

BEDKE SPRING - TREND STUDY NO. 1-18-11

Vegetation Type: Wyoming Big Sagebrush

Range Type: Substantial Deer Winter, Crucial Elk Year-long

NRCS Ecological Site Description: [Semidesert Shallow Hardpan \(8-10 Ppt\), R028AY231UT](#)

Land Ownership: BLM

Elevation: 5,500 ft. (1,676 m)

Aspect: West

Slope: 5%

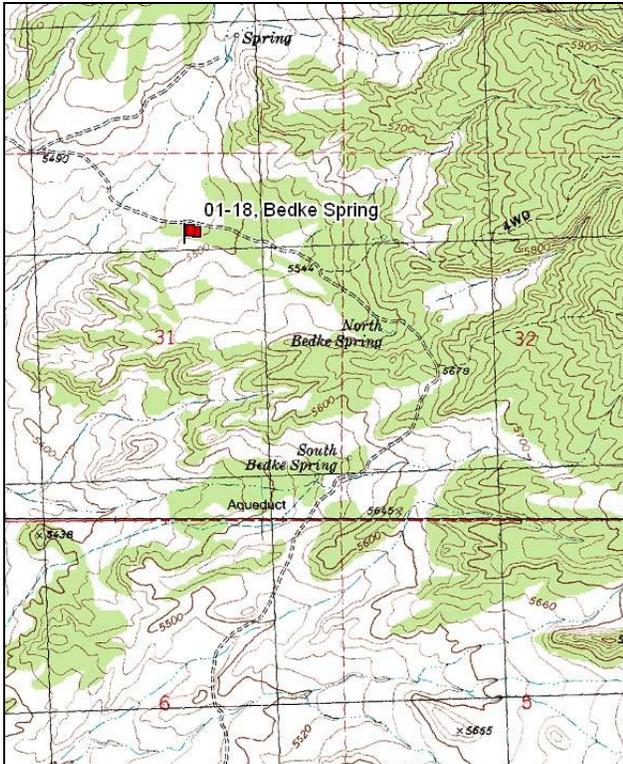
Transect bearing: 110° magnetic

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95 ft)

Directions:

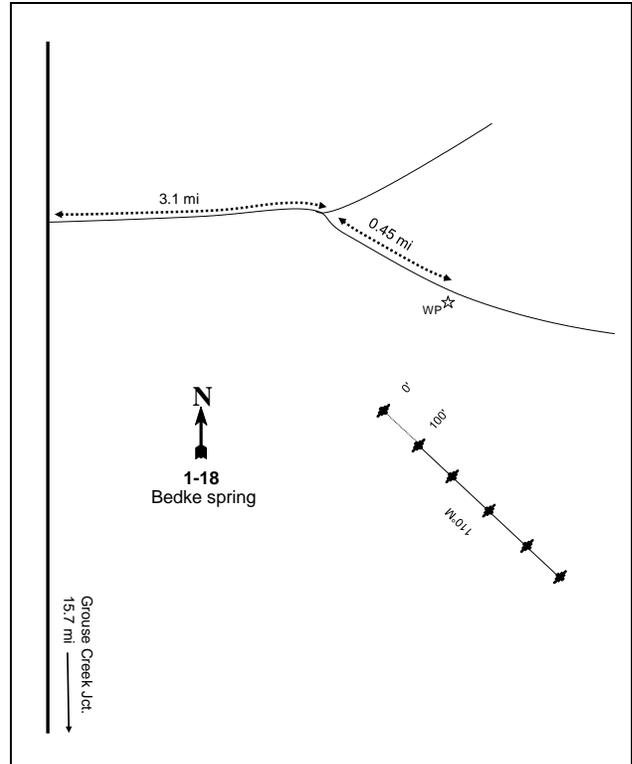
From the Grouse Creek Junction on U-30 travel north for 15.7 miles. Turn right and travel east for 3.1 miles. Stay right and continue 0.45 miles to a witness post on the right hand side of the road. The baseline is approximately 300 feet in a southerly direction on a small bench. The baseline runs 110 degrees magnetic.

Map Name: Ingham Canyon



Township: 11N Range: 17W Section: 31

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 263597 E 4613230 N

Site Information

Site Description: The study samples a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat surrounded by Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) located just west of North Bedke Spring. The area is managed by the Bureau of Land Management (BLM) as part of the Red Butte allotment. Deer pellet groups have been sampled in low abundance since 2001. Sampled cattle sign has been minimal since 2001. Quadrat frequency of rabbit pellets was high in 2006 (Table - Pellet Group Data).

Browse: Wyoming big sagebrush is the dominant browse species, but has been in a state of decline since 1996. Wyoming big sagebrush has steadily decreased in both cover (Table - Browse Trends) and density since the outset of the study. Decadence is moderate within the sagebrush population, but has been high at times. Poor vigor is moderately high, and recruitment has been poor in most sample years. The increaser species narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*) is nearly as dominant as sagebrush, but has also decreased over the course of the study. Other shrubs contributing additional forage include shadscale (*Atriplex confertifolia*), black sagebrush (*Artemisia nova*), and a few scattered spiny hopsage (*Grayia spinosa*). Utilization of these shrubs is light with the exception of a few heavily hedged spiny hopsage. Black greasewood (*Sarcobatus vermiculatus*) and threadleaf rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *consimilis*) are increaser species that also occur on the site, but are not abundant (Table - Browse Characteristics).

Herbaceous Understory: For a Wyoming big sagebrush community, perennial grasses are fairly diverse and abundant. The most abundant perennial species consist of Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Agropyron spicatum*), western wheatgrass (*A. smithii*), crested wheatgrass (*A. cristatum*), and bottlebrush squirreltail (*Sitanion hystrix*). Since the establishment of the study, western wheatgrass and crested wheatgrass abundance has increased, and bottlebrush squirreltail abundance has decreased. The annual species cheatgrass (*Bromus tectorum*) is prevalent on the site, and has at times been the dominant species in cover. The forb composition is also diverse and abundant, though nearly all of the forb cover is provided by the low growing species Hoods phlox (*Phlox hoodii*) (Table - Herbaceous Trends).

Soil: The soil is in the Puett-Plegomir gravelly loams, likely as part of the Plegomir component. These soils occur on hillslopes, with parent material consisting of alluvium derived from limestone and quartzite (Soil Survey Staff 2011). Soil texture is a clay loam with a slightly alkaline soil reaction (pH 7.7). Phosphorus may have limited availability for plant growth and development at 5.4 ppm (Tiedemann and Lopez 2004). The soil is light colored in the interspaces with little organic matter buildup in the surface horizon (Table - Soil Analysis Data). There are large areas of unprotected bare soil in the interspaces. However, vegetation litter has steadily increased over the course of the study (Table - Basic Cover). Water movement is evident on the surface and soil is pedestalled underneath shrubs. The soil erosion condition was classified as slight to moderate in 2001, slight in 2006, and stable in 2011.

Trend Assessments

Browse:

- **1996 to 2001 - slightly down (-1):** The density of Wyoming big sagebrush decreased 24% from 3,360 plants/acre to 2,540 plants/acre, and cover decreased from 8% to 7%. Decadence increased from 26% to 35%, and poor vigor increased from 5% to 14%. Shadscale increased 74% from 1,160 plants/acre to 2,020 plants/acre. The increaser species narrowleaf rabbitbrush decreased 42% in density from 6,600 plants/acre to 3,820 plants/acre, and cover decreased from 7% to 3%.
- **2001 to 2006 - down (-2):** The density of Wyoming big sagebrush decreased 19% to 2,060 plants/acre, and cover decreased to 5%. Decadence of sagebrush increased to 41%, and poor vigor

increased to 25%. Shadscale density decreased 20% to 1,620 plants/acre, though cover increased to 3%.

- **2006 to 2011 - down (-2):** Wyoming big sagebrush density decreased by 42% to 1,200 plants/acre, though cover remained similar. Decadence decreased to 22%, but poor vigor remained similar at 25%. Shadscale decreased 52% in density to 780 plants/acre, but cover remained similar at 2%. Decadence of shadscale increased from 12% to 26%, and poor vigor increased from 10% to 26%.

Grass:

- **1996 to 2001 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 10%, but cover increased from 6% to 7%. Cheatgrass increased significantly in nested frequency, and cover increased from less than 1% to 4%.
- **2001 to 2006 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover increased to 9%. Cheatgrass remained similar in frequency, but cover increased to 7%.
- **2006 to 2011 - slightly up (+1):** The perennial grass sum of nested frequency increased 15%, and cover increased to 12%. Cheatgrass decreased significantly in nested frequency, and cover decreased to 4%.

Forb:

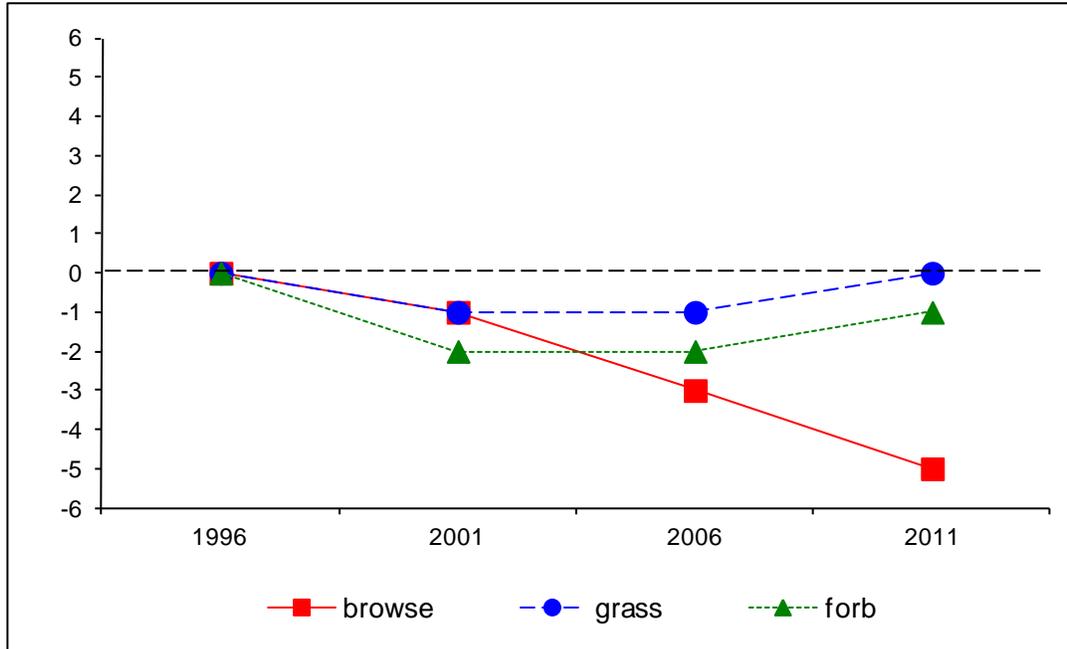
- **1996 to 2001 - down (-2):** The perennial forb sum of nested frequency decreased by 20%, but cover increased slightly from 8% to 10%. There was also a substantial increase in the sum of nested frequency and cover of annual forbs.
- **2001 to 2006 - stable (0):** There was little change in the sum of nested frequency or cover of perennial forbs.
- **2006 to 2011 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 14%, but cover decreased slightly to 9%. The sum of nested frequency of annual forbs and cover increased substantially.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 1, study no: 18

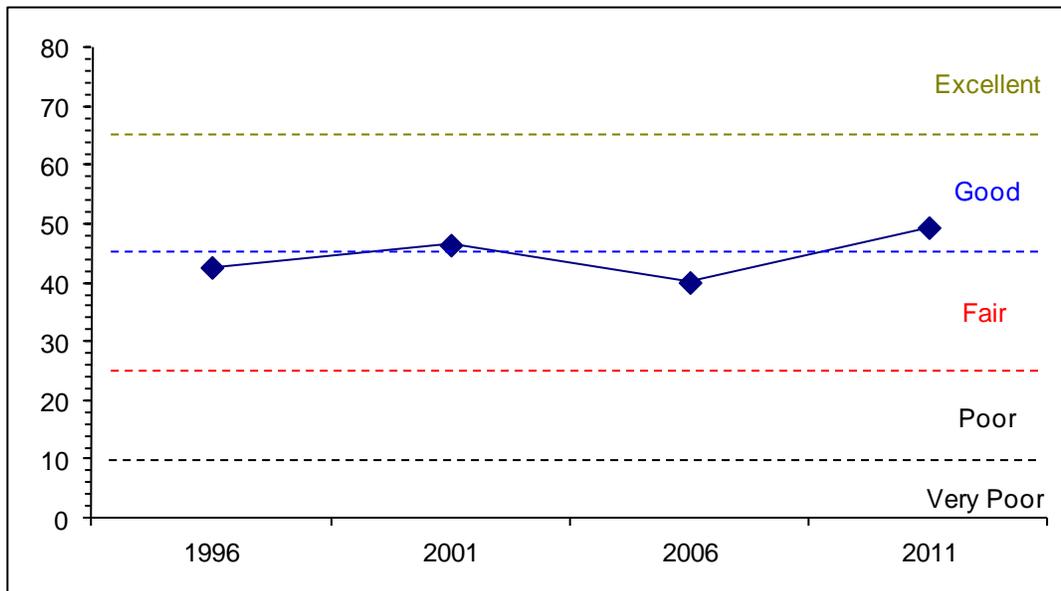
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
96	11.0	6.9	4.0	11.0	-0.2	10.0	0.0	42.7	Fair
01	9.9	6.0	10.1	13.1	-2.6	10.0	0.0	46.5	Fair-Good
06	8.6	5.6	4.2	17.1	-5.4	10.0	0.0	40.1	Fair
11	8.1	8.2	3.2	23.2	-3.2	10.0	0.0	49.4	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 1 Study no: 18



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
 Management unit 1, Study no: 18



HERBACEOUS TRENDS--
Management unit 01, Study no: 18

T y p e	Species	Nested Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
G	Agropyron cristatum	a7	a11	a14	b53	.30	.10	.72	1.25
G	Agropyron smithii	ab30	a21	c85	bc63	.19	.12	.82	.83
G	Agropyron spicatum	ab51	c89	a22	bc80	.72	1.11	.73	2.37
G	Bromus tectorum (a)	a115	c310	c351	b190	.30	3.50	7.17	4.24
G	Elymus sp.	10	-	-	-	.12	-	-	-
G	Festuca sp.	2	-	-	3	.03	-	-	.01
G	Oryzopsis hymenoides	-	-	-	3	-	-	-	.03
G	Poa fendleriana	2	-	-	-	.03	-	-	-
G	Poa secunda	216	218	247	248	2.92	4.32	5.17	6.80
G	Sitanion hystrix	c135	b71	ab55	a35	1.19	.89	1.11	.28
Total for Annual Grasses		115	310	351	190	0.30	3.50	7.17	4.24
Total for Perennial Grasses		453	410	423	485	5.51	6.55	8.56	11.58
Total for Grasses		568	720	774	675	5.82	10.05	15.73	15.82
F	Agoseris glauca	-	-	3	3	-	-	.03	.00
F	Allium acuminatum	1	13	11	15	.00	.03	.02	.03
F	Alyssum alyssoides (a)	-	-	6	-	-	-	.01	-
F	Antennaria rosea	a-	a-	b12	c34	-	-	.25	1.02
F	Arabis sp.	5	1	-	2	.04	.03	-	.00
F	Aster scopulorum	-	-	1	8	-	-	.00	.18
F	Astragalus beckwithii	ab21	b43	b33	c3	.12	.59	.65	.03
F	Astragalus cibarius	ab35	a7	b41	b41	.20	.05	1.43	.96
F	Astragalus purshii	bc13	a5	c19	ab3	.14	.00	.16	.01
F	Camelina microcarpa (a)	a-	a3	b66	a-	-	.01	.34	-
F	Carex microptera	a-	a-	a-	b88	-	-	-	.63
F	Castilleja angustifolia	2	-	3	-	.03	-	.03	-
F	Chaenactis douglasii	b23	a3	a7	a6	.05	.00	.04	.01
F	Chorisporea tenella (a)	-	-	-	4	-	-	-	.01
F	Collinsia parviflora (a)	a32	a10	a19	b108	.10	.02	.06	.52
F	Collomia linearis (a)	4	-	-	-	.01	-	-	-
F	Cordylanthus ramosus (a)	2	-	3	-	.00	-	.00	-
F	Crepis acuminata	-	1	-	4	-	.00	-	.03
F	Cryptantha sp.	b12	a-	a1	a3	.06	-	.00	.03
F	Delphinium nuttallianum	-	4	3	12	-	.01	.00	.05
F	Descurainia pinnata (a)	a11	c122	a5	b46	.01	.42	.01	.12
F	Erigeron pumilus	b50	a10	a5	a-	.34	.02	.01	-
F	Erigeron sp.	a-	a6	b14	a1	-	.18	.11	.00
F	Eriogonum ovalifolium	1	3	-	2	.00	.00	-	.03
F	Eriogonum umbellatum	-	1	2	-	-	.00	.03	-
F	Gilia sp. (a)	a2	b29	a3	a-	.01	.10	.00	-
F	Hackelia patens	-	-	-	5	-	-	-	.03
F	Lappula occidentalis (a)	ab22	c77	bc48	a12	.06	.13	.16	.04
F	Lathyrus brachycalyx	-	1	-	-	-	.00	-	-
F	Lomatium sp.	-	-	-	-	-	-	.01	-

Type	Species	Nested Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
F	<i>Microsteris gracilis</i> (a)	a-	b33	c114	a5	-	.08	.79	.01
F	<i>Penstemon cyananthus</i>	b24	a-	a4	a1	.25	-	.04	.15
F	<i>Phlox hoodii</i>	240	240	217	204	6.65	8.27	6.41	5.41
F	<i>Phlox longifolia</i>	b67	ab52	a32	a29	.32	.45	.31	.36
F	<i>Ranunculus testiculatus</i> (a)	a11	b196	b183	c338	.01	1.57	1.25	5.88
F	<i>Tragopogon dubius</i> (a)	-	-	1	-	-	-	.03	-
F	Unknown forb-annual (a)	4	-	-	-	.03	-	-	-
F	Unknown forb-perennial	-	4	-	-	-	.01	-	-
F	<i>Veronica biloba</i> (a)	a-	a-	a3	b15	-	-	.01	.03
Total for Annual Forbs		88	470	451	528	0.26	2.34	2.68	6.63
Total for Perennial Forbs		494	394	408	464	8.22	9.67	9.57	9.02
Total for Forbs		582	864	859	992	8.48	12.01	12.25	15.65

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

BROWSE TRENDS--

Management unit 01, Study no: 18

Type	Species	Strip Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
B	<i>Artemisia nova</i>	1	3	0	2	.76	.03	-	.15
B	<i>Artemisia tridentata wyomingensis</i>	76	70	60	48	7.83	6.91	4.90	4.59
B	<i>Atriplex confertifolia</i>	23	33	35	21	.31	1.22	2.46	2.14
B	<i>Chrysothamnus nauseosus consimilis</i>	2	1	1	11	-	.03	.38	.06
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	86	70	74	68	7.31	3.35	2.33	3.96
B	<i>Grayia spinosa</i>	0	1	0	2	.30	-	-	.86
B	<i>Opuntia</i> sp.	7	14	15	2	.15	.06	.09	-
B	<i>Sarcobatus vermiculatus</i>	2	2	3	1	.38	.78	1.00	1.23
Total for Browse		197	194	188	155	17.04	12.40	11.19	13.01

CANOPY COVER, LINE INTERCEPT--

Management unit 01, Study no: 18

Species	Percent Cover	
	'06	'11
<i>Artemisia tridentata wyomingensis</i>	6.06	6.30
<i>Atriplex confertifolia</i>	2.90	2.96
<i>Chrysothamnus nauseosus consimilis</i>	.75	1.20
<i>Chrysothamnus viscidiflorus stenophyllus</i>	3.65	3.31
<i>Opuntia</i> sp.	.15	-
<i>Sarcobatus vermiculatus</i>	.46	.45

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 01, Study no: 18

Species	Average leader growth (in)		
	'01	'06	'11
Artemisia tridentata wyomingensis	1.3	0.8	1.1

BASIC COVER--

Management unit 01, Study no: 18

Cover Type	Average Cover %			
	'96	'01	'06	'11
Vegetation	29.98	34.56	38.54	44.67
Rock	2.48	.67	.64	.21
Pavement	6.25	10.18	7.13	7.75
Litter	28.97	22.69	24.74	17.82
Cryptogams	7.75	12.10	7.60	8.72
Bare Ground	27.96	31.32	38.42	26.92

SOIL ANALYSIS DATA --

Management unit 01, Study no: 18, Study Name: Bedke Spring

Effective rooting depth (in)	pH	Clay-Loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.0	7.7	36.7	30.0	33.3	2.2	5.4	387.2	0.6

PELLET GROUP DATA--

Management unit 01, Study no: 18

Type	Quadrat Frequency				Days use per acre (ha)		
	'96	'01	'06	'11	'01	'06	'11
Rabbit	7	2	49	5	-	-	-
Elk	3	-	-	-	-	5 (12)	-
Deer	6	1	10	1	2 (5)	6 (15)	1 (3)
Cattle	1	3	3	5	11 (27)	15 (36)	7 (16)

BROWSE CHARACTERISTICS--

Management unit 01, Study no: 18

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Artemisia nova									
96	40	0	50	50	-	100	0	0	10/26
01	60	0	67	33	-	0	0	0	13/24
06	0	0	0	0	-	0	0	0	-/-
11	40	0	100	0	-	0	0	0	8/15
Artemisia tridentata wyomingensis									
96	3360	6	68	26	20	13	0	5	22/31
01	2540	17	49	35	40	5	0	14	22/28
06	2060	8	51	41	-	8	0	25	21/25
11	1200	5	73	22	-	13	0	25	24/31

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Atriplex confertifolia</i>									
96	1160	76	24	0	200	2	0	0	8/10
01	2020	39	59	2	20	0	0	0	8/15
06	1620	9	79	12	-	0	0	10	12/22
11	780	10	64	26	-	0	0	26	14/20
<i>Chrysothamnus nauseosus consimilis</i>									
96	40	50	50	-	-	0	0	0	21/31
01	20	0	100	-	-	0	0	0	24/49
06	20	0	100	-	-	0	0	0	28/50
11	400	10	90	-	-	15	0	0	11/16
<i>Chrysothamnus viscidiflorus stenophyllus</i>									
96	6600	3	94	2	20	.60	0	.30	11/15
01	3820	6	51	43	340	0	0	14	9/13
06	3840	5	89	6	360	9	2	.52	9/13
11	3600	21	75	4	440	3	0	2	9/14
<i>Grayia spinosa</i>									
96	0	0	0	-	-	0	0	0	18/40
01	20	100	0	-	-	0	0	0	15/25
06	0	0	0	-	-	0	0	0	17/40
11	40	0	100	-	-	0	0	0	10/15
<i>Opuntia sp.</i>									
96	140	29	71	0	-	0	0	0	5/9
01	300	13	87	0	40	0	0	0	4/7
06	320	6	88	6	20	0	0	6	5/13
11	40	0	50	50	-	0	0	100	4/10
<i>Sarcobatus vermiculatus</i>									
96	80	100	0	-	-	0	0	0	26/33
01	60	67	33	-	-	0	0	0	38/57
06	80	50	50	-	-	0	0	0	21/32
11	20	0	100	-	20	0	0	0	36/53
<i>Symphoricarpos oreophilus</i>									
96	0	0	0	-	-	0	0	0	-/-
01	0	0	0	-	-	0	0	0	-/-
06	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	31/62