

TWO WATER WMA - TREND STUDY NO. 10R-4-10

Vegetation Type: Black Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: Semidesert Shallow Loam (Utah Juniper-Pinyon), R034XY233UT

Land Ownership: BLM

Elevation: 6300 ft. (1921 m)

Aspect: North

Slope: 3-5%

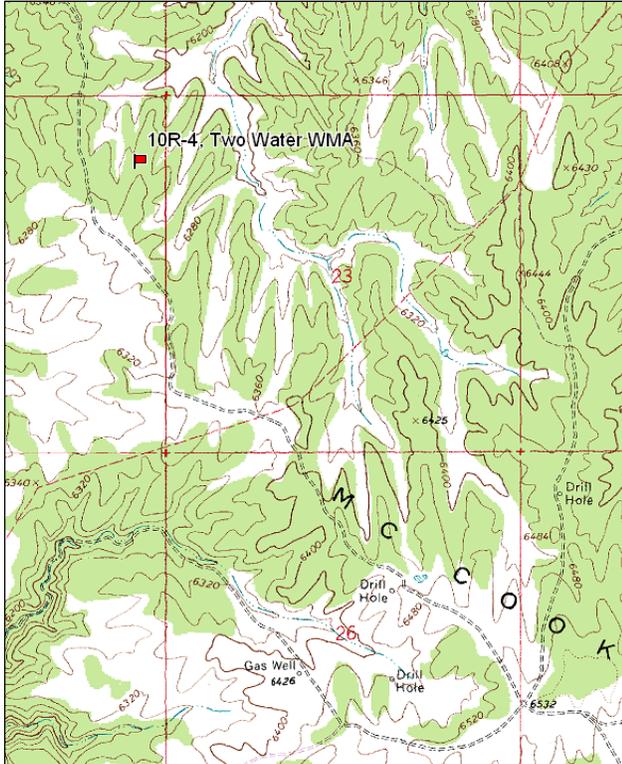
Transect bearing: 162° magnetic

Belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Belt 2 rebar at 5ft., belt 5 rebar at 10ft.

Directions:

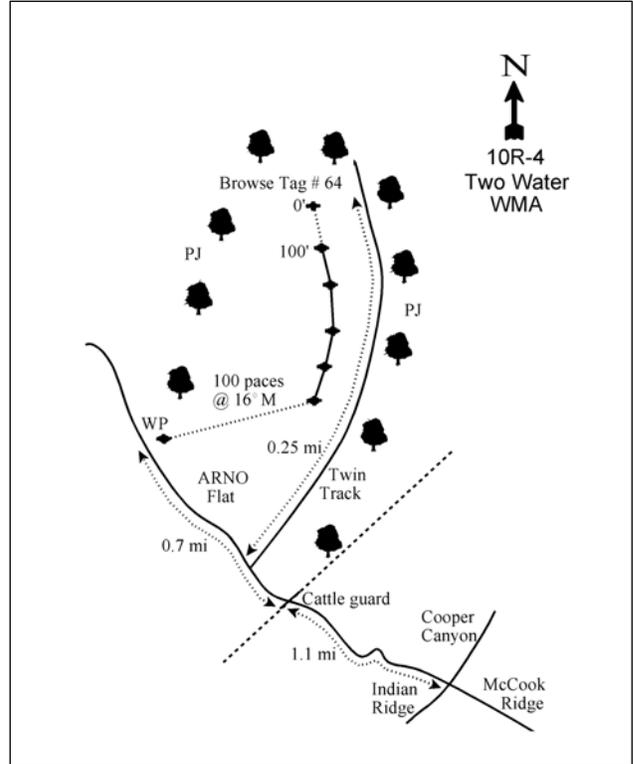
From the intersection of Cooper Canyon, Indian Ridge and McCook Ridge go northwest on McCook Ridge road. Travel 1.1 miles to a cattle guard. Go 0.7 miles past the cattle guard to a sage brush flat on the right and a witness post. The 500-foot stake is 100 paces into the sagebrush flat at an azimuth of 16°M. It is also possible to reach the site by taking the two track road on the east side of the chaining 0.25 miles to the 0-foot stake. The 0-foot stake is marked with browse tag #64.

Map Name: Cooper Canyon



Township: 13S Range: 23E Section: 22

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 643974 E 4393205 N

TWO WATER WMA - TREND STUDY NO. 10R-4

Site Information

Site Description: This study is located on a black sagebrush (*Artemisia nova*) flat just outside of the Two Water Wildlife Management Area. The site is surrounded by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands about 1/4 of a mile from a main road. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Olsen Amp allotment. Pellet group transect data has shown fluctuating use of wildlife. Estimated deer use was heavy in 2000 and 2010, and moderate in 2005. Estimated elk use was light in 2000, moderately heavy in 2005 and no elk sign was sampled in 2010. It was noted in 2010 that the majority of pellets were sampled on the west side of the transect, farther from the road. Estimated cattle use has been light since 2005 (Table - Pellet Group Data).

Browse: The dominant browse on the flat is black sagebrush, which provides the majority of the browse cover on the site (Table - Browse Trends). Other preferred browse includes winterfat (*Ceratoides lanata*), shadscale (*Atriplex confertifolia*) and fringed sage (*Artemisia frigida*). The black sagebrush population is mostly mature with low decadence and good vigor. Recruitment of young black sagebrush plants has been moderate to good, and utilization has been moderate to heavy with the heaviest use in 2010. Winterfat has a low growth form of only 8 to 10 inches in height with moderate to heavy use. Shadscale are widely scattered on the site and have shown moderate to heavy use. Fringed sagebrush density decreased substantially in 2005, and utilization has been mostly light (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are fairly diverse and have increased in cover each sample year since 1997. Cheatgrass (*Bromus tectorum*) was the most dominant grass species at the outset of the study in 1997, but cheatgrass nested frequency and cover decreased substantially in 2000 and has remained low. The most common perennial grasses are needle-and-thread (*Stipa comata*), bottlebrush squirreltail (*Sitanion hystrix*), galleta (*Hilaria jamesii*), blue grama (*Bouteloua gracilis*) and Indian ricegrass (*Oryzopsis hymenoides*). Thickspike wheatgrass (*Agropyron dasystachyum*) and bluebunch wheatgrass (*A. spicatum*) were also sampled, but only occasionally. Forbs are fairly diverse, but not particularly abundant. Scarlet globemallow (*Sphaeralcea coccinea*) is the most common forb, but cover of perennial forbs has only been about 1% with each reading (Table - Herbaceous Trends). Most of the forbs are found within the protective cover of black sagebrush canopies.

Soil: The soil is a clay loam texture with a neutral soil reaction (pH 7.25). Phosphorus may have limited availability for plant growth and development at 3.6 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). The soil surface is cracked, indicating shrink-swell potential. Bare ground cover is moderate with a fairly high amount of pavement and cryptogams (Table - Basic Cover). Most cryptogams were found around the base of black sagebrush plants. The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1997 to 2000 - up (+2):** There was a 60% increase in the density of the primary browse black sagebrush from 13,260 plants/acre to 21,180 plants/acre, and cover increased slightly from 20% to 21%. Decadence of black sagebrush has increased slightly from 5% to 12%. Recruitment of young sagebrush plants decreased, but remained good at 14%.
- **2000 to 2005 - stable (0):** The density of sagebrush decreased by 5%, though density remains very high at 20,180 plants/acre. Cover of black sagebrush increased slightly to 23%. Decadence increased to 23% and recruitment decreased to 6%.
- **2005 to 2010 - slightly down (-1):** Black sagebrush density decreased 18% to 16,460 plants/acre, and cover decreased to 20%. However, decadence decreased to 8% and recruitment of young sagebrush plants remained similar.

Grass:

- **1997 to 2000 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 12%, though cover increased slightly. Cheatgrass decreased significantly in nested frequency and cover decreased from 4% to less than 1%.
- **2000 to 2005 - stable (0):** There was little change in the sum of nested frequency of perennial grasses and cover increased slightly.
- **2005 to 2010 - stable (0):** The sum of nested frequency of perennial grasses changed little, though cover increased from 6% to 12% with a large increase in the cover of needle-and-thread.

Forb:

- **1997 to 2000 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 22%, but forbs were already fairly rare.
- **2000 to 2005 - stable (0):** There was little change in perennial forb sum of nested frequency or cover.
- **2005 to 2010 - stable (0):** There was little change in perennial forb sum of nested frequency or cover.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

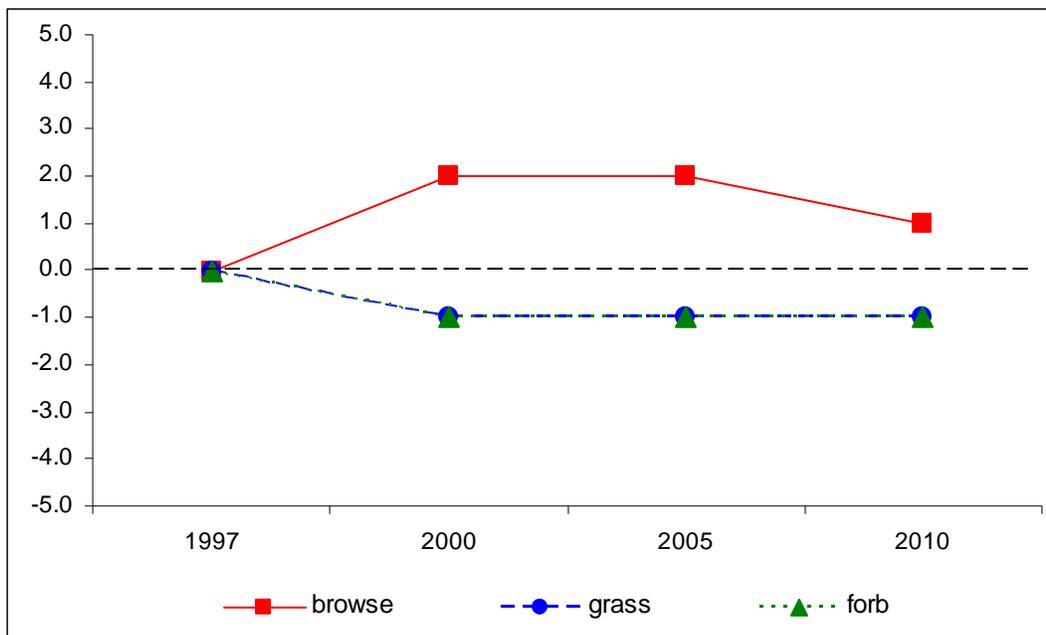
Management unit 10R, study no: 4

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
97	28.8	13.4	10.5	10.6	-3.0	1.6	0.0	62.0	Good
00	29.9	11.2	6.6	11.8	-0.1	1.8	0.0	61.2	Good
05	30.0	8.6	2.8	12.7	0.0	2.0	0.0	56.2	Good
10	26.8	12.8	3.6	23.8	0.0	2.5	0.0	69.4	Excellent

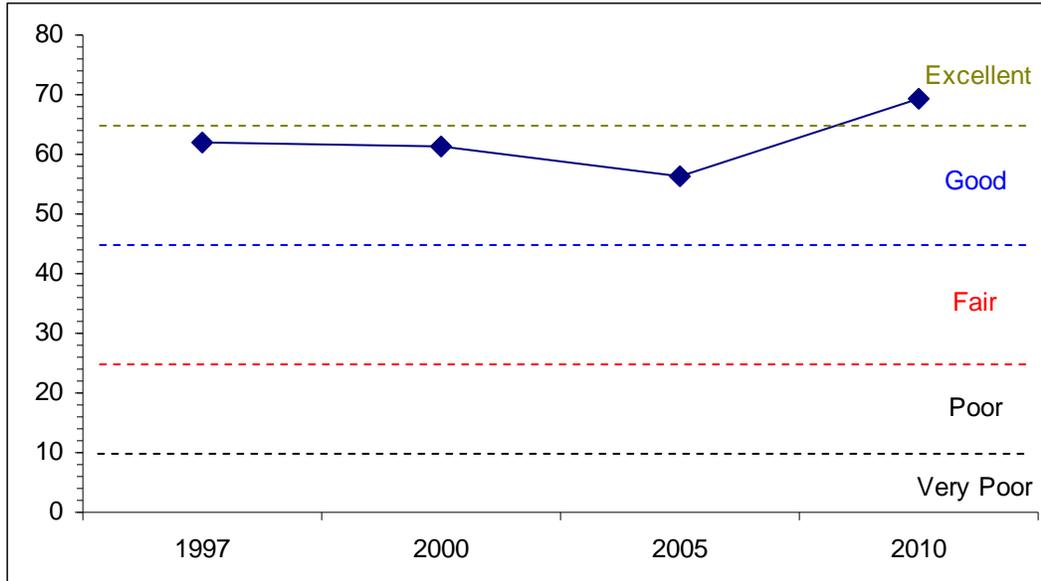
Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 10R, Study no: 4



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
 Management unit 10R, Study no: 4



HERBACEOUS TRENDS--
 Management unit 10R, Study no: 4

Type	Species	Nested Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
G	<i>Agropyron dasystachyum</i>	6	2	4	2	.06	.03	.00	.00
G	<i>Agropyron spicatum</i>	13	5	13	12	.36	.30	.37	.31
G	<i>Bouteloua gracilis</i>	a-	b25	b40	b43	-	.31	1.02	1.43
G	<i>Bromus tectorum</i> (a)	b215	a28	a10	a14	4.02	.11	.03	.02
G	<i>Hilaria jamesii</i>	b75	ab46	a43	a32	1.10	.82	.71	1.00
G	<i>Oryzopsis hymenoides</i>	b64	a34	b53	a18	.91	.51	.73	.62
G	<i>Sitanion hystrix</i>	b84	b92	a52	ab61	.87	1.02	.59	1.12
G	<i>Stipa comata</i>	a92	a90	a110	b146	2.01	2.87	2.92	7.40
Total for Annual Grasses		215	28	10	14	4.02	0.11	0.03	0.01
Total for Perennial Grasses		334	294	315	314	5.32	5.89	6.37	11.89
Total for Grasses		549	322	325	328	9.35	6.01	6.40	11.92
F	<i>Alyssum alyssoides</i> (a)	6	-	-	-	.01	-	-	-
F	<i>Castilleja</i> sp.	4	-	1	3	.01	-	.00	.00
F	<i>Cryptantha</i> sp.	b10	a-	b9	ab3	.13	-	.10	.00
F	<i>Descurainia pinnata</i> (a)	b32	a6	b33	a-	.10	.01	.33	-
F	<i>Draba</i> sp. (a)	a-	a-	b11	a-	-	-	.02	-
F	<i>Erigeron</i> sp.	3	-	2	-	.03	-	.00	-
F	<i>Lappula occidentalis</i> (a)	b69	a12	b59	b73	.40	.17	1.02	.21
F	<i>Leucelele ericoides</i>	-	-	-	2	-	-	-	.03
F	<i>Linum lewisii</i>	-	-	1	-	-	-	.03	-
F	<i>Machaeranthera grindelioides</i>	-	1	-	-	-	.03	-	-
F	<i>Navarretia intertexta</i> (a)	5	-	2	-	.01	-	.01	-
F	<i>Penstemon</i> sp.	2	-	-	-	.03	-	-	-
F	<i>Schoenrambe linifolia</i>	4	2	-	8	.03	.00	-	.07

Type	Species	Nested Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
F	<i>Sphaeralcea coccinea</i>	100	85	77	72	.57	.82	.84	1.12
F	<i>Townsendia incana</i>	-	8	4	6	-	.04	.04	.01
F	<i>Tragopogon dubius</i>	2	2	-	-	.00	.00	-	-
F	Unknown forb-annual (a)	9	-	-	-	.01	-	-	-
Total for Annual Forbs		121	18	105	73	0.53	0.18	1.39	0.21
Total for Perennial Forbs		125	98	94	94	0.82	0.90	1.02	1.24
Total for Forbs		246	116	199	167	1.36	1.08	2.42	1.45

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

BROWSE TRENDS--

Management unit 10R, Study no: 4

Type	Species	Strip Frequency				Average Cover %			
		'97	'00	'05	'10	'97	'00	'05	'10
B	<i>Artemisia frigida</i>	28	31	12	18	.62	1.00	.19	.54
B	<i>Artemisia nova</i>	92	96	96	98	19.72	21.10	22.46	19.69
B	<i>Atriplex confertifolia</i>	34	32	26	19	.85	.79	.34	.27
B	<i>Ceratoides lanata</i>	71	57	73	67	2.12	1.41	2.23	1.12
B	<i>Gutierrezia sarothrae</i>	12	3	12	16	-	.01	.19	.04
B	<i>Opuntia</i> sp.	2	3	3	1	-	-	.03	-
B	<i>Pediocactus simpsonii</i>	1	1	3	1	.00	.00	-	.00
Total for Browse		240	223	225	220	23.32	24.31	25.44	21.68

CANOPY COVER, LINE INTERCEPT--

Management unit 10R, Study no: 4

Species	Percent Cover	
	'05	'10
<i>Artemisia frigida</i>	.28	.25
<i>Artemisia nova</i>	23.54	23.73
<i>Atriplex confertifolia</i>	.20	.25
<i>Ceratoides lanata</i>	1.98	1.28
<i>Gutierrezia sarothrae</i>	.10	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 10R, Study no: 4

Species	Average leader growth (in)	
	'05	'10
<i>Artemisia nova</i>	1.3	.8
<i>Ceratoides lanata</i>	3.8	2.4

BASIC COVER--

Management unit 10R, Study no: 4

Cover Type	Average Cover %			
	'97	'00	'05	'10
Vegetation	28.09	33.27	30.62	38.26
Rock	5.72	5.38	3.32	2.11
Pavement	13.89	10.66	24.53	11.82
Litter	21.39	21.67	14.10	28.55
Cryptogams	6.80	7.54	6.41	5.26
Bare Ground	23.37	31.45	29.30	33.25

SOIL ANALYSIS DATA --

Management unit 10R, Study no: 4, Study Name: Two Water WMA

Effective rooting depth (in)	pH	clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.5	7.3	25.6	37.8	36.6	2.0	3.6	198.4	0.7

PELLET GROUP DATA--

Management unit 10R, Study no: 4

Type	Quadrat Frequency				Days use per acre (ha)			
	'97	'00	'05	'10	'97	'00	'05	'10
Rabbit	8	14	55	3	-	-	-	-
Elk	11	9	11	7	13 (32)	5 (12)	44 (109)	-
Deer	33	32	43	22	33 (82)	60 (148)	29 (73)	57 (141)
Cattle	-	1	-	-	1 (2)	-	2 (5)	2 (4)

BROWSE CHARACTERISTICS--

Management unit 10R, Study no: 4

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Artemisia frigida										
97	1800	14	86	-	-	0	0	0	10/10	
00	2000	23	77	-	20	2	0	0	4/7	
05	380	11	89	-	100	5	0	0	9/12	
10	760	11	89	-	-	3	0	8	8/10	
Artemisia nova										
97	13260	23	72	5	420	28	2	.30	8/17	
00	21180	14	75	12	260	51	10	3	6/15	
05	20180	6	72	23	80	40	3	7	8/17	
10	16460	7	85	8	980	30	41	5	8/16	
Atriplex confertifolia										
97	880	7	68	25	-	16	14	16	16/16	
00	860	0	65	35	-	42	0	21	14/16	
05	600	0	50	50	-	20	7	37	17/16	
10	480	8	83	8	20	4	0	8	16/16	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Ceratoides lanata</i>										
97	4060	10	89	1	60	22	3	.49	10/10	
00	2960	0	82	18	-	35	7	11	8/8	
05	3520	2	97	1	20	33	51	.56	9/9	
10	2800	7	92	1	20	31	14	2	9/9	
<i>Gutierrezia sarothrae</i>										
97	280	7	93	0	-	0	0	0	8/6	
00	100	0	100	0	-	0	0	0	2/3	
05	400	0	100	0	-	0	0	0	7/7	
10	680	15	82	3	-	0	0	3	5/4	
<i>Opuntia sp.</i>										
97	60	0	100	-	-	0	0	0	5/9	
00	140	0	100	-	-	0	0	0	2/5	
05	100	0	100	-	-	0	0	0	4/10	
10	20	0	100	-	-	0	0	0	4/6	
<i>Pediocactus simpsonii</i>										
97	20	100	0	-	-	0	0	0	-/-	
00	20	0	100	-	-	0	0	0	-/-	
05	60	0	100	-	-	0	0	0	1/2	
10	20	0	100	-	-	0	0	0	-/-	