Trend Study 3-6-01

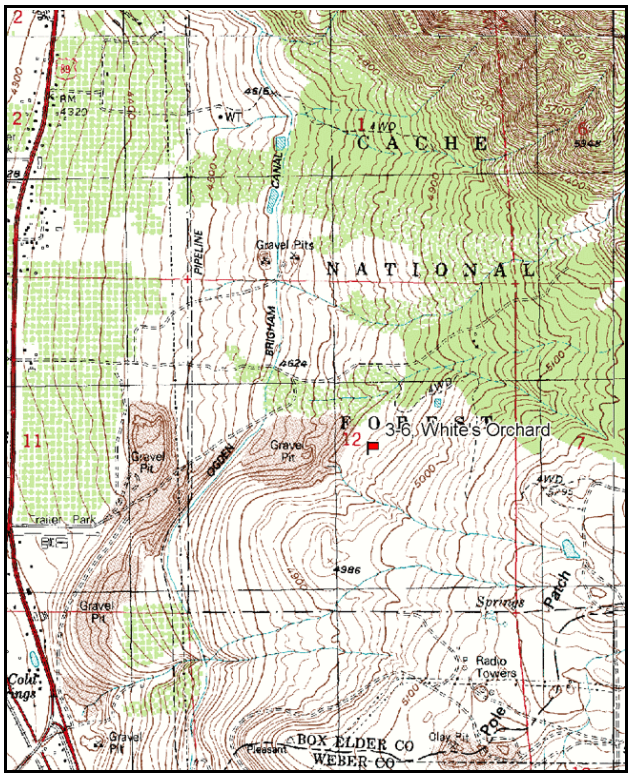
Study site name: White's Orchard . Vegetation type: Big Sagebrush-Grass .

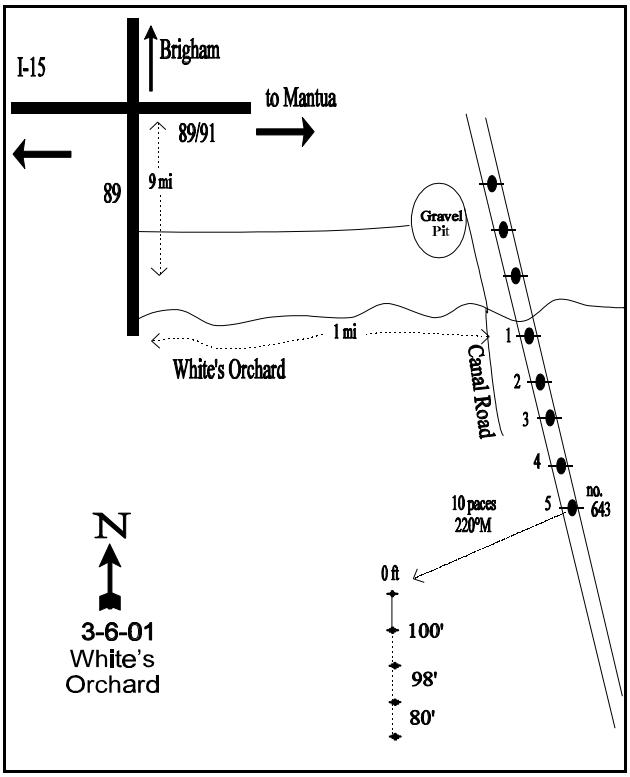
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

In Brigham City, at the junction of US 89 and 91, turn south on US 89 and proceed 9.0 miles. Turn left and drive through White's Orchard, stopping after 1.0 mile where the power lines cross the road. Power poles run at 137 degrees magnetic. Walk south to the fifth pole, number 643. From the base of this pole walk 10 paces at 220 degrees magnetic to the baseline 0-foot stake with browse tag #7920. The first two posts are bent over.





Map Name: Plain City

Diagrammatic Sketch

Township 7N , Range 2W , Section 12

UTM 4578643 N 415163 E

DISCUSSION

Trend Study No. 3-6

The White's Orchard study, located near the south boundary of the herd unit, samples an extensive big sagebrush type on a moderate (20%), northwest slope. Elevation of the site is 4,820 feet. Although winter deer use of the area was reportedly heavy in the past, few pellet groups were observed during the 1996 and 2001 readings. Pellet group transect data taken in 2001 estimated less than 1 deer day use/acre (2 ddu/ha). Browse utilization was intense in 1984, but it appeared to be largely a function of livestock use. Cattle pats were very common in 1984 as utilization of the available grass forage approached 80%. In 1996 and 2001, cattle sign was moderately abundant and probably high because of a watering trough near the base of the hill. In 2001, cattle use was estimated at 68 cow days use/acre (168 cdu/ha) from pellet transect data. Coyote scat was also noted in the area along with some den sites ('96).

Soil is a "Wasatch Gravelly Sandy Loam," a moderately deep alluvially deposited soil with slightly alkaline characteristics. Water permeability is rapid and drainage is excessive. Soils on the site have a sandy loam texture with a soil reaction that is moderately acidic (6.0 pH). Small sized gravel is found on the surface and within the profile. Effective rooting depth (see methods) was estimated at less than 10 inches. Average soil temperature is moderately high at 67°F at an average depth of 12 inches. Complete soil drying may occur as deep as 35 inches for 90 consecutive days in summer. This soil has a moderate erosion hazard but current vegetation and litter cover appear sufficient to control most soil movement. Heavy cattle grazing and trampling damage has resulted in some sheet and gully erosion in the past.

Browse composition consists almost exclusively of basin big sagebrush. During the 1984 and 1990 readings, the sagebrush was classified as mountain big sagebrush (*Artemisia tridentata vaseyana*). However, in 1996 this was changed to basin big sagebrush *(A. tridentata tridentata)*. The only other shrub present is an occasional broom snakeweed. Sagebrush density is moderate, estimated at nearly 2,000 plants/acre in 2001. Current density estimates are lower than those taken in 1984 and 1990. However, the number of young plants in the population and 1,000 plants/acre of decadent sagebrush appear to have died since 1990. Dead plants, first sampled in 1996, number about 1,100 plants/acre in 1996 and 2001, supporting the assumption that the sagebrush population has declined with the long periods of drought and winter injury since 1985. The result is a smaller and healthier population of sagebrush which is lightly utilized, generally in good vigor with a lower percent decadency (decreasing from 48% in 1984 to 16% in 2001). Utilization was extremely heavy in 1984, with all plants sampled being heavily hedged (>60% of twigs browsed). From 1990-2001, use has decreased and is currently ('01) classified as light. In 1996 and 2001, recruitment from young plants was moderate at 14% and 24% respectively. However, the average number of young since 1984 is not high enough to replace the dead in the population at the present time. Average leader growth on basin big sage was just under 3 inches in 2001.

The herbaceous understory is dominated by perennial grasses with the principal species being bulbous bluegrass and intermediate wheatgrass. Bulbous bluegrass, a less desirable perennial, significantly increased in nested frequency between 1996 and 2001. It currently accounts for 67% of the grass cover and 51% of the total vegetation cover. Intermediate wheatgrass maintained a stable nested frequency in 2001, providing 21% of the grass cover. In 2001, cheatgrass and Japanese brome combine to provide 11% of the grass cover. Cheatgrass significantly increased in nested frequency and Japanese brome remained stable between 1996 and 2001. Forbs were nearly absent in 1984 and 1990, but have increased since. Composition is extremely poor and dominated by annuals. Storksbill is the most abundant species in 2001. Weedy perennial species which should be closely monitored in the future include: curlycup gumweed, ragweed, sunflower, thistle and tarweed.

1984 APPARENT TREND ASSESSMENT

In spite of light to moderate erosion, this site appears to have a relatively stable soil trend. The lack of steep slope and low precipitation as well as a fair amount of cover, helps prevent excessive soil loss. Although subsequent readings of the study plots may indicate otherwise, the vegetative trend appears stable. If heavy cattle grazing persists, it is possible that basin big sagebrush may even increase in density, although plant size, vigor, and vegetative diversity will continue to be limited.

1990 TREND ASSESSMENT

Basin big sagebrush shows a notable increase in density. Further data comparisons reveal that the number of mature sagebrush increased from 1,266 to 1,600 plants per acre. The largest increase was in the number of seedlings. The shrubs are vigorous with light to moderate hedging. While the increase in sagebrush could be related to heavy cattle grazing on this private land, the frequency of intermediate wheatgrass also increased. The amount of litter cover decreased and the percentage of bare soil increased from 1% to 15%, but overall there is minimal soil erosion.

TREND ASSESSMENT
soil - stable (3)
browse - improving (4)
herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The soil trend is up slightly. Percent bare ground declined from 15% to 9%. Erosion is not currently a problem. Trend for browse is stable. The sagebrush population has declined due to a reduction in young and decadent plants, but the number of mature plants has actually increased. Seedlings and young are less abundant yet appear in sufficient numbers to maintain or even increase the current population. Utilization is mostly light and percent decadence has declined from 30% to 14%. Although the herbaceous understory continues to be dominated by grasses, sum of nested frequency for perennial grasses has declined slightly. Nested frequency of intermediate wheatgrass declined significantly. Annual grasses and bulbous bluegrass are abundant and account for nearly half of the grass cover. Forbs are lacking and species composition is extremely poor. Several aggressive weeds were found on the site which included ragweed, thistle, curlycup gumweed, sunflower and tarweed. Trend for the herbaceous understory is considered slightly down due to the significant decline in intermediate wheatgrass.

TREND ASSESSMENT
soil - up slightly (4)
browse - stable (3)
herbaceous understory - slightly down because of the losses to key perennial grass species (2)

2001 TREND ASSESSMENT

Soil trend is stable. Perennial grasses dominate the understory, and although bulbous bluegrass is a less desirable species, it is fairly good at holding soils in place. Bare ground remains near 1996 levels. Trend for browse is slightly down. Due to low deer numbers in this unit, use on sagebrush remains light. Vigor is generally good. However, the population appears to be slowly decreasing as recruitment from the young age class is not adequate to replace the dead in the population. Sagebrush strip frequency also declined in 2001. Trend for the herbaceous understory is slightly down. Although sum of nested frequency for perennial grasses increased, most of this increase is due to the significant increase in bulbous bluegrass, a less desirable

species. Cheatgrass brome also significantly increased in nested frequency. Forb composition is poor with annuals and weedy perennials being the most abundant.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 6

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	a6	a1	ab9	b24	3	1	4	11	.10	.47
G	Agropyron intermedium	ab222	b248	ab190	a180	82	88	58	60	14.46	10.28
G	Agropyron spicatum	-	-	-	4	-	-	-	2	-	.06
G	Bromus japonicus (a)	-	-	212	216	-	-	70	81	7.41	2.67
G	Bromus tectorum (a)	-	-	a36	b106	-	-	12	36	.89	2.66
G	Festuca myuros (a)	-	-	4	6	-	-	4	4	.04	.02
G	Poa bulbosa	b270	a146	a141	c325	99	61	49	93	3.67	32.27
G	Sporobolus cryptandrus	-	-	5	-	-	-	3	-	.18	-
Total for Annual Grasses		0	0	252	328	0	0	86	121	8.35	5.36
Total for Perennial Grasses		498	395	345	533	184	150	114	166	18.43	43.09
Total for Grasses		498	395	597	861	184	150	200	287	26.78	48.46
F	Alyssum alyssoides (a)	-	-	-	5	-	-	-	3	-	.01
F	Ambrosia psilostachya	a-	a-	a5	b23	-	-	3	12	.04	1.12
F	Artemisia ludoviciana	a-	a-	a3	b9	-	-	1	3	.03	1.03
F	Cirsium spp.	-	-	1	5	-	-	1	2	.00	.01
F	Collomia linearis (a)	-	-	-	2	-	-	-	2	-	.01
F	Collinsia parviflora (a)	-	-	-	8	-	-	-	3	-	.09
F	Cynoglossum officinale	-	-	-	3	-	-	-	1	-	.03
F	Descurainia pinnata (a)	-	-	b48	a13	-	-	17	7	.79	.06
F	Draba spp. (a)	-	-	-	14	-	-	-	5	-	.02
F	Epilobium brachycarpum (a)	-	-	b52	a8	-	-	24	4	.20	.02
F	Erodium cicutarium (a)	-	-	a41	b142	-	-	16	51	.46	4.96
F	Erigeron pumilus	a-	a-	b8	a-	-	-	4	-	.21	.00
F	Grindelia squarrosa	a-	a-	b12	a-	-	-	6	-	.20	-
F	Helianthus annuus (a)	-	a3	b25	a-	-	2	12	-	.28	-
F	Holosteum umbellatum (a)	-	-	1	-	-	-	1	-	.00	-
F	Lactuca serriola	a-	a-	b11	b24	-	-	6	10	.20	.12
F	Madia glomerata (a)	-	-	17	-	-	-	8	-	.04	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Plantago patagonica (a)	-	-	32	22	-	-	14	11	.14	.10
F	Polygonum douglasii (a)	-	-	$_{b}$35	$_{a}$12	-	-	19	5	.17	.05
F	Taraxacum officinale	-	-	-	3	-	-	-	1	-	.03
F	Tragopogon dubius	1	-	1	-	1	-	1	-	.00	-
Total for Annual Forbs		0	3	251	226	0	2	111	91	2.09	5.33
Total for Perennial Forbs		1	0	41	67	1	0	22	29	0.69	2.36
Total for Forbs		1	3	292	293	1	2	133	120	2.79	7.70

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 6

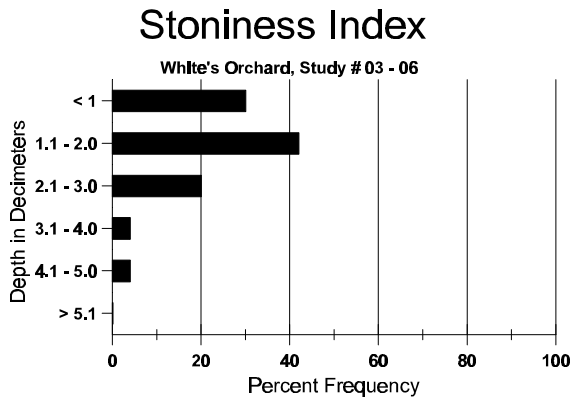
Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata tridentata	66	51	16.13	7.64
B	Gutierrezia sarothrae	1	0	-	-
Total for Browse		67	51	16.13	7.64

BASIC COVER --
Herd unit 03 , Study no: 6

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	364	379	1.00	15.50	45.02	65.48
Rock	67	19	0	.50	.57	.19
Pavement	208	111	17.25	7.00	3.35	2.08
Litter	400	353	80.50	56.75	53.93	37.77
Cryptogams	99	33	0	5.50	2.65	.41
Bare Ground	249	185	1.25	14.75	9.26	8.38

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 06, White's Orchard

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.7	67.2 (12.0)	6.0	64.6	16.1	19.4	1.9	17.1	137.6	.3



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 6

Type	Quadrat Frequency '96	Quadrat Frequency '01	Pellet Transect Pellet Groups per Acre '01	Pellet Transect Days Use per Acre (ha) '01
Rabbit	1	1	-	-
Deer	1	1	9	1 (2)
Cattle	14	8	818	68 (168)

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 6

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata tridentata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	156	-	-	-	-	-	-	-	-	156	-	-	-	10400			156
	96	33	-	-	-	-	-	-	-	-	33	-	-	-	660			33
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	5	-	-	-	-	-	-	4	-	1	-	333			5
	90	20	-	-	-	-	-	-	-	-	20	-	-	-	1333			20
	96	19	1	-	-	-	-	-	-	-	19	-	1	-	400			20
	01	24	-	-	-	-	-	-	-	-	24	-	-	-	480			24
M	84	-	-	19	-	-	-	-	-	-	19	-	-	-	1266	29	20	19
	90	18	6	-	-	-	-	-	-	-	24	-	-	-	1600	30	38	24
	96	90	9	-	-	-	-	-	-	-	86	-	12	1	1980	31	40	99
	01	59	-	-	-	-	-	-	-	-	55	1	3	-	1180	29	40	59
D	84	-	-	21	-	-	-	-	-	1	16	-	6	-	1466			22
	90	10	8	-	1	-	-	-	-	-	12	-	-	7	1266			19
	96	13	4	1	1	-	-	-	-	-	12	1	3	3	380			19
	01	16	-	-	-	-	-	-	-	-	11	-	-	5	320			16
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1160			58
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	1100			55

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	100%	15%	+27%
'90	22%	00%	11%	-34%
'96	10%	.72%	14%	-28%
'01	00%	00%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	3065	Dec:	48%
	'90	4199		30%
	'96	2760		14%
	'01	1980		16%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	8	2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'84	00%	00%	00%
'90	00%	00%	00%
'96	00%	00%	00%
'01	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
'84	200	Dec:		-
'90	0			-
'96	40			-
'01	0			-