

Trend Study 27-6-08

Study site name: Nephi Pasture I.

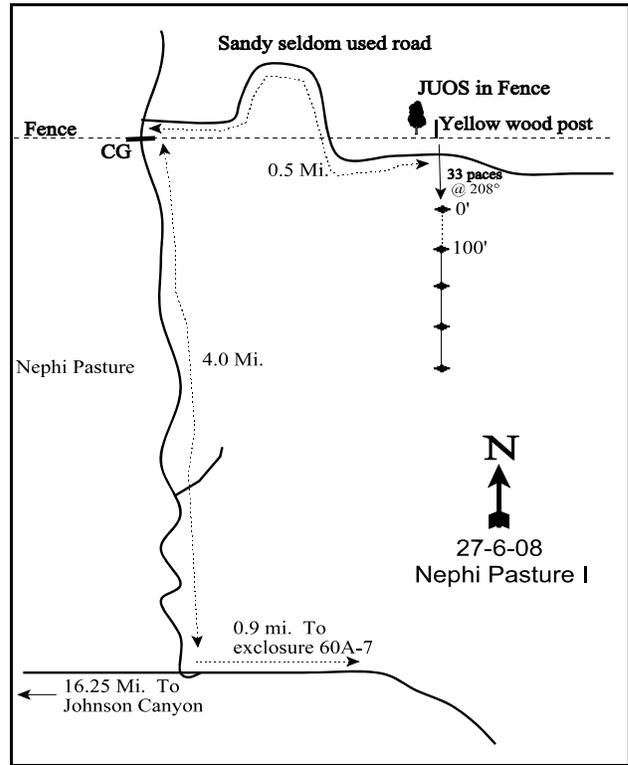
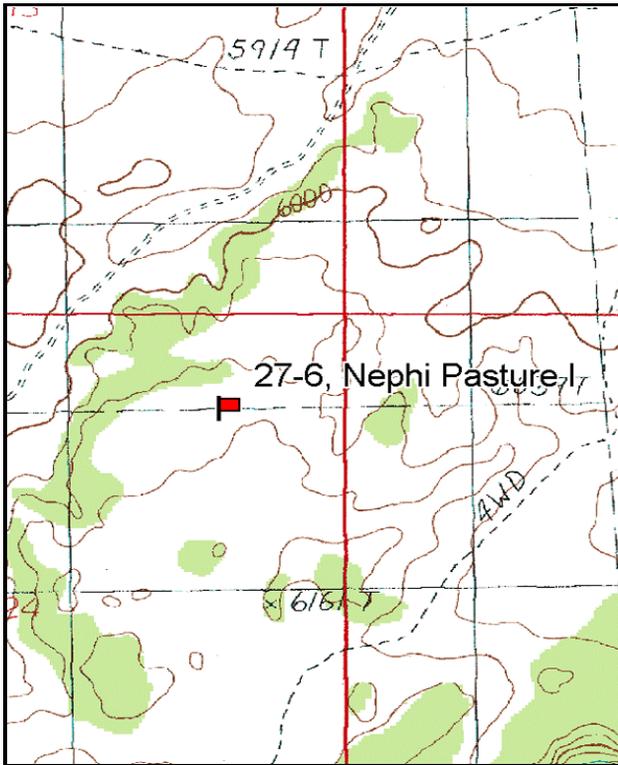
Vegetation type: Basin Big Sagebrush.

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

Diagrammatic Sketch

Township 41S, Range 4W, Section 24

GPS: NAD 83, UTM 12S 395313 E, 4121659 N

DISCUSSION

Nephi Pasture I - Trend Study No. 27-6

Study Information

This study samples an important spring-fall range for deer below the White Cliffs that also receives use in light winters [elevation: 6,000 feet (1,830 m), slope: 5%-10%, aspect: northwest]. Most of the area below the White Cliffs consists of either sagebrush-grass or pinyon-juniper (*Pinus edulis* and *Juniperus osteosperma*) woodland communities. The study samples a basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) community with scattered mixed browse associated with a sparse herbaceous understory. Water is limited in this area in the summer. Although cattle were present in the lower end of Nephi Pasture in 1987, there was little sign or use on the site. Pellet group data estimated deer use to be very heavy in 2003 (72 ddu/acre:177 ddu/ha) and decreasing, but still heavy in 2008 (43 ddu/acre:106 ddu/ha). Cattle use was estimated to be light in 2003 and 2008 (9 cdu/acre:22 cdu/ha and 3 cdu/acre:7 cdu/ha, respectively). There was high use by rabbits noted in 2008.

Soil

The soil on the site consists of loose, excessively drained sandy soil with a slightly acidic reaction (pH 6.5) that is susceptible to soil movement as evidenced by gullies in the drainages. Soils are also susceptible to wind erosion. 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%. Relative combined vegetation and litter cover ranged from 60%-66% from 1992 to 2008. Relative bare ground cover ranged from 31%-38% from 1992 to 2008. The high proportion of bare ground is the result of the minimal herbaceous understory. The erosion condition rating was classified as stable in 2003 and slight in 2008.

Browse

Basin big sagebrush density was estimated at 3,000 plants/acre in 1992, but has steadily declined with each survey. Density was estimated at 1,200 plants/acre in 2008. Basin big sagebrush provided nearly 70% of the total browse cover on the transect from 1992 to 2003, but had decreased to just 45% in 2008. Along with the steady decline in population density and production since 1992, basin big sagebrush plants displaying poor vigor has increased and reproduction has declined. Decadence, which was high from 1987-1997 at 40-50%, has increased to very high rates of 91% in 2003 and 75% in 2008. 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 in July of 2003 and 1 inch in July of 2008.

The most preferred browse on the site is antelope bitterbrush (*Purshia tridentata*) which is present on the site in low densities. These scattered plants were moderately to heavily used from 1987 to 2003, but mostly lightly used in 2008. Bitterbrush plants 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 550 plants/acre between 1992-2008. The large serviceberry (*Amelanchier utahensis*) are more scattered, less common and loosely aggregated. With the increased sample size, serviceberry density was estimated at 500 plants/acre in 1992, 300 plant/acre in 1997, 100 plants/acre in 2003, and 540 plant/acre in 2008. 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, but annual leader growth decreased to about 1.5 inches for both species in 2008. Other woody species sampled on the site include the increaser, broom snakeweed (*Gutierrezia sarothrae*), green ephedra (*Ephedra viridis*), and Utah juniper.

Herbaceous Understory

The most common grass, Sandhill muhly (*Muhlenbergia pungens*), 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, and 93% in 2008. 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 (*Sporobolus cryptandrus*), bottlebrush squirreltail (*Sitanion hystrix*), blue grama (*Bouteloua gracilis*), and Indian ricegrass (*Oryzopsis hymenoides*), but these species occur infrequently. Sixweeks fescue (*Vulpia octoflora*), 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 (*Lathyrus brachycalyx*) and bastard toadflax (*Comandra pallida*). Sum of nested frequency values of all perennial herbaceous species declined by more than half from 1997 and 2003.

1992 TREND ASSESSMENT

The browse trend is stable. Due to changes in sample size to determine density it is difficult to compare the previous reading. Sagebrush also had a slight increase in decadence from 46% in 1987 to 51%. Recruitment of sagebrush has decreased since 1987 with young plants comprising 8% of the population. The preferred browse species, antelope bitterbrush and serviceberry, had good vigor with low decadence. Recruitment of young plants was also good for both species. The trend for both grasses and forbs is slightly down with a decrease in sum of nested frequency of perennial grasses and perennial forbs. The herbaceous understory is almost nonexistent.

winter range condition (DCI) - fair (53) Mid-level potential scale

browse - stable (0)

grass - slightly down (-1)

forb - slightly down (-1)

1997 TREND ASSESSMENT

Trend for browse is down. The primary browse species, basin big sagebrush, density declined 30% since 1992 to 2,100 plants/acre. Sagebrush plants displaying poor vigor increased from 8% in 1992 to 32%. Recruitment of sagebrush continued to decline with young plants comprising only 3% of the population. The preferred browse species, bitterbrush, has also declined slightly in density to 460 plants/acre. A larger proportion of the shrubs display poor vigor (17%). Decadence of bitterbrush has increased from 33% in 1992 to 39%, and recruitment is poor. Trend for the grasses 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. The trend for forbs is stable. There was a slight increase in the sum of nested frequency and cover of perennial forbs. Unlike other sites on the unit, grass and forb cover values are similar compared to 1992 estimates.

winter range condition (DCI) - poor (45) Mid-level potential scale

browse - down (-2)

grass - stable (0)

forb - stable (0)

2003 TREND ASSESSMENT

Trend for browse is down. The primary browse species, basin big sagebrush, has a lower density estimate of 1,620 plants/acre. Recruitment of sagebrush was nonexistent with no seedlings or young plants encountered. Sagebrush also showed a large increase in poor vigor since 1997 (32% to 47%) and decadence (40% to 91%). The preferred browse species, bitterbrush, increased slightly in density in 2003 and shows less decadence and improved vigor. However, density is still low at about 600 plants/acre. 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. The trend for grasses is down. The sum of nested frequency of perennial grasses decreased by 72% and production of perennial grasses decreased from 4% of total cover in 1997 to less than 1%. The most abundant species, Sandhill muhly declined significantly in nested frequency and cover. Trend for forbs is stable. Sum of nested frequency of perennial forbs decreased slightly, but production of perennial forbs increased slightly. There were also no annual forbs encountered on the site in 2003. Herbaceous production remains poor with total grass and forb cover estimated at only about 3%.

winter range condition (DCI) - very poor (25) Mid-level potential scale
browse - down (-2) grass - down (-2) forb - stable (0)

2008 TREND ASSESSMENT

Trend for browse is slightly down. The density of the primary browse species, basin big sagebrush, continued to decline to 1,200 plants/acre. Sagebrush plants displaying poor vigor remained high at 52%. Decadence in the sagebrush population decreased, but remained high at 75%. There continued to be no new recruitment of young sagebrush plants. The trend for the preferred browse species, antelope bitterbrush, was stable with no to little change in density, vigor, or decadence. Recruitment of bitterbrush increased slightly. There was an 81% increase in the density of serviceberry to 540 plants/acre. Serviceberry vigor remained good and decadence was low. Recruitment of young serviceberry plants was good. The trend for grasses is stable with little change in the sum of nested frequency or production of perennial grasses. Trend for forbs is slightly down. There was little change in the sum of nested frequency of perennial forbs, but production of perennial forbs decreased slightly to less than 1% of cover. The largest change was the substantial increase in the sum of nested frequency of annual forbs. The herbaceous production remains poor.

winter range condition (DCI) - poor (38) Mid-level potential scale
browse - slightly down (-1) grass - stable (0) forb - slightly down (-1)

HERBACEOUS TRENDS --
Management unit 27 , Study no: 6

T y p e	Species	Nested Frequency					Average Cover %			
		'87	'92	'97	'03	'08	'92	'97	'03	'08
G	Agropyron sp.	9	-	-	-	-	-	-	-	-
G	Bouteloua gracilis	3	-	3	-	-	-	.03	-	-
G	Muhlenbergia pungens	c122	b85	b97	a30	a30	3.97	3.78	.59	1.13
G	Oryzopsis hymenoides	1	10	9	-	3	.15	.10	-	.00
G	Poa secunda	6	2	-	-	-	.03	-	-	-
G	Sitanion hystrix	b15	b17	b20	a3	a-	.63	.16	.03	-
G	Sporobolus cryptandrus	b19	ab9	ab9	a6	a4	.42	.07	.06	.01
G	Vulpia octoflora (a)	-	a12	b168	a-	a16	.02	1.29	-	.06
Total for Annual Grasses		0	12	168	0	16	0.01	1.29	0	0.06
Total for Perennial Grasses		175	123	138	39	37	5.20	4.15	0.68	1.16
Total for Grasses		175	135	306	39	53	5.22	5.45	0.68	1.22
F	Astragalus sp.	3	-	-	-	-	-	-	-	-
F	Calochortus nuttallii	3	-	6	-	-	-	.01	-	-
F	Comandra pallida	b49	a18	ab44	ab41	ab26	.16	.85	.84	.11
F	Delphinium nuttallianum	-	-	2	-	-	-	.03	-	-
F	Descurainia pinnata (a)	-	a5	b47	a-	b67	.01	.35	-	.32
F	Eriogonum cernuum (a)	a6	b70	a15	a-	b69	.23	.03	-	.13
F	Gilia sp. (a)	-	-	9	-	-	-	.02	-	-
F	Lathyrus brachycalyx	ab65	b74	ab58	a39	ab49	.38	.47	1.50	.67

Type	Species	Nested Frequency					Average Cover %			
		'87	'92	'97	'03	'08	'92	'97	'03	'08
F	Lappula occidentalis (a)	-	-	3	-	-	-	.03	-	-
F	Navarretia intertexta (a)	-	-	-	-	3	-	-	-	.00
F	Penstemon sp.	1	-	-	-	-	-	-	-	-
F	Ranunculus testiculatus (a)	-	-	-	-	3	-	-	-	.00
F	Sphaeralcea parvifolia	1	3	-	-	-	.01	-	-	-
F	Townsendia sp.	-	1	-	-	-	.00	-	-	-
Total for Annual Forbs		6	75	74	0	142	0.24	0.43	0	0.46
Total for Perennial Forbs		122	96	110	80	75	0.55	1.37	2.34	0.79
Total for Forbs		128	171	184	80	217	0.79	1.81	2.34	1.25

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	'08	'92	'97	'03	'08
B	Amelanchier utahensis	8	7	4	8	3.50	2.25	2.64	4.56
B	Artemisia tridentata tridentata	68	59	58	42	19.74	14.50	13.35	9.27
B	Ephedra viridis	0	0	0	1	-	-	-	.00
B	Gutierrezia sarothrae	27	45	13	2	1.37	1.79	.09	.07
B	Juniperus osteosperma	2	2	2	3	.98	.63	.82	2.49
B	Opuntia sp.	0	2	0	1	-	.00	-	.03
B	Purshia tridentata	17	17	19	18	2.87	2.33	2.65	3.98
Total for Browse		122	132	96	75	28.48	21.52	19.56	20.40

CANOPY COVER, LINE INTERCEPT --

Management unit 27 , Study no: 6

Species	Percent Cover	
	'03	'08
Amelanchier utahensis	7.98	8.44
Artemisia tridentata tridentata	7.31	8.86
Ephedra viridis	-	.10
Gutierrezia sarothrae	.13	-
Juniperus osteosperma	1.36	3.73
Purshia tridentata	5.75	6.19

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 27 , Study no: 6

Species	Average leader growth (in)	
	'03	'08
Amelanchier utahensis	5.6	1.5
Artemisia tridentata tridentata	2.1	1.0
Purshia tridentata	6.0	1.7

BASIC COVER --

Management unit 27 , Study no: 6

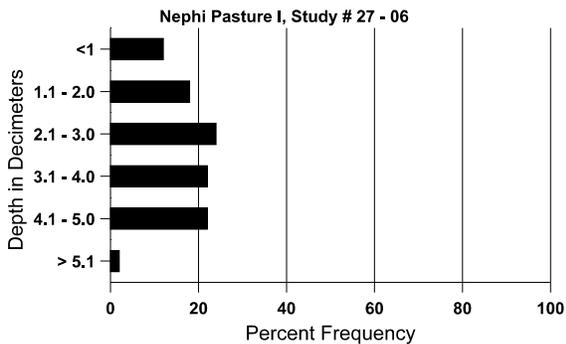
Cover Type	Average Cover %				
	'87	'92	'97	'03	'08
Vegetation	8.00	33.87	29.81	21.84	23.17
Rock	.50	1.13	.27	.59	.25
Pavement	2.00	0	.73	.88	.31
Litter	60.50	48.39	43.54	47.32	53.90
Cryptogams	1.00	1.53	1.53	.18	.20
Bare Ground	28.00	39.89	34.83	43.46	40.65

SOIL ANALYSIS DATA --

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

Effective rooting depth (in)	Temp °F (depth)	pH	loamy sand			%OM	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
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	'08
Rabbit	48	27	17	73
Deer	30	49	21	24
Cattle	-	1	2	3

Days use per acre (ha)	
'03	'08
-	-
72 (177)	43 (106)
9 (22)	3 (7)

BROWSE CHARACTERISTICS --

Management unit 27 , Study no: 6

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>												
87	66	-	-	66	-	-	0	100	0	-	0	55/59
92	500	40	440	40	20	-	8	0	4	4	36	-/-
97	300	-	200	100	-	-	7	0	0	-	0	95/111
03	100	-	-	100	-	20	0	20	0	-	0	86/80
08	540	-	260	260	20	-	0	4	4	-	0	100/111
<i>Artemisia tridentata tridentata</i>												
87	3464	1066	466	1399	1599	-	27	10	46	3	25	44/32
92	3000	20	240	1220	1540	-	31	.66	51	3	8	-/-
97	2100	40	60	1200	840	1180	18	7	40	29	32	39/47
03	1620	-	-	140	1480	1180	15	2	91	47	47	36/39
08	1200	20	-	300	900	1840	25	20	75	48	52	44/49
<i>Ceratoides lanata</i>												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	13/13
08	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Ephedra viridis</i>												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	40/46
08	20	-	-	20	-	-	100	0	-	-	0	55/67

		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>Gutierrezia sarothrae</i>												
87	1399	66	266	1133	-	-	0	0	0	-	0	8/10
92	1480	340	220	1220	40	-	3	1	3	-	0	-/-
97	3500	-	120	3380	-	40	0	0	0	-	0	11/10
03	320	-	-	320	-	20	0	0	0	-	0	7/9
08	40	-	20	20	-	40	0	0	0	-	0	4/5
<i>Juniperus osteosperma</i>												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
92	40	-	20	20	-	-	0	0	-	-	0	-/-
97	40	-	-	40	-	-	0	0	-	-	0	-/-
03	40	-	-	40	-	-	0	0	-	-	0	-/-
08	60	-	-	60	-	-	0	0	-	-	0	-/-
<i>Opuntia sp.</i>												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
97	40	-	20	20	-	-	0	0	-	-	0	3/7
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	20	-	-	20	-	-	0	0	-	-	0	2/3
<i>Purshia tridentata</i>												
87	199	-	66	133	-	-	100	0	0	-	0	31/22
92	540	340	60	300	180	-	52	19	33	-	4	-/-
97	460	-	20	260	180	-	52	26	39	17	17	30/49
03	620	-	-	500	120	60	32	68	19	6	6	33/49
08	620	-	80	420	120	140	19	3	19	3	3	34/57
<i>Yucca sp.</i>												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	59/74
08	0	-	-	-	-	-	0	0	-	-	0	53/44