

Trend Study 11R-7-05

Study site name: East Carbon Burn 3.

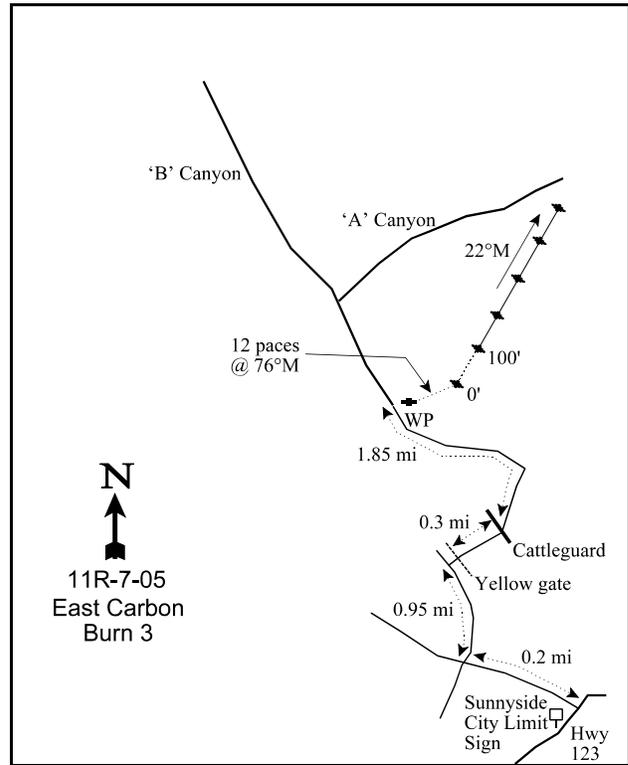
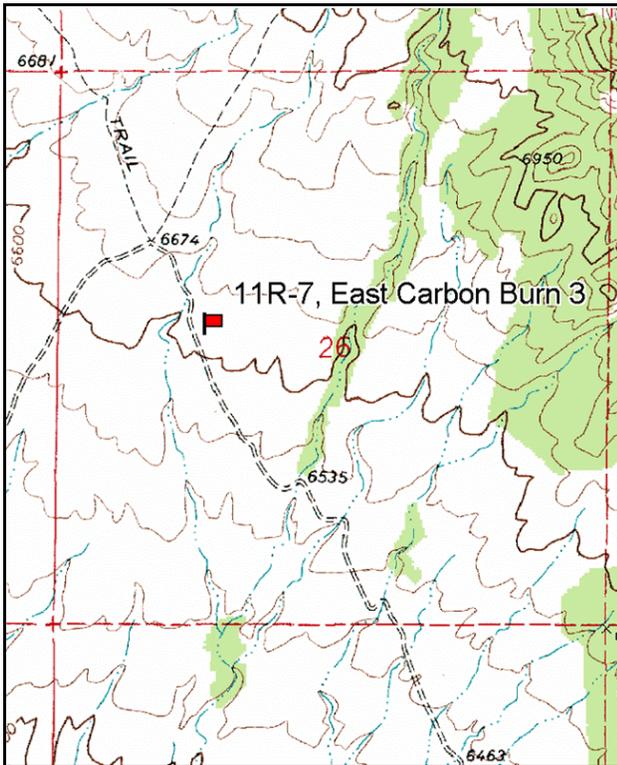
Vegetation type: Burn

Compass bearing: frequency baseline 22 degrees magnetic.

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

LOCATION DESCRIPTION

From the Sunnyside City limit sign on Highway 123 at the west end of town, turn north and go 0.2 miles, passing the East Carbon High School football field. Turn right and go 0.95 miles. Turn right and pass through a yellow metal gate, continuing 0.3 miles to another gate. Stay on the main road and go north 1.85 miles to a witness post on the right. (This is 0.2 miles before the fork to “A” and “B” Canyons.) From the witness post walk 12 paces at 76 degrees magnetic to the 0-foot stake. The study is marked with green, steel fenceposts approximately 12-18 inches in height.



Map name: Sunnyside.

Diagrammatic Sketch

Township 14S, Range 13E, Section 26

GPS: NAD 27, UTM 12S 4380962 N, 548706 E

DISCUSSION

East Carbon Burn 3 - Trend Study No. 11R-7

The East Carbon Burn 3 study was established in the unseeded and unchained area of the East Carbon pinyon-juniper burn of 1996. It was established in 1997 to monitor natural revegetation and to compare the revegetation success of this site with that of the seeded East Carbon Burn 2 (11R-6) site. It is located on winter range 3 miles northwest of East Carbon City at an elevation of 6,600 feet. It is located on a southern aspect with a 6% slope. It is within the Mud Springs grazing allotment, which receives 338 cattle grazing the allotment from mid-October to mid-June. During the 1997 survey, little big game use was measured, but had steadily increased by the 2005 reading. In 1997, the pellet group data was estimated at 1 deer day use/acre (2 ddu/ha). The estimated pellet group data in 2000 was 11 deer and 3 elk days use/acre (26 ddu/ha and 8 edu/ha). The 2005 pellet group data estimated 18 deer, 5 elk, and 10 cow days use/acre (45 ddu/ha, 12 edu/ha, and 25 edu/ha).

The soil is a shallow sandy loam with stony layer at 11 inches. The combined relative cover of rock and pavement has decreased from 38% in 1997, to 23% in 2000, to 15% in 2005. The soil has a neutral pH of 7.2. The phosphorus concentration was measured at 17.2 ppm in 1997, which is higher than required for most wildland plants (Tiedemann and Lopez 2004). This high phosphorus level is likely due to the high nutrient release caused by the fire the previous year. The relative cover of bare ground fluctuated from 47% in 1997, to 19% in 2000, to 39% in 2005. Despite the lack of vegetation following the fire, there was little erosion on the site all years that the site was sampled. The erosion index assessment in 2005 rated the soil erosion as slight, mainly because of moderate to high numbers of pedestals surrounding shrubs and perennial grasses, minor surface rock and litter movement, minor soil movement, a few rills less than ½ inch deep, and small gullies which made up around 2% of the site area.

The browse is very limited. True mountain mahogany and green ephedra are the only preferred browse species left on the site after the fire. Green ephedra individuals were not measured in any density strips. Mountain mahogany densities were estimated at 160 young plants/acre in 1997. In 2000, 140 young plants/acre were estimated (14% less individuals than 1997). In 2005, no young plants were sampled, but 80 mature plants/acre were estimated (a 43% decrease from the 2000 estimates). No dying or decadent plants were sampled any of the years, most of which were likely killed in the fire. Utilization on mahogany increase from 100% light use in 1997, to 86% light and 14% heavy use in 2000, to 100% heavy use in 2005.

The herbaceous understory of this site is dominated by crested wheatgrass. In 1997, crested wheatgrass provided 3% cover, 26% in 2000 and 24% in 2005. There are no annual grasses on the site and other perennial grass species combined make up less than one-half percent cover each year sampled. Perennial forbs contributed around one-fourth of 1% cover in 1997 and 2005 and 2% in 2000. Similarly, annual forbs provided less than 2% cover all years.

1997 APPARENT TREND ASSESSMENT

The soil is in poor condition. Relative bare ground cover is high and vegetation cover low. The current soil condition is a product of the fire that occurred the previous year and should improve as vegetation reestablishes. The browse is also in poor condition with very few young true mountain mahogany individuals. The herbaceous understory is dominated by crested wheatgrass that had been seeded before the burn. Indian ricegrass and a handful of forbs are the only other herbaceous species sampled. The Desirable Components Index score is very poor to poor due to a lack of browse and perennial forb cover and low perennial grass cover.

1997 winter range condition (DC Index) - Very Poor to Poor (8) Lower Potential scale

2000 TREND ASSESSMENT

The trend for soil is up. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased since 1997. Relative bare ground cover decreased substantially while relative cover for vegetation and litter both increased substantially. The trend for browse is stable. There are very few preferred browse species. True mountain mahogany is present in a small number of young and decadent individuals. The herbaceous understory trend is up. The nested frequency for perennials increased 67%. Crested wheatgrass was the only species to increase significantly. Unfortunately, the annual species on the site are weedy and increased nearly four-fold, but could be out-competed by competitive perennial grasses. The DCI score increased to fair due to a substantial increase in perennial grass cover.

TREND ASSESSMENT

soil - up (+2)

browse - stable (0)

herbaceous understory - up (+2)

2000 winter range condition (DC Index) - Fair (35) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soils is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground changed little since 2000. Relative cover of bare ground increased from 19 to 39% and relative litter cover decreased from 32 to 23%. The erosion index measurement also rated the soil erosion as slight. Therefore, the soil trend is slightly down despite the relatively small protective cover ratio change. The trend for browse is stable. The density of the only measured preferred browse species, mountain mahogany, changed little. The handful of plants measure changed from the young and decadent age classes to mature. The trend for herbaceous understory is up. The nested frequency of perennial grasses, in actuality crested wheatgrass, increased significantly. Unfortunately, the other four perennial grass species sampled in 2000 were not sampled again in 2005, which decreases the ecological resilience of the habitat to extended drought, intense grazing pressure, as well as other ecological stresses. The nested frequency of perennial forbs decreased, but there are very few perennial forbs of forage value. Therefore, the trend is based on increases in crested wheatgrass. The DCI score remained fair with a slight decrease in perennial forb cover.

TREND ASSESSMENT

soil - slightly down (-1)

browse - stable (0)

herbaceous understory - up (+2)

winter range condition (DC Index) - Fair (32) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 11R, Study no: 7

| Type | Species | Nested Frequency | | | Average Cover % | | |
|------|----------------------|------------------|------------------|------------------|-----------------|-------|-------|
| | | '97 | '00 | '05 | '97 | '00 | '05 |
| G | Agropyron cristatum | _a 147 | _b 249 | _c 334 | 3.19 | 25.75 | 24.26 |
| G | Aristida purpurea | - | 5 | - | - | .03 | - |
| G | Oryzopsis hymenoides | 9 | 2 | - | .07 | .36 | - |
| G | Poa fendleriana | - | 4 | - | - | .03 | - |
| G | Poa secunda | - | 1 | - | - | .00 | - |

| T y p e | Species | Nested Frequency | | | Average Cover % | | |
|------------------|------------------------------|------------------|-----------------|------------------|-----------------|-------|-------|
| | | '97 | '00 | '05 | '97 | '00 | '05 |
| | Total for Annual Grasses | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total for Perennial Grasses | 156 | 261 | 334 | 3.26 | 26.18 | 24.26 |
| | Total for Grasses | 156 | 261 | 334 | 3.26 | 26.18 | 24.26 |
| F | Astragalus convallarius | - | 6 | - | - | .04 | - |
| F | Chenopodium fremontii (a) | - | - | 1 | - | - | .00 |
| F | Descurainia pinnata (a) | _b 10 | _a - | _b 25 | .09 | - | .11 |
| F | Euphorbia fendleri | _a 24 | _b 52 | _a 26 | .25 | 1.81 | .15 |
| F | Lesquerella sp. | - | - | 1 | - | - | .01 |
| F | Machaeranthera grindelioides | 2 | - | 3 | .00 | - | .03 |
| F | Penstemon sp. | 13 | 5 | 14 | .03 | .04 | .06 |
| F | Salsola iberica (a) | _a - | _b 47 | _c 163 | .03 | 2.08 | .37 |
| F | Sisymbrium altissimum (a) | - | 1 | 1 | - | .00 | .03 |
| F | Sphaeralcea coccinea | - | 2 | - | - | .00 | - |
| F | Townsendia sp. | - | - | 4 | - | - | .00 |
| | Total for Annual Forbs | 10 | 48 | 190 | 0.12 | 2.09 | 0.52 |
| | Total for Perennial Forbs | 39 | 65 | 48 | 0.28 | 1.90 | 0.25 |
| | Total for Forbs | 49 | 113 | 238 | 0.40 | 3.99 | 0.77 |

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

BROWSE TRENDS --

Management unit 11R, Study no: 7

| T y p e | Species | Strip Frequency | | | Average Cover % | | |
|------------------|----------------------|-----------------|-----|-----|-----------------|------|------|
| | | '97 | '00 | '05 | '97 | '00 | '05 |
| B | Cercocarpus montanus | 8 | 7 | 4 | .53 | .56 | 1.16 |
| B | Opuntia sp. | 0 | 2 | 0 | - | .15 | - |
| | Total for Browse | 8 | 9 | 4 | 0.53 | 0.72 | 1.16 |

CANOPY COVER, LINE INTERCEPT --

Management unit 11R, Study no: 7

| Species | Percent Cover |
|----------------------|---------------|
| | '05 |
| Cercocarpus montanus | 1.75 |

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11R, Study no: 7

| Species | Average leader growth (in) |
|----------------------|----------------------------|
| | '05 |
| Cercocarpus montanus | 0.9 |

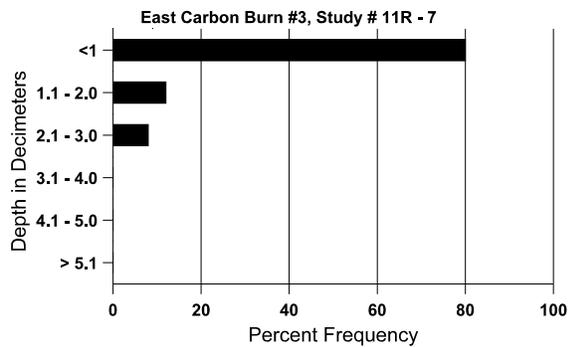
BASIC COVER --
Management unit 11R, Study no: 7

| Cover Type | Average Cover % | | |
|-------------|-----------------|-------|-------|
| | '97 | '00 | '05 |
| Vegetation | 4.58 | 31.79 | 25.25 |
| Rock | 11.64 | 15.44 | 13.18 |
| Pavement | 20.40 | 14.51 | 3.57 |
| Litter | 8.85 | 40.99 | 25.78 |
| Cryptogams | .18 | .12 | 0 |
| Bare Ground | 40.02 | 24.60 | 42.45 |

SOIL ANALYSIS DATA --
Herd Unit 11R, Study # 7, Study Name: East Carbon Burn 3

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | ppm P | ppm K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 10.6 | 51.3 (11.0) | 7.2 | 64.0 | 17.4 | 18.6 | 3.3 | 17.2 | 83.2 | 0.7 |

Stoniness Index



PELLET GROUP DATA --

Management unit 11R, Study no: 7

| Type | Quadrat Frequency | | |
|--------|-------------------|-----|-----|
| | '97 | '00 | '05 |
| Rabbit | 21 | 31 | 55 |
| Elk | - | - | 4 |
| Deer | - | 2 | 16 |
| Cattle | - | - | 2 |

| Days use per acre (ha) | | |
|------------------------|---------|---------|
| '97 | '00 | '05 |
| - | - | - |
| - | 3 (8) | 5 (45) |
| 1 (2) | 11 (26) | 18 (45) |
| - | - | 10 (25) |

BROWSE CHARACTERISTICS --

Management unit 11R, Study no: 7

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | | |
|------------------------------|---------------------------------------|--|-------|--------|----------|------|-------------|---------|------------|---------|--------------|---------------------------|
| Year | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % dying | % poor vigor | Average Height Crown (in) |
| Cercocarpus montanus | | | | | | | | | | | | |
| 97 | 160 | - | 160 | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 00 | 140 | - | 140 | - | - | 340 | 0 | 14 | - | - | 0 | 37/22 |
| 05 | 80 | - | - | 80 | - | - | 0 | 100 | - | - | 0 | 26/28 |
| Ephedra viridis | | | | | | | | | | | | |
| 97 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 00 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 05 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | 35/73 |
| Juniperus osteosperma | | | | | | | | | | | | |
| 97 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 00 | 0 | - | - | - | - | 20 | 0 | 0 | - | - | 0 | -/- |
| 05 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| Opuntia sp. | | | | | | | | | | | | |
| 97 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 00 | 40 | - | - | 40 | - | - | 0 | 0 | - | - | 0 | 3/7 |
| 05 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | 4/10 |

SUMMARY OF THE EAST CARBON BURN REHABILITATION

Results of the burn rehabilitation varied, even between the two sites in the chaining and seeding treatment area, East Carbon Burn 2 (11R-6) and 'B' Canyon (11B-5). Relatively few seeded species became established. On both treated sites crested wheatgrass, intermediate wheatgrass, fourwing saltbush, and bitterbrush established to some degree. Intermediate wheatgrass and bitterbrush established successfully on both sites. This can be inferred from the fact that intermediate wheatgrass and bitterbrush were not sampled on the 'B' Canyon site previous to the 1996 burn and likely was not on the East Carbon Burn 2 site before the seeding in 1996.

Crested wheatgrass, however, was on the 'B' Canyon site before the burn; it had been seeded during a 1966 chaining treatment. After the burn, the nested frequency of crested wheatgrass was unchanged from the pre-fire nested frequencies. However, the percent cover of crested wheatgrass doubled. This could be due to either a stimulation of growth of plants from the release of nutrients by the fire, a supplementation to the existing crested wheatgrass community with new seed, or both. In the case of East Carbon Burn 2, which was also seeded, crested wheatgrass also successfully established. When compared to East Carbon Burn 3, which was not seeded, the increase in nested frequencies and percent cover for crested wheatgrass were very similar. Therefore, the question is presented of whether crested wheatgrass was already present on the East Carbon Burn 2 site (as it was on 'B' Canyon and apparently was on East Carbon Burn 3) or if it had been seeded in 1996. If the crested wheatgrass was present before the fire, it is difficult to determine the success of establishment. If it was not present before the fire, it was a quite successful seeding, to the magnitude of success similar to the regeneration of the established crested wheatgrass populations of 'B' Canyon and East Carbon Burn 3.

Fourwing saltbush appears to have established from the seeding. It was measured on the 'B' Canyon site before the 1996 fire as well as after, which means that it is a natural component of the community. In 1986, some seedlings were measured on the site. During the 1994 reading, only two years before the fire, no fourwing individuals were measured, but 40 plants/acre were estimated in 2000 and 2005. Therefore, it can be assumed that these shrubs were not there before the fire and were established from seed. Because there was some success seeding fourwing on 'B' Canyon, it is likely that the fourwing saltbush individuals measured on East Carbon Burn 2 are from the seeding.

No other seed mix species were found growing on the East Carbon Burn 2 site besides the two mentioned above. On the 'B' Canyon site, however, three other species established after the seeding: Paiute orchardgrass, 'Ladak' alfalfa, and 'Delar' small burnet. The alfalfa is disputable because it was sampled with the same quadrat frequency two readings before the burn, although it was not sampled during the reading directly before the burn. It is possible that it had died out before the burn and was reseeded during the 1996 treatment. Orchardgrass and small burnet were only sampled after the seeding. Both of these species were sampled in 2000, the first sampling after the treatment, but were not sampled again in 2005. This could be due to the heavy grazing pressure on the site at the time of the 2005 reading. The plants may have been on the site, but merely too overgrazed to identify.

The only species included in the seed mix which was not sampled was 'Bozoisky' Russian wildrye. It is likely that this species did establish on the treatment area, but not within the sampled area.

In comparison, the East Carbon Burn 2 and East Carbon Burn 3 sites show little difference. Both produced enough herbaceous understory cover to stabilize the soil. There would have been a much larger difference between the herbaceous understory of the two sites had crested wheatgrass not been planted on the unseeded site previous to the fire. The unseeded site would have had less herbaceous cover and more erosion. The seeded site did have slightly more diversity in the understory and considerably more browse diversity. The seeded East Carbon Burn 2 site had fourwing saltbush and bitterbrush as browse species, where the East Carbon Burn 3 site did not.