

Trend Study 27R-4-08

Study site name: Nephi Pasture Total Enclosure .

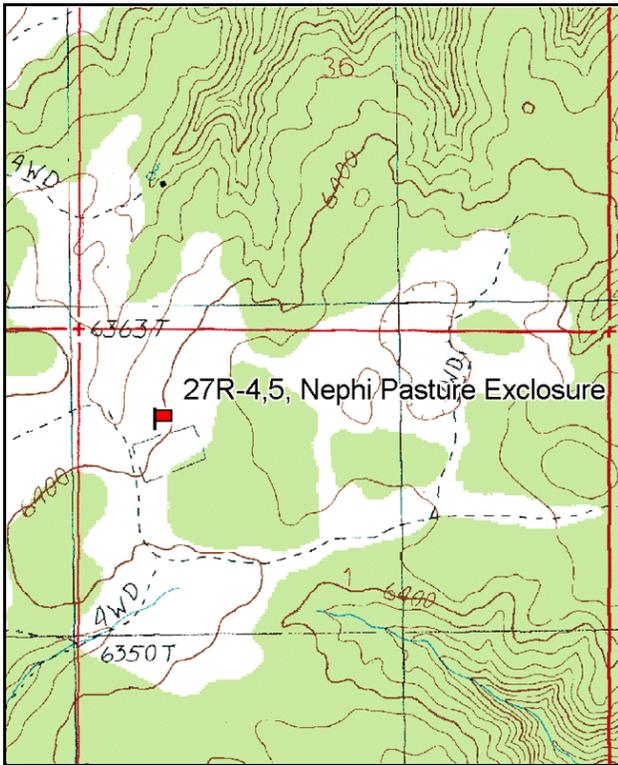
Vegetation type: P-J/ Big Sagebrush .

Compass bearing: frequency baseline 142 degrees magnetic.

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

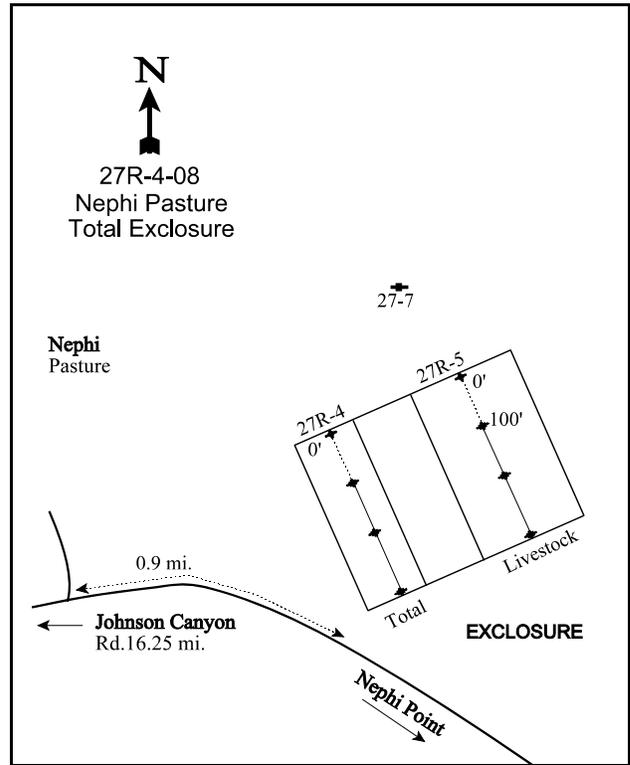
LOCATION DESCRIPTION

From Kanab, take US 89 east for 9.4 miles to Johnson Canyon. Travel north up Johnson Canyon 9.75 miles to the Lock Ridge-Nephi Pasture road. Turn right and go 16.25 miles (see 27-6-03 for more detail) on the main road to a major intersection in Nephi Pasture. Continue straight towards Nephi Point, going 0.9 miles to an enclosure. From the northwest corner of the enclosure, count up five posts to the 0 foot baseline on the inside of the enclosure. The baseline runs at 142 degrees magnetic.



Map Name: Nephi Point

Township 42S, Range 4W, Section 1



Diagrammatic Sketch

GPS: NAD 83, UTM 12S 394135 E, 4116780 N

DISCUSSION

Nephi Pasture Total Exclosure - Trend Study No. 27R-4

Study Information

The Nephi Pasture exclosure complex was built in the 1960's and is found approximately 20 miles northeast of Kanab [elevation: 6,400 feet (1,950 m), slope: 11%-13%, aspect: northwest]. This transect was established inside the total exclosure in 1998 as part of a three-way comparison between the different exclosure grazing treatments; no grazing in the total exclosure, wildlife use in the livestock exclosure, and open to all grazing animals outside the exclosure. The area supports a mixed shrub community with a scattered overstory of pinyon pine (*Pinus edulis*) and Utah juniper trees (*Juniperus osteosperma*). Deer generally utilize the area at high levels during the winter. The total exclosure is supposed to exclude all animals, but due to a hole in the fence, some deer had gotten into the exclosure prior to both the 1998 and 2003 surveys, and had moderately hedged many of the preferred shrubs.

Soil

Soils inside the exclosure are very deep, sandy loam in texture, and moderately acidic (pH 5.9). Effective rooting depth was estimated at almost 23 inches in 1998. Phosphorus is low on the site at 8.2 ppm and may have marginal availability for plant growth. Potassium may be limiting to plant growth at 25.6 ppm (Tiedemann and Lopez 2004). There is virtually no rock or pavement on the surface or within the soil profile. Relative combined vegetation and litter cover was high with a range of 68%-71% from 1998 to 2008. Relative bare ground cover was 20% in 1998, increasing to 30% in 2003, and decreasing to 25% in 2008. The soil erosion condition was classified as stable in 2003 and 2008.

Browse

The total exclosure supports a moderately dense stand of basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) with a population that numbered 2,820 plants/acre in 1998, declining to 1,780 plants/acre in 2003, and 1,500 plants/acre in 2008. An increase in the number of dead individuals as well as a decline in young recruitment resulted in a population decrease in 2003 and 2008. Decadence in sagebrush has been high with an average of 62% over the three sample years. Plants displaying poor vigor was high in 1998 at 46%, declining to 18% in 2003, and increasing again to 31% in 2008. Antelope bitterbrush (*Purshia tridentata*) density has averaged around 850 plants/acre over the three sample years. Young bitterbrush made up 20% of the population in 1998, but none were sampled in 2003 or 2008. Bitterbrush decadence has increased steadily over the study going from 2% in 1998, increasing to 30% in 2003, and 63% in 2008. Vigor was normal throughout the population in all three surveys. A few large serviceberry (*Amelanchier utahensis*) are present inside the total exclosure, but in far lower numbers compared to the livestock exclosure and outside.

Herbaceous Understory

The herbaceous understory was moderately productive in 1998 providing 17% cover. Diversity is only fair however, and cheatgrass (*Bromus tectorum*) accounted for over half of the total. With drought in 2003, the grass component virtually disappeared and produced less than 1% cover. Cheatgrass was not sampled in 2003, and the three most abundant perennial grasses, western wheatgrass (*Agropyron smithii*), Sandberg bluegrass (*Poa secunda*), and needle-and-thread (*Stipa comata*), all had lower nested frequency values from 1998. Grasses decreased to almost nonexistent in 2008 producing less than 0.05% of the total cover. The forb component was dominated by bastard toadflax (*Comandra pallida*) in 1998, 2003, and 2008.

1998 DESIRABLE COMPONENTS INDEX

winter range condition (DCI) - poor (46) Mid-level potential scale

2003 TREND ASSESSMENT

Trend for browse is down. Basin big sagebrush has a lower density, decreased reproduction, and a large

increase in the number of dead plants in the population. Although decadence improved, it still remains high at 54%. Bitterbrush also showed a population decline due to the increase in dead plants and less young in 2003. Bitterbrush decadence increased to 30% in 2003, but vigor remains mostly normal. Trend for the grasses is down. With drought conditions in 2003, grasses virtually disappeared. Cheatgrass was by far the most abundant herbaceous species in 1998, but was not sampled at all in 2003. Western wheatgrass, Sandberg bluegrass, and needle-and-thread all had lower nested frequency values in 2003. Trend for forbs is slightly down. Sum of nested frequency of perennial forbs decreased by 15% from 1999. Bastard toadflax was the only abundant forb in either 1998 or 2003 and it declined significantly. All of these downward trends are likely due to the dry precipitation cycle that southern Utah was in prior to, and including the 2003 survey.

winter range condition (DCI) - very poor-poor (35) Mid-level potential scale
browse - down (-2) grass - down (-2) forb - slightly down (-1)

2008 TREND ASSESSMENT

Trend for browse is slightly down. The density of the primary browse species, basin big sagebrush, decreased slightly to 1,500 plants/acre. Sagebrush decadence increased from 54% in 2003 to 69%, and plants displaying poor vigor increased from 18% in 2003 to 31%. There was an increase in the number of dead sagebrush plants sampled, but recruitment of young plants has remained low. Bitterbrush density increased slightly to 860 plants/acre, but decadence also increased from 30% in 2003 to 63%. Serviceberry density has steadily declined from 1998 to a current density of 40 plants/acre. Serviceberry decadence has also increased steadily to 50%. Trend for grasses is down. With the continued drought, grasses were almost nonexistent on the site and the dominant species were cheatgrass and sixweeks fescue (*Vulpia octoflora*), both annuals and both rare on the site. Trend for forbs is slightly up. The sum of nested frequency of perennial forbs increased and the frequency of the dominant forb species, bastard toadflax, increased significantly.

winter range condition (DCI) - very poor (33) Mid-level potential scale
browse - slightly down (-1) grass - down (-2) forb - slightly up (+1)

HERBACEOUS TRENDS --
Management unit 27R, Study no: 4

Type	Species	Nested Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
G	Agropyron smithii	b ₅₆	b ₂₉	a ⁻	.76	.26	-
G	Agropyron spicatum	2	-	-	.03	-	-
G	Bromus tectorum (a)	b ₃₂₁	a ⁻	a ₇	7.44	-	.01
G	Oryzopsis hymenoides	3	6	-	.18	.23	-
G	Poa secunda	b ₃₇	a ₈	a ₁	.43	.05	.00
G	Sitanion hystrix	8	-	1	.04	-	.00
G	Sporobolus cryptandrus	3	5	-	.06	.03	-
G	Stipa comata	b ₆₀	a ₁₂	a ₂	1.92	.27	.00
G	Vulpia octoflora (a)	b ₁₄₄	a ⁻	a ₁₁	1.41	-	.02
Total for Annual Grasses		465	0	18	8.85	0	0.03
Total for Perennial Grasses		169	60	4	3.44	0.85	0.01
Total for Grasses		634	60	22	12.29	0.85	0.04

Type	Species	Nested Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
		F	Calochortus nuttallii	a-	b11	a-	-
F	Comandra pallida	b167	a132	b179	3.32	2.77	4.65
F	Collinsia parviflora (a)	-	-	3	-	-	.00
F	Descurainia pinnata (a)	a11	a-	b68	.07	-	.72
F	Eriogonum cernuum (a)	a5	a-	b35	.03	-	.10
F	Erigeron sp.	6	-	-	.06	-	-
F	Eriogonum racemosum	-	8	-	-	.04	-
F	Euphorbia sp.	-	-	13	-	-	.02
F	Gilia sp. (a)	-	b42	a2	-	1.23	.00
F	Lappula occidentalis (a)	-	-	6	-	-	.02
F	Lupinus sp.	5	-	-	.18	.15	-
F	Microsteris gracilis (a)	6	6	-	.03	.04	-
F	Penstemon sp.	-	-	2	-	-	.01
F	Phlox austromontana	4	5	-	.03	.04	-
F	Plantago patagonica (a)	b66	a1	a16	.76	.00	.04
F	Polygonum douglasii (a)	a3	a-	b25	.00	-	.06
F	Sphaeralcea coccinea	1	-	1	.00	-	.00
Total for Annual Forbs		91	49	155	0.90	1.27	0.95
Total for Perennial Forbs		183	156	195	3.60	3.06	4.69
Total for Forbs		274	205	350	4.51	4.34	5.65

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

BROWSE TRENDS --

Management unit 27R, Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
		B	Amelanchier utahensis	4	3	2	1.03
B	Artemisia tridentata tridentata	73	54	48	10.35	7.36	8.64
B	Gutierrezia sarothrae	35	2	1	1.42	.15	.00
B	Juniperus osteosperma	2	3	3	.00	.63	2.00
B	Opuntia sp.	1	0	0	.03	-	-
B	Purshia tridentata	30	27	27	7.90	6.50	7.02
Total for Browse		145	89	81	20.73	18.40	20.80

CANOPY COVER, LINE INTERCEPT --
 Management unit 27R, Study no: 4

Species		
	'03	'08
Amelanchier utahensis	5.36	4.31
Artemisia tridentata tridentata	8.63	11.94
Gutierrezia sarothrae	.06	-
Juniperus osteosperma	.98	3.95
Purshia tridentata	5.80	8.35

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 27R, Study no: 4

Species	Average leader growth (in)	
	'03	'08
Amelanchier utahensis	5.5	3.3
Artemisia tridentata tridentata	2.0	1.8
Purshia tridentata	4.0	3.9

BASIC COVER --
 Management unit 27R, Study no: 4

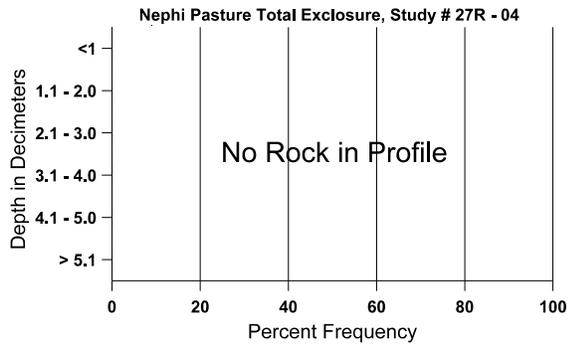
Cover Type	Average Cover %		
	'98	'03	'08
Vegetation	41.18	23.88	27.64
Rock	0	0	.04
Pavement	.01	0	.12
Litter	41.79	54.27	59.02
Cryptogams	11.46	2.98	2.63
Bare Ground	23.23	34.92	29.29

SOIL ANALYSIS DATA --

Management unit 27R, Study no: 4, Study Name: Nephi Pasture Total Exclosure

Effective rooting depth (in)	Temp °F (depth)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
			%sand	%silt	%clay				
22.7	68.8 (17.7)	5.9	74.2	18.0	7.8	0.7	8.2	25.6	0.4

Stoniness Index



PELLET GROUP DATA --

Management unit 27R, Study no: 4

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	14	31	88
Elk	1	-	-
Deer	22	14	10

BROWSE CHARACTERISTICS --
Management unit 27R, Study no: 4

		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)
Amelanchier utahensis												
98	80	-	20	40	20	-	0	0	25	-	0	88/103
03	60	-	-	40	20	20	33	0	33	-	0	84/90
08	40	-	-	20	20	-	0	0	50	-	0	83/87
Artemisia tridentata tridentata												
98	2820	-	340	680	1800	2020	32	0	64	46	46	32/37
03	1780	-	-	820	960	3680	2	0	54	18	18	35/37
08	1500	360	80	380	1040	4660	8	1	69	23	31	40/43
Cercocarpus montanus												
98	0	-	-	-	-	-	0	0	-	-	0	39/49
03	0	-	-	-	-	-	0	0	-	-	0	52/41
08	0	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
98	1580	-	80	1460	40	20	0	0	3	3	3	10/11
03	60	-	-	60	-	-	0	0	0	-	0	11/12
08	20	-	20	-	-	20	0	0	0	-	0	-/-
Juniperus osteosperma												
98	40	-	40	-	-	-	0	0	-	-	0	-/-
03	60	-	20	40	-	-	0	0	-	-	0	-/-
08	60	-	20	40	-	-	0	0	-	-	0	-/-
Opuntia sp.												
98	20	-	-	-	20	-	0	0	100	100	100	-/-
03	0	-	-	-	-	-	0	0	0	-	0	-/-
08	0	-	-	-	-	-	0	0	0	-	0	-/-
Purshia tridentata												
98	920	-	180	720	20	60	28	0	2	2	2	35/51
03	740	-	-	520	220	320	14	5	30	3	3	33/53
08	860	-	-	320	540	160	21	0	63	7	14	32/50