

CONSUMER BENCH - TREND STUDY NO. 16B-23-09

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter

NRCS Ecological Site Description: Semidesert Loam (Wyoming Big Sagebrush), R034XY212UT

Land Ownership: BLM

Elevation: 6,100 ft (1,859 m)

Aspect: South

Slope: 5%

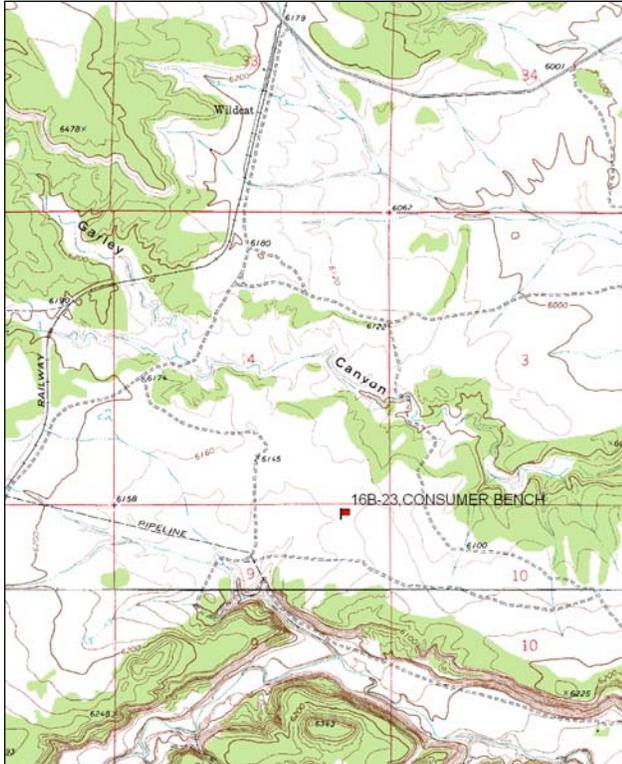
Transect bearing: 328 degrees magnetic

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

Directions:

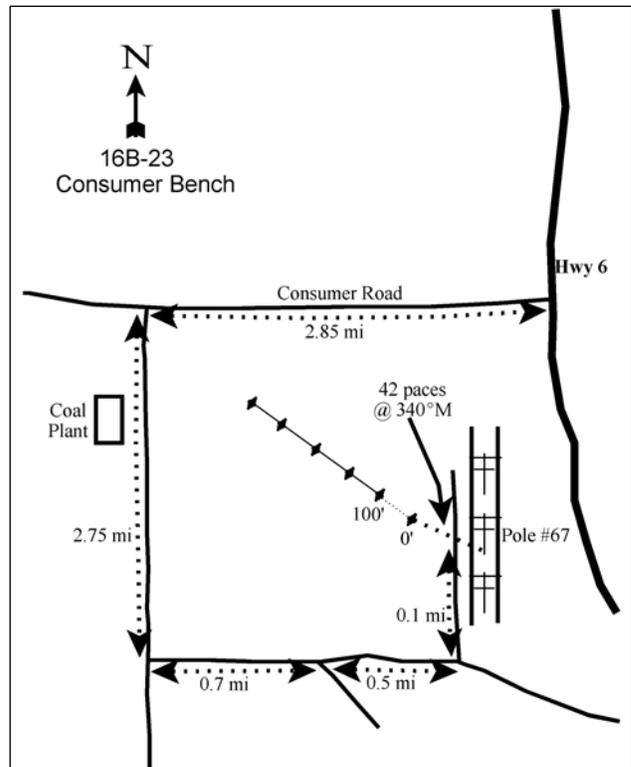
On US 6 south of Helper, turn right (west) on Consumer Road and travel 2.85 miles. Turn left on a dirt road, and go 2.75 miles passing a coal plant. Turn left and travel 0.7 miles to a fork. Stay left for an additional 0.5 miles to another fork. Turn left and go 0.1 miles to a telephone pole (#67). The 0' stake is 42 paces away at 340°M from the telephone pole.

Map Name: Standardville



Township: 14S, Range: 9E, Section: 4

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 507432 E 4386548 N

CONSUMER BENCH - TREND STUDY NO. 16B-23

Site Information

Site Description: The study monitors a big sagebrush/grass community with a few scattered junipers. The site occurs within the Consumers Wash allotment, which is allotted for winter and spring sheep grazing. The area has many other land uses than just grazing and wildlife as evidenced by an oil pad about 400 feet to the south, a pressure station about one mile to the west, a coal loading station two miles to the north, and numerous power lines that crisscross the area. The study area was treated with a double drum aerator in the fall of 2004 and spring of 2005 as part of the Price West Benches Watershed Restoration Initiative project ([project # 228](#)). Remediation treatments focused on the worst die-off areas near Price. The basic approach was to establish drought-hardy mule deer winter forage plants on contoured belts covering about one-quarter to one-third of each delineated block. Belts were about 12'-14' wide, the exact width determined by the equipment used. The project area was seeded from a seedbox mounted in front of the aerator. Forage Kochia (*Kochia prostrata*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) were seeded aurally during spring (Table - Seed Mix). Because of difficulties in differentiating between species, deer and sheep use was combined. Pellet group data indicated high sheep/deer use since 1999. Estimated elk use has declined from moderately heavy use in 1999 to lightly moderate use in 2009 (Table - Pellet Group Data).

Browse: The key browse species on the site is Wyoming big sagebrush. There was a large die-off of sagebrush between the 1999 and 2004 sample years attributed to a severe drought in the years prior to the 2004 sampling. The cover of sagebrush decreased from an average of 10% in 1994 and 1999 to around 2% after 2004 (Table - Browse Trends). Sagebrush density also decreased substantially from 1999 to 2004 with 94% of the population being classified as decadent in 2004. Sagebrush plants displaying poor vigor also increased to 90% in 2004 and recruitment of young sagebrush plants was very poor. The density of sagebrush remained low in 2009, but had increased with improved recruitment of young sagebrush. Decadence and poor vigor in sagebrush decreased in 2009, as well. Utilization of sagebrush was mostly heavy in 1999 and 2004, but was mostly light in 2009 (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is relatively abundant for a Wyoming big sagebrush site. Perennial native grasses dominate the site. There was a sharp decline in the cover and sum of nested frequency of perennial grasses in 2004, but both returned to near or above 1999 levels in 2009. There was a significant increase in the nested frequency of needle-and-thread (*Stipa comata*) making it the dominant grass on the site. Blue grama (*Bouteloua gracilis*) was the dominant grass at the outset of the study in 1994, but decreased significantly in nested frequency in 2004. Other common grasses on the site include Indian ricegrass (*Oryzopsis hymenoides*) and western wheatgrass (*Agropyron smithii*). Salina wildrye (*Elymus salina*) was prevalent on the site at the outset of the study, but decreased significantly in 2004 and is now rare on the site. Forbs have been fairly diverse and abundant in past sample years, but decreased substantially in 2009. Scarlet globemallow (*Sphaeralcea coccinea*) is the dominant forb on the site providing nearly all of the forb cover (Table -Herbaceous Trends).

Soil: The soil is a sandy loam with a slightly alkaline pH and a moderately deep effective rooting depth. Phosphorus and potassium have limited availability for plant growth and development at 3.3 ppm and 41.6 ppm, respectively (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is fairly high on the site with the majority of protective ground cover coming from litter cover. Cryptogam cover has steadily decreased since 1999 (Table - Basic Cover). A couple of active gullies were noted on the site in 2004 and the soil erosion condition was classified as slight in 2004. The soil erosion condition was classified as stable in 2009.

Trend Assessments

Browse:

- **1994 to 1999 - slightly up (+1):** Density of the primary browse species, Wyoming big sagebrush, increased by 17% from 3,820 plants/acre to 4,480 plants/acre, and cover increased slightly. Decadence and vigor of sagebrush remained good in the population. Recruitment of young sagebrush plants also remained good at 17% of the population.
- **1999 to 2004 - down (-2):** Density of sagebrush decreased by 77% to 1,040 plants/acre and cover decreased from 10% to 2%. Decadence of sagebrush was high at 94% and 90% of the population displayed poor vigor. There was minimal recruitment of young sagebrush plants in the population.
- **2004 to 2009 - slightly up (+1):** The density of sagebrush increased to 1,940 plants/acre, though there was little change in cover. Decadence and poor vigor of sagebrush both decreased to more moderate levels of 24% and 18%, respectively. Recruitment of young sagebrush plants increased to 35% of the population.

Grass:

- **1994 to 1999 - stable (0):** There was a slight increase in the sum of nested frequency and cover of perennial grasses, but no significant increases.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 44% and cover decreased from 16% to 5%. There was a significant decrease in the nested frequency many of the grass species.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased to near 1999 levels and cover increased to 24%. There was a significant increase in the nested frequency of many grasses including needle-and-thread, which also increased in cover from 3% to 14%.

Forb:

- **1994 to 1999 - up (+2):** The sum of nested frequency of perennial forbs increased by 65%, though there was little change in cover.
- **1999 to 2004 - stable (0):** There was a 13% decrease in the sum of nested frequency of perennial forbs, but cover increased from 2% to 11%.
- **2004 to 2009 - down (-2):** The sum of nested frequency of perennial forbs decreased by 21% and cover decreased to 5%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 16B, study no: 23

| Year | Preferred Browse Cover | Preferred Browse Decadence | Preferred Browse Young | Perennial Grass Cover | Annual Grass Cover | Perennial Forb Cover | Noxious Weeds | Total Score | Ranking |
|------|------------------------|----------------------------|------------------------|-----------------------|--------------------|----------------------|---------------|-------------|-----------|
| 94 | 11.5 | 6.6 | 8.5 | 28.7 | 0.0 | 2.7 | 0.0 | 57.9 | Good |
| 99 | 12.9 | 6.9 | 8.5 | 30.0 | 0.0 | 4.0 | 0.0 | 62.3 | Good |
| 04 | 2.3 | 0.0 | 0.0 | 10.9 | -0.1 | 10.0 | 0.0 | 23.1 | Poor-Fair |
| 09 | 2.7 | 0.0 | 0.0 | 30.0 | -0.2 | 9.1 | 0.0 | 41.6 | Fair |

SEED MIX

Management unit 16B, study no: 23

Project name: Price West Benches Year 2-Consumers, Airport

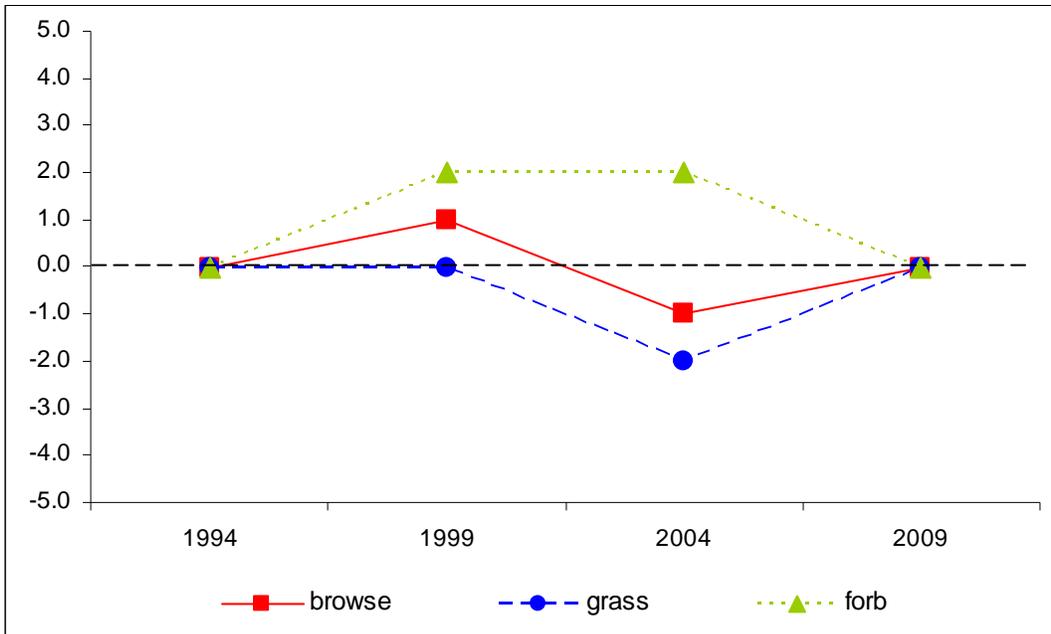
WRI Database #: 228

| Aerator Mix | Size (acre): | 1851 | Ariel Mix | Size (acre): | 3267 |
|------------------------------|--------------|--------------|-----------------------|--------------|-------------|
| Seed type | lbs in mix | lbs/acre | Seed type | lbs in mix | lbs/acre |
| Russian wild-rye | 4115 | 2.22 | Wyoming big sagebrush | 1825 | 0.56 |
| Indian rice-grass 'Nezpar' | 849 | 0.46 | Forage kochia | 550 | 0.17 |
| Indian rice-grass 'Rimrock' | 1000 | 0.54 | TOTAL: | 2375 | 0.73 |
| Crested wheatgrass 'Douglas' | 1150 | 0.62 | | | |
| Crested wheatgrass 'Hycrest' | 1000 | 0.54 | | | |
| Western wheatgrass | 1850 | 1.00 | | | |
| Alfalfa 'Ladak' | 750 | 0.41 | | | |
| Alfalfa 'Nomad' | 750 | 0.41 | | | |
| Alfalfa 'Ranger' | 750 | 0.41 | | | |
| Sainfoin 'Eski' | 2500 | 1.35 | | | |
| Small burnett 'Delar' | 1500 | 0.81 | | | |
| Yellow sweet clover | 416 | 0.22 | | | |
| Fourwing saltbush | 2000 | 1.08 | | | |
| TOTAL: | 18630 | 10.06 | | | |

Trend Summary

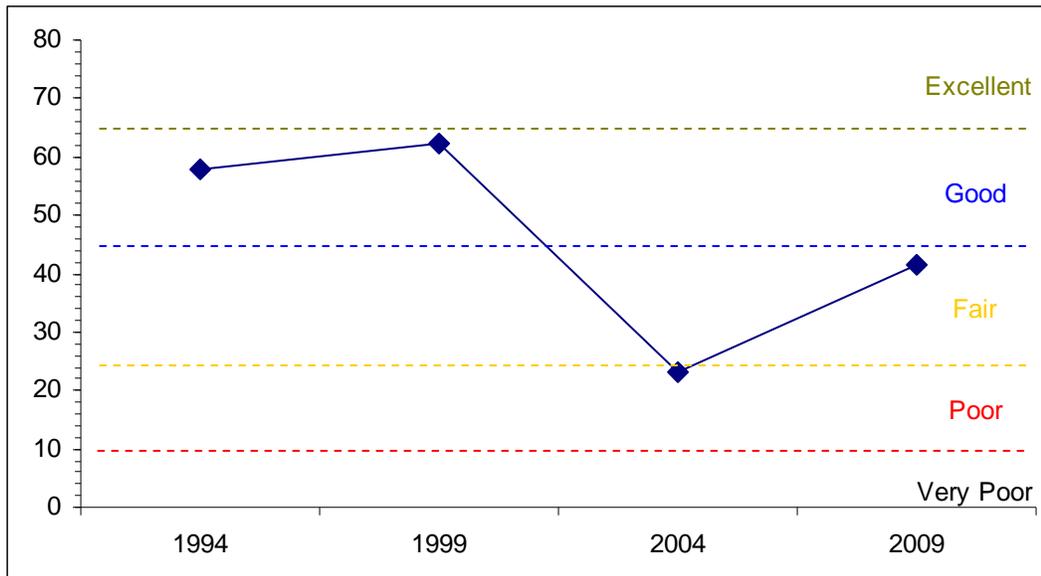
CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 16B, Study no: 23



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 16B, Study no: 23



HERBACEOUS TRENDS--

Management unit 16B, Study no: 23

| Type | Species | Nested Frequency | | | | Average Cover % | | | |
|-----------------------------|-----------------------------|------------------|-------|------|------|-----------------|-------|------|-------|
| | | '94 | '99 | '04 | '09 | '94 | '99 | '04 | '09 |
| G | Agropyron smithii | a- | a- | b18 | c34 | - | - | .12 | 1.41 |
| G | Bouteloua gracilis | b195 | b193 | a109 | a109 | 6.22 | 4.79 | 2.02 | 2.91 |
| G | Bromus tectorum (a) | - | - | - | 1 | - | - | - | .00 |
| G | Elymus salina | b86 | b105 | a1 | a3 | .95 | 2.59 | .00 | .15 |
| G | Oryzopsis hymenoides | ab114 | b159 | a68 | b145 | 2.06 | 3.80 | .22 | 5.14 |
| G | Sitanion hystrix | ab24 | b22 | a1 | b19 | .39 | .56 | .03 | .46 |
| G | Sporobolus cryptandrus | 1 | - | 1 | 1 | .00 | - | .00 | .03 |
| G | Stipa comata | b181 | ab142 | a147 | c271 | 4.69 | 4.33 | 3.02 | 13.59 |
| G | Vulpia octoflora (a) | a- | a6 | b44 | c70 | - | .01 | .10 | .23 |
| Total for Annual Grasses | | 0 | 6 | 44 | 71 | 0 | 0.01 | 0.10 | 0.24 |
| Total for Perennial Grasses | | 601 | 621 | 345 | 582 | 14.33 | 16.10 | 5.44 | 23.88 |
| Total for Grasses | | 601 | 627 | 389 | 653 | 14.33 | 16.11 | 5.53 | 24.13 |
| F | Astragalus convallarius | a6 | b39 | b30 | a10 | .01 | .19 | 1.57 | .04 |
| F | Astragalus sp. | 7 | - | - | - | .04 | - | - | - |
| F | Calochortus nuttallii | a- | b11 | b16 | a- | - | .04 | .05 | - |
| F | Castilleja linariaefolia | a- | b17 | a3 | a3 | - | .04 | .00 | .03 |
| F | Chenopodium fremontii (a) | - | - | 3 | - | - | - | .04 | - |
| F | Chenopodium leptophyllum(a) | - | a- | c162 | b33 | - | - | 1.55 | .17 |
| F | Collinsia parviflora (a) | b17 | b15 | b16 | a- | .06 | .25 | .11 | - |
| F | Comandra pallida | a- | b10 | b11 | ab8 | - | .02 | .25 | .07 |
| F | Cordylanthus sp. (a) | - | - | 1 | - | - | - | .00 | - |
| F | Cryptantha sp. | a- | a- | b11 | a- | - | - | .27 | - |
| F | Cymopterus sp. | - | 3 | 1 | - | - | .00 | .00 | - |
| F | Descurainia pinnata (a) | a3 | a1 | b16 | a- | .00 | .01 | .08 | - |

| Type | Species | Nested Frequency | | | | Average Cover % | | | |
|---------------------------|----------------------------|------------------|-------------------|------------------|-------------------|-----------------|------|-------|------|
| | | '94 | '99 | '04 | '09 | '94 | '99 | '04 | '09 |
| F | Eriogonum cernuum (a) | a ⁴ | a ⁻ | b ²² | a ¹ | .01 | - | .12 | .00 |
| F | Eriogonum ovalifolium | 5 | 16 | 1 | 3 | .04 | .34 | .03 | .01 |
| F | Gayophytum ramosissimum(a) | a ⁻ | a ⁻ | b ⁶⁵ | a ⁻ | - | - | .73 | - |
| F | Gilia sp. (a) | a ⁻ | a ⁻ | b ¹¹⁴ | a ⁻ | - | - | .95 | - |
| F | Lappula occidentalis (a) | a ⁻ | a ⁻ | b ²⁰ | a ⁻ | - | - | .06 | - |
| F | Lepidium montanum | 12 | 3 | 3 | 7 | .21 | .01 | .07 | .04 |
| F | Lygodesmia sp. | - | - | 3 | - | - | - | .06 | - |
| F | Machaeranthera canescens | 1 | 3 | 2 | - | .00 | .03 | .03 | - |
| F | Penstemon linarioides | 3 | - | - | - | .00 | - | - | - |
| F | Penstemon sp. | 11 | 3 | 4 | - | .02 | .03 | .03 | - |
| F | Phlox longifolia | ab ²⁶ | b ⁵⁰ | b ³⁰ | a ⁸ | .05 | .15 | .18 | .01 |
| F | Plantago patagonica (a) | a ³ | a ² | b ¹⁰³ | a ⁴ | .00 | .01 | 1.00 | .01 |
| F | Salsola iberica (a) | a ⁻ | a ⁻ | b ³⁸ | a ¹¹ | - | - | .57 | .07 |
| F | Schoenrambe linifolia | a ⁷ | ab ¹⁷ | a ⁵ | b ²² | .01 | .07 | .06 | .11 |
| F | Sisymbrium altissimum (a) | - | - | - | 2 | - | - | - | .00 |
| F | Sphaeralcea coccinea | a ¹²⁸ | ab ¹⁶⁶ | b ¹⁷³ | ab ¹⁶⁹ | .93 | 1.04 | 8.54 | 4.19 |
| F | Taraxacum officinale | - | - | 1 | - | - | - | .00 | - |
| F | Tragopogon dubius | - | 2 | 1 | 4 | - | .00 | .00 | .03 |
| Total for Annual Forbs | | 27 | 18 | 560 | 51 | 0.08 | 0.26 | 5.25 | 0.26 |
| Total for Perennial Forbs | | 206 | 340 | 295 | 234 | 1.33 | 2.00 | 11.18 | 4.55 |
| Total for Forbs | | 233 | 358 | 855 | 285 | 1.41 | 2.27 | 16.43 | 4.82 |

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

BROWSE TRENDS--

Management unit 16B, Study no: 23

| Type | Species | Strip Frequency | | | | Average Cover % | | | |
|------------------|-----------------------------------|-----------------|-----|-----|-----|-----------------|-------|------|------|
| | | '94 | '99 | '04 | '09 | '94 | '99 | '04 | '09 |
| B | Artemisia tridentata wyomingensis | 77 | 74 | 35 | 34 | 9.19 | 10.31 | 1.80 | 1.92 |
| B | Ceratoides lanata | 2 | 1 | 2 | 5 | .00 | .00 | .01 | .07 |
| B | Chrysothamnus viscidiflorus | 1 | 2 | 2 | 5 | .00 | .15 | .01 | .01 |
| B | Gutierrezia sarothrae | 28 | 62 | 11 | 11 | .78 | .97 | .25 | .22 |
| B | Kochia prostrata | 0 | 0 | 0 | 0 | - | - | - | .15 |
| B | Opuntia polyacantha | 29 | 21 | 20 | 20 | .51 | .66 | .64 | 1.10 |
| B | Pinus edulis | 0 | 1 | 1 | 0 | - | .00 | .03 | - |
| B | Sclerocactus sp. | 0 | 0 | 0 | 0 | - | - | - | .03 |
| Total for Browse | | 137 | 161 | 71 | 75 | 10.49 | 12.11 | 2.74 | 3.50 |

CANOPY COVER, LINE INTERCEPT--

Management unit 16B, Study no: 23

| Species | Percent Cover | |
|-----------------------------------|---------------|------|
| | '04 | '09 |
| Artemisia tridentata wyomingensis | 1.23 | 1.00 |
| Ceratoides lanata | .01 | .11 |
| Chrysothamnus viscidiflorus | .01 | .08 |
| Gutierrezia sarothrae | .20 | - |
| Opuntia polyacantha | .35 | .46 |

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 16B, Study no: 23

| Species | Average leader growth (in) | |
|-----------------------------------|----------------------------|-----|
| | '04 | '09 |
| Artemisia tridentata wyomingensis | 4.3 | 1.9 |
| Ceratoides lanata | 9.4 | 4.4 |

BASIC COVER--

Management unit 16B, Study no: 23

| Cover Type | Average Cover % | | | |
|-------------|-----------------|-------|-------|-------|
| | '94 | '99 | '04 | '09 |
| Vegetation | 24.62 | 32.35 | 26.23 | 31.95 |
| Rock | .05 | .01 | .00 | .01 |
| Pavement | .44 | .26 | .60 | .26 |
| Litter | 17.95 | 24.32 | 30.77 | 32.55 |
| Cryptogams | 1.43 | 11.09 | 2.56 | .19 |
| Bare Ground | 45.88 | 36.49 | 51.98 | 45.53 |

SOIL ANALYSIS DATA --

Management unit 16B, Study no: 23, Study Name: Consumer Bench

| Effective rooting depth (in) | pH | sandy loam | | | %OM | PPM P | PPM K | ds/m |
|------------------------------|-----|------------|-------|-------|-----|-------|-------|------|
| | | %sand | %silt | %clay | | | | |
| 16.4 | 7.8 | 54.7 | 27.4 | 17.8 | 1.7 | 3.3 | 41.6 | 0.6 |

PELLET GROUP DATA--

Management unit 16B, Study no: 23

| Type | Quadrat Frequency | | | | Days use per acre (ha) | | |
|------------|-------------------|-----|-----|-----|------------------------|-----------|-----------|
| | '94 | '99 | '04 | '09 | '99 | '04 | '09 |
| Sheep | - | - | - | 12 | - | - | 53 (131) |
| Rabbit | 6 | 66 | 36 | 38 | - | - | - |
| Elk | 20 | 17 | 16 | 10 | 64 (159) | 25 (63) | 17 (43) |
| Sheep/Deer | 55 | 58 | 62 | 53 | 90 (223) | 106 (263) | 137 (339) |
| Cattle | - | - | - | 4 | - | 1 (2) | 2 (4) |

BROWSE CHARACTERISTICS--
Management unit 16B, Study no: 23

| 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>Artemisia tridentata wyomingensis</i> | | | | | | | | | |
| 94 | 3820 | 17 | 54 | 28 | 260 | 15 | 0 | 10 | 16/26 |
| 99 | 4480 | 17 | 55 | 27 | 300 | 26 | 47 | 11 | 17/30 |
| 04 | 1040 | 2 | 4 | 94 | - | 38 | 54 | 90 | 16/19 |
| 09 | 1940 | 35 | 41 | 24 | 60 | 13 | 6 | 18 | 10/14 |
| <i>Atriplex canescens</i> | | | | | | | | | |
| 94 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 99 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 04 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 09 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 34/26 |
| <i>Ceratoides lanata</i> | | | | | | | | | |
| 94 | 60 | 0 | 100 | - | - | 0 | 0 | 0 | 9/8 |
| 99 | 20 | 100 | 0 | - | - | 0 | 0 | 0 | 3/4 |
| 04 | 40 | 0 | 100 | - | 20 | 0 | 100 | 0 | 11/13 |
| 09 | 220 | 36 | 64 | - | 20 | 0 | 0 | 0 | 9/12 |
| <i>Chrysothamnus viscidiflorus</i> | | | | | | | | | |
| 94 | 60 | 0 | 100 | - | - | 0 | 0 | 0 | 7/18 |
| 99 | 60 | 100 | 0 | - | - | 0 | 0 | 0 | 4/10 |
| 04 | 60 | 0 | 100 | - | 140 | 0 | 0 | 0 | 9/13 |
| 09 | 220 | 9 | 91 | - | - | 36 | 0 | 0 | 6/10 |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | |
| 94 | 1020 | 0 | 96 | 4 | - | 0 | 4 | 0 | 8/9 |
| 99 | 6460 | 50 | 50 | 0 | 2220 | .30 | .61 | .30 | 4/4 |
| 04 | 340 | 6 | 94 | 0 | - | 6 | 0 | 0 | 6/8 |
| 09 | 240 | 42 | 58 | 0 | - | 0 | 8 | 0 | 6/8 |
| <i>Kochia prostrata</i> | | | | | | | | | |
| 94 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 99 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 04 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 09 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 9/6 |
| <i>Opuntia polyacantha</i> | | | | | | | | | |
| 94 | 920 | 4 | 91 | 4 | - | 0 | 0 | 0 | 3/10 |
| 99 | 700 | 14 | 71 | 14 | 40 | 0 | 0 | 6 | 3/9 |
| 04 | 740 | 19 | 81 | 0 | 40 | 0 | 0 | 0 | 4/12 |
| 09 | 740 | 3 | 86 | 11 | 40 | 0 | 0 | 14 | 3/11 |
| <i>Pinus edulis</i> | | | | | | | | | |
| 94 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 99 | 20 | 100 | 0 | - | - | 0 | 0 | 0 | -/- |
| 04 | 20 | 0 | 100 | - | - | 0 | 0 | 0 | -/- |
| 09 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |

| | | Age class distribution | | | Utilization | | | | |
|------------------|--|------------------------|----------|------------|---------------------------|------------|---------|--------------|------------------------------|
| Year | Plants per Acre (excluding seedlings) | % Young | % Mature | % Decadent | Seedling (plants/acre) | % moderate | % heavy | % poor vigor | Average Height Crown (in) |
| Sclerocactus sp. | | | | | | | | | |
| 94 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 99 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 04 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 09 | 0 | 0 | 0 | - | 20 | 0 | 0 | 0 | 2/3 |