

Vegetation Monitoring Davidson Mesa – East Louisville, Colorado

2019 Report

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Vegetation Monitoring of Davidson Mesa - East Louisville, Colorado

INTRODUCTION

Quantitative vegetation sample plots have been established as part of the monitoring program to help guide management decisions at the Davidson Mesa – East property. It is anticipated that fire will be used as a management tool for the existing vegetation and before- and after-fire data will aid in the evaluation and monitoring of management efforts.

An initial site visit determined that the vegetation had distinct units that would be best to sample separately. The area was mapped to define the location and extent of these units and samples were subjectively assigned to the different units. The intent was to properly represent the quantitative vegetation cover as well as the inherent diversity among and within the mapped vegetation units. Ten vegetation units were mapped and the unvegetated trail and dog park were also mapped.

Note: the property boundaries were not fully surveyed so some adjustment of the boundaries was made to more closely line up with the aerial orthophotography. The acreages are estimates and not exact.

The twenty samples at the Davidson Mesa - East site are shown in Figure 1. The transect origin (start) and end are represented by a star and the approximate transect location and orientation are attached to the stars. The sample ID includes the sample number with an “s” that indicates the start end of the transect. The vegetation units are described in the Results section of this report.

These data were collected as a component of a comparison study of changes over time following a fire management treatment. A second post-fire sampling is anticipated for 2020.

METHODS

Vegetation mapping was conducted using a WAAS enabled GPS unit and ESRI Collector with horizontal accuracy of about 1 to 2 meters. Vegetation boundaries were determined on the ground and recorded by walking the boundaries while recording with the GPS unit.

Vegetation cover and species density data were collected at each transect location. Two photographs were taken at each sample, with one photograph taken at the origin as well as the end of each transect, and oriented along the transect. Sampling for all samples occurred July 23 - 31, 2019.

The starting and end points of each transect were recorded with a GPS unit, and the slope and aspect of the start point and the transect orientation relative to the start point were also recorded. Aluminum endcap survey markers on a 1-foot piece of rebar were installed at each start and end point to enable future sampling at that same location. The survey markers were driven into the soil with only the top 1 inch visible at the surface. The survey markers were stamped with the word “Ecotone” and the sample number with an “s” suffix for the start point and an “e” for the end point. Grey fiberglass rods were also installed at the start and end points to facilitate sample location recovery. The rods are about 1 meter tall. These rods are not highly visible until you are about 10 meters away.

Foliar cover data were collected as point-intercept data, using the Cover-Point optical scope along a 50 meter transect. Point data were collected at each meter, with one point at 0.5m from the center line on both sides of the transect for a total of 100 points (2 points at each meter x 50 meters). Data were recorded as first-hit and second-hit data for vegetation and standing dead plant material; and ground cover hits were recorded separately for bare soil, rock and litter. The first hit data were the first vertical points hit by cross hairs, and the second hit data were the second vertical hits on a different species. First hit data are a record of top canopy. To calculate the total cover of any particular species, the top canopy (1st hit) and the 2nd hit data are combined. Rock was considered to be any inorganic material greater than 1 cm. in diameter. Standing dead was considered to be any organic material that was still standing and was produced in the previous growing seasons. When possible, the standing dead material was recorded to species.

Species density data were collected in a 2-meter x 50-meter plot that was centered on the 50 meters transect. Any species that occurred within the plot was recorded. The final density value is presented as the number of species per 100 sq. m.

Plant species nomenclature follows Weber & Wittmann 1992 (with 1999 addenda).

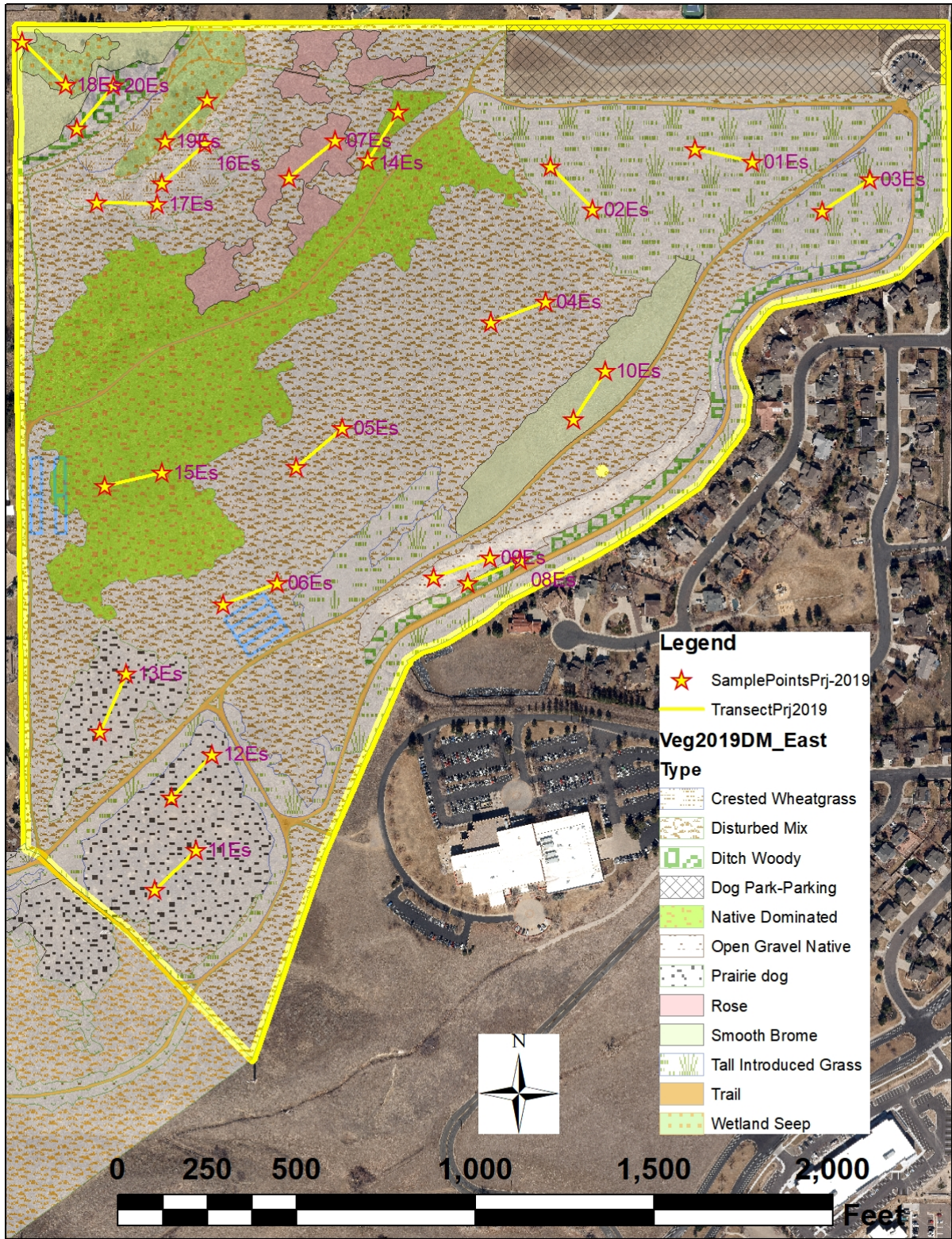


Figure 1. Project Location – Davidson Mesa - East - 2019.

RESULTS

The combined sample data with summary information are presented in Table 1 (16 pages). This table also provides the complete list of species from all 20 samples. The Vegetation Type-specific data are presented separately with more complete descriptions in the Discussion section. The letter P in the cover data indicates that a species was present within the 2m x 50m plot but did not have a hit. Numbers in parentheses indicate second hits.

Average cover is presented as the average 1st hit cover of a species, growth form, and sample, averaged over all 20 samples. Frequency is the number of times a species or growth form occurred divided by the total number of samples (i.e., 20 samples). Relative vegetation cover is the total cover of a species or growth form divided by the total vegetation cover. The sum of all the relative vegetation cover for all species for a particular plot is always 100%. “Average Vegetation Cover – All” is the calculation of Average Cover including second hits. “Relative Vegetation Cover – All” is the calculation of Relative Vegetation Cover including second hits.

Figure 2 provides the total vegetation cover results summarized in a bar graph. Figure 3 provides the relative cover by lifeform for all of the transects. Figure 4 provides the species density by lifeform for all of the transects.

Ten distinct vegetation types were mapped and sampled. The trail area and dog park and parking lot were also mapped but not sampled. The mapped units and acreages were:

Vegetation/Map Type	Acres	# Samples
Disturbed Mix - DX	40.70	3
Tall Introduced Grass - TIG	16.91	3
Native Dominated - ND	14.23	2
Prairie dog - PD	7.14	3
Smooth Brome - SB	4.21	1
Ditch Woody - DW	2.69	2
Rose - ROSE	2.55	1
Wetland Seep - WS	2.01	2
Crested Wheatgrass - CW	1.89	2
Open Gravel Native - OGN	1.88	1
Trail	3.18	0
Dog Park-Parking	5.58	0
Grand Total	102.98	20

The climate as well as site specific disturbance events were likely contributors to current vegetation cover and composition. Figure 5 provides an estimate of the climatic changes over time using Thornthwaite climate diagrams that present the average monthly temperatures (blue line), precipitation (blue dashed fill), and potential evapotranspiration (red fill). These climate data were collected at Boulder, but probably provide a reasonable estimate of conditions at the Louisville sample sites although site specific weather events can be highly variable. The long-

term diagram shows that there are typically wet springs followed by drier summers where evapotranspiration exceeds precipitation from about mid-May to July.

The duration of soil saturation and the frequency and intensity of precipitation events can play a significant part in species composition.

The truncated end of the 2019 Thornthwaite climate diagram reflects the data that are not yet reported for November and December of this year.

Sample site specifications and notes are presented in Table 2. Photographs are presented in Appendix A.

Table 1. All Cover Data 2019 (20 Samples)

PLANT SPECIES			AVERAGE COVER	FREQUENCY	RELATIVE VEGETATION COVER	AVERAGE COVER-ALL	RELATIVE VEGETATION COVER-ALL
Scientific Name	Synonym	Common Name	(%)	(%)	(%)	(%)	(%)
NATIVE ANNUAL & BIENNIAL FORBS							
<i>Chenopodium incanum</i>		MEALY GOOSEFOOT	0.50	10.00	0.76	0.50	0.65
<i>Cirsium undulatum</i>		WAVYLEAF THISTLE	0.05	25.00	0.08	0.05	0.06
<i>Collomia linearis</i>		LINEARLEAF COLLOMIA	0.00	5.00	0.00	0.00	0.00
<i>Cryptantha minima</i>		LITTLE CRYPTANTHA	0.00	5.00	0.00	0.00	0.00
<i>Descurainia incana</i>		RICHARDSON TANSYMUSTARD	0.00	5.00	0.00	0.00	0.00
<i>Descurainia pinnata</i>		PINNATE TANSYMUSTARD	0.10	15.00	0.15	0.10	0.13
<i>Erigeron divergens</i>		SPREADING FLEABANE	0.00	10.00	0.00	0.00	0.00
<i>Grindelia squarrosa</i>		GUMWEED	0.05	40.00	0.08	0.05	0.06
<i>Hedeoma hispidum</i>		ROUGH FALSEPENNYROYAL	0.00	10.00	0.00	0.00	0.00
<i>Helianthus annuus</i>		COMMON SUNFLOWER	0.00	10.00	0.00	0.00	0.00
<i>Oenothera villosa ssp. strigosa</i>	OENOTHERA STRIGOSA	HAIRY EVENINGPRIMROSE	0.30	5.00	0.45	0.35	0.45
<i>Oligosporus pacificus</i>		FIELD SAGEWORT	0.00	5.00	0.00	0.00	0.00
<i>Plantago patagonica</i>		WOOLLY PLANTAIN	0.00	15.00	0.00	0.00	0.00
<i>Pterogonum alatum</i>	ERIOGONUM ALATUM	WINGED BUCKWHEAT	0.00	5.00	0.00	0.00	0.00
<i>Silene antirrhina</i>		SLEEPY CATCHFLY	0.00	15.00	0.00	0.00	0.00
TOTAL NATIVE ANN. & BIEN. FORBS			1.0	70.0	1.5	1.1	1.4
INTRODUCED ANNUAL & BIENNIAL FORBS							
<i>Acosta diffusa</i>	CENTAUREA DIFFUSA	TUMBLE KNAPWEED	0.10	25.00	0.15	0.10	0.13
<i>Alyssum alyssoides</i>		ALYSSUM	1.10	60.00	1.66	1.35	1.74
<i>Bassia sieversiana</i>	KOCHIA SCOPARIA, K. SIEVERSIANA	BURNING-BUSH	0.00	5.00	0.00	0.00	0.00
<i>Carduus nutans ssp. macrolepis</i>		MUSK THISTLE	0.05	25.00	0.08	0.05	0.06
<i>Chenopodium album</i>		LAMB'S QUARTERS	0.00	5.00	0.00	0.00	0.00
<i>Conyza canadensis</i>		HORSEWEED	0.00	10.00	0.00	0.00	0.00
<i>Descurainia sophia</i>		FLIXWEED TANSYMUSTARD	0.00	5.00	0.00	0.00	0.00
<i>Erodium cicutarium</i>		FILAREE	0.00	10.00	0.00	0.00	0.00
<i>Lactuca serriola</i>		PRICKLY LETTUCE	0.20	65.00	0.30	0.20	0.26
<i>Lappula redowskii</i>		EARLY STICKSEED	0.05	20.00	0.08	0.05	0.06
<i>Melilotus albus</i>	MELILOTUS ALBA	WHITE SWEET-CLOVER	0.00	15.00	0.00	0.00	0.00
<i>Melilotus officinale</i>	MELILOTUS OFFICINALIS	YELLOW SWEETCLOVER	2.35	20.00	3.55	2.50	3.23
<i>Neolepia campestris</i>	LEPIDIUM CAMPESTRE	FIELD PEPPERWEED	0.00	10.00	0.00	0.00	0.00
<i>Onopordum acanthium</i>		SCOTCH THISTLE	0.15	15.00	0.23	0.15	0.19
<i>Podospermum laciniatum</i>	SCORZONERA LACINIATUM	FALSE SALSIFY	0.00	20.00	0.00	0.00	0.00
<i>Salsola australis</i>	SALSOLA IBERICA, KOCHIA IBERICA, S. KALLI, S. PESTIFER	RUSSIAN THISTLE	0.00	5.00	0.00	0.00	0.00
<i>Salsola collina</i>		RUSSIAN THISTLE	3.45	30.00	5.21	3.75	4.84
<i>Sisymbrium altissimum</i>		JIM HILL MUSTARD	0.05	30.00	0.08	0.05	0.06
<i>Solanum triflorum</i>		NIGHTSHADE	0.35	20.00	0.53	0.45	0.58
<i>Tragopogon dubius ssp. major</i>		YELLOW SALSIFY	0.25	65.00	0.38	0.30	0.39
<i>Verbascum blattaria</i>		MOTH MULLEIN	0.00	5.00	0.00	0.00	0.00
<i>Verbascum thapsus</i>		MULLEIN	0.95	55.00	1.44	1.10	1.42
<i>Ximenesia encelioides</i>	VERBESINA ENCELIoidES	COWPEN DAISY	0.30	10.00	0.45	0.30	0.39
TOTAL INTRO. ANN. & BIEN. FORBS			9.4	95.0	14.1	10.4	13.4
NATIVE ANNUAL GRASSES							
<i>Vulpia octoflora</i>	FESTUCA OCTOFLORA	SIX-WEEKS FESCUE	0.10	5.00	0.15	0.10	0.13
TOTAL NATIVE ANN. GRASSES			0.1	5.0	0.2	0.1	0.1
INTRODUCED ANNUAL GRASSES							
<i>Anisantha tectorum</i>	BROMUS TECTORUM	CHEATGRASS	2.95	45.00	4.46	3.05	3.94
<i>Bromus japonicus</i>		JAPANESE BROME	0.90	25.00	1.36	1.10	1.42
TOTAL INTRO. ANN. GRASSES			3.9	60.0	5.8	4.2	5.4

P = present

(#) = numbers in parentheses are second hits.

Table 1. All Cover Data 2019 (20 Samples)

PLANT SPECIES			AVERAGE COVER	FREQUENCY	RELATIVE VEGETATION COVER	AVERAGE COVER-ALL	RELATIVE VEGETATION COVER-ALL
Scientific Name	Synonym	Common Name	(%)	(%)	(%)	(%)	(%)
NATIVE PERENNIAL FORBS							
<i>Adenolinum lewisii</i>	LINUM LEWISII	BLUE FLAX	0.00	10.00	0.00	0.00	0.00
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>		WESTERN RAGWEED	0.20	35.00	0.30	0.20	0.26
<i>Aphyllon fasciculatum</i>	OROBANCHE FASCICULATA	PURPLE BROOMRAPE	0.00	10.00	0.00	0.00	0.00
<i>Apocynum cannabinum</i>	APOCYNUM SIBIRICUM	INDIAN HEMP	0.05	5.00	0.08	0.10	0.13
<i>Argemone polyanthemus</i>		PRICKLY POPPY	0.15	15.00	0.23	0.15	0.19
<i>Artemisia frigida</i>		FRINGED SAGE	1.95	55.00	2.95	2.30	2.97
<i>Artemisia ludoviciana</i>		PASTURE SAGE	0.00	5.00	0.00	0.00	0.00
<i>Asclepias speciosa</i>		SHOWY MILKWEED	0.10	5.00	0.15	0.10	0.13
<i>Astragalus shortianus</i>		SHORT'S MILKVETCH	0.00	5.00	0.00	0.00	0.00
<i>Calylophus serrulatus</i>		YELLOW SUNDROPS	0.00	5.00	0.00	0.00	0.00
<i>Castilleja sessiliflora</i>	CASTILLEJA GRANDIFLORA	LARGEFLOWERED PAINTBRUSH	0.00	5.00	0.00	0.00	0.00
<i>Comandra umbellata</i> ssp. <i>pallida</i>		BASTARD TOADFLAX	0.00	5.00	0.00	0.00	0.00
<i>Dalea purpurea</i>		VIOLET PRAIRIE CLOVER	0.00	15.00	0.00	0.00	0.00
<i>Epilobium ciliatum</i>		CILIATE WILLOW HERB	0.60	5.00	0.91	1.40	1.81
<i>Erigeron colo-mexicanus</i>		FLEABANE	0.05	5.00	0.08	0.05	0.06
<i>Evolvulus nuttallianus</i>	EVOLVULUS PILOSUS (ARGENTUS)	SHAGGY DWARF MORNING-GLORY	0.00	5.00	0.00	0.00	0.00
<i>Gaillardia aristata</i>		BLANKETFLOWER	0.00	5.00	0.00	0.00	0.00
<i>Gaura coccinea</i>		GAURA	0.00	20.00	0.00	0.00	0.00
<i>Geum macrophyllum</i>		LARGE-LEAVED AVENS	0.15	5.00	0.23	0.25	0.32
<i>Glycyrrhiza lepidota</i>		WILD LICORICE	0.15	15.00	0.23	0.15	0.19
<i>Helianthus pumilus</i>		SUNFLOWER	0.00	5.00	0.00	0.00	0.00
<i>Heterotheca villosa</i>	HETEROTHECA HORRIDA, CHRYSOPSIS VILLOSA	HAIRY GOLDEN ASTER	1.50	35.00	2.27	1.80	2.33
<i>Liatis punctata</i>		GAYFEATHER	0.00	20.00	0.00	0.00	0.00
<i>Lygodesmia juncea</i>		SKELETONWEED	0.00	5.00	0.00	0.00	0.00
<i>Oenothera howardii</i>	OENOTHERA BRACHYCARPA, OENOTHERA JAMESII	HOWARD EVENINGPRIMROSE	0.00	5.00	0.00	0.00	0.00
<i>Oligosporus dracunculus</i> ssp. <i>glaucus</i>	ARTEMISIA DRACUNCULUS SPP. GLAUCUS	WILD TARRAGON	0.20	15.00	0.30	0.25	0.32
<i>Orophaca tridactylca</i>		FOOTHILL MILKVETCH	0.00	5.00	0.00	0.00	0.00
<i>Oxybaphus linearis</i>	MIRABILIS LINEARIS	UMBRELLAWORT	0.00	15.00	0.00	0.00	0.00
<i>Psoralidium tenuiflorum</i>	PSORALEA TENUIFLORA	PRAIRIE SCURFPEA	0.35	55.00	0.53	0.50	0.65
<i>Ratibida columnifera</i>		PRAIRIE CONEFLOWER	0.00	15.00	0.00	0.00	0.00
<i>Rumex altissimus</i>	RUMEX BRITANNICA	DOCK	0.00	10.00	0.00	0.00	0.00
<i>Senecio spartioides</i>		BROOM GROUNSEL	0.05	25.00	0.08	0.05	0.06
<i>Sphaeralcea coccinea</i>		COPPER MALLOW	0.00	15.00	0.00	0.00	0.00
<i>Thelesperma megapotamicum</i>		GREENTHREAD	0.10	25.00	0.15	0.10	0.13
<i>Virgulus falcatus</i>	ASTER FALATUS, ASTER COMMUTATUS	WHITE PRAIRIE ASTER	0.40	35.00	0.60	0.55	0.71
TOTAL NATIVE PERENNIAL FORBS			6.0	100.0	9.1	8.0	10.3
INTRODUCED PERENNIAL FORBS							
<i>Breca arvensis</i>	CIRSIIUM ARVENSE	CANADA THISTLE	0.80	30.00	1.21	1.00	1.29
<i>Convolvulus arvensis</i>		FIELD BINDWEED	1.60	55.00	2.42	2.05	2.65
<i>Hypericum perforatum</i>		KLAMATH WEED	0.00	15.00	0.00	0.00	0.00
<i>Linaria genistifolia</i> ssp. <i>dalmatica</i>	LINARIA DALMATICA	DALMATION TOADFLAX	0.10	5.00	0.15	0.10	0.13
<i>Marrubium vulgare</i>		HOREHOUND	0.00	15.00	0.00	0.00	0.00
<i>Medicago sativa</i>		ALFALFA	0.45	20.00	0.68	0.45	0.58
<i>Nepeta cataria</i>		CATNIP	0.05	5.00	0.08	0.25	0.32
<i>Taraxacum officinale</i>		COMMON DANDELION	0.00	5.00	0.00	0.00	0.00
<i>Verbena bracteata</i>		VERVAIN	0.05	10.00	0.08	0.05	0.06
TOTAL INTRO. PERENNIAL FORBS			3.1	80.0	4.6	3.9	5.0

P = present

(#) = numbers in parentheses are second hits.

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PLANT SPECIES			AVERAGE COVER	FREQUENCY	RELATIVE VEGETATION COVER	AVERAGE COVER-ALL	RELATIVE VEGETATION COVER-ALL
Scientific Name	Synonym	Common Name	(%)	(%)	(%)	(%)	(%)
NATIVE PERENNIAL GRASSES (cool)							
<i>Carex pensylvanica ssp. heliophila</i>	CAREX HELIOPHILA	SUN SEDGE	0.85	20.00	1.28	1.35	1.74
<i>Carex praegracilis</i>		BLACKCREEPER SEDGE	0.65	5.00	0.98	0.65	0.84
<i>Eleocharis macrostachya</i>	ELEOCHARIS PALUSTRIS	CREEPING SPIKERUSH	0.45	5.00	0.68	0.80	1.03
<i>Elymus elymoides</i>	SITANION HYSTRIX	BOTTLEBRUSH SQUIRRELTAIL	0.40	20.00	0.60	0.40	0.52
<i>Elymus lanceolatus</i>	AGROPYRON LANCEOLATUM,A. DASYSTACHYMA,ALBICANS,A. RIP	THICKSPIKE WHEATGRASS	4.20	40.00	6.34	4.40	5.68
<i>Hesperostipa comata</i>	STIPA COMATA	NEEDLE-AND-THREAD GRASS	0.50	40.00	0.76	0.50	0.65
<i>Juncus arcticus ssp. ater</i>	JUNCUS BALTICUS,J. ATER	BALTIC RUSH	2.95	10.00	4.46	4.00	5.17
<i>Koeleria macrantha</i>	KOELERIA CRISTATA,K. PYRAMIDATA,K.GRACILIS	JUNEGRASS	0.05	5.00	0.08	0.10	0.13
<i>Schoenoplectus pungens</i>	SCIRPUS AMERICANUS	THREE SQUARE	0.25	5.00	0.38	0.30	0.39
<i>Typha latifolia</i>		BROADLEAF CATTAIL	0.50	5.00	0.76	0.50	0.65
TOTAL NATIVE PERENNIAL GRASSES (c)			10.8	65.0	16.3	13.0	16.8
INTRODUCED PERENNIAL GRASSES (cool)							
<i>Agropyron desertorum</i>	AGROPYRON CRISTATUM SSP. DESERTORUM	DESERT WHEATGRASS	9.25	40.00	13.97	11.00	14.21
<i>Alopecurus pratensis</i>		MEADOW FOXTAIL	0.00	5.00	0.00	0.00	0.00
<i>Bromopsis inermis</i>	BROMUS INERMIS	SMOOTH BROME	3.95	45.00	5.97	4.05	5.23
<i>Dactylis glomerata</i>		ORCHARD GRASS	0.00	5.00	0.00	0.05	0.06
<i>Elytrigia repens</i>	AGROPYRON REPENS	QUACKGRASS	0.05	5.00	0.08	0.15	0.19
<i>Festuca pratensis</i>		MEADOW FESCUE	0.50	10.00	0.76	0.75	0.97
<i>Poa compressa</i>		CANADA BLUEGRASS	1.35	20.00	2.04	1.40	1.81
<i>Poa pratensis</i>		KENTUCKY BLUEGRASS	4.90	40.00	7.40	6.15	7.95
<i>Thinopyrum intermedium</i>	AGROPYRON INTERMEDIUM	INTERMEDIATE WHEATGRASS	4.00	35.00	6.04	4.40	5.68
TOTAL INTRO. PERENNIAL GRASSES (c)			24.0	80.0	36.3	28.0	36.1
NATIVE PERENNIAL GRASSES (warm)							
<i>Andropogon gerardii</i>		BIG BLUESTEM -- TURKEYFOOT	0.50	30.00	0.76	0.50	0.65
<i>Aristida purpurea</i>	ARISTIDA FENDLERIANA,A. LONGISETA,A. WRIGHTII	PURPLE THREE-AWN	0.75	25.00	1.13	0.90	1.16
<i>Bouteloua curtipendula</i>		SIDEOATS GRAMA	0.30	10.00	0.45	0.45	0.58
<i>Buchloe dactyloides</i>		BUFFALOGRASS	0.05	10.00	0.08	0.05	0.06
<i>Chondrosium gracile</i>	BOUTELOUA GRACILIS	BLUE GRAMA GRASS	0.40	15.00	0.60	0.45	0.58
<i>Schizachyrium scoparium</i>	ANDROPOGON SCOPARIUM	LITTLE BLUESTEM	0.10	10.00	0.15	0.10	0.13
<i>Sporobolus cryptandrus</i>		SAND DROPSEED	0.20	15.00	0.30	0.20	0.26
TOTAL NATIVE PERENNIAL GRASSES (w)			2.3	55.0	3.5	2.7	3.4
NATIVE SUBSHRUBS							
<i>Gutierrezia sarothrae</i>		BROOM SNAKEWEED	0.15	15.00	0.23	0.15	0.19
TOTAL NATIVE SUBSHRUBS			0.2	15.0	0.2	0.2	0.2
NATIVE SHRUBS							
<i>Amorpha fruticosa var. angustifolia</i>		INDIGOBUSH LEADPLANT	0.80	5.00	1.21	0.90	1.16
<i>Eriogonum effusum</i>		WILD BUCKWHEAT	0.00	20.00	0.00	0.00	0.00
<i>Padus virginiana ssp. melanocarpa</i>	PRUNUS VIRGINIANA SSP. MELANOCARPA	CHOCHECHERRY	0.00	5.00	0.00	0.00	0.00
<i>Rosa sayi</i>	ROSA ACICULARIS SSP. SAYI	PRICKLY ROSE	1.20	10.00	1.81	1.30	1.68
<i>Rosa woodsii</i>		WOOD'S ROSE	0.00	5.00	0.00	0.00	0.00
<i>Yucca glauca</i>		SPANISH BAYONET	0.45	40.00	0.68	0.55	0.71
TOTAL NATIVE SHRUBS			2.5	55.0	3.7	2.8	3.6
INTRODUCED SHRUBS							
<i>Viburnum lantana</i>		WAFARING TREE	0.00	5.00	0.00	0.05	0.06
TOTAL INTRODUCED SHRUBS			0.0	5.0	0.0	0.1	0.1

P = present

(#) = numbers in parentheses are second hits.

Table 1. All Cover Data 2019 (20 Samples)

PLANT SPECIES			AVERAGE COVER	FREQUENCY	RELATIVE VEGETATION COVER	AVERAGE COVER-ALL	RELATIVE VEGETATION COVER-ALL
Scientific Name	Synonym	Common Name	(%)	(%)	(%)	(%)	(%)
NATIVE TREES							
<i>Populus angustifolia</i>		NARROWLEAF COTTONWOOD	1.00	5.00	1.51	1.00	1.29
<i>Populus deltoides ssp. monilifera</i>	POPULUS SARGENTII	PLAINS COTTONWOOD	1.75	10.00	2.64	1.75	2.26
<i>Sabina scopulorum</i>	JUNIPERUS SCOPULORUM	ROCKY MOUNTAIN JUNIPER	0.25	5.00	0.38	0.40	0.52
TOTAL NATIVE TREES			3.0	10.0	4.5	3.2	4.1
INTRODUCED TREES							
<i>Malus spp.</i>		APPLE	0.10	5.00	0.15	0.10	0.13
TOTAL INTRODUCED TREES			0.1	5.0	0.2	0.1	0.1
SUCCULENT							
<i>Opuntia macrorhiza</i>	OPUNTIA COMPRESSA	TWISTPINE PRICKLYPEAR CACTUS	0.05	25.00	0.08	0.05	0.06
<i>Opuntia phaeacantha</i>		NEW MEXICO PRICKLY PEAR CACTUS	0.00	35.00	0.00	0.00	0.00
<i>Opuntia polyacantha</i>		PRICKLYPEAR CACTUS	0.00	5.00	0.00	0.00	0.00
<i>Pediocactus simpsonii</i>		BALL CACTUS	0.00	5.00	0.00	0.05	0.06
TOTAL SUCCULENT			0.1	45.0	0.1	0.1	0.1
LITTER				100.0			
BARE SOIL				45.0			
ROCK				20.0			
TOTALS			100.0			111.2	
TOTAL VEGETATION COVER			66.2 (s=17.1)		100.0	77.4 (s=27.7)	100.0
GROUND COVER (Litter+Rock+Veg+St. Dead)			94.1			105.3	
SPECIES DENSITY (# of species/100 sq.m.)							
(AVERAGE= 21.5 Std.Dev.= 9.9)							

P = present

(#) = numbers in parentheses are second hits.

Table 1. All Cover Data 2019 (20 Samples)

Scientific Name	Synonym	Common Name	Dense Tall Introduced Grass			Disturbed Mix			Rose	Open Gravel Native
			01-DIG	02-DIG	03-DIG	04-DX	05-DX	06-DX	07-Rose	09-OGN
NATIVE ANNUAL & BIENNIAL FORBS										
<i>Chenopodium incanum</i>		MEALY GOOSEFOOT								
<i>Cirsium undulatum</i>		WAVYLEAF THISTLE				P				P
<i>Collomia linearis</i>		LINEARLEAF COLLOMIA								
<i>Cryptantha minima</i>		LITTLE CRYPTANTHA								
<i>Descurainia incana</i>		RICHARDSON TANSYMUSTARD								
<i>Descurainia pinnata</i>		PINNATE TANSYMUSTARD				1	1			
<i>Erigeron divergens</i>		SPREADING FLEABANE	P		P					
<i>Grindelia squarrosa</i>		GUMWEED	P	P	P	1				P
<i>Hedeoma hispidum</i>		ROUGH FALSEPENNYROYAL								
<i>Helianthus annuus</i>		COMMON SUNFLOWER								
<i>Oenothera villosa ssp. strigosa</i>	OENOTHERA STRIGOSA	HAIRY EVENINGPRIMROSE								
<i>Oligosporus pacificus</i>		FIELD SAGEWORT								P
<i>Plantago patagonica</i>		WOOLLY PLANTAIN				P				
<i>Pterogonum alatum</i>	ERIOGONUM ALATUM	WINGED BUCKWHEAT								
<i>Silene antirrhina</i>		SLEEPY CATCHFLY				P			P	
TOTAL NATIVE ANN. & BIEN. FORBS			P	P	P	2	1	---	P	P
INTRODUCED ANNUAL & BIENNIAL FORBS										
<i>Acosta diffusa</i>	CENTAUREA DIFFUSA	TUMBLE KNAPWEED				P				P
<i>Alyssum alyssoides</i>		ALYSSUM	1(2)	4	1	P	P		3	P
<i>Bassia sieversiana</i>	KOCHIA SCOPARIA, K. SIEVERSIANA	BURNING-BUSH								
<i>Carduus nutans ssp. macrolepis</i>		MUSK THISTLE		P						
<i>Chenopodium album</i>		LAMB'S QUARTERS								
<i>Conyza canadensis</i>		HORSEWEED								
<i>Descurainia sophia</i>		FLIXWEED TANSYMUSTARD					P			
<i>Erodium cicutarium</i>		FILAREE					P			
<i>Lactuca serriola</i>		PRICKLY LETTUCE	P	P	P	P	2	1	P	
<i>Lappula redowskii</i>		EARLY STICKSEED				P	1			
<i>Melilotus albus</i>	MELILOTUS ALBA	WHITE SWEET-CLOVER				P				P
<i>Melilotus officinalis</i>	MELILOTUS OFFICINALIS	YELLOW SWEETCLOVER	21(2)	(1)	26					
<i>Neolepia campestris</i>	LEPIDIUM CAMPESTRE	FIELD PEPPERWEED							P	
<i>Onopordum acanthium</i>		SCOTCH THISTLE								
<i>Podospermum laciniatum</i>	SCORZONERA LACINIATUM	FALSE SALSIFY	P	P	P	P				
<i>Salsola australis</i>	SALSOLA IBERICA, KOCHIA IBERICA, S. KALLS. PESTIFER	RUSSIAN THISTLE								
<i>Salsola collina</i>		RUSSIAN THISTLE					11(3)	6(3)		
<i>Sisymbrium altissimum</i>		JIM HILL MUSTARD					1			
<i>Solanum triflorum</i>		NIGHTSHADE					P			
<i>Tragopogon dubius ssp. major</i>		YELLOW SALSIFY	1	P	P	2(1)	1		P	
<i>Verbascum blattaria</i>		MOTH MULLEIN								
<i>Verbascum thapsus</i>		MULLEIN	P			3(1)	1		P	P
<i>Ximenesia encelioides</i>	VERBESINA ENCELIoidES	COWPEN DAISY								
TOTAL INTRO. ANN. & BIEN. FORBS			23(4)	4(1)	27	5(2)	17(3)	7(3)	3	P
NATIVE ANNUAL GRASSES										
<i>Vulpia octoflora</i>	FESTUCA OCTOFLORA	SIX-WEEKS FESCUE								
TOTAL NATIVE ANN. GRASSES			---	---	---	---	---	---	---	---
INTRODUCED ANNUAL GRASSES										
<i>Anisantha tectorum</i>	BROMUS TECTORUM	CHEATGRASS				11	15	5	2	
<i>Bromus japonicus</i>		JAPANESE BROME	4	(1)	4(1)				8(1)	
TOTAL INTRO. ANN. GRASSES			4	(1)	4(1)	11	15	5	10(1)	---

P = present

(#) = numbers in parentheses are second hits.

Table 1. All Cover Data 2019 (20 Samples)

Scientific Name	Synonym	Common Name	Dense Tall Introduced Grass			Disturbed Mix			Rose	Open Gravel Native
			01-DIG	02-DIG	03-DIG	04-DX	05-DX	06-DX	07-Rose	09-OGN
NATIVE PERENNIAL FORBS										
<i>Adenolinum lewisii</i>	LINUM LEWISII	BLUE FLAX				P				
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>		WESTERN RAGWEED				2	P	P		P
<i>Aphyllon fasciculatum</i>	OROBANCHE FASCICULATA	PURPLE BROOMRAPE				P				
<i>Apocynum cannabinum</i>	APOCYNUM SIBIRICUM	INDIAN HEMP								
<i>Argemone polyanthemus</i>		PRICKLY POPPY								
<i>Artemisia frigida</i>		FRINGED SAGE		P	P	17(6)	P			
<i>Artemisia ludoviciana</i>		PASTURE SAGE								
<i>Asclepias speciosa</i>		SHOWY MILKWEED								
<i>Astragalus shortianus</i>		SHORT'S MILKVETCH								P
<i>Calylophus serrulatus</i>		YELLOW SUNDROPS								
<i>Castilleja sessiliflora</i>	CASTILLEJA GRANDIFLORA	LARGEFLOWERED PAINTBRUSH								
<i>Comandra umbellata</i> ssp. <i>pallida</i>		BASTARD TOADFLAX								
<i>Dalea purpurea</i>		VIOLET PRAIRIE CLOVER					P	P		
<i>Epilobium ciliatum</i>		CILIATE WILLOW HERB								
<i>Erigeron colo-mexicanus</i>		FLEABANE	1							
<i>Evolvulus nuttallianus</i>	EVOLVULUS PILOSUS (ARGENTUS)	SHAGGY DWARF MORNING-GLORY								
<i>Gaillardia aristata</i>		BLANKETFLOWER								
<i>Gaura coccinea</i>		GAURA								P
<i>Geum macrophyllum</i>		LARGE-LEAVED AVENS								
<i>Glycyrrhiza lepidota</i>		WILD LICORICE								
<i>Helianthus pumilus</i>		SUNFLOWER				P				
<i>Heterotheca villosa</i>	HETEROTHECA HORRIDA, CHRYSOPSIS VILLOSA	HAIRY GOLDEN ASTER	P			P		P		P
<i>Liatis punctata</i>		GAYFEATHER						P		P
<i>Lygodesmia juncea</i>		SKELETONWEED								
<i>Oenothera howardii</i>	OENOTHERA BRACHYCARPA, OENOTHERA JAMESII	HOWARD EVENINGPRIMROSE								P
<i>Oligosporus dracunculoides</i> ssp. <i>glauca</i>	ARTEMISIA DRACUNCULUS SPP. GLAUCUS	WILD TARRAGON				1(1)				
<i>Orophaca tridactylca</i>		FOOTHILL MILKVETCH								P
<i>Oxybaphus linearis</i>	MIRABILIS LINEARIS	UMBRELLAWORT				P				
<i>Psoraleidium tenuiflorum</i>	PSORALEA TENUIFLORA	PRAIRIE SCURFPEA				P	(1)	P		P
<i>Ratibida columnifera</i>		PRAIRIE CONEFLOWER				P				
<i>Rumex altissimus</i>	RUMEX BRITANNICA	DOCK		P						
<i>Senecio spartioides</i>		BROOM GROUNSEL				P				
<i>Sphaeralcea coccinea</i>		COPPER MALLOW								
<i>Thelesperma megapotamicum</i>		GREENTHREAD						P		1
<i>Virgulus falcatus</i>	ASTER FALATUS, ASTER COMMUTATUS	WHITE PRAIRIE ASTER	P	1	6(3)	P		P		P
TOTAL NATIVE PERENNIAL FORBS			1	1	6(3)	20(7)	(1)	P	P	1
INTRODUCED PERENNIAL FORBS										
<i>Breca arvensis</i>	CIRSIIUM ARVENSE	CANADA THISTLE	P							
<i>Convolvulus arvensis</i>		FIELD BINDWEED		1	3(1)	P		P		P
<i>Hypericum perforatum</i>		KLAMATH WEED								
<i>Linaria genistifolia</i> ssp. <i>dalmatica</i>	LINARIA DALMATICA	DALMATION TOADFLAX				2				
<i>Marrubium vulgare</i>		HOREHOUND				P				
<i>Medicago sativa</i>		ALFALFA	P		8					P
<i>Nepeta cataria</i>		CATNIP								
<i>Taraxacum officinale</i>		COMMON DANDELION	P							
<i>Verbena bracteata</i>		VERVAIN								
TOTAL INTRO. PERENNIAL FORBS			P	1	11(1)	2	---	P	---	P

P = present

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Table 1. All Cover Data 2019 (20 Samples)

Scientific Name	Synonym	Common Name	Dense Tall Introduced Grass			Disturbed Mix			Rose	Open Gravel Native
			01-DIG	02-DIG	03-DIG	04-DX	05-DX	06-DX	07-Rose	09-OGN
NATIVE PERENNIAL GRASSES (cool)										
<i>Carex pennsylvanica ssp. heliophila</i>	CAREX HELIOPHILA	SUN SEDGE				P	2(1)		10(9)	
<i>Carex praegracilis</i>		BLACKCREEPER SEDGE								
<i>Eleocharis macrostachya</i>	ELEOCHARIS PALUSTRIS	CREEPING SPIKERUSH								
<i>Elymus elymoides</i>	SITANION HYSTRIX	BOTTLEBRUSH SQUIRRELTAIL					5	P		
<i>Elymus lanceolatus</i>	AGROPYRON LANCEOLATUM,A. DASYSTACHYM,A. ALBICANS,A. RIP	THICKSPIKE WHEATGRASS				5	12(1)	24		
<i>Hesperostipa comata</i>	STIPA COMATA	NEEDLE-AND-THREAD GRASS				P	2	7	1	P
<i>Juncus arcticus ssp. ater</i>	JUNCUS BALTICUS,J. ATER	BALTIC RUSH								
<i>Koeleria macrantha</i>	KOELERIA CRISTATA,K. PYRAMIDATA,K.GRACILIS	JUNEGRASS								
<i>Schoenoplectus pungens</i>	SCIRPUS AMERICANUS	THREE SQUARE								
<i>Typha latifolia</i>		BROADLEAF CATTAIL								
TOTAL NATIVE PERENNIAL GRASSES (c)			---	---	---	5	16(2)	36	11(9)	P
INTRODUCED PERENNIAL GRASSES (cool)										
<i>Agropyron desertorum</i>	AGROPYRON CRISTATUM SSP. DESERTORUM	DESERT WHEATGRASS				13	5		P	
<i>Alopecurus pratensis</i>		MEADOW FOXTAIL								
<i>Bromopsis inermis</i>	BROMUS INERMIS	SMOOTH BROME	P	10	P	3				1
<i>Dactylis glomerata</i>		ORCHARD GRASS								
<i>Elytrigia repens</i>	AGROPYRON REPENS	QUACKGRASS								
<i>Festuca pratensis</i>		MEADOW FESCUE								
<i>Poa compressa</i>		CANADA BLUEGRASS			1				12	
<i>Poa pratensis</i>		KENTUCKY BLUEGRASS	15(5)	17(3)	3(2)				11(3)	
<i>Thinopyrum intermedium</i>	AGROPYRON INTERMEDIUM	INTERMEDIATE WHEATGRASS	17(1)	20	10(1)					7(1)
TOTAL INTRO. PERENNIAL GRASSES (c)			32(6)	47(3)	14(3)	16	5	---	23(3)	8(1)
NATIVE PERENNIAL GRASSES (warm)										
<i>Andropogon gerardii</i>		BIG BLUESTEM -- TURKEYFOOT	P			1	2	4	1	
<i>Aristida purpurea</i>	ARISTIDA FENDLERIANA,A. LONGISETA,A. WRIGHTII	PURPLE THREE-AWN					2	4(1)		4(1)
<i>Bouteloua curtipendula</i>		SIDE-OATS GRAMA					4(3)	2		
<i>Buchloe dactyloides</i>		BUFFALOGRASS					P			
<i>Chondrosium gracile</i>	BOUPELOUA GRACILIS	BLUE GRAMA GRASS					7(1)	1		
<i>Schizachyrium scoparium</i>	ANDROPOGON SCOPARIUM	LITTLE BLUESTEM						1		
<i>Sporobolus cryptandrus</i>		SAND DROPSEED							P	
TOTAL NATIVE PERENNIAL GRASSES (w)			P	---	---	1	15(4)	12(1)	1	4(1)
NATIVE SUBSHRUBS										
<i>Gutierrezia sarothrae</i>		BROOM SNAKEWEED								3
TOTAL NATIVE SUBSHRUBS			---	---	---	---	---	---	---	3
NATIVE SHRUBS										
<i>Amorpha fruticosa var. angustifolia</i>		INDIGOBUSH LEADPLANT								
<i>Eriogonum effusum</i>		WILD BUCKWHEAT				P			P	
<i>Padus virginiana ssp. melanocarpa</i>	PRUNUS VIRGINIANA SSP. MELANOCARPA	CHOKECHERRY								
<i>Rosa sayi</i>	ROSA ACICULARIS SSP. SAYI	PRICKLY ROSE							24(2)	
<i>Rosa woodsii</i>		WOOD'S ROSE								
<i>Yucca glauca</i>		SPANISH BAYONET				1			P	4(1)
TOTAL NATIVE SHRUBS			---	---	---	1	---	---	24(2)	4(1)
INTRODUCED SHRUBS										
<i>Viburnum lantana</i>		WAFARING TREE								
TOTAL INTRODUCED SHRUBS			---	---	---	---	---	---	---	---

P = present

(#) = numbers in parentheses are second hits.

Table 1. All Cover Data 2019 (20 Samples)

PLANT SPECIES			Dense Tall Introduced Grass			Disturbed Mix			Rose	Open Gravel Native
Scientific Name	Synonym	Common Name	01-DIG	02-DIG	03-DIG	04-DX	05-DX	06-DX	07-Rose	09-OGN
NATIVE TREES										
<i>Populus angustifolia</i>		NARROWLEAF COTTONWOOD								
<i>Populus deltoides ssp. monilifera</i>	POPULUS SARGENTII	PLAINS COTTONWOOD								
<i>Sabina scopulorum</i>	JUNIPERUS SCOPULORUM	ROCKY MOUNTAIN JUNIPER								
TOTAL NATIVE TREES			---	---	---	---	---	---	---	---
INTRODUCED TREES										
<i>Malus spp.</i>		APPLE								
TOTAL INTRODUCED TREES			---	---	---	---	---	---	---	---
SUCCULENT										
<i>Opuntia macrorhiza</i>	OPUNTIA COMPRESSA	TWISTPINE PRICKLYPEAR CACTUS	P	1						
<i>Opuntia phaeacantha</i>		NEW MEXICO PRICKLY PEAR CACTUS		P	P	P	P		P	
<i>Opuntia polyacantha</i>		PRICKLYPEAR CACTUS								
<i>Pediocactus simpsonii</i>		BALL CACTUS								
TOTAL SUCCULENT			P	1	P	P	P	---	P	---
LITTER			40	46	36	36	31	34	28	15
BARE SOIL			---	---	2	---	---	4	---	63
ROCK			---	---	---	1	---	2	---	2
TOTALS			100	100	100	100	100	100	100	100
TOTAL VEGETATION COVER			60(10)	54(5)	62(8)	63(9)	69(10)	60(4)	72(15)	20(3)
GROUND COVER (Litter+Rock+Veg+St. Dead)			100(10)	100(5)	98(8)	100(9)	100(10)	96(4)	100(15)	37(3)
SPECIES DENSITY (# of species/100 sq.m.)			20	17	18	37	26	14	25	24
(AVERAGE= 21.5 Std.Dev.= 9.9)										

P = present

(#) = numbers in parentheses are second hits.

Table 1. All Cover Data 2019 (20 Samples)

PLANT SPECIES

Scientific Name	Synonym	Common Name	Smooth Brome	Prairie dog			Native Disturbed		Crested Wheatgrass	
			10-SB	11-PD	12-PD	13-PD	14-ND	15-ND	16-CW	17-CW
NATIVE ANNUAL & BIENNIAL FORBS										
<i>Chenopodium incanum</i>		MEALY GOOSEFOOT		P	10					
<i>Cirsium undulatum</i>		WAVYLEAF THISTLE		1			P	P		
<i>Collomia linearis</i>		LINEARLEAF COLLOMIA			P					
<i>Cryptantha minima</i>		LITTLE CRYPTANTHA		P						
<i>Descurainia incana</i>		RICHARDSON TANSYMUSTARD					P			
<i>Descurainia pinnata</i>		PINNATE TANSYMUSTARD		P						
<i>Erigeron divergens</i>		SPREADING FLEABANE								
<i>Grindelia squarrosa</i>		GUMWEED	P		P			P		
<i>Hedeoma hispidum</i>		ROUGH FALSEPENNYROYAL		P	P					
<i>Helianthus annuus</i>		COMMON SUNFLOWER		P				P		
<i>Oenothera villosa ssp. strigosa</i>	OENOTHERA STRIGOSA	HAIRY EVENINGPRIMROSE								
<i>Oligosporus pacificus</i>		FIELD SAGEWORT					P			
<i>Plantago patagonica</i>		WOOLLY PLANTAIN			P			P		
<i>Pterogonum alatum</i>	ERIOGONUM ALATUM	WINGED BUCKWHEAT					P			
<i>Silene antirrhina</i>		SLEEPY CATCHFLY			P					
TOTAL NATIVE ANN. & BIEN. FORBS			P	1	10	---	P	P	---	---
INTRODUCED ANNUAL & BIENNIAL FORBS										
<i>Acosta diffusa</i>	CENTAUREA DIFFUSA	TUMBLE KNAPWEED			1			1		
<i>Alyssum alyssoides</i>		ALYSSUM	4(1)				1(1)	8(1)		
<i>Bassia sieversiana</i>	KOCHIA SCOPARIA, K. SIEVERSIANA	BURNING-BUSH			P					
<i>Carduus nutans ssp. macrolepis</i>		MUSK THISTLE		P	P				1	P
<i>Chenopodium album</i>		LAMB'S QUARTERS								
<i>Conyza canadensis</i>		HORSEWEED		P	P					
<i>Descurainia sophia</i>		FLIXWEED TANSYMUSTARD								
<i>Erodium cicutarium</i>		FILAREE			P					
<i>Lactuca serriola</i>		PRICKLY LETTUCE					P	P	1	P
<i>Lappula redowskii</i>		EARLY STICKSEED		P	P					
<i>Melilotus albus</i>	MELILOTUS ALBA	WHITE SWEET-CLOVER	P							
<i>Melilotus officinale</i>	MELILOTUS OFFICINALIS	YELLOW SWEETCLOVER			P					
<i>Neolepia campestris</i>	LEPIDIUM CAMPESTRE	FIELD PEPPERWEED					P			
<i>Onopordum acanthium</i>		SCOTCH THISTLE		2	P			1		
<i>Podospermum laciniatum</i>	SCORZONERA LACINIATIUM	FALSE SALSIFY								
<i>Salsola australis</i>	SALSOLA IBERICA, KOCHIA IBERICA, S. KALLS. PESTIFER	RUSSIAN THISTLE		P						
<i>Salsola collina</i>		RUSSIAN THISTLE		7	16	29		P		
<i>Sisymbrium altissimum</i>		JIM HILL MUSTARD		P	P				P	P
<i>Solanum triflorum</i>		NIGHTSHADE		3(1)	4(1)	P				
<i>Tragopogon dubius ssp. major</i>		YELLOW SALSIFY	P				1	P	P	P
<i>Verbascum blattaria</i>		MOTH MULLEIN						P		
<i>Verbascum thapsus</i>		MULLEIN		11(1)	4(1)		P	P	P	P
<i>Ximenesia encelioides</i>	VERBESINA ENCELIoidES	COWPEN DAISY		5	1					
TOTAL INTRO. ANN. & BIEN. FORBS			4(1)	28(2)	26(2)	29	2(1)	10(1)	2	P
NATIVE ANNUAL GRASSES										
<i>Vulpia octoflora</i>	FESTUCA OCTOFLORA	SIX-WEEKS FESCUE						2		
TOTAL NATIVE ANN. GRASSES			---	---	---	---	---	2	---	---
INTRODUCED ANNUAL GRASSES										
<i>Anisantha tectorum</i>	BROMUS TECTORUM	CHEATGRASS			P	8(1)	P	18(1)		
<i>Bromus japonicus</i>		JAPANESE BROME					2(1)			
TOTAL INTRO. ANN. GRASSES			---	---	P	8(1)	2(1)	18(1)	---	---

P = present

(#) = numbers in parentheses are second hits.

Table 1. All Cover Data 2019 (20 Samples)

PLANT SPECIES

Scientific Name	Synonym	Common Name	Smooth Brome	Prairie dog			Native Disturbed		Crested Wheatgrass	
			10-SB	11-PD	12-PD	13-PD	14-ND	15-ND	16-CW	17-CW
NATIVE PERENNIAL FORBS										
<i>Adenolinum lewisii</i>	LINUM LEWISII	BLUE FLAX						P		
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>		WESTERN RAGWEED					P	P		
<i>Aphyllon fasciculatum</i>	OROBANCHE FASCICULATA	PURPLE BROOMRAPE						P		
<i>Apocynum cannabinum</i>	APOCYNUM SIBIRICUM	INDIAN HEMP							1(1)	
<i>Argemone polyanthemus</i>		PRICKLY POPPY		P		P				3
<i>Artemisia frigida</i>		FRINGED SAGE	P	9(1)	4	P	P	8		
<i>Artemisia ludoviciana</i>		PASTURE SAGE					P			
<i>Asclepias speciosa</i>		SHOWY MILKWEED								
<i>Astragalus shortianus</i>		SHORT'S MILKVETCH								
<i>Calylophus serrulatus</i>		YELLOW SUNDROPS					P			
<i>Castilleja sessiliflora</i>	CASTILLEJA GRANDIFLORA	LARGEFLOWERED PAINTBRUSH					P			
<i>Comandra umbellata</i> ssp. <i>pallida</i>		BASTARD TOADFLAX				P				
<i>Dalea purpurea</i>		VIOLET PRAIRIE CLOVER			P					
<i>Epilobium ciliatum</i>		CILIATE WILLOW HERB								
<i>Erigeron colo-mexicanus</i>		FLEABANE								
<i>Evolvulus nuttallianus</i>	EVOLVULUS PILOSUS (ARGENTEUS)	SHAGGY DWARF MORNING-GLORY			P					
<i>Gaillardia aristata</i>		BLANKETFLOWER						P		
<i>Gaura coccinea</i>		GAURA		P			P	P		
<i>Geum macrophyllum</i>		LARGE-LEAVED AVENS								
<i>Glycyrrhiza lepidota</i>		WILD LICORICE							P	3
<i>Helianthus pumilus</i>		SUNFLOWER								
<i>Heterotheca villosa</i>	HETEROTHECA HORRIDA, CHRYSOPSIS VILLOSA	HAIRY GOLDEN ASTER			P		16(2)	14(4)		
<i>Liatis punctata</i>		GAYFEATHER			P		P			
<i>Lygodesmia juncea</i>		SKELETONWEED								P
<i>Oenothera howardii</i>	OENOTHERA BRACHYCARPA, OENOTHERA JAMESII	HOWARD EVENINGPRIMROSE								
<i>Oligosporus dracunculul</i> ssp. <i>glauca</i>	ARTEMISIA DRACUNCULUS SPP. GLAUCUS	WILD TARRAGON						3		
<i>Orophaca tridactylca</i>		FOOTHILL MILKVETCH								
<i>Oxybaphus linearis</i>	MIRABILIS LINEARIS	UMBRELLAWORT			P		P			
<i>Psoralidium tenuiflorum</i>	PSORALEA TENUIFLORA	PRAIRIE SCURFPEA		P	P	P	P	1	P	6(2)
<i>Ratibida columnifera</i>		PRAIRIE CONEFLOWER			P			P		
<i>Rumex altissimus</i>	RUMEX BRITANNICA	DOCK								
<i>Senecio spartioides</i>		BROOM GROUNDSEL		P			P	1		
<i>Sphaeralcea coccinea</i>		COPPER MALLOW		P	P					
<i>Thelesperma megapotamicum</i>		GREENTHREAD					1	P		
<i>Virgulus falcatus</i>	ASTER FALATUS, ASTER COMMUTATUS	WHITE PRAIRIE ASTER					1	P		
TOTAL NATIVE PERENNIAL FORBS			P	9(1)	4	P	18(2)	27(4)	1(1)	12(2)
INTRODUCED PERENNIAL FORBS										
<i>Breca arvensis</i>	CIRSIIUM ARVENSE	CANADA THISTLE							P	P
<i>Convolvulus arvensis</i>		FIELD BINDWEED	6	11(1)	3(1)	4(2)			P	4(4)
<i>Hypericum perforatum</i>		KLAMATH WEED		P	P			P		
<i>Linaria genistifolia</i> ssp. <i>dalmatica</i>	LINARIA DALMATICA	DALMATION TOADFLAX								
<i>Marrubium vulgare</i>		HOREHOUND		P	P					
<i>Medicago sativa</i>		ALFALFA	1							
<i>Nepeta cataria</i>		CATNIP								
<i>Taraxacum officinale</i>		COMMON DANDELION								
<i>Verbena bracteata</i>		VERVAIN		1	P					
TOTAL INTRO. PERENNIAL FORBS			7	12(1)	3(1)	4(2)	---	P	P	4(4)

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Table 1. All Cover Data 2019 (20 Samples)

PLANT SPECIES

Scientific Name	Synonym	Common Name	Smooth Brome	Prairie dog			Native Disturbed		Crested Wheatgrass	
			10-SB	11-PD	12-PD	13-PD	14-ND	15-ND	16-CW	17-CW
NATIVE PERENNIAL GRASSES (cool)										
<i>Carex pensylvanica ssp. heliophila</i>	CAREX HELIOPHILA	SUN SEDGE					5			
<i>Carex praegracilis</i>		BLACKCREEPER SEDGE								
<i>Eleocharis macrostachya</i>	ELEOCHARIS PALUSTRIS	CREeping SPIKERUSH								
<i>Elymus elymoides</i>	SITANION HYSTRIX	BOTTLEBRUSH SQUIRRELTAIL					P	3		
<i>Elymus lanceolatus</i>	AGROPYRON LANCEOLATUM,A. DASYSTACHYM,A. ALBICANS,A. RIP	THICKSPIKE WHEATGRASS		5	11	22(3)		5		
<i>Hesperostipa comata</i>	STIPA COMATA	NEEDLE-AND-THREAD GRASS					P	P		
<i>Juncus arcticus ssp. ater</i>	JUNCUS BALTICUS,J. ATER	BALTIC RUSH								
<i>Koeleria macrantha</i>	KOELERIA CRISTATA,K. PYRAMIDATA,K.GRACILIS	JUNEGRASS					1(1)			
<i>Schoenoplectus pungens</i>	SCIRPUS AMERICANUS	THREE SQUARE								
<i>Typha latifolia</i>		BROADLEAF CATTAIL								
TOTAL NATIVE PERENNIAL GRASSES (c)			---	5	11	22(3)	6(1)	8	---	---
INTRODUCED PERENNIAL GRASSES (cool)										
<i>Agropyron desertorum</i>	AGROPYRON CRISTATUM SSP. DESERTORUM	DESERT WHEATGRASS	4					1	81(3)	67(7)
<i>Alopecurus pratensis</i>		MEADOW FOXTAIL								
<i>Bromopsis inermis</i>	BROMUS INERMIS	SMOOTH BROME	48(1)							
<i>Dactylis glomerata</i>		ORCHARD GRASS								
<i>Elytrigia repens</i>	AGROPYRON REPENS	QUACKGRASS								
<i>Festuca pratensis</i>		MEADOW FESCUE								
<i>Poa compressa</i>		CANADA BLUEGRASS					14(1)			
<i>Poa pratensis</i>		KENTUCKY BLUEGRASS					19(1)			
<i>Thinopyrum intermedium</i>	AGROPYRON INTERMEDIUM	INTERMEDIATE WHEATGRASS						P		
TOTAL INTRO. PERENNIAL GRASSES (c)			52(1)	---	---	---	33(2)	1	81(3)	67(7)
NATIVE PERENNIAL GRASSES (warm)										
<i>Andropogon gerardii</i>		BIG BLUESTEM -- TURKEYFOOT					2			
<i>Aristida purpurea</i>	ARISTIDA FENDLERIANA,A. LONGISETA,A. WRIGHTII	PURPLE THREE-AWN			2			3(1)		
<i>Bouteloua curtipendula</i>		SIDE-OATS GRAMA								
<i>Buchloe dactyloides</i>		BUFFALOGRASS						1		
<i>Chondrosium gracile</i>	BOUTELLOUA GRACILIS	BLUE GRAMA GRASS			P					
<i>Schizachyrium scoparium</i>	ANDROPOGON SCOPARIUM	LITTLE BLUESTEM					1			
<i>Sporobolus cryptandrus</i>		SAND DROPSEED				P				
TOTAL NATIVE PERENNIAL GRASSES (w)			---	---	2	P	3	4(1)	---	---
NATIVE SUBSHRUBS										
<i>Gutierrezia sarothrae</i>		BROOM SNAKEWEED				P				
TOTAL NATIVE SUBSHRUBS			---	---	P	---	---	---	---	---
NATIVE SHRUBS										
<i>Amorpha fruticosa var. angustifolia</i>		INDIGOBUSH LEADPLANT								
<i>Eriogonum effusum</i>		WILD BUCKWHEAT		P				P		
<i>Padus virginiana ssp. melanocarpa</i>	PRUNUS VIRGINIANA SSP. MELANOCARPA	CHOKECHERRY								
<i>Rosa sayi</i>	ROSA ACICULARIS SSP. SAYI	PRICKLY ROSE								P
<i>Rosa woodsii</i>		WOOD'S ROSE								
<i>Yucca glauca</i>		SPANISH BAYONET		P	P		3(1)	1		
TOTAL NATIVE SHRUBS			---	P	P	---	3(1)	1	---	P
INTRODUCED SHRUBS										
<i>Viburnum lantana</i>		WAFARING TREE								
TOTAL INTRODUCED SHRUBS			---	---	---	---	---	---	---	---

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Table 1. All Cover Data 2019 (20 Samples)

PLANT SPECIES

Scientific Name	Synonym	Common Name	Smooth Brome	Prairie dog			Native Disturbed		Crested Wheatgrass	
			10-SB	11-PD	12-PD	13-PD	14-ND	15-ND	16-CW	17-CW
NATIVE TREES										
<i>Populus angustifolia</i>		NARROWLEAF COTTONWOOD								
<i>Populus deltoides ssp. monilifera</i>	POPULUS SARGENTII	PLAINS COTTONWOOD								
<i>Sabina scopulorum</i>	JUNIPERUS SCOPULORUM	ROCKY MOUNTAIN JUNIPER								
TOTAL NATIVE TREES			---	---	---	---	---	---	---	---
INTRODUCED TREES										
<i>Malus spp.</i>		APPLE								
TOTAL INTRODUCED TREES			---	---	---	---	---	---	---	---
SUCCULENT										
<i>Opuntia macrorhiza</i>	OPUNTIA COMPRESSA	TWISTPINE PRICKLYPEAR CACTUS	P				P			
<i>Opuntia phaeacantha</i>		NEW MEXICO PRICKLY PEAR CACTUS					P			
<i>Opuntia polyacantha</i>		PRICKLYPEAR CACTUS					P			
<i>Pediocactus simpsonii</i>		BALL CACTUS					(1)			
TOTAL SUCCULENT			P	---	---	---	(1)	---	---	---
LITTER										
		LITTER	37	32	32	29	31	28	16	17
BARE SOIL										
		BARE SOIL	---	13	12	8	1	1	---	---
ROCK										
		ROCK	---	---	---	---	1	---	---	---
TOTALS										
TOTALS			100	100	100	100	100	100	100	100
TOTAL VEGETATION COVER			63(2)	55(4)	56(3)	63(6)	67(9)	71(7)	84(4)	83(13)
GROUND COVER (Litter+Rock+Veg+St. Dead)			100(2)	87(4)	88(3)	92(6)	99(9)	99(7)	100(4)	100(13)
SPECIES DENSITY (# of species/100 sq.m.)										
SPECIES DENSITY (# of species/100 sq.m.)			10	29	38	10	37	37	11	13
(AVERAGE= 21.5 Std.Dev.= 9.9)										

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Table 1. All Cover Data 2019 (20 Samples)

PLANT SPECIES

Scientific Name	Synonym	Common Name	Wetland Seep		Ditch Woody	
			18-WS	19-WS	08-Ditch	20-Ditch
NATIVE ANNUAL & BIENNIAL FORBS						
<i>Chenopodium incanum</i>		MEALY GOOSEFOOT				
<i>Cirsium undulatum</i>		WAVYLEAF THISTLE				
<i>Collomia linearis</i>		LINEARLEAF COLLOMIA				
<i>Cryptantha minima</i>		LITTLE CRYPTANTHA				
<i>Descurainia incana</i>		RICHARDSON TANSYMUSTARD				
<i>Descurainia pinnata</i>		PINNATE TANSYMUSTARD				
<i>Erigeron divergens</i>		SPREADING FLEABANE				
<i>Grindelia squarrosa</i>		GUMWEED				
<i>Hedeoma hispidum</i>		ROUGH FALSEPENNYROYAL				
<i>Helianthus annuus</i>		COMMON SUNFLOWER				
<i>Oenothera villosa ssp. strigosa</i>	OENOTHERA STRIGOSA	HAIRY EVENINGPRIMROSE		6(1)		
<i>Oligosporus pacificus</i>		FIELD SAGEWORT			P	
<i>Plantago patagonica</i>		WOOLLY PLANTAIN				
<i>Pterogonum alatum</i>	ERIOGONUM ALATUM	WINGED BUCKWHEAT				
<i>Silene antirrhina</i>		SLEEPY CATCHFLY				
TOTAL NATIVE ANN. & BIEN. FORBS			---	6(1)	P	---
INTRODUCED ANNUAL & BIENNIAL FORBS						
<i>Acosta diffusa</i>	CENTAUREA DIFFUSA	TUMBLE KNAPWEED			P	
<i>Alyssum alyssoides</i>		ALYSSUM			P	P
<i>Bassia sieversiana</i>	KOCHIA SCOPARIA, K. SIEVERSIANA	BURNING-BUSH				
<i>Carduus nutans ssp. macrolepis</i>		MUSK THISTLE				
<i>Chenopodium album</i>		LAMB'S QUARTERS				P
<i>Conyza canadensis</i>		HORSEWEED				
<i>Descurainia sophia</i>		FLIXWEED TANSYMUSTARD				
<i>Erodium cicutarium</i>		FILAREE				
<i>Lactuca serriola</i>		PRICKLY LETTUCE		P		P
<i>Lappula redowskii</i>		EARLY STICKSEED				
<i>Melilotus albus</i>	MELILOTUS ALBA	WHITE SWEET-CLOVER				
<i>Melilotus officinale</i>	MELILOTUS OFFICINALIS	YELLOW SWEETCLOVER				
<i>Neolepia campestris</i>	LEPIDIUM CAMPESTRE	FIELD PEPPERWEED				
<i>Onopordum acanthium</i>		SCOTCH THISTLE				
<i>Podospermum laciniatum</i>	SCORZONERA LACINIATUM	FALSE SALSIFY				
<i>Salsola australis</i>	SALSOLA IBERICA, KOCHIA IBERICA, S. KALLI, S. PESTIFER	RUSSIAN THISTLE				
<i>Salsola collina</i>		RUSSIAN THISTLE				
<i>Sisymbrium altissimum</i>		JIM HILL MUSTARD		P		
<i>Solanum triflorum</i>		NIGHTSHADE				
<i>Tragopogon dubius ssp. major</i>		YELLOW SALSIFY			P	P
<i>Verbascum blattaria</i>		MOTH MULLEIN				
<i>Verbascum thapsus</i>		MULLEIN				
<i>Ximenesia encelioides</i>	VERBESINA ENCELIODES	COWPEN DAISY				
TOTAL INTRO. ANN. & BIEN. FORBS			---	P	P	P
NATIVE ANNUAL GRASSES						
<i>Vulpia octoflora</i>	FESTUCA OCTOFLORA	SIX-WEEKS FESCUE				
TOTAL NATIVE ANN. GRASSES			---	---	---	---
INTRODUCED ANNUAL GRASSES						
<i>Anisantha tectorum</i>	BROMUS TECTORUM	CHEATGRASS			P	
<i>Bromus japonicus</i>		JAPANESE BROME				
TOTAL INTRO. ANN. GRASSES			---	---	P	---

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Table 1. All Cover Data 2019 (20 Samples)

PLANT SPECIES

Scientific Name	Synonym	Common Name	Wetland Seep		Ditch Woody	
			18-WS	19-WS	08-Ditch	20-Ditch
NATIVE PERENNIAL FORBS						
<i>Adenolinum lewisii</i>	LINUM LEWISII	BLUE FLAX				
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>		WESTERN RAGWEED			2	
<i>Aphyllon fasciculatum</i>	OROBANCHE FASCICULATA	PURPLE BROOMRAPE				
<i>Apocynum cannabinum</i>	APOCYNUM SIBIRICUM	INDIAN HEMP				
<i>Argemone polyanthemos</i>		PRICKLY POPPY				
<i>Artemisia frigida</i>		FRINGED SAGE			1	
<i>Artemisia ludoviciana</i>		PASTURE SAGE				
<i>Asclepias speciosa</i>		SHOWY MILKWEED	2			
<i>Astragalus shortianus</i>		SHORT'S MILKVETCH				
<i>Calylophus serrulatus</i>		YELLOW SUNDROPS				
<i>Castilleja sessiliflora</i>	CASTILLEJA GRANDIFLORA	LARGEFLOWERED PAINTBRUSH				
<i>Comandra umbellata</i> ssp. <i>pallida</i>		BASTARD TOADFLAX				
<i>Dalea purpurea</i>		VIOLET PRAIRIE CLOVER				
<i>Epilobium ciliatum</i>		CILIATE WILLOW HERB		12(16)		
<i>Erigeron colo-mexicanus</i>		FLEABANE				
<i>Evolvulus nuttallianus</i>	EVOLVULUS PILOSUS (ARGENTUS)	SHAGGY DWARF MORNING-GLORY				
<i>Gaillardia aristata</i>		BLANKETFLOWER				
<i>Gaura coccinea</i>		GAURA				
<i>Geum macrophyllum</i>		LARGE-LEAVED AVENS		3(2)		
<i>Glycyrrhiza lepidota</i>		WILD LICORICE				P
<i>Helianthus pumilus</i>		SUNFLOWER				
<i>Heterotheca villosa</i>	HETEROTHECA HORRIDA, CHRYSOPSIS VILLOSA	HAIRY GOLDEN ASTER				
<i>Liatis punctata</i>		GAYFEATHER				
<i>Lygodesmia juncea</i>		SKELETONWEED				
<i>Oenothera howardii</i>	OENOTHEA BRACHYCARPA, OENOTHEA JAMESII	HOWARD EVENINGPRIMROSE				
<i>Oligosporus dracuncululus</i> ssp. <i>glauucus</i>	ARTEMISIA DRACUNCULUS SPP. GLAUCUS	WILD TARRAGON			P	
<i>Orophaca tridactylca</i>		FOOTHILL MILKVETCH				
<i>Oxybaphus linearis</i>	MIRABILIS LINEARIS	UMBRELLAWORT				
<i>Psoralea tenuiflorum</i>	PSORALEA TENUIFLORA	PRAIRIE SCURFPEA				
<i>Ratibida columnifera</i>		PRAIRIE CONEFLOWER				
<i>Rumex altissimus</i>	RUMEX BRITANNICA	DOCK				P
<i>Senecio spartioides</i>		BROOM GROUNSEL			P	
<i>Sphaeralcea coccinea</i>		COPPER MALLOW			P	
<i>Thelesperma megapotamicum</i>		GREENTHREAD			P	
<i>Virgulus falcatus</i>	ASTER FALATUS, ASTER COMMUTATUS	WHITE PRAIRIE ASTER				
TOTAL NATIVE PERENNIAL FORBS			2	15(18)	3	P
INTRODUCED PERENNIAL FORBS						
<i>Breca arvensis</i>	CIRSIIUM ARVENSE	CANADA THISTLE	1(2)	15(2)		P
<i>Convolvulus arvensis</i>		FIELD BINDWEED				
<i>Hypericum perforatum</i>		KLAMATH WEED				
<i>Linaria genistifolia</i> ssp. <i>dalmatica</i>	LINARIA DALMATICA	DALMATION TOADFLAX				
<i>Marrubium vulgare</i>		HOREHOUND				
<i>Medicago sativa</i>		ALFALFA				
<i>Nepeta cataria</i>		CATNIP		1(4)		
<i>Taraxacum officinale</i>		COMMON DANDELION				
<i>Verbena bracteata</i>		VERVAIN				
TOTAL INTRO. PERENNIAL FORBS			1(2)	16(6)	---	P

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PLANT SPECIES

Scientific Name	Synonym	Common Name	Wetland Seep		Ditch Woody	
			18-WS	19-WS	08-Ditch	20-Ditch
NATIVE PERENNIAL GRASSES (cool)						
<i>Carex pennsylvanica ssp. heliophila</i>	CAREX HELIOPHILA	SUN SEDGE				
<i>Carex praegracilis</i>		BLACKCREEPER SEDGE	13			
<i>Eleocharis macrostachya</i>	ELEOCHARIS PALUSTRIS	CREEPING SPIKERUSH		9(7)		
<i>Elymus elymoides</i>	SITANION HYSTRIX	BOTTLEBRUSH SQUIRRELTAIL				
<i>Elymus lanceolatus</i>	AGROPYRON LANCEOLATUM,A. DASYSTACHYM,A. ALBICANS,A. RIP	THICKSPIKE WHEATGRASS	P			
<i>Hesperostipa comata</i>	STIPA COMATA	NEEDLE-AND-THREAD GRASS			P	
<i>Juncus arcticus ssp. ater</i>	JUNCUS BALTICUS,J. ATER	BALTIC RUSH	23(3)	36(18)		
<i>Koeleria macrantha</i>	KOELERIA CRISTATA,K. PYRAMIDATA,K.GRACILIS	JUNEGRASS				
<i>Schoenoplectus pungens</i>	SCIRPUS AMERICANUS	THREE SQUARE		5(1)		
<i>Typha latifolia</i>		BROADLEAF CATTAIL		10		
TOTAL NATIVE PERENNIAL GRASSES (c)			36(3)	60(26)	P	---
INTRODUCED PERENNIAL GRASSES (cool)						
<i>Agropyron desertorum</i>	AGROPYRON CRISTATUM SSP. DESERTORUM	DESERT WHEATGRASS				14(25)
<i>Alopecurus pratensis</i>		MEADOW FOXTAIL	P			
<i>Bromopsis inermis</i>	BROMUS INERMIS	SMOOTH BROME	11		5	1(1)
<i>Dactylis glomerata</i>		ORCHARD GRASS				(1)
<i>Elytrigia repens</i>	AGROPYRON REPENS	QUACKGRASS				1(2)
<i>Festuca pratensis</i>		MEADOW FESCUE	9(4)			1(1)
<i>Poa compressa</i>		CANADA BLUEGRASS			P	
<i>Poa pratensis</i>		KENTUCKY BLUEGRASS	23(1)	1		9(10)
<i>Thinopyrum intermedium</i>	AGROPYRON INTERMEDIUM	INTERMEDIATE WHEATGRASS			21(4)	5(1)
TOTAL INTRO. PERENNIAL GRASSES (c)			43(5)	1	26(4)	31(41)
NATIVE PERENNIAL GRASSES (warm)						
<i>Andropogon gerardii</i>		BIG BLUESTEM -- TURKEYFOOT				
<i>Aristida purpurea</i>	ARISTIDA FENDLERIANA,A. LONGISETA,A. WRIGHTII	PURPLE THREE-AWN				
<i>Bouteloua curtipendula</i>		SIDEOATS GRAMA				
<i>Buchloe dactyloides</i>		BUFFALOGRASS				
<i>Chondrosium gracile</i>	BOUTELOUA GRACILIS	BLUE GRAMA GRASS				
<i>Schizachyrium scoparium</i>	ANDROPOGON SCOPARIUM	LITTLE BLUESTEM				
<i>Sporobolus cryptandrus</i>		SAND DROPSEED			4	
TOTAL NATIVE PERENNIAL GRASSES (w)			---	---	4	---
NATIVE SUBSHRUBS						
<i>Gutierrezia sarothrae</i>		BROOM SNAKEWEED			P	
TOTAL NATIVE SUBSHRUBS			---	---	P	---
NATIVE SHRUBS						
<i>Amorpha fruticosa var. angustifolia</i>		INDIGOBUSH LEADPLANT				16(2)
<i>Eriogonum effusum</i>		WILD BUCKWHEAT				
<i>Padus virginiana ssp. melanocarpa</i>	PRUNUS VIRGINIANA SSP. MELANOCARPA	CHOKECHERRY				P
<i>Rosa sayi</i>	ROSA ACICULARIS SSP. SAYI	PRICKLY ROSE				
<i>Rosa woodsii</i>		WOOD'S ROSE	P			
<i>Yucca glauca</i>		SPANISH BAYONET			P	
TOTAL NATIVE SHRUBS			P	---	16(2)	P
INTRODUCED SHRUBS						
<i>Viburnum lantana</i>		WAFARING TREE				(1)
TOTAL INTRODUCED SHRUBS			---	---	---	(1)

P = present

(#) = numbers in parentheses are second hits.

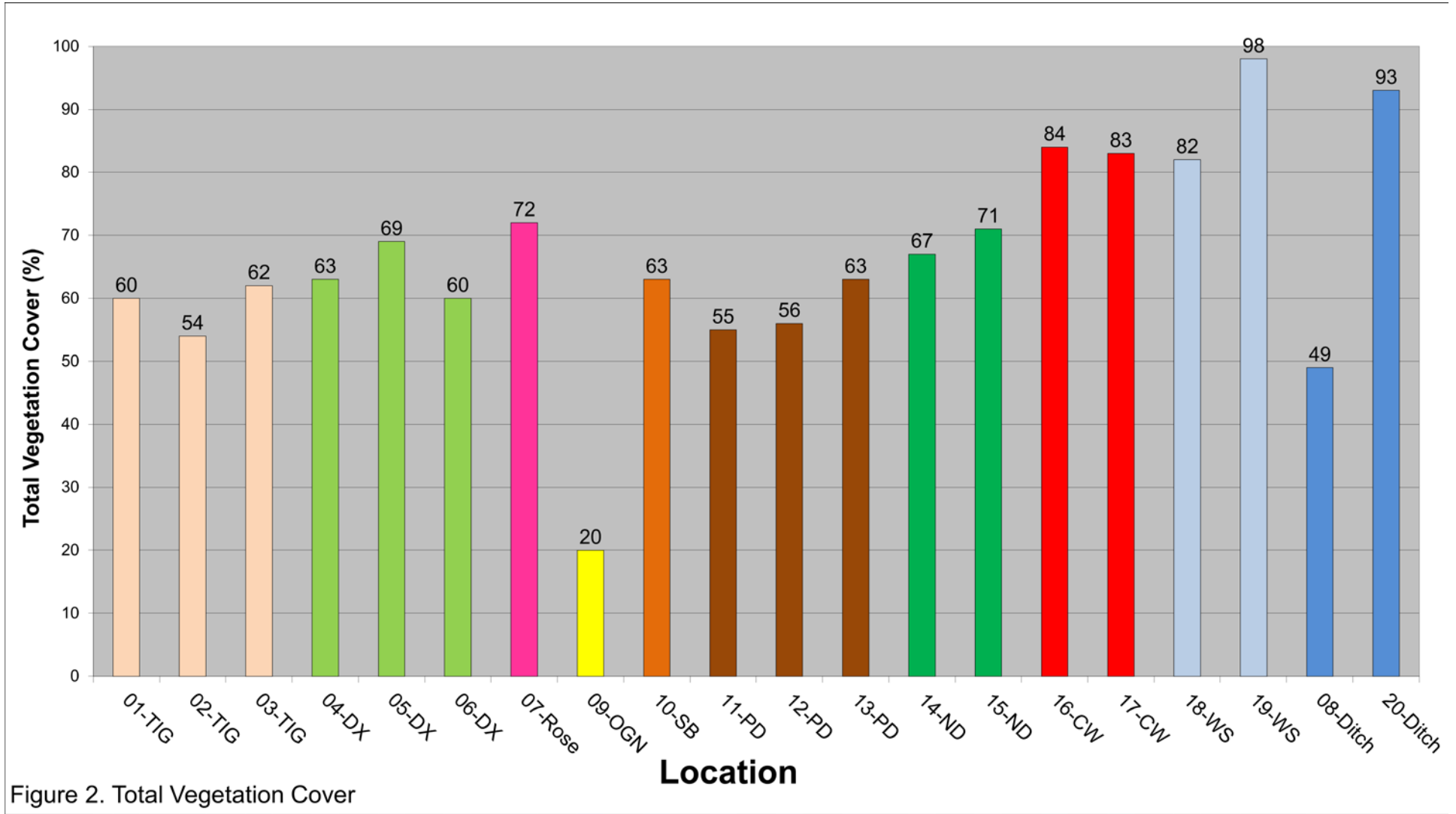
Table 1. All Cover Data 2019 (20 Samples)

PLANT SPECIES

Scientific Name	Synonym	Common Name	Wetland Seep		Ditch Woody	
			18-WS	19-WS	08-Ditch	20-Ditch
NATIVE TREES						
<i>Populus angustifolia</i>		NARROWLEAF COTTONWOOD				20
<i>Populus deltoides ssp. monilifera</i>	POPULUS SARGENTII	PLAINS COTTONWOOD			P	35
<i>Sabina scopulorum</i>	JUNIPERUS SCOPULORUM	ROCKY MOUNTAIN JUNIPER				5(3)
TOTAL NATIVE TREES			---	---	P	60(3)
INTRODUCED TREES						
<i>Malus spp.</i>		APPLE				2
TOTAL INTRODUCED TREES			---	---	---	2
SUCCULENT						
<i>Opuntia macrorhiza</i>	OPUNTIA COMPRESSA	TWISTPINE PRICKLYPEAR CACTUS			P	
<i>Opuntia phaeacantha</i>		NEW MEXICO PRICKLY PEAR CACTUS			P	
<i>Opuntia polyacantha</i>		PRICKLYPEAR CACTUS				
<i>Pediocactus simpsonii</i>		BALL CACTUS				
TOTAL SUCCULENT			---	---	P	---
LITTER						
		LITTER	18	2	36	7
BARE SOIL						
		BARE SOIL	---	---	15	---
ROCK						
		ROCK	---	---	---	---
TOTALS			100	100	100	100
TOTAL VEGETATION COVER			82(10)	98(51)	49(6)	93(45)
GROUND COVER (Litter+Rock+Veg+St.Dead)			100(10)	100(51)	85(6)	100(45)
SPECIES DENSITY (# of species/100 sq.m.)			10	12	22	20
(AVERAGE= 21.5 Std.Dev.= 9.9)						

P = present

(#) = numbers in parentheses are second hits.



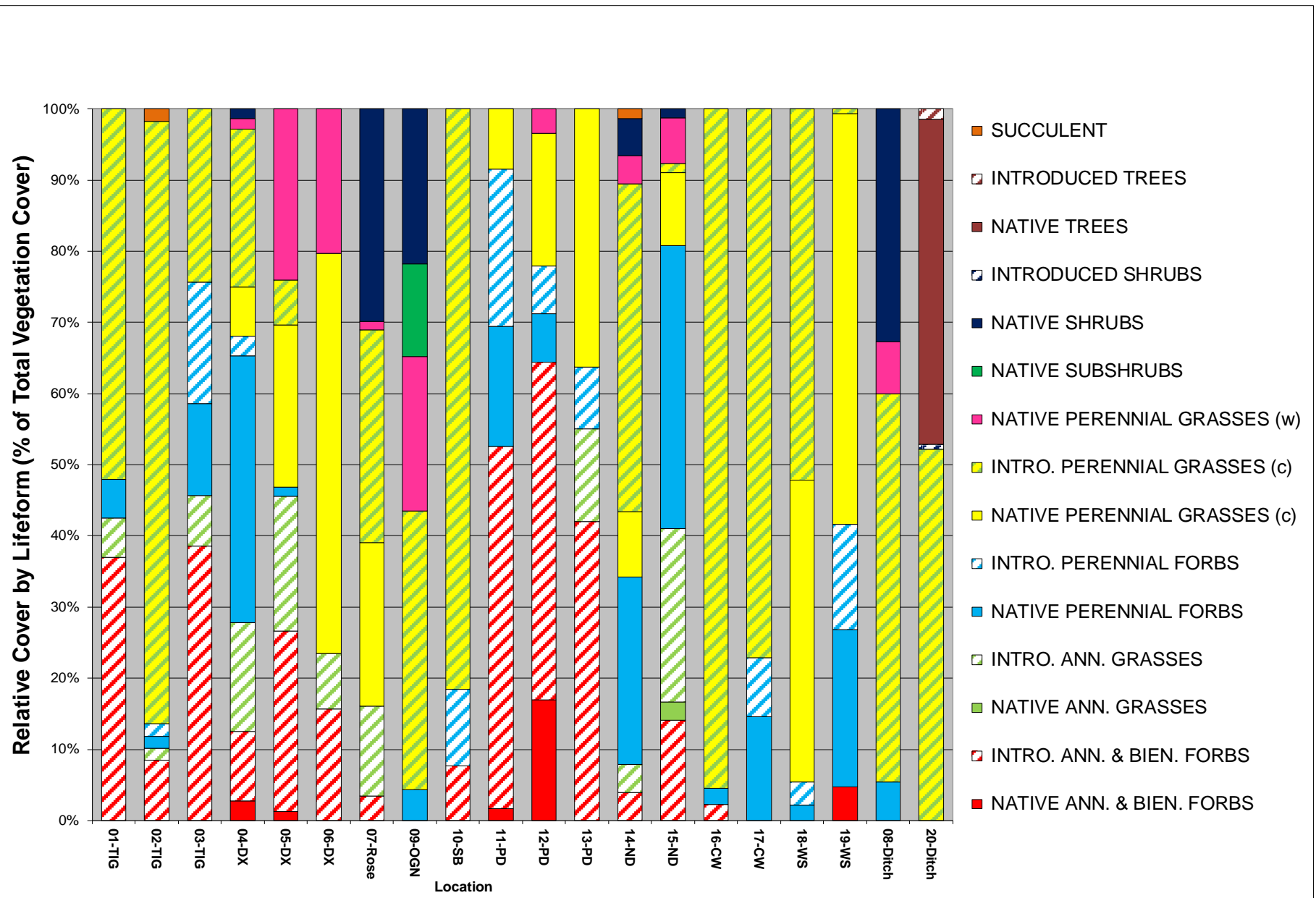


Figure 3. Relative Cover by Lifeform

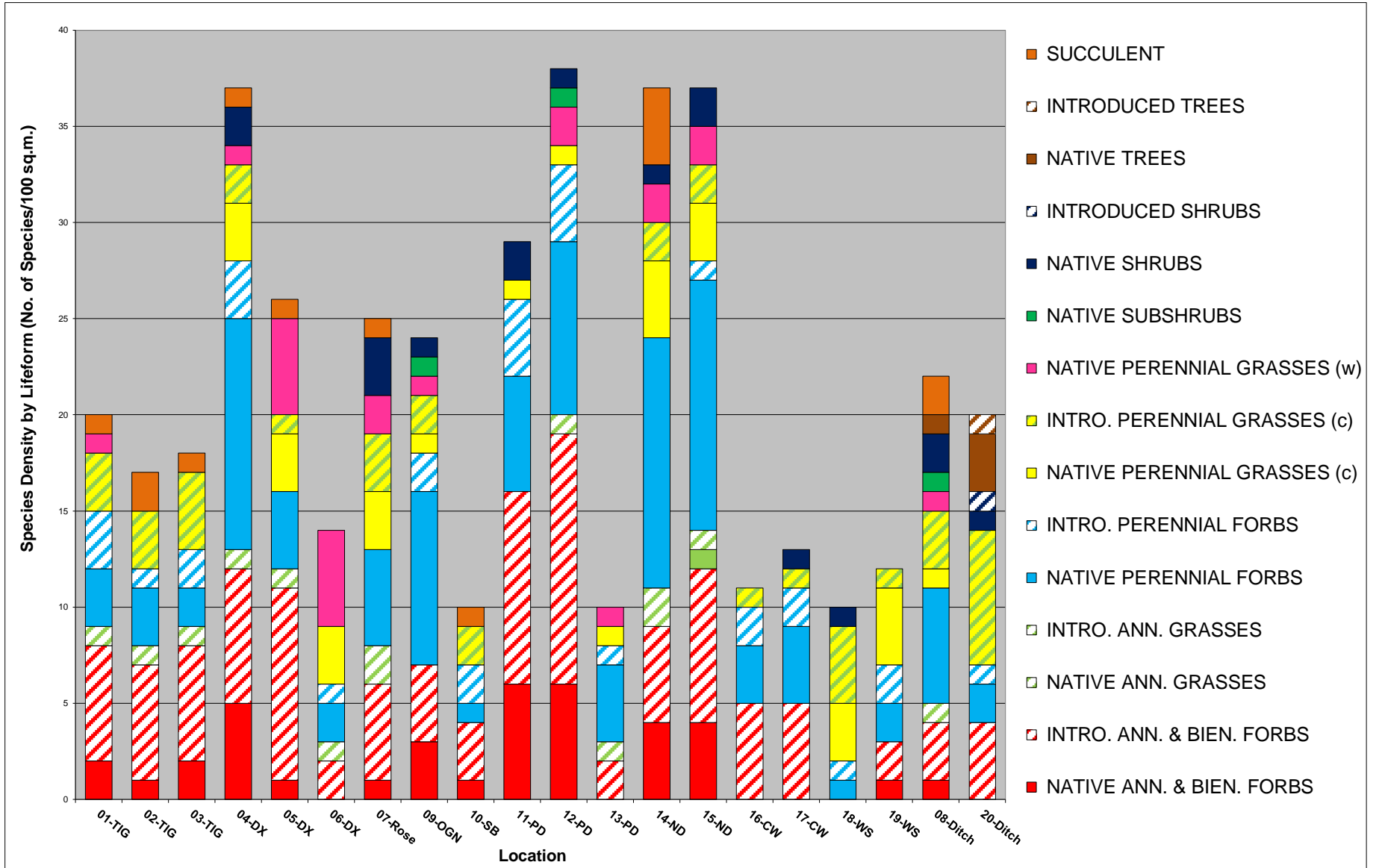


Figure 4. Species Density by Lifeform

Table 2. Louisville Site Data 2019												
PROJECT	AREA	SAMPLEID	SAMPLERS	EASTING	NORTHING	ELEVATION	ORIENTATION (magnetic)	ASPECT (magnetic)	SLOPE (degrees)	SLOPE (pct)	COMMENT	DATE
Davidson Mesa 2019	Dense Tall Introduced grass	01E	PM	-105 10 4.62	39 58 39.26	5567.26	280	70	1	1.7		7/23/2019
Davidson Mesa 2019	Dense Tall Introduced grass	02E	PM	-105 10 10.39	39 58 37.99	5568.9	310	60	1	1.7		7/23/2019
Davidson Mesa 2019	Dense Tall Introduced grass	03E	PM	-105 10 0.42	39 58 38.75	5565.62	230	60	1	1.7		7/23/2019
Davidson Mesa 2019	Disturbed mix	04E	PM	-105 10 12.13	39 58 35.37	5574.15	240	70	1	1.7		7/29/2019
Davidson Mesa 2019	Disturbed mix	05E	PM	-105 10 19.47	39 58 31.93	5583.99	220	60	1	1.7		7/29/2019
Davidson Mesa 2019	Disturbed mix	06E	PM	-105 10 21.82	39 58 27.69	5577.43	245	45	1	1.7	this area has a lot of natives that were evidently planted the eleylan demonstrates a non native version of that species that shows hybrid characters with elytrigia repens. ie long awns > 1mm.	7/29/2019
Davidson Mesa 2019	Rosa	07E	PM	-105 10 19.63	39 58 39.86	5541.34	220	290	10	17.6		7/30/2019
Davidson Mesa 2019	Ditch woody	08E	PM	-105 10 13.07	39 58 28.36	5569.23	238	50	1	1.7		7/24/2019
Davidson Mesa 2019	Open Gravel Native	09E	PM	-105 10 14.06	39 58 28.34	5562.99	240	110	1	1.7		7/24/2019
Davidson Mesa 2019	Smooth brome dominated	10E	PM	-105 10 9.94	39 58 33.54	5570.87	210	335	1	1.7		7/24/2019
Davidson Mesa 2019	Prairie dog	11E	PM	-105 10 24.74	39 58 20.27	5591.86	220	10	1	1.7		7/25/2019
Davidson Mesa 2019	Prairie dog	12E	PM	-105 10 24.16	39 58 22.96	5572.18	215	20	1	1.7		7/25/2019
Davidson Mesa 2019	Prairie dog	13E	PM	-105 10 27.26	39 58 25.12	5610.56	196	100	1	1.7		7/25/2019
Davidson Mesa 2019	Native Dominated	14E	PM	-105.1718015	39.97759194	5551.51	30	290	10	17.6		7/29/2019
Davidson Mesa 2019	Native Dominated	15E	PM	-105 10 25.87	39 58 30.7	5574.15	250	60	1	1.7		7/29/2019
Davidson Mesa 2019	Crested Wheatgrass	16E	PM	-105 10 24.34	39 58 39.8	5492.13	220	310	3	5.2		7/30/2019
Davidson Mesa 2019	Crested Wheatgrass	17E	PM	-105 10 26.08	39 58 38.11	5501.97	270	330	3	5.2		7/30/2019
Davidson Mesa 2019	Wetland Seep	18E	PM	-105 10 29.31	39 58 41.44	5462.6	310	310	4	7	This seep area is below the ditch. Rosa with obovate lvs and lots of flrs/fruits. tall and woody.	7/30/2019
Davidson Mesa 2019	Wetland Seep	19E	PM	-105 10 25.78	39 58 39.87	5495.41	40	310	6	10.5	Slope seep wetland	7/31/2019
Davidson Mesa 2019	Ditch woody	20E	PM	-105 10 27.74	39 58 41.39	5469.16	220	310	5	8.7		7/31/2019

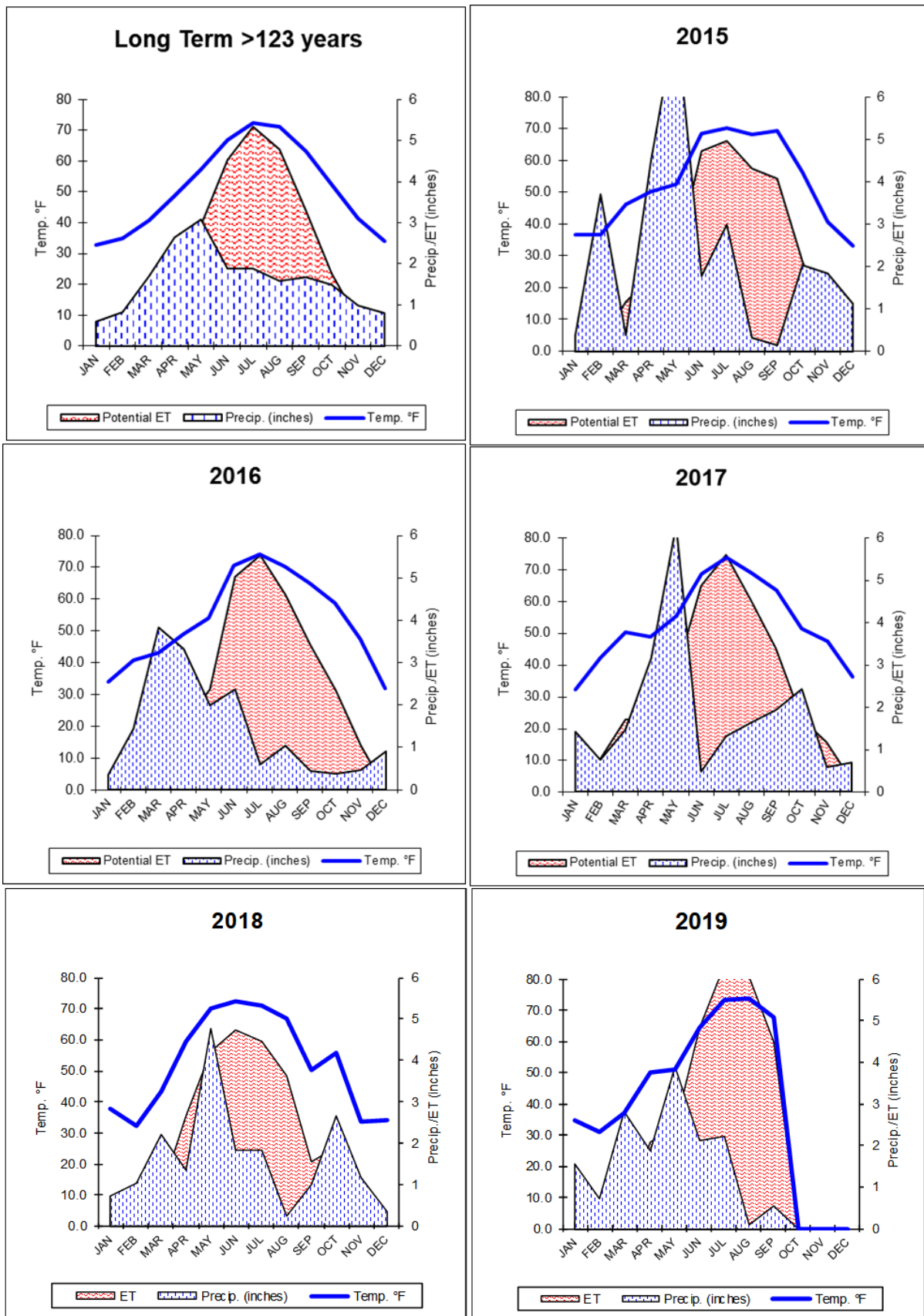


Figure 5. Thornthwaite Climate diagrams.

DISCUSSION

Climate diagrams presented in Figure 5 provide a context for short term vegetation change. The long term (123 year) average is a comparison to use for each year. The zone of red hatch in the diagrams shows the time and degree of potential soil moisture deficit. Most species can tolerate these periods of soil moisture deficit, but the degree and duration can negatively affect other species. The effects of climate are complex, and some species respond immediately and others are more delayed. Annuals typically respond quickly and perennials are typically more delayed. That is why it is often best to consider the climate of the year before sampling to evaluate vegetation cover and productivity of any single year.

Points of interest with respect to this project are the greater soil moisture deficits of 2016 that were compensated by late summer precipitation in 2017, the year before the 2018 sampling. The 2018 sampling in mid-October was preceded by a wet spring, a severely dry August and an exceptionally wet October. The 2019 sampling of this report occurred in July and was preceded by an exceptionally wet spring/early summer but was followed by an exceptionally hot and dry late summer and fall.

The following discussion will describe the characteristics of the mapped vegetation units at Davidson Mesa East including acreages.

Disturbed Mix Vegetation Unit – 40.70 acres. (04-DX, 05-DX, 06-DX)

Table 3 presents a brief summary of the data for the Disturbed Mix vegetation unit. Total vegetation cover ranged from 60% to 69%. All of the areas have low bare soil, and the litter was moderate at the three samples. This area is characterized by the planting in the past of native grass especially *Elymus lanceolatus* [Thickspike wheatgrass] into disturbed areas that still had some native species. See photographs 7-12.

Table 3. Davidson Mesa East - Disturbed Mix

	04-DX	05-DX	06-DX
LITTER	36	31	34
BARE SOIL	---	5	2
ROCK	1	---	2
TOTAL VEGETATION COVER	63(9)	69(10)	60(4)
GROUND COVER (Litter+Rock+Veg+St.Dead)	100(9)	100(10)	96(4)
SPECIES DENSITY (# of species/100 sq.m.)	37	26	14

Data in parentheses are second hits.

The following discussion references absolute cover values that include first and second hits, thus representing the total cover for that particular species

04-DX was dominated by native perennial forbs but with an abundance of introduced perennial and annual grasses and forbs. The dominant native perennial forb was *Artemisia frigida* [Fringed sage] 23% and included *Ambrosia psilostachya* var. *coronopifolia* [Western ragweed] 2%, and *Oligosporus dracunculoides* ssp. *glaucus* [Wild tarragon] 2%. The introduced perennial grasses included *Agropyron desertorum* [Desert wheatgrass] 13% and *Bromopsis inermis* [Smooth brome] 3%. Introduced annual grass was *Anisantha tectorum* [Cheatgrass] 11%. Introduced annual forbs included *Verbascum thapsus* [Moth mullein] 4% and *Tragopogon dubius* ssp. *major*

[Yellow salsify] 3%. Native perennial grasses include *Elymus lanceolatus* [Thickspike wheatgrass] 5%. Native annual forbs included *Descurania pinnata* [Pinnate tansymustard] 1% and *Grindellia squarrosa* [Gumweed] 1%. Introduced perennial forbs included *Linaria genistifolia* ssp. *dalmatica* [Dalmation toadflax] 2%. Native warm season perennial grass was *Andropogon gerardii* [Big bluestem] 1%. Native shrub included *Yucca glauca* [Spanish bayonet] 1%. This transect had relatively high species density with 37 species.

05-DX was quite different from 04-DX and was co-dominated by introduced forbs and grasses vs. native grasses. The dominant introduced annual forb was *Salsola collina* [Russian thistle] (14%) with *Lactuca seriolla* [Prickly lettuce] 2%. Introduced annual grass was *Anisantha tectorum* [Cheatgrass] 15%. Native perennial cool season grasses were *Elymus lanceolatus* [Thickspike wheatgrass] 13%, *Carex pensylvanica* ssp. *heliophila* [sun sedge] 3%, and *Hesperostipa comata* [Needle-and-thread grass] 2%. Native perennial warm season grasses were *Chondrosium gracile* [Blue grama grass] 8%, *Bouteloua curtipendula* [Sideoats grama] 7%, *Andropogon gerardii* [Big bluestem] 2%, and *Aristida purpurea* [Purple three-awn] 2%. Introduced perennial cool season grass was *Agropyron desertorum* [Desert wheatgrass] 5%. Native annual forb was *Descurainia pinnata* [Pinnate tansymustard] 1%. This transect had moderate species density with 26 species.

06-DX was also quite different from the other two samples demonstrating the range of variability in the vegetation unit. This sample was dominated by native grasses. The dominant native perennial cool season grass was the planted species *Elymus lanceolatus* [Thickspike wheatgrass] 24% along with *Hesperostipa comata* [Needle-and-thread grass] 7% and *Elymus elymoides* [Bottlebrush squirreltail] 5%. Native perennial warm season grasses included *Aristida purpurea* [Purple three-awn] 5%, *Andropogon gerardii* [Big bluestem] 4%, *Bouteloua curtipendula* [Sideoats grama] 2%, *Chondrosium gracile* [Blue grama grass] 1%, and *Schizachyrium scoparium* [Little bluestem] 1%. Introduced annual forbs included *Salsola collina* [Russian thistle] 9%. Introduced annual grass was *Anisantha tectorum* [Cheatgrass] 5%. This transect had low species density with 14 species.

Tall Introduced grass (TIG) Vegetation Unit - 16.91 acres. (01-TIG, 02-TIG, 03-TIG)

Table 4 presents a brief summary of the data for the Tall Introduced Grass vegetation unit. Total vegetation cover ranged from 54% to 62%. All of these areas have been planted with introduced reclamation/"improvement" grasses. All of the areas have low bare soil and relatively high litter cover. See photographs 1-6.

Table 4. Davidson Mesa East - Tall Introduced Grass

	01-TIG	02-TIG	03-TIG
LITTER	40	46	36
BARE SOIL	---	---	2
TOTAL VEGETATION COVER	60(10)	54(5)	62(8)
GROUND COVER (Litter+Rock+Veg+St.Dead)	100(10)	100(5)	98(8)
SPECIES DENSITY (# of species/100 sq.m.)	20	17	18

Data in parentheses are second hits.

The following discussion references absolute cover values that include first and second hits, thus representing the total cover for that particular species

01-TIG was dominated by introduced perennial grasses and introduced annual forbs. The introduced perennial cool season grasses were *Poa pratensis* [Kentucky bluegrass] 20% and *Thinopyrum intermedium* [Intermediate wheatgrass] 18%. The introduced annual forbs were *Melilotus officinale* [Yellow sweetclover] (23%), *Alyssum alyssoides* [Alyssum] 3%, and *Tragopogon dubius* ssp. major [Yellow salsify] 1%. This transect had moderate species density with 20 species.

02-TIG was dominated by introduced perennial grasses. The introduced perennial cool season grasses were *Poa pratensis* [Kentucky bluegrass] 20% and *Thinopyrum intermedium* [Intermediate wheatgrass] 20%, and *Bromopsis inermis* [Smooth brome] 10%. Introduced annual forbs were *Alyssum alyssoides* [Alyssum] 4%, and *Melilotus officinale* [Yellow sweetclover] (1%). This transect had moderate species density with 17 species.

03-TIG was co-dominated by introduced annual forbs and introduced perennial grasses. The dominant introduced annual forb was *Melilotus officinale* [Yellow sweetclover] (26%). The dominant introduced perennial cool season grasses were *Thinopyrum intermedium* [Intermediate wheatgrass] (11%). *Poa pratensis* [Kentucky bluegrass] (5%), *Poa compressa* [Canada bluegrass] 1%. Also common was the native perennial forb *Virgulus falcatus* [White prairie clover] 9% and the introduced perennial forbs *Medicago sativa* [Alfalfa] 8% and *Convolvulus arvensis* [Field bindweed] 4%. This transect had moderate species density with 18 species.

Native Dominated (ND) Vegetation Unit – 14.23 acres. (14-ND, 15-ND)

Table 5 presents a brief summary of the data for the Native Dominated vegetation unit. These areas are dominated by native species with much smaller amounts of introduced grasses and forbs. Total vegetation cover ranged from 67% to 71%. All of the areas have low bare soil, and moderate litter. See photographs 27-30.

Table 5. Davidson Mesa East - Native Dominated

	14-ND	15-ND
LITTER	31	28
BARE SOIL	1	1
ROCK	1	---
TOTAL VEGETATION COVER	67(9)	71(7)
GROUND COVER (Litter+Rock+Veg+St.Dead)	99(9)	99(7)
SPECIES DENSITY (# of species/100 sq.m.)	37	37

Data in parentheses are second hits.

The following discussion references absolute cover values that include first and second hits, thus representing the total cover for that particular species

14-ND was dominated by introduced perennial grasses that are not part of the typical seeding efforts (e.g. seeding with Intermediate wheatgrass) that have occurred on Davidson Mesa and are probably remnants from past grazing. There is also an abundance of native perennial forbs and grasses. The dominant introduced perennial grasses were *Poa pratensis* [Kentucky bluegrass] 20%, and *Poa compressa* [Canada bluegrass] 15%. The dominant native perennial forbs were *Heterotheca villosa* [Hairy golden aster] 18%, *Thelesperma megapotamicum* [Greenthreadleaf]

1% and *Virgulus falcatus* [White prairie aster] 1%. The dominant native perennial grasses were *Carex pensylvanica* ssp. *heliophila* [Sun sedge] 5%, and *Koeleria macrantha* [Junegrass] 2%. The dominant native shrub was *Yucca glauca* [Spanish bayonet] 4%. The dominant native perennial warm season grasses were *Andropogon gerardii* [Big bluestem] 2%, and *Schizachyrium scoparium* [Little bluestem] 1%. This transect and the next had the highest species density with 37 species.

15-ND was dominated by native perennial forbs and grasses. The dominant native perennial forbs were *Heterotheca villosa* [Hairy golden aster] 18%, *Artemisia frigida* [Fringed sage] 8%, and *Oligosporus dracuncululus* ssp. *glauca* [Wild tarragon] 3%, *Psoraleidum tenuiflorum* [Prairie scurfpea] 1%, and *Senecio spartioides* [Broom groundsel] 1%. The dominant native perennial cool season grasses were *Elymus lanceolatus* [Thickspike wheatgrass] 5%, and *Elymus elymoides* [Bottlebrush squirreltail] 3%. The native perennial warm season grasses were *Aristida purpurea* [Purple three-awn] 4%, and *Buchloe dactyloides* [Buffalograss] 1%. The introduced annual grass was *Anisantha tectorum* [Cheatgrass] 19%. The dominant introduced annual/biennial species were *Alyssum alyssoides* [Alyssum] 9%, *Acosta diffusa* [Tumble knapweed] 1%, and *Onopordum acanthium* [Scotch thistle] 1%. Native shrub was *Yucca glauca* [Spanish bayonet] 1%. This transect and the previous had the second highest species densities with 37 species.

Prairie dog (PD) Vegetation Unit – 7.14 acres. (11-PD, 12- PD, 13- PD)

Table 6 presents a brief summary of the data for the Prairie dog vegetation unit. These areas have active prairie dog colonies and are dominated by introduced forbs. Total vegetation cover ranged from 55% to 63%. All of the areas have low to moderate bare soil, and the litter was moderate at all samples. See photographs 21-26.

Table 6. Davidson Mesa East - Prairie dog

	11-PD	12-PD	13-PD
LITTER	32	32	29
BARE SOIL	13	12	8
TOTAL VEGETATION COVER	55(4)	56(3)	63(6)
GROUND COVER (Litter+Rock+Veg+St.Dead)	87(4)	88(3)	92(6)
SPECIES DENSITY (# of species/100 sq.m.)	29	38	10

Data in parentheses are second hits.

The following discussion references absolute cover values that include first and second hits, thus representing the total cover for that particular species

11-PD was dominated by introduced and native forbs. The dominant introduced annual/biennial forbs were *Verbascum thapsus* [Mullein] 12%, *Salsola collina* [Russian thistle] 7%, *Ximenesia encelioides* [Cowpen daisy] 5%, *Solanum triflorum* [Nightshade] 4%, and *Onopordum acanthium* [Scotch thistle] 2%. Introduced perennial forbs included *Convolvulus arvensis* [Field bindweed] 12%. Native perennial forbs included *Artemisia frigida* [Fringed sage] 10%. Native perennial cool season grass was *Elymus lanceolatus* [Thickspike wheatgrass] 5%. This transect had moderately high species density with 29 species.

12-PD was dominated by introduced and native forbs. The dominant introduced annual/biennial forbs were *Salsola collina* [Russian thistle] 16%, *Solanum triflorum* [Nightshade] 5%, *Verbascum thapsus* [Mullein] 5%, *Acosta diffusa* [Tumble knapweed] 1%, and *Ximenesia encelioides* [Cowpen daisy] 1%. Native annual forbs included *Chenopodium incanum* [Mealy goosefoot] 10%. Native perennial cool season grass was *Elymus lanceolatus* [Thickspike wheatgrass] 11%. Introduced perennial forbs included *Convolvulus arvensis* [Field bindweed] 4%. Native perennial forbs included *Artemisia frigida* [Fringed sage] 4%. Native perennial warm season grasses included *Aristida purpurea* [Purple three-awn] 2%. This transect had the highest species density of all samples with 38 species.

13-PD was dominated by introduced annual forbs with an abundance of native perennial cool and season grass. The dominant introduced annual/biennial forb was *Salsola collina* [Russian thistle] 29%. The native perennial cool season grass was *Elymus lanceolatus* [Thickspike wheatgrass] 25%. The introduced annual grass was *Anisantha tectorum* [Cheatgrass] 9%. The introduced perennial forb was *Convolvulus arvensis* [Field bindweed] 6%. This transect had one of the lowest species densities of all samples with 10 species.

Smooth Brome (SB) Vegetation Unit – 4.21 acres. (10-SB)

Table 6 presents a brief summary of the data for the Smooth Brome vegetation unit. These areas have been planted with non-native pasture improvement grasses that now dominate. Total vegetation cover was 63%. All of the areas have very low bare soil, and the litter was moderately high at all locations.

Table 7. Davidson Mesa East - Smooth Brome

	10-SB
LITTER	37
TOTAL VEGETATION COVER	63(2)
GROUND COVER (Litter+Rock+Veg+St.Dead)	100(2)
SPECIES DENSITY (# of species/100 sq.m.)	10

Data in parentheses are second hits.

The following discussion references absolute cover values that include first and second hits, thus representing the total cover for that particular species

10-SB was dominated by introduced perennial cool season grass. The dominant introduced perennial cool season grasses were *Bromopsis inermis* [Smooth brome] (49%), and *Agropyron desertorum* [Desert wheatgrass] 4%. The introduced perennial forbs were *Convolvulus arvensis* [Field bindweed] 6%, and *Medicago sativa* [Alfalfa] 1%. Introduced annual forbs included *Alyssum alyssoides* [Alyssum] 5%. This transect had one of the lowest species densities with 10 species.

Ditch Woody (DW) Vegetation Unit – 2.69 acres. (08-DW, 20-DW)

Table 8 presents a brief summary of the data for the Ditch Woody vegetation unit. These areas are 2 irrigation ditches that occur on the south side and northwest corner of Davidson Mesa East. Both ditches may receive seasonal controlled flows as well and ephemeral flows related to precipitation. The northwest corner ditch has large mature trees and the southern ditch is much more open and has younger woody species. Total vegetation cover is highly variable between

the two ditches and ranged from 49% to 93%. These samples were dominated by the introduced perennial grasses with the northwest corner ditch (20-DW) having an abundance of native trees and the south ditch (08-DW) with native shrubs. The bare soil and litter were also highly variable between the two ditches. See photographs 15-16, 39-40.

Table 8. Davidson Mesa East - Ditch Woody

	08-DW	20-DW
LITTER	36	7
BARE SOIL	15	---
ROCK	2	---
TOTAL VEGETATION COVER	49(6)	93(45)
GROUND COVER (Litter+Rock+Veg+St.Dead)	85(6)	100(45)
SPECIES DENSITY (# of species/100 sq.m.)	22	20

Data in parentheses are second hits.

The following discussion references absolute cover values that include first and second hits, thus representing the total cover for that particular species

08-DW was dominated by introduced perennial cool season grasses with common native shrubs. The dominant introduced perennial cool season grasses were *Thinopyrum intermedium* [Intermediate wheatgrass] (25%), and *Bromopsis inermis* [Smooth brome] 5%. Native shrubs included *Amorpha fruticosa* var. *angustifolia* [Indigobush leadplant] 18%. Native perennial forbs included *Ambrosia psilostachya* var. *coronopifolia* [Western ragweed] 2%, and *Artemisia frigida* [Fringed sage] 1%. This transect had moderate species density with 22 species.

20-DW was co-dominated by introduced perennial cool season grasses and native trees. The dominant introduced perennial cool season grasses were dominated by *Agropyron desertorum* [Desert wheatgrass] 39%, *Poa pratensis* [Kentucky bluegrass] (19%), *Thinopyrum intermedium* [Intermediate wheatgrass] (6%), *Elytrigia repens* [Quackgrass] 3%, *Bromopsis inermis* [Smooth brome] 2%, and *Festuca pratensis* [Meadow fescue] 2%. The native trees were *Populus deltoides* ssp. *monilifera* [Plains cottonwood] 35%, *Populus angustifolia* [Narrowleaf cottonwood] 20%, and *Sabina scopulorum* [Rocky Mountain juniper] 8%. The introduced tree *Malus* spp. [Apple] 2% was also present. This transect had moderate species density with 20 species.

Rose (ROSE) Vegetation Unit – 2.55 acres. (07-ROSE)

Table 9 presents a brief summary of the data for the Rose vegetation unit. These areas are typically on native dominated slopes that probably have some groundwater slope seepage. Total vegetation cover was 72%. These samples were dominated by rose and introduced and native cool season grasses. All of the areas have low bare soil, and the litter was moderate. See photographs 13-14.

Table 9. Davidson Mesa East - Rose

	07-Rose
LITTER	28
TOTAL VEGETATION COVER	72(15)
GROUND COVER (Litter+Rock+Veg+St.Dead)	100(15)
SPECIES DENSITY (# of species/100 sq.m.)	25

Data in parentheses are second hits.

The following discussion references absolute cover values that include first and second hits, thus representing the total cover for that particular species

07-ROSE was co-dominated by the native shrub and introduced perennial cool season grasses. The dominant native shrub was *Rosa sayi* [Prickly rose] 26%. The dominant native perennial cool season grasses were *Poa pratensis* [Kentucky bluegrass] (14%), and *Poa compressa* [Canada bluegrass] 12%. Native perennial cool season grasses were *Carex pensylvanica* ssp. *heliophila* [Sun sedge] 19%, and *Hesperostipa comata* [Needle-and-thread grass] 1%. The dominant introduced annual forb was *Alyssum alyssoides* [Alyssum] 3%. This transect had moderate species density with 25 species.

Wetland Seep (WS) Vegetation Unit – 2.01 acres. (18-WS, 19-WS)

Table 10 presents a brief summary of the data for the Wetland Seep vegetation unit. These areas are subirrigated either by the adjacent ditch (18-WS) or the adjacent slope (19-WS). The sample 18-WS is in a pasture area that has been planted with introduced grass species in the past, while sample 19-WS is in an area that is predominantly native species. Total vegetation cover ranged from 82% to 98%. All of the areas have low bare soil, and the litter was low to moderate. See photographs 35-38.

Table 10. Davidson Mesa East - Wetland Seep

	18-WS	19-WS
LITTER	18	2
TOTAL VEGETATION COVER	82(10)	98(51)
GROUND COVER (Litter+Rock+Veg+St.Dead)	100(10)	100(51)
SPECIES DENSITY (# of species/100 sq.m.)	10	12

Data in parentheses are second hits.

The following discussion references absolute cover values that include first and second hits, thus representing the total cover for that particular species

18-WS was dominated by introduced perennial cool season grasses. The dominant introduced perennial cool season grasses were *Poa pratensis* [Kentucky bluegrass] (24%), *Festuca pratensis* [Meadow fescue] 13%, and *Bromopsis inermis* [Smooth brome] 11%. The dominant native perennial cool season grasses were *Juncus arcticus* ssp. *ater* [Baltic rush] 26%, and *Carex praegracilis* [Blackcreeper sedge] 13%. Introduced perennial forb was *Breca arvensis* [Canada thistle] 3%. Native perennial forb was *Asclepias speciosa* [Showy milkweed] 2%. This transect had low species density with 10 species.

19-WS was dominated by native perennial cool season grasses and native forbs. The native perennial cool season grasses were *Juncus arcticus* ssp. *ater* [Baltic rush] 54%, *Eleocharis macrostachya* [Creeping spikerush] 16%, *Typha latifolia* [Broadleaf cattail] 10%, and *Schoenoplectus pungens* [Three square] 6%. The native perennial forbs were *Epilobium ciliatum* [Ciliate willow herb] 28%, and *Geum macrophyllum* [Large-leaved avens] 5%. The introduced perennial forbs were *Breca arvensis* [Canada thistle] 17% and *Nepeta cataria* [Catnip] 5%. Native annual/biennial forb was *Oenothera villosa* ssp. *strigose* [Hairy eveningprimrose] 7%. Note that there was very little introduced grass in this seep wetland. This transect had low species density with 12 species.

Crested Wheatgrass (CW) Vegetation Unit – 1.89 acres. (16-CW, 17-CW)

Table 11 presents a brief summary of the data for the Crested Wheatgrass (aka Desert Wheatgrass) vegetation unit. These areas have been planted with non-native pasture improvement grasses that now dominate. Total vegetation cover ranged from 83% to 84%. All of the areas have low bare soil, and the litter was low to moderate at all samples. See photographs 31-34.

Table 11. Davidson Mesa East - Crested Wheat

	16-CW	17-CW
LITTER	16	17
TOTAL VEGETATION COVER	84(4)	83(13)
GROUND COVER (Litter+Rock+Veg+St.Dead)	100(4)	100(13)
SPECIES DENSITY (# of species/100 sq.m.)	11	13

Data in parentheses are second hits.

The following discussion references absolute cover values that include first and second hits, thus representing the total cover for that particular species

16-CW was dominated by introduced perennial cool season grass. The dominant introduced perennial cool season grass was *Agropyron desertorum* [Desert Wheatgrass] 84%. Introduced annual/biennial forbs included *Carduus nutans* ssp. *macrolepis* [Musk thistle] 1%, and *Lactuca serriola* [Prickly lettuce] 1%. Native perennial forbs include *Apocynum cannabinum* [Indian hemp] 2%. This transect had low species density with 11 species.

17-CW was dominated by introduced perennial cool season grass. The dominant introduced perennial cool season grass was *Agropyron desertorum* [Desert Wheatgrass] 74%. Native perennial forbs included *Psoraleidium tenuiflorum* [Prairie scurfpea] 8%, *Argemone polyanthemos* [Prickly poppy] 3%, and *Glycyrrhiza lepidota* [Wild licorice] 3%. The introduced perennial forb was *Convolvulus arvensis* [Field bindweed] 8%. This transect had low species density with 13 species.

Open Gravel Native (OGN) Vegetation Unit – 1.88 acres. (09-OGN)

Table 12 presents a brief summary of the data for the Open Gravel Native vegetation unit. These areas remained open and dominated by a diverse mix of native species and should receive special attention and protection. Total vegetation cover was 20%. These samples were co-dominated by

introduced cool season grass and native grasses and shrubs. All of the areas have high bare soil, and the litter was low to moderate. See photographs 17-18.

Table 12. Davidson Mesa East - Open Gravel Native

	09-OGN
LITTER	15
BARE SOIL	63
ROCK	2
TOTAL VEGETATION COVER	20(3)
GROUND COVER (Litter+Rock+Veg+St.Dead)	37(3)
SPECIES DENSITY (# of species/100 sq.m.)	24

Data in parentheses are second hits.

The following discussion references absolute cover values that include first and second hits, thus representing the total cover for that particular species

09-OGN was dominated by introduced perennial cool season grasses. The dominant introduced perennial cool season grasses were *Thinopyrum intermedium* [Intermediate wheatgrass] (8%), and *Bromopsis inermis* [Smooth brome] 1%. The remaining vegetation was predominantly native. The native perennial warm season grass was *Aristida purpurea* [Purple three-awn] 5%. The native shrub was *Yucca glauca* [Spanish bayonet] 5%. The native subshrub was *Gutierrezia sarothrae* [Broom snakeweed] 3%. Although there were a large number of native annual and perennial forbs, their cover value was low. This transect had moderate to high species density with 24 species.

Appendix A

Photographs



Photograph 1. Plot 01-TIG Origin – W-facing view. July 23, 2019.



Photograph 2. Plot 01-TIG End – E-facing view.



Photograph 3. Plot 02-TIG Origin – NW-facing view. July 23, 2019.



Photograph 4. Plot 02-TIG End – SE-facing view.



Photograph 5. Plot 03--TIG Origin – SW-facing view. July 23, 2019.



Photograph 6. Plot 03--TIG End – NE-facing view.



Photograph 7. Plot 04-DX Origin – SW-facing view. July 29, 2019.



Photograph 8. Plot 04-DX End – NE-facing view.



Photograph 9. Plot 05-DX Origin – SW-facing view. July 29, 2019.



Photograph 10. Plot 05-DX End – NE-facing view.



Photograph 11. Plot 06-DX Origin – SW-facing view. July 29, 2019.



Photograph 12. Plot 06-DX End – NE-facing view.



Photograph 13. Plot 07-ROSE Origin – SW-facing view. July 30, 2019.



Photograph 14. Plot 07-ROSE End – NE-facing view.



Photograph 15. Plot 08-DW Origin – SW-facing view. July 24, 2019.



Photograph 16. Plot 08-DW End – NE-facing view.



Photograph 17. Plot 09-OGN Origin – SW-facing view. July 24, 2019.



Photograph 18. Plot 09-OGN End – NE-facing view.



Photograph 19. Plot 10--SB Origin – SW-facing view. July 24, 2019.



Photograph 20. Plot 10--SB End – NE-facing view.



Photograph 21. Plot 11-PD Origin – SW-facing view. July 25, 2019.



Photograph 22. Plot 11-PD End – NE-facing view.



Photograph 23. Plot 12-PD Origin – SW-facing view. July 25, 2019.



Photograph 24. Plot 12-PD End – NE-facing view.



Photograph 25. Plot 13-PD Origin – SSW-facing view. July 25, 2019.



Photograph 26. Plot 13-PD End – NNE-facing view.



Photograph 27. Plot 14-ND Origin – NNE-facing view. July 29, 2019.



Photograph 28. Plot 14-ND End – SSW-facing view.



Photograph 29. Plot 15-ND Origin – SW-facing view. July 29, 2019.



Photograph 30. Plot 15-ND End – NE-facing view.



Photograph 31. Plot 16-CW Origin – SSW-facing view. July 30, 2019.



Photograph 32. Plot 16-CW End – NNE-facing view.



Photograph 33. Plot 17-CW Origin – W-facing view. July 30, 2019.



Photograph 34. Plot 17-CW End – E-facing view.



Photograph 35. Plot 18-WS Origin – NW-facing view. July 30, 2019.



Photograph 36. Plot 18-WS End – SE-facing view.



Photograph 37. Plot 19-WS Origin – NNE-facing view. July 31, 2019.



Photograph 38. Plot 19-WS End – SSW-facing view.



Photograph 39. Plot 20-DW Origin – SW-facing view. July 31, 2019.



Photograph 40. Plot 20-DW End – NE-facing view.