Trend Study 11A-5-05

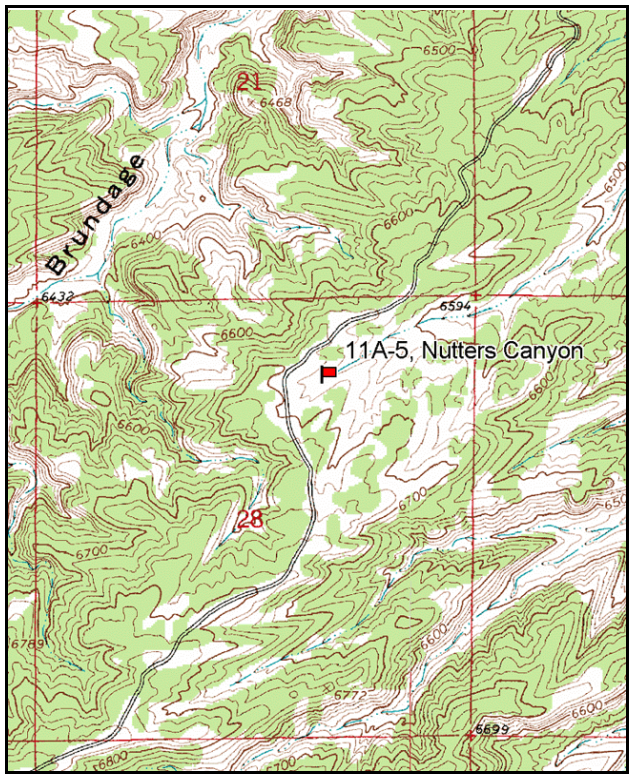
Study site name: Nutters Canyon . Vegetation type: Black Sagebrush .

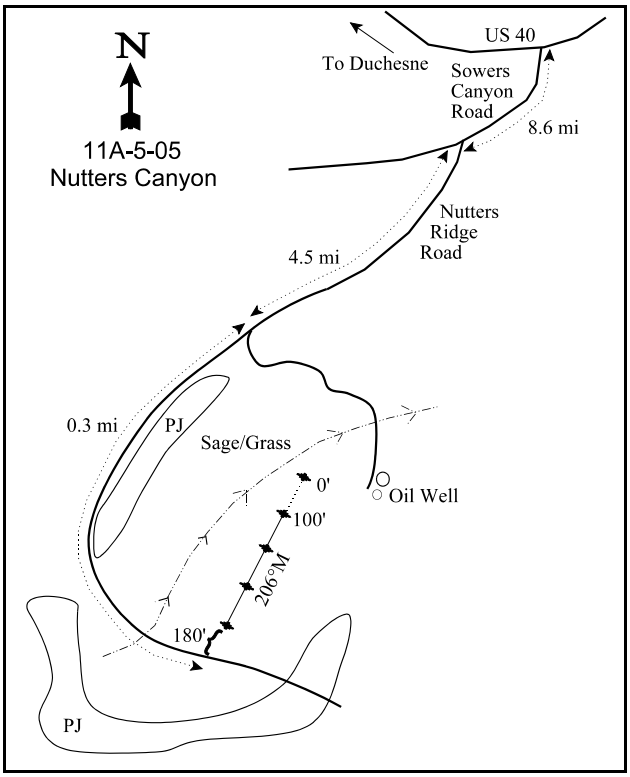
Compass bearing: frequency baseline 206 degrees magnetic.

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

LOCATION DESCRIPTION

From Highway U.S. 40 near Bridgeland, turn south and go up the Anthro Mountain-Sowers Canyon Road 8.6 miles to the turnoff to Nutters Ridge by an old cabin and an oil well. Turn left and go 4.5 miles up the ridge on the main road (stay left at major forks) to another fork to an oil well. Bear right and continue 0.3 miles to where the road curves and crosses a small drainage. Stop before you drive back into the P-J and walk down into the sage opening about 180 feet to the 400-foot baseline stake. The 0-foot baseline stake is marked with browse tag #9035. The study is marked by green fenceposts approximately 18 inches tall.





Map Name: Duchesne SE

Diagrammatic Sketch

Township 5S , Range 4W , Section 28

GPS: NAD 27, UTM 12S 4430201 N, 556569 E

DISCUSSION

Nutters Canyon - Trend Study No. 11A-5

This trend study is located above Nutters Canyon in the middle of a sagebrush/grass swale surrounded by pinyon-juniper woodland. Natural sagebrush/grass openings are found within the heads of most drainages. This swale drains to the east-northeast and has a north aspect. This winter range study has a slope of 3-5% at an elevation of approximately 6,600 feet. There are roads along most of the main ridges, plus spur roads going to numerous oil wells within the area. Cattle grazing is of relatively light use on this Ute Reservation land. The area receives light to moderate use from deer, elk and antelope. Pellet group data read in 2000 were estimated at 5 deer and 40 elk days use/acre (12 ddu/ha and 99 edu/ha). In 2005, pellet group data estimates were 41 deer and 31 elk days use/acre (101 ddu/ha and 76 edu/ha). The majority of elk pellets were found in the grassy areas and most deer pellets were found in the black sagebrush adjacent to the pinyon-juniper woodland.

Soils are loamy in texture and slightly alkaline (pH of 7.4). Soil depth is moderate with an estimated effective rooting depth of nearly 18 inches. Rocks are fairly uniformly distributed throughout the profile as illustrated by the stoniness index. Phosphorus was measured at 6.6 ppm, values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). Erosion is light, although vegetation and litter cover are not particularly abundant. Relative pavement cover has been high (45% in 1995, 41% in 2000, and 28% in 2005), and the relative bare ground cover value was low but is increasing (5% in 1995, 9% in 2000, and 26% in 2005). Pedestaling is slight around the base of sagebrush plants. The erosion index measurement in 2005 rated soil erosion as stable.

The sagebrush is classified as black sagebrush, although there appears to be some hybridization between Wyoming big sagebrush and black sagebrush. Along the edge of the pinyon-juniper type and along the drainage bottom, there are shrubs more characteristic of mountain big sagebrush. Black sagebrush provided around 16% cover in both 1995 and 2000, or over 90% of the total browse cover in both years. In 2005, cover had decreased to 8% (79% of the total browse cover). The estimated black sagebrush density was 10,840 plants/acre in 1995, 12,100 plant/acre in 2000, and had decreased substantially to 6,180 plants/acre in 2005. The decadent individuals made up 12% of the popolation in 1995, 39% in 2000, and 37% in 2005. Dying individuals increased from 5% in 1995, to 12% in 2000, to 26% in 2005. Since 1995, the majority of the population has been mature with at least 58% of the population rated in the mature age class. Recruitment of young individuals has also been low with 17% of the population being young plants in 1995, 3% in 2000, and 2% in 2005. Since 1995, recruitment has not been adequate enough to replace those individuals in the population classified as dying. Utilization on the shrubs has been moderate to heavy all years, but had decreased some in 2005. The proportion of the population displaying poor vigor mirrored the numbers of dying. Leader growth on black sagebrush was minimal in 2000 and 2005. Other browse include: winterfat, shadscale, fringed sagebrush, stickyleaf low rabbitbrush, and snakeweed. These species have low densities and combine to contribute under 2% average cover.

The herbaceous understory is dominated by perennial grasses. Blue grama, bottlebrush squirreltail, and needle-and-thread grass are the dominant species. Other perennial species sampled, but occur less frequently, include: thickspike wheatgrass, galleta, Indian ricegrass, and Sandberg bluegrass. The sum of nested frequencies for grasses has decreased slightly since 1995. However, the average cover of the grasses has increased since 1995. Forbs have provided very little vegetation cover during all sampling periods, especially in 2000. Due to drought in 2000, forbs were nearly non-existent with only four species being sampled. In 1995 and 2005, forbs consituted about 1.5% of the total average cover, but in 2000 only provided 1/100 of 1%. The sum of nested frequency for forbs declined substantially from 1995 to 2000, and only half recovered by 2005.

1988 APPARENT TREND ASSESSMENT

Grasses provide considerable litter cover at this site (44%). Decomposition is relatively slow with the soil containing very little organic matter. Pavement contributes 33% of the ground cover. With the 11% vegetation cover provided by the grasses, total ground cover is adequate with only 11% of the surface exposed as bare soil.

1995 TREND ASSESSMENT

Percent bare ground is low, while pavement cover is extremely high. Although pavement does protect from rain drop impact, it also can accelerate runoff across the ground. Percent bare ground has decreased and pavement cover has increased. The majority of the soil loss most likely occurred in the past. As a result, the soil trend is stable. The black sagebrush population appears to be shifting to a more mature population with 8% of the population classified as dead. Hedging is moderate to heavy with height staying nearly the same and the crown measurements increasing by 6 inches. There is low biotic potential which is due to drought conditions over the past several years. Other increaser species such as broom snakeweed, sticky leaf rabbitbrush, and fringed sagebrush appear to have stable populations with low densities. The browse trend is stable. The sum of nested frequency for perennial grasses has greatly decreased while there was a great increase in perennial forb sum of nested frequency. Many forbs are annual species and account for high cover and nested frequency values. Because of the large decrease in perennial grasses, herbaceous understory trend is slightly down. The Desirable Components Index rated this site as good with a score of 61 due to fair perennial grass cover, good browse cover, and low shrub decadence.

TREND ASSESSMENT
soil - stable (0)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good (61) Lower Potential scale

2000 TREND ASSESSMENT

The trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased from 3.8:1 in 1995 to 3.1:1 in 2000. This downward trend is a product of a two-fold increase in the cover for bare ground. Erosion still appears to be minimal even with a large decrease in the abundance of forbs in 2000. Trend for browse would be considered stable. Even though black sagebrush shows an increase in decadency (13% to 39%), poor vigor (5% to 13%), and dying (5% to 12%), the sagebrush population actually increased in density by more than 10%. These negative aspects are of concern, but not substantial enough to warrant a downward trend with the corresponding increase in density. Trend for the herbaceous understory is slightly down overall due to drought. Perennial grasses slightly decreased in sum of nested frequency in 2000, while perennial forbs drastically decreased in sum of nested frequency. The Desirable Components Index rated this site as good with a score of 54 due to good perennial grass cover and good browse cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - stable (0)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good (54) Lower Potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground decreased from 3.1:1 in 2000 to 2.5:1 in 2005, a 19% decrease. This decrease is a product of a three-fold increase in the bare ground cover and a three-fold decrease in the cryptogamic cover. Although the soil trend is slightly down, there is still no apparent soil erosion. The trend for browse is down. This is due to a large loss in numbers of black sagebrush, the key browse species on the site. The black sagebrush density decreased 49% from 12,100 plants/acre in 2000 to 6,180 plants/acre in 2005. The percentage of decadent individuals in the population changed little (39% down to 37%), while those individuals classified as dying increased from 12% to 26% in 2005. With only 2% of the individuals in the population classified as young, recruitment of new plants is very low and not enough to replace the dying indiviuals. A substantial increase in winterfat occured from 2000 to 2005 (from 120 to 1,360 plants/acre), but this was not sufficient enough to compensate for the losses to black sagebrush. The herbaceous understory trend is slightly down. The nested frequency of perennial grasses decreased 13% and perennial forbs increased some. This winter range is dependent upon the perennial grass component for providing forage for big game during the spring and autumn, whereas perennial forbs provide little forage during these seasons. Therefore, the decrease in perennial grasses has the largest impact on the herbaceous trend. The Desirable Components Index rated this site as good with a score of 57 due to excellent perennial grass cover and fair browse cover.

TREND ASSESSMENT
soil - slightly down (-1)
browse - down (-2)
herbaceous understory - slightly down (-1)
winter range condition (DC Index) - good (57) Lower Potential scale

HERBACEOUS TRENDS --
Management unit 11A, Study no: 5

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	a-	b17	b20	ab9	.16	.05	.04
G	Bouteloua gracilis	c209	b139	b154	a65	1.20	3.24	1.54
G	Hilaria jamesii	a-	b18	b14	ab5	.24	.07	.04
G	Oryzopsis hymenoides	b10	b8	ab6	a-	.06	.07	-
G	Poa secunda	ab14	ab17	a7	b25	.11	.04	.42
G	Sitanion hystrix	b221	a157	a165	ab179	2.01	3.34	7.67
G	Stipa comata	b281	a174	a136	a154	2.88	4.56	8.07
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		735	530	502	437	6.67	11.38	17.81
Total for Grasses		735	530	502	437	6.67	11.38	17.81
F	Arabis perennans	a-	b18	a-	a-	.06	-	-
F	Astragalus purshii	a-	c58	a-	b8	.19	-	.02
F	Astragalus sp.	ab7	c44	a-	b21	.15	-	.10
F	Chenopodium fremontii (a)	-	b35	a-	a-	.23	-	-
F	Chenopodium leptophyllum(a)	-	3	-	5	.01	-	.01

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Cryptantha sp.	-	1	-	-	.00	-	-
F	Descurainia pinnata (a)	-	$_{b}$48	$_{a}$-	$_{a}$1	.33	-	.00
F	Eriogonum cernuum (a)	-	4	-	3	.01	-	.03
F	Erigeron pumilus	-	3	-	-	.00	-	-
F	Lappula occidentalis (a)	-	$_{b}$49	$_{a}$-	$_{b}$44	.20	-	.18
F	Machaeranthera canescens	1	3	-	1	.01	-	.03
F	Navarretia intertexta (a)	-	$_{b}$32	$_{a}$-	$_{a}$3	.12	-	.01
F	Orobanche sp.	-	1	-	-	.00	-	-
F	Phlox longifolia	$_{a}$-	$_{b}$38	$_{a}$-	$_{b}$23	.07	-	.06
F	Schoencrambe linifolia	7	10	4	4	.03	.01	.19
F	Sphaeralcea coccinea	$_{b}$32	$_{b}$20	$_{a}$2	$_{ab}$20	.13	.01	.85
F	Taraxacum officinale	-	1	-	-	.00	-	-
F	Townsendia sp.	-	-	-	2	-	-	.00
Total for Annual Forbs		0	171	0	56	0.91	0	0.24
Total for Perennial Forbs		47	197	6	79	0.68	0.01	1.26
Total for Forbs		47	368	6	135	1.60	0.01	1.51

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

BROWSE TRENDS --
Management unit 11A, Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia frigida	6	5	1	.01	.04	.00
B	Artemisia nova	92	95	83	16.18	16.71	7.67
B	Artemisia tridentata wyomingensis	1	0	0	-	-	-
B	Atriplex confertifolia	12	8	15	1.32	.71	1.41
B	Ceratoides lanata	10	6	26	.06	.00	.29
B	Chrysothamnus nauseosus graveolens	3	2	0	.07	.00	-
B	Chrysothamnus viscidiflorus stenophyllus	6	7	7	.01	.21	.25
B	Gutierrezia sarothrae	10	23	5	.08	.28	.00
B	Opuntia sp.	3	2	1	.00	.03	.03
B	Pediocactus simpsonii	2	10	4	.00	.04	.00
B	Pinus edulis	0	4	4	-	-	.03
Total for Browse		145	162	146	17.76	18.05	9.69

CANOPY COVER, LINE INTERCEPT --
Management unit 11A, Study no: 5

Species	Percent Cover '05
Artemisia nova	11.80
Atriplex confertifolia	3.36
Ceratoides lanata	.58
Chrysothamnus viscidiflorus stenophyllus	.50
Pinus edulis	.45

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 11A, Study no: 5

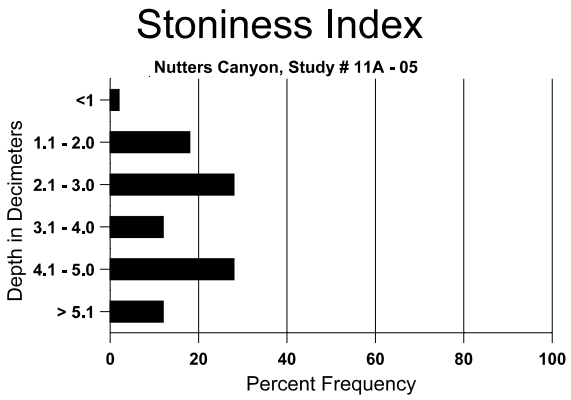
Species	Average leader growth (in) '05
Ceratoides lanata	3.8

BASIC COVER --
Management unit 11A, Study no: 5

Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	11.00	25.97	29.31	27.87
Rock	.50	.84	2.42	1.05
Pavement	33.00	47.27	44.26	30.35
Litter	44.50	25.42	19.22	21.31
Cryptogams	0	.05	2.71	.94
Bare Ground	11.00	5.48	9.82	28.22

SOIL ANALYSIS DATA --
Herd Unit 11A, Study # 5, Study Name: Nutters Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	ppm P	ppm K	dS/m
17.8	60.8 (18.1)	7.4	44.9	33.8	21.3	2.3	6.6	220.8	0.9



PELLET GROUP DATA --
Management unit 11A, Study no: 5

Type	Quadrat Frequency				
	'82	'88	'95	'00	'05
Rabbit	-	-	6	10	6
Elk	-	-	15	24	37
Deer	-	-	17	9	24

Days use per acre (ha)	
'00	'05
-	-
40 (99)	31 (76)
5 (13)	41 (101)

BROWSE CHARACTERISTICS --
Management unit 11A, Study no: 5

		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)
Artemisia frigida												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**2532**	1200	1533	933	66	-	16	11	3	-	5	7/11
95	**240**	40	140	100	-	-	0	0	0	-	0	12/10
00	**200**	-	60	140	-	-	0	0	0	-	0	3/5
05	**20**	-	-	20	-	-	0	0	0	-	0	9/8
Artemisia nova												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**21066**	5866	8933	9000	3133	-	13	.31	15	.56	5	10/12
95	**10840**	320	1800	7740	1300	980	58	32	12	5	5	11/18
00	**12100**	200	420	7020	4660	1160	15	35	39	12	13	7/15
05	**6180**	2120	100	3780	2300	4540	8	23	37	26	26	7/15
Artemisia tridentata wyomingensis												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**20**	-	-	20	-	-	100	0	-	-	0	15/7
00	**0**	-	-	-	-	-	0	0	-	-	0	-/-
05	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Atriplex confertifolia												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**133**	-	-	133	-	-	0	0	0	-	0	8/13
95	**360**	-	20	320	20	-	0	0	6	-	6	16/29
00	**320**	-	40	80	200	20	19	31	63	6	6	13/28
05	**400**	220	160	220	20	-	0	0	5	5	10	16/39
Ceratoides lanata												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**266**	-	200	-	66	-	0	0	25	-	0	-/-
95	**320**	-	40	280	-	-	19	6	0	-	0	10/10
00	**120**	-	-	100	20	-	33	67	17	17	17	3/3
05	**1360**	720	980	340	40	20	21	0	3	3	3	11/15

		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)
Chrysothamnus nauseosus graveolens												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
95	**300**	-	60	240	-	-	0	0	0	-	0	9/11
00	**40**	-	-	20	20	-	0	50	50	50	50	11/6
05	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Chrysothamnus viscidiflorus stenophyllus												
82	**0**	-	-	-	-	-	0	0	0	-	0	-/-
88	**132**	66	-	66	66	-	0	0	50	-	0	3/2
95	**140**	-	-	140	-	-	0	0	0	-	0	6/7
00	**340**	40	40	100	200	20	0	24	59	59	59	2/7
05	**260**	100	160	100	-	-	0	0	0	-	0	8/10
Gutierrezia sarothrae												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**266**	-	66	200	-	-	0	0	-	-	0	5/5
95	**240**	380	20	220	-	20	0	0	-	-	0	7/6
00	**1680**	60	120	1560	-	40	0	0	-	-	0	3/5
05	**100**	-	-	100	-	-	0	0	-	-	0	8/8
Opuntia sp.												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**60**	-	-	60	-	-	0	0	-	-	0	6/10
00	**40**	-	-	40	-	-	0	0	-	-	0	-/-
05	**20**	-	-	20	-	-	0	0	-	-	0	3/8
Pediocactus simpsonii												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
95	**40**	-	-	40	-	-	0	0	-	-	0	0/1
00	**260**	-	80	180	-	-	8	0	-	-	0	1/2
05	**80**	-	-	80	-	-	0	0	-	-	0	1/1
Pinus edulis												
82	**0**	-	-	-	-	-	0	0	-	-	0	-/-
88	**133**	-	133	-	-	-	0	0	-	-	0	-/-
95	**0**	-	-	-	-	-	0	0	-	-	0	-/-
00	**100**	20	100	-	-	-	0	0	-	-	0	-/-
05	**100**	-	100	-	-	-	0	0	-	-	0	-/-