

Trend Study 11R-6-05

Study site name: East Carbon Burn 2.

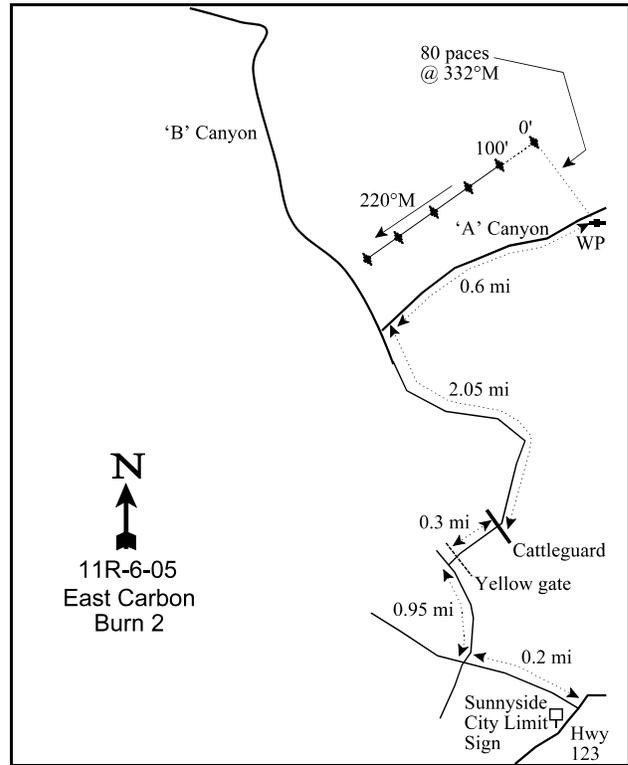
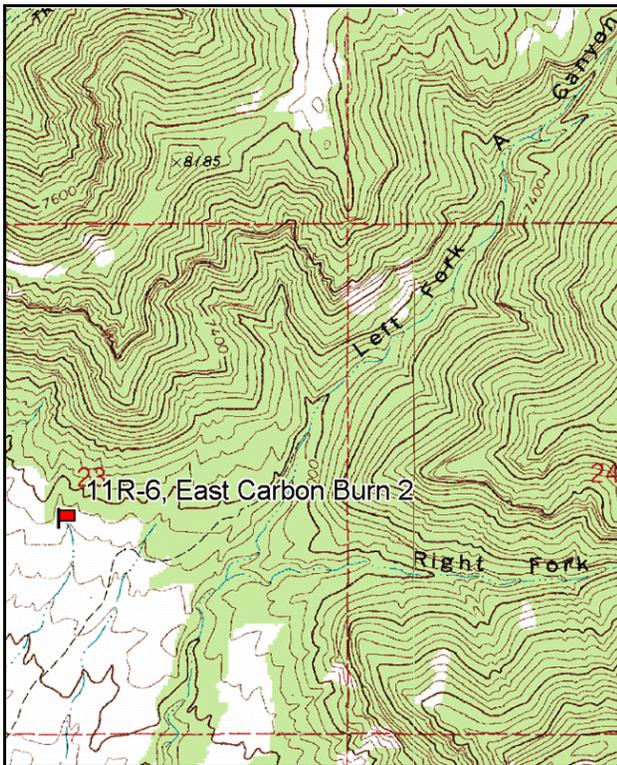
Vegetation type: Burned-Seeded-Chained.

Compass bearing: frequency baseline 220 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 2.05 miles to an intersection. Stay right at the fork and go 0.6 miles to a witness post on the right side of the road. Walk 80 paces from the witness post at an azimuth of 332 degrees magnetic to the 0-foot stake. The study is marked by 12-18 inch high, green, steel fenceposts.



Map name: Sunnyside.

Diagrammatic Sketch

Township 14S, Range 13S, Section 23

GPS: NAD 27, UTM 12S 4382381 N, 548978 E

DISCUSSION

East Carbon Burn 2 - Trend Study No. 11R-6

The East Carbon Burn 2 study was initially established following an approximately 900 acre fire 2 miles northwest of East Carbon City. The fire occurred in 1996 and 300 acres of the burn area was chained and seeded (either aerially or with a dribbler) the following autumn. The seed mix included 'Hycrest' crested wheatgrass, 'Paiute' orchardgrass, 'Bozoisky' Russian wildrye, intermediate wheatgrass, 'Ladak' alfalfa, 'Delar' small burnet, fourwing saltbush, and bitterbrush. This site was established on the chained and seeded treatment area. A second site, East Carbon Burn 3 (11R-7), was established on the burned and untreated area. The 'B' Canyon site (11B-5) was also in the burn and treatment area, but is much more heavily grazed than 11R-6 and 11R-7.

The study is located on winter range 3 miles northwest of East Carbon City on southwest-facing 8% slope at an elevation of 6,900 ft. Before the burn, the area was dominated by pinyon-juniper. The site is within the Mud Springs grazing allotment, which receives 338 cattle grazing the allotment from mid-October to mid-June. Animal use has steadily increased since the burn. In 1997, the estimated pellet group data was 3 deer and 1 cow days use/acre (7ddu/ha and 2 cdu/ha). The 2000 pellet group data was estimated at 11 deer and 2 elk days use/acre (28 ddu/ha and 2 edu/ha). In 2005, cows were on the site during the reading. The 2005 estimated data was 24 deer, 8 elk, and 12 cow days use/acre (60 ddu/ha, 20 edu/ha, and 29 cdu/ha).

The soil is a shallow sandy clay loam with a stony layer at around 14 inches. Rock and pavement make up 15-23% of the ground cover and 78% of the stone found in the soil profile is located in the upper 8 inches. The soil pH was neutral (7.3). Phosphorus levels were measured at 16.5 ppm in 1997, which is higher than average in a pinyon-juniper woodland (Tiedemann and Lopez 2004). This high phosphorus level is likely due to the high release of nutrients by the fire the previous year. Calcium deposits were reported on the rocks during the 2000 reading of the site. The relative percent bare ground cover has fluctuated from 54% in 1997, to 23% in 2000, to 43% in 2005. The relative litter cover fluctuated from 9% in 1997, to 34% in 2000, to 18% in 2005. The relative vegetation cover has increased steadily from 9% in 1997, to 24% in 2000, and 25% in 2005. Large gullies, one on each side of the site, run parallel to the baseline transect. Erosion has been minor on the site and the erosion index assessment in 2005 rated the soil erosion state as stable.

Browse is very sparse. Fourwing saltbush, true mountain mahogany, green ephedra, broom snakeweed, and bitterbrush grow on the site, but only broom snakeweed and bitterbrush were measured in the density strips. Bitterbrush was measured for the first time in 2005 at a density of 20 plants/acre, all of which were mature individuals. Broom snakeweed was also measured for the first time in 2005. Snakeweed density was estimated to be 60 plants/acre, all of which were young. In 1997 and 2000, true mountain mahogany were measured using the point-center quarter method. Mahogany numbers were estimated to be 19 plants/acre both years. Utilization on all browse species was light in 2005, with the exception of bitterbrush which showed 100% heavy utilization. Bitterbrush and, possibly, fourwing saltbush were the only browse species seeded on the site after the fire and both established.

The herbaceous understory of the site is dominated by perennial grasses, particularly crested wheatgrass. Perennial grasses constituted 6% cover in 1997 and 26% in 2000 and 2005. Perennial forbs make up the majority of the rest of the herbaceous understory. Annual grasses were only observed in one quadrat during the 1997 reading, and were not sampled at all in 2000 and 2005. Annual forbs constituted less than one-tenth of 1% cover in 1997, 0% in 2000, and 1% in 2005. Crested wheatgrass was the only prominent grass species in 1997 and 2000, but intermediate wheatgrass and slender wheatgrass were also prominent in 2005. The prominent forb species fluctuated between timber poisonvetch, looseflower milkvetch, and Utah sweetvetch. Crested wheatgrass and intermediate wheatgrass were the only species seeded on the treatment which became established. The crested wheatgrass was on the site previous to the burn and might have been simply supplemented by the seeding.

1997 APPARENT TREND ASSESSMENT

Soil condition is poor. Vegetation, litter, and cryptogamic crust cover are very low and bare ground cover is very high. There is a high potential for erosion with so little protective ground cover. There were no browse species in density strips. Point-center quarter data for mountain mahogany reflect very low densities. The herbaceous understory is dominated with crested wheatgrass with some scattered forbs. The Desirable Components Index score is poor due to no browse cover, moderate perennial grass cover, and no perennial forb cover.

1997 winter range condition (DC Index) - Poor (15) 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 substantially since 1997. Relative bare ground cover decreased from 54 to 23%, relative litter cover increased from 9 to 34%, and vegetation cover increased from 9 to 24%. The trend for browse is stable. The only browse species measured on the site was true mountain mahogany, which remained at an estimated 20 plants/acre in both 1997 and 2000. The herbaceous understory trend is slightly up. The nested frequency of perennial grasses increased slightly. The nested frequency of perennial forbs decreased, but are of secondary importance on this winter range. Crested wheatgrass, particularly, is the most important herbaceous species and it showed no significant change nested frequency. It did increase in cover nearly 5-fold. The DCI score improved to fair due to higher perennial grass and perennial forb cover.

TREND ASSESSMENT

soil - up (+2)

browse - stable (0)

herbaceous understory - slightly up (+1)

2000 winter range condition (DC Index) - Fair (36) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained about the same from 2000 to 2005. Relative bare ground cover increased from 23% to 43%. However, the erosion condition class rated the soil as stable. The trend for browse is stable. The only preferred browse species measured in density strips in 2005 was bitterbrush, which were in very low numbers. True mountain mahogany was not measured using the point-center quarter method. The herbaceous understory trend is up. The nested frequency of herbaceous species increased 55% from 2000 to 2005. Perennial grasses increased 37% from 2000 to 2005 and no annual grasses were measured either year. Perennial forbs increased 30% from 2000 to 2005. Annual forbs consisted mainly of Russian thistle, which increased substantially from a nested frequency of 0 to 64 from 2000 to 2005. This increase of Russian thistle only slightly affected the herbaceous understory. The DCI score remained fair with only a slight decrease in perennial forb cover.

TREND ASSESSMENT

soil - down (-2)

browse - stable (0)

herbaceous understory - up (+2)

winter range condition (DC Index) - Fair (34) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11R, Study no: 6

Type	Species	Nested Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
G	Agropyron cristatum	_a 259	_a 279	_b 315	5.30	24.45	22.97
G	Agropyron dasystachyum	-	6	8	-	.53	.30
G	Agropyron intermedium	14	19	36	.03	.51	1.34
G	Agropyron trachycaulum	_b 19	_a -	_b 29	.19	-	1.57
G	Bromus inermis	-	-	2	-	-	.03
G	Bromus tectorum (a)	1	-	-	.00	-	-
G	Festuca ovina	-	-	1	-	-	.00
G	Oryzopsis hymenoides	_a 3	_a 5	_b 36	.03	.15	.16
G	Poa fendleriana	-	3	-	-	.03	-
Total for Annual Grasses		1	0	0	0.00	0	0
Total for Perennial Grasses		295	312	427	5.56	25.68	26.40
Total for Grasses		296	312	427	5.56	25.68	26.40
F	Arabis sp.	2	-	1	.00	-	.00
F	Astragalus convallarius	38	32	44	.52	1.04	.48
F	Astragalus tenellus	_a -	_b 28	_b 21	-	1.61	1.01
F	Chenopodium fremontii (a)	-	-	5	-	-	.00
F	Descurainia pinnata (a)	4	-	5	.04	-	.04
F	Euphorbia fendleri	6	1	2	.06	.03	.00
F	Hedysarum boreale	_b 55	_a 8	_a 18	1.10	.42	.30
F	Lesquerella sp.	_b 12	_a -	_a -	.06	-	.00
F	Linum lewisii	_b 19	_a -	_a -	.13	.00	.00
F	Machaeranthera grindelioides	-	-	-	-	-	.00
F	Pedicularis centranthera	-	-	-	-	-	.00
F	Penstemon cyanocaulis	-	-	5	-	-	.01
F	Penstemon sp.	6	2	3	.01	.00	.04
F	Salsola iberica (a)	_a -	_a -	_b 64	-	-	.89
F	Unknown forb-perennial	-	1	-	-	.03	-
Total for Annual Forbs		4	0	74	0.04	0	0.94
Total for Perennial Forbs		138	72	94	1.90	3.16	1.88
Total for Forbs		142	72	168	1.95	3.16	2.82

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

BROWSE TRENDS --

Management unit 11R, Study no: 6

Type	Species	Strip Frequency			Average Cover %		
		'97	'00	'05	'97	'00	'05
B	Gutierrezia sarothrae	0	0	2	-	-	.03
B	Purshia tridentata	0	0	1	-	-	-
Total for Browse		0	0	3	0	0	0.03

BASIC COVER --

Management unit 11R, Study no: 6

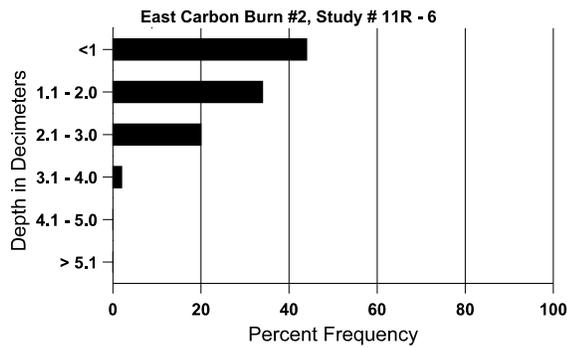
Cover Type	Average Cover %		
	'97	'00	'05
Vegetation	7.75	29.59	26.93
Rock	8.47	11.21	11.07
Pavement	13.86	11.69	4.07
Litter	7.52	41.92	19.63
Cryptogams	.18	.12	.05
Bare Ground	43.87	28.53	47.15

SOIL ANALYSIS DATA --

Herd Unit 11R, Study # 6, Study Name: East Carbon Burn 2

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
13.7	47.3 (16.0)	7.3	46.0	27.4	26.6	2.4	16.5	76.8	0.6

Stoniness Index



PELLET GROUP DATA --
Management unit 11R, Study no: 6

Type	Quadrat Frequency		
	'97	'00	'05
Rabbit	-	42	23
Elk	-	-	8
Deer	-	2	9
Cattle	-	-	3

Days use per acre (ha)		
'97	'00	'05
-	-	-
-	2 (5)	8 (20)
3 (7)	11 (28)	24 (60)
1 (2)	-	12 (29)

BROWSE CHARACTERISTICS --
Management unit 11R, Study no: 6

		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)
<i>Atriplex canescens</i>												
97	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	40/30
<i>Cercocarpus montanus</i>												
97	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	27/28
<i>Ephedra viridis</i>												
97	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	38/53
<i>Gutierrezia sarothrae</i>												
97	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	60	100	60	-	-	-	0	0	-	-	0	-/-
<i>Opuntia sp.</i>												
97	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	4/17
<i>Purshia tridentata</i>												
97	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	100	-	-	0	8/7

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.