

BENNETT RANCH - TREND STUDY NO. 8B-5-10

Vegetation Type: Mountain Big Sagebrush-Grass

Range Type: Crucial Deer Winter

NRCS Ecological Site Description: SANDY (10-14W), R034XY250WY

Land Ownership: Private

Elevation: 603463 ft. (4534401 m)

Aspect: North

Slope: 8%

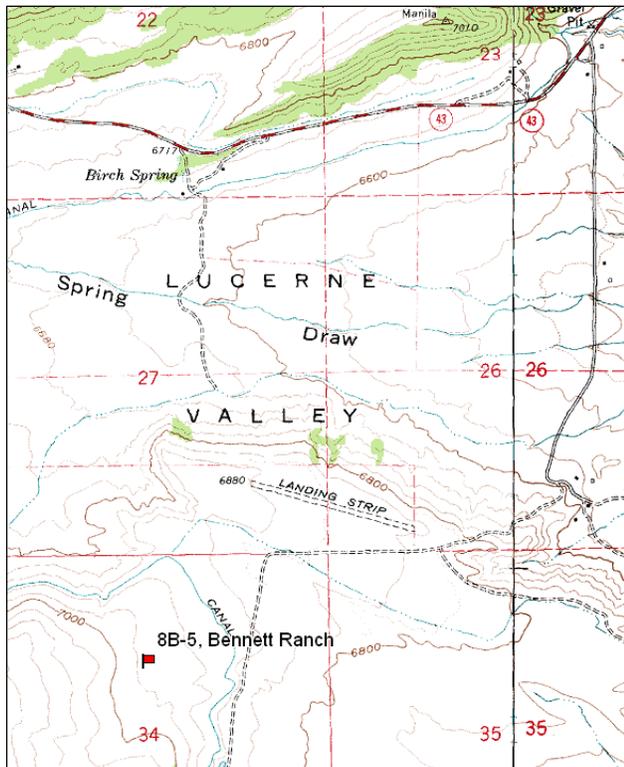
Transect bearing: 200° magnetic

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

Directions:

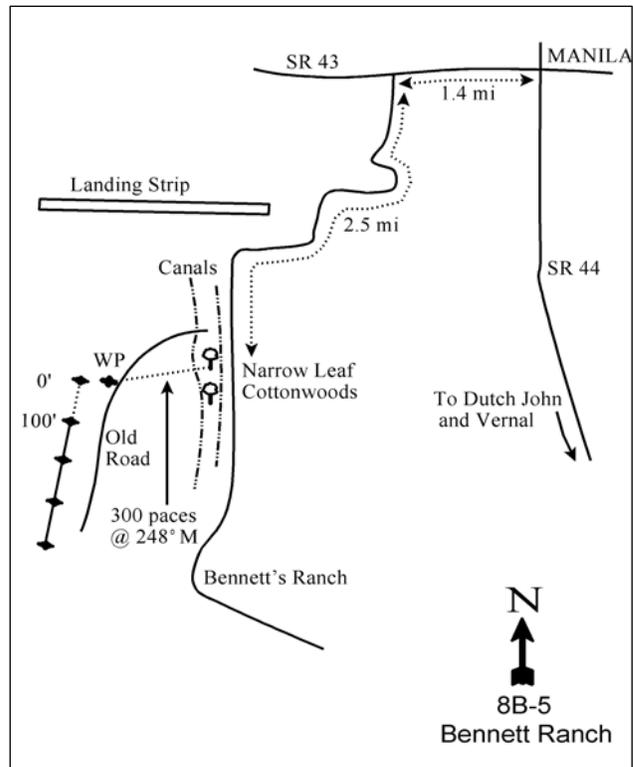
From the intersection of Highway U-43 and Main Street in Manila, proceed west on U-43 for 1.4 miles to a dirt road (Bennion Lane) on the left. Turn south and go 2.5 miles to a narrowleaf cottonwood (*Populus angustifolia*) tree on the right (west) side of the road. From the cottonwood tree, the 0-foot baseline stake is 300 paces away at a bearing of 234°M. Several canals have to be crossed from the road to the study transect.

Map Name: Jessen Butte



Township: 3N Range: 19E Section: 34

Diagrammatic Sketch:



GPS: NAD 83, UTM 12T 603463 E 4534401 N

BENNETT RANCH - TREND STUDY NO. 8B-5

Site Information

Site Description: The trend study is located on Bennett Ranch property, which is privately owned. The study samples a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community, located at the foot of Jensen Butte, and above the irrigated hay fields and pastures near Manila. Water is seasonally available from an irrigation ditch about 400 yards from the site. The area is used by cattle and wintering deer and elk. Pellet group transect data estimated light use by deer and elk in 2000, with more moderate use by both species since 2005. Estimated use by cattle has been light since 2000 (Table - Pellet Group Data).

Browse: The key browse species include Wyoming big sagebrush and black sagebrush (*Artemisia nova*), which together provide nearly all of the browse cover (Table - Browse Trends). The Wyoming big sagebrush population is comprised of a fairly dense stand of relatively small, mature plants with moderately high decadence, and moderate to heavy use. Much of the population has displayed poor vigor over the course of the study, and recruitment of young plants has been mostly poor. The density of Wyoming big sagebrush has steadily decreased since 1995. The black sagebrush population is also comprised of mostly small, mature plants, but decadence and vigor are considerably better than in Wyoming big sagebrush. Recruitment of young black sagebrush plants has fluctuated over the sample years, but has been generally good. Utilization of black sagebrush has been mostly light. Other preferred browse encountered on the site included small numbers of winterfat (*Ceratoides lanata*), white rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *hololeucus*) and slenderbush eriogonum (*Eriogonum microthecum*) (Table - Browse Characteristics). Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) are found in low densities scattered over the site (Table - Point-Quarter Tree Data).

Herbaceous Understory: Grasses are quite diverse and abundant for a Wyoming big sagebrush site. Native perennial grasses dominate the site including thickspike wheatgrass (*Agropyron dasystachyum*), needle-and-thread (*Stipa comata*), mutton bluegrass (*Poa fendleriana*) and prairie junegrass (*Koeleria cristata*). Forbs are diverse, but are not overly abundant. Most of the perennial forb cover is provided by two species, Hood's phlox (*Phlox hoodii*) and scarlet globemallow (*Sphaeralcea coccinea*) (Table - Herbaceous Trends). Utilization of the grasses has been heavy in the past, but there was no apparent use observed since 2000.

Soil: Soils are an alluvial deposited sandy clay loam with a neutral soil reaction (pH 7.1) (Table - Soil Analysis Data). Ground cover is typical for a Wyoming big sagebrush site with a moderately high amount of bare ground (Table - Basic Cover). Some erosion has been occurring on the site but it is not serious due to the shallow slope. The soil erosion condition was classified as stable in 2005, but was slight in 2010 due primarily to rills and flow patterns which were transporting a large portion of litter and soil on the site.

Trend Assessments

Browse:

- **1982 to 1988 - up (+2):** There was a substantial increase in the density of both Wyoming big sagebrush and black sagebrush. However, decadence of both species also increased markedly.
- **1988 to 1995 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1995; therefore, trend was determined using other parameters. Decadence of Wyoming big sagebrush decreased from 34% to 7%, and poor vigor decreased from 17% to 4%. The decadence of black sagebrush also decreased from 22% to 1%.
- **1995 to 2000 - slightly down (-1):** The density of Wyoming big sagebrush decreased by 13% from 6,080 plants/acre to 5,260 plants/acre, though cover changed little. The proportion of decadent plants increased to 39% and poor vigor increased to 21% of the population. Recruitment of young Wyoming big sagebrush plants decreased from 10% to 2%. Black sagebrush, however, increased by 47% in density from 2,760 plants/acre to 4,060 plants/acre, though cover decreased slightly. Decadence and

poor vigor remained low in black sagebrush, but recruitment of young plants decreased from 19% to 6%.

- **2000 to 2005 - stable (0):** The density of Wyoming big sagebrush decreased slightly, but the density of black sagebrush increased slightly. Decadence and poor vigor remained high in the Wyoming big sagebrush population, and recruitment remained low.
- **2005 to 2010 - slightly down (-1):** Wyoming big sagebrush density decreased by 13% from 4,960 plants/acre to 4,300 plants/acre, and cover decreased from 16% to 12%. Decadence decreased from 40% to 29%, but is still considered moderately high. Poor vigor increased from 32% to 40%. The black sagebrush population remained similar.

Grass:

- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for grasses are available from 1982, so no trend was given.
- **1988 to 1995 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 15%.
- **1995 to 2000 - slightly down (-1):** There was a 10% decrease in the sum of nested frequency of perennial grasses, though cover remained similar.
- **2000 to 2005 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 11%, returning to 1995 levels, but cover decreased from 9% to 6%. There was a slight change in composition with a significant decrease in the nested frequency of thickspike wheatgrass and a significant increase in the nested frequency of needle-and -thread.
- **2005 to 2010 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 14%, though cover increased to 9%.

Forb:

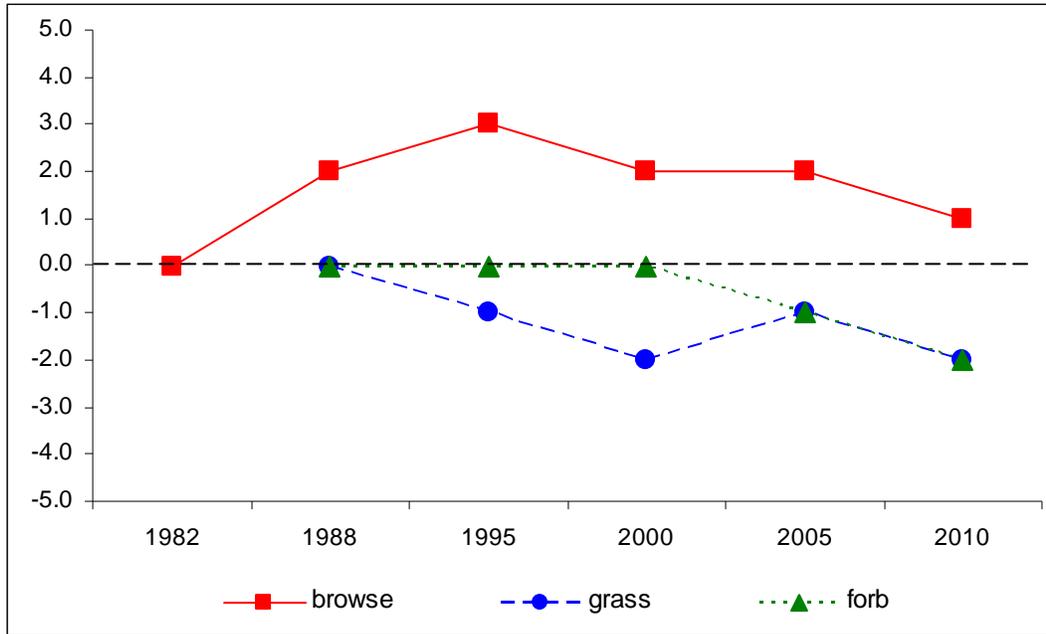
- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for forbs are available from 1982, so no trend was given.
- **1988 to 1995 - stable (0):** There was little change in the sum of nested frequency of perennial forbs.
- **1995 to 2000 - stable (0):** The perennial forb sum of nested frequency and cover remained similar.
- **2000 to 2005 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 12%, and cover decreased from 5% to 4%.
- **2005 to 2010 - slightly down (-1):** The perennial forb sum of nested frequency decreased by 18%, though cover remained similar.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 8B, study no: 5

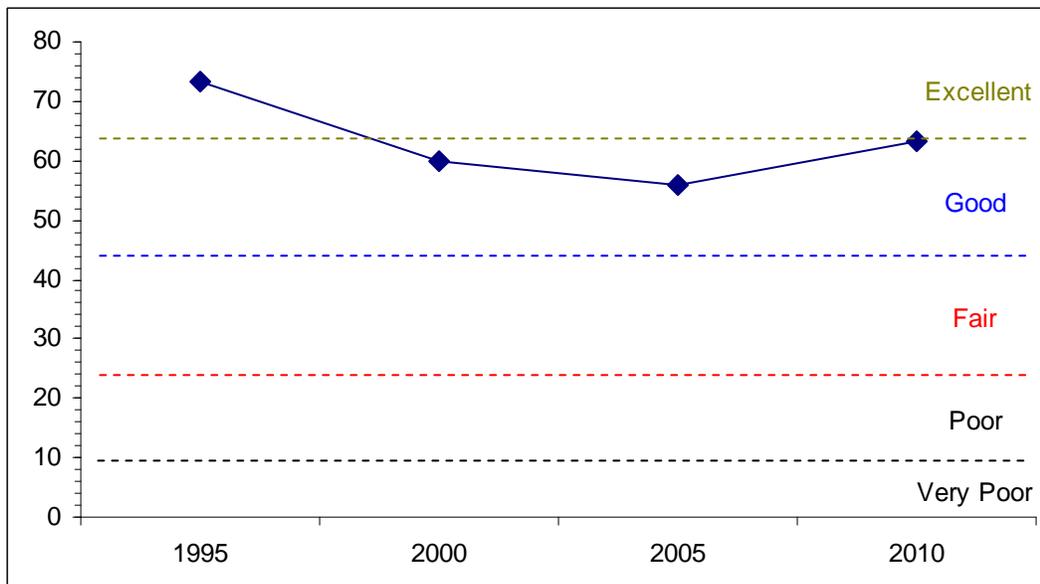
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
95	28.0	13.4	6.1	16.5	0.0	9.1	0.0	73.2	Excellent
00	26.0	5.4	1.5	17.1	0.0	10.0	0.0	60.0	Good
05	28.2	6.0	1.8	11.8	0.0	8.2	0.0	56.0	Good
10	25.3	8.9	2.9	18.4	0.0	7.6	0.0	63.1	Good-Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 8B, Study no: 5



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
Management unit 8B, Study no: 5



HERBACEOUS TRENDS--
Management unit 08B, Study no: 5

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron cristatum	1	-	-	-	-	-	-	-	-
G	Agropyron dasystachyum	ab209	bc220	c247	ab201	a156	2.75	3.98	1.40	1.79

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron intermedium	-	-	3	5	-	-	.03	.09	-
G	Hilaria jamesii	a ⁻	a ⁻	a ³	a ⁻	b ¹⁸	-	.00	-	.19
G	Koeleria cristata	bc ⁴⁷	ab ¹⁹	a ⁷	bc ⁴²	c ⁴⁶	.11	.07	.55	1.17
G	Oryzopsis hymenoides	24	35	14	31	19	.43	.19	.26	.38
G	Poa fendleriana	b ¹⁷⁷	a ⁴⁷	a ⁸¹	a ⁴⁶	a ⁶³	.88	1.50	.45	1.58
G	Poa secunda	68	71	61	92	71	.74	.46	1.13	1.26
G	Sitanion hystrix	a ⁴⁰	b ⁸¹	a ¹⁷	a ²⁰	a ¹⁵	1.36	.38	.14	.16
G	Stipa comata	ab ¹¹¹	ab ¹⁰⁴	a ⁸⁷	b ¹⁴²	ab ¹⁰⁸	1.99	1.93	1.87	2.65
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		677	577	520	579	496	8.27	8.57	5.92	9.21
Total for Grasses		677	577	520	579	496	8.27	8.57	5.92	9.21
F	Agoseris glauca	a ⁻	a ⁻	b ¹²	a ⁻	ab ²	-	.02	-	.01
F	Arabis sp.	ab ⁴	b ¹⁶	a ⁻	ab ⁹	a ¹	.03	-	.02	.00
F	Astragalus sp.	3	-	1	-	4	-	.00	-	.01
F	Calochortus nuttallii	ab ⁷	ab ⁶	a ⁻	b ⁸	a ⁻	.01	-	.02	-
F	Castilleja sp.	-	-	4	-	-	-	.04	-	-
F	Chaenactis douglasii	a ⁻	a ¹	b ¹⁷	ab ⁵	a ²	.00	.09	.04	.01
F	Chenopodium leptophyllum(a)	-	b ⁴⁷	a ⁻	a ⁻	a ³	.10	-	-	.00
F	Cirsium sp.	-	-	3	-	-	-	.00	-	-
F	Crepis acuminata	b ¹⁶	ab ¹²	a ¹	ab ¹⁰	a ⁵	.04	.00	.07	.02
F	Cryptantha sp.	a ⁻	a ⁻	a ⁻	b ¹²	a ⁴	-	-	.29	.03
F	Descurainia pinnata (a)	b ¹³	c ³²	ab ²	ab ³	a ¹	.16	.00	.01	.00
F	Erigeron pumilus	-	4	3	4	6	.02	.01	.04	.15
F	Hackelia patens	-	-	-	3	-	-	-	.15	-
F	Haplopappus acaulis	-	-	3	6	1	-	.03	.18	.00
F	Hymenoxys richardsonii	b ¹⁷	a ¹	ab ⁷	ab ⁸	ab ⁷	.03	.09	.15	.21
F	Lesquerella alpina	-	4	2	-	1	.03	.00	-	.00
F	Leucelene ericoides	ab ²³	a ⁵	b ³¹	a ¹⁵	a ¹³	.04	.38	.06	.15
F	Linum lewisii	ab ³⁷	b ⁶²	a ²⁶	ab ⁴⁴	a ²²	.21	.13	.28	.24
F	Machaeranthera canescens	1	3	8	4	2	.18	.09	.06	.03
F	Penstemon humilis	7	-	1	-	-	-	.03	-	-
F	Phlox hoodii	c ¹⁴⁶	b ⁹⁴	bc ¹²⁴	ab ⁹¹	a ⁷⁷	2.59	2.97	1.78	1.80
F	Phlox longifolia	-	-	-	-	4	-	-	-	.00
F	Physaria acutifolia	-	-	1	-	-	-	.00	-	-
F	Senecio multilobatus	-	-	4	-	-	-	.03	.00	.00
F	Sphaeralcea coccinea	a ⁸⁰	b ¹¹⁹	ab ⁹⁸	ab ⁸⁵	ab ⁹⁹	1.36	1.22	.90	1.11
F	Townsendia incana	7	-	-	-	-	-	-	-	-
F	Unknown forb-perennial	8	-	-	-	-	-	-	-	-
Total for Annual Forbs		13	79	2	3	4	0.26	0.00	0.01	0.00
Total for Perennial Forbs		356	327	346	304	250	4.57	5.19	4.08	3.82
Total for Forbs		369	406	348	307	254	4.84	5.19	4.09	3.83

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

BROWSE TRENDS--

Management unit 08B, Study no: 5

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia nova	46	51	55	60	5.64	4.62	6.93	7.84
B	Artemisia tridentata wyomingensis	97	94	92	94	16.11	16.09	15.63	12.41
B	Ceratoides lanata	8	7	5	3	.60	.04	.00	-
B	Chrysothamnus nauseosus hololeucus	1	0	0	3	.15	-	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	9	19	10	6	.33	.39	.56	.19
B	Eriogonum microthecum	3	4	3	2	.03	.01	-	-
B	Gutierrezia sarothrae	25	61	70	13	.04	1.34	2.72	.16
B	Juniperus osteosperma	-	-	-	-	.93	-	-	-
B	Opuntia sp.	30	41	41	40	1.58	1.11	1.14	1.22
B	Pediocactus simpsonii	0	0	1	1	-	-	-	-
Total for Browse		219	277	277	222	25.44	23.62	27.01	21.83

CANOPY COVER, LINE INTERCEPT--

Management unit 08B, Study no: 5

Species	Percent Cover	
	'05	'10
Artemisia nova	10.71	8.89
Artemisia tridentata wyomingensis	16.35	19.68
Chrysothamnus nauseosus hololeucus	-	.05
Chrysothamnus viscidiflorus viscidiflorus	.26	.38
Eriogonum microthecum	-	.05
Gutierrezia sarothrae	1.29	.08
Opuntia sp.	.50	.43

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 08B, Study no: 5

Species	Average leader growth (in)	
	'05	'10
Artemisia nova	0.7	0.7
Artemisia tridentata wyomingensis	0.9	0.9

POINT-QUARTER TREE DATA--

Management unit 08B, Study no: 5

Species	Trees per Acre			
	'95	'00	'05	'10
Juniperus osteosperma	14	24	-	39
Pinus edulis	-	7	-	19

Average diameter (in)			
'95	'00	'05	'10
4.1	3.1	-	4.1
-	1.8	-	.8

BASIC COVER--

Management unit 08B, Study no: 5

Cover Type	Average Cover %					
	'82	'88	'95	'00	'05	'10
Vegetation	3.00	6.75	32.09	41.79	32.27	36.56
Rock	5.50	9.00	9.55	5.67	6.74	5.73
Pavement	11.50	14.25	5.40	8.54	7.50	6.09
Litter	45.25	41.25	39.65	36.47	29.86	33.48
Cryptogams	.75	5.25	3.51	6.07	3.90	3.37
Bare Ground	34.00	23.50	21.24	29.50	35.99	35.61

SOIL ANALYSIS DATA --

Management unit 8B, Study no: 5, Study Name: Bennett Ranch

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
8.8	7.1	61.4	16.0	22.6	2.1	6.0	92.8	0.9

PELLET GROUP DATA--

Management unit 08B, Study no: 5

Type	Quadrat Frequency				Days use per acre (ha)		
	'95	'00	'05	'10	'00	'05	'10
Sheep	-	-	1	-	-	-	-
Rabbit	3	2	12	2	-	-	-
Elk	10	9	21	12	14 (35)	32 (78)	34 (83)
Deer	32	7	18	21	9 (23)	22 (55)	39 (96)
Cattle	10	3	3	1	6 (14)	11 (27)	-

BROWSE CHARACTERISTICS--

Management unit 08B, Study no: 5

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Artemisia frigida									
82	0	0	0	-	-	0	0	0	-/-
88	532	12	88	-	-	13	13	0	5/6
95	0	0	0	-	-	0	0	0	-/-
00	0	0	0	-	-	0	0	0	-/-
05	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	-/-
Artemisia nova									
82	1932	7	93	0	-	7	0	0	6/12
88	5464	20	59	22	799	44	12	5	7/14
95	2760	19	80	1	-	27	4	.72	7/20
00	4060	6	86	8	40	11	4	3	6/15
05	4520	5	88	7	-	0	0	5	8/23
10	4500	10	83	7	20	4	7	7	7/19

		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>										
82	3932	2	90	8	-	5	88	29	11/17	
88	7131	13	53	34	666	43	31	17	13/16	
95	6080	10	83	7	40	56	25	4	14/27	
00	5260	2	59	39	-	44	27	21	12/25	
05	4960	3	56	40	40	37	49	32	16/27	
10	4300	3	68	29	40	41	13	40	15/31	
<i>Ceratoides lanata</i>										
82	266	0	100	0	-	0	0	0	4/6	
88	466	0	100	0	-	43	57	0	4/5	
95	220	9	91	0	-	64	9	0	5/8	
00	160	50	50	0	-	50	0	0	4/6	
05	120	0	83	17	-	0	100	17	2/5	
10	80	50	50	0	-	100	0	0	5/7	
<i>Chrysothamnus nauseosus hololeucus</i>										
82	0	0	0	-	-	0	0	0	-/-	
88	0	0	0	-	-	0	0	0	-/-	
95	20	0	100	-	-	0	0	0	17/13	
00	0	0	0	-	-	0	0	0	-/-	
05	0	0	0	-	-	0	0	0	19/19	
10	60	0	100	-	-	0	0	0	17/23	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
82	0	0	0	0	-	0	0	0	-/-	
88	0	0	0	0	-	0	0	0	-/-	
95	240	0	100	0	-	17	0	0	9/14	
00	500	8	80	12	-	4	0	8	9/15	
05	340	12	76	12	-	71	0	12	9/14	
10	220	0	91	9	-	27	0	9	10/14	
<i>Eriogonum microthecum</i>										
82	0	0	0	-	-	0	0	0	-/-	
88	0	0	0	-	-	0	0	0	-/-	
95	140	0	100	-	-	0	0	0	4/7	
00	80	25	75	-	-	0	0	0	4/7	
05	80	0	100	-	-	0	0	0	3/3	
10	40	0	100	-	-	0	0	0	-/-	
<i>Gutierrezia sarothrae</i>										
82	3133	0	100	0	-	0	0	0	5/5	
88	7865	45	54	1	66	0	0	.84	5/4	
95	680	0	100	0	-	0	0	0	12/14	
00	3300	2	96	1	20	0	0	.60	5/7	
05	4460	1	97	2	60	0	0	1	7/8	
10	400	10	90	0	-	0	0	0	8/8	

		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>Opuntia</i> sp.										
82	999	0	100	0	-	0	0	0	4/6	
88	2132	31	63	6	66	0	0	13	3/5	
95	860	2	98	0	-	9	0	0	4/15	
00	1320	6	92	2	20	0	0	0	4/11	
05	1320	5	80	15	-	2	0	3	4/10	
10	1020	4	82	14	20	0	0	18	4/12	
<i>Pediocactus simpsonii</i>										
82	0	0	0	-	-	0	0	0	-/-	
88	0	0	0	-	-	0	0	0	-/-	
95	0	0	0	-	-	0	0	0	-/-	
00	0	0	0	-	-	0	0	0	-/-	
05	20	0	100	-	-	0	0	0	2/3	
10	20	0	100	-	-	0	0	0	2/3	
<i>Pinus edulis</i>										
82	0	0	0	-	-	0	0	0	-/-	
88	0	0	0	-	-	0	0	0	-/-	
95	0	0	0	-	-	0	0	0	-/-	
00	0	0	0	-	20	0	0	0	-/-	
05	0	0	0	-	-	0	0	0	-/-	
10	0	0	0	-	-	0	0	0	-/-	