

Trend Study 27-6-03

Study site name: Nephi Pasture I.

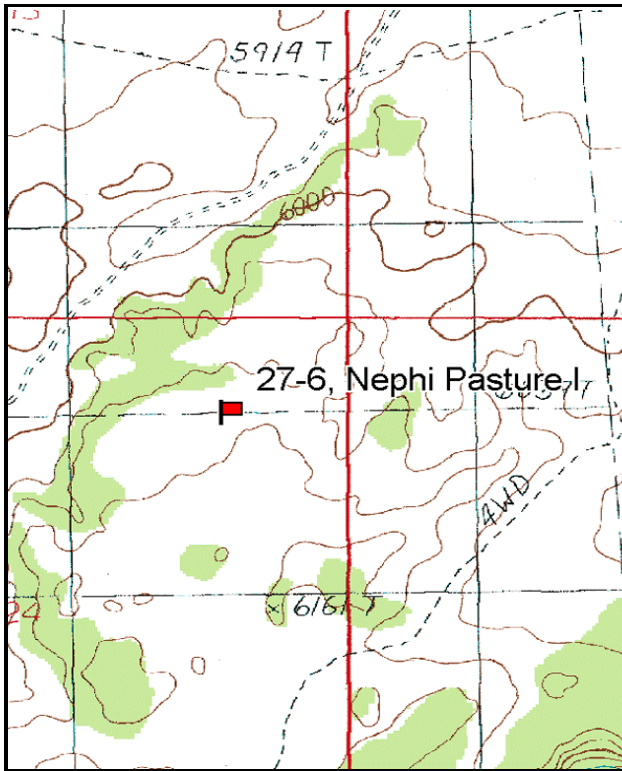
Vegetation type: Basin Big Sagebrush.

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft). No rebar.

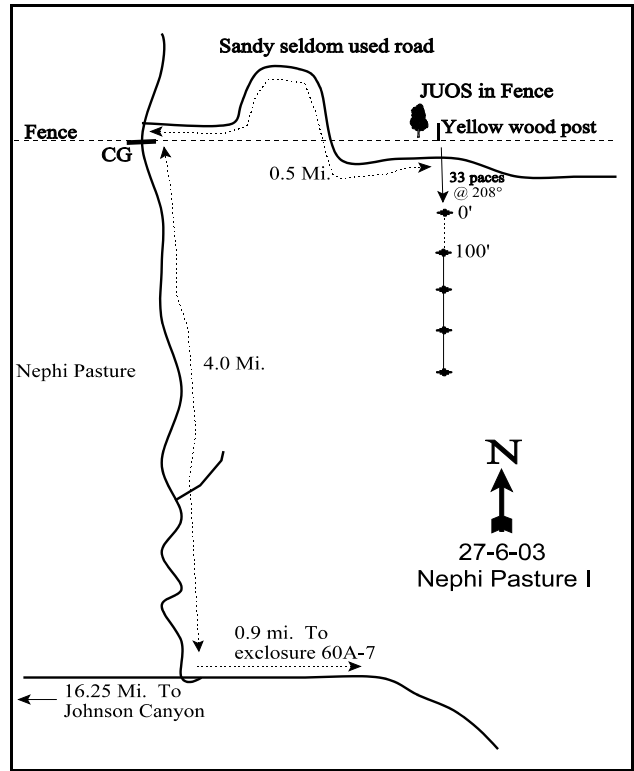
LOCATION DESCRIPTION

From Kanab, take US 89 east for 9.4 miles to the Johnson Canyon turnoff. Turn left and travel up Johnson Canyon 9.75 miles to the Lock Ridge-Nephi Pasture road. Turn right. Go 3.6 miles to a cattleguard. Go 0.8 miles to a fork, bear right (There are lots of forks, stay on main Nephi Pasture road). Go 1.25 miles to a fork, keep right. Go 0.85 miles to a fork by a cattleguard, continue straight. Continue 1.2 miles to a cattleguard. Continue 4.7 miles to a fork, bear right. Go 0.7 miles to a cattleguard, and continue 2.8 miles to an intersection. Turn left (straight goes to Nephi Point and the Nephi Pasture enclosure) and follow this road 4.0 miles to a cattleguard. Turn right and follow the road up the fence 0.5 miles to a yellow-painted wood post marking the pellet group transect and range trend study. The 0-foot baseline stake is 33 paces at 208 degrees magnetic south of the yellow post. The trend study is marked by short fenceposts, and runs south along the pellet group transect.



Map Name: Buckskin Mountain

Township 41S, Range 4W, Section 24



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4121457 N, 395377 E

## DISCUSSION

### Nephi Pasture I - Trend Study No. 27-6

This study samples an important spring-fall range for deer, but also receives use in light winters. Most of the area below the White Cliffs consists of either sagebrush/grass or pinyon-juniper woodland communities. The study samples a basin big sagebrush community with scattered mixed browse associated with a sparse herbaceous understory. Although cattle were present in the lower end of Nephi Pasture in 1987, there was little sign or forage on the site. Water is limited in this area in the summer. Elevation at the study site is approximately 6,000 feet. The slope is 5-8% with a northwest exposure. Quadrat frequency of deer pellets was moderate in 1992 and 2003 at 30% and 21% respectively, and high in 1997 at 49%. Pellet group transect data collected in 2003 estimated 72 deer days use/acre (177 ddu/ha) and 9 cow days use/acre (22 cdu/ha) on the site. Cattle pats were from the previous grazing season while deer pellets were from winter and spring.

There is some snow cover in winter, but most of the annual precipitation comes during the summer monsoons as high intensity thunderstorms. Consequently, the loose, excessively drained sandy soil is susceptible to soil movement as evidenced by gullies in the drainages. Soils are also susceptible to wind erosion. Bare ground has been high in all readings, but particularly so in 2003 at 43%. The high proportion of bare ground is the result of the minimal herbaceous understory. Soil depth on the stabilized dunes is moderately deep with an effective rooting depth of nearly 16 inches. There are some areas with sandstone occurring at a depth of 10 to 12 inches. Organic matter is very low at less than 1%. Shrubs and grasses either have exposed roots or a buildup of soil, but cover appears adequate to help minimize soil loss from the site. An erosion condition class assessment rated soils as stable in 2003.

Due to competition for moisture in the sandy soils, basin big sagebrush is somewhat limited in its density. Basin big sagebrush density was estimated at 3,000 plants/acre in 1992, but has steadily declined with each survey. Density was estimated at 1,620 plants/acre in 2003, about half of the 1992 estimate. Basin big sagebrush has provided nearly 70% of the total browse cover on the transect since 1992. Along with the steady decline in population density, basin big sagebrush also has increased poor vigor and declining reproduction since 1992. The most alarming parameter is percent decadence which was high from 1987-1997 at 40-50%, but extreme in 2003 at 91%. Additionally, 71% and 51% of the decadent plants were classified as dying in 1997 and 2003 respectively. This population will almost undoubtedly continue to decline in the future. Use on basin big sagebrush has been light to moderate with few plants showing heavy use in any year. Annual sagebrush leaders had averaged 2.1 inches of growth when the site was read on July 30, 2003.

The most preferred browse on the site is antelope bitterbrush which is present on the site in low densities. These scattered plants are moderately to heavily used, but have maintained good vigor and moderate to low decadence even during cyclic drought periods during the late 1980's and early 2000's. Bitterbrush density has averaged about 500 plants/acre between 1992-2003. The large serviceberry are more scattered, less common and loosely aggregated. With the increased sample size, serviceberry density was estimated at 500 plants/acre in 1992, 300 in 1997, and 100 in 2003. The decline in the serviceberry population is due to the constant decline of young in the population since 1992. The available portions of the serviceberry plants were heavily browsed in 1987, but use has since become mostly light. Bitterbrush and serviceberry leaders averaged 6.0 and 5.6 inches of annual growth respectively in 2003. Other woody species sampled on the site include the increaser, broom snakeweed, green ephedra, and Utah juniper.

The most common grass, Sandhill muhly, forms large rings in the open areas. It is of low forage quality and an increaser with heavy grazing. Sandhill muhly accounted for 69% of the grass cover in 1997 increasing to 87% in 2003. However, this species significantly declined in nested frequency and average cover in 2003 which illustrates the limited herbaceous understory on the site. Other grasses sampled on the site include sand dropseed, bottlebrush squirreltail, blue grama, and Indian ricegrass, but these species occur infrequently.

Sixweeks fescue, an annual, had the highest nested frequency value of any grass in 1997 but was not sampled in 2003 with the dry conditions. Forbs are also limited on the site. The most common species are peavine and toadflax. Sum of nested frequency values of all perennial herbaceous species declined by more than half from 1997 and 2003.

### 1992 TREND ASSESSMENT

Soil trend for this site would have to be considered down and in poor condition because of the relatively high percentage of bare ground (40%). Total vegetative cover is relatively low at only 34%, and only 18% of that comes from the herbaceous understory. Herbaceous species are the most protective portion of the vegetative community against high intensity summer storms. The browse trend is slightly down for basin big sagebrush with a slight decrease in density, and an increase in percent decadence to 51%. Also, biotic potential (percentage of seedlings to the population) and percentage of the population in the young age class has decreased substantially since 1987. The herbaceous understory is almost nonexistent. Grasses and forbs both showed decreased nested frequency values for perennial species.

#### TREND ASSESSMENT

soil - down (1)

browse - slightly down (2)

herbaceous understory - down (1)

### 1997 TREND ASSESSMENT

Trend for soil is considered stable but still in poor condition. Percent bare ground declined slightly; however, vegetation and litter cover also declined. Erosion is not currently a serious problem on the site. Overall trend for browse would be down. Trend for browse is slightly down for bitterbrush and down for basin big sagebrush (which makes up 67% of the browse cover). Bitterbrush has declined slightly in density. Utilization remains at 1992 levels but a larger proportion of the shrubs display poor vigor. Percent decadence has increased from 33% to 39% and recruitment is poor. Basin big sagebrush shows these same trends. Even though percent decadence has declined due to a die-off of decadent plants, 71% of the decadent plants are classified as dying. This translates into an additional 600 plants/acre that could be lost from the population. Trend for the herbaceous understory is stable yet depleted. The increase in sum of nested frequency for grasses comes from the a significant increase in the nested frequency of the small annual, sixweeks fescue. Unlike other sites on the unit, grass and forb cover values are similar compared to 1992 estimates.

#### TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - stable (3)

### 2003 TREND ASSESSMENT

Trend for soil is slightly down. A decline in vegetation cover and corresponding increase in bare ground elevates the erosion potential on the site. The high infiltration rate of this sandy soil helps keep erosion below excessive levels. Trend for browse is down. Basin big sagebrush has a lower density estimate and decreased reproduction. This species also shows alarming increases in poor vigor (32% to 47%) and percent decadence (40% to 91%). As was the case in 1997, a large proportion of the decadent age class is classified as dying in 2003 (51%). This translates into an additional ~750 plants/acre that could die-off in the near future. Serviceberry continues to decline in density with no young in the population in 2003. These plants are large, and mostly unavailable to browsing deer during winter months. Bitterbrush increased in density in 2003 and shows improved decadence and vigor. However, density is still low at about 600 plants/acre. The herbaceous

understory remains limited and has a downward trend. The most abundant species, Sandhill muhly declined significantly in nested frequency and cover. Perennial grasses and forbs both had lower sum of nested frequency values in 2003 compared to 1997 estimates. Herbaceous production remains poor with total grass and forb cover estimated at only about 3%.

TREND ASSESSMENT

soil - slightly down (2)

browse - down (1)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Management unit 27 , Study no: 6

Type	Species	Nested Frequency				Average Cover %		
		'87	'92	'97	'03	'92	'97	'03
G	Agropyron spp.	9	-	-	-	-	-	-
G	Bouteloua gracilis	3	-	3	-	-	.03	-
G	Muhlenbergia pungens	c122	b85	b97	a30	3.97	3.78	.59
G	Oryzopsis hymenoides	1	10	9	-	.15	.10	-
G	Poa secunda	6	2	-	-	.03	-	-
G	Sitanion hystrix	b15	b17	b20	a3	.63	.16	.03
G	Sporobolus cryptandrus	b19	ab9	ab9	a6	.42	.07	.06
G	Vulpia octoflora (a)	-	a12	b168	a-	.02	1.29	-
Total for Annual Grasses		0	12	168	0	0.01	1.29	0
Total for Perennial Grasses		175	123	138	39	5.20	4.15	0.68
Total for Grasses		175	135	306	39	5.22	5.45	0.68
F	Astragalus spp.	3	-	-	-	-	-	-
F	Calochortus nuttallii	3	-	6	-	-	.01	-
F	Comandra pallida	b49	a18	ab44	b41	.16	.85	.84
F	Delphinium nuttallianum	-	-	2	-	-	.03	-
F	Descurainia pinnata (a)	-	a5	b47	a-	.01	.35	-
F	Eriogonum cernuum (a)	ab6	c70	b15	a-	.23	.03	-
F	Gilia spp. (a)	-	-	9	-	-	.02	-
F	Lathyrus brachycalyx	ab65	b74	ab58	a39	.38	.47	1.50
F	Lappula occidentalis (a)	-	-	3	-	-	.03	-
F	Penstemon spp.	1	-	-	-	-	-	-
F	Sphaeralcea parvifolia	1	3	-	-	.01	-	-
F	Townsendia spp.	-	1	-	-	.00	-	-
Total for Annual Forbs		6	75	74	0	0.24	0.43	0
Total for Perennial Forbs		122	96	110	80	0.55	1.37	2.34
Total for Forbs		128	171	184	80	0.79	1.81	2.34

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

BROWSE TRENDS --

Management unit 27 , Study no: 6

Type	Species	Strip Frequency			Average Cover %		
		'92	'97	'03	'92	'97	'03
B	Amelanchier utahensis	8	7	4	3.50	2.25	2.64
B	Artemisia tridentata tridentata	68	59	58	19.74	14.50	13.35
B	Gutierrezia sarothrae	27	45	13	1.37	1.79	.09
B	Juniperus osteosperma	2	2	2	.98	.63	.82
B	Opuntia spp.	0	2	0	-	-	-
B	Purshia tridentata	17	17	19	2.87	2.33	2.65
Total for Browse		122	132	96	28.48	21.52	19.56

CANOPY COVER, LINE INTERCEPT --

Management unit 27 , Study no: 6

Species	Percent Cover
	'03
Amelanchier utahensis	7.98
Artemisia tridentata tridentata	7.31
Gutierrezia sarothrae	.13
Juniperus osteosperma	1.36
Purshia tridentata	5.75

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 27 , Study no: 6

Species	Average leader growth (in)
	'03
Amelanchier utahensis	5.6
Artemisia tridentata tridentata	2.1
Purshia tridentata	6.0

BASIC COVER --

Management unit 27 , Study no: 6

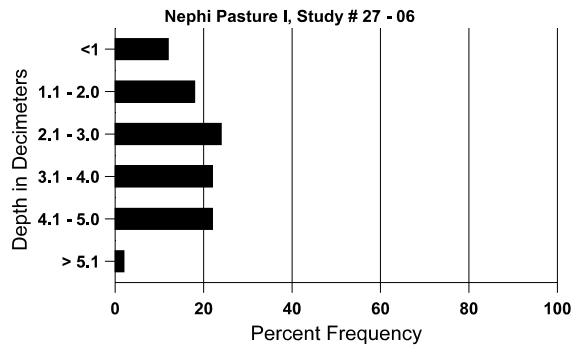
Cover Type	Average Cover %			
	'87	'92	'97	'03
Vegetation	8.00	33.87	29.81	21.84
Rock	.50	1.13	.27	.59
Pavement	2.00	0	.73	.88
Litter	60.50	48.39	43.54	47.32
Cryptogams	1.00	1.53	1.53	.18
Bare Ground	28.00	39.89	34.83	43.46

SOIL ANALYSIS DATA --

Management unit 27, Study no: 6, Study Name: Nephi Pasture I

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.8	66.3 (14.6)	6.5	88.4	4.1	7.56	0.6	13.0	57.6	0.3

Stoniness Index



PELLET GROUP DATA --

Management unit 27 , Study no: 6

Type	Quadrat Frequency		
	'92	'97	'03
Rabbit	48	27	17
Deer	30	49	21
Cattle	-	1	2

Days use per acre (ha)
'03
-
72 (177)
9 (22)

BROWSE CHARACTERISTICS --  
Management unit 27 , Study no: 6

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>											
87	<b>66</b>	-	-	66	-	-	0	100	0	0	55/59
92	<b>500</b>	40	440	40	20	-	8	0	4	36	-/-
97	<b>300</b>	-	200	100	-	-	7	0	0	0	95/111
03	<b>100</b>	-	-	100	-	20	0	20	0	0	86/80
<i>Artemisia tridentata tridentata</i>											
87	<b>3466</b>	1066	466	1400	1600	-	27	10	46	25	44/32
92	<b>3000</b>	20	240	1220	1540	-	31	.66	51	8	-/-
97	<b>2100</b>	40	60	1200	840	1180	18	7	40	32	39/47
03	<b>1620</b>	-	-	140	1480	1180	15	2	91	47	36/39
<i>Ceratoides lanata</i>											
87	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
92	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
97	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	0	13/13
<i>Ephedra viridis</i>											
87	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
92	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
97	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	0	40/46
<i>Gutierrezia sarothrae</i>											
87	<b>1399</b>	66	266	1133	-	-	0	0	0	0	8/10
92	<b>1480</b>	340	220	1220	40	-	3	1	3	0	-/-
97	<b>3500</b>	-	120	3380	-	40	0	0	0	0	11/10
03	<b>320</b>	-	-	320	-	20	0	0	0	0	7/9
<i>Juniperus osteosperma</i>											
87	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
92	<b>40</b>	-	20	20	-	-	0	0	-	0	-/-
97	<b>40</b>	-	-	40	-	-	0	0	-	0	-/-
03	<b>40</b>	-	-	40	-	-	0	0	-	0	-/-
<i>Opuntia spp.</i>											
87	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
92	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
97	<b>40</b>	-	20	20	-	-	0	0	-	0	3/7
03	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<b>Purshia tridentata</b>											
87	<b>199</b>	-	66	133	-	-	100	0	0	0	31/22
92	<b>540</b>	340	60	300	180	-	52	19	33	4	-/-
97	<b>460</b>	-	20	260	180	-	52	26	39	17	30/49
03	<b>620</b>	-	-	500	120	60	32	68	19	6	33/49
<b>Yucca spp.</b>											
87	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
92	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
97	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	0	59/74