unit 14, Study no: 13

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	10	<18	24	6.3	-	7.2

BASIC COVER--

Management unit 14, Study no: 13

Cover Type	Average Cover %					
	'86	'92	'94	'99	'04	'09
Vegetation	3.25	23.40	23.32	25.59	37.04	19.16
Rock	0	.45	.10	.06	.02	0
Pavement	.50	0	.09	.06	.26	.09
Litter	38.50	27.37	29.72	38.25	25.48	35.57
Cryptogams	5.75	.91	.31	.08	.22	.27
Bare Ground	52.00	39.81	46.33	38.41	45.67	53.94

SOIL ANALYSIS DATA --

Management unit 14, Study no: 13, Study Name: Black Mesa

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
13.7	7.3	60.9	16.6	22.6	1.3	7.5	70.4	0.5

PELLET GROUP DATA--

Management unit 14, Study no: 13

Type	Quadrat Frequency					Days use per acre (ha)		
	'92	'94	'99	'04	'09	'99	'04	'09
Rabbit	52	39	75	39	61	-	-	-
Elk	-	1	1	-	3	1 (2)	1 (2)	11 (26)
Deer	22	17	34	33	30	58 (143)	38 (93)	77 (190)
Cattle	-	4	10	3	-	44 (109)	9 (22)	4 (11)

BROWSE CHARACTERISTICS--

Management unit 14, Study no: 13

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Artemisia tridentata wyomingensis</i>										
86	3265	16	47	37	466	29	37	20	19/15	
92	2880	19	24	57	-	50	26	7	-/-	
94	3660	26	35	39	5740	0	0	22	25/36	
99	2140	9	31	60	120	36	53	22	23/33	
04	1680	1	30	69	80	61	14	77	18/25	
09	1600	1	48	51	40	31	10	28	20/26	
<i>Ephedra viridis</i>										
86	0	0	0	-	-	0	0	0	-/-	
92	20	0	100	-	-	0	0	0	-/-	
94	20	0	100	-	-	0	0	0	17/19	
99	20	0	100	-	-	0	0	0	19/15	
04	20	0	100	-	-	0	0	0	17/17	
09	20	0	100	-	-	0	0	0	22/6	
<i>Gutierrezia sarothrae</i>										
86	10131	12	73	14	66	0	0	0	9/9	
92	8320	2	88	10	80	0	0	0	-/-	
94	2940	27	59	14	3920	0	0	24	13/13	
99	8900	18	80	2	40	0	0	1	9/9	
04	24460	10	89	0	-	0	0	18	7/9	
09	580	7	38	55	-	0	0	52	5/4	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Opuntia sp.										
86	0	0	0	-	-	0	0	0	-/-	
92	0	0	0	-	-	0	0	0	-/-	
94	20	100	0	-	-	0	0	0	4/3	
99	0	0	0	-	-	0	0	0	-/-	
04	20	0	100	-	-	0	0	0	8/24	
09	20	0	100	-	-	0	0	0	7/32	
Yucca sp.										
86	0	0	0	-	-	0	0	0	-/-	
92	20	0	100	-	-	100	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	40	0	100	-	-	0	0	0	14/19	
04	40	0	100	-	-	0	0	0	20/26	
09	40	0	100	-	-	0	0	0	22/28	