SECTION 15

VEGETATION

TABLE OF CONTENTS

SECTION	SECTION TITLE	PAGE NUMBER
SECTION 15	VEGETATION	1
15.1	Vegetation Information Collection and Analysis	1
15.1.1	Cover, Species Frequency, and Constancy	2
15.1.2	Shrub Density	3
15.1.3	Production	3
15.1.4	Sample Adequacy	3
15.2	Description of Vegetation Communities	4
15.2.1	Dunes	4
15.2.2	Sands	5
15.2.3	Arroyo Shrub	6
15.2.4	Alkali Wash	4
15.2.5	Thin Breaks	6
15.2.6	Badlands	6
15.3	Endangered and Threatened Plant Species	7
	References	8

SECTION 15

VEGETATION

LIST OF TABLES

TABLE NUMBER	TABLE TITLE
15-1	Proportions and Acreages of the Vegetation Communities within the No Name Permit Area
15-2	Characteristics of the Vegetation Communities within the No Name Mine Permit Area
15-3	Alkali Wash Vegetation Community Spring and Fall Total and Relative Cover
15-4	Vegetation Community Forage and Animal Unit Months per Acre
15-5	Sands Vegetation Community Spring and Fall Total and Relative Cover
15-6	Dunes Vegetation Community Spring and Fall Total and Relative Cover
15-7	Badlands Vegetation Community Spring and Fall Total and Relative Cover
15-8	Thin Breaks Vegetation Community Spring and Fall Total and Relative Cover
15-9	Arroyo Shrub Vegetation Community Spring and Fall Total and Relative Cover

SECTION 15

VEGETATION

LIST OF EXHIBITS

EXHIBIT NUMBER	EXHIBIT TITLE
15-1	Baseline Vegetation Communities

SECTION 15

VEGETATION

LIST OF APPENDICES

APPENDIX NUMBER	APPENDIX TITLE
15-A	Vegetation Survey Navajo Mine Area 4 North 1987
15-B	Floristic Survey and Ecological Study of BHP Area 4 North, San Juan County, 2004
15-C	2007 Baseline Vegetation Inventories
15-D	No Name Permit Area: Threatened, Endangered, and Sensitive Flora and Fauna
15-E	2025 Threatened and Endangered Species Survey No Name Permit Project

SECTION 15

VEGETATION

LIST OF REVISIONS DURING PERMIT TERM

REV. NUMBER	REVISION DESCRIPTION	DATE APPROVED

SECTION 15 VEGETATION

Navajo Transitional Energy Company's (NTEC) No Name Permit (NNP) is located in northwestern New Mexico on Navajo Nation lands in San Juan County and encompasses approximately 11,526 acres of NTEC's coal lease. Elevations of the permit area range from 5,300 to 5,600 feet and the area is characterized by low rolling grasslands/shrublands interspersed with rocky cliffs and thin breaks. Land uses in the permit area and adjacent areas include livestock grazing and residential areas.

The native vegetation of the permit area is characteristic of the Colorado Plateau salt-desert shrub ecosystem. Salt-desert shrub ranges occur in Utah, Nevada, western Colorado, northeastern Arizona, and northwestern New Mexico. This ecosystem contains a large number of salt-tolerant species and a significant shrub component. Common shrubs present include numerous species of saltbush (*Atriplex* spp.), rabbitbrush (*Chrysothamnus* spp. and *Ericameria* spp.), Mormon tea (*Ephedra* spp.), and broom snakeweed (*Gutierrezia sarothrae*). The grass community is generally dominated by the warm season species of galleta (*Pleuraphis jamesii*) and alkali sacaton (*Sporobolus airoides*) and the annual, cheatgrass (*Bromus tectorum*). The only cool-season grass of any significance is Indian ricegrass (*Achnatherum hymenoides*). Prevalent forb species include globemallow (*Sphaeralcea* spp.), buckwheat (*Eriogonum* spp.), and Russian thistle (*Salsola tragus*).

Ecosphere Environmental Services (Ecosphere) conducted a baseline vegetation inventory in 2007 for the southern portion of the NTEC's lease area including the south part of the Pinabete Mine permit area and all of the NNP area. A detailed baseline vegetation inventory report including survey methodologies and vegetation community characteristics (cover, frequency, constancy, shrub density, and production) is provided in Appendix 15-C. The raw data from this survey were reanalyzed in 2025 to only look at those samples collected within the No Name permit boundary. The purpose of the baseline inventory is to document the vegetation communities and characteristics prior to disturbance and to identify and propose suitable vegetation reference areas. These are areas which are not planned to be impacted by future mining activities, are of sufficient size to maintain natural ecological processes, and are of similar characteristics to provide comparative standards to determine reclamation success. Further discussion on reclamation success is presented in Section 37 Post-Reclamation Vegetation. The delineated vegetation communities are presented on Exhibit 15-1. The following subsections provide a summary of key vegetation resource information from Appendix 15-C as it pertains to the No Name permit area.

15.1 Vegetation Information Collection and Analysis

Spring field work for the 2007 baseline inventory occurred in May and June, fall field work was completed in October. The number of sampling points varied between the spring and fall data collection events. The spring data collection consisted of sampling a maximum of 20 randomly generated sample points within each vegetation community, while a maximum of 40 new randomly generated points were sampled during the fall data collection. The final number of spring and fall transects in each vegetation community varied to reflect changes as a result of data collection and mapping. These mapping changes affected the number of spring

transects in each vegetation community, since the most intensive ground truthing occurred during and after the spring sampling effort. Occasionally the ground truthing revealed that sample points were located within a different vegetation community than originally mapped. In these instances, the points were either sampled and their associated vegetation community classification changed, or they were not sampled and an additional point was randomly located within the bounds of the originally intended vegetation community.

The spring data collection was conducted throughout the entire project area. Parameters sampled included percent cover, species frequency, constancy, and composition. The main purpose of the spring data collection was to accurately document species occurrence. Some species may only occur during a single season; therefore, a two-season survey will more accurately represent species occurrence. The secondary purpose of the spring data collection was to propose a suitable vegetation community reference area.

The fall data collection was separated into two different studies, the permit area and vegetation community reference area. Sampling transects were independently located within each area for sampling the following parameters: percent cover, species frequency, constancy, composition, production, and shrub density. Treating the fall data collection as two separate independent studies allowed for statistical comparisons between each area and whether or not the reference area was similar to the project area. Further discussion on the selection, comparison, and use of the vegetation reference area is provided in Appendix 15-A and Section 37 Post-Reclamation Vegetation. Additional data was collected in the proposed reference areas in the fall of 2025 and will be collected again in the spring of 2026 to verify the 2007 results. These data will be analyzed and submitted to OSMRE in a supplemental report.

15.1.1. Cover, Species Frequency, and Constancy

Linear transects were established at each randomly generated sampling point and used to collect quantitative data within Areas 4 South and 5 of the permit area. Each linear transect was 50 meters (m) long and located completely within a single vegetation community at a randomly chosen direction. The random direction was determined by tossing a screwdriver into the air and following a line extending from the handle along the working end of the screwdriver. The transect origin was located where the screwdriver landed. If the entire 50-m transect length did not fall within the intended vegetation community, the screwdriver toss was repeated until a suitable direction was achieved.

Cover and frequency data were collected using a point intercept method (Barbour et al. 1980; Knight 1978) along a 50-m tape stretched the transect length. Starting at the beginning of the 50-m tape, a laser point sampler was used to point perpendicular to the ground at every 0.5-m mark along the tape; therefore, a total of 100 readings per transect was recorded. Cover data were recorded as the first “hit” of the laser beam in the following categories: bare ground, litter, gravel/stone, and vegetation. If the laser hit vegetation, the species was recorded as a measure of cover and frequency.

Species constancy was determined by identifying and recording a singular list of each species that occurred within a 100-m^2 area (i.e., 2-m wide belt transect for the length of the 50-m tape). The formula for calculating percent constancy is:

$$\left(\frac{n}{N}\right) \times 100$$

Where: n = Number of belt transects (100-m^2 area) that contain the species

N = Total number of belt transects within a vegetation community

15.1.2. Shrub Density

Shrub density was measured within a 2-m wide by 50-m long (100 m^2) belt transect (i.e., 1 m wide along each side of the tape). Every shrub rooted in the belt transect area was identified by species and recorded. Densities were reported as the number of rooted stems by species per 100 m^2 and converted to stems per acre. To remain consistent with previous reporting, shrub density was reported both with and without broom snakeweed.

15.1.3. Production

Production sampling consisted of one 1-m^2 plot (10 cm x 10 m). The plot was located at the 10-m mark along the right-hand side of the 50-m transect tape with the longer edge parallel to the tape. The placement of the production plot away from the starting point of the 50-m tape reduces bias and trampling resulting from the establishment of the transect. All plants and parts of plants located within the vertical projection of the plot were included regardless of where they were rooted. Parts of plants overhanging outside the plot were excluded. All species within the plot were identified, recorded, current year's growth clipped to ground level, bagged by species, and weighed. Clipped biomass was air dried for a minimum of 10 days and weighed to produce an air dry weight as recommended in the National Range and Pasture Handbook (United States Department of Agriculture, Natural Resources Conservation Service (USDA NRCS) 2003). Biomass lost to grazing was reconstructed using the ocular estimation method described by Coulloudon et al. (1999a). Production was measured in grams per square meter (g/m^2) and converted to pounds per acres (lb/ac).

Estimated stocking rates were calculated based on the production data. In determining the carrying capacity values, a 50 percent proper use factor was assigned to species known to be used as livestock forage. It was assumed that one animal unit requires 900 pounds of forage for a month (one animal unit month or AUM). Use factors for cattle were used as a basis; however, corresponding carrying capacity values for sheep units were also calculated.

15.1.4. Sample Adequacy

Due to the tremendous variability between transects, a statistical sample adequacy requirement on some communities would require several hundred samples. Discussions with the Office of Surface Mining Reclamation and Enforcement (OSMRE) resulted in their concurrence that a maximum of 40 samples would

be taken from any one community. Sample adequacy for the vegetation community characteristics is met by obtaining a statistically sufficient sample number or sampling a maximum of 40 samples.

Sample adequacy for vegetative cover and production is determined based on the formula (Cochran 1977):

$$n\frac{(ts)^2}{(d\bar{x})^2}_{min}$$

Where: n_{min} = Number of samples (minimum sample size)

t = varies with sample size and confidence interval (1.685 for 90% confidence interval)

s = Sample standard deviation

d = Precision level for desired percentage of the sample mean (0.10 for 90%).

$\overline{x}$ = Sample mean

15.2 Description of Vegetation Communities

The same vegetation communities used in NTEC's Navajo Mine baseline vegetation surveys were used to describe the baseline vegetation communities within the NNP area, with one exception. The three Sand vegetation communities (sands, calcareous sands, and saline sands) identified in Navajo Mine's baseline vegetation surveys are combined into one All Sands vegetation community. The decision to combine these vegetation communities is based on discussions with OSMRE and is consistent with Navajo Mine vegetation reporting (Brenda Steele, OSMRE, personal communication, 2007). The remaining vegetation communities were unchanged. Vegetation communities were categorized into the following six communities (in order of prevalence): Alkali Wash, All Sands, Dunes, Badlands, Thin Breaks, and Arroyo Shrub. Baseline vegetation communities are represented on Exhibit 15-1. The proportion of the NNP area that each vegetation community comprises is presented in Table 15-1. A summary of each community is summarized in the following subsections with a detailed discussion provided in Appendix 15-C.

15.2.1. Alkali Wash

The Alkali Wash vegetation community is the most prevalent in the NNP area (Table 15-1). It is associated with small ephemeral waterways or drainages that are typically broad and level with occasional small, dense patches of galleta grass and alkali sacaton. Alkali Wash sites are typically located in washes and major drainages as well as at the base of Badlands. Terrain is nearly level to moderately sloping, ranging from 0-3%. The soils found in the Alkali Wash vegetation community are shallow and unsuitable for salvage because of heavy clays and high sodic levels.

Total vegetative cover in the Alkali Wash vegetation community varied from 8.4 $\pm$ 6.6% (mean $\pm$ standard deviation) in the spring to 5.3 $\pm$ 4.3% in the fall (Table 15-3). Spring perennial cover was 3.0%, which comprised 32.8% of total vegetation cover (Table 15-3). Fall perennial cover was 1.6%, which comprised

24.2% of the total vegetation cover. The greatest contributor to vegetative cover was annual forbs. Relative cover for annual forbs in the spring and fall data collections was 59.7% and 61.6%, respectively. Biomass production was 139.3 ± 152.9 lb/ac (Table 15-2). The calculated stocking rate for the Alkali Wash community was 0.15 AUM/ac (Table 15-4). Average shrub density was 651.5 ± 654.7 stems/ac with broom snakeweed, and 598.3 ± 592.3 stems/ac without broom snakeweed (Table 15-2).

15.2.2. All Sands

The All Sands vegetation communities (sands, calcareous sands, and saline sands) contains moderately deep soils which can range from saline to calcareous sands. These sandy soils allow for deeper penetration of rainwater resulting in greater water availability and increased plant species diversity. The All Sands vegetation community often transitions to and can be mixed with Thin Breaks. In years with high amounts of spring rainfall, the All Sands vegetation community can display an abundance of annuals including scorpion weed (*Phacelia crenulata*), annual Townsend daisy *(Townsendia annua*), and cryptantha species (*Cryptantha* sp.).

Total vegetative cover varied from 14.9 ± 6.7% in the spring to 12.9 ± 5.8% in the fall (Table 15-2), even though the composition of annual forbs and perennial grasses changed more appreciably between the seasons (Table 15-5). Relative cover of annual forbs in the spring and fall was 61.4% and 31.6%, respectively. Meanwhile, relative cover of perennial grasses in the spring and fall was 17.9% and 43.5%, respectively. Total perennial cover in the spring was 5.6%, which comprised 36.7% of the total vegetation cover. Fall total perennial cover was 8.7%, which comprised 68.2% of the total vegetation cover. Biomass production, measured in the fall, was 206.4 ± 122.2 lb/ac (Table 15-2). The calculated stocking rate for the All Sands vegetation community was 0.16 AUM/ac (Table 15-4). Average shrub density was 1,892.0 ± 2054.5 stems/ac with broom snakeweed and 427.7 ± 317.4 stems/ac without broom snakeweed (Table 15-2).

15.2.3. Dunes

Dunes form gently rolling terrain (0-5% slopes) located on the leeward side of ridges, bluffs, and plateaus. Soils within the Dune vegetation community are deep and composed of well-drained eolian sands. These deep sands allow for deep water availability. Since only deep-rooted perennial plants can exploit this water, Dunes have several unique plant species, such as canaigre dock (*Rumex hymenosepalus*) and sand sagebrush (*Artemisia filifolia*).

Total average vegetative cover in the Dunes community varied from 21.1 ± 6.7% in the spring to 14.6 ± 4.5% in the fall (Table 15-2) due to seasonal changes in species composition, primarily higher spring annual forb cover. In the spring and fall data collection, annual forbs contributed 49.8% and 40.2% of relative vegetation cover, respectively (Table 15-6). Meanwhile, the relative cover of the perennial species in the spring and fall was 48.6% and 58.0%, respectively. Total perennial cover in the spring and fall was 9.8% and 8.1%, respectively. Biomass production, measured in the fall, was 205.6 ± 137.2 lb/ac (Table 15-2). The calculated

stocking rate for the Dunes vegetation community was 0.12 AUM/ac (Table 15-4). Average shrub density within the Dunes vegetation community was 691.7 ± 643.7 stems/ac including broom snakeweed and 524.8 ± 446.1 stems/ac without broom snakeweed (Table 15-2).

15.2.4. Badlands

The Badlands vegetation community consists of exposed, weathered shales with steep to moderately undulating topography (10-60% slopes). These sites generally occur between plateau edges and major drainages. The badlands have the least vegetation of any of the six communities. Plants, where they occur, are often located along the small relief channels of these barren areas. This vegetation community can abruptly shift to another vegetation community or gradually transition to Alkali Wash or Thin Breaks communities.

Total vegetative cover in the Badlands vegetation community varied from 3.7 ± 3.9% in the spring to 3.3 ± 2.7% in the fall (Table 15-2). Badlands sites were sparsely vegetated, and cover data demonstrated few seasonal differences. Spring perennial cover was 0.8%, which comprised 26.9% of the total vegetation cover (Table 15-7). Fall perennial cover was 1.0%, which comprised 29.7% of the total vegetation cover. The greatest contributor to total cover in the spring and fall sampling was annual forbs. Relative cover of annual forbs in the spring and fall was 52.2% and 54.3%, respectively. Biomass production was 88.1 ± 205.2 lb/ac (Table 15-2). The calculated stocking rate for the Badlands vegetation community was 0.25 AUM/ac (Table 15-4). Average shrub density was 546.8 ± 450.4 stems/ac with broom snakeweed and 540.6 ± 456.4 stems/ac without broom snakeweed (Table 15-2).

15.2.5. Thin Breaks

Thin Breaks topography includes exposed shale, siltstone, and sandstone outcrops and associated thin soils of the immediate adjacent area. These sites typically occur along ridges and rock outcrops between plateaus and major drainages or plateaus and badlands, as well as butte and mesa tops. Slopes vary from 2 to 9%. The soil surface is usually covered with thin, broken fragments of sandstone. There are rocky areas, sometimes with loose rock and sometimes with large pieces of rock firmly embedded in the ground. Thin Breaks are typically upland habitats with surface rock as a unifying feature. Flat surface rocks allow for greater water runoff and for accumulation in crevices or fissures between rocks. Thin Breaks vegetation communities can abruptly shift to another vegetation community or gradually shift to Badlands or sandy soil types.

Total vegetative cover in the Thin Breaks vegetation community varied from 4.5 ± 3.8% in the spring to 5.2 ± 3.8% in the fall (Table 15-2). With a low vegetative component in the Thin Breaks community, there was little difference between cover values in spring and fall data. Spring perennial cover within the Thin Breaks vegetation community was 1.5%, which comprised 26.2% of the total vegetation cover (Table 15-8). Fall perennial cover was 1.9%, which comprised 36.0% of the total vegetation cover. The greatest contributor to total cover in the spring and fall sampling was annual forbs. Relative cover of annual forbs in the spring and

fall sampling was 63.1% and 56.0%, respectively. Biomass production was 144.1 ± 129.0 lb/ac (Table 15-2). The calculated stocking rate for the Thin Breaks community was 0.24 AUM/ac (Table 15-4). Average shrub density was 500.6 ± 601.8 stems/ac with broom snakeweed and 368.7 ± 315.3 stems/ac without broom snakeweed (Table 15-2).

15.2.6. Arroyo Shrub

Arroyo Shrub vegetation sites are found on level or nearly level terrain (0-2% slopes) located along stream beds in major drainages, such as No Name Arroyo and Pinabete Arroyo. The Arroyo Shrub vegetation community was the least observed vegetation type in the survey area. The soils of the Arroyo Shrub vegetation community are stratified sands and often have high sodium adsorption ratio values. Production was still high on the site because of the deep, well-drained soil and proximity to water.

Total average vegetative cover in the Arroyo Shrub community varied from 20.3 ± 15.3% in the spring to 10.8 ± 6.0% in the fall (Table 15-2). Spring total perennial cover was 9.4%, which comprised 40.7% of the total vegetation cover (Table 15-9). Total perennial cover in the fall was 6.5%, which comprised 60.4% of the total vegetation cover. Perennial grass comprised over 20% of the total vegetative cover in both spring and fall. Shrub cover contributed the highest relative cover in the fall (35.5%), while annual forbs contributed the highest amount of vegetative cover in the spring (50.9%). Biomass production was 307.0 ± 492.9 lb/ac, which was higher than any other vegetation community (Table 15-2). The calculated stocking rate for the Arroyo Shrub vegetation community was 0.71 AUM/ac (Table 15-4). Shrub density in Arroyo Shrub was the highest of all vegetation communities in the project area (Table 15-2). Average shrub density was 1,019.8 ± 1070.6 stems/ac with broom snakeweed and 830.4 ± 1098.7 stems/ac without broom snakeweed.

15.3 Endangered and Threatened Plant Species

Threatened, endangered and sensitive species (TES) surveys were conducted in 1987, 2004, 2007 and 2012. Details of surveys are provided in Appendix15-A, Appendix 15-B, Appendix 15-C and Appendix 15-D. In 2025, Barr Engineering Co. (Barr) conducted an updated survey to update the 2012 occurrence data for threatened, endangered, and sensitive flora and fauna species and their potential habitat within the NNP area. Federal and tribal special status species lists have changed since 2008. Details of the 2025 surveys are provided in Appendix 15-E. The 2025 surveys focused on species listed by the United States Fish and Wildlife Service and the Navajo Natural Heritage Program of the Navajo Nation Department of Fish and Wildlife as documented or having potential to occur in the permit area. Potential habitat in the permit area was evaluated and delineated using a combination of vegetation community types and soil survey map unit descriptions. When TES flora species were found, their locations were digitally recorded with a handheld global positioning system unit.

No potential habitat occurs within the permit area boundary for any federally listed threatened or endangered flora species listed for San Juan County. No Navajo Nation threatened or endangered species, or potential

habitats, have been identified within the NTEC mining lease. Therefore, disturbance activities within the permit area would have no effects on any federally listed threatened or endangered flora species.

15.4 References

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Cochran, W.G. 1977. Sampling Techniques. 3rd Edition. Wiley Interscience, New York, New York.

Knight, D. H. 1978. Methods for Sampling Vegetation – An Instructional Manual of Botany. Department of Botany, University of Wyoming, Laramie.

Navajo Nation. 2020. Navajo Endangered Species List. Resources Committee Resolution No. RDCJA-01-20. February 13, 2020. URL: https://www.nndfw.org/nnhp/nnhp_nesl.pdf

United States Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2003. National Range and Pasture Handbook, Revision 1. USDA NRCS Grazing Lands Technology Institute, Fort Worth, Texas.

Table 15-1: Proportions and Acreages of the Vegetation Communities within the No Name Permit Area

	No Name Mine Permit Area		Baseline Survey Area	
Vegetation community	Acreage	Percent of total	Acreage	Percent of total
Alkali Wash (Al/Wa)	4,345.5	37.7	4,719.0	36.3
All Sands (Sa)	4,178.3	36.3	4,438.7	34.1
Dunes (Du)	981.6	8.5	1,204.2	9.3
Badlands (Bd)	786.8	6.8	896.8	6.9
Thin Breaks (Th/Br)	778.7	6.8	1,110.6	8.5
Arroyo Shrub (Ar/Sh)	454.9	3.9	637.1	4.9
Total	11,525.8	100	13,006.4	100

Table 15-2: Characteristics of the Vegetation Communities within the No Name Permit Area

Vegetation Community	Average Total Vegetation Cover (%)		Average Production (lbs/ac)	Average Shrub Density (stems per ac)	
	Spring	Fall	Fall	Fall	Fall[1]
Alkali Wash	8.4	5.3	139.3	651.5	598.3
Sands	14.9	12.9	206.4	1892.0	427.7
Dunes	21.1	14.6	205.6	691.7	524.8
Badlands	3.7	3.3	88.1	546.8	540.6
Thin Breaks	4.5	5.1	144.1	500.6	368.7
Arroyo Shrub	20.3	10.8	307.0	1019.8	830.4

[1] Calculated without *Guterrezia sarothrae*

Table 15-3: Alkali Wash Vegetation Community Spring and Fall Total and Relative Cover

	Average Total Vegetation Cover (%)		Average Relative Vegetation Cover (%)	
Life form	Spring	Fall	Spring	Fall
Annual forbs	4.9	3.4	59.7	61.6
Annual grasses	0.4	0.2	2.5	2.8
Unidentified forbs[1]	0.0	0.0	0.0	0.0
Perennial forbs	0.3	0.1	2.5	1.2
Perennial grasses	1.5	0.8	14.8	8.9
Perennial shrubs	1.3	0.8	15.5	13.9
Perennial succulents	0.0	0.0	0.0	0.2
Unidentified	0.1	0.0	1.7	0.0
Total perennial	3.0	1.6	32.8	24.2
Total	8.4	5.3	100.0	100.0
Standard deviation	6.6	4.3		

[1] Forbs not specifically identified as either annual or perennial

Table 15-4: Vegetation Community Forage and Animal Unit Months per Acre

Community	Usable Forage (lb/ac)[1]	AUM/ Acre[2]	Acre/ AUM[3]	Acre/ AUYL[4]	Acre/ SUYL[5]
Alkali Wash	262.30	0.15	6.9	82.3	20.6
Sands	288.80	0.16	6.2	74.8	18.7
Dunes	223.20	0.12	8.1	96.8	24.2
Badlands	444.20	0.25	4.1	48.6	12.2
Thin Breaks	425.50	0.24	4.2	50.8	12.7
Arroyo Shrub	1284.60	0.71	1.4	16.8	4.2

[1] Total usable forage is derived from production data for species known to be used as forage by cattle.

[2] Animal units sustained on one acre for one month. One animal unit requires 900 pounds of forage for one month or one AUM.

[3] Acres required to support one animal unit for one month.

[4] Acres required to support one animal unit for one year.

[5] Acres required to support one sheep unit for one year. Four sheep units are equal to one animal unit.

Table 15-5: All Sands Vegetation Community Spring and Fall Total and Relative Cover

	Average Total Vegetation Cover (%)		Average Relative Vegetation Cover (%)	
Life form	Spring	Fall	Spring	Fall
Annual forbs	9.0	4.2	61.4	31.6
Annual grasses	0.1	0.0	1.3	0.1
Unidentified forbs[1]	0.0	0.0	0.0	0.2
Perennial forbs	1.4	0.3	6.9	1.7
Perennial grasses	2.8	5.4	17.9	43.5
Perennial shrubs	1.3	3.0	11.2	22.9
Perennial succulents	0.1	0.0	0.7	0.0
Unidentified	0.1	0.0	0.6	0.0
Total perennial	5.6	8.7	36.7	68.2
Total	14.9	12.9	100.0	100.0
Standard deviation	6.7	5.8		

[1] Forbs not specifically identified as either annual or perennial

Table 15-6: Dunes Vegetation Community Spring and Fall Total and Relative Cover

	Average Total Vegetation Cover (%)		Average Relative Vegetation Cover (%)	
Life form	Spring	Fall	Spring	Fall
Annual forbs	10.9	6.2	49.8	40.2
Annual grasses	0.0	0.2	0.0	1.3
Unidentified forbs[1]	0.2	0.0	1.1	0.2
Perennial forbs	5.1	0.8	25.1	4.9
Perennial grasses	2.4	4.1	13.9	29.1
Perennial shrubs	2.3	3.2	9.4	24.0
Perennial succulents	0.1	0.0	0.2	0.0
Unidentified	0.1	0.0	0.5	0.3
Total perennial	9.8	8.1	48.6	58.0
Total	21.1	14.6	100.0	100.0
Standard deviation	6.7	4.5		

[1] Forbs not specifically identified as either annual or perennial

Table 15-7: Badlands Vegetation Community Spring and Fall Total and Relative Cover

	Average Total Vegetation Cover (%)		Average Relative Vegetation Cover (%)	
Life form	Spring	Fall	Spring	Fall
Annual forbs	2.6	2.2	52.2	54.3
Annual grasses	0.0	0.0	0.0	0.4
Unidentified forbs[1]	0.0	0.0	0.0	0.3
Perennial forbs	0.1	0.1	0.6	3.4
Perennial grasses	0.3	0.2	2.7	3.0
Perennial shrubs	0.5	0.8	23.6	23.3
Perennial succulents	0.0	0.0	0.0	0.0
Unidentified	0.3	0.0	4.2	0.0
Total perennial	0.8	1.0	26.9	29.7
Total	3.7	3.3	100.0	100.0
Standard deviation	3.9	2.7		

[1] Forbs not specifically identified as either annual or perennial

Table 15-8: Thin Breaks Vegetation Community Spring and Fall Total and Relative Cover

	Average Total Vegetation Cover (%)		Average Relative Vegetation Cover (%)	
Life form	Spring	Fall	Spring	Fall
Annual forbs	2.8	3.2	63.1	56.0
Annual grasses	0.2	0.0	1.9	0.0
Unidentified forbs[1]	0.0	0.0	0.0	0.0
Perennial forbs	0.1	0.0	2.6	0.0
Perennial grasses	0.6	1.1	12.3	17.9
Perennial shrubs	0.8	0.8	11.3	18.1
Perennial succulents	0.0	0.0	0.0	0.0
Unidentified	0.1	0.0	1.1	0.6
Total perennial	1.5	1.9	26.2	36.0
Total	4.5	5.2	100.0	100.0
Standard deviation	3.8	3.8		

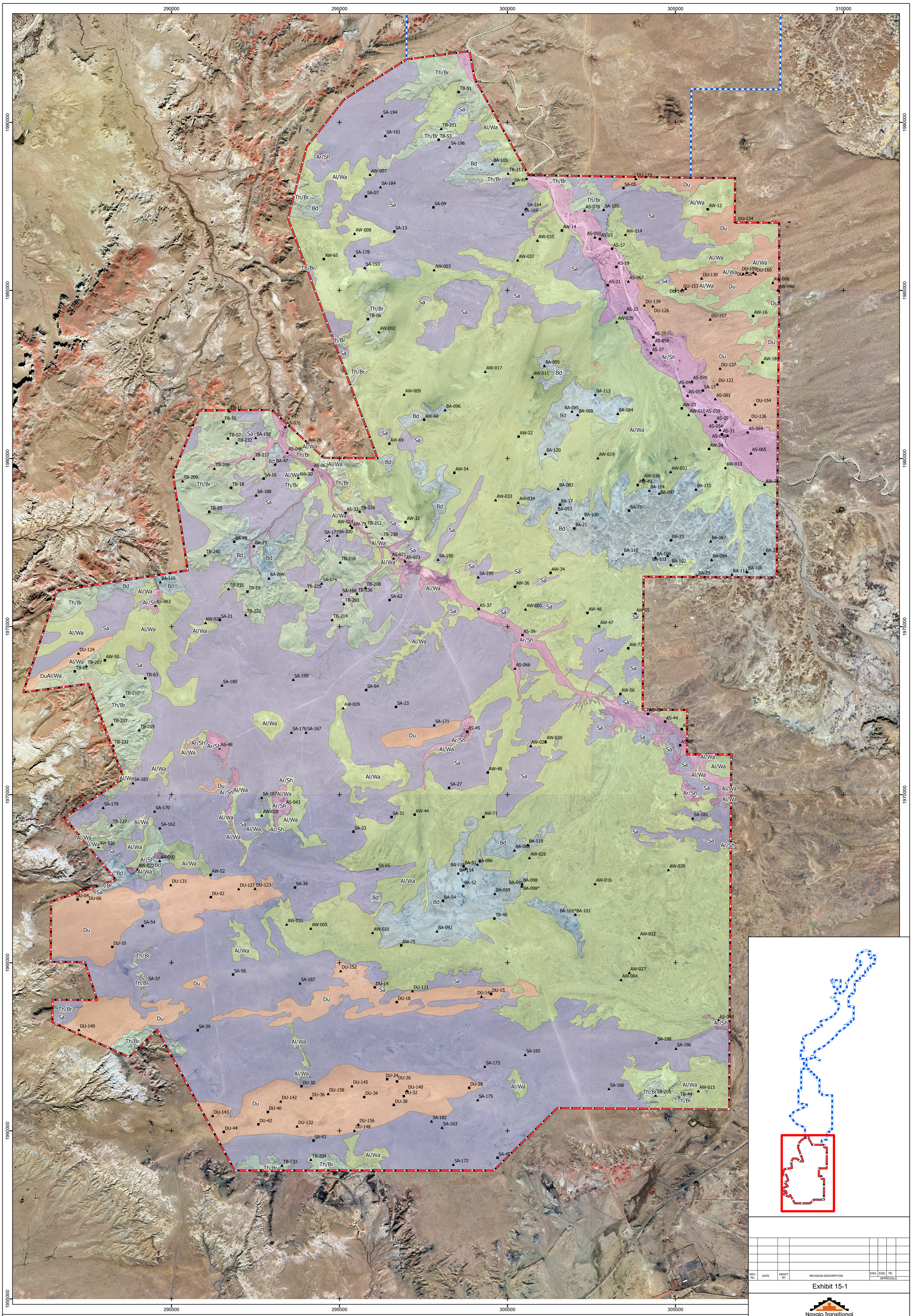
[1] Forbs not specifically identified as either annual or perennial

[2] 0.024%

Table 15-9: Arroyo Shrub Vegetation Community Spring and Fall Total and Relative Cover

	Average Total Vegetation Cover (%)		Average Relative Vegetation Cover (%)	
Life form	Spring	Fall	Spring	Fall
Annual forbs	8.0	3.7	50.9	34.2
Annual grasses	2.7	0.4	6.5	2.3
Unidentified forbs[1]	0.2	0.2	2.0	1.1
Perennial forbs	1.3	0.4	4.1	2.8
Perennial grasses	5.3	2.8	20.2	21.5
Perennial shrubs	2.8	3.1	16.3	35.5
Perennial succulents	0.0	0.1	0.0	0.5
Unidentified	0.0	0.0	0.0	2.0
Total perennial	9.4	6.5	40.7	60.4
Total	20.3	10.8	100.0	100.0
Standard deviation	15.3	6.0		

[1] Forbs not specifically identified as either annual or perennial


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Ar/Sh
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SA-161
TB-211
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Appendix 15.A

Vegetation Survey Navajo Mine Area 4 North 1987

VEGETATION SURVEY

Navajo Mine

Area IV North

by

Dr. M. Karl Wood

Dr. Kelly W. Allred

October 1987

VEGETATION INFORMATION
Navajo Mine
Area IV North

Table of Contents

1.1 Introduction 1

1.2 Vegetation Mapping and Sampling 1

1.3 Methodology 1

1.3.1 Vegetal Cover 2

1.3.2 Frequency 2

1.3.3 Constancy 2

1.3.4 Production 2

1.3.5 Density 3

1.3.6 Sample Adequacy 3

1.3.7 Randomization 3

1.4 Results and Discussion 4

1.4.1 Alkali Wash Range Site 4

1.4.2 Arroyo Shrub Range Site 5

1.4.3 Badlands Range Site 6

1.4.4 Dunes Range Site 7

1.4.5 Saline Sands Range Site 8

1.4.6 Sands Range Site 9

1.4.7 Thin Breaks Range Site 10

1.4.8 Sample Adequacy 11

1.5 General Plant Survey of Area IV North, Navajo Mine, with Emphasis on Rare, Threatened, or Endangered Species 12

Appendix A 24

VEGETATION INFORMATION

1.1 Introduction

The native vegetation of the Navajo Mine Study Area is characteristic of the Colorado Plateau salt-desert shrub ecosystem. Salt-desert shrub ranges occur in Utah, Nevada, Western Colorado, Northeastern Arizona, and Northwestern New Mexico. This ecosystem contains a large number of salt tolerant species and a significant shrub component. Common shrubs present include numerous species of salt bush (Atriplex spp.), rabbitbrush (Chrysothamnus spp.), Mormon tea (Ephedra spp.), and snakeweed (Gutierrezia sarothrae). The grass community is generally dominated by the warm season species of galleta (Hilaria jamesii) and alkali sacaton (Sporobolus airoides) and the annual, cheatgrass (Bromus tectorum). The only cool-season grass of any significance is Indian ricegrass (Oryzopsis hymenoides). Prevalent forb species include ribscale (Atriplex powellii), globemallow (Sphaeralcea spp.), buck-wheat (Eriogonum spp.), and Russian thistle (Salsola iberica).

1.2 Vegetation Mapping and Sampling

The first step characterizing the vegetation on the Navajo Mine Study Area was to produce a map that divided areas into representative units. This was accomplished by producing a range site map for the entire study area. Range sites are separate vegetation communities found on rangelands and are defined as follows:

> A distinctive kind of rangeland, which in the absence of abnormal disturbance and physical site deterioration has the potential to support a native plant community typified by an association of species different from that of other sites. This differentiation is based upon significant differences in kind or proportion of species, or total productivity (Society for Range Management. 1974. A Glossary of Terms Used in Range Management. 2nd Ed. Belke Printing Co. Denver).

Site-specific range sites were identified on the Study Area by aerial photography interpretation followed by ground truthing. Pace transects were run on undisturbed areas to obtain data on species composition and frequency of species occurrence. This information along with site-specific data on soils, geology, and topography were used to delineate individual range sites.

The map showing the distribution and extent of the seven range sites found on the Study Area are presented at the end of the report.

Sampling of the vegetation on the seven range sites occurred in July and August of 1987. This report will characterize the vegetation of the Study Area based on the 1987 data. This data is presented in its entirety as tables at the end of the report.

1.3 Methodology

Personnel of Buchanan Consultants Ltd. collected the data necessary to complete the following information:

1. Vegetation basal cover, frequency, and constancy for each species in the herbaceous stratum for each plant community.

2. Total annual production for each species in the herbaceous stratum for each plant community.

3. Basal cover, frequency, constancy, and density for each species in the shrub stratum for each plant community in which the shrub stratum is present.

4. Total production for each palatable species in the shrub stratum for each plant community in which the shrub stratum is present.

The following methodologies were utilized to assure that data was collected in a timely and statistically adequate manner.

1.3.1 Vegetal Cover

Vegetal cover by species for grasses, forbs, and shrubs was determined by utilizing a 30 meter line intercept transect. Continuous readings recording intercepted length of live vegetation were taken along the entire length of the transect. The intercepted length of each plant was recorded to the nearest 1 mm. Each transect counted as one sample.

1.3.2 Frequency

Frequency was obtained by species for grasses, forbs, and shrubs. The 30 meter tape was divided into ten subplots each 3 meters in length. The number of subplots, in which a given species was present, was recorded as a percentage.

1.3.3 Constancy

Constancy was calculated for each species by dividing the number of transects in which a species was recorded by the total number of transects within each vegetative type. Constancy values were recorded as a percentage.

1.3.4 Production

Production for grasses, forbs, and shrubs was harvested by species within a 10 cm x 10 m quadrat (1 m^{2}). The longest edge of the quadrat was placed to the right of and adjacent to a previously selected random location along the 30 meter tape. All plant biomass within the vertical projection of the quadrat was clipped regardless of rooting location. The clipped green weight was recorded to the nearest one tenth gram. Sample adequacy for production was based on these field weights. Each quadrat counted as one sample.

The clipped biomass was oven-dried at 60° C to a constant weight and recorded to the nearest one hundredth gram. All calculations of Animal Unit Months (AUMs) are reported on a per acre basis using the oven-dried weights. Animal Unit Month figures were computed by multiplying production by their appropriate Proper Use Factor (PUF). PUF values for each species were supplied by the Bureau of Indian Affairs, Shiprock Agency and the Bureau of Land Management, Farmington Resource Area Office. The products of PUF values times production/acre values

for each species were totaled by vegetation type.

AUMs per acre for each vegetation type was then calculated using the formula:

$$\text{AUM/acre} = \frac{(\text{PUF} \times \text{production})/\text{acre}}{28 \text{ lbs/day} \times 30 \text{ days/month}}$$

1.3.5 Density

Density for shrubs was determined from counting the number of rooted individuals by species within one meter of either side of the 30 meter transect. Data are expressed in numbers per acre or hectare.

1.3.6 Sample Adequacy

Sample adequacy for vegetal cover and production was determined based on the formula:

$$N = \frac{Z^2 s^2}{(d\ x)^2}$$

Where: N = Number of samples (minimum sample size)

s = Sample standard deviation

d = Precision level for desired percentage of the sample mean (expressed as a decimal).

x = Sample mean

Z = Value for specified confidence level.

The values of z and d are 1.345 and 0.20, respectively.

If, after 40 samples, sample adequacy had not been met at the desired level of accuracy, no further sampling was conducted for that range site and the sample size was considered adequate.

1.3.7 Randomization

Selection of the starting point, direction of the line intercept transect and the location of the production quadrant along the transect was completely random. The starting point for the line transect was determined by overlaying the vegetative map with a grid, assigning coordinate axes and then selecting the coordinate values from a random numbers table. A minimum of 15 sampling points was selected for each vegetative type. Following collection of data from these 15 sampling points, sample adequacy was calculated for vegetative cover and production for each vegetation type. If additional sampling points were needed to meet sample adequacy, the random selection procedure was repeated.

Direction of the transect was randomly selected by running the transect in the direction of the position of the watch second hand at the exact time that the starting point for the line transect was located in the field. If the transect extended into another vegetative type, at that point another random direction was chosen by the above method to

continue the transect to its 30 meter length.

Location of the production quadrat along the line transect was determined by selection of numbers from a random numbers table. This number was determined prior to going to the field.

1.4 Results and Discussion

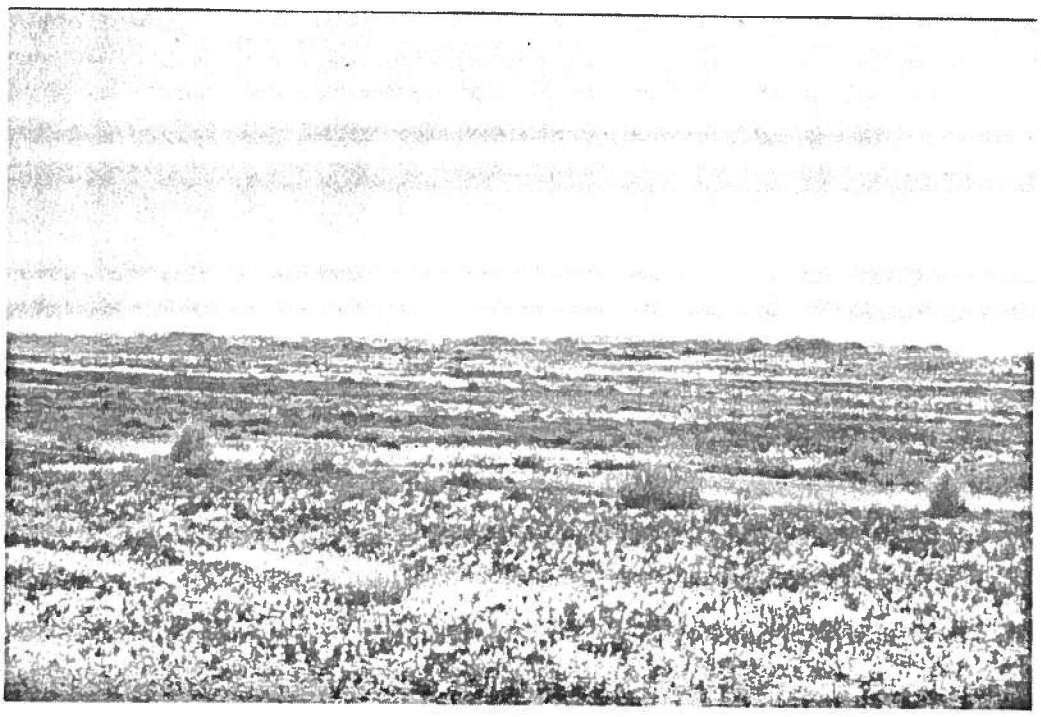
The Navajo Mine Study Area is delineated into seven range sites:

1. Alkali Wash
2. Arroyo Shrub
3. Badlands
4. Dunes
5. Saline Sands
6. Sands
7. Thin Breaks

No vegetation was found in areas delineated as River Wash on the maps.

Table 1-1 summarizes the cover and shrub density data for the 1987 survey. Table 1-2 summarizes the production or phytomass and carrying capacity data. The following sections are a discussion of the data from each range site.

1.4.1 Alkali Wash Range Site



Alkali Wash range sites occupy approximately 42.2 percent of the study area and are typically located in washes and major drainages as well as at the base of Badlands. Terrain is nearly level to moderately sloping ranging from zero to three percent. The soils are shallow and unsuitable for salvage because of heavy clays and high sodic levels.

Table 1.1. Summary of cover and shrub density for all sites

Summary	ACREAGE	COVER (%)					SHRUB DENSITY			
		Foliar		Basal		Standard	#/m square		#/ha	#/acre
		aa	mean	aa	mean	deviation	Mean	Std. dev.	Mean	Mean
Alkali Wash	1135	69814	5.81	27873	2.31	5.82	0.416	0.974	2850	1153
Arroyo Shrub	104	128130	10.68	52062	4.34	8.73	0.738	1.593	7382	2978
Badlands	786	39633	3.3	13911	1.17	3.23	0.125	0.264	1250	506
Dunes	75	101265	8.44	43186	3.58	6.33	0.691	0.963	6949	2813
Saline Sands	37	74472	6.09	45809	3.83	4.88	0.269	0.543	2688	1087
Sands	146	75143	6.19	35171	2.94	4.93	1.646	1.798	15569	6301
Thin Breaks	387	85342	7.11	42173	3.49	5.34	0.782	1.079	7832	3171

Table 1.2. Summary of production (phytomass) and carrying capacity for all sites.

All Sites

	GREEN PHYTOMASS		DRY PHYTOMASS				CARRYING CAPACITY			
Summary	g/m square		g/m square		kg/ha	lb/ac	AUM'S/acre			
	Mean	Std. dev.	Mean	Std. dev.	Mean	Mean	Cattle	Sheep	Horses	Deer
Alkali Wash	97.03	261.58	65.45	168.92	654.33	584.04	0.1435	0.1468	0.1084	0.0937
Arroyo Shrub	271.61	676.43	156.06	375.28	1560.44	1392.82	0.3031	0.3534	0.3141	0.0765
Badlands	75.19	257.61	44.24	146.3	442.32	394.78	0.0958	0.1431	0.1032	0.047
Dunes	224.93	556.3	137.11	322.64	1370.83	1223.57	0.3108	0.3272	0.2928	0.0187
Saline Sands	153.8	271.36	102.37	182.66	1023.78	913.81	0.4599	0.4631	0.4573	0.0142
Sands	172.06	393.67	102.77	244.01	1027.71	917.33	0.2731	0.293	0.277	0.042
Thin Breaks	169.49	369.41	117.52	248.09	1175.05	1048.93	0.2293	0.3907	0.2931	0.1045

These conditions made the site very unproductive.

Total vegetation cover on the range site was 2.31 percent with 1.62 percent perennial vegetation and 0.69 percent contributed by annuals. The site is dominated by the annual species of Salsola iberica, Atriplex powellii, and Halogeton glomeratus which comprise 1.0, 0.12, and 0.13 percent cover, respectively. The highest cover values for perennials were recorded for Atriplex obovata (0.65 percent), and Sporobolus airoides (0.45 percent).

The Alkali Wash range site had a total mean production of 584 pounds per acre. Annuals made up 355 pounds per acre with perennials contributing 229 pounds per acre. Highest producing annual species were Salsola iberica and Atriplex powellii at 156 and 114 pounds per acre, respectively. Atriplex obovata had 117 pounds per acre. Atriplex confertifolia had 32 pounds per acre while Suaeda torreyana and Atriplex cuneata had 32 and 29 pounds per acre, respectively. Sporobolus airoides had 18 pounds per acre which was the highest producing perennial grass.

The average shrub density for this site was 1683 plants per acre. Atriplex obovata had a mean density of 1153 per acre. Atriplex corrugata and Atriplex cuneata each had a density of 179 per acre.

The computer printouts for this range site can be found at the end of this report.

1.4.2 Arroyo Shrub Range Site



Arroyo Shrub range sites are found on level or nearly level (zero to 2 percent slopes) terrain located next to stream beds in major drainages, such as Cottonwood Wash, and occupy approximately 3.9 percent of the

Study Area. The soils are stratified sands and often have high Sodium Adsorption Ratio values. Production is still high on the site because of the deep, well-drained soil and proximity to water.

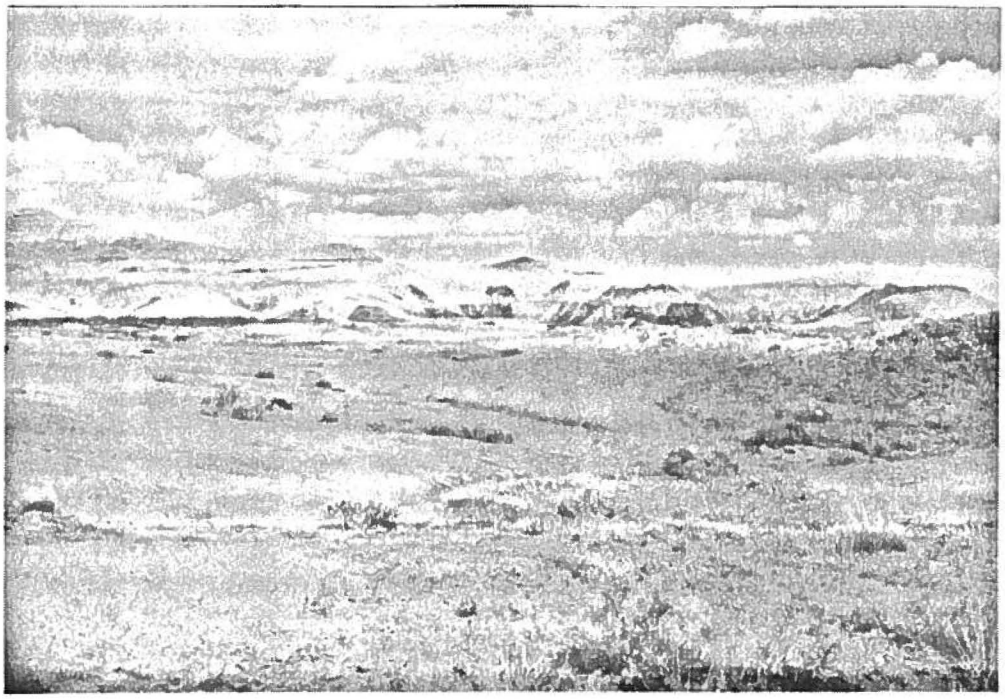
Total vegetation cover mean was 4.34 percent. Perennial vegetation made up 3.61 percent with annuals contributing 0.73 percent. Bromus tectorum had 0.47 percent cover while Vulpia octoflora had 0.18 percent. Forb cover was negligible. Perennial grasses with the most cover were Sporobolus airoides (1.07 percent), Hilaria jamesii (0.6 percent), and Oryzopsis hymenoides (0.27 percent).

Total production on this site averaged 1,393 pounds per acre. Perennial vegetation comprised 1,194 pounds per acre with annual vegetation making up 199 pounds per acre. The highest perennial production values were for Sporobolus airoides (116 pounds per acre), Sarcobatus vermiculatus (253 pounds per acre), Chrysothamnus nauseosus (348 pounds per acre), and Gutierrezia sarothrae at 118 pounds per acre.

Shrub density was the third highest of the seven range sites with a mean value of 2,978 plants per acre. Gutierrezia sarothrae had a mean density of 1,150 plants per acre followed by Atriplex obovata at 958 plants per acre.

The computer printouts for this range site can be found at the end of this report.

1.4.3 Badlands Range Site



The Badland range sites consist of exposed, weathered shales with steep to moderately undulating topography (10 to 60 percent). These sites, generally occur between plateau edges and major drainages and form

approximately 29.2 percent of the Study Area. This is the most unproductive of the seven range sites, and none of the soil material is suitable for salvage because of the high clay content and high sodium values.

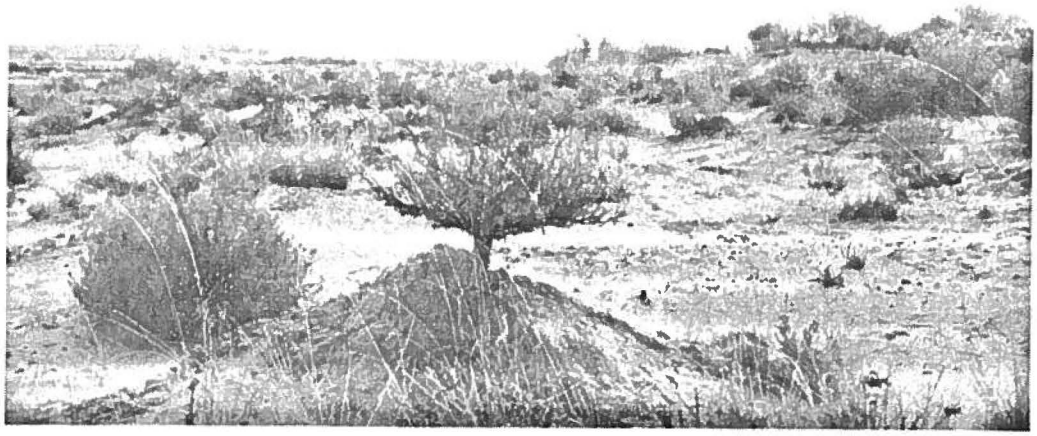
Total vegetation cover on this site averaged 1.17 percent. Annual vegetation made up 0.42 percent and perennial vegetation comprised 0.75 percent of the total cover. The highest cover values were recorded by the Atripex species. Cover for Atriplex powellii was 0.17 percent, Atriplex obovata was 0.28 percent, Atriplex confertifolia was 0.16 percent, Atriplex cuneata was 0.11 percent, and Atriplex corrugata was 0.09 percent.

Total production was 395 pounds per acre. Nearly half of this was from annuals (143 pounds per acre) and only 24.8 pounds was from perennial grasses. Shrubs of the genus Atriplex made up 227 pounds per acre.

Shrub density on Badlands was low in comparison to the other sites at 506 plants per acre. Atriplex obovata had the highest shrub density of 266 plants per acre followed by Atriplex cuneata at 155 plants per acre.

The computer printouts for this range site can be found at the end of the report.

1.4.4 Dunes Range Site



The Dunes range site is the second most productive found on the Study Area. It is the most productive for desirable forage plants. Dunes form gently rolling terrain (zero to 5 percent) located on the leeward side of ridges, bluffs, or plateaus. Dunes soils are deep and composed

of well-drained sands. Dunes range sites comprise approximately 2.8 percent of the Study Area.

Total vegetation cover of these sites was relatively high at 3.58 percent. All of the cover was perennial vegetation. The highest cover values were for grasses Muhlenbergia pungens (1.27 percent), Oryzopsis hymenoides (0.59 percent), Sporobolus airoides (0.27 percent), and Aristida purpurea (0.23 percent). Four shrubs were found in nearly equal amounts and consisted of Ephedra torreyana (0.25 percent), Eriogonum leptocladon (0.22 percent), Chrysothamnus pulchellus (0.19 percent), and Gutierrezia sarothrae (0.16 percent).

Total production on the Dunes range site averaged 1,224 pounds per acre, with perennials making up 1,223 pounds per acre and annuals only 1 pound. Penstemon strictus was the highest producing perennial forb with 4.58 pounds per acre while Oryzopsis hymenoides and Muhlenbergia pungens were the highest producing grasses with 170 and 105 pounds per acre, respectively.

Shrub species had a density value of 2,813 plants per acre on the Dunes range sites. Gutierrezia sarothrae had the highest value of 1,096 plants per acre followed by Eriogonum leptocladon with 710 plants per acre.

The computer printouts for this range site can be found at the end of this report.

1.4.5 Saline Sands Range Site



The Saline Sands range sites form the smallest expanse in the Study Area. Total area occupied by this vegetation type is approximately

1.39 percent of the Study Area. Terrain is level to gently rolling (zero to 5 percent slopes). The site in this Study Area is located downwind from strongly alkali affected sites (i.e., Badlands, Alkali Wash) or surrounding such sites. Soil types are moderately deep and soils of these sites tend to be alkaline in nature, thereby supporting vegetation species which are moderately salt tolerant.

Total vegetation cover on this site was second highest for all seven sites at 3.83 percent. Perennial vegetation made up 3.47 percent with perennial grasses comprising 3.35 percent. Cover of the perennial vegetation was dominated by grass species as follows: Sporobolus airoides (2.25 percent), Oryzopsis hymenoides (0.64 percent), and Hilaria jamesii (0.31 percent).

The only annual producing any significant cover was Vulpia octoflora at 0.12 percent.

Production of all vegetation on the Saline Sands range site averaged 914 pounds per acre. Sporobolus airoides (431 pounds per acre) and Oryzopsis hymenoides (238 pounds per acre) made up most of the production for the site.

Shrub density on this range site was 1089 plants per acre. Gutierrezia sarothrae had the majority of density with 682 plants per acre.

The computer printouts for this range site can be found at the end of this report.

1.4.6 Sands Range Site



The Sands range sites are usually located on the leeward and lower

windward side of ridges and plateaus occupying approximately 5.44 percent of the Study Area. Soils, aeolian in nature, are moderately deep and well-drained. Terrain is flat to gentle, rolling slopes (zero to 5 percent).

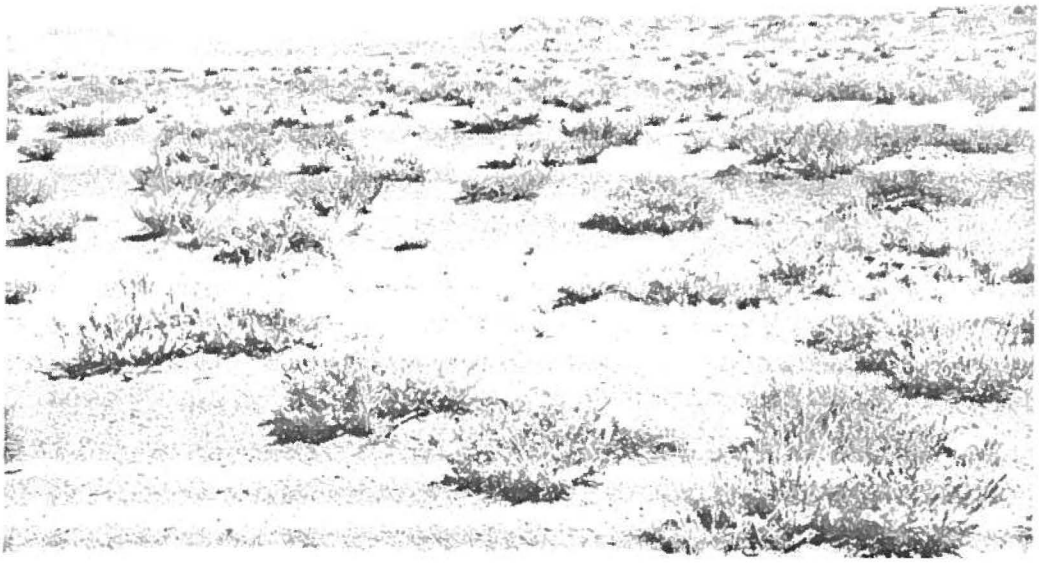
The Sands range site had a total vegetation cover of 2.94 percent. Annual vegetation contributed only 0.14 percent. Much of the total cover came from four species: Oryzopsis hymenoides (0.52 percent), Sporobolus airoides (0.61 percent), Hilaria jamesii (0.44 percent), and Gutierrezia sarothrae (0.59 percent).

Total production on this range site averaged 917 pounds per acre. Perennial vegetation contributed 834 pounds per acre with annuals having only 83 pounds per acre. The highest producing annual species was Salsola iberica at 37 pounds per acre. The six top producing perennials are: Oryzopsis hymenoides (162 pounds per acre), Sporobolus airoides (124 pounds per acre), Hilaria jamesii (73 pounds per acre), Gutierrezia sarothrae (275 pounds per acre), Atriplex confertifolia (63 pounds per acre), and Atriplex obovata (61 pounds per acre).

The Sands range site had the highest shrub density of the seven range sites at 6,301 plants per acre. The majority of these plants were Gutierrezia sarothrae with 5,319 plants per acre.

The computer printouts for this range site can be found at the end of this report.

1.4.7 Thin Breaks Range Site



Thin breaks topography includes exposed sandstone outcrops and associated thin soils of the immediate surrounding area. Thin breaks

range sites occup approximately 14.4 percent of the Study Area. These sites usually occur along ridges and rock outcrops between plateaus and major drainages or plateaus and Badlands, as well as butte and mesa tops. Slopes vary from 2 to 9 percent. Typical soils are shallow sandy deposits overlaying sandstone. The soil surface is usually covered with thin, broken fragments of sandstone.

Thin breaks range site had a total vegetation cover value of 3.49 percent. Perennial vegetation species made up 3.39 percent while annuals constituted the remainder or 0.10 percent. Perennials with the highest cover values were: Sporobolus airoides (0.62 percent), Hilaria jamesii (0.47 percent), Atriplex confertifolia (1.50 percent), and Atriplex obovata (0.46 percent). None of the annuals had any substantial cover values.

Total plant production on this site averaged 1,048 pounds per acre with perennials contributing 1,018 pounds per acre and annuals 30 pounds per acre. Top producing perennial species included Sporobolus airoides (100 pounds per acre), Atriplex confertifolia (573 pounds per acre), and Atriplex obovata (181 pounds per acre). Of the annuals Atriplex powellii had 13 pounds per acre and Salsola iberica had 7 pounds per acre.

Shrub density on the Thin breaks range site averaged 3,171 plants per acre. Atriplex confertifolia was the most abundant with 1,685 plants per acre or more than half of the total. Other abundant shrubs were Atriplex obovata (641 plants per acre) and Gutierrezia sarothrae (432 plants per acre).

The computer printouts for this range site can be found at the end of this report.

1.4.8 Sample Adequacy

Sample adequacy for production and cover on all the range sites, except for cover on Saline Sands range site, was met by taking 40 samples as explained in Section 1.3.6. Because of miscalculation or counting error in the field, 46 samples were taken for Sands range site. All 46 samples were used in calculations for the Sands range site in this report. Because of the tremendous variability between transects, statistical sample adequacy requirements on some range sites would have required several hundred samples. Discussions with O.S.M. on this issue at other UII projects in New Mexico resulted in an agreement that 40 samples would be the maximum number of samples taken on any one range site. Cover on Saline Sands met statistical sample adequacy by taking 34 samples.

GENERAL PLANT SURVEY OF AREA IV NORTH, NAVAJO MINE, WITH EMPHASIS ON RARE, THREATENED, OR ENDANGERED SPECIES

21-25 July 1987

Prepared for: Buchanan Consultants

Prepared by: Kelly W. Allred, Ph.D., Plant Taxonomist, Box 3I, New Mexico State University, Las Cruces, NM 88003, (505) 646-1042

TABLE OF CONTENTS

Page

INTRODUCTION 14

Objective 14

Methods 14

Previous Work 14

SPECIES OF SPECIAL CONCERN 15

Found 15

Not Found 15

LIST OF VASCULAR PLANT SPECIES FOUND ON THE STUDY SITE 18

REFERENCES 23

INTRODUCTION

This document reports the findings of a plant survey taken 21-25 July 1987 on Area IV North of the Navajo Mine, owned by BHP-Utah International, Inc. The study site lies about 15 miles south of Fruitland, New Mexico, and about 10 miles southeast of The Hogback. It is bounded roughly on the north by the Cottonwood Arroyo and on the south by the Pinabete Arroyo. It is approximately 3.5 miles at the longest point and 4 miles at the widest point, and comprises approximately 10 square miles. Elevation ranges from about 5300 ft. to about 5600 ft. above sea level. The native vegetation is typical of the Colorado Plateau salt-desert shrub ecosystem, with the dominant plants being species of Atriplex, Bromus, Chrysothamnus, Gutierrezia, Hilaria, Oryzopsis, Sarcobatus, and Sporobolus. Topography includes flat plains and washes, mesas and buttes, eroded talus slopes, and rounded badland hills and knolls.

Objective: To document the occurrence of the plant species found on the study area, with particular emphasis placed on rare, threatened, or endangered species.

Methods: Based on previous work done at the mine (see below), a review of pertinent literature (see References), and personal knowledge and expertise, a preliminary list of "possible species of special concern" was drawn up (see Species of Special Concern, below). In particular, the plant survey by Richard Spellenberg in 1983 of Areas I-III of the Navajo Mine was a valuable reference. In addition, habitats were identified where the species of special concern might occur. At the study site, all types of vegetation (range types) were surveyed, with special attention paid to potential habitats of the species of special concern. The survey was done entirely by foot. For plants already well-known to the author, identification was done in the field; other plants were collected, pressed, and identified later with the aid of appropriate manuals, monographs, and herbarium specimens. These specimens are deposited in the Range Science Herbarium, Department of Animal and Range Sciences, New Mexico State University, Las Cruces. Notes were taken regarding vegetation type, soils or substrate, topography, abundance, and associated plant species. Color photographs were also taken of many plants and habitats. A significant difficulty encountered in the survey was the timing relative to the growing season. Some spring-flowering plants may have already fruited and died and may have been missed in the survey. However, as many dead plants as possible were identified. Also, many of the fall-flowering species had not yet begun to bloom.

For further information about species of special concern, contact the Heritage Program, New Mexico Department of Natural Resources, Villagra Building, Santa Fe, NM 87503 (attn. Paul Knight), 827-7865

Previous Work: In November 1983 Richard Spellenberg prepared "A Report On the Plant Species Present On the Navajo Mine, With Special Emphasis On Threatened Or Endangered Species." For this he surveyed approximately 45 square miles of land to the north of the present study site, comprising Areas I-III of the Navajo Mine. He identified species of special concern and reported on those species found in his study area. He also supplied a complete listing of all

species found on the area, with notes on occurrance and abundance. His work was utilized heavily in gaining a preliminary understanding of the plants on the present study site. In order to easily compare the study areas, this report will refer to his findings. In 1986, Dr. Spellenberg also prepared for the mine "An Annotated List of the Plant Species on the Navajo, San Juan, and La Plata Coal Mines, Utah International, Inc." Acknowledgment is herein given for his contribution to this report.

SPECIES OF SPECIAL CONCERN

This section reports on the the species of special concern that may occur on the study site. The locations of species that were found are marked on the orthophotos of Area IV North, maps 8 and 9.

FOUND:

Oenothera caespitosa ssp. navajoensis (Onagraceae)
Classification: Species of special concern
Source: New Mexico Heritage Program

Oenothera caespitosa was encountered infrequently in the thin breaks and badlands range types. The plants were past flowering but still carried the fruiting capsules and could be identified as subsp. navajoensis. According to the recent revision of this group by Wagner et al. (1985), this subspecies forms small colonies on soils derived from clays, shale, sandstone, and gypsum. In New Mexico it is found only in San Juan County and central Sandoval County, but it is more common in the Colorado Plateau region of east-central Utah, northern Arizona, and western Colorado.

Platyschkuhria integrifolia var. oblongifolia (Asteraceae)
Synonyms: Platyschkuhria oblongifolia, Bahia oblongifolia
Classification: Species of special concern
Source: New Mexico Heritage Program

The most recent treatment of this species group (Ellison 1971) classifies our plant as a variety of the wider ranging Platyschkuhria integrifolia. Subspecies oblongifolia is found in desert shrub communities in all four states of the Four Corners area and is closely related to the more northern var. desertorum. Our subspecies was found somewhat frequently in the thin breaks, but infequently in the badlands, arroyo shrub, and sand range types.

NOT FOUND:

Astragalus fucatus (Fabaceae)
Classification: Species of special concern
Source: New Mexico Heritage Program

Although not located in this survey, this species was found by Spellenberg in loose sand along the east side of the Navajo Mine.

Astragalus hallii var. hallii (Fabaceae)

Astragalus humillimus (Fabaceae)

Astragalus kentrophyta var. neomexicana (Fabaceae)

Astragalus micromerius (Fabaceae)

Astragalus monumentalis var. cottamii (Fabaceae)

Astragalus monumentalis var. monumentalis (Fabaceae)

Astragalus naturitensis (Fabaceae)

Astragalus oocalycis (Fabaceae)

Atriplex pleiantha (Chenopodiaceae)
Classification: Federal candidate, category 2
Source: Spellenberg's 1983 report, New Mexico Heritage Program

Spellenberg found this species north of our study area in badlands and alkali wash range types, and it has been found in other areas as well since 1983. These range types in area IV-north were searched very carefully, especially areas with Atriplex saccaria, a known cohabitant. The species was not found. It is possible, though it seems unlikely, that plants had dried and were not recognized. Spellenberg (personal communication) thought that this species would not be present in our study area.

Camissonia scapoidea var. scapoidea (Onagraceae)
Classification: Species of special concern
Source: Spellenberg's 1983 report, New Mexico Heritage Program

Although this species was not found during the present survey, Spellenberg found it on the north banks along Cottonwood Arroyo in sandy soil. It is a spring-flowering annual, likely withered by late July when the survey was made, and to be expected in the sandy washes at the north portion of area IV-north. It has been found in several localities in the northwest corner of New Mexico, and is common to the north.

Castilleja chromosa (Scrophulariaceae)

Cercocarpus intricatus (Rosaceae)

Cleome multicaulis (Capparidaceae)

Eriogonum ovalifolium (Polygonaceae)

Gilia formosa (Polomoniaceae)

Mimulus eastwoodiae (Scrophulariaceae)

Pediocactus knowltonii (Cactaceae)

Penstemon strictus var. strictus (Scrophulariaceae)

Phacelia splendens (Hydrophyllaceae)

Sclerocactus mesae-verdae (Cactaceae)
Classification: Federal threatened
Source: Federal Register, 1980

The badlands and shale formations of the area were searched very carefully for this species. All previous searches have failed to find this cactus on the mine lease, and we did not find it in area IV-North.

Sclerocactus whipplei var. heilii (Cactaceae)

Sclerocactus whipplei var. reevesii (Cactaceae)

Sclerocactus new species, as yet undescribed (Cactaceae)

Ken Heil has recently found an undescribed species of Sclerocactus near Sheep Springs. It is very tiny and apparently allied to S. mesae-verdae (Spellenberg, personal communication). No cactus was found in this survey that could be this new species.

Veronica micromeria (Scrophulariaceae)

Wyethia scabra var. canescens (Asteraceae)

LIST OF VASCULAR PLANT SPECIES FOUND ON THE STUDY SITE

A list is presented of the vascular plants found in area IV-North in this survey. The species are arranged alphabetically within families. Following each species is an estimate of its occurrence by range type. The range types are abbreviated as follows:

- pond = stock ponds and drains
- rw = river wash
- alwa = alkali wash
- arsh = arroyo shrub
- sa = sands (including saline sands and calcareous sands)
- du = sand dunes
- thbr = thin breaks
- bd = badlands

Frequency of occurrence is estimated following Spellenberg's 1980 report, as follows:

- COMMON = part of the dominant vegetation; encountered regularly and often. abbreviation: all upper case and underlined (POND)
- OCCASIONAL = encountered several times during a search, but not regularly part of the dominant vegetation. abbreviation: all upper case (POND)
- uncommon = rarely encountered during the search abbreviation: all lower case (pond)

The frequency of the annuals and herbaceous perennials is likely underestimated because of die-off during the time of search.

An asterisk (*) notes species found that have not been recorded previously for the Navajo Mine.

APIACEAE (Carrot Fam.)	
Cymopteris sp.	sa, bd
ASCLEPIADACEAE (Milweed Fam.)	
Asclepias sp.	sa
ASTERACEAE (Sunflower Fam.)	
Ambrosia acanthicarpa (= Franseria a.)	RW, SA, DU
Artemisia bigelovii	sa, thbr
Artemisia dracunculus (=A. dracunculoides)	RW, alwa
Artemisia filifolia	sa, du
Artemisia ludoviciana subsp. mexicana	RW
*Bahia woodhousei	thbr
Brickellia oblongifolia	SA, du, THBR, bd

Chrysothamnus nauseosus subsp. graveolens	RW, alwa, ARSH,
Chrysothamnus pulchellus subsp. baileyi	sa, DU
Chrysothamnus greenei	SA
Conyza canadensis	POND, alwa
Dicoria brandegei	RW, DU
Gaillardia pinnatifida	sa
Grindelia squarrosa	POND, alwa, sa, thbr
Gutierrezia sarothrae	ALWA, ARSH, SA, DU, THBR
*Isocoma tenuisecta	rw, arsh
*Iva axillaris	POND
Lactuca serriola	arsh
Leucelene ericoides	alwa, arsh, SA, DU, bd
Machaeranthera canescens	sa, DU, thbr, bd
Platyschkuhria integrifolia var. oblongifolia (= Bahia oblongifolia)	arsh, sa, THBR, bd
Senecio douglasii var. longilobus	pond, alwa, sa, du
Stephanomeria exigua	arwh, arsh, sa, du
Townsendia fendleri	du
BORAGINACEAE (Borago Fam.)	
Cryptantha crassisepala var. elacantha	ALWA, ARSH, SA, du, THBR, bd
BRASSICACEAE (Mustard Fam.)	
Descurainia pinnata	alwa, arsh, sa, du
Sisymbrium altissimum	ALWA, ARSH, thbr, BD
CACTACEAE (Cactus Fam.)	
Opuntia polyacantha	arsh, SA
Sclerocactus whipplei var. intermedius	arsh, sa, thbr, bd
CAPPARIDACEAE (Caper Fam.)	
Cleome lutea	rw, ALWA, ARSH, sa, du, bd

CHENOPODIACEAE (Goosefoot Fam.)	
Atriplex argentea subsp. argentea	pond
Atriplex canescens	alwa, ARSH, SA, DU, THBR, bd
Atriplex confertifolia	ALWA, ARSH, SA, THBR, BD
Atriplex corrugata	ALWA, ARSH, THBR, BD
Atriplex gardneri var. cuneata (= A. cuneata, A. nuttallii var. cuneata)	alwa, arsh, BD, THBR
Atriplex obovata	ALWA, arsh, thbr, BD
Atriplex powellii	POND, ALWA, ARSH, SA, BD
Atriplex saccaria	arsh, BD
Chenopodium leptophyllum	POND
Ceratoides lanata	sa
Halogeton glomeratus	ALWA, thbr, BD
Kochia scoparia	pond
Salsola iberica (= S. kali)	POND, RW, ALWA, ARSH, SA, du, THBR, BD
Sarcobatus vermiculatus	ALWA, ARSH, sa, bd
Suaeda torreyana	pond, ALWA, ARSH, BD
CONVOLVULACEAE (Morning-glory Fam.)	
*Evolvulus pilosus	DU
EPHEDRACEAE (Mormon Tea Fam.)	
Ephedra torreyana	ARSH, SA, THBR
Ephedra viridis	thbr
EUPHORBIACEAE (Spurge Fam.)	
Euphorbia missurica var. intermedia	DU
FABACEAE (Pea Fam.)	
Astragalus mollissimus var. thompsonae	sa
Astragalus sabulonum	sa, du
Dalea lanata (= D. terminalis)	SA
*Glycerrhiza lepidota	RW

Hoffmanseggia jamesii	sa
Parryella filifolia	SA, DU
Psoralea lanceolata	RW
HYDROPHYLLACEAE (Waterleaf Fam.)	
Nama hispidum var. hispidum	sa
Phacelia crenulata var. corrugata	ALWA, ARSH, sa, thbr
LILIACEAE (Lily Fam.)	
Allium macropetalum	arwa
Yucca angustissima	SA, thbr
LINACEAE (Flax Fam.)	
Linum aristatum	SA
LOASACEAE (Loasa Fam.)	
Mentzelia albicaulis	ALWA, ARSH, SA, THBR, BD
Mentzelia multiflora	sa, thbr, BD
MALVACEAE (Mallow Fam.)	
Sphaeralcea coccinea	SA, du, THBR, bd
Sphaeralcea parviflora	alwa, arsh, SA, DU
ONAGRACEAE (Evening Primrose Fam.)	
Oenothera caespitosa subsp. navajoensis	thbr, bd
Oenothera pallida	SA
OROBANCHACEAE (Broomrape Fam.)	
Orobanche ludoviciana	SA, du
PLANTAGINACEAE (Plantain Fam.)	
Plantago patagonica (= P. purshii)	RW, ALWA, ARSH, SA, du, thbr, bd
POACEAE (Grass Fam.)	
*Agropyron cristatum	alwa
Agropyron smithii	RW
Aristida purpurea var. fendleriana	SA, DU
*Aristida purpurea var. nealleyi	sa
Bromus rubens	alwa, arsh
Bromus tectorum	ALWA, ARSH, SA, THBR, BD
Distichlis spicata	RW

Hilaria jamesii	ALWA, ARSH, SA, THBR, BD
Hordeum jubatum	RW. ALWA
Hordeum pusillum	ALWA, ARSH
Muhlenbergia pungens	SA, DU
Oryzopsis hymenoides	RW, ALWA, ARSH, SA, DU, THBR, bd
Sitanion hystrix	RW, ALWA, ARSH, SA
Sporobolus airoides	ALWA, ARSH, SA, THBR, BD
Sporobolus contractus	arsh, SA, DU
Sporobolus cryptandrus	rw, sa
Sporobolus giganteus	rw, SA, DU
Stipa comata var. comata	SA
Vulpia ocotflora	ALWA, ARSH, SA, DU, THBR, bd
POLEMONIACEAE (Phlox Fam.)	
Ipomopsis gunnisonii	sa, thbr
Ipomopsis longiflora	sa
POLYGONACEAE (Buckwheat Fam.)	
Eriogonum divaricatum	BD
Eriogonum gordonii	BD
Eriogonum hookeri	thbr
Eriogonum leptocladon	SA, DU
Eriogonum salsuginosum	ARSH, THBR, BD
Eriogonum scabrellum	BD
Polygonum aviculare	POND
Rumex hymenosepalus	SA, DU
SCROPHULARIACEAE (Snapdragon Fam.)	
Penstemon strictus?	SA, DU
SOLANACEAE (Potato Fam.)	
Lycium pallidum	ALWA, ARSH
TAMARICACEAE (Saltcedar Fam.)	
Tamarix ramosissima (= T. pentandra)	RW, ARSH
VERBENACEAE (Verbena Fam.)	
Verbena bracteata	POND

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APPENDIX A

Site: Alkali Wash

	COVER (%)							CONSTANCY	FREQUENCY	DENSITY			
	Foliar		Basal		Standard	Percentage	Percentage	%	%	#/m square		#/ha	#/acr
	mm	mean	mm	mean	deviation	of Group	of Total			Mean	Std.dev.	Mean	Mean
Annual Forbs													
Salsola iberica	11244	0.94	1192	0.1	0.13	27	4.2	75	40.75				
Atriplex powellii	7728	0.64	1422	0.12	0.25	32.2	5.1	87.5	39.25				
Halogeton glomeratus	3984	0.33	1506	0.13	0.35	34.1	5.4	32.5	18.25				
Descurainia pinnata	672	0.06	168	0.01	0.04	3.8	0.6	37.5	9.5				
Eriogonum gordonii	228	0.02	46	0	0.01	1	0.2	22.5	9				
Eriogonum salsuginosum	156	0.01	31	0	0.01	0.7	0.1	20	4.75				
Plantago patagonica	96	0.01	24	0	0.01	0.5	0.1	15	2.25				
Eriogonum scabrellum	36	0	7	0	0	0.2	0	2.5	0.25				
Atriplex saccaria	36	0	7	0	0	0.2	0	2.5	0.5				
Phacelia cenulata var. corrugata	12	0	3	0	0	0.1	0	2.5	0.25				
Cleome lutea	12	0	3	0	0	0.1	0	5	0.5				
Sisymbrium altissimum	12	0	8	0	0.01	0.2	0	2.5	0.25				
Allium macropetalum	12	0	3	0	0	0.1	0	5	0.5				
Total	24228	2.01	4420	0.36	0.81	100.2	15.9						
Annual Grasses													
Bromus tectorum	7572	0.63	3710	0.31	0.84	92.2	13.3	70	28.25				
Hordeum pusillum	262	0.02	148	0.01	0.05	3.7	0.5	10	2.5				
Vulpia octoflora	168	0.01	168	0.01	0.04	4.2	0.6	7.5	0.75				
Total	8002	0.66	4026	0.33	0.95	100.1	14.4						
Perennial Forb													
Sphaeralcea parviflora	12	0	6	0	0	100	0	2.5	0.25				
Total	12	0	6	0	0	100	0						
Perenial Grasses													
Sporobolus airoides	7632	0.64	5434	0.45	0.97	79.5	19.5	45	10.75				
Hilaria jamesii	1236	0.1	921	0.07	0.28	12	2.9	10	1				
Oryzopsis hymenoides	1080	0.09	567	0.05	0.2	8.3	2	20	3.75				
Sitanion hystrix	24	0	14	0	0.01	0.2	0.1	2.5	0.25				
Total	9972	0.83	6836	0.57	1.46	100	24.5						
Shrubs													
Atriplex obovata	16044	1.34	7813	0.65	1.04	62.1	28	87.5	34.5	0.259	0.431	2850	1153
Atriplex corrugata	3216	0.27	1376	0.12	0.65	10.9	4.9	5	2	0.044	0.266	442	179
Atriplex confertifolia	3180	0.27	1491	0.12	0.38	11.8	5.3	12.5	2.5	0.02	0.07	196	79
Suaeda torreyana	2832	0.24	1136	0.1	0.33	9	4.1	15	6.5	0.017	0.043	172	69
Atriplex cuneata	2208	0.18	733	0.06	0.19	5.8	2.6	15	3.75	0.044	0.144	442	179
Gutierrezia sarothrae	120	0.01	36	0	0.01	0.3	0.1	5	0.5	0.004	0.014	42	17
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0.002	0.006	17	7
Total	27600	2.31	12585	1.05	2.6	99.9	45.2			0.416	0.974	4161	1683
Grand Total	69814	5.81	27873	2.31	5.82		100						

SITE: Alkali Wash

	GREEN PHYTOMASS g/m square		DRY PHYTOMASS g/m square		kg/ha	lb/ac	Percentage	Percentage	CARRYING CAPACITY AUM'S/acre			
	Mean	Std.dev	Mean	Std.dev.	Mean	Mean	of Group	of Total	Cattle	Sheep	Horses	Deer
Annual Forbs												
Salsola iberica	21.45	33.39	15.6	23.6	155.97	139.22	46	23.8	0.0663	0.0663	0.0663	0.0653
Atriplex powellii	13	27.13	11.42	22.1	114.15	101.89	33.7	17.4	0.0243	0.0243	0.0243	0.0243
Halogeton glomeratus	13.35	35.63	5.43	15.5	54.33	48.5	16	8.3	0	0	0	0
Descurainia pinnata	0.7	2.53	0.89	3.39	8.88	7.92	2.6	1.4	0	0	0	0
Eriogonum gordonii	0.13	0.34	0.32	1.19	3.23	2.88	1	0.5	0.0005	0.0005	0.0005	0.0004
Eriogonum salsuginosum	0.03	0.16	0.06	0.33	0.6	0.54	0.2	0.1	0.0001	0.0001	0.0001	0
Plantago patagonica	0.05	0.22	0.17	0.9	1.65	1.47	0.5	0.3	0.0002	0.0002	0.0002	0.0002
Eriogonum scoparium	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0
Phacelia cuenulata var. corrugata	0	0	0	0	0	0	0	0	0	0	0	0
Cleome lutea	0	0	0	0	0	0	0	0	0	0	0	0
Sisymbrium alttissimum	0	0	0	0	0	0	0	0	0	0	0	0
Allium macropetalum	0	0	0	0	0	0	0	0	0	0	0	0
Total	48.71	99.95	33.89	67.06	338.81	302.42	100	51.8	0.0914	0.0914	0.0914	0.0912
Annual Grasses												
Bromus tectorum	6.03	15.97	5.93	15.76	59.33	52.96	100	9.1	0	0	0	0
Hordeum pusillum	0	0	0	0	0	0	0	0	0	0	0	0
Vulpia octoflora	0	0	0	0	0	0	0	0	0	0	0	0
Total	6.03	15.97	5.93	15.76	59.33	52.96	100	9.1	0	0	0	0
Perennial Forb												
Sphaeralcea parviflora	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
Perennial Grasses												
Sporobolus airoides	2.05	3.04	1.98	7.96	19.77	17.65	80.7	3	0.0105	0.0105	0.0105	0
Hilaria jamesii	0	0	0	0	0	0	0	0	0	0	0	0
Oryzopsis hymenoides	0.5	3.16	0.47	2.99	4.73	4.22	19.3	0.7	0.0028	0.0028	0.0028	0
Sitanion hystrix	0	0	0	0	0	0	0	0	0	0	0	0
Total	2.55	11.2	2.45	10.95	24.5	21.87	100	3.7	0.0133	0.0133	0.0133	0
Shrubs												
Atriplex obovata	21.08	47.97	13.18	28.63	131.78	117.62	56.9	20.1	0.028	0.042	0.028	0.014
Atriplex corrugata	0.9	4	0.42	2.63	4.21	3.75	1.8	0.6	0.0009	0.0013	0.0009	0.0004
Atriplex confertifolia	4.93	25.46	3.58	17.9	35.75	31.91	15.4	5.5	0.004	0.012	0.008	0.004
Suaeda torreyana	6	24.12	3.2	13.04	32	28.56	13.8	4.9	0	0	0	0
Atriplex cuneata	6.83	32.91	2.8	12.95	27.95	24.95	12.1	4.3	0.0059	0.0088	0.0059	0.003
Gutierrezia sarothrae	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0
Total	39.74	134.46	23.18	75.15	231.69	206.79	100	35.4	0.0388	0.0421	0.037	0.025
Grand Total	97.03	261.53	65.45	168.92	654.33	584.04			0.1435	0.1468	0.1384	0.0937

Site: Arroyo Shrub

	COVER (%)							CONSTANCY FREQUENCY		DENSITY			
	Foliar		Basal			Percentage	Percentage	%	%	#/m square		#/ha	#/acr
	mm	mean	mm	mean	Std.Dev.	of Group	of Total			Mean	Std.dev.	Mean	Mean
Annual Forbs													
Salsola iberica	5328	0.44	565	0.05	0.04	63.64	1.09	60	27.25				
Descurainia pinnata	996	0.08	249	0.02	0.05	27.91	0.48	52.5	13.75				
Halogeton glomeratus	156	0.01	59	0.01	0.02	6.61	0.11	5	1.25				
Eriogonum salsuginosum	36	0	7	0	0	0.78	0.01	5	0.5				
Eriogonum scabrellum	24	0	5	0	0	0.56	0.01	2.5	0.25				
Astragalus sabulonum	12	0	1	0	0	0.11	0	2.5	0.25				
Atriplex powellii	11	0	2	0	0	0.22	0	2.5	0.25				
Plantago patagonica	10	0	2	0	0	0.22	0	2.5	0.25				
Mentzelia albicaulis	5	0	1	0	0	0.11	0	2.5	0.25				
Eriogonum gordonii	4	0	1	0	0	0.11	0	7.5	0.75				
Total	6582	0.53	892	0.08	0.11	99.97	1.71						
Annual Grasses													
Bromus tectorum	11448	0.95	5610	0.47	0.56	71.17	10.78	82.5	57.25				
Vulpia octoflora	2136	0.18	2136	0.18	0.76	27.1	4.1	17.5	7.75				
Hordeum pusillum	240	0.02	136	0.01	0.03	1.73	0.26	20	2				
Total	13824	1.15	7882	0.66	1.35	100	15.14						
Perennial Forbs													
Grindelia squarrosa	168	0.01	37	0	0.01	27.84	0.07	7.5	0.75				
Sphaeralcea parviflora	144	0.01	67	0.01	0.01	54.03	0.13	10	1				
Penstemon strictus	48	0	20	0	0.02	16.13	0.04	2.5	0.25				
Total	360	0.02	124	0.01	0.04	100	0.24						
Perennial Grasses													
Sporobolus airoides	18048	1.5	12850	1.07	1.61	55.07	24.68	55	14.75				
Hilaria jamesii	10788	0.9	7163	0.6	0.89	30.7	13.76	52.5	16				
Oryzopsis hymenoides	6216	0.52	3263	0.27	0.48	13.98	6.27	72.5	20				
Sporobolus giganteus	96	0.01	58	0	0.03	0.25	0.11	2.5	0.25				
Total	35148	2.93	23334	1.95	3.01	100	44.82						
Shrubs													
Sarcobatus vermiculatus	22476	1.87	3618	0.3	0.36	18.25	6.95	67.5	17	0.112	0.106	1117	452
Chrysothamnus nauseosus	14029	1.17	3619	0.3	0.62	18.25	6.75	27.5	8.75	0.047	0.055	467	189
Gutierrezia sarothrae	13200	1.1	3920	0.33	0.67	19.77	7.53	27.5	11	0.284	0.605	2842	1150
Atriplex obovata	10788	0.9	5254	0.44	1.42	26.5	10.09	32.5	8.75	0.237	0.672	2367	958
Atriplex canescens	6144	0.51	1352	0.11	0.24	6.82	2.65	32.5	5.25	0.037	0.048	367	148
Atriplex confertifolia	1368	0.11	642	0.05	0.17	3.24	1.23	10	1.25	0.015	0.035	150	61
Suaeda torreyana	1296	0.11	520	0.04	0.27	2.62	1	2.5	0.75	0.011	0.033	139	56
Parryella filifolia	1008	0.08	252	0.02	0.13	1.27	0.48	2.5	0.25	0.001	0.005	8	3
Yucca angustissima	816	0.07	422	0.04	0.22	2.13	0.81	2.5	0.25	0.001	0.005	8	3
Ephedra torreyana	804	0.07	137	0.01	0.07	0.69	0.26	2.5	0.25	0.001	0.004	8	3
Atriplex cuneata	276	0.02	92	0.01	0.05	0.46	0.18	2.5	0.25	0.001	0.005	8	3
Isocoma tenuisecta	12	0	2	0	0	0.01	0	2.5	0.25	0.001	0.004	7	3
Artemisia dracunculus	0	0	0	0	0	0	0	0	0	0.001	0.003	4	2
Atriplex corrugata	0	0	0	0	0	0	0	0	0	0.001	0.005	8	3
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0.001	0.005	8	3
Total	72216	6.02	19830	1.65	4.22	100.01	38.09			0.751	1.63	7508	3037
Grand Total	128130	10.68	52062	4.34	8.73		100						

Site: Arroyo Shrub

	GREEN PHYTOMASS g/m square		DRY PHYTOMASS g/m square		kg/ha	lb/ac	Percentage	Percentage	CARRYING CAPACITY AUM'S/acre			
	Mean	Std.dev.	Mean	Std.dev	Mean	Mean	of Group	of Total	Cattle	Sheep	Horses	Deer
Annual Forbs												
Salsola iberica	12.08	23.79	5.7	11.3	57	50.88	94	3.7	0.0242	0.0242	0.0242	0.0242
Descurainia pinnata	0.1	0.38	0.36	1.51	3.63	3.24	6	0.2	0	0	0	0
Halogeton glomeratus	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum salsuginosum	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum scabrellum	0	0	0	0	0	0	0	0	0	0	0	0
Astragalus sabulonum	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex powellii	0	0	0	0	0	0	0	0	0	0	0	0
Plantago patagonica	0	0	0	0	0	0	0	0	0	0	0	0
Mentzelia albicaulis	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum gordonii	0	0	0	0	0	0	0	0	0	0	0	0
Total	12.18	24.17	6.06	12.81	60.63	54.12	100	3.9	0.0242	0.0242	0.0242	0.0242
Annual Grasses												
Bromus tectorum	15.18	19.01	14.55	17.89	143.5	129.67	90.1	9.3	0	0	0	0
Vulpia octoflora	1	3.9	1.08	3.95	10.8	9.64	6.7	0.7	0	0	0	0
Hordeum pusillum	0.38	3.48	0.53	2.82	5.25	4.69	3.3	0.3	0.0022	0.0022	0.0022	0
Total	16.76	25.39	16.16	24.66	161.55	144.2	100.1	10.3	0.0022	0.0022	0.0022	0
Perennial Forbs												
Grindelia squarrosa	0.98	6.17	0.47	2.96	4.68	4.17	51.9	0.3	0	0	0	0
Sphaeralcea parviflora	0.48	3	0.43	2.74	4.33	3.86	48.1	0.3	0.0005	0.0005	0.0005	0.0002
Penstemon strictus	0	0	0	0	0	0	0	0	0	0	0	0
Total	1.46	9.17	0.9	5.7	9.01	8.03	100	0.6	0.0005	0.0005	0.0005	0.0002
Perennial Grasses												
Sporobolus airoides	17.4	39.33	13.02	28.39	130.15	116.17	43.6	8.3	0.0691	0.0691	0.0691	0
Hilaria jamesii	11.58	19.79	9.98	16.56	99.82	89.1	33.4	6.4	0.0477	0.0424	0.0424	0
Oryzopsis hymenoides	6.58	16.11	6.3	13.97	62.98	56.21	21.1	4	0.0368	0.0368	0.0368	0
Sporobolus giganteus	0.88	3.53	0.59	3.73	5.9	5.27	2	0.4	0.0022	0.0022	0.0022	0
Total	36.44	80.76	29.89	62.65	298.85	266.75	100.1	19.2	0.1558	0.1505	0.1505	0
Shrubs												
Sarcobatus vermiculatus	66.48	118	28.35	49.03	283.48	253.03	27.5	18.2	0.0151	0.0302	0.0302	0
Chrysothamnus nauseosus	73.18	196.5	39.01	107.64	390.08	348.16	37.9	25	0.0415	0.0622	0.0415	0.0208
Gutierrezia sarothrae	19.2	55.32	13.17	36.14	131.73	117.56	12.8	8.4	0	0	0	0
Atriplex obovata	23.2	65	12.1	32.22	121.02	108.03	11.7	7.8	0.0257	0.0386	0.0257	0.0128
Atriplex canescens	14.98	52.23	7.14	23.76	71.4	63.73	6.9	4.6	0.0341	0.0379	0.0341	0.0152
Atriplex confertifolia	2.13	13.44	1.17	7.37	11.65	10.4	1.1	0.7	0.0012	0.0036	0.0024	0.0012
Suaeda torreyana	1.25	7.91	0.18	1.11	1.75	1.56	0.2	0.1	0	0	0	0
Parryella filifolia	3.25	20.56	1.29	8.16	12.9	11.52	1.3	0.8	0.0014	0.0014	0.0014	0.0014
Yucca angustissima	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra torreyana	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex cuneata	1.1	6.98	0.64	4.03	6.33	5.69	0.6	0.4	0.0014	0.0021	0.0014	0.0007
Isocoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia dracunculus	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex corrugata	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0
Total	204.77	535.94	103.05	269.46	1030.4	919.72	100	66	0.1204	0.176	0.1367	0.0521
Grand Total	271.61	676.43	156.06	375.28	1560.4	1392.8		100	0.3031	0.3534	0.3141	0.0765

Site: Badlands

	COVER (%)							CONSTANCY	FREQUENCY	DENSITY			
	Foliar		Basal			Percentage	Percentage	%	%	#/m square		#/ha	#/acre
	mm	mean	mm	mean	Std.Dev.	of Group	of Total			Mean	Std.dev.	Mean	Mean
Annual Forbs													
Atriplex powellii	10920	0 91	2009	0.17	0.2	48.26	14.44	80	41.5				
Salsola iberica	3609	0.3	382	0.03	0.0e	9.18	2.75	57.5	21				
Eriogonum salsuginosum	1322	0.11	1056	0.08	0.18	25.37	7.59	50	15.5				
Atriplex saccaria	1320	0.11	243	0.02	0.06	5.84	1.75	20	4.5				
Halogeton glomeratus	367	0.03	136	0.01	0.04	3.27	0.98	15	2.75				
Plantago patagonica	362	0.03	54	0.01	0.02	1.3	0.39	10	3.25				
Descurainia pinnata	248	0.02	60	0.01	0.01	1.44	0.43	12.5	2.25				
Eriogonum gordonii	245	0.02	144	0.01	0.04	3.46	1.04	15	5.25				
Eriogonum scabrellum	240	0.02	79	0.01	0	1.9	0.57	2.5	0.5				
Allium macropetalum	12	0	6	0	0	0	0	5	0.5				
Sisymbrium altissimum	21	0	10	0	0.01	0	0	5	0.5				
Total	18666	1.5a	4163	0.36	0.62	100.02	29.93						
Annual Grasses													
Bromus tectorum	1442	0.12	706	0.06	0.15	100	5.08	32.5	9.25				
Vulpia octoflora	0	0	0	0	0	0	0	2.5	0.25				
Total	1442	0.12	706	0.06	0.15	100	5.08						
Perennial Forb													
Sphaeralcea parviflora	241	0.02	112	0.01	0.05	100	0.8	5	1				
Total	241	0.02	112	0.01	0.05	100	0.8						
Perennial Grasses													
Sitanion hystrix	482	0.04	288	0.02	0.1	23.45	2.07	7.5	0.75				
Sporobolus airoides	1320	0.11	940	0.08	0.41	76.55	6.76	10	2				
Total	1802	0.15	1228	0.1	0.51	100	9.83						
Shrubs													
Atriplex obovata	6960	0.58	3390	0.28	0.52	44.02	24.37	35	26	0.066	0.086	658	266
Atriplex confertifolia	4203	0.35	1970	0.16	0.73	25.56	14.16	7.5	1.5	0.008	0.02	82	33
Atriplex cuneata	3968	0.33	1315	0.11	0.43	17.07	9.45	12.5	3.25	0.039	0.124	383	155
Atriplex corrugata	2401	0.2	1027	0.09	0.22	13.33	7.38	17.5	2.75	0.011	0.024	112	45
Gutierrezia sarothrae	0	0	0	0	0	0	0	0	0	0	0.003	3	1
Opuntia polyacantha	0	0	0	0	0	0	0	0	0	0	0.003	3	1
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0.001	0.004	8	3
Total	17532	1.46	7702	0.64	1.9	100	55.36			0.125	0.264	1249	504
Grand Total	39683	3.3	13911	1.17	3.23		100						

Site: Badlands

	GREEN PHYTOMASS g/m square		DRY PHYTOMASS g/m square		kg/ha	lb/ac	Percentage	Percentage	CARRYING CAPACITY AUM'S/acre			
	Mean	Std.dev.	Mean	Std.dev.	Mean	Mean	of Group	of Total	Cattle	Sheep	Horses	Deer
Annual Forbs												
Atriplex powellii	17.05	24.99	11.5	15.82	115	102.65	77.1	26	0.0244	0.0366	0.0244	0.0122
Salsola iberica	3.08	7.87	1.37	3.12	13.73	12.25	9.2	3.1	0.0058	0.0058	0.0058	0.0058
Eriogonum salsuginosum	1.22	3.98	0.79	2.65	7.88	7.03	5.3	1.8	0.0013	0.0013	0.0013	0.0009
Atriplex saccaria	0.45	1.78	0.25	1.01	2.48	2.21	1.7	0.6	0.0005	0.0008	0.0005	0.0002
Halogeton glomeratus	0.08	0.47	0.14	0.61	1.35	1.21	0.9	0.3	0	0	0	0
Plantago patagonica	0.9	5.69	0.2	1.23	1.95	1.74	1.3	0.4	0.0002	0.0002	0.0002	0.0002
Descurainia pinnata	0.45	2.54	0.24	1.38	2.4	2.14	1.6	0.5	0	0	0	0
Eriogonum gordonii	0.95	3.92	0.31	1.47	3.13	2.79	2.1	0.7	0.0004	0.0004	0.0004	0.0003
Eriogonum scabrellum	0.48	3	0.13	0.84	1.33	1.18	0.9	0.3	0.0002	0.0002	0.0002	0.0002
Allium macropetalum	0	0	0	0	0	0	0	0	0	0	0	0
Sisymbrium altissimum	0	0	0	0	0	0	0	0	0	0	0	0
Total	24.67	54.24	14.93	28.13	149.25	133.2	100.1	33.7	0.0328	0.0453	0.0328	0.0198
Annual Grasses												
Bromus tectorum	2.28	7.09	1.1	4.24	10.98	9.8	100	2.5	0	0	0	0
Vulpia octoflora	0	0	0	0	0	0	0	0	0	0	0	0
Total	2.28	7.09	1.1	4.24	10.98	9.8	100	2.5	0	0	0	0
Perennial Forb												
Sphaeralcea parviflora	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
Perennial Grasses												
Sitanion hystrix	0	0	0	0	0	0	0	0	0	0	0	0
Sporobolus airoides	4.38	20.75	2.78	14.33	27.8	24.81	100	6.3	0.0148	0.0148	0.0148	0
Total	4.38	20.75	2.78	14.33	27.8	24.81	100	6.3	0.0148	0.0148	0.0148	0
Shrubs												
Atriplex obovata	18.48	44.17	10.82	26.73	108.23	96.6	42.6	24.5	0.023	0.034	0.023	0.011
Atriplex confertifolia	11.18	70.68	6.21	37.33	62.08	55.41	24.4	14	0.0074	0.0222	0.0148	0.0074
Atriplex cuneata	8.85	37.05	5.88	24.26	58.83	52.51	23.1	13.3	0.0125	0.0188	0.0125	0.0062
Atriplex corrugata	5.35	23.63	2.52	11.28	25.15	22.45	9.9	5.7	0.0053	0.008	0.0053	0.0026
Gutierrezia sarothrae	0	0	0	0	0	0	0	0	0	0	0	0
Opuntia polyacantha	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0
Total	43.86	175.53	25.43	99.6	254.29	226.97	100	57.5	0.0482	0.093	0.0556	0.0272
Grand Total	75.19	257.61	44.24	146.3	442.32	394.78		100	0.0958	0.1431	0.1032	0.047

Site: Dune

	COVER (%)							CONSTANCY	FREQUENCY	DENSITY			
	Foliar		Basal			Percentage	Percentage	%	%	#/m square		#/ha	#/acre
	mm	mean	mm	mean	Std.Dev.	of Group	of Total			Mean	Std.dev.	Mean	Mean
Annual Forbs													
Ambrosia acanthicarpa	317	0.03	17	0	0	47.2	0.04	22.5	3				
Descurainia pinnata	33	0	8	0	0	22.2	0.02	7.5	1.25				
Salsola iberica	15	0	2	0	0	5.6	0	5	0.5				
Ipomopsis gunnisonii	10	0	3	0	0	8.3	0	2.5	0.25				
Dithyrea wislizenii	10	0	5	0	0	13.9	0	2.5	0.25				
Euphorbia missurica var. intermedia	2	0	1	0	0	2.8	0	2.5	0.25				
Total	387	0.03	36	0	0	100	0.08						
Annual Grass													
Bromus tectorum	7	0	3	0	0	100	0	5	0.5				
Total	7	0	3	0	0	100	0						
Perennial Forbs													
Penstemon strictus	527	0.04	214	0.02	0.04	39.9	0.5	30	4				
Evolvulus pilosus	478	0.04	145	0.01	0.04	27	0.34	12.5	3				
Dalea lanata	225	0.02	22	0	0.01	4.1	0.05	15	2				
Oenothera pallida	194	0.02	58	0.01	0.02	10.8	0.13	7.5	1.5				
Leucelene ericoides	75	0.01	38	0	0.01	7.1	0.09	7.5	0.75				
Dalea sp.	65	0.01	32	0	0.02	6	0.07	2	0.25				
Sphaeralcea parviflora	61	0.01	28	0	0.01	5.2	0.06	10	1				
Total	1625	0.14	537	0.04	0.15	100.1	1.24						
Perennial Grasses													
Muhlenbergia pungens	17480	1.46	15208	1.27	2.47	51.2	35.22	57.5	19.25				
Oryzopsis hymenoides	13574	1.13	7126	0.59	0.41	24	16.5	100	73.5				
Sporobolus airoides	4624	0.38	3292	0.27	0.57	11.1	7.62	57.5	19.25				
Aristida purpurea	3255	0.27	2786	0.23	0.33	9.4	6.45	55	9.75				
Hilaria jamesii	1091	0.09	724	0.06	0.12	2.4	1.68	27.5	9				
Sporobolus giganteus	933	0.08	565	0.05	0.13	1.9	1.31	20	3.25				
Total	40957	3.41	29701	2.47	4.03	100	68.77						
Shrubs													
Ephedra torreyana	17350	1.45	2950	0.25	0.31	22.9	6.83	67.5	14.25	0.057	0.047	571	231
Eriogonum leptocladon	11887	0.99	2686	0.22	0.29	20.8	6.22	80	32.75	0.172	0.166	1754	710
Chrysothamnus pulchellus	10537	0.88	2276	0.19	0.28	17.6	5.27	52.5	11.25	0.084	0.104	858	339
Gutierrezia sarothrae	6442	0.54	1913	0.16	0.32	14.8	4.43	62.5	14.25	0.271	0.372	2708	1096
Chrysothamnus nauseosus	3967	0.33	1023	0.08	0.34	7.9	2.37	12.5	2.25	0.014	0.032	142	57
Artemisia filifolia	3319	0.28	770	0.06	0.22	6	1.78	12.5	2	0.019	0.073	192	78
Atriplex canescens	1540	0.13	339	0.03	0.09	2.6	0.78	15	2.25	0.015	0.021	154	62
Isocoma tenuisecta	1180	0.1	229	0.02	0.1	1.8	0.53	7	0.75	0.007	0.029	71	29
Chrysothamnus greenei	1143	0.1	251	0.02	0.1	1.9	0.58	10	2	0.016	0.048	158	64
Yucca angustissima	814	0.07	420	0.04	0.1	3.3	0.97	17.5	2	0.032	0.053	320	130
Atriplex confertifolia	110	0.01	52	0	0	0.4	0.12	2.5	0.25	0.003	0.014	29	12
Atriplex obovata	0	0	0	0	0	0	0	0	0	0.001	0.004	12	5
Total	58289	4.86	12909	1.07	2.15	100	29.39			0.691	0.963	6949	2813
Grand Total	101265	8.44	43186	3.58	6.33		100						
Grand Total	101265	8.44	43186	3.58	6.33		100						

Site: Dunes

	GREEN PHYTOMASS g/m square		DRY PHYTOMASS g/m square		kg/ha	lb/ac	Percentage of Group	Percentage of Total	CARRYING CAPACITY AUM'S/acre			
	Mean	Std.dev.	Mean	Std.dev.	Mean	Mean			Cattle	Sheep	Horses	Deer
Annual Forbs												
Ambrosia acanthicarpa	0.4	2.53	0.09	0.57	0.9	0.8	100	0.1	0	0	0	0
Descurainia pinnata	0	0	0	0	0	0	0	0	0	0	0	0
Salsola iberica	0	0	0	0	0	0	0	0	0	0	0	0
Ipomopsis gunnisonii	0	0	0	0	0	0	0	0	0	0	0	0
Dithyrea wislizenii	0	0	0	0	0	0	0	0	0	0	0	0
Euphorbia missurica	0	0	0	0	0	0	0	0	0	0	0	0
Total	0.4	2.53	0.09	0.57	0.9	0.8	100	0.1	0	0	0	0
Annual Grass												
Bromus tectorum	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	100	0	0	0	0	0
Perennial Forbs												
Penstemon strictus	0.45	2.85	0.51	2.18	5.13	4.58	49.7	0.4	0.0003	0.000	0.0003	0.000
Evolvulus pilosus	0.55	2.47	0.24	1.09	2.35	2.1	22	0.2	0.0003	0.000	0.0003	0.000
Dalea lanata	0.62	2.82	0.13	0.61	1.3	1.16	12.1	0.1	0	0	0	0
Oenothera pallida	0.82	3.66	0.19	0.87	1.93	1.72	18	0.1	0	0	0	0
Leucelene ericoides	0	0	0	0	0	0	0	0	0	0	0	0
Dalea sp.	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeralcea parviflora	0	0	0	0	0	0	0	0	0	0	0	0
Total	2.01	11.8	1.07	4.75	10.71	9.56	100	0.8	0.0006	0.000	0.0006	0.000
Perennial Grasses												
Muhlenbergia pungens	17.02	35.61	11.77	25.61	117.7	105.06	27.1	8.6	0.0125	0.012	0.0125	0.006
Oryzopsis hymenoides	28.8	25.34	19.12	19	191.18	170.64	44	13.9	0.1117	0.111	0.1117	0
Sporobolus airoides	9.4	26.27	6.31	18.21	63.08	56.3	14.5	4.6	0.0335	0.033	0.0335	0
Aristida purpurea	5.02	11.98	2.93	7.8	29.3	26.15	6.8	2.2	0.0047	0.004	0.0047	0
Hilaria jamesii	2.98	7.82	1.42	3.79	14.18	12.65	3.3	1	0.0068	0.006	0.006	0
Sporobolus giganteus	3.32	12.92	1.84	6.09	18.35	16.38	4.2	1.3	0.0066	0.006	0.0068	0
Total	66.54	119.94	43.39	80.5	433.79	387.18	100	31.6	0.175	0.175	0.1752	0.006
Shrubs												
Ephedra torreyana	48.47	98.66	33.28	65.26	332.78	297.04	36	24.3	0.0707	0.070	0.053	0.070
Eriogonum leptocladon	26.3	51.83	15.94	32.95	159.35	142.24	17.2	11.6	0.0254	0.025	0.0254	0.016
Chrysothamnus pulchellus	21.85	44.21	12.94	25.71	129.35	115.46	14	9.4	0.0137	0.020	0.0137	0.006
Gutierrezia sarothrae	19.9	38.24	10.01	19.39	100.13	89.37	10.8	7.3	0	0	0	0
Chrysothamnus nauseosus	23	92.13	12.04	46.35	120.43	107.49	13	8.8	0.0128	0.019	0.0128	0.006
Artemisia filifolia	4	22.28	1.67	9.62	16.7	14.91	1.8	1.2	0.0036	0.005	0.0036	0.000
Atriplex canescens	2.3	14.55	1.37	8.65	13.68	12.21	1.5	1	0.0065	0.007	0.0065	0.002
Isocoma tenuisecta	6.08	34.88	3.06	17.74	30.55	27.27	3.3	2.2	0	0	0	0
Chrysothamnus greenei	0.38	1.69	0.23	1.03	2.33	2.08	0.3	0.2	0.0002	0.000	0.0002	0.000
Yucca angustissima	2.42	15.34	1.52	6.97	15.15	13.52	1.6	1.1	0.0008	0.000	0.0008	0.000
Atriplex confertifolia	1.3	8.22	0.5	3.15	4.98	4.44	0.5	0.4	0.0005	0.001	0.001	0.000
Atriplex obovata	0	0	0	0	0	0	0	0	0	0	0	0
Total	156	422.03	92.56	236.82	925.43	826.03	100	67.5	0.1342	0.151	0.117	0.011
Grand Total	224.95	556.3	137.11	322.64	1370.8	1223.5		100	0.3103	0.327	0.2923	0.018
Grand Total	224.95	556.3	137.11	322.64	1370.8	1223.5		100	0.3108	0.327	0.2928	0.018

Site: Saline Sands

	COVER (%)							CONSTANCY	FREQUENCY	DENSITY			
	Foliar		Basal			Percentage	Percentage	%	%	#/m square		#/ha	#/acre
	mm	mean	mm	mean	Std.Dev.	of Group	of Total			Mean	Std.dev.	Mean	Mean
Annual Forbs													
Cryptantha crassisepala	1224	0.1	678	0.06	0.06	73.1	1.5	45.7	14.35				
Salsola iberica	576	0.05	61	0.01	0.01	6.6	0.1	19.6	5.65				
Descurainia pinnata	348	0.03	87	0.01	0.03	9.4	0.2	30.4	5.65				
Plantago patagonica	324	0.03	81	0.01	0.03	8.7	0.2	23.9	5				
Ambrosia acanthicarpa	252	0.02	14	0	0	1.5	0	21.7	3.04				
Nama hispidum	24	0	6	0	0	0.6	0	2.2	0.22				
Eriogonum gordonii	0	0	0	0	0	0	0	2.2	0.22				
Total	2748	0.33	927	0.08	0.13	99.9	2						
Annual Grasses													
Bromus tectorum	2400	0.2	1176	0.1	0.38	44.9	2.6	43.5	16.3				
Vulpia octoflora	1416	0.12	1416	0.12	0.18	54	3.1	76.1	28.04				
Bromus rubens	60	0.01	29	0	0.02	1.1	0.1	4.3	0.87				
Total	3876	0.33	2621	0.22	0.58	100	5.7						
Perennial Forbs													
Penstemon strictus	1128	0.09	459	0.04	0.09	67.3	1	26.3	6.96				
Sphaeralcea parviflora	612	0.05	153	0.01	0.06	22.4	0.3	23.9	3.91				
Sphaeralcea coccinea	252	0.02	63	0.01	0.02	9.2	0.1	19.6	3.26				
Oenothera pallida	24	0	7	0	0	1	0	2.2	0.22				
Total	2016	0.16	682	0.06	0.17	99.9	1.5						
Perennial Grasses													
Sporobolus airoides	37944	3.16	27016	2.25	1.67	67.5	59	95.7	81.74				
Oryzopsis hymenoides	14508	1.21	7617	0.64	0.52	19	16.6	95.7	68.48				
Hilaria jamesii	5520	0.46	3665	0.31	0.83	9.2	8	52.2	16.3				
Aristida purpurea	1908	0.16	1635	0.14	0.53	4.1	3.6	17.4	5.87				
Sporobolus cryptandrus	84	0.01	60	0.01	0.04	0.1	0.1	2.2	0.22				
Sporobolus giganteus	36	0	22	0	0.01	0.1	0	2.2	0.22				
Total	6000	4.84	40014	3.35	3.6	100	87.3						
Shrubs													
Ephedra torreyana	2376	0.2	404	0.03	0.1	25.8	0.9	17.4	2.17	0.012	0.022	120	48
Gutierrezia sarothrae	1224	0.1	364	0.03	0.06	23.3	0.8	32.6	7.39	0.168	0.266	1685	682
Atriplex obovata	612	0.05	298	0.03	0.08	19	0.7	13	1.74	0.021	0.055	210	85
Atriplex canescens	576	0.05	127	0.01	0.04	5.1	0.3	10.9	1.52	0.018	0.026	181	73
Atriplex confertifolia	576	0.05	270	0.02	0.08	17.3	0.6	21.7	2.39	0.024	0.053	243	98
Eriogonum leptocladon	192	0.02	43	0	0.02	2.7	0.1	2.2	0.43	0.005	0.032	54	22
Isocoma tenuisecta	144	0.01	26	0	0.02	1.8	0.1	2.2	0.43	0.003	0.017	25	10
Opuntia polyacantha	48	0	10	0	0	0.6	0	6.3	0.65	0.001	0.002	4	2
Lycium pallidum	36	0	11	0	0	0.7	0	4.3	0.65	0.011	0.04	105	43
Chrysothamnus nauseosus	24	0	6	0	0	0.4	0	2.2	0.22	0.001	0.003	7	3
Sarcobatus vermiculatus	23	0	4	0	0	0.3	0	4.3	0.43	0.003	0.007	25	10
Yucca angustissima	0	0	0	0	0	0	0	0	0	0.003	0.022	33	13
Total	5831	0.48	1565	0.12	0.4	100	3.4			0.27	0.545	2688	1089
Grand Total	74471	6.09	45809	3.83	4.88		100						

Site: Saline Sands

	GREEN PHYTOMASS g/m square		DRY PHYTOMASS g/m square		kg/ha	lb/ac	Percentage of Group	Percentage of Total	CARRYING CAPACITY AUM'S/acre			
	Mean	Std.dev.	Mean	Std.dev.	Mean	Mean			Cattle	Sheep	Horses	Deer
Annual Forbs												
Cryptantha crassisepala	2.78	10.58	2.18	8.73	21.83	19.48	68.6	2.1	0	0	0	0
Salsola iberica	0.54	2.83	0.14	0.73	1.41	1.26	4.4	0.1	0.0006	0.0006	0.0006	0.0006
Descurainia pinnata	0.87	5.7	0.75	5.06	7.46	6.66	23.4	0.7	0	0	0	0
Plantago patagonica	0.17	1.18	0.07	0.49	0.72	0.64	2.3	0.1	0.0001	0.0001	0.0001	0.0001
Ambrosia acanthicarpa	0.54	3.69	0.04	0.28	0.41	0.37	1.3	0	0	0	0	0
Nama hispidum	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum gordonii	0	0	0	0	0	0	0	0	0	0	0	0
Total	4.9	24.18	3.18	15.29	31.83	28.41	100	2.1	0.007	0.0007	0.0007	0.0007
Annual Grasses												
Bromus tectorum	1.59	4.05	0.97	2.56	9.74	8.69	24.5	1	0	0	0	0
Vulpia octoflora	5.02	9.99	2.81	6.61	28.11	25.09	70.9	2.7	0	0	0	0
Bromus rubens	0.22	1.47	0.19	1.25	1.85	1.65	4.7	0.2	0	0	0	0
Total	6.83	15.51	3.97	10.42	39.7	35.43	100	3.9	0	0	0	0
Perennial Forbs												
Penstemon strictus	3.22	9.51	1.06	5.65	10.61	9.47	90.4	1	0.0006	0.0012	0.0006	0.0012
Sphaeralcea parviflora	0.3	2.06	0.11	0.77	1.13	1.01	9.6	0.1	0.0001	0.0001	0.0001	0
Sphaeralcea coccinea	0	0	0	0	0	0	0	0	0	0	0	0
Oenothera pallida	0	0	0	0	0	0	0	0	0	0	0	0
Total	3.52	11.57	1.17	4.42	11.74	10.48	100	1.1	0.0007	0.0013	0.0007	0.0012
Perennial Grasses												
Sporobolus airoides	71.28	51.36	48.3	38.04	483	431.13	58.5	47.2	0.2566	0.2566	0.2566	0
Oryzopsis hymenoides	38.07	46.01	26.72	37.48	267.17	238.48	32.4	26.1	0.1561	0.1561	0.1561	0
Hilaria jamesii	5.96	12.18	3.92	8.34	39.24	35.02	4.8	3.8	0.0188	0.0167	0.0167	0
Aristida purpurea	4.85	20.17	3.58	15.46	35.76	31.92	4.3	3.5	0.0057	0.0057	0.0057	0
Sporobolus cryptandrus	0	0	0	0	0	0	0	0	0	0	0	0
Sporobolus giganteus	0	0	0	0	0	0	0	0	0	0	0	0
Total	120.16	129.72	82.52	99.32	825.17	736.55	100	80.6	0.4372	0.4331	0.4331	0
Shrubs												
Ephedra torreyana	5.46	28.53	3.3	17.45	33.02	29.48	22.6	3.2	0.007	0.007	0.005	0.007
Gutierrezia sarothrae	5.11	14.83	2.87	8.33	28.72	25.63	24.9	2.8	0	0	0	0
Atriplex obovata	2.28	10.94	1.41	6.69	14.07	12.55	12.2	1.4	0.003	0.004	0.003	0.002
Atriplex canescens	3.5	17.45	2.04	10.64	20.39	18.2	17.7	2	0.0098	0.0109	0.0098	0.0022
Atriplex confertifolia	1.76	7.13	1.07	4.38	10.7	9.55	9.3	1	0.0011	0.0033	0.0022	0.0011
Eriogonum leptoclador	0	0	0	0	0	0	0	0	0	0	0	0
Isocoma tenuisecta	0.23	1.92	0.06	0.41	0.61	0.54	0.5	0.1	0	0	0	0
Opuntia polyacantha	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus nauseosus	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	1.41	9.58	0.78	5.31	7.83	6.99	6.8	0.8	0.0004	0.0008	0.0008	0
Yucca angustissima	0	0	0	0	0	0	0	0	0	0	0	0
Total	18.39	90.38	11.33	53.21	115.34	102.94	100	11.3	0.0213	0.026	0.0202	0.0123
Grand Total	153.8	271.36	102.37	182.66	1023.7	913.31		100	0.4599	0.4831	0.4573	0.0142

Site: Sands

	COVER (%)							CONSTANCY	FREQUENCY	DENSITY			
	Foliar		Basal			Percentage	Percentage	%	%	#/m square		#/ha	#/acre
	mm	mean	mm	mean	Std.Dev.	of Group	of Total			Mean	Std.dev.	Mean	Mean
Annual Forbs													
Salsola iberica	2280	0.17	242	0.02	0.07	59	6.7	20.6	7.94				
Descurainia pinnata	372	0.03	93	0.01	0.02	22.7	0.3	26.5	7.94				
Nama hispidum	96	0.01	24	0	0.01	5.9	0.1	11.8	1.18				
Allium macropetalum	48	0	13	0	0.01	3.2	0	2.9	0.29				
Cryptantha crassisepala	48	0	27	0	0.01	6.6	0.1	11.8	1.77				
Atriplex saccaria	36	0	7	0	0	1.7	0	2.9	0.29				
Dithyrea wislezenii	12	0	3	0	0	0.7	0	2.9	0.29				
Ambrosia acanthicarpa	12	0	1	0	0	0.2	0	2.9	0.29				
Sisymbrium altissimum	0	0	0	0	0	0	0	0	0				
Total	2904	0.23	410	0.03	0.12	100	1.2						
Annual Grasses													
Bromus tectorum	1488	0.12	729	0.06	0.26	54.9	2.1	38.2	11.77				
Vulpia octoflora	600	0.05	600	0.05	0.14	45.1	1.7	32.4	10				
Total	2088	0.17	1329	0.11	0.4	100	3.8						
Perennial Forbs													
Pentemon strictus	528	0.04	215	0.02	0.06	71	0.6	20.6	4.12				
Leucelene ericoides	168	0.01	84	0.01	0.02	27.7	0.2	14.7	2.35				
Delea lanata	36	0	4	0	0	1.3	0	2.9	0.59				
Sphaeralcea parviflora	12	0	0	0	0	0	0	5.9	0.59				
Total	744	0.05	303	0.03	0.08	100	0.9						
Perennial Grasses													
Oryzopsis hymenoides	11892	0.99	6243	0.52	0.66	28.4	17.8	91.2	62.06				
Sporobolus airoides	10248	0.85	7297	0.61	0.77	33.2	18.3	73.5	30.88				
Hilaria jamesii	7944	0.66	5275	0.44	0.59	24	15.4	70.6	40				
Aristida purpurea	2448	0.2	2095	0.18	0.57	9.5	6.1	29.4	8.24				
Muhlenbergia pungens	1008	0.08	877	0.07	0.23	4	2.5	11.8	2.35				
Sporobolus cryptandrus	132	0.01	94	0.01	0.05	0.4	0.3	2.9	0.59				
Sporobolus giganteus	132	0.01	80	0.01	0.04	0.4	0.2	2.9	0.88				
Total	33804	2.8	21961	1.34	2.91	99.9	62.4						
Shrubs													
Gutierrezia sarothrae	24012	2	7132	0.59	0.53	63.9	20.3	79.4	52.35	1.314	1.219	13142	5319
Atriplex confertifolia	3864	0.32	1812	0.15	0.25	16.2	5.2	38.4	7.94	0.087	0.139	873	353
Ephedra torreyana	2496	0.21	424	0.04	0.09	3.8	1.2	26.5	3.53	0.028	0.041	284	115
Atriplex obovata	2436	0.2	1136	0.1	0.36	10.6	3.4	11.8	1.76	0.018	0.054	176	71
Eriogonum leptocladon	2088	0.17	472	0.04	0.13	4.2	1.3	17.6	6.47	0.07	0.196	696	282
Chrysothamnus pulchellus	396	0.03	86	0.01	0.03	0.8	0.3	17.6	3.53	0.016	0.048	157	63
Atriplex canescens	132	0.01	29	0	0.01	0.3	0.1	5.9	0.59	0.011	0.026	113	46
Lycium pallidum	48	0	13	0	0.01	0.1	0	2.9	0.29	0.01	0.057	98	40
Atriplex cuneata	36	0	12	0	0.01	0.1	0	2.9	0.29	0.001	0.009	15	6
Yucca angustissima	0	0	0	0	0	0	0	0	0	0.001	0.009	15	6
Total	35508	2.94	11166	0.93	1.42	100	31.8			1.646	1.796	15569	6301
Grand Total	75143	6.19	35171	2.94	4.93		100.1						

Site: Sands

	GREEN PHYTOMASS g/m square		DRY PHYTOMASS g/m square		kg/ha	lb/ac	Percentage	Percentage	CARRYING CAPACITY AUM'S/acre			
	Mean	Std.dev.	Mean	Std.dev.	Mean	Mean	of Group	of Total	Cattle	Sheep	Horses	Deer
Annual Forbs												
Salsola iberica	11.12	31.46	4.14	12.27	41.44	36.99	70.8	4	0.0176	0.0176	0.0176	0.0176
Descurainia pinnata	1.71	5.7	1.39	4.72	13.94	12.44	23.8	1.4	0	0	0	0
Nama hispidum	0	0	0	0	0	0	0	0	0	0	0	0
Allium macropetalum	0	0	0	0	0	0	0	0	0	0	0	0
Cryptantha crassisepala	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0
Dithyrea wislizenii	0	0	0	0	0	0	0	0	0	0	0	0
Ambrosia acanthicarpa	0	0	0	0	0	0	0	0	0	0	0	0
Sisymbrium altissimum	0.53	3.09	0.32	1.84	3.15	2.81	5.4	0.3	0	0	0	0
Total	13.36	40.25	5.85	18.83	58.53	52.24	100	5.7	0.0176	0.0176	0.0176	0.0176
Annual Grasses												
Bromus tectorum	1.44	6.01	0.98	4.19	9.82	8.77	67.9	1	0	0	0	0
Vulpia octoflora	1.24	6.36	0.47	2.01	4.65	4.15	32.1	0.5	0	0	0	0
Total	2.68	12.39	1.45	6.2	14.47	12.92	100	1.4	0	0	0	0
Perennial Forbs												
Penstemon strictus	0.97	5.66	0.13	0.74	1.26	1.13	100	0.1	0.0001	0.0001	0.0001	0.0001
Leucelene ericoides	0	0	0	0	0	0	0	0	0	0	0	0
Dalea lanata	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeralcea parviflora	0	0	0	0	0	0	0	0	0	0	0	0
Total	0.97	5.66	0.13	0.74	1.26	1.13	100	0.1	0.0001	0.0001	0.0001	0.0001
Perennial Grasses												
Oryzopsis hymenoides	28.09	29.29	18.19	25.1	181.88	162.35	40.8	17.7	0.1063	0.1063	0.1063	0
Sporobolus airoides	22.74	40.18	13.89	28.29	138.91	123.99	32.2	13.5	0.0738	0.0738	0.0738	0
Hilaria jamesii	13.59	21.59	8.15	13.36	81.53	72.77	18.3	7.9	0.039	0.035	0.035	0
Aristida purpurea	1.88	5.97	1.36	4.45	13.59	12.13	3	1.3	0.0022	0.0022	0.0022	0
Muhlenbergia pungens	3.97	13.72	2.97	10.02	29.71	26.52	6.7	2.9	0.0032	0.0032	0.0032	0.0016
Sporobolus cryptandrus	0	0	0	0	0	0	0	0	0	0	0	0
Sporobolus giganteus	0	0	0	0	0	0	0	0	0	0	0	0
Total	70.27	110.15	44.56	81.22	445.62	397.76	100	43.4	0.2245	0.221	0.221	0.0016
Shrubs												
Gutierrezia sarothrae	48.06	65.37	30.87	48.22	308.79	275.63	60.8	30	0	0	0	0
Atriplex confertifolia	11.68	45.74	7.06	29.65	70.56	62.98	13.9	6.9	0.0075	0.023	0.015	0.0075
Ephedra torreyana	5.12	20.9	3.1	12.65	31	27.67	6.1	3	0.0066	0.0066	0.0066	0.006
Atriplex obovata	14.65	70.79	6.89	33.12	68.85	61.46	13.6	6.7	0.0146	0.022	0.0146	0.0073
Eriogonum leptocladon	1.56	6.69	1.22	5.12	12.24	10.92	2.4	1.2	0	0	0	0
Chrysothamnus pulchellus	2.71	8.9	1	4.55	10.03	8.95	2	1	0.0011	0.002	0.0011	0.0005
Atriplex canescens	0.21	1.2	0.22	1.29	2.21	1.97	0.4	0.2	0.0011	0.0014	0.0011	0.0005
Lycium pallidum	0.79	4.63	0.42	2.42	4.15	3.7	0.8	0.4	0	0	0	0
Atriplex cuneata	0	0	0	0	0	0	0	0	0	0	0	0
Yucca angustissima	0	0	0	0	0	0	0	0	0	0	0	0
Total	84.78	225.22	50.78	137.02	507.83	453.26	100	49.4	0.0309	0.054	0.038	0.022
Grand Total	172.06	393.67	102.77	244.01	1027.7	917.33		100	0.2731	0.293	0.277	0.042

Site: Thin Breaks

	COVER (%)							CONSTANCY	FREQUENCY	DENSITY			
	Foliar		Basal			Percentage	Percentage	%	%	#/m square		#/ha	#/acre
	mm	mean	mm	mean	Std.Dev.	of Group	of Total			Mean	Std.dev.	Mean	Mean
Annual Forbs													
Atriplex powellii	804	0.07	148	0.01	0.04	24.5	0.4	15	8.25				
Halogeton glomeratus	600	0.05	227	0.02	0.06	37.5	0.5	17.5	5.25				
Salsola iberica	600	0.05	64	0.01	0.01	10.5	0.2	22.5	8				
Descurainia pinnata	276	0.02	69	0.01	0.02	11.4	0.2	32.5	4.5				
Atriplex saccaria	132	0.01	26	0	0.01	4.3	0.1	2.5	1.25				
Eriogonum salsuginosum	84	0.01	17	0	0	2.8	0	10	3.25				
Eriogonum gordonii	60	0.01	12	0	0	2	0	5	2.25				
Sisymbrium altissimum	48	0	33	0	0.01	5.5	0.1	5	1				
Phacelia crenulata var. corrugata	24	0	6	0	0	1	0	5	0.5				
Plantago patagonica	12	0	3	0	0	0.5	0	7.5	0.75				
Total	2640	0.22	605	0.05	0.15	100.1	1.4						
Annual Grasses													
Bromus tectorum	1272	0.11	623	0.05	0.15	97.8	1.5	62.5	16.5				
Vulpia octoflora	24	0	14	0	0	2.2	0	7.5	0.75				
Total	1296	0.11	637	0.05	0.15	100	1.5						
Perennial Forbs													
Platyschkuhria integrif var. oblongifolia	936	0.08	285	0.02	0.06	63.6	0.7	20	4				
Sphaeralcea parviflora	348	0.03	163	0.01	0.03	36.4	0.4	22.5	2.75				
Total	1284	0.11	448	0.03	0.09	100	1.1						
Perennial Grasses													
Sporobolus airoides	10440	0.87	7433	0.62	0.8	52.7	17.6	67.5	23.75				
Hilaria jamesii	8568	0.71	5589	0.47	0.62	40.3	12.5	65	21.25				
Oryzopsis hymenoides	1884	0.16	989	0.08	0.24	7	2.3	35	6.75				
Total	20892	1.74	14111	1.17	1.86	100	33.5						
Shrubs													
Atriplex confertifolia	38484	3.21	18049	1.5	1.41	68.4	42.2	95	39	0.416	0.302	4162	1685
Atriplex obovata	11443	0.95	5575	0.46	0.96	21.1	12.2	40	11.5	0.158	0.276	1583	641
Ephedra torreyana	2880	0.24	490	0.04	0.11	1.9	1.2	15	4.5	0.017	0.041	171	69
Atriplex cuneata	2448	0.2	813	0.07	0.28	3.1	1.9	7.5	2	0.037	0.12	371	150
Gutierrezia sarothrae	2088	0.17	620	0.05	0.13	2.4	1.5	32.5	6.5	0.107	0.183	1067	432
Atriplex corrugata	1896	0.16	811	0.07	0.2	3.1	1.9	12.5	2.25	0.046	0.143	458	185
Suaeda torreyana	36	0	14	0	0	0.1	0	2.5	0.25	0	0.003	4	2
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0.003	4	2
Chrysothamnus nauseosus	0	0	0	0	0	0	0	0	0	0.001	0.008	12	5
Total	59230	4.93	25372	2.19	3.09	100.1	62.5			0.782	1.079	7832	3171
Grand Total	85342	7.11	42173	3.49	5.34		100						

Site: Thin Breaks

	GREEN PHYTOMASS g/m square		DRY PHYTOMASS g/m square		kg/ha	lb/ac	Percentage	Percentage	CARRYING CAPACITY AUM'S/acre			
	Mean	Std.dev.	Mean	Std.dev.	Mean	Mean	of Group	of Total	Cattle	Sheep	Horses	Deer
Annual Forbs												
Atriplex powellii	1.33	5.2	1.49	5.78	14.85	13.25	49.3	1.3	0.0032	0.0048	0.0032	0.0016
Halogeton glomeratus	1.88	10.5	0.08	0.47	0.75	0.67	2.5	0.1	0	0	0	0
Salsola iberica	1.48	4.54	0.77	2.15	7.68	6.85	25.5	0.7	0.0033	0.0033	0.0033	0.0033
Descurainia pinnata	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex saccaria	0	0	0.06	0.4	0.65	0.56	2.1	0.1	0.0001	0.0002	0.0001	0
Eriogonum salsuginosum	0.12	0.56	0.07	0.41	0.65	0.58	2.2	0.1	0.0001	0.0001	0.0001	0.0001
Eriogonum gordonii	0	0	0.56	2.94	5.55	4.95	18.4	0.5	0.001	0.001	0.001	0.001
Sisymbrium altissimum	0	0	0	0	0	0	0	0	0	0	0	0
Phacelia crenulata var. corrugata	0	0	0	0	0	0	0	0	0	0	0	0
Plantago patagonica	0	0	0	0	0	0	0	0	0	0	0	0
Total	4.86	21.8	3.03	12.15	30.11	26.87	100	2.6	0.0077	0.0094	0.0077	0.006
Annual Grasses												
Bromus tectorum	0.35	1.56	0.41	1.57	4.08	3.64	100	0.3	0	0	0	0
Vulpia octoflora	0	0	0	0	0	0	0	0	0	0	0	0
Total	0.35	1.56	0.41	1.57	4.08	3.64	100	0.3	0	0	0	0
Perennial Forbs												
Platyschkuhria integrif var. oblongifolia	1.45	6.16	0.74	3.69	7.43	6.63	59.8	0.6	0.0008	0.0008	0.0008	0.0008
Sphaeralcea parviflora	1.1	6.96	0.72	4.55	7.2	6.43	47.2	0.6	0.0008	0.0008	0.0008	0.0004
Total	2.55	13.12	1.46	7.44	14.63	13.06	100	1.2	0.0016	0.0016	0.0016	0.0012
Perennial Grasses												
Sporobolus airoides	14.95	23.13	11.23	16.55	112.33	100.25	64.3	9.6	0.0597	0.0597	0.0597	0
Hilaria jamesii	4.82	11.1	4.02	6.63	40.23	35.91	23	3.4	0.0192	0.0171	0.0171	0
Oryzopsis hymenoides	2.33	7.1	2.2	6.49	22	19.64	12.6	1.9	0.0129	0.0129	0.0129	0
Total	22.15	41.32	17.45	31.67	174.56	155.81	99.9	14.9	0.0918	0.0897	0.0897	0
Shrubs												
Atriplex confertifolia	91.48	137.7	64.32	94.11	642.23	573.25	67.5	54.7	0.0682	0.2046	0.1364	0.0682
Atriplex obovata	32.12	93.27	20.29	60.69	202.9	181.11	21.3	17.3	0.0431	0.0646	0.0431	0.0215
Ephedra torreyana	6.8	22.74	4.27	14.49	42.68	38.07	4.5	3.6	0.0091	0.0091	0.0068	0.0091
Atriplex cuneata	3.2	15.58	2.09	10.32	20.83	18.63	2.3	1.8	0.0044	0.0066	0.0044	0.0022
Gutierrezia sarothrae	3.58	11.62	2.71	8.61	27.05	24.15	3.3	2.3	0	0	0	0
Atriplex corrugata	2.4	10.6	1.59	7.04	15.93	14.23	1.7	1.4	0.0034	0.0051	0.0034	0.0017
Suaeda torreyana	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus nauseosus	0	0	0	0	0	0	0	0	0	0	0	0
Total	139.53	291.61	95.17	195.26	951.67	849.45	100	81	0.1282	0.29	0.1941	0.1027
Grand Total	169.49	369.41	117.52	248.09	1175.0	1048.3		100	0.2293	0.3907	0.2731	0.1045

Appendix 16-I

1986 Vegetation Data

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

ALKALI WASH

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	DRY PRODUCT. KG/HA	DRY PRODUCT. LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
*** ANNUAL FORB ***												
SALSOLA KALI/SALSOLA IBERICA	3658	0.30	34.51	17.82	31.05	27.70	42.83	16.77	95.00	55.25		
DESCURAINIA PINNATA	2857	0.24	26.95	13.92	10.07	8.99	13.90	5.44	67.50	35.75		
ATRIPLEX POWELLII	1310	0.11	12.36	6.38	15.47	13.81	21.34	8.36	55.00	23.25		
LAPPULA REDOWSKII	822	0.07	7.75	4.00	6.70	5.98	9.24	3.62	62.50	17.75		
ERIGERON FLEXUM	524	0.04	4.94	2.55	0.47	0.42	0.66	0.26	20.00	9.50		
CRYPTANTHA CRASSISEPALA	290	0.02	2.64	1.36	1.22	1.09	1.69	0.66	10.00	3.75		
HALOGETON GLOMERATUS	266	0.02	2.51	1.30	2.85	2.54	3.93	1.54	15.00	5.00		
MENTZELIA ALBICAULIS	218	0.02	2.06	1.06	0.32	0.29	0.45	0.18	22.50	6.25		
PLANTAGO PATAGONICA	140	0.01	1.32	0.68	0.65	0.58	0.90	0.35	15.00	3.75		
PHACELIA CORRUGATA	126	0.01	1.19	0.61	2.02	1.81	2.79	1.09	20.00	2.50		
CLEOME LUTEA	77	0.01	0.73	0.38	0.17	0.16	0.24	0.09	15.00	2.25		
CHAENACTIS STEVOIDES	68	0.01	0.64	0.33	0.75	0.67	1.03	0.41	10.00	2.75		
ERIOGONUM DIVARICATUM	58	0.00	0.55	0.28	0.30	0.27	0.41	0.16	7.50	2.50		
IPOMOPSIS LONGIFLORA	57	0.00	0.54	0.28	0.20	0.18	0.28	0.11	12.50	2.00		
IPOMOPSIS GUNNISONII	46	0.00	0.43	0.22	0.00	0.00	0.00	0.00	10.00	1.75		
TOWNSENDIA ANNUA	36	0.00	0.34	0.18	0.07	0.07	0.10	0.04	2.50	0.75		
GILIA LEPTOMERIA	32	0.00	0.30	0.16	0.02	0.02	0.03	0.01	7.50	1.50		
ERIOGONUM SALSUGINOSUM	20	0.00	0.19	0.10	0.00	0.00	0.00	0.00	5.00	0.50		
DESCURAINIA SOPHIA	5	0.00	0.05	0.02	0.00	0.00	0.00	0.00	2.50	0.25		
IPOMOPSIS POLYCLADON	0	0.00	0.00	0.00	0.12	0.11	0.17	0.07	0.00	0.00		
*** ANNUAL FORB TOTALS:	10600	0.86	100.00	51.63	72.50	64.68	99.99	39.16				
*** ANNUAL GRASS ***												
BROMUS TECTORUM	633	0.05	46.44	3.08	1.37	1.23	35.48	0.74	50.00	12.75		
HORDEUM PUSILLUM	409	0.03	30.01	1.99	0.85	0.76	21.94	0.46	12.50	5.25		
VULPIA OCTOFLORA	314	0.03	23.04	1.53	1.65	1.47	42.58	0.89	12.50	4.25		
BROMUS RUBENS	7	0.00	0.51	0.03	0.00	0.00	0.00	0.00	2.50	0.25		
*** ANNUAL GRASS TOTALS:	1363	0.11	100.00	6.64	3.87	3.46	100.00	2.09				
*** PERENNIAL FORB ***												
BAHIA OBLONGIFOLIA	58	0.00	65.91	0.28	0.87	0.78	100.00	0.47	2.50	0.25		
SPHAERALCEA COCCINEA	30	0.00	34.09	0.15	0.00	0.00	0.00	0.00	5.00	0.75		
*** PERENNIAL FORB TOTALS:	88	0.00	100.00	0.43	0.87	0.78	100.00	0.47				
*** PERENNIAL GRASS ***												
SPOROBOLUS AIROIDES	1151	0.10	58.25	5.61	15.12	13.49	74.42	8.17	32.50	8.00		
ORYZOPSIS HYMENOIDES	413	0.03	20.90	2.01	3.75	3.35	18.45	2.03	25.00	7.50		
HILARIA JAMESII	347	0.03	17.56	1.69	0.57	0.51	2.83	0.31	25.00	5.00		
SITANION HYSTRIX	36	0.00	1.82	0.18	0.40	0.36	1.97	0.22	5.00	0.50		
HORDEUM JUBATUM	29	0.00	1.47	0.14	0.47	0.42	2.34	0.26	2.50	1.00		
*** PERENNIAL GRASS TOTALS:	1976	0.16	100.00	9.62	20.32	18.13	100.01	10.98				

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

ALKALI WASH

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
XXX PERENNIAL SHRUB XXX												
ATRIPLEX CUNEATA	2494	0.21	38.35	12.15	38.00	33.90	43.39	20.52	37.50	9.00	400.0	161.9
ATRIPLEX CONFERTIFOLIA	1624	0.14	24.97	7.91	12.10	10.80	13.82	6.54	22.50	6.50	416.7	168.6
SACROBATUS VERMICULATUS	1126	0.09	17.32	5.48	7.70	6.87	8.79	4.16	12.50	2.25	45.8	18.5
ATRIPLEX CORRUGATA	659	0.05	10.13	3.21	22.02	19.65	25.15	11.90	7.50	2.75	158.3	64.1
ATRIPLEX OBOVATA	390	0.03	5.84	1.85	6.37	5.69	7.28	3.44	7.50	0.75	45.8	18.5
GUTIERREZIA SAROTHRAE	170	0.01	2.61	0.83	1.37	1.23	1.57	0.74	5.00	1.00	145.8	59.0
ATRIPLEX CANESCENS	50	0.00	0.77	0.24	0.00	0.00	0.00	0.00	7.50	1.00	70.8	28.7
OPUNTIA POLYACANTHA	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.5	5.1
XXX PERENNIAL SHRUB TOTALS:	6503	0.53	99.99	31.68	87.57	78.13	100.00	47.30			1295.8	524.4
ALKALI WASH	20530	1.66		100.00	185.15	165.19		100.00			1295.8	524.4

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

ARROYO SHRUB

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
*** ANNUAL FORB ***												
SALSOLA KALI/SALSOLA IBERICA	2654	0.22	40.52	7.87	19.37	17.29	43.74	5.89	82.50	41.00		
DESCURAINIA PINNATA	1836	0.15	28.03	5.44	8.00	7.14	18.06	2.43	75.00	33.50		
LAPPULA REDOWSKII	964	0.08	14.72	2.86	11.75	10.48	26.52	3.57	55.00	20.50		
GILIA LEPTOMERIA	307	0.03	4.69	0.91	0.40	0.36	0.90	0.12	25.00	9.00		
AMBROSIA ACANTHICARPA	189	0.02	2.89	0.56	0.95	0.85	2.14	0.29	12.50	3.00		
CRYPTANTHA CRASSISEPALA	118	0.01	1.80	0.35	2.10	1.87	4.74	0.64	17.50	3.00		
CHAENACTIS STEVOIDES	104	0.01	1.59	0.31	0.30	0.27	0.68	0.09	10.00	2.50		
EUPHORBIA GLYPTOSPERMA	96	0.01	1.47	0.28	0.37	0.33	0.85	0.11	7.50	3.25		
CHENOPODIUM INCANUM	69	0.01	1.05	0.20	0.00	0.00	0.00	0.00	5.00	1.25		
VERBENA BRACTEATA	53	0.00	0.81	0.16	0.47	0.42	1.07	0.14	7.50	1.75		
PHACELIA CORRUGATA	41	0.00	0.63	0.12	0.10	0.09	0.23	0.03	2.50	1.00		
PLANTAGO PATAGONICA	32	0.00	0.49	0.09	0.12	0.11	0.28	0.04	10.00	1.50		
MENTZELIA ALBICAULIS	30	0.00	0.46	0.09	0.05	0.04	0.11	0.02	10.00	1.50		
TOWNSENDIA ANNUA	23	0.00	0.35	0.07	0.10	0.09	0.23	0.03	5.00	1.25		
ERIGERON FLEXUM	20	0.00	0.31	0.06	0.12	0.11	0.28	0.04	5.00	1.00		
MALCOMIA AFRICANA	14	0.00	0.21	0.04	0.00	0.00	0.00	0.00	2.50	0.25		
IPOMOPSIS GUNNISONII	0	0.00	0.00	0.00	0.07	0.07	0.17	0.02	0.00	0.00		
*** ANNUAL FORB TOTALS:	6550	0.54	100.02	19.42	44.30	39.52	100.00	13.46				
*** ANNUAL GRASS ***												
BROMUS TECTORUM	2560	0.21	56.19	7.59	8.97	7.92	50.93	2.70	82.50	41.25		
VULPIA OCTOFLORA	1972	0.16	43.28	5.85	8.45	7.54	48.49	2.57	65.00	27.75		
HORDEUM PUSILLUM	24	0.00	0.53	0.07	0.10	0.09	0.57	0.03	2.50	1.00		
*** ANNUAL GRASS TOTALS:	4556	0.37	100.00	13.51	17.42	15.55	99.99	5.29				
*** PERENNIAL FORB ***												
EUPHORBIA FENDLERI	101	0.01	38.70	0.30	0.10	0.09	5.88	0.03	5.00	1.25		
SPHAERALCEA COCCINEA	85	0.01	32.57	0.25	0.27	0.25	15.18	0.08	15.00	2.00		
SPHAERALCEA PARVIFOLIA	31	0.00	11.88	0.09	0.62	0.56	36.76	0.19	10.00	1.00		
PSORALEA LANCEOLATA	20	0.00	7.66	0.06	0.00	0.00	0.00	0.00	2.50	0.25		
HOFFMANSEGGIA JAMESII	10	0.00	3.83	0.03	0.00	0.00	0.00	0.00	2.50	0.25		
PENSTEMON STRICTUS	8	0.00	3.07	0.02	0.42	0.38	25.00	0.13	2.50	0.25		
LEUCELENE ERICOIDES	6	0.00	2.30	0.02	0.07	0.07	4.41	0.02	2.50	0.25		
ASTRAGALUS CERAMICUS	0	0.00	0.00	0.00	0.20	0.18	11.76	0.06	0.00	0.00		
*** PERENNIAL FORB TOTALS:	261	0.02	100.01	0.77	1.70	1.52	99.99	0.52				
*** PERENNIAL GRASS ***												
ORYZOPSIS HYMENOIDES	4943	0.41	47.22	14.65	63.20	56.39	46.26	19.20	87.50	49.75		
SPOROBOLUS AIROIDES	3227	0.27	30.83	9.57	46.95	41.89	34.36	14.27	57.50	17.75		
HILARIA JAMESII	1821	0.15	17.40	5.40	12.85	11.46	9.41	3.90	65.00	18.50		
SPOROBOLUS GIGANTEUS	233	0.02	2.23	0.69	11.50	10.26	8.42	3.49	12.50	1.50		

MARCH 10, 1987

NAVAJO MINE
VEGETATION DATA REPORTING
1986

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

ARROYO SHRUB

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
XXX PERENNIAL GRASS XXX												
SITANION HYSTRIX	73	0.01	0.70	0.22	0.10	0.09	0.07	0.03	10.00	1.25		
MUHLENBERGIA PUNGENS	64	0.01	0.61	0.19	0.92	0.83	0.68	0.28	5.00	1.25		
AGROPYRON SMITHII	56	0.00	0.54	0.17	0.25	0.22	0.18	0.08	10.00	1.50		
ARISTIDA PURPUREA	37	0.00	0.35	0.11	0.85	0.76	0.62	0.26	2.50	1.50		
DISTICHLIS SPICATA	13	0.00	0.12	0.04	0.00	0.00	0.00	0.00	2.50	0.25		
XXX PERENNIAL GRASS TOTALS:	10467	0.87	100.00	31.03	136.62	121.90	100.00	41.51				
XXX PERENNIAL SHRUB XXX												
SACROBATUS VERMICULATUS	4425	0.37	37.19	13.12	32.20	28.73	24.95	9.78	55.00	12.25	370.8	150.1
CHRYSOTHAMNUS NAUSEOSUS	4215	0.35	35.42	12.49	65.97	58.86	51.12	20.05	52.50	13.50	791.7	320.4
ATRIPLEX CANESCENS	1233	0.10	10.36	3.65	12.15	10.84	9.41	3.69	32.50	7.50	233.3	94.4
GUTIERREZIA SAROTHRAE	1128	0.09	9.48	3.34	13.12	11.71	10.17	3.99	42.50	10.25	1058.3	428.3
ATRIPLEX CUNEATA	399	0.03	3.35	1.18	3.27	2.92	2.54	1.00	15.00	3.50	162.5	65.8
ATRIPLEX CONFERTIFOLIA	306	0.03	2.57	0.91	1.85	1.65	1.43	0.56	22.50	3.00	225.0	91.1
SUAEDA TORREYANA	128	0.01	1.08	0.38	0.00	0.00	0.00	0.00	2.50	1.00	83.3	33.7
ATRIPLEX CORRUGATA	35	0.00	0.29	0.10	0.20	0.18	0.15	0.06	2.50	0.25	20.8	8.4
EPHEDRA TORREYANA	24	0.00	0.20	0.07	0.00	0.00	0.00	0.00	2.50	0.25	4.2	1.7
CERATOIDES LANATA	8	0.00	0.07	0.02	0.00	0.00	0.00	0.00	2.50	0.25	8.3	3.4
CHRYSOTHAMNUS VISCIDIFLORUS	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.3	3.4
OPUNTIA WHIPPLEI	0	0.00	0.00	0.00	0.27	0.25	0.21	0.08	0.00	0.00	8.3	3.4
YUCCA ANGUSTISSIMA	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.8	8.4
XXX PERENNIAL SHRUB TOTALS:	11901	0.98	100.00	35.28	129.05	115.14	99.98	39.21			2995.8	1212.4
ARROYO SHRUB	33735	2.79		100.00	329.10	293.62		100.00			2995.8	1212.4

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

BADLANDS

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	DRY PRODUCT. KG/HA	DRY PRODUCT. LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
*** ANNUAL FORB ***												
SALSOLA KALI/SALSOLA IBERICA	3767	0.31	36.84	27.80	26.42	23.58	31.89	24.03	72.50	32.50		
ATRIPLEX POWELLII	2874	0.24	28.10	21.21	35.52	31.70	42.87	32.30	67.50	34.25		
ERIGERON FLEXUM	1755	0.15	17.16	12.95	7.60	6.78	9.17	6.91	60.00	25.25		
HALOGETON GLOMERATUS	873	0.07	8.54	6.44	8.82	7.87	10.65	8.02	20.00	10.25		
DESCURAINIA PINNATA	329	0.03	3.22	2.43	1.20	1.07	1.45	1.09	35.00	7.25		
LAPPULA REDOWSKII	225	0.02	2.20	1.66	0.45	0.40	0.54	0.41	40.00	6.75		
ATRIPLEX SACCARIA	77	0.01	0.75	0.57	0.72	0.65	0.87	0.66	5.00	1.25		
MENTZELIA ALBICAULIS	67	0.01	0.66	0.49	0.22	0.20	0.27	0.20	5.00	2.25		
PHACELIA CORRUGATA	56	0.00	0.55	0.41	0.52	0.47	0.63	0.48	7.50	1.50		
PLANTAGO PATAGONICA	53	0.00	0.52	0.39	0.15	0.13	0.18	0.14	10.00	1.25		
ERIOGONUM SALSUGINOSUM	41	0.00	0.40	0.30	0.97	0.87	1.18	0.89	5.00	0.50		
CRYPTANTHA CRASSISEPALA	40	0.00	0.39	0.30	0.00	0.00	0.00	0.00	2.50	1.00		
ERIOGONUM DIVARICATUM	22	0.00	0.22	0.16	0.00	0.00	0.00	0.00	2.50	0.25		
GILIA LEPTOMERIA	13	0.00	0.13	0.10	0.00	0.00	0.00	0.00	5.00	0.50		
CLEOME LUTEA	12	0.00	0.12	0.09	0.25	0.22	0.30	0.23	2.50	0.75		
ERIOGONUM WETHERILLI	10	0.00	0.10	0.07	0.00	0.00	0.00	0.00	2.50	0.25		
MALCOMIA AFRICANA	8	0.00	0.08	0.06	0.00	0.00	0.00	0.00	2.50	0.25		
IPOMOPSIS POLYCLADON	4	0.00	0.04	0.03	0.00	0.00	0.00	0.00	2.50	0.25		
*** ANNUAL FORB TOTALS:	10226	0.84	100.02	75.47	82.87	73.94	100.00	75.36				
*** ANNUAL GRASS ***												
VULPIA OCTOFLORA	149	0.01	65.35	1.10	0.22	0.20	10.11	0.20	7.50	2.75		
BROMUS TECTORUM	73	0.01	32.02	0.54	1.72	1.54	77.53	1.57	15.00	2.25		
HORDEUM PUSILLUM	6	0.00	2.63	0.04	0.27	0.25	12.36	0.25	2.50	0.25		
*** ANNUAL GRASS TOTALS:	228	0.02	100.00	1.69	2.22	1.99	100.00	2.02				
*** PERENNIAL FORB ***												
SPHAERALCEA COCCINEA	35	0.00	74.47	0.26	0.45	0.40	64.29	0.41	2.50	0.25		
BAHIA OBLONGIFOLIA	12	0.00	25.53	0.09	0.25	0.22	35.71	0.23	2.50	0.25		
*** PERENNIAL FORB TOTALS:	47	0.00	100.00	0.35	0.70	0.62	100.00	0.64				
*** PERENNIAL GRASS ***												
SPOROBOLUS AIROIDES	516	0.04	99.23	3.81	3.52	3.14	100.00	3.21	12.50	2.50		
HILARIA JAMESII	4	0.00	0.77	0.03	0.00	0.00	0.00	0.00	2.50	0.25		
*** PERENNIAL GRASS TOTALS:	520	0.04	100.00	3.84	3.52	3.14	100.00	3.21				
*** PERENNIAL SHRUB ***												
ATRIPLEX CORRUGATA	833	0.07	32.95	6.15	12.12	10.82	58.72	11.03	10.00	1.00	133.3	54.0
ATRIPLEX CONFERTIFOLIA	663	0.06	26.23	4.89	2.75	2.45	13.32	2.50	20.00	3.25	216.7	87.7
ATRIPLEX CUNEATA	523	0.04	20.69	3.86	3.10	2.77	15.01	2.82	20.00	2.75	112.5	45.5

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

BADLANDS

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
XXX PERENNIAL SHRUB XXX												
SUAEDA TORREYANA	248	0.02	9.81	1.83	2.25	2.01	10.90	2.05	2.50	1.25	125.0	50.6
ATRIPLEX CANESCENS	195	0.02	7.71	1.44	0.00	0.00	0.00	0.00	2.50	0.25	62.5	25.3
SACROBATUS VERMICULATUS	26	0.00	1.03	0.19	0.00	0.00	0.00	0.00	2.50	0.25	8.3	3.4
ATRIPLEX OBOVATA	20	0.00	0.79	0.15	0.00	0.00	0.00	0.00	2.50	0.25	16.7	6.7
EPHEDRA VIRIDIS	20	0.00	0.79	0.15	0.00	0.00	0.00	0.00	2.50	0.50	0.0	0.0
GUTIERREZIA SAROTHRAE	0	0.00	0.00	0.00	0.42	0.38	2.06	0.39	0.00	0.00	8.3	3.4
OPUNTIA POLYACANTHA	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.2	1.7
XXX PERENNIAL SHRUB TOTALS:	2528	0.21	100.00	18.66	20.65	19.42	100.01	19.78			687.5	278.2
BADLANDS	13549	1.11		100.00	109.97	98.12		100.00			687.5	278.2

NAVAJO MINE
VEGETATION DATA REPORTING
1986

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

CALCAREOUS SANDS

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
XXX ANNUAL FORB XXX												
DESCURAINIA PINNATA	6321	0.53	62.59	18.53	35.87	32.01	55.34	11.54	85.00	57.75		
SALSOLA KALI/SALSOLA IBERICA	1407	0.12	13.93	4.12	13.80	12.31	21.29	4.44	60.00	23.00		
GILIA LEPTOMERIA	827	0.07	8.19	2.42	1.47	1.32	2.28	0.47	52.50	18.75		
LAPPULA REDOWSKII	357	0.03	3.54	1.05	4.87	4.35	7.52	1.57	40.00	9.25		
CRYPTANTHA CRASSISEPALA	353	0.03	3.50	1.03	4.80	4.28	7.40	1.54	37.50	8.25		
IPOMOPSIS LONGIFLORA	255	0.02	2.53	0.75	0.62	0.56	0.96	0.20	12.50	6.75		
MENTZELIA ALBICAULIS	194	0.02	1.92	0.57	0.77	0.69	1.20	0.25	32.50	7.50		
ERIGERON FLEXUM	167	0.01	1.65	0.49	1.27	1.14	1.97	0.41	10.00	4.25		
IPOMOPSIS GUNNISONII	152	0.01	1.51	0.45	0.60	0.54	0.93	0.19	12.50	3.00		
CHAENACTIS STEVOIDES	43	0.00	0.43	0.13	0.00	0.00	0.00	0.00	7.50	1.50		
AMBROSIA ACANTHICARPA	9	0.00	0.09	0.03	0.22	0.20	0.35	0.07	2.50	0.50		
PHACELIA CORRUGATA	8	0.00	0.08	0.02	0.00	0.00	0.00	0.00	2.50	0.25		
MALCOMIA AFRICANA	6	0.00	0.06	0.02	0.25	0.22	0.39	0.08	2.50	0.25		
PLANTAGO PATAGONICA	0	0.00	0.00	0.00	0.12	0.11	0.19	0.04	0.00	0.00		
TOWNSENDIA ANNUA	0	0.00	0.00	0.00	0.12	0.11	0.19	0.04	0.00	0.00		
XXX ANNUAL FORB TOTALS:	10099	0.84	100.02	29.60	64.82	57.84	100.01	20.85				
XXX ANNUAL GRASS XXX												
BROMUS TECTORUM	321	0.03	92.52	0.94	4.62	4.13	100.00	1.49	40.00	9.50		
HORDEUM PUSILLUM	52	0.00	13.37	0.15	0.00	0.00	0.00	0.00	2.50	1.25		
VULPIA OCTOFLORA	16	0.00	4.11	0.05	0.00	0.00	0.00	0.00	5.00	0.50		
XXX ANNUAL GRASS TOTALS:	389	0.03	100.00	1.14	4.62	4.13	100.00	1.49				
XXX BIENNIAL FORB XXX												
MACHERANTHERA CANESCENS	0	0.00		0.00	0.57	0.51	100.00	0.18	0.00	0.00		
XXX BIENNIAL FORB TOTALS:	0	0.00	0.00	0.00	0.57	0.51	100.00	0.18				
XXX PERENNIAL FORB XXX												
SPHAERALCEA PARVIFOLIA	12	0.00	50.00	0.04	0.12	0.11	22.73	0.04	5.00	0.50		
LEUCELENE ERICOIDES	8	0.00	33.33	0.02	0.30	0.27	54.55	0.10	2.50	0.25		
SPHAERALCEA COCCINEA	4	0.00	16.67	0.01	0.12	0.11	22.73	0.04	2.50	0.25		
XXX PERENNIAL FORB TOTALS:	24	0.00	100.00	0.07	0.55	0.49	100.01	0.18				
XXX PERENNIAL GRASS XXX												
ORYZOPSIS HYMENOIDES	7846	0.65	47.18	23.00	80.57	71.89	53.61	25.91	100.00	68.50		
HILARIA JAMESII	4440	0.37	26.70	13.01	26.07	23.26	17.35	8.39	95.00	50.25		
SPOROBOLUS AIROIDES	4298	0.36	25.84	12.60	42.87	38.25	28.53	13.79	50.00	26.25		
ARISTIDA PURPUREA	18	0.00	0.11	0.05	0.00	0.00	0.00	0.00	2.50	0.25		
MUHLENBERGIA PUNGENS	18	0.00	0.11	0.05	0.32	0.29	0.22	0.10	5.00	0.50		
SPOROBOLUS GIGANTEUS	10	0.00	0.06	0.03	0.00	0.00	0.00	0.00	2.50	0.25		

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

CALCAREOUS SANDS

N (COVER) = 40
N (PROD.) = 40

SPECIES		COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
XXX PERENNIAL GRASS	XXX												
HORDEUM JUBATUM		0	0.00	0.00	0.00	0.45	0.40	0.30	0.14	0.00	0.00		
XXX PERENNIAL GRASS	TOTALS:	16630	1.38	100.00	48.75	150.30	134.10	100.01	48.34				
XXX PERENNIAL SHRUB	XXX												
ATRIPLEX CONFERTIFOLIA		6237	0.52	89.43	18.29	77.52	69.17	86.09	24.93	97.50	41.50	2987.5	1209.0
GUTIERREZIA SAROTHRAE		617	0.05	8.85	1.81	10.77	9.61	11.97	3.47	17.50	5.50	762.5	308.6
CERATOIDES LANATA		61	0.01	0.87	0.18	1.75	1.56	1.94	0.56	5.00	0.75	104.2	42.2
ATRIPLEX CANESCENS		59	0.00	0.85	0.17	0.00	0.00	0.00	0.00	7.50	1.00	41.7	16.9
ATRIPLEX OBOVATA		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.3	3.4
OPUNTIA POLYACANTHA		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.8	8.4
XXX PERENNIAL SHRUB	TOTALS:	6974	0.58	100.00	20.44	90.05	80.34	100.00	28.96			3925.0	1588.4
CALCAREOUS SANDS		34116	2.83		100.00	310.92	277.40		100.00			3925.0	1588.4

NAVAJO MINE
VEGETATION DATA REPORTING
1986

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

DUNES

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
*** ANNUAL FORB ***												
SALSOLA KALI/SALSOLA IBERICA	1270	0.11	39.72	3.86	15.97	14.25	47.90	4.37	52.50	19.00		
DESCURAINIA PINNATA	540	0.05	16.89	1.64	2.27	2.03	6.82	0.62	42.50	11.50		
CRYPTANTHA CRASSISEPALA	487	0.04	15.23	1.48	8.30	7.41	24.89	2.27	20.00	9.50		
ATRIPLEX SACCARIA	170	0.01	5.32	0.52	0.00	0.00	0.00	0.00	2.50	0.25		
AMBROSIA ACANTHICARPA	165	0.01	5.16	0.50	2.10	1.87	6.30	0.57	47.50	7.00		
GILIA LEPTOMERIA	142	0.01	4.44	0.43	0.52	0.47	1.57	0.14	27.50	5.75		
ASTRAGALUS SABULONUM	81	0.01	2.53	0.25	1.95	1.74	5.85	0.53	10.00	1.75		
ERIGERON FLEXUM	67	0.01	2.10	0.20	0.00	0.00	0.00	0.00	5.00	1.75		
STEPHANOMERIA EXIGUA	52	0.00	1.63	0.16	0.00	0.00	0.00	0.00	5.00	1.00		
STREPTANTHELLA LONGIROSTRIS	49	0.00	1.53	0.15	0.07	0.07	0.22	0.02	12.50	1.75		
LYGODESMIA GRANDIFLORA	31	0.00	0.97	0.09	0.00	0.00	0.00	0.00	7.50	1.00		
NAMA HISPIDUM	31	0.00	0.97	0.09	0.00	0.00	0.00	0.00	5.00	0.75		
MENTZELIA ALBICAULIS	28	0.00	0.88	0.09	0.77	0.69	2.32	0.21	2.50	1.25		
MALCOMIA AFRICANA	22	0.00	0.69	0.07	0.82	0.74	2.47	0.23	5.00	0.50		
VERBENA BRACTEATA	18	0.00	0.56	0.05	0.35	0.31	1.05	0.10	5.00	0.75		
PLANTAGO PATAGONICA	14	0.00	0.44	0.04	0.00	0.00	0.00	0.00	2.50	0.75		
DITHYRAEA WISLIZENII	9	0.00	0.28	0.03	0.00	0.00	0.00	0.00	2.50	0.50		
LAPPULA REDOWSKII	9	0.00	0.28	0.03	0.10	0.09	0.30	0.03	5.00	0.50		
CHAENACTIS STEVOIDES	6	0.00	0.19	0.02	0.10	0.09	0.30	0.03	2.50	0.25		
IPOMOPSIS POLYCLADON	6	0.00	0.19	0.02	0.00	0.00	0.00	0.00	2.50	0.50		
*** ANNUAL FORB TOTALS:	3197	0.25	100.00	9.71	33.35	29.75	99.99	9.12				
*** ANNUAL GRASS ***												
VULPIA OCTOFLORA	516	0.04	76.67	1.57	1.30	1.16	46.85	0.36	40.00	12.00		
BROMUS TECTORUM	123	0.01	18.28	0.37	1.07	0.96	38.74	0.29	27.50	5.25		
BOUTELOUA BARBATA	34	0.00	5.05	0.10	0.40	0.36	14.41	0.11	2.50	0.50		
*** ANNUAL GRASS TOTALS:	673	0.05	100.00	2.04	2.77	2.48	100.00	0.76				
*** PERENNIAL FORB ***												
ERIOGONUM LEPTOPHYLLUM	352	0.03	27.91	1.07	10.15	9.06	48.62	2.77	27.50	7.00		
PENSTEMON STRICTUS	343	0.03	27.20	1.04	4.67	4.17	22.40	1.28	30.00	6.00		
LEUCELENE ERICOIDES	242	0.02	19.19	0.73	2.57	2.30	12.34	0.70	27.50	5.50		
HOFFMANSEGGIA JAMESII	167	0.01	13.24	0.51	2.42	2.16	11.62	0.66	7.50	0.75		
SPHAERALCEA PARVIFOLIA	64	0.01	5.08	0.19	0.00	0.00	0.00	0.00	12.50	1.50		
SPHAERALCEA COCCINEA	44	0.00	3.49	0.13	0.87	0.78	4.19	0.24	7.50	1.75		
ERIOGONUM LONCHOPHYLLUM	26	0.00	2.06	0.08	0.00	0.00	0.00	0.00	2.50	0.75		
LINUM ARISTATUM	23	0.00	1.82	0.07	0.17	0.16	0.84	0.05	10.00	1.25		
*** PERENNIAL FORB TOTALS:	1261	0.10	99.99	3.83	20.87	18.62	100.01	5.71				
*** PERENNIAL GRASS ***												
ORYZOPSIS HYMENOIDES	10221	0.85	61.74	31.04	132.47	118.19	71.07	36.21	97.50	78.75		

MARCH 10, 1987

NAVAJO MINE
VEGETATION DATA REPORTING
1986

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

DUNES

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
XXX PERENNIAL GRASS XXX												
HILARIA JAMESII	2106	0.19	12.72	6.40	22.50	20.07	12.07	6.15	80.00	43.50		
MUHLENBERGIA PUNGENS	1674	0.14	10.11	5.08	4.75	4.24	2.55	1.30	17.50	6.75		
ARISTIDA PURPUREA	1185	0.10	7.16	3.60	13.05	11.64	7.00	3.57	22.50	8.25		
SPOROBOLUS AIROIDES	696	0.06	4.20	2.11	6.85	6.11	3.67	1.87	22.50	8.50		
HORDEUM JUBATUM	256	0.02	1.55	0.78	5.20	4.64	2.79	1.42	12.50	4.00		
SPOROBOLUS GIGANTEUS	147	0.01	0.89	0.45	0.20	0.18	0.11	0.05	22.50	3.75		
SPOROBOLUS CRYPTANDRUS	135	0.01	0.82	0.41	1.37	1.23	0.74	0.38	10.00	2.50		
MUHLENBERGIA ASPERIFOLIA	131	0.01	0.79	0.40	0.00	0.00	0.00	0.00	2.50	0.50		
AGROPYRON SMITHII	4	0.00	0.02	0.01	0.00	0.00	0.00	0.00	2.50	0.25		
XXX PERENNIAL GRASS TOTALS:	16555	1.38	100.00	50.28	186.40	166.30	100.00	50.95				
XXX PERENNIAL SHRUB XXX												
GUTIERREZIA SAROTHRAE	4446	0.37	39.55	13.50	51.00	45.50	41.65	13.94	55.00	30.50	4125.0	1669.4
CHRYSOTHAMNUS PULCHELLUS	1617	0.13	14.38	4.91	21.72	19.38	17.74	5.94	12.50	4.00	283.3	114.7
ARTEMISIA FILIFOLIA	1463	0.12	13.01	4.44	9.97	8.90	8.15	2.73	15.00	4.50	391.7	158.5
CHRYSOTHAMNUS NAUSEOSUS	1209	0.10	10.76	3.67	11.95	10.57	9.68	3.24	25.00	3.50	191.7	77.6
CHRYSOTHAMNUS GREENEI	804	0.07	7.15	2.44	11.40	10.17	9.31	3.12	20.00	7.50	441.7	178.7
ATRIPLEX CONFERTIFOLIA	506	0.04	4.50	1.54	1.90	1.70	1.55	0.52	5.00	1.25	87.5	35.4
YUCCA ANGUSTISSIMA	362	0.03	3.22	1.10	0.00	0.00	0.00	0.00	5.00	0.50	50.0	20.2
ATRIPLEX CANESCENS	320	0.03	2.85	0.97	6.72	6.00	5.49	1.84	37.50	5.00	216.7	87.7
EPHEDRA TORREYANA	314	0.03	2.79	0.95	2.97	2.65	2.43	0.81	17.50	2.75	112.5	45.5
EPHEDRA VIRIDIS	167	0.01	1.49	0.51	4.90	4.37	4.00	1.34	12.50	1.50	137.5	55.6
OPUNTIA POLYACANTHA	28	0.00	0.25	0.09	0.00	0.00	0.00	0.00	2.50	0.25	29.2	11.8
BACCHARIS WRIGHTII	5	0.00	0.04	0.02	0.00	0.00	0.00	0.00	2.50	0.25	0.0	0.0
CERATOIDES LANATA	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.5	5.1
XXX PERENNIAL SHRUB TOTALS:	11241	0.93	99.99	34.14	122.45	109.25	100.00	33.47			6079.2	2460.2
DUNES	32927	2.71		100.00	365.95	326.41		100.00			6079.2	2460.2

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

SANDS

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	DRY PRODUCT. KG/HA	DRY PRODUCT. LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
XXX ANNUAL FORB XXX												
SALSOLA KALI/SALSOLA IBERICA	916	0.08	23.26	2.94	13.50	12.04	34.70	4.48	60.00	19.25		
PLANTAGO PATAGONICA	699	0.06	17.75	2.24	9.57	8.54	24.61	3.18	35.00	12.50		
CRYPTANTHA CRASSISEPALA	655	0.05	16.63	2.10	7.22	6.45	18.57	2.40	45.00	15.50		
GILIA LEPTOMERIA	612	0.05	15.54	1.96	2.35	2.10	6.04	0.78	47.50	14.75		
LAPPULA REDOWSKII	373	0.03	9.47	1.20	1.52	1.36	3.92	0.51	27.50	8.50		
DESCURAINIA SOPHIA	360	0.03	9.14	1.15	2.82	2.52	7.26	0.94	5.00	2.25		
DESCURAINIA PINNATA	127	0.01	3.22	0.41	0.00	0.00	0.00	0.00	20.00	3.75		
ERIGERON FLEXUM	110	0.01	2.79	0.35	1.67	1.49	4.31	0.56	5.00	2.00		
IPOMOPSIS GUNNISONII	42	0.00	1.07	0.13	0.00	0.00	0.00	0.00	7.50	1.00		
MENTZELIA ALBICAULIS	25	0.00	0.63	0.08	0.00	0.00	0.00	0.00	7.50	1.00		
ATRIPLEX POWELLII	7	0.00	0.18	0.02	0.00	0.00	0.00	0.00	2.50	0.25		
IPOMOPSIS LONGIFLORA	7	0.00	0.18	0.02	0.00	0.00	0.00	0.00	2.50	0.25		
MALCOMIA AFRICANA	5	0.00	0.13	0.02	0.22	0.20	0.58	0.07	2.50	0.25		
XXX ANNUAL FORB TOTALS:	3938	0.32	99.99	12.62	38.90	34.71	99.99	12.91				
XXX ANNUAL GRASS XXX												
VULPIA OCTOFLORA	3453	0.29	96.08	11.07	20.27	18.09	99.51	6.73	52.50	32.50		
BROMUS TECTORUM	127	0.01	3.53	0.41	0.10	0.09	0.49	0.03	37.50	6.75		
BOUTELOUA BARBATA	14	0.00	0.39	0.04	0.00	0.00	0.00	0.00	2.50	0.25		
XXX ANNUAL GRASS TOTALS:	3594	0.30	100.00	11.52	20.37	18.18	100.00	6.76				
XXX PERENNIAL FORB XXX												
LEUCELENE ERICOIDES	154	0.01	38.50	0.49	1.42	1.27	56.44	0.47	17.50	3.75		
BAHIA OBLONGIFOLIA	93	0.01	23.25	0.30	0.00	0.00	0.00	0.00	2.50	0.50		
PENSTEMON STRICTUS	58	0.00	14.50	0.19	0.90	0.80	35.64	0.30	12.50	1.25		
ERIOGONUM LEPTOPHYLLUM	46	0.00	11.50	0.15	0.00	0.00	0.00	0.00	5.00	0.50		
ABRONIA FRAGRANS	22	0.00	5.50	0.07	0.00	0.00	0.00	0.00	2.50	0.25		
LINUM ARISTATUM	19	0.00	4.75	0.06	0.10	0.09	3.96	0.03	5.00	0.75		
SPHAERALCEA COCCINEA	8	0.00	2.00	0.03	0.10	0.09	3.96	0.03	2.50	0.25		
XXX PERENNIAL FORB TOTALS:	400	0.02	100.00	1.28	2.52	2.25	100.00	0.84				
XXX PERENNIAL GRASS XXX												
ORYZOPSIS HYMENOIDES	8202	0.69	46.11	26.29	67.50	60.22	44.48	22.40	85.00	49.75		
SPOROBOLUS AIROIDES	5588	0.47	31.42	17.91	53.07	47.35	34.98	17.62	72.50	39.75		
HILARIA JAMESII	3694	0.31	20.77	11.84	28.77	25.67	19.96	9.55	95.00	59.25		
ARISTIDA PURPUREA	277	0.02	1.56	0.89	2.40	2.14	1.58	0.80	20.00	4.00		
AGROPYRON SMITHII	18	0.00	0.10	0.06	0.00	0.00	0.00	0.00	2.50	0.50		
MUHLENBERGIA PUNGENS	8	0.00	0.04	0.03	0.00	0.00	0.00	0.00	2.50	0.25		
XXX PERENNIAL GRASS TOTALS:	17787	1.48	100.00	57.02	151.75	135.39	100.00	50.37				

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

SANDS

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
XXX PERENNIAL SHRUB XXX												
GUTIERREZIA SAROTHRAE	3198	0.27	58.23	10.22	47.40	42.29	54.03	15.73	70.00	34.75	4316.7	1746.9
ATRIPLEX CONFERTIFOLIA	1006	0.08	18.37	3.22	32.60	29.09	37.16	10.82	22.50	5.50	220.8	89.4
ATRIPLEX CUNEATA	498	0.04	8.91	1.56	4.25	3.79	4.84	1.41	10.00	1.75	54.2	21.9
EPHEDRA TORREYANA	363	0.03	6.63	1.16	0.00	0.00	0.00	0.00	5.00	0.50	12.5	5.1
ATRIPLEX CANESCENS	354	0.03	6.47	1.13	3.47	3.10	3.96	1.15	15.00	2.50	112.5	45.5
EPHEDRA VIRIDIS	35	0.00	0.64	0.11	0.00	0.00	0.00	0.00	2.50	0.25	4.2	1.7
PARRYELLA FILIFOLIA	26	0.00	0.47	0.08	0.00	0.00	0.00	0.00	2.50	0.50	20.8	8.4
SACROBATUS VERMICULATUS	15	0.00	0.27	0.05	0.00	0.00	0.00	0.00	2.50	0.25	16.7	6.7
ATRIPLEX CORRUGATA	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.7	6.7
ATRIPLEX OBOVATA	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.5	5.1
CERATOIDES LANATA	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.5	5.1
CHRYSOTHAMNUS NAUSEOSUS	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.8	8.4
OPUNTIA POLYACANTHA	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.3	13.5
YUCCA ANGUSTISSIMA	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.3	3.4
XXX PERENNIAL SHRUB TOTALS:	5475	0.45	99.99	17.55	87.72	78.27	99.99	29.12			4862.5	1967.8
SANDS	31194	2.57		100.00	301.27	268.79		100.00			4862.5	1967.8

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

SALINE SANDS

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
*** ANNUAL FORB ***												
SALSOLA KALI/SALSOLA IBERICA	1933	0.16	37.86	5.23	10.77	9.61	41.52	4.11	60.00	24.75		
DESCURAINIA PINNATA	875	0.07	17.14	2.37	2.75	2.45	10.60	1.05	50.00	18.50		
CRYPTANTHA CRASSISEPALA	867	0.07	16.98	2.34	6.42	5.73	24.76	2.45	45.00	13.25		
GILIA LEPTOMERIA	700	0.06	13.71	1.89	1.70	1.52	6.55	0.65	47.50	20.75		
LAPPULA REDOWSKII	145	0.01	2.84	0.39	1.67	1.49	6.45	0.64	27.50	4.00		
ERIGERON FLEXUM	136	0.01	2.66	0.37	0.00	0.00	0.00	0.00	7.50	2.00		
PLANTAGO PATAGONICA	117	0.01	2.29	0.32	1.40	1.25	5.39	0.53	20.00	3.75		
PHACELIA CORRUGATA	106	0.01	2.08	0.29	0.25	0.22	0.96	0.10	15.00	3.50		
MALCOMIA AFRICANA	82	0.01	1.61	0.22	0.00	0.00	0.00	0.00	10.00	1.00		
IPOMOPSIS POLYCLADON	50	0.00	0.98	0.14	0.32	0.29	1.25	0.12	7.50	1.50		
CHENOPODIUM INCANUM	30	0.00	0.59	0.08	0.00	0.00	0.00	0.00	2.50	0.25		
MENTZELIA ALBICAULIS	20	0.00	0.39	0.05	0.00	0.00	0.00	0.00	7.50	0.75		
IPOMOPSIS GUNNISONII	11	0.00	0.22	0.03	0.25	0.22	0.96	0.10	5.00	0.50		
ATRIPLEX POWELLII	9	0.00	0.18	0.02	0.10	0.09	0.39	0.04	5.00	0.50		
IPOMOPSIS LONGIFLORA	8	0.00	0.16	0.02	0.05	0.04	0.19	0.02	2.50	0.25		
HALOGETON GLOMERATUS	5	0.00	0.10	0.01	0.25	0.22	0.96	0.10	2.50	0.25		
CHAENACTIS STEVOIDES	4	0.00	0.08	0.01	0.00	0.00	0.00	0.00	2.50	0.25		
ERIOGONUM DIVARICATUM	3	0.00	0.06	0.01	0.00	0.00	0.00	0.00	2.50	0.25		
CLEOME LUTEA	2	0.00	0.04	0.01	0.00	0.00	0.00	0.00	2.50	0.25		
ERIOGONUM SALSUGINOSUM	2	0.00	0.04	0.01	0.00	0.00	0.00	0.00	2.50	0.25		
*** ANNUAL FORB TOTALS:	5105	0.41	100.01	13.80	25.95	23.15	99.98	9.89				
*** ANNUAL GRASS ***												
VULPIA OCTOFLORA	5098	0.42	92.01	13.76	17.57	15.68	90.36	6.70	55.00	35.00		
BROMUS TECTORUM	442	0.04	7.99	1.20	1.87	1.67	9.64	0.71	42.50	10.25		
*** ANNUAL GRASS TOTALS:	5530	0.46	100.00	14.95	19.45	17.35	100.00	7.41				
*** PERENNIAL FORB ***												
SPHAERALCEA COCCINEA	73	0.01	84.88	0.20	0.00	0.00	0.00	0.00	7.50	0.75		
LEUCELENE ERICOIDES	13	0.00	15.12	0.04	0.00	0.00	0.00	0.00	2.50	0.25		
SPHAERALCEA PARVIFOLIA	0	0.00	0.00	0.00	0.10	0.09	100.00	0.04	0.00	0.00		
*** PERENNIAL FORB TOTALS:	86	0.01	100.00	0.23	0.10	0.09	100.00	0.04				
*** PERENNIAL GRASS ***												
SPOROBOLUS AIROIDES	10934	0.91	50.96	29.57	74.62	66.58	49.62	28.45	85.00	51.25		
ORYZOPSIS HYMENOIDES	6467	0.54	30.14	17.49	55.42	49.45	36.85	21.13	75.00	40.75		
HILARIA JAMESII	3856	0.32	17.97	10.43	19.32	17.24	12.85	7.37	85.00	43.75		
ARISTIDA PURPUREA	201	0.02	0.94	0.54	1.02	0.91	0.68	0.39	10.00	1.75		
*** PERENNIAL GRASS TOTALS:	21458	1.79	100.01	58.02	150.40	134.19	100.00	57.33				

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

SALINE SANDS

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
XXX PERENNIAL SHRUB XXX												
ATRIPLEX CONFERTIFOLIA	1365	0.11	28.43	3.69	10.17	9.08	15.32	3.88	27.50	7.75	425.0	172.0
SACROBATUS VERMICULATUS	1315	0.11	27.38	3.56	25.50	22.75	38.39	9.72	7.50	1.00	16.7	6.7
GUTIERREZIA SAROTHRAE	1278	0.11	26.61	3.46	19.07	17.02	28.72	7.27	30.00	9.50	1150.0	465.4
ATRIPLEX CUNEATA	532	0.04	11.08	1.44	7.52	6.71	11.33	2.87	10.00	2.50	145.8	59.0
ATRIPLEX OBOVATA	150	0.01	3.12	0.41	4.15	3.70	6.25	1.58	2.50	0.75	54.2	21.9
CERATOIDES LANATA	95	0.01	1.98	0.26	0.00	0.00	0.00	0.00	2.50	0.25	25.0	10.1
OPUNTIA POLYACANTHA	42	0.00	0.87	0.11	0.00	0.00	0.00	0.00	2.50	0.25	20.8	8.4
ATRIPLEX CANESCENS	25	0.00	0.52	0.07	0.00	0.00	0.00	0.00	5.00	0.50	16.7	6.7
CHRYSOTHAMNUS NAUSEOSUS	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.7	6.7
EPHEDRA TORREYANA	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.2	1.7
LYCIUM PALLIDUM	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.5	5.1
XXX PERENNIAL SHRUB TOTALS:	4802	0.39	99.99	12.99	66.42	59.26	100.01	25.32			1887.5	763.9
SALINE SANDS	36981	3.06		100.00	262.32	234.04		100.00			1887.5	763.9

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

THINBREAKS

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
*** ANNUAL FORB ***												
SALSOLA KALI/SALSOLA IBERICA	3204	0.27	45.71	16.02	17.97	16.04	35.47	10.56	70.00	38.25		
DESCURAINIA PINNATA	734	0.06	10.47	3.67	3.97	3.55	7.84	2.33	67.50	20.75		
HALOGETON GLOMERATUS	705	0.06	10.06	3.52	8.25	7.36	16.28	4.85	35.00	12.25		
ERIGERON FLEXUM	697	0.06	9.94	3.48	2.40	2.14	4.74	1.41	32.50	11.25		
ATRIPLEX POWELLII	434	0.04	6.19	2.17	8.45	7.54	16.67	4.96	22.50	8.75		
PHACELIA CORRUGATA	414	0.03	5.91	2.07	3.92	3.41	7.55	2.25	37.50	10.75		
CHAENACTIS STEVOIDES	188	0.02	2.68	0.94	1.05	0.94	2.07	0.62	12.50	5.00		
LAPPULA REDOWSKII	166	0.01	2.37	0.83	0.32	0.29	0.64	0.19	30.00	6.75		
ERIOGONUM SALSUGINOSUM	152	0.01	2.17	0.76	0.97	0.87	1.92	0.57	5.00	2.25		
PLANTAGO PATAGONICA	102	0.01	1.46	0.51	0.95	0.76	1.68	0.50	10.00	3.75		
GILIA LEPTOMERIA	49	0.00	0.70	0.24	0.00	0.00	0.00	0.00	5.00	1.25		
AMBROSIA ACANTHICARPA	44	0.00	0.63	0.22	0.00	0.00	0.00	0.00	7.50	1.25		
ERIOGONUM DIVARICATUM	38	0.00	0.54	0.19	0.27	0.25	0.54	0.16	2.50	1.50		
IPOMOPSIS GUNNISONII	35	0.00	0.50	0.17	1.22	1.09	2.42	0.72	10.00	1.00		
MENTZELIA ALBICAULIS	21	0.00	0.30	0.10	0.12	0.11	0.25	0.07	7.50	1.00		
ATRIPLEX SACCARIA	14	0.00	0.20	0.07	0.52	0.47	1.04	0.31	2.50	0.50		
IPOMOPSIS LONGIFLORA	8	0.00	0.11	0.04	0.00	0.00	0.00	0.00	2.50	0.25		
CLEOME LUTEA	5	0.00	0.07	0.02	0.00	0.00	0.00	0.00	2.50	0.25		
IPOMOPSIS POLYCLADON	0	0.00	0.00	0.00	0.45	0.40	0.89	0.26	0.00	0.00		
*** ANNUAL FORB TOTALS:	7010	0.57	100.01	35.04	50.67	45.21	100.00	29.76				
*** ANNUAL GRASS ***												
VULPIA OCTOFLORA	267	0.02	52.05	1.33	0.40	0.36	45.71	0.23	7.50	2.25		
BROMUS TECTORUM	246	0.02	47.95	1.23	0.47	0.42	54.29	0.28	17.50	4.50		
*** ANNUAL GRASS TOTALS:	513	0.04	100.00	2.56	0.87	0.78	100.00	0.51				
*** PERENNIAL FORB ***												
BAHIA OBLONGIFOLIA	274	0.02	56.49	1.37	2.97	2.65	78.29	1.75	7.50	2.00		
SPHAERALCEA COCCINEA	141	0.01	29.07	0.70	0.82	0.74	21.71	0.48	15.00	2.00		
ASTRAGALUS LONCHOCARPUS	32	0.00	6.60	0.16	0.00	0.00	0.00	0.00	2.50	0.25		
ERIOGONUM CORYMBOSUM	16	0.00	3.30	0.08	0.00	0.00	0.00	0.00	2.50	0.25		
SPHAERALCEA PARVIFOLIA	13	0.00	2.68	0.06	0.00	0.00	0.00	0.00	2.50	0.25		
ERIOGONUM LEPTOPHYLLUM	9	0.00	1.86	0.04	0.00	0.00	0.00	0.00	2.50	0.25		
*** PERENNIAL FORB TOTALS:	485	0.03	100.00	2.42	3.80	3.39	100.00	2.23				
*** PERENNIAL GRASS ***												
SPOROBOLUS AIROIDES	1350	0.11	44.25	6.75	13.30	11.87	69.18	7.81	35.00	9.25		
HILARIA JAMESII	1048	0.09	34.35	5.24	0.87	0.78	4.55	0.51	45.00	9.25		
ORYZOPSIS HYMENOIDES	653	0.05	21.40	3.26	5.05	4.51	26.27	2.97	30.00	7.00		
*** PERENNIAL GRASS TOTALS:	3051	0.25	100.00	15.25	19.22	17.15	100.00	11.29				

COVER, PRODUCTION, CONSTANCY, FREQUENCY, AND SHRUB DENSITY BY SPECIES

UNDISTURBED AREAS

THINBREAKS

N (COVER) = 40
N (PROD.) = 40

SPECIES	COVER (MM.)	COVER (%)	% OF GROUP COVER	% OF TOTAL COVER	- DRY PRODUCT. - KG/HA	LB/AC	% OF GROUP PROD.	% OF TOTAL PROD.	CONST.	FREQ.	DENSITY /HA	DENSITY /AC
XXX PERENNIAL SHRUB XXX												
ATRIPLEX CONFERTIFOLIA	7056	0.59	78.87	35.27	57.60	51.39	60.19	33.83	72.50	29.25	2095.8	848.2
GUTIERREZIA SAROTHRAE	1196	0.10	13.26	5.93	11.45	10.22	11.96	6.72	37.50	9.50	812.5	328.8
ATRIPLEX CORRUGATA	294	0.02	3.29	1.47	13.10	11.69	13.69	7.69	7.50	3.75	266.7	107.9
ATRIPLEX CUNEATA	193	0.02	2.16	0.96	10.65	9.50	11.13	6.25	10.00	1.75	100.0	40.5
SUAEDA TORREYANA	163	0.01	1.82	0.81	2.47	2.21	2.59	1.45	10.00	1.00	58.3	23.6
ATRIPLEX OBOVATA	25	0.00	0.28	0.12	0.42	0.38	0.44	0.25	2.50	0.50	37.5	15.2
ATRIPLEX CANESCENS	16	0.00	0.18	0.08	0.00	0.00	0.00	0.00	2.50	0.75	33.3	13.5
OPUNTIA POLYACANTHA	13	0.00	0.15	0.06	0.00	0.00	0.00	0.00	2.50	0.25	29.2	11.8
BACCHARIS WRIGHTII	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.3	3.4
EPHEDRA TORREYANA	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.3	3.4
XXX PERENNIAL SHRUB TOTALS:	8946	0.74	100.01	44.72	95.70	85.38	100.00	56.20			3450.0	1396.2
THINBREAKS	20005	1.63		100.00	170.27	151.92		100.00			3450.0	1396.2

76-I-17

DECEMBER 15, 1987

NAVAJO MINE
VEGETATION DATA REPORTING
1986

SUMMARY OF RANGE STATISTICAL TOTALS -- UNDISTURBED AREAS

	% COVER & (% TOTAL COVER)			DRY PRODUCTION IN #/ACRE & (% TOTAL PROD.)			
	HERBACEOUS	SHRUB	TOTAL	HERBACEOUS	SHRUB	TOTAL	SHRUB DENS. (UNIT/ACRE)
ALKALI WASH	1.13 (68.32)	0.53 (31.68)	1.65	87.06 (52.70)	78.13 (47.30)	165.19	524.4
ARROYO SHRUB	1.79 (64.32)	0.98 (35.25)	2.77	178.48 (60.79)	115.14 (39.21)	293.62	1205.7
BADLANDS	0.90 (81.34)	0.21 (18.66)	1.11	79.69 (81.22)	18.42 (18.78)	98.12	278.2
CALCAREOUS SANDS	2.25 (79.56)	0.58 (20.44)	2.83	197.06 (71.04)	80.34 (28.96)	277.40	1588.4
DUNES	1.78 (65.86)	0.93 (34.14)	2.71	217.16 (66.53)	109.25 (33.47)	326.41	2460.2
SANDS	2.07 (80.26)	0.45 (17.55)	2.52	190.53 (70.98)	78.27 (29.12)	268.79	1967.8
SALINE SANDS	2.67 (87.01)	0.39 (12.99)	3.06	174.78 (74.68)	59.26 (25.32)	234.04	763.9
THINBREAKS	0.89 (55.28)	0.74 (44.72)	1.63	66.54 (43.80)	85.38 (56.20)	151.92	1396.2

Appendix 15.B

Floristic Survey and Ecological Study of BHP Area 4 North,

San Juan County, 2004

FLORISTIC SURVEY AND ECOLOGICAL STUDY OF BHP AREA IV, SAN JUAN COUNTY, NEW MEXICO



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November 2004

1.0 INTRODUCTION

This vegetation resource baseline report has been prepared to update permitting information pertinent to the continuation of coal extraction in Area IV North of Navajo Mine on the Navajo Reservation, approximately 15 miles southwest of Farmington, New Mexico. Specifically, this vegetation baseline report addresses the entire existing Area IV North lease area totaling approximately 4,000 acres. This baseline data has been collected to provide the Office of Surface Mining (OSM) with current vegetation data necessary to prepare National Environmental Protection Act (NEPA) documentation for continued coal extraction in Area IV North. The data was collected in May, 2004. With this purpose in mind the following ecological research and floristic inventory objectives were deemed as essential: 1.) Conduct an ecological study estimating the structure (cover, density, and frequency) of the natural scrubland vegetation in Area IV; 2.) Undertake a floristic survey to identify all vascular plant species that occur in Area IV; 3.) Assess the presence or absence of plants with special protection or conservation status according to Federal, State, and Navajo Nation wildlife management agencies.

2.0 STUDY AREA

2.1 Location

Area IV North is found on the Hogback S, Kirtland SW, Newcomb NE, and The Pillar NW 7.5-minutes USGS Quadrangles (Figure 1).

2.2 Area IV Vegetation Community Types

Ecologists categorize the natural vegetation in Area IV as Great Basin Desertscrub (Brown, 1994). This type of vegetation is known as “cold desert”, a name assigned due to the climatic combination of cold winters, low precipitation (less than 250 mm/yr), and wide fluctuations in both daily and seasonal temperature extremes. Eight months of each year have monthly rainfall averages between 12 and 17 mm. The four months with monthly rainfall amounts greater than 20 mm (20-30 mm per month) are July to October. Maximum daily temperatures remain below freezing during many days of the three coldest months: December, January and February.

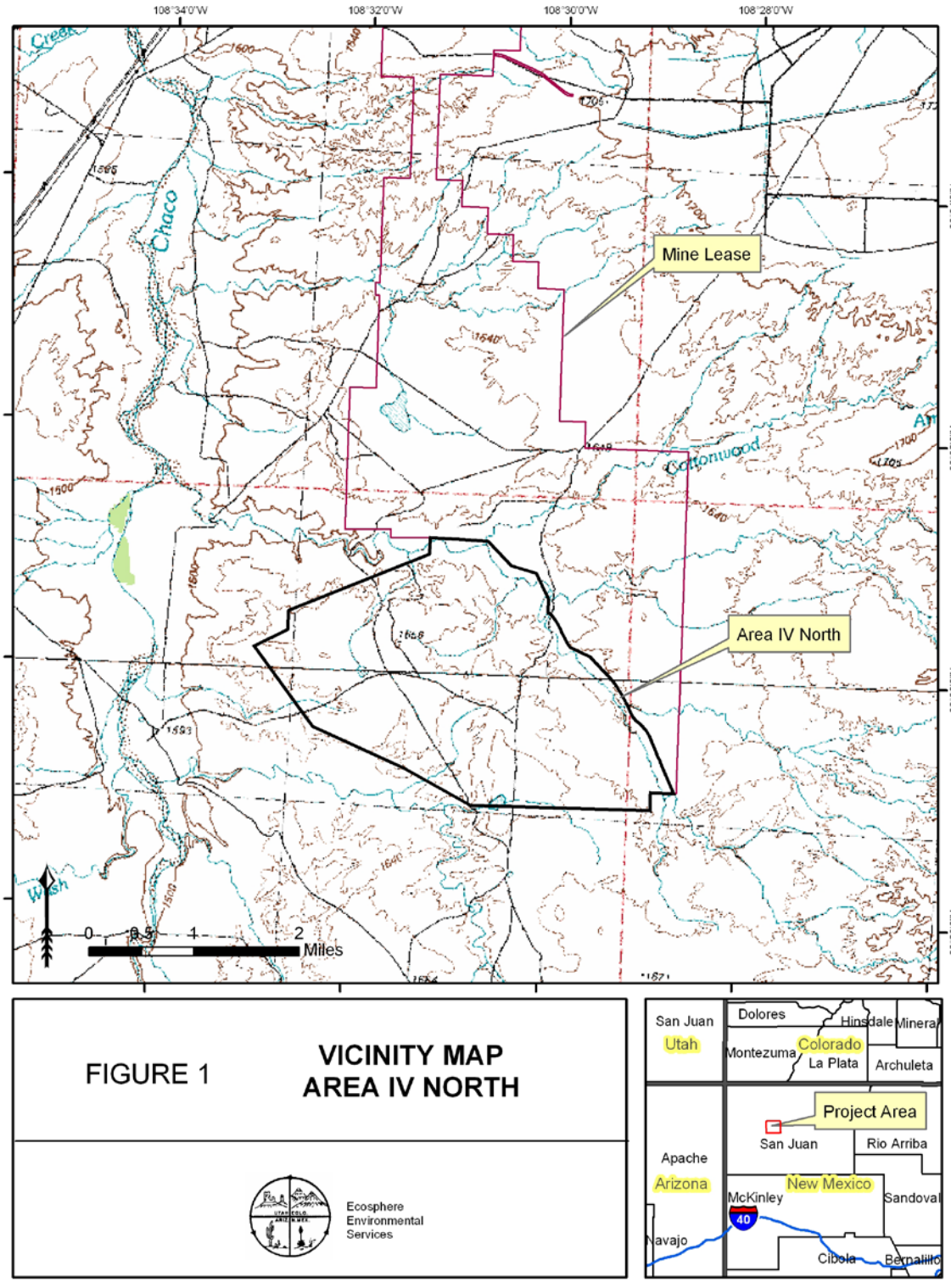


FIGURE 1 **VICINITY MAP AREA IV NORTH**

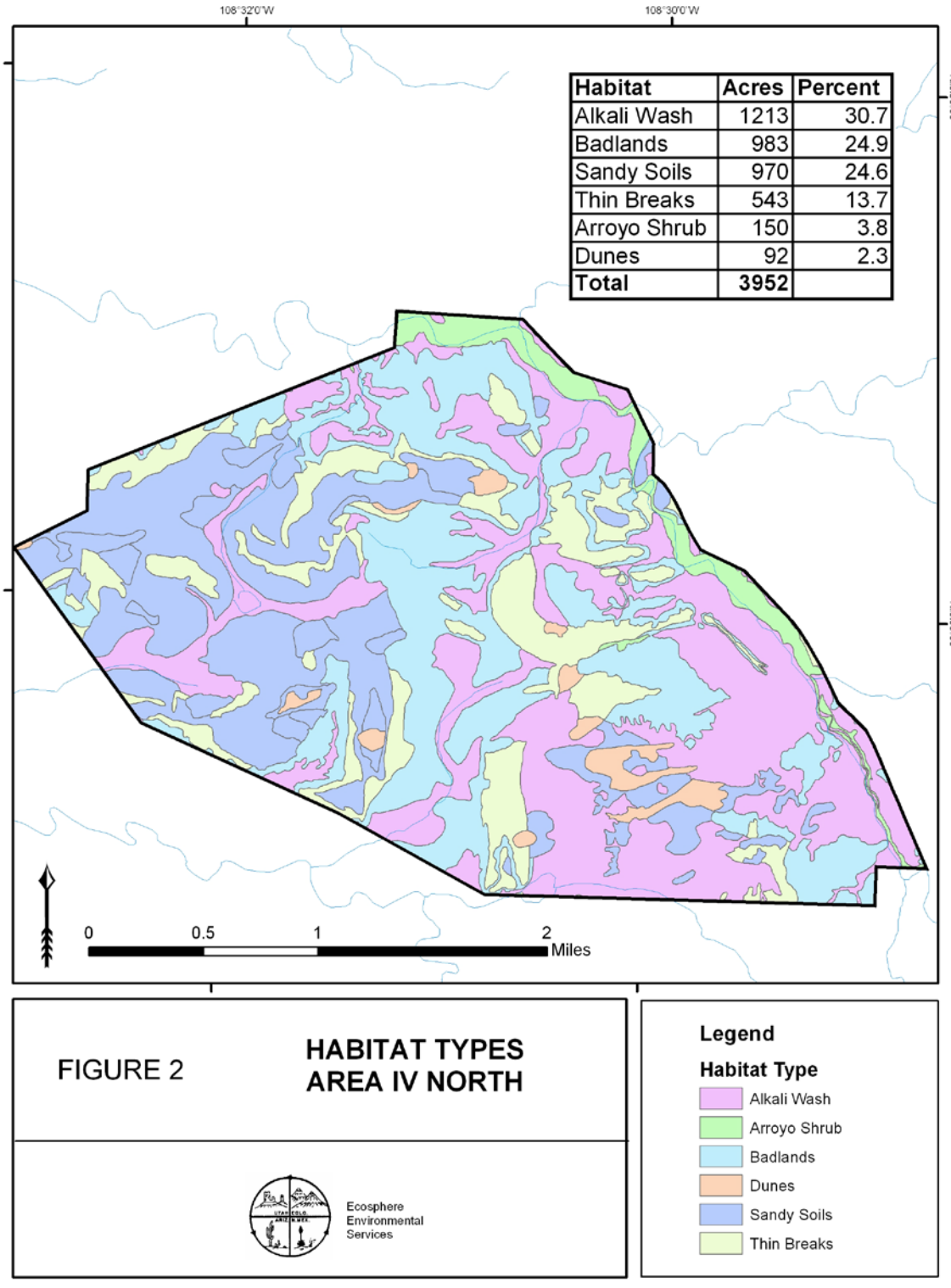
Ecosphere Environmental Services

The Great Basin Desertscrub is characteristically dominated by halophytes and has few cacti (Brown, 1994). Both these statements are true for Area IV where six species of *Atriplex* often occur as dominants and where there are only two cacti species. The only cacti present are the infrequent *Opuntia polyacantha* (plains prickly pear) and an even more infrequent *Sclerocactus cloveriae* subsp *cloveriae* (clover fishhook cactus). *Atriplex confertifolia* (shadescale), *Atriplex gardneri* (Gardner saltbush), *Ericameria nauseosus* (rubber rabbitbursh), *Gutierrezia sarothrae* (snakeweed), *Sarcobatus vermiculatus* (black greasewood), *Pleuraphis jamesii* (galleta), and *Sporobolus airoides* (alkali sacaton) are locally common in Area IV. This makes Area IV a part of the shadescale series of the Great Basin Desertscrub (Brown, 1994).

As a whole, the plant species diversity of this Great Basin Desertscrub series is typically less than other types of desert scrublands. Within the shadscale series of the Great Basis Desertscrub (Area IV) there is considerable variation in plant species diversity among habitats. For example, sand dunes have much greater species diversity than badlands. In recognition of variations in species richness that can occur among habitats, six habitat types within the Great Basin Desertscrub of Area IV were identified from aerial photographs (Figure 2). Although many of the more than 160 plant species that occur here are present in two or more habitats, each habitat had a few unique or characteristic plant species and a few are listed as characteristic of two habitats. The following brief descriptions list a few of the more characteristic or unique plant species for each habitat. These six habitats are listed in descending order, beginning with the habitat with the greatest species richness and amount of vegetation and proceeding to the habitat with less vegetation and with fewer plant species.

2.2.1 Dunes

The deep sands of dunes allows for deep, but more consistent water availability. Since only deep-rooted perennial plants can exploit this deep water, the dunes have several unique plant species. Among the unique dune plant species are *Ericameria nauseosa* var. *arenaria* (sand rabbibrush), *Chrysothamnus pulchellus, Evolvulus nuttallianus, Dalea leporina,* and *Caesalpinia jamesii*. Besides these species, *Abonia fragrans* and *Mentzelia pumila* are perennials that can be locally abundant on dunes.


108°32'0"W
108°30'0"W
36°32'0"N
36°30'0"N
Habitat | Acres | Percent
Alkali Wash | 1213 | 30.7
Badlands | 983 | 24.9
Sandy Soils | 970 | 24.6
Thin Breaks | 543 | 13.7
Arroyo Shrub | 150 | 3.8
Dunes | 92 | 2.3
Total | 3952
0 0.5 1 2 Miles
FIGURE 2
HABITAT TYPES
AREA IV NORTH
Ecosphere Environmental Services
Legend
Habitat Type
Alkali Wash
Arroyo Shrub
Badlands
Dunes
Sandy Soils
Thin Breaks

2.2.2 Sandy Soils

Sandy soils comprise the largest proportion of Area IV. As with dunes, the deeper penetration of rainwater into sandy soil allows for greater water availability and increases plant species diversity. The types of sand in this habitat can vary from saline to calcareous. This sand habitat often transitions to and can be mixed with thin break habitat. In years with high amounts of spring rainfall, such as the spring of 2004, sandy soils display an abundance of annuals, especially of *Phacelia crenulata, Townsendia annua,* and *Cryptantha crassisepala*. To a lesser extent *Dimorphocarpa wislizenii* (spectacle pod), *Malacothrix sonchoides* (desert dandelion), and *Streptanthella longirostris* are common. In regard to shrubs *Ephedra torreyana* (Torrey ephedra) and *Krascheninnidovia lanata* (winterfat) occur on sandy soils.

2.2.3 Arroyo Shrub

This is the habitat of major waterways, such as Pinabete and Cottonwood Creeks. Shrubs and perennials characteristic of this Area IV habitat include *Sarcobatus vermiculatus* (greasewood), *Isocoma azteca* (burroweed), *Psoralidium lanceolatum* (lemon scurf-pea), *Cycloloma atriplicifolia* (winged pigweed), *Parryella filifolia* (dune), *Lycium pallidum* (wolfberry), and *Distichlis spicata* (saltgrass). Also established along major waterways and behind checkdams is the exotic *Tamarix chinensis* (salt cedar) and the poisonous *Suckleya suckleyana* (poison suckleya).

2.2.4 Alkali Wash

This is the habitat of minor waterways. These areas can be broad and level, sometimes with small, dense patches of *Pleuraphis jamesii* (galleta) and *Sporobolus airoides* (alkali sacaton). Other plants that are locally common in alkali washes include *Chamaesaracha coronpus* (false nightshade), *Lycium pallidum* (wolfberry), *Eriogonum corymbosum* (corymb buckwheat), *Monolepis nuttalliana* (poverty weed), *Eremopyrum triticeum* (annual wheatgrass), and *Suaeda moquini* (seepweed).

2.2.5 Thin Breaks

These are rocky areas, sometimes with loose rock and sometimes with large pieces of rock, usually shale, that are firmly embedded in the ground. Thin breaks are typically upland habitats,

with surface rock as a unifying feature. Flat surface rocks allow for greater water to runoff and to accumulate in crevices or fissures between rocks. Thin-break plant species that occur in these fissures include *Artemisia bigelovii* (Bigelow sagebrush), *Brickellia oblongifolia* (Mojave brickellbush), *Euphorbia fendleri* (Fendler's spurge) and *Platyschkuhria integrifolia* (obling bahia). This habitat can abruptly shift to another habitat type or gradually shift to badlands or sandy soil habitats.

2.2.6 Badlands

The badlands have the least vegetation of any Area IV habitat. Among the more common plants along the small relief channels of these barren areas are *Atriplex gardnerii* (Gardner's saltbush), *Atriplex powellii* (Powell's saltbush), *Cleome lutea* (yellow beeplant), *Camissonia scapoidea*, and *Monolepis nuttalliana* (poverty weed). This habitat can abruptly shift to another habitat type or gradually transition to alkali wash or thin break habitats.

3.0 STUDY METHODS

Vegetation structure is essential baseline data, especially when an area is destined for revegetation. With this purpose in mind, the vegetation information of greatest interest for this study is plant cover, plant density and frequency. To estimate these aspects of vegetation structure it is necessary to obtain ecological data from field plots. The timing of this fieldwork was in May (May 5-16, 2004). This was the optimal time to estimate both annual and perennial plant cover, density and frequency.

3.1 Ecological Study

Before fieldwork began 197 plot locations were randomly designated. This number of plots allowed each plot to represent about 20 hectares, a fairly intensive sampling scheme. Plot locations were selected at random to ensure that data points were representative of the entire area. Plot locations were selected by plotting computer-generated random coordinates onto a map of Area IV. After these 197 randomly generated points were plotted on a map, the proportion of plots in each of the six major habitat types was calculated. These proportions were: 5% dune, 21% thin break, 30 % sand, 21% badland, 20% alkali wash and 8% arroyo shrub. With one exception these proportions were similar to the overall proportions of land with this habitat. The

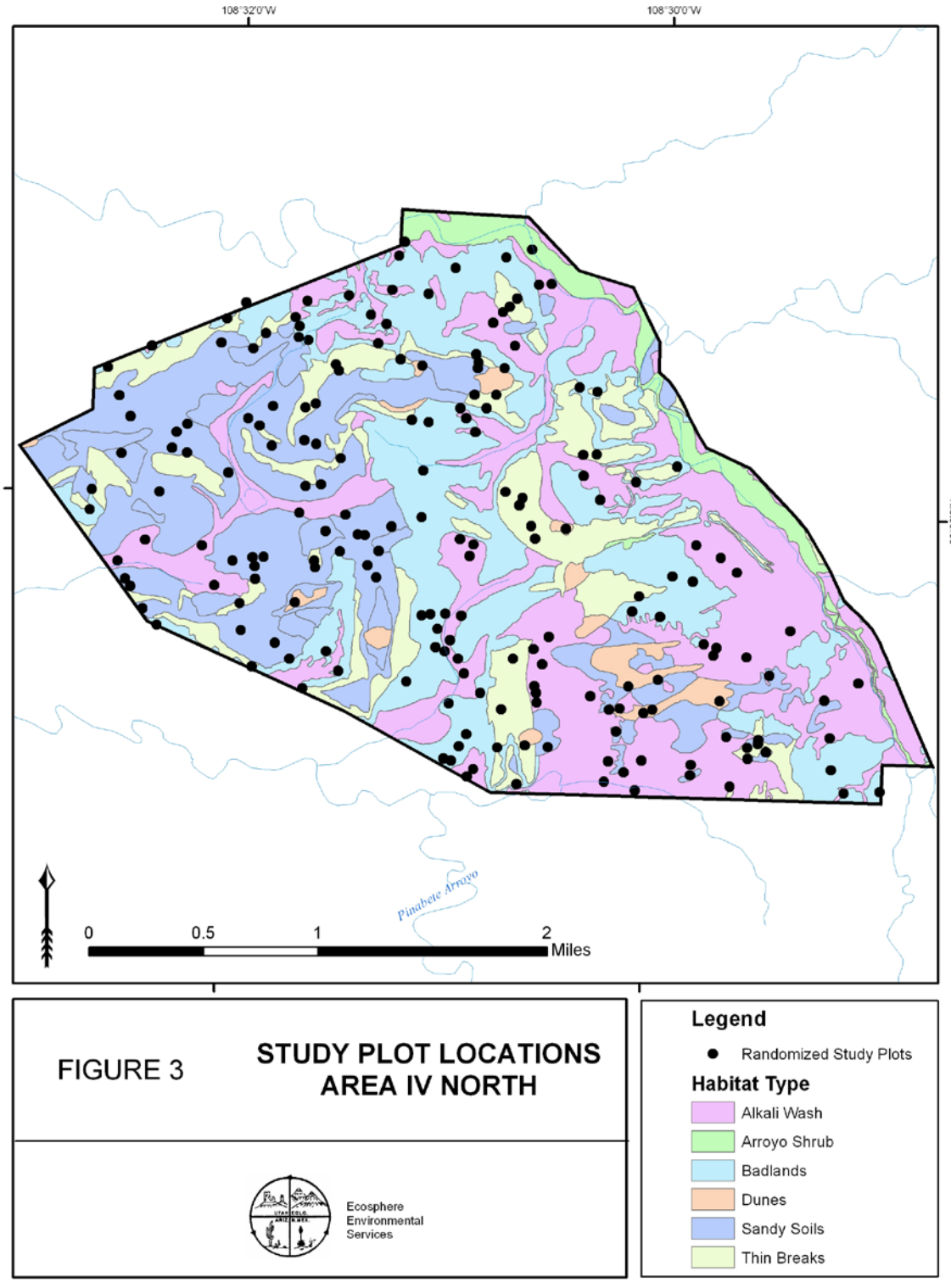
exception was the arroyo shrub, a habitat that was somewhat under-represented by plots. To compensate for this random under sampling, two additional arroyo shrub plots were established. These two additions increased the total number of study plots in Area IV to 199 (Figure 3).

Plots points were located in the field by the use of detailed U.S. Geological Survey (USGS) 7.5-minute quadrangle maps. Global positioning systems (G.P.S.) were used to triangulate signals from satellites and thereby locate random plots in areas where landmarks were scarce. Once a plot was located a portable G.P.S. was used to determine the Universal Transverse Mercater (U.T.M.) coordinates of the plot. The U.T.M. coordinates, date, plot number, and names of the field investigators were recorded on field data sheets.

After a plot point was located in the field, a decision had to be made regarding the direction to extend a 30 m line transect, the line that would also be the central axis for a temporary plot. This direction to extend the transect line from the starting point was determined by selecting an azimuth direction from a table of randomly generated azimuth numbers. This random number was the compass heading direction where the transect line was extended. On a few occasions, the random azimuth direction extended into another habitat type. When this happened, another azimuth number was randomly selected until an azimuth heading was a line that was within a single habitat type.

To determine shrub densities, the number and species of all shrubs rooted within one meter of the 30 transect line were tallied and recorded. For each plot the shrub density figures are from this rectangular plot (30 x 2 meters in size) that covers an area of 60 m^2. For each shrub species present within the 30 x 2 meter plot, the height of one individual was recorded. The individual measured for height was the one closest to the beginning point of the line transect.

Next, the canopy intercept distance (cover) along the entire 30 m length of the transect line was recorded to the nearest centimeter. This was done by visually following one edge of the extended tape; imagining a millimeter thin line, along the entire length of the 30 m transect line. To facilitate data collection, the line-intercept data was recorded on the data sheet in six columns. These corresponded to 0-5, 5-10, 10-15, 15-20, 20-25, and 25-30 m intervals along the 30 m


108°32'0"W
108°30'0"W
36°30'0"N
Pinabete Arroyo
0
0.5
1
2
Miles
FIGURE 3
STUDY PLOT LOCATIONS
AREA IV NORTH
Ecosphere
Environmental
Services
Legend
Randomized Study Plots
Habitat Type
Alkali Wash
Arroyo Shrub
Badlands
Dunes
Sandy Soils
Thin Breaks

transect line. Within each of these 5 meter intervals the amounts of rock and litter intercepted by the transect line were recorded. Rock was defined as any piece of rock larger than a grain of sand. Litter was defined as dead plant material (wood, leaves or fruits) or other organic matter, such as occasional animal droppings.

Vegetation cover (dominance) data for all living plant species was collected for these same six 5-meter intervals along the 30 m transect line. Whenever a living plant intercepted the line the distance of the intercept was recorded to the nearest centimeter. If a plant crossed the line at a distance of less than 1 cm, a minimal value of 1 cm was recorded. This assured that each plant species present along the transect line was recorded.

After the transect line was extended, care was taken to walk only along one side of the line. This is important because the rock, litter, and vegetation along the untrampled side of the line are to be used as plot locations to collect plant density, plant frequency, rock cover, litter cover, annual plant cover and perennial plant cover data. The large 30 x 2 m plot was used to collect data on shrub density and frequency, but five smaller plots, each 0.25 m^2 in size were used to collect density and frequency information for non-shrubs. These 5 square plots were 0.5 x 0.5 m in size and were systematically located along the untrampled side of the extended transect line at the 5.0-5.5, 10.0-10.5, 15.0-15.5, 20.0-20.5 and 25.0-25.5 m locations.

For each of these 0.25 m^2 plots, the species and number of every individual plant rooted inside the plot area was counted and recorded. It was recognized that the estimates of individuals were less exact for perennial grasses than for annual plants. Also within each 0.25 m^2 plot visual estimates of the percentage of the area covered by rock, litter, and living vegetation were made. After an estimate was made of total vegetation cover (perennial and annual plants), the amount of this total cover that was annual plants was estimated and recorded. This separate estimate for annuals is an indication of the relative importance of annual plants to total vegetation cover. Based on observer experience at the mine and in the region, the abundance of annuals in Area IV was noticeably greater in 2004 than in the previous low-rainfall years. Therefore, the proportion of annual vegetation cover to total vegetation in 2004 will reflect the cover of annuals during a year with high amounts of spring rainfall.

This fieldwork took 10 days with 3-6 investigators in the field each day (average of 4 per day). Transects were read by teams of 2 people, with an experienced botanist on each team. This amounted to a total of 40 person-days of fieldwork to collect the line transect data from Area IV.

3.2 Floristic Survey Methods

All plant species seen in Area IV during the 2 weeks of transect work were identified. This was done by either keying plants to species with the aid of regional floras (Welsh, et. al., Weber and Taylor) or by personal consultation with local plant identification experts.

Prior to the field surveys a list of all rare plants in San Juan County was secured (Table 1). Key field characters of plants were studied and a visit was made to the San Juan College herbarium to examine herbarium specimens of these rare plants. Notes were taken at the herbarium to ensure that these plants could be accurately identified if encountered during the field survey.

The 199 transects were located in all sections and in all habitats of Area IV. As these were read, a list of plants for all of Area IV was compiled. As transects were read, additional time was spent searching for plant species in species-rich habitats and in unique micro-sites such as in sand dunes, along drainages, and in soil-filled seams below rock slicks. Not including the time spent collecting the line-transect data; another 4 person-days were spent searching unique habitats and micro-sites in Area IV for plant species.

4.0 RESULTS

4.1 Rare Plants of Area IV

According to the New Mexico Rare Plant Council, there are 18 plant species in San Juan County, New Mexico listed as “rare” (Table 1). For the purpose of this baseline report, the term rare refers to a taxon that is narrowly endemic to a specific geographic feature (e.g., rock outcrops) or subset area of a phytogeographic region (e.g., southern Rocky Mountains, northern Chihuahuan desert). It can be locally abundant within its narrow range, but typically will not extend more than 100 miles in length of range. Included on this list are all federally listed threatened and endangered plants and species listed on the Navajo Endangered Species List (NESL).

Table 1. Rare Plant Species Known To Occur In San Juan County, New Mexico.

Species	Family	Federal	State of NM	Navajo Nation
**Abronia bloackii*	Nyctaginaceae	-	Species of concern	-
Aletes macdougalii ssp. breviradiatus	Brassicaceae	-	Species of concern	-
Aliciella formosa	Polemoniaceae	Species of concern	Endangered	-
**Asclepias sanjuanensis*	Asclepiadaceae	-	Species of concern	Group 4
Astragalus chuskanus	Fabaceae	-	Species of concern	-
Astragalus cottamii	Fabaceae	-	-	-
Astragalus humillus	Fabaceae	Endangered	Endangered	Group 2
Astragalus micromerius	Fabaceae	-	Species of concern	-
Astragalus naturitensis	Fabaceae	-	Species of concern	Group 4
Astragalus oocalycis	Fabaceae	-	Species of concern	-
Pediocactus knowltonii	Cactaceae	Endangered	Endangered	-
Penstemon breviculus	Scrophulariaceae		Species of concern	-
Penstemon lentus	Scrophulariaceae	-	-	-
Phlox cluteana	Polemoniiaceae	-	Species of concern	-
**Proatriplex pleiantha*	Chenopodiaceae	-	Species of concern	-
**Puccinellia parshii*	Poaceae	Species of concern	Endangered	Group 3
Sclerocactus cloveriae ssp. brackii	Cactaceae	Species of concern	Endangered	-
Sclerocactus mesae-verde	Cactaceae	Threatened	Endangered	Group 3

Source: New Mexico Rare Plant Technical Council

The only plant from this table to occur in BHP Area IV is *Ascelpias sanjuanensis* (Ascelpiadaceae). Field survey personnel were aware of the possible occurrence all 18 plant species (Table 1). Special attention was given to four plant species (preceded by an asterisk) known to occur near Area IV. Even though the San Juan milkweed was the only one of the four species encountered, habitat and distribution information for all four rare plant species that occur near Area IV plant are summarized here.

4.1.1 **Abronia bolackii** N. D. Atwood, S. L. Welsh & K. D. Heil (Nyctaginaceae)

This rare plant species was only recently described (Atwood and others, 2002). It is known from only four locations in San Juan County, New Mexico. One of these locations is 10 miles SSW of Waterflow on the Navajo Mine Lease land west of the Neck region. This is approximately two miles from the Area IV survey area. Since this is near the Area IV survey area, special attention was given to areas with gypsiferous clay lens soils of the Ojo Alamo Formation, a preferred substrate for this plant. This species differs from *Abronia fragrans*, a common plant in Area IV, by having rhizomes, occurring in colonies, and having a shorter corolla tube. Whenever patches of *Abronia* were encountered that appeared to be clonal, these were closely examined. No *A. blackii* plants have yet been discovered in Area IV.

4.1.2 **Asclepias sanjuanensis** Heil, Porter, & Welsh (Asclepiadaeae)

This milkweed was encountered at 4 widely dispersed locations in Area IV. Eight or more individual milkweed plants were encountered at each of these locations. The stems of this perennial milkweed grow from a woody taproot and are 4-8 cm. tall. Stems are typically prostrate with leaves 2-4 cm long. Diagnostic characters of this milkweed are the white, tomentulose leaf margins, and a terminal inflorescence with a reddish-violet flowers. This milkweed flowers in April and has mature fruits in mid to late May. (Ecosphere Environmental Services, 1995). The characteristic habitat of this plant is sandy soil, sometimes occurring in pinyon-juniper woodlands. In Area IV this plant occurs in sandy soil, dune habitats and along small sandy gullies.

There are no federal, State of New Mexico or Navajo Nation protections for this species. The State recommends that these plants be protected from land use impacts when possible. The Navajo Nation Department of Fish and Wildlife (NNDFW) does not currently have sufficient information to support this species being listed as G2 or G3 on the NESL. According to Daniela Roth, NNDFW Botanist, this species may be locally abundant or more abundant than was previously thought. However, the NNDFW does request that discoveries be reported in order to further assess the status of this plant on the reservation. Based on what is currently known about this plant, it is unlikely that any special protection measures for this species would be applied by the NNDFW on mining in Area IV (Personal communication w/Daniela Roth, 2004).

4.1.3 **Proatriplex pleiantha** (W. A. Weber) Stutz & Chu (Chenopodiaceae)

Proatriplex pleiantha is an annual herb with alternate, succulent, petioled, and entire leaves (Welsh, 2003). This species has been collected from 15 locations in Montezuma County Colorado, from one location in San Juan County Utah, and from 15 locations in San Juan County New Mexico. All but four of the New Mexico collections are from between Chinle Wash and Cottonwood Arroyo. This cluster of collections for this species in San Juan County includes collections from the Navajo Mine Lease (Marron,Taschеck, Knight, Inc. and Ecosphere Environmental Service, Inc.,1991). The 1991 report summarized the taxonomic history of this rare plant species (first called *Atriplex pleiantha*), and had maps of the known locations for this plant on and near the Navajo Mine

The above cited 1991 report surveyed two areas for *P. pleiantha:* Areas A and B. Area A was a badland area situated west and adjacent to the Navajo Mine Lease, included 2,300 acres of land east of Chaco River and included the Navajo Mine Lease section known as "The Neck". In these areas 31 of 52 *P. pleiantha* locations were reported to occur on Navajo Mine Lease lands. It is of significance that this cluster of locations is considered the "core cluster" of *P. pleiantha* individuals for San Juan County, where densities are relatively high. The other area surveyed in 1991 was 2,939 acres of land located east of the Navajo Mine, in the Cottonwood Arroyo Drainage, in an area just south of the Navajo Irrigation Project. In this area 21 locations of *P. pleiantha* were discovered, but these locations were more scattered and were less concentrated than in Area A.

Since *P. pleiantha* occurs about 2 miles northeast of Survey Area IV, it was expected to occur in this survey area. In preparation of the Area IV floristic survey the following information on the potential habitat for this plant was obtained from the literature. Stutz (1998) summarized the status of *P. pleiantha* and considered it to be abundant enough to not be officially classified as rare or threatened. In his Master of Arts thesis Foote (1989) did work on the germination success and requirements of this species. Stutz and others (1990) reported that *P. pleiantha* plants often occur in clusters within areas 10-50 m^2 in size. *Proatriplex pleiantha* plants located in the vicinity of Area IV region occurred in densities as great as 50-80 plants per m^2.

Proatriplex pleiantha is loosely associated with stratigraphic horizons of the Kirtland formation, Mancos shale, Lewis shale and Morrison formation (Adrian Hunt, Museum of Natural History expert on the Cretaceous: cited in 1991 report). The typical habitat for this plant is badland landscape, typically occurring in association with other halpophytic plants such as *Kochia americana, Suaeda torreyana*, *Atriplex obovata*, *Monolepis nuttallian*a and *Distichlis spicata*. Whenever these plant species were located (occasionally) and whenever these stratgraphic horizons were encountered (seldom), a more intense search was made for this plant species.

4.1.4 **Puccinellia parishii** A.S. Hitchc. (Poaceae)

This grass occurs in alkali swales. This grass is to be looked for among halpophytic plants such as *Kochia americana*, *Suaeda torreyana*, *Atriplex obovata*, *Monolepis nuttallian*a and *Distichlis spicata*. It has not yet been located in Area IV.

In regard to the other rare plants in San Juan County (Table 1) *Astagalus cottamii* and *Astragalus humillimu*s occur about 10 miles southwest of Area IV. However, these occur on very different substrates are not expected on BHP lease lands. *Sclerocactus mesae-verde* (Mesa Verde cactus) also occurs about 6 miles WNW of the Area IV, but since it occurs on very different substrates it too is not expected to occur on BHP lease lands. The remaining 11 plant species in Table 1 occur at more distant locations of San Juan County and do not have potential to occur in Area IV.

4.2 Line Intercept Data

The BHP study area was sampled by the random placement of 199 transect lines. These fell 27% in alkali wash, 25% in sand, 23% in badlands, 18% in thin breaks, 4% in dune, and 3% in arroyo-shrub habitat (Table 2). Table 2 also indicates the vegetation intercept distances (a measure of dominance) for three lifeforms (forbs, grasses, and shrubs). For the entire site the forb lifeform was most dominant, comprising 54% of the vegetation that was intercepted. By this same measure shrubs made of 32% and grasses 15% of the vegetation intercept.

Table 2. Total line intercept distance measured at the BHP Area IV North study site compared to vegetation intercept distances for three lifeforms and six habitat types. Within each habitat the percentage of the total transect area in each lifeform is in parenthesis. The proportions in parentheses in the total vegetation column are this habitats' contribution to the total vegetation cover of the entire study site.

Habitat Type	Number Of Transects	Total Transect Distance (% of each habitat total)	Vegetation Intercept by Lifeform (m)			Total Vegetation Intercept (m) (% of all intercepts)
			Forbs	Grasses	Shrubs	
Alkali Wash	57	1,710 (27%)	26.85 (49%)	8.91 (16%)	19.52 (35%)	55.28 (23%)
Sand	49	1,470 (25%)	74.98 (61%)	20.50 (17%)	27.32 (22%)	122.80 (53%)
Badlands	45	1,350 (23%)	9.10 (62%)	1.34 (10%)	4.13 (28%)	14.57 (6.1%)
Thin Breaks	36	1,080 (18%)	8.21 (36%)	3.54 (15%)	11.14 (49%)	22.89 (9.6%)
Dune	7	210 (4%)	6.58 (50%)	1.55 (12%)	4.96 (38%)	13.09 (5.5%)
Arroyo Shrub	5	150 (3%)	3.18 (37%)	0.16 (2%)	5.23 (62%)	8.57 (3.6%)
All Habitats	**199**	**5,970**	**128.9 (54%)**	**36.00 (15%)**	**72.30 (32%)**	**237.2 (100%)**

When the total vegetation intercept (all lifeforms combined) of 237.2 m is compared with the entire length of the transect area, an area vegetation cover value of 4.00% was obtained. This 4 percent value was lower than the 5.2 percent vegetation cover obtained from quadrat data (Table 2). However, since a bias of at least 2 percent is not unusual in either sample technique, the similarity of these two estimates provides a good baseline estimate for vegetation cover at this study site.

Although forbs were the dominate lifeform overall, there were two habitats where forbs were not the most dominant vegetation (Table 2). In both the thin breaks and the arroyo shrub habitat shrubs were the dominant lifeform. Grasses were the least dominant of these three lifeforms in every habitat.

4.2.1 Shrub Height

The mean height of shrubs at the BHP study site was 23.4 cm (Table 3). This value is based on height values from randomly selected shrubs from every transect line. The two habitats with the greatest shrub densities (dune and arroyo shrub) were also the two habitats with the greatest mean shrub heights. In like fashion, the two habitats with the lowest shrub densities (badlands and thin breaks) were the two habitats with the lowest mean shrub height. There was considerable variation in shrub height among habitats, ranging from some shrubs over a meter high in the dune and arroyo shrub habitats to some shrubs that were less than 10 cm high in every habitat.

Table 3. Average shrub heights and total shrub densities (listed from the highest to the least densities) the six main vegetation types at the BHP study site.

Habitat Type	Density (shrubs / m^2)	Mean shrub height (cm.) (range in ht. values)
Dune	0.94	31.5 (6-125)
Arroyo Shrub	0.34	35.0 (2-115)
Alkali Wash	0.24	26.4 (6-86)
Sand	0.16	24.8 (6-85)
Badlands	0.10	19.2 (4-61)
Thin Breaks	0.01	18.4 (4-41)
All Habitats	**0.15**	**23.4**

4.2.2 Shrub Density

The greatest shrub density was clearly at the dune habitat, where there was 0.94 shrubs/m^2: nearly one shrub per square meter (Table 3). Second and third in shrub densities were the arroyo shrub and the alkali wash habitats. The sand habitat had 0.16 shrubs/m^2 and the badlands habitat had 0.1 shrubs/m^2. The habitat with the least shrubs was thin breaks, where there were only 0.01 shrubs/m^2.

4.2.3 Dominant Plant Species

Plant species dominance values were calculated for each life form. The rankings were based on the total line transect distance for each species. Based on the total line intercept distance for each lifeform of 54% forb, 15% grass, and 32% shrubs (Table 2), the relative dominance of forbs, grasses, and shrubs were calculated for each lifeform (Table 4).

For the entire study site two forb species made up over 50% of the forb line intersect distance (Table 4). The first was the exotic tumbleweed (*Salsola tragus*), which covered over 28% of the distance. Second was *Phacelia crenulata*, which covered over 22% of the distance. The annual, exotic *Salsola tragus* was the most dominant forb at the study site, but it was not the most dominant form at the sand or at the dune habitats. At these sites *Phacelia crenulata* and *Cryptantha crassisepala* were the most dominant forbs. Other habitat specific variations in forb dominance are apparent on Table 4. For example, *Phacelia integrifolia* and *Mentzelia pumila* were present only on the dune and the sand habitat. Eleven of the 12 most dominant forbs at the BHP study site were annual forbs. The only perennial forb (seventh in rank) was *Sphaeralcea coccinea* (scarlet globe mallow, yerba de la negrita). A total of 63 forb species were encountered and identified along the transect lines.

For the entire site two grass species made up over 75% of the grass intersect distance (Table 4). The first was *Sporobolus airoides* (alkali sacaton) at over 41% and the second was *Pleuraphis jamesii* (galleta) at over 38%. Both of these grass species are perennials. Seven of the 10 most dominant grass species were perennials. The annuals collectively made up only 5% of the grass transect distance. These annuals were the exotic *Bromus tectorum* (cheatgrass) and two native grasses: *Vulpia octoflora* (six-week fescue) and *Eremopyrum triticeum* (annual wheatgrass). The

Table 4. The most common forbs, grasses, cacti, and shrubs in each of the six BHP habitat types. For this table the most common species are those with the greatest overall line intercept distances (data is in meters). For each lifeform the species are listed in order with the species with the greatest intercept distance first. The species with the greatest relative dominance in each habitat and lifeform are indicated with an asterisk.

Plant Species	**Overall**	**Transect Area (m)**					
Top 12 Forb Species	**128.9 m**	**Alkali Shrub**	**Sand**	**Badland**	**Thin Breaks**	**Dune**	**Arroyo Shrub**
1. Salsola tragus	28.4%	13.0*	14.1	4.7*	3.8*	0.2	1.0
2. Phacelia crenulata	22.2%	4.4	21.6*	0.4	2.2	0.1	0
3. Cryptantha crassisepala	17.6%	1.8	16.9	< 0.1	0.2	3.4*	0.2
4. Townsendia annua	7.0%	4.2	2.3	0.8	0.9	< 0.1	1.0*
5. Phacelia integrifolia	4.6%	0	5.5	0	< 0.1	0.5	0
6. Abronia fragrans	4.4%	< 0.1	5.5	0	0	< 0.1	0
7. Sphaeralcea coccinea	1.8%	< 0.1	1.2	0.7	0.3	< 0.1	0
8. Townsendia incana	1.7%	0.2	1.2	0.8	< 0.1	0	< 0.1
8. Descurainia pinnata	1.3%	0.6	0.6	0.3	< 0.1	< 0.1	0.2
9. Mentzelia pumila	1.2%	0	0.9	0	0	0.4	0
10. Lappula occidentalis var. cupulata	< 1%	0	0	0	0.2	0	0.4
11. Stephanomeria exigua	< 1%	0	0	0	0	0.3	0
12. Astragalus fucatus	< 1%	0	0	0	0	0.2	0
51 other forbs:	9 %						

Table 5 – Continued

Cacti	1.26	Alkali Shrub	Sand	Badland	Thin Breaks	Dune	Arroyo Shrub
1. Opuntia polyacantha	96%	0.4*	0.7*	0.1*	0.1*	0	0
2. Sclerocactus cloveriae	4%	0	0	0	0.1	0	0
Top 10 Grass species	**36.0 m**						
1. Sporobolus airoides	41.5%	3.7	7.9	0.4	2.5*	0.4*	< 0.1
2. Pleuraphis jamesii (Hilaria)	38.5%	4.6*	8.0*	0.3	0.7	0.4	< 0.1
3. Sporobolus cryptandrus	7.8%	0.1	2.2	0.2	< 0.1	0.4	0.1*
4. Sporobolus contractus	2.9%	0	1.0	0	0	< 0.1	0
5. Bromus tectorum	2.8%	0.1	< 0.1	0.5*	< 0.1	0	0
6. Achnatherum hymenoides (Oryzopsis)	2.5%	< 0.1	0.7	0.1	0.1	0.1	0
7. Vulpia octoflora	1.6%	0.1	0.4	0	< 0.1	0	< 0.1
8. Aristida purpurea	1.3%	0	0.2	< 0.1	0.3	< 0.1	< 0.1
9. Eremopyrum triticeum	0.6%	0.1	0	0.1	0	0	< 0.1
10. Stipa comata	0.4%	0	< 0.1	0	0	0.1	0
6 other grasses:	0.1						

Table 5 – Continued

Top 11 Shrub species	72.3 m	Alkali Shrub	Sand	Badland	Thin Breaks	Dune	Arroyo Shrub
1. Atriplex confertifolia	26.9%	3.1	7.4	1.0	6.8*	0.7	0.5
2. Gutierrezia sarothrae	22.3%	0.6	12.7*	0	1.6	1.3*	0
3. Atriplex obovata	17.0%	6.8*	< 0.1	2.3*	1.3	0	1.9
4. Sarcobatus vermiculatus	9.8%	4.2	0	0	0	0	2.9*
5. Ephedra torreyana	5.4%	0.3	2.1	0	0.4	1.2	0
6. Ericameria nauseosa	4.0%	1.2	1.0	0	0	0.7	0
7. Atriplex gardnerii	3.1%	1.3	0	0.5	0.2	0	0
8. Eriogonum leptocladon	2.3%	0	1.1	0	0	0.5	0
9. Atriplex canescens	2.1%	0.9	0.7	< 0.1	0	0	0
10. Krascheninnikovia lanata	1.7%	0	1.2	0	0	0	0
11. Artemisia bigelovii	1.1%	0	0.1	0	0.8	0	0
8 other shrubs	4.3%						

two habitats with the least grasses (badlands and arroyo shrub) were also the only two locations where alkali sacaton and galleta were not the most common grasses. The most dominant grass on the badlands (still very infrequent) was *Bromus inermis* (cheatgrass). The most dominant grass in the arroyo shrub habitat was *Sporobolus cryptandrus* (sand dropseed). A total of 16 grass species were encountered and identified along the transect lines.

For the entire study site two shrub species made up over 50% of the shrub intersect distance (Table 4). These were *Atriplex confertifolia* (shadscale) at about 27% and *Gutierrezia sarothrae* (snakeweed) at over 22%. Despite its overall dominance, *Atriplex confertifolia* was the most dominant shrub only in the thin break habitat. *Gutierrezia sarothrae* was the most dominant

shrub in both the sand and the dune habitats. The third most dominant shrub was *Atriplex obovata* (New Mexico saltbush), a species that was the most dominant shrub in both the alkali shrub and the badland habitats. The final habitat, the arroyo shrub, had *Sarcobatus vermiculatus* (greasewood) as the most dominant shrub. A total of 19 shrub species were encountered and identified along transect lines.

Although cacti line intersect distances were included both within the shrub intercept data and as a separate lifeform category on Table 4. Cacti made up only 1.4% of the intersect area of shrubs and only 0.01 percent of the overall transect distance. Cacti are conspicuous, but were not a dominant plant at this study site.

A complete listing of vegetation documented in Area IV is provided as Attachment 1 to this baseline report.

5.0 DATA SUMMARY

The data in Tables 2-4 in this report quantify the vegetation cover by lifeform, the rock cover, the litter cover, the shrub densities, and mean shrub height data for the six habitat types. Table 4 indicates the dominant plant species by lifeform for each habitat. This table clearly shows the mosaic nature of habitat dominance by species and lifeform types. In like fashion, there is also a mosic pattern of rock, litter, and vegetation cover amounts among the six habitats.

Further data analyses are possible on the extensive amount of data that were collected during this study. For example, statistical tests could be done to affirm the trends identified here with statistical tests. There may be significant differences in the densities or intercept distances among species, habitats, and lifeforms identified in the tables of this report. Also, relative frequency information could be obtained by tallying the occurrences of each species in the 6 sections (each 5 m) for each transect line.

Refereneces

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Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
1	4041286	722314	Thin Break

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
Grasses								
SPAI	2	1						
Shrubs/ Trees								
ATOB							16	13
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
2	4043110	720790	SA SA

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	6		6		5	10		
PHCR	12		1			1,10		
TOAN	2			10	5	2,6		
DEPI		2						
CRCR		7				1		
CHSST		1	9		2	1,1		
SPPA				2				
Grasses								
SPAI		1		5	4	2,2		
VUOC	1	2	1	2	1	2		
Shrubs/ Trees								
ATCO				8	9		8	36
GUSA		9	25	15	22	4,9	183	14
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:					
3	4041407	720846	ALKALI WASH					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
HAGL			1	1				
CHGL								
Grasses								
Shrubs/ Trees								
ATCO	9		5				66	6
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
4	404532	7021978	TH / BR

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
Grasses								
SPAI	30							
Shrubs/ Trees								
ATOB		13					3	13,20
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
5	4041626	721182	SA SA

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
CRCR	4,2,5	6	3		6			
VUOC	1,2			2				
SATR	1		1		1			
PHCR	24,14	14	6,31	12,14	12,7,5	13,14,21		
TOAN	5,3	8,2,2	4		1			
SPPA		4						
PLPA		5,2						
STEX			1					
GILE						1		
Grasses								
ORHY	7	1						
SPCR	5	3						
SPAI		14	1,3					
HIJA				2				
Shrubs/ Trees								
ATCO	6						4	52

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
6	4040151	723885	ALKALI WASH

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR		6						
HAGL					2			
Grasses								
Shrubs/ Trees								
ATOB							5	15,9
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
7A	4043082	721017	SA SA

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
CRCR	15	15	20	20	15	4		
ABFR	4							
SPPA	2	3						
SATR	1		1	2	20	5		
STEX	1							
PHIN	8	15						
OEPA		2	2					
CHER				2		4		
Grasses								
HIJA	1,1	1	2,1	5	30	8		
SPCR	1	4			2			
ORHY				1				
Shrubs/ Trees								
GUSA	1	5		3		6	64	11
ATCO							1	33
ATCA							3	34
OPPO					40			
Total Veg Cover								
Bare Ground								

Litter	
Rock	

Transect Number:	**N Coordinate:**	**E Coordinate:**	**Habitat Type:**
7B	**4043082**	**722602**	**SAND**

5/12
HAZ +
ADB

Species	**0-5 m**	**5-10 m**	**10-15 m**	**15-20 m**	**20-25 m**	**25-30 m**	**Density**	**Height**
Forbs								
CRCR	23	33,14	20,14	18	20,7	6		
ASFU	3	2						
STLO	2				8			
CYBU	1							
SEPI		1						
STEX			2,1	2				
OEPA			3,1					
SPCOC				1				
PHCR					3,4	39		
Grasses								
BRTE	1							
SPAI		1	1			3		
HIJA		3	2,10					
SPCO				3	7			
DEPI				1				
Shrubs/ Trees								
ERLEP		4			3		29	35
GUSA						10,11	42	14
ATCO					20		3	28
ATCA					15	11	2	39

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
9	4041587	720965	SA SA

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
CRCR	6	8	7,2	3,12,4,3	23,3,1	5,7,1,9		
TOAN	2,4		1	5	2			
SATR	4,1			3	2	4,3		
PHCR	1	12,12	21,4	2	1,3	1,21		
PLPA				2	2	2,3,1,5		
OEPA					4			
CYAC					1			
Grasses								
VUOC	1,1			1				
SPCR	5,2	3	10	1	3	5		
SPAI		1						
Shrubs/ Trees								
ATCO	10		5				8	23
GUSA	7	3					9	15
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
10	4040791	723148	ALKALI WASH

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
TOAN					2,3,6	3,5		
Grasses								
Shrubs/ Trees								
ATOB							10	8
GUSA							2	
OPPO		23					1	
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:					
11	4040392	722902	TH BR					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
ATSA			1					
HAGL				4				
Grasses								
SPCR	1			3				
HIJA	4							
Shrubs/ Trees								
ATCO					14	11	11	24
GUSA							2	6
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
12	4041042	722492	THIN BREAKS

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
TOAN		3	2,5,5					
SATR		6	5,4					
PHCR		3	28,22					
Grasses								
HIJA		14						
SPAI			4					
Shrubs/ Trees								
ATOB	15	16			3	2	12	26
ATGA	12						1	10
GUSA							2	14
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 13	N Coordinate: 4040924	E Coordinate: 721405	Habitat Type: SA SA					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SPCOC			2			3,2		
Grasses								
SPAI	1	5,2	3					
HIJA		3,3				3		
Shrubs/ Trees								
GUSA				1		8	37	14
ATCO	25	28	6,2		18		18	17
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 14	N Coordinate: 4041067	E Coordinate: 722425	Habitat Type: BADLAND					
Species	**0-5 m**	**5-10 m**	**10-15 m**	**15-20 m**	**20-25 m**	**25-30 m**	**Density**	**Height**
Forbs								
PLIN	2							
SATR				1,1,1		2		
TOAN						5		
Grasses								
Shrubs/ Trees								
ATOB		5	6		23		2	23
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
15	4040996	725406	ALKALI WASH

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
TOAN	4							
SATR	1		1		14,2	3,3,5,1		
Grasses								
ERTR	5							
SPAI	12							
Shrubs/ Trees								
ATOB				15	5		14	7,17
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
16	4043282	720820	BADLAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
ATPO			1					
SATR						1		
Grasses								
Shrubs/ Trees								
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 17	N Coordinate: 4041825	E Coordinate: 721833	Habitat Type: SA

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
CRCR	17	2						
LEER	3				1			
SATR		4						
PHCR		4						
Grasses								
HIJA	3,8,1	10	7	13	9	7		
Shrubs/ Trees								
ATCO			22				14	29
GUSA	3	12	6	4	9		177	6
EPTO							1	33
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 18	N Coordinate: 4042153	E Coordinate: 722972	Habitat Type: Alkali Wash

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
ASMO		5						
LEER		2						
PEAN				17				
PHCR					2,4	3,11		
CYAC						6		
Grasses								
HIJA		3			5			
SPAI				2,4				
Shrubs/ Trees								
EPTO						26	2	22
ATCO		9,21	27		36	2	16	22
GUSA							21	11
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 19	N Coordinate: 4042099	E Coordinate: 722951	Habitat Type: Alkali Wash					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
TOAN	1	1	3	4,1				
SATR		4,2	3					
PHCO		6		7,16,18,8	6	3,7		
DEPI			1					
ASMO					7			
STLO						1		
ATSA			1					
Grasses								
SPAI					1	3		
Shrubs/ Trees								
ATCO	2						7	23
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 20	N Coordinate: 4042411	E Coordinate: 721190	Habitat Type: SAND					
Species	**0-5 m**	**5-10 m**	**10-15 m**	**15-20 m**	**20-25 m**	**25-30 m**	**Density**	**Height**
PHCR	20,33,13	10,13	11,14		8	3		
SATR	2,15	18	1,4	2	3	22		
SPCOC		6						
TOAN			4					
Grasses								
SPAI		5	1					
ORHY			1					
Shrubs/ Trees								
ATCO							2	
GUSA							5	
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:

21	4041896	724210	ALKALI WASH					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	2				1			
CRCR	1							
Grasses								
Shrubs/ Trees								
ATOB			2		5		6	15,12
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 22	**N Coordinate: 4041895**	**E Coordinate: 722064**	**Habitat Type: SAND DUNE**					
Species	**0-5 m**	**5-10 m**	**10-15 m**	**15-20 m**	**20-25 m**	**25-30 m**	**Density**	**Height**
Forbs								
CRCR	8,17	4	5,1	10,2	9,7,8	4,17		
EVNU	1		4	5				
STEX			5	1	1			
LEER			1					
GAPI				5				
ABFR				3				
SATR					1			
Grasses								
SPCR	5,5	1,5	3		2	3		
STCO			7	5				
HIJA			2			4		
ORHY					2	2		
ARPU						2		
Shrubs/ Trees								
ATCO						26,48	6	23
ATCA							1	23
EPTO	1			35	1		2	41
GUSA			2	15			31	9
Total Veg Cover								
Bare Ground								
Litter								
Rock								
Transect Number: 23	N Coordinate: 4042688	E Coordinate: 722539	Habitat Type: BADLAND					

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR				1				
ATPO						1		
LARE						1		
Grasses								
Shrubs/ Trees								
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
24	4043369	722688	BADLAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
Grasses								
Shrubs/ Trees								
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
25	4041212	720355	THIN BREAKS

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR		2	1	1	2,2,1	3		
TOAN						7		
Grasses								
SPAI	4,3	5	3		1,3	2		
Shrubs/ Trees								
ATCO					7		8	25
GUSA							4	13

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
26	4042310	723761	BADLAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	2,1		1	2	2			
CLLU			2	6	2			
ATPO			3					
CRCR				1				
Grasses								
Shrubs/ Trees								
ATOB	4						1	22,16

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
28	4043141	722583	BADLAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
DEPI		3						
MEAL		2						
SATR		4,6	12			2		
TOAN		3						
PHIV			3					
Grasses								
Shrubs/ Trees								
ATCO			26			10	8	10

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
29	4041334	724905	ALKALI WASH

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	5,4	7	12	6	2,2			
TOAN		20	3	28	3,8	67		
CLLU				1				
PLPA						2		
Grasses								
SPAI	1				10,2			
ATGA		10						
HIJA		15	9					
Shrubs/ Trees								
ATOB						20		21,15

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:					
30	4043314	721940	ALKALI WASH					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	17	25,13	17,9	6,3,9,4	9,9	6		
CHIN	4	3	3	4	2	1		
SLLU						3,3		
DEPI		8						
ABFR		2						
MEAL					2			
Grasses								
Shrubs/ Trees								
ATCO				28,2			2	28
SAVE					28		1	55
ATGA							1	10
Total Veg Cover								
Bare Ground								
Litter								
Rock								
Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:					
31	4041961	723044	Alkali Wash					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
TOAN			4			3		
CRCR				5		1		
SATR			2	7,1,3	1	2,1		
LYGR					6			
PHCR	2	1,7	17,13	7,1	4	6		
LEER	1,6,13	2						
OEAL				3		3		
CHST					5			
PLPA						5,3		
Grasses								
HIJA	6	2						
SPAI	1		3					
Shrubs/ Trees								
GUSA		3					24	8
ATOB							3	28
ATCO		5,8	11				14	27
Total Veg Cover								

Bare Ground	
Litter	
Rock	

Transect Number:	**N Coordinate:**	**E Coordinate:**	**Habitat Type:**
32	**4043796**	**722000**	**ALKALI WASH**

Species	**0-5 m**	**5-10 m**	**10-15 m**	**15-20 m**	**20-25 m**	**25-30 m**	**Density**	**Height**
Forbs								
SATR	12,17	18	12,7	13,11	22	13		
CHIN	3	4						
Grasses								
Shrubs/ Trees								
ATOB					17		3	15

Total Veg Cover								
Bare Ground								
Litter								
Rock								
Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:					
33	4043555	721966	THIN BREAK					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SCTR	3	2	1	5	1			
SPCOC				3				
Grasses								
Shrubs/ Trees								
ATCO							2	
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 34	N Coordinate: 4041872	E Coordinate: 723076	Habitat Type: Alkali Wash					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
TOAN	1,12	8						
SATR		2						
CRCR		2						
PHCR		3						
Grasses								
HIJA		9						
SPAI				1				
VUOC					1			
Shrubs/ Trees								
OPPO							1	14
TESP					25		2	41
ATOB	29						5	21
ATCO		6			29		5	24

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number: 35	N Coordinate: 4042954	E Coordinate: 723325	Habitat Type: BD					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR		5,11,1,4	4,8,1	1		4		
CHST		3	6			3		
PHCR		8				2		
AGGL		4						
EUGL			3					
DEPI			4			3		
MEAL			1					
TOAN			2			9,2,3		
STEX						2		
PUPA						3		
SPCOC						8,13		
Grasses								
SPAI			2					
Shrubs/ Trees								
ATOB			2	8	18,7	9	8	16

ATGA							2	13
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 36	**N Coordinate: 4041537**	**E Coordinate: 720158**	**Habitat Type: Alkali Wash**					
Species	**0-5 m**	**5-10 m**	**10-15 m**	**15-20 m**	**20-25 m**	**25-30 m**	**Density**	**Height**
Forbs								
SATR	11	9	4		2	7		
TOAN	4					24		
DEPI	1	1				2		
MEAL			1					
PLPA						5		
CRCR						1		
Grasses								
HIJA				7	15			
SPAI				5				
Shrubs/ Trees								
ATCA				10			2	72
ATCO						5	2	34
CHNAG					57		2	62
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 37	N Coordinate:	E Coordinate:	Habitat Type:					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
Grasses								
Shrubs/ Trees								
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 38	N Coordinate: 4043174	E Coordinate: 721891	Habitat Type: BADLAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	20,14	15	22	5,1	4	13,12		
ATSA		2,2	1	1				
CHIN		2		3		6		
LARE		1						
HAGL				1		4		
TOAN						1		
Grasses								
BRTE	11	1		7	20	8		
Shrubs/ Trees								
OPPO						5	3	11
ATGA							1	20

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number: 39	N Coordinate: 4042556	E Coordinate: 720184	Habitat Type: Sand

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
PHCR	10	30	50	50	40	30		
SATR	2			1				
LIPO		4						
STLO		1						
SP 2		1						
TOAN					2	1		
Grasses								
HIJA	14	2	1	1		1		
Shrubs/ Trees								
ATCO					25		12	23
GUSA	35		5			20	>0	10

Total Veg Cover
Bare Ground
Litter

Rock

Transect Number: 40	N Coordinate: 4042188	E Coordinate: 722849	Habitat Type: Th. Br.

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	10		1	1	4			
HAGL				1				
Grasses								
SPAI	9			1				
Shrubs/ Trees								
ATOB			3		10		4	12

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number: 41	N Coordinate: 4040838	E Coordinate: 723136	Habitat Type: ALKALI WASH

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
TOAN	1			17,7	6,13	6,4		
CLLU	11							
PHCR	11			6				
SATR				2				
CRCR				3				
Grasses								
SPAI					3			
Shrubs/ Trees								
ATOB					15		14	
OPPO								

Total Veg Cover
Bare Ground
Litter

Rock

Transect Number: 42	N Coordinate: 4042479	E Coordinate: 723378	Habitat Type: Th. Br.

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
HAGL		1						
Grasses								
Shrubs/ Trees								
SCCL						2	2	4
ARGA							2	10
ATOB							2	16
ATCO		13				9	2	37

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number: 43	N Coordinate: 4040815	E Coordinate: 724442	Habitat Type: SA SA

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
CHER	1					1		
PHIN	10		16,10	7,4	11,1,27			
CRCR	3	2	6,11	4	6,2,4			
PHCR		2						
STEX		2						
SATR		1			5			
OEPA			1,6					
ABFR					3,17,2			
CRCA						2		
Grasses								
HIJA	4,4,2	2,2	4	3,1	2	6,2,3		
ORHY					1,1			

Shrubs/ Trees								
ERLEP							2	
EPTO		75			5		2	33,52
GUSA								
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 44	**N Coordinate: 4041322**	**E Coordinate: 721420**	**Habitat Type: DUNE**					
Species	**0-5 m**	**5-10 m**	**10-15 m**	**15-20 m**	**20-25 m**	**25-30 m**	**Density**	**Height**
Forbs								
MEPU	6,3							
MASO	1							
CRCR	1,1,8,8	1		3,8,11	6,5,3,15	3,2,31,9		
ABFR	4							
SATR	1		1					
DEPI			1					
STEX					1			
PHCR					10			
Grasses								
ORHY		1,1						
HIJA		4	3	3	2,3			
SPCR						1		
Shrubs/ Trees								
GUSA	10	4	23		7,5	13	202	16
ERLEP	1	3					13	25
ATCA							1	42
OPPO							1	6
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 45	**N Coordinate: 4043371**	**E Coordinate: 721829**	**Habitat Type: SAND**

Species	**0-5 m**	**5-10 m**	**10-15 m**	**15-20 m**	**20-25 m**	**25-30 m**	**Density**	**Height**
Forbs								
PHCR	11	1	11,2	5,8	13	8,28		
SATR	2	3,1,2	2	2,2	2,1	2		
CRCR				1		2		

TOAN						6		
Grasses								
SPAI				3				
Shrubs/ Trees								
ATCO						45	3	29

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number:	**N Coordinate:**	**E Coordinate:**	**Habitat Type:**
46	**4041679**	**720741**	**ALKALI WASH**

Species	**0-5 m**	**5-10 m**	**10-15 m**	**15-20 m**	**20-25 m**	**25-30 m**	**Density**	**Height**
Forbs								
TOAN	5	4,1,2		4,1	1	1		
CRCR		3						
DEPI			1					
SATR				8,5,1	19	9		
Grasses								
SPAI	16,12		22					
HIJA	29,3,7	15,15	16					
SPCR				1				
Shrubs/ Trees								
ATCO							1	
GUSA			4	11			2	

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number:	**N Coordinate:**	**E Coordinate:**	**Habitat Type:**
47	**4042464**	**721414**	**THIN BREAK**

Species	**0-5 m**	**5-10 m**	**10-15 m**	**15-20 m**	**20-25 m**	**25-30 m**	**Density**	**Height**
Forbs								
SATR	3	1	3			2		
IPPU		1						
TOAN		3						

PHCR			2	1	1			
LIAR						4		
CYAC					3	2		
Grasses								
Shrubs/ Trees								
ATCO							8	12
GUSA							5	12

Total Veg Cover								
Bare Ground								
Litter								
Rock								
Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:					
48	4043042	722600	SAND					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
STLO	4			2				
SATR	1							
PHCR	1	10,10,5	17		3	1,5,13		
SPCOC		4		12	8,6	3		
STEX				1				
MACA						11		
Grasses								
HIJA	11,1,1,6	3	7,3	1,3,21,3	8,2	3		
SPAI		6	6			2,12		
SPCO					4			
STCO					2			
ORHY						1		
Shrubs/ Trees								
ATCO				1			15	32
GUSA	5		4	2	19	2,7	69	8
EPTO						6	1	14
ERLEP						14		17
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:					
49	4043073	722055	THIN BREAK					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
CHST				2				
PHCR					2,3,2			
Grasses								
HIJA	7							
SPAI		10	4,5	2				
Shrubs/ Trees								
BROB							1	24
CHNA							1	40
GUSA							14	10
ATCO			17	24	14	3	13	27
ARBI						2	5	30
APTO						9,20	8	26
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:					
50	4041470	721129	SA SA					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
TOAN	5,1	3,2		1	1	2		
CRCR	6,3,1	10		3	8,16	2,2		
SATR	1			1				
PHCR	3		9,6	7,5	8,4,2,2	3,3,2,3,1		
CHST				4				
Grasses								
SPAI	6,6	1,8,6,6	5,4		2,1	1		
HIJA	5	6,7	9,8	5,12	4			
SPCR			1					
VUOC		2						
ORHY				2				
Shrubs/ Trees								
ATCO							14	33
GUSA							2	
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 51	N Coordinate:	E Coordinate:	Habitat Type:					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
Grasses								
Shrubs/ Trees								
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
52	4042593	721014	ALKALI WASH

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
HAGL	1			5		2		
CRCR			3,2		2			
DEPI			10	5		1		
CLLU				3				
SATR				1	1,1	12		
Grasses								
Shrubs/ Trees								
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
53	4041612	721912	SAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
TOIN	7	3,9,3	7					
SATR	2	3	3	3,4	1,2	2,3		
PHCR	13	7,8,12	5,2	20,21,11	14	4,6,3		
GILE		1			1			
TOAN	3							
Grasses								
VUOC		2	1					
SPAI		3			2			
Shrubs/ Trees								
ATCO				47			4	30
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
54	4041307	722479	BADLAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR			6					
PLIN			4					
PLPA			2					
MAAF			12	2				
Grasses								
Shrubs/ Trees								
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
55	4042172	723517	BD

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	6	14,18	12					
PHCOR	4							
ATPO		2						
Grasses								
ERTR		2	4					
Shrubs/ Trees								
ATGA							3	23
ATOB			22				1	28

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
56	4042695	720099	Sand

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SPCOC	8,1	4		5				
PHCR	2	4	2	8				
SATR	3	2	1		3			
MACA	2	4	4					
CRCR		1						
LYGR				1				
Grasses								
SPAI	4,1		1		3	4		
VUOC	1							
Shrubs/ Trees								
GUSA	30	40	35	40	30	15	210	8
ATCO	30	12				40	27	18

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
57	4043736	722401	ARROYO SHRUB

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	9	5,2	14		12	6		
CHIN	2	1	3					
TOAN			7		5			
Grasses								
Shrubs/ Trees								
ATCO	30,20						8	19
SAVE				26		25	4	48
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
58	4042313	723761	ALKALI WASH

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	1,2,7	5,7	5,3,3	4,4	1	4,7,4		
DEPI		4,3	1	2,9				
CHIN			1			1		
SPPA				5				
PHCR				15				
CRCR						1		
Grasses								
Shrubs/ Trees								
ATOB					9,3		10	21,15
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
59	4040555	723729	SA SA

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
ABFR	10,9,3	7,8			8			
CRCR	1,2,1,1	6	4,2,6	4	4,3,6,3			
SATR	1,2	1,1	2,3	2	4	1		
PLPA						1		
Grasses								
SPCO	1,5	2,1	3,3,5,1	4,35,7	6,6	2,2		
ORHY						1		
Shrubs/ Trees								
GUSA	9,15						44	10,5

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
60	4042350	721680	THIN BREAK

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	1	2,1	11,1	5,11		8		
MEAL		2						
Grasses								
SPAI		1						
Shrubs/ Trees								
ATCO				30			9	30
ERSA						2		

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
61	4040243	725601	THIN BREAK

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
ERSA				2				
Grasses								
Shrubs/ Trees								
ATOB						40	1	20

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
62	4042291	720137	Sa. Sa.

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
ABFR	15	12				3		
CRCR	4							
SATR	1	1	2,3	8	4	1,3,2		
CHCR		5				1		
PHCOR				4				
DEPI					1			
SPCOC						3		
Grasses								
SPAI								
HIJA	3,5		2,10	3	5,3,9,6	2,4,4		
VUOC			1					
SPCR					1			
Shrubs/ Trees								
ATCA							2	
GUSA	34	5,16	4	4,17	11,3,5	20,10,3,42	404	
ERLEP	3	1		15	24,4		17	
KRLA			35				1	

Total Veg Cover	
Bare Ground	

Litter			
Rock			
Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
63	4041124	722523	ALKALI WASH

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
CRCR	5					12,6,2		
CHIN	1							
SATR		1,2	1		6,10	5,2,3		
GILE				1				
TOAN						2,6		
Grasses								
HIJA				35,2		18,6,93,12		
BRTE				10				
ELEL				10				
SPAI				15	28,10	6,7		
Shrubs/ Trees								
ATOB						55	4	13
ATCA			75				1	92
CHNA				48			4	72

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
64	4042767	722679	TH BR

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SPCOC	6							
PHCR			2	6	2	1		
SATR				1		2		
Grasses								
SPAI	4	2,2	5	2				
Shrubs/ Trees								
GUSA	2,10		15	14	12	15	270	8
ATCO	45			4		12	36	17
ATOB						2	2	5

Total Veg Cover
Bare Ground

Litter								
Rock								
Transect Number: 65	N Coordinate:	E Coordinate:	Habitat Type:					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
Grasses								
Shrubs/ Trees								
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	**N Coordinate:**	**E Coordinate:**	**Habitat Type:**
66	**4043654**	**722995**	Arroy. Shrub trans. Alk. Wash

Species	**0-5 m**	**5-10 m**	**10-15 m**	**15-20 m**	**20-25 m**	**25-30 m**	**Density**
Forbs							
CRCR	1						
SATR						2	
Grasses							
Shrubs/ Trees							
ATOB			55	4	30,10,15		29
SAVE		10				35	5
Total Veg Cover							
Bare Ground							
Litter							
Rock							

Transect Number: 67	N Coordinate: 4040723	E Coordinate: 721508	Habitat Type: BADLAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR					4			
CRCR						7		
DEPI						2		
Grasses								
HIJA					3			
Shrubs/ Trees								
ATCO							5	55

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number: 68	N Coordinate: 4040475	E Coordinate: 724788	Habitat Type: SA SA

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
PHIN	2,20,12,13	2	15,7,6	6,4	15,11	16,10,11,4		
ASFU	2							
SATR		2,5			1			
ABFR			8					
CRCR			2		4			
TOIN				5		2,3		
PLPA						3		
Grasses								
SPAI	2,1		1,3	1,3	3,5,7	1,2,2		
Shrubs/ Trees								
GUSA	2						3	42,39
EPTO		100					1	
ATCA								

Total Veg Cover
Bare Ground
Litter
Rock

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
69	4040352	724265	ALKALI WASH

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
CRCR	16,10,6,5	16,9,6	3		5			
SATR	7	3		1	1	3		
SPAI	1,1	1						
PHCO		20,13	9,10	1,3	17,28			
TOAN				2				
PLPA				5				
SPCR					3			
Grasses								
Shrubs/ Trees								
ATOB							1	34,19

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
70	4040719	723743	ALKALI WASH

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
HAGL	1	1	1					
CRCR				5				
SATR				1,1	1,2,1,2			
TOAN				1				
PLPA				1				
Grasses								
Shrubs/ Trees								
ATOB	5,3	2	4		1,4,6	13,4	38	10,10

Total Veg Cover	
Bare Ground	
Litter	

Rock Transect Number: 71	N Coordinate: 4041104	E Coordinate: 720460	Habitat Type: THIN BREAK					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	2					1		
SPCOC		1						
Grasses								
SPAI			4					
Shrubs/ Trees								
ATCO				45	4		9	
ATGA							6	
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number: 72	N Coordinate: 4040281	E Coordinate: 724266	Habitat Type: SA SA

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
AMAC	1,1		1		1,3			
CRCR	7,8	1,3,9,6	5,6,9,10		5,8,2,3,8			
DEPI	1							
SATR		1	2,5	3,4	1,2,2,3			
SPAI	8,1,3,4	5,1	3,3,13	5,3,5,6	3,13			
GILE	1	1						
PHIN		6						
Grasses								
Shrubs/ Trees								
GUSA		3					7	14
EPTO								45
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
74	4042439	724042	BADLAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SAIB			1			1		
LARE			6					
SPCOC			18					
ATSA				2		2		
HAGL					5	1		
Grasses								
Shrubs/ Trees								
ATOB				25	4		9	26

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
75	4040292	722529	BADLAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR		2,2,4	2					
SPCOC						12		
CASC						1		
Grasses								
HIJA	1							
Shrubs/ Trees								
ATOB	3	2					10	11
ATCO								14

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number: 76	N Coordinate: 4040860	E Coordinate: 721755	Habitat Type: BADLAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
PLIN	2							
PHCR	4	1						
SATR	3	2	1					
Grasses								
HIJA	2							
Shrubs/ Trees								
ATOB							3	25

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number: 77	N Coordinate: 4041380	E Coordinate: 723986	Habitat Type: BADLAND

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
PLPA	3							
SATR						1		
Grasses								
Shrubs/ Trees								

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Transect Number: 78	N Coordinate: 4042526	E Coordinate: 720587	Habitat Type: Sa. Sa.

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height

Forbs								
ABFR	5,10,1,8,5	2,8	2,3,13,10	3	6,4,9	1,8		
SPPA								
CRCR		1	2	3	9	4,5,3		
CAJA	8							
MEPU	1		8	1				
LUPU		4						
OEPA		1						
DEPI			1					
SATR					3			
Grasses								
ARPU	1			6				
HIJA		2	9,6	7				
ORHY		1						
Shrubs/ Trees								
GUSA	6,17,15	2	17,10,6	1			109	8
ERLE				7,6			31	17
EPTO							1	42
KRLA							1	35

Total Veg Cover								
Bare Ground								
Litter								
Rock								
Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:					
79	4042963	721630	THIN BREAK					
Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
PLIN	2							
SATR	2		1,1					
TOAN			1			2		
IPPU					3			
PHCR						2		
Grasses								
SPAI					1			
Shrubs/ Trees								
ATCO			2	12	10		18	40
GUSA							27	8
OPPO			6				1	15
Total Veg Cover								
Bare Ground								
Litter								
Rock								

Transect Number:	N Coordinate:	E Coordinate:	Habitat Type:
80	4043898	722035	ARROYO SHRUB

Species	0-5 m	5-10 m	10-15 m	15-20 m	20-25 m	25-30 m	Density	Height
Forbs								
SATR	4	1	1					
TOAN			11,8	4,5	18,22	9		
LARE			1,4		11,6	4,6		
DEPI					4	4		
Grasses								
SPAI				2				
ERTR					2			
HIJA						1		
VUOC						1		
Shrubs/ Trees								
ATOB	15	4,3	4	22	8		28	11
SARE							1	29

Total Veg Cover	
Bare Ground	
Litter	
Rock	

Habitat Type	*Transect Number*	*Plot Number*	*Total # of Species*	*Total Veg Cover*	*Annual Veg Cover*	*Rock*	*Litter*
THIN BREAK	1	1	1	<1	<1	80	4
THIN BREAK	1	2	1	<1	<1	80	2
THIN BREAK	1	3	0	0	0	85	0
THIN BREAK	1	4	0	0	0	40	4
THIN BREAK	1	5	2	1	1	0	25
SA SA	2	1	2	12	<1	3	4
SA SA	2	2	5	8	3	0	35
SA SA	2	3	3	4	<1	1	3
SA SA	2	4	6	10	2	<1	6
SA SA	2	5	5	15	6	<1	15
Alkali Wash	3	1	1	<1	<1	15	<1
Alkali Wash	3	2	2	1	1	10	<1
Alkali Wash	3	3	3	4	4	10	2
Alkali Wash	3	4	1	1	0	12	1
Alkali Wash	3	5	1	<1	<1	20	<1
THIN BREAK	4	1	3	18	1	20	4
THIN BREAK	4	2	2	<1	<1	20	2
THIN BREAK	4	3	2	<1	<1	50	25
THIN BREAK	4	4	1	<1	<1	30	8
THIN BREAK	4	5	1	0	0	20	60
SA SA	5	1	2	20	20	<1	4
SA SA	5	2	2	4	4	1	3
SA SA	5	3	2	20	20	<1	2
SA SA	5	4	3	15	15	0	3
SA SA	5	5	6	7	3	<1	4
Alkali Wash	6	5	0	0	0	25	0
Alkali Wash	6	10	0	0	0	30	<1
Alkali Wash	6	15	0	0	0	25	0
Alkali Wash	6	20	3	<1	<1	25	0
Alkali Wash	6	25	0	0	0	25	0
SA SA	7A	1	5	15	5	<1	10
SA SA	7A	2	3	15	8	0	4
SA SA	7A	3	3	30	25	0	2
SA SA	7A	4	3	12	8	0	1
SA SA	7A	5	4	30	29	0	10
SAND	7B	1	3	3	2	1	4
SAND	7B	2	4	5	2	2	2

SAND	7B	3	4	6	3	0	1
SAND	7B	4	2	25	25	2	3
SAND	7B	5	6	8	6	1	2
	8	1					
	8	2					
	8	3					
	8	4					
	8	5					
SA SA	9	1	7	35	34	<1	2
SA SA	9	2	8	20	17	1	1
SA SA	9	3	6	5	4	<1	4
SA SA	9	4	5	15	11	0	5
SA SA	9	5	6	7	7	<1	3
Alkali Wash	10	1	0	0	0	10	1
Alkali Wash	10	2	0	0	0	8	<1
Alkali Wash	10	3	0	0	0	30	<1
Alkali Wash	10	4	1	<1	0	40	<1
Alkali Wash	10	5	4	20	0	15	5
THIN BREAK	11	1	1	<1	<1	10	2
THIN BREAK	11	2	2	<1	<1	15	8
THIN BREAK	11	3	2	<1	<1	15	<1
THIN BREAK	11	4	2	<1	<1	1	7
THIN BREAK	11	5	2	1	<1	<1	30
THIN BREAK	12	1	0	0	0	20	<1
THIN BREAK	12	2	0	0	0	15	<1
THIN BREAK	12	3	1	20	0	10	3
THIN BREAK	12	4	1	2	2	6	<1
THIN BREAK	12	5	2	2	1	18	1
SA SA	13	1	2	12	0	10	8
SA SA	13	2	3	8	0	5	10
SA SA	13	3	1	5	0	50	5
SA SA	13	4	0	0	0	40	15
SA SA	13	5	1	<1	0	20	2
BADLAND	14	1	0	0	0	50	0
BADLAND	14	2	2	<1	<1	95	1
BADLAND	14	3	0	0	0	98	0
BADLAND	14	4	2	1	1	20	1
BADLAND	14	5	0	0	0	98	0

Alkali Wash	15	1	1	0	0	0	<1
Alkali Wash	15	2	0	0	0	0	0
Alkali Wash	15	3	0	0	0	0	0
Alkali Wash	15	4	2	<1	<1	0	<1
Alkali Wash	15	5	3	5	5	0	1
BADLAND	16	1	0	0	0	80	0
BADLAND	16	2	0	0	0	5	0
BADLAND	16	3	0	0	0	10	1
BADLAND	16	4	0	0	0	8	<1
BADLAND	16	5	0	0	0	6	<1
SA	17	1	7	10	5	0	4
SA	17	2	3	10	0.02	1	8
SA	17	3	3	20	0	<1	13
SA	17	4	2	25	0	<1	18
SA	17	5	3	50	0	0	10
Alkali Wash	18	25	1	2	2	1	0
Alkali Wash	18	20	3	2	1	<1	5
Alkali Wash	18	15	0	0	0	4	1
Alkali Wash	18	10	3	12	<1	<1	4
Alkali Wash	18	5	0	0	0	5	2
Alkali Wash	19	25	0	0	0	20	<1
Alkali Wash	19	20	3	10	10	0	5
Alkali Wash	19	15	2	5	5	1	15
Alkali Wash	19	10	1	<1	<1	5	5
Alkali Wash	19	5	2	<1	<1	25	<1
SAND	20	1	4	10	10	1	5
SAND	20	2	1	<1	<1	1	1
SAND	20	3	1	<1	<1	1	<1
SAND	20	4	1	1	1	2	2
SAND	20	5	4	10	10	1	70
Alkali Wash	21	1	1	0	0	85	0
Alkali Wash	21	2	0	0	0	80	10
Alkali Wash	21	3	1	<1	<1	3	1
Alkali Wash	21	4	1	<1	21	10	1
Alkali Wash	21	5	1	<1	0	1	5
SAND DUNE	22	1	5	8	7	0	3
SAND DUNE	22	2	4	5	2	0	10
SAND DUNE	22	3	3	13	12	0	4

SAND DUNE	22	4	4	15	14	0	3
SAND DUNE	22	5	4	4	3	0	1
BADLAND	23	1	1	<1	<1	<1	2
BADLAND	23	2	1	<1	<1	<1	1
BADLAND	23	3	0	0	0	<1	3
BADLAND	23	4	0	0	0	2	<1
BADLAND	23	5	0	0	0	0	0
BADLAND	24	1	0	0	0	10	<1
BADLAND	24	2	0	0	0	15	0
BADLAND	24	3	0	0	0	18	1
BADLAND	24	4	1	0	0	5	<1
BADLAND	24	5	0	0	0	2	0
THIN BREAK	25	1	1	<1	<1	30	<1
THIN BREAK	25	2	0	0	0	20	<1
THIN BREAK	25	3	0	0	0	5	2
THIN BREAK	25	4	2	2	1	15	3
THIN BREAK	25	5	0	0	0	20	1
BADLAND	26	1	0	0	0	0	0
BADLAND	26	2	4	5	5	2	0
BADLAND	26	3	0	0	0	0	0
BADLAND	26	4	4	1	1	<1	<1
BADLAND	26	5	3	<1	<1	0	<1
	27						
	27						
	27						
	27						
	27						
BADLAND	28	1	0	0	0	30	<1
BADLAND	28	2	0	0	0	20	0
BADLAND	28	3	0	0	0	20	0
BADLAND	28	4	3	5	5	3	3
BADLAND	28	5	2	2	1	4	<1
Alkali Wash	29	1	1	2	2	<1	<1
Alkali Wash	29	2	3	20	5	0	60
Alkali Wash	29	3	3	15	15	<1	2
Alkali Wash	29	4	3	3	3	0	3
Alkali Wash	29	5	1	1	0	0	<1
Alkali Wash	30	1	2	7	7	6	<1

Alkali Wash	30	2	2	<1	<1	6	0
Alkali Wash	30	3	3	1	1	5	0
Alkali Wash	30	4	2	<1	<1	2	<1
Alkali Wash	30	5	1	2	2	2	1
Alkali Wash	31	25	2	15	1	<1	5
Alkali Wash	31	20	1	<1	<1	<1	8
Alkali Wash	31	15	3	10	10	0	5
Alkali Wash	31	10	2	15	3	<1	7
Alkali Wash	31	5	3	15	6	0	4
Alkali Wash	32	1	1	7	7	<1	1
Alkali Wash	32	2	1	3	3	1	<1
Alkali Wash	32	3	1	4	4	3	<1
Alkali Wash	32	4	2	10	10	<1	1
Alkali Wash	32	5	5	15	15	1	<1
THIN BREAK	33	1	1	<1	<1	80	<1
THIN BREAK	33	2	1	<1	<1	80	<1
THIN BREAK	33	3	1	1	1	70	1
THIN BREAK	33	4	1	<1	<1	80	1
THIN BREAK	33	5	1	<1	<1	60	<1
Alkali Wash	34	25	0	0	0	8	<1
Alkali Wash	34	20	2	20	0	0	25
Alkali Wash	34	15	5	1	1	5	1
Alkali Wash	34	10	4	2	>1	3	1
Alkali Wash	34	5	3	5	3	<1	1
BADLAND	35	25	3	5	5	1	1
BADLAND	35	20	0	0	0	50	<1
BADLAND	35	15	6	8	<1	3	1
BADLAND	35	10	1	10	10	<1	3
BADLAND	35	5	0	0	0	40	30
Alkali Wash	36	1	4	60	5	>1	>1
Alkali Wash	36	2	2	4	1	0	25
Alkali Wash	36	3	2	20	>1	0	75
Alkali Wash	36	4	1	4	4	0	>1
Alkali Wash	36	5	5	0	0	0	1
	37						
	37						
	37						
	37						

	37						
BADLAND	38	1	4	10	10	2	<1
BADLAND	38	2	2	<1	<1	2	0
BADLAND	38	3	5	5	<1	3	0
BADLAND	38	4	0	0	0	1	<1
BADLAND	38	5			8	1	1
Sand	39	1	2	25	3	0	15
Sand	39	2	3	2	2	5	3
Sand	39	3	2	30	30	2	10
Sand	39	4	2	15	14	1	4
Sand	39	5	3	8	4	1	3
THIN BREAK	40	1	0	0	0	35	3
THIN BREAK	40	2	1	2	2	25	20
THIN BREAK	40	3	0	0	0	60	3
THIN BREAK	40	4	0	0	0	60	1
THIN BREAK	40	5	0	0	0	40	4
Alkali Wash	41	1	3	<1	<1	85	
Alkali Wash	41	2	0	0	0	15	<1
Alkali Wash	41	3	4	20	1	10	12
Alkali Wash	41	4	4	10	0	<1	10
Alkali Wash	41	5	2	3	3	<1	25
THIN BREAK	42	25	2	<1	<1	10	<1
THIN BREAK	42	20	1	<1	<1	70	0
THIN BREAK	42	15	1	<1	<1	60	<1
THIN BREAK	42	10	0	0	0	80	0
THIN BREAK	42	5	0	0	0	80	<1
SA SA	43	1	4	3	1	0	2
SA SA	43	2	5	30	27	0	5
SA SA	43	3	5	5	1	0	3
SA SA	43	4	6	8	7	0	2
SA SA	43	5	3	1	1	0	2
DUNE	44	1	3	4	1	<1	2
DUNE	44	2	4	6	1	1	3
DUNE	44	3	4	6	1	0	5
DUNE	44	4	4	20	20	0	3
DUNE	44	5	7	20	3	1	3
SAND	45	1	4	2	2	2	1
SAND	45	2	2	10	10	0	10

SAND	45	3	1	<1	<1	3	1
SAND	45	4	2	1	1	2	2
SAND	45	5	5	<1	<1	3	1
Alkali Wash	46	1	2	1	1	1	<1
Alkali Wash	46	2	5	5	5	0	<1
Alkali Wash	46	3	3	3	3	<1	<1
Alkali Wash	46	4	5	5	1	0	1
Alkali Wash	46	5	2	4	4	1	1
THIN BREAK	47	1	1	<1	<1	35	1
THIN BREAK	47	2	0	0	0	50	1
THIN BREAK	47	3	2	1	1	50	1
THIN BREAK	47	4	1	<1	<1	40	1
THIN BREAK	47	5	1	1	1	25	4
SAND	48	1	4	2	1	1	1
SAND	48	2	3	3	1	1	1
SAND	48	3	4	4	1	2	3
SAND	48	4	5	20	5	<1	5
SAND	48	5	4	18	8	1	4
THIN BREAK	49	1	0	0	0	95	0
THIN BREAK	49	2	2	<1	<1	70	3
THIN BREAK	49	3	0	0	0	35	1
THIN BREAK	49	4	1	10	0	3	5
THIN BREAK	49	5	0	0	0	80	1
SA SA	50	1	3	5	5	2	2
SA SA	50	2	3	20	1	<1	8
SA SA	50	3	5	10	3	1	3
SA SA	50	4	4	20	12	1	3
SA SA	50	5	5	10	8	<1	2
	51						
	51						
	51						
	51						
	51						
Alkali Wash	52	1	2	<1	<1	5	1
Alkali Wash	52	2	3	1	1	5	2
Alkali Wash	52	3	1	4	4	10	1
Alkali Wash	52	4	1	<1	<1	8	0
Alkali Wash	52	5	2	1	1	3	<1

SAND	53	1	4	3	2	1	4
SAND	53	2	2	2	1	1	40
SAND	53	3	2	20	1	1	6
SAND	53	4	5	10	10	1	3
SAND	53	5	4	8	8	1	1
BADLAND	54	1	0	0	0	8	0
BADLAND	54	2	0	0	0	20	0
BADLAND	54	3	0	0	0	10	0
BADLAND	54	4	0	0	0	45	0
BADLAND	54	5	0	0	0	25	0
BADLAND	55	25	0	0	0	20	0
BADLAND	55	20	0	0	0	3	<1
BADLAND	55	15	0	0	0	10	0
BADLAND	55	10	3	10	10	0	1
BADLAND	55	5	2	2	2	<1	<1
Sand	56	1	2	15	>1	4	4
Sand	56	2	5	14	2	2	4
Sand	56	3	4	20	4	>1	4
Sand	56	4	6	8	>1	0	7
Sand	56	5	2	30	0	>1	5
ARROYO SHRUB	57	1	3	1	1	0	1
ARROYO SHRUB	57	2	1	8	8	0	3
ARROYO SHRUB	57	3	3	5	5	0	1
ARROYO SHRUB	57	4	3	4	4	0	3
ARROYO SHRUB	57	5	3	12	1	0	25
Alkali Wash	58	1	5	20	20	5	1
Alkali Wash	58	2	1	1	1	15	1
Alkali Wash	58	3	4	10	9	20	1
Alkali Wash	58	4	1	3	3	20	<1
Alkali Wash	58	5	4	3	3	1	4
SA SA	59	1	4	10	10	0	2
SA SA	59	2	5	8	4	0	3
SA SA	59	3	4	1	1	0	1
SA SA	59	4	3	12	6	0	2
SA SA	59	5	4	2	1	0	1
THIN BREAK	60	1	2	5	5	5	3
THIN BREAK	60	2	2	<1	<1	10	<1
THIN BREAK	60	3	1	<1	<1	6	<1

THIN BREAK	60	4	2	3	3	4	<1
THIN BREAK	60	5	2	1	1	5	1
THIN BREAK	61	1	0	0	0	30	0
THIN BREAK	61	2	0	0	0	70	0
THIN BREAK	61	3	4	<1	0	80	0
THIN BREAK	61	4	0	0	0	10	0
THIN BREAK	61	5	0	0	0	85	0
Sa. Sa.	62	1	6	8	1	5	4
Sa. Sa.	62	2	4	23	1	2	1
Sa. Sa.	62	3	5	5	1	3	4
Sa. Sa.	62	4	6	8	1	1	20
Sa. Sa.	62	5	4	17	6	5	1
Alkali Wash	63	1	5	2	1	1	3
Alkali Wash	63	2	5	22	2	0	3
Alkali Wash	63	3	1	25	0	0	3
Alkali Wash	63	4	1	1	1	0	1
Alkali Wash	63	5	2	1	1	2	<1
THIN BREAK	64	1	2	25	0	15	7
THIN BREAK	64	2	1	4	0	10	2
THIN BREAK	64	3	3	13	1	1	6
THIN BREAK	64	4	2	6	0	7	3
THIN BREAK	64	5	3	7	1	8	6
	65	1					
	65	2					
	65	3					
	65	4					
	65	5					
)y. Shrub trans. Alk. W	66	1	3	20	1	0	5
)y. Shrub trans. Alk. W	66	2	2	7	1	1	2
)y. Shrub trans. Alk. W	66	3	0	0	0	15	1
)y. Shrub trans. Alk. W	66	4	2	>1	>1	15	>1
)y. Shrub trans. Alk. W	66	5	2	>1	>1	10	>1
BADLAND	67	1	0	0	0	95	1
BADLAND	67	2	0	0	0	99	<1
BADLAND	67	3	1	<1	<1	95	0
BADLAND	67	4	0	0	0	75	8
BADLAND	67	5	2	4	4	90	1
SA SA	68	1	1	5	5	0	3

SA SA	68	2	4	3	3	0	15
SA SA	68	3	2	4	0	0	6
SA SA	68	4	2	10	10	0	10
SA SA	68	5	2	15	12	0	5
Alkali Wash	69	1	4	20	10	<1	10
Alkali Wash	69	2	3	30	30	1	3
Alkali Wash	69	3	5	12	5	<1	5
Alkali Wash	69	4	1	<1	<1	1	5
Alkali Wash	69	5	2	2	2	5	5
Alkali Wash	70	1	2	1	1	2	<1
Alkali Wash	70	2	4	<1	<1	3	1
Alkali Wash	70	3	2	5	<1	15	2
Alkali Wash	70	4	2	<1	<1	45	2
Alkali Wash	70	5	2	<1	<1	40	<1
THIN BREAK	71	1	0	0	0	95	<1
THIN BREAK	71	2	1	25	0	75	0
THIN BREAK	71	3	1	2	0	95	3
THIN BREAK	71	4	1	1	1	95	2
THIN BREAK	71	5	0	0	0	40	<1
SA SA	72	5	5	15	5	0	7
SA SA	72	10	2	12	2	0	3
SA SA	72	15	2	15	1	0	10
SA SA	72	20	3	1	1	0	2
SA SA	72	25	4	4	1	0	4
	73	1					
	73	2					
	73	3					
	73	4					
	73	5					
BADLAND	74	1	1	2	0	60	2
BADLAND	74	2	2	3	3	5	1
BADLAND	74	3	3	<1	0	25	6
BADLAND	74	4	0	0	0	8	1
BADLAND	74	5	0	0	0	15	0
BADLAND	75	1	0	0	0	90	<1
BADLAND	75	2	0	0	0	80	0
BADLAND	75	3	0	0	0	90	0
BADLAND	75	4	0	0	0	90	<1

BADLAND	75	5	0	0	0	90	<1
BADLAND	76	1	1	<1	<1	15	1
BADLAND	76	2	1	1	1	20	15
BADLAND	76	3	1	<1	<1	10	<1
BADLAND	76	4	0	0	0	5	1
BADLAND	76	5	0	0	0	15	1
BADLAND	77	1	0	0	0	1	0
BADLAND	77	2	0	0	0	40	0
BADLAND	77	3	0	<1	0	60	2
BADLAND	77	4	0	0	0	30	0
BADLAND	77	5	1	<1	0	80	0
Sa. Sa.	78	5	3	3	3	<1	2
Sa. Sa.	78	10	4	5	2	1	2
Sa. Sa.	78	15	4	3	1	1	1
Sa. Sa.	78	20	4	10	9	<1	5
Sa. Sa.	78	25	3	12	2	<1	1
THIN BREAK	79	1	0	0	0	15	3
THIN BREAK	79	2	0	0	0	70	<1
THIN BREAK	79	3	3	10	0	15	5
THIN BREAK	79	4	1	<1	<1	75	<1
THIN BREAK	79	5	2	3	0	80	<1
ARROYO SHRUB	80	1	5	20	20	0	2
ARROYO SHRUB	80	2	2	10	10	0	2
ARROYO SHRUB	80	3	2	10	10	0	1
ARROYO SHRUB	80	4	4	1	1	0	<1
ARROYO SHRUB	80	5	2	15	<1	0	25
	81	1					
	81	2					
	81	3					
	81	4					
	81	5					
	82	1					
	82	2					
	82	3					
	82	4					
	82	5					
	83	1					
	83	2					

Appendix 15.D

Pinabete Permit Area: Threatened, Endangered, and Sensitive Flora and Fauna

Ecosphere
Environmental Services

Pinabete Permit Area: Threatened, Endangered, and Sensitive Flora and Fauna

Navajo Mine, San Juan County, New Mexico

Prepared for:

BHP Navajo Coal Company, Fruitland, New Mexico

November 2012

Durango, CO
Cortez, CO
Pagosa Springs, CO
Farmington, NM

TABLE OF CONTENTS

1. Introduction 1

2. Permit Area 2

2.1 Location 2

2.2 Physical Description 2

2.3 Vegetation 2

2.3.1 Dunes 3

2.3.2 Sands 3

2.3.3 Arroyo Shrub 3

2.3.4 Alkali Wash 3

2.3.5 Thinbreaks 3

2.3.6 Badlands 4

3. Threatened, Endangered, and Sensitive Species 4

3.1 Threatened, Endangered, and Sensitive Flora 7

3.1.1 Federally Listed Species 7

3.1.2 San Juan Milkweed 7

3.2 Threatened, Endangered, and Sensitive Fauna 8

3.2.1 Black-footed Ferret 8

3.2.2 Mountain Plover 11

3.2.3 Burrowing Owls 13

3.2.4 Ferruginous Hawk, Golden Eagle & Other Raptors 13

4. References 16

LIST OF TABLES

Table 3-1 Species Listed by the USFWS for San Juan County, New Mexico (Under the Authority of the Endangered Species Act of 1973) 4

Table 3-2 Navajo Nation Species of Concern with Potential to Occur in the Area Encompassed by Permit Area 6

APPENDIX A: LIST OF FIGURES

Figure 1. The vicinity of the Pinabete permit area A-2
Figure 2: The Pinabete permit area A-3
Figure 3: San Juan milkweed habitat and locations A-4
Figure 4: Size and location of mapped prairie dog towns and survey areas for nocturnal black-footed ferret surveys A-5
Figure 5: Raptor sightings and nest locations A-6
Figure 6: Potential mountain plover habitat, sightings, and nests A-7

APPENDIX B: SURVEY FORMS

Survey Form 1: First of three consecutive nocturnal surveys for black-footed ferret B-2
Survey Form 2: Second of three consecutive nocturnal surveys for black-footed ferret B-3
Survey Form 3: Third of three consecutive nocturnal surveys for black-footed ferret B-4

APPENDIX C: LIST OF PHOTOGRAPHS

Photograph 1: Prairie Dog Colony 1 looking east; unoccupied colony. C-2
Photograph 2: Prairie Dog Colony 2-active colony in Area 4 South and 4 North. C-2
Photograph 3: Active burrowing owl burrow-whitewash, pellets, and feathers, located in Prairie Dog Colony 2. ..... C-3
Photograph 4: Potential mountain plover habitat in Area 4 South. C-3
Photograph 5: Potential mountain plover habitat in Area 4 South. C-4
Photograph 6: Active mountain plover nest in Area 5, overview. C-4
Photograph 7: Active mountain plover nest in Area 5, zoomed, showing two hatched chicks and two un-hatched eggs. C-5
Photograph 8: Red-tailed hawk nest with three young located along Pinabete Arroyo within the Pinabete permit area. C-5

ACRONYMS

BNCC	BHP Navajo Coal Company
Cm	centimeters
CFR	Code of Federal Regulations
ESA	Endangered Species Act
Ecosphere	Ecosphere Environmental Services
GPS	Global Positioning System
TES	Threatened, Endangered, and Sensitive
NEPA	National Environmental Policy Act
NM	New Mexico
NNHP	Navajo Natural Heritage Program
NNDFW	Navajo Nation Department of Fish and Wildlife
NNC	Navajo Nation Code
SMCRA	Surface Mining Control and Reclamation Act
U.S.	United States
USC	United States Code
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service

1. INTRODUCTION

In May 2012, BHP Navajo Coal Company (BNCC) retained Ecosphere Environmental Services (Ecosphere) to conduct threatened endangered, and sensitive (TES) species surveys in the proposed Pinabete permit area. BNCC has proposed the development of a standalone Surface Mining Control and Reclamation Act (SMCRA) (30 CFR 780.16) mine permit to conduct surface coal mining activities within the undeveloped portions of BNCC's Navajo Mine Lease Area 4 North and the unpermitted and undeveloped portions of Navajo Mine Lease Area 4 South, known as the Pinabete Permit area (permit area)

The purpose of the field surveys was to refresh the occurrence data for TES flora and fauna species and their potential habitat information within the permit area. The surveys focused on species listed by the United States Fish and Wildlife Service (USFWS) and the Navajo Natural Heritage Program (NNHP) of the Navajo Nation Department of Fish and Wildlife (NNDFW) as documented or having potential to occur in the permit area. The survey data will be used primarily to support current SMCRA permits and National Environmental Policy Act (NEPA) analysis. The survey data may also be used in preparation of a Biological Assessment for compliance with the Endangered Species Act (ESA), as amended (16 U.S. Code [USC] 1531 et seq.) and a Biological Evaluation for compliance with the Navajo Nation Code (NNC) requirement for species of concern (17 NNC 507).

This report outlines the data collections and methodologies implemented for inventorying the proposed permit area. The methodologies used are consistent with USFWS and NNDFW guidelines and requirements.

2. PERMIT AREA

2.1 Location

Navajo Mine is located on Navajo Nation lands in San Juan County, New Mexico (NM), approximately 20 miles southwest of Farmington, NM (Figure 1, Appendix A). The BNCC mining lease is subdivided into six administrative areas known as Areas 1, 2, 3, 4 North, 4 South, and 5. The proposed permit area would be located immediately south of active Navajo Mine operations (Figure 2, Appendix A).

The permit area is found on the Hogback South, Newcomb NE, Kirtland SW and The Pillar NW, New Mexico 7.5-minutes U.S. Geological Survey (USGS) quadrangles. The permit area comprises approximately 5,569 acres in BNCC lease Area 4 North and 4 South and is located within:

Sections 6, 7, 18, and 19
Township 26 North, Range 15 West
Sections 1, 9, 10, 11, 12, 13, 14, 15, 16, 22, 23, 24, 25, and 26
Township 26 North, Range 16 West
New Mexico Principal Meridian

2.2 Physical Description

The permit area is located on the western extremities of the San Juan Basin within the Colorado Plateau province. Much of the proposed permit area exhibits minimal relief. Erosional features such as badlands, short ridges, and tablelands are predominant near ephemeral drainages in the northeast corner and the along the western boundary of the proposed permit area. Elevation ranges from approximately 5,320 to 5,460 feet above sea level. The area slopes west toward the Chaco River, an intermittent drainage. The main Chaco River channel is located between 5,000 and 16,000 feet from the permit area. Three unnamed tributaries of Cottonwood Arroyo flow through the northeast portion of the permit area, while Pinabete Arroyo flows through the southwest portion. Two seasonal ponds are located within the permit area and there are no perennial water sources in the area. The San Juan River is located approximately 16 miles north of the permit area.

2.3 Vegetation

The permit area is comprised of Great Basin desert-scrub habitat (Dick-Peddie 1993). The great Basin desert-scrub habitat is a cold desert ecosystem dominated by a variety of shrubs with a sparse understory of forbs and grasses, with bare ground dominating in poor, alkaline soils (Fitzgerald et al. 1994, Dick-Peddie 1993). Six vegetation community types occur in the permit area. Each vegetation community type contains a few distinguishing or unique plant species. The following brief descriptions list some of those distinguishing or unique plant species that typically define the vegetation community.

2.3.1 Dunes

The deep sands found in dune communities allow for more consistent water availability. Since only deep-rooted perennial plants can exploit this deep water, the dunes have several unique plant species including San Juan milkweed (*Asclepias sanjuanensis*), as well as canaigre dock (*Rumex hymenosepalus*) and sand sagebrush (*Artemisia filifolia*). Other common species include cryptantha (*Cryptantha crassisepala*), tansy mustard (*Descurania pinnata*), twinpod (*Dimorphocarpa wislizeni*), globemallow (*Sphaeralcea parvifolia*), Indian ricegrass (*Achnatherum hymenoides*), galleta grass (*Pleuraphis jamesii*), and evening primrose (*Oenothera pallida*).

2.3.2 Sands

As with dunes, the deeper penetration of rainwater into sandy soil allows for greater water availability and increases plant species diversity. The types of sand in this vegetation community can vary from saline to calcareous. The sands community often transitions to and can be mixed with the thinbreaks community. In years with high amounts of spring rainfall, sandy soils display an abundance of annuals, especially of scorpion weed (*Phacelia crenulata*), annual Townsend daisy (*Townsendia annua*), and cryptantha. Other common species include Russian thistle (*Salsola tragus*), pincushion (*Chaenactis stevioides*), galleta grass, and wire lettuce (*Stephanomeria exigua*).

2.3.3 Arroyo Shrub

Arroyo shrub communities are commonly found in major drainages and washes, such as Pinabete Arroyo. Shrubs and perennials characteristic of this community include greasewood (*Sarcobatus vermiculatus*), Russian thistle, tansy mustard, alkali sacaton (*Sporabolus airoides*), four-winged saltbush (*Atriplex canescens*), cryptantha, and snakeweed (*Gutierrezia sarothrae*).

2.3.4 Alkali Wash

Alkali wash is a vegetation community associated with minor waterways. These areas are typically broad and level with occasional small, dense patches of galleta grass and alkali sacaton. Alkali wash vegetation communities are typically located in washes and drainages, as well as at the base of badlands. The terrain is nearly level to moderately sloping, ranging from 0 to 3 percent. Other plants that are locally common in alkali wash include tansy mustard, Russian thistle, scorpion weed, mound saltbush (*Atriplex obovata*), alkali sacaton, galleta grass, woolly plantain (*Plantago patagonica*), and annual Townsend daisy.

2.3.5 Thinbreaks

Thinbreaks is characteristic of rocky areas with loose rock and occasionally with large pieces of rock, usually shale, that are firmly embedded in the ground. Thinbreaks are typically upland vegetation communities with surface rock as a unifying feature. Flat, surface rocks allow for greater water to run off and accumulate in crevices or fissures between rocks. Thinbreaks plant species that occur in these fissures include Russian thistle, tansy mustard, cryptantha, shadscale saltbush (*Atriplex confertifolia*), alkali sacaton, stickseed (*Lappula occidentalis*), dwarf gilia (*Ipomopsis pumila*), and scorpion weed.

2.3.6 Badlands

Badlands have the least vegetation of any vegetation community in the permit area. Among the more common plants along the small relief channels of these barren areas are Powell's saltbush (*Atriplex powelli* var. *powelli*), mound saltbush, annual Townsend daisy, stickseed, woolly plantain, salty buckwheat (*Stenogonum salsuginosum*), Gordon's buckwheat (*Eriogonum gordonii*), scorpion weed, and globemallow.

3. THREATENED, ENDANGERED, AND SENSITIVE SPECIES

Prior to conducting fieldwork, Ecosphere biologists compiled a list of TES species listed by the USFWS and NNHP. According to the USFWS, there are 11 federally listed threatened, endangered, and candidate species with potential to occur in San Juan County. Table 3-1 lists these species, as well as their status, habitat associations, and potential to occur in the permit area.

The species listed by the Navajo Nation are quadrangle map-specific rather than project site-specific. The NNHP currently lists 11 species of concern with potential to occur on the USGS 7.5-minute topographic maps that encompass the permit area.

Table 3-2 lists these species, as well as their conservation status, habitat associations, and potential to occur in the permit area.

Table 3-1 Species Listed by the USFWS for San Juan County, New Mexico (Under the Authority of the Endangered Species Act of 1973)

SPECIES	STATUS	HABITAT ASSOCIATIONS	POTENTIAL TO OCCUR IN THE PERMIT AREA
MAMMALS			
Black-footed ferret (*Mustela nigripes*)	Endangered	Open grasslands with year-round prairie dog (*Cynomys gunnisoni*) colonies greater than 198 acres in size and greater than 20 burrows per 2.5 acres.	There are prairie dog (*Cynomys gunnisoni*) towns of marginally sufficient size to support black-footed ferret in the permit area.
Canada lynx (*Lynx Canadensis*)	Candidate	Generally occurs in boreal and montane forests dominated by coniferous or mixed forest with thick undergrowth.	No boreal or montane forests occur within the permit area.
BIRDS			
Mexican spotted owl (*Strix occidentalis lucida*)	Threatened with Critical Habitat	Nests in caves, cliffs, or trees in steep-walled canyons of mixed conifer forests.	No suitable habitat in the permit area due to lack of mixed conifer forests and forested canyons.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	Endangered with Critical habitat	Breeds in dense, shrubby riparian habitats, usually in close proximity to surface water or saturated soil.	Suitable, but sparse migratory stopover habitat occurs in widely scattered patches of tamarisk (*Tamarix* sp.) in Pinabete and Cottonwood arroyos and at a small stock pond in the southern portion of the permit area.
Yellow-billed cuckoo (*Coccyzus americanus*)	Candidate	Breeds in riparian woodlands with dense, understory vegetation.	No suitable habitat within the permit area due to lack of riparian woodland habitats and perennial water resources.
FISH			
Colorado pikeminnow (*Ptychocheilus lucius*)	Endangered with Critical Habitat	Large rivers with strong currents, deep pools, and quiet backwaters.	No suitable habitat within the permit area due to lack of perennial waters.
Razorback sucker (*Xyrauchen texanus*)	Endangered with Critical Habitat	Medium to large rivers with silty to rocky substrates. Prefers strong currents and deep pools.	No suitable habitat within the permit area due to lack of perennial waters.

SPECIES	STATUS	HABITAT ASSOCIATIONS	POTENTIAL TO OCCUR IN THE PERMIT AREA
Roundtail chub (*Gila robusta*)	Candidate	Large rivers. Present in low numbers in the San Juan, Mancos, La Plata, and Animas rivers in Colorado and New Mexico.	No suitable habitat within the permit area due to lack of perennial waters.
PLANTS			
Knowlton's cactus (*Pediocactus knowltonii*)	Endangered	Alluvial deposits that form rolling, gravelly hills in piñon-juniper and sagebrush communities (6,200-6,400 feet).	No rolling, gravelly alluvial deposits vegetated with piñon-juniper woodland in the permit area.
Mancos milkvetch (*Astragalus humillimus*)	Endangered	Cracks of Point Lookout Sandstone of the Mesa Verde series (5,000-6,000 feet).	Point Lookout Sandstone does not occur in the permit area. The nearest protrusion of this formation is 6 to 7 miles west of the permit area, along the Hogback Monocline.
Mesa Verde cactus (*Sclerocactus mesae-verdae*)	Threatened	Highly alkaline soils in sparse shale or adobe clay badlands of the Mancos and Fruitland formations (4,000-5,550 feet).	The majority of soil substrates in the permit area are sands or alkali wash. Badlands in the permit area are capped with sandstone or red cinders and do not provide suitable habitat.

Source: USFWS 2012

Table 3-2 Navajo Nation Species of Concern with Potential to Occur in the Area Encompassed by Permit Area

SPECIES	NNHP STATUS[a]	HABITAT ASSOCIATIONS	POTENTIAL TO OCCUR IN THE PERMIT AREA
MAMMALS			
Black-footed ferret (*Mustela nigripes*)	Group 2	Open grasslands with year-round prairie dog (*Cynomys gunnisoni*) colonies greater than 198 acres in size and greater than 20 burrows per 2.5 acres.	There are prairie dog colonies of sufficient size to support black-footed ferret in the permit area.
Kit fox (*Vulpes macrotis*)	Group 4	Desert scrub or desert grassland with soft, alluvial or silty-clay soils with sparse vegetation cover.	Documented in the permit area.
BIRDS			
Southwestern willow flycatcher (*Empidonax traillii extimus*)	Group 2	Breeds in dense, shrubby riparian habitats, usually in close proximity to surface water or saturated soil.	Suitable, but sparse migratory stopover habitat occurs in widely scattered patches of tamarisk (*Tamarix sp.*) in Pinabete and Cottonwood arroyos and at a small stock pond in the southern portion of the permit area.
Ferruginous hawk (*Buteo regalis*)	Group 3	Nests in badlands, flat or rolling grasslands, and desert scrub.	Potential habitat for this species occurs within the permit area; the most recent successful nesting occurred east of the 1-mile buffer in 2011. Successful nesting was documented in Area 1 in 2012.
Golden eagle (*Aquila chrysaetos*)	Group 3	Open habitats in mountainous, canyon terrain. Nests primarily on steep cliffs and occasionally in large trees.	Potential habitat for this species occurs within the permit area. Most recent successful nesting occurred about 1 mile west of the 1-mile buffer in Area 4 South in 2012.
American peregrine falcon (*Falco peregrinus anatum*)	Group 4	Cliffs that generally exceed 200 feet in height near permanent surface water.	The permit area lacks high cliffs suitable for nesting/perching for this species.
Mountain plover (*Charadrius montanus*)	Group 4	Breeds in short sparse vegetation in disturbed prairies or semi-deserts with less than a two-degree slope.	Potential habitat for this species occurs within the permit area; breeding documented in the BNCC lease area (Area 5) in 2012.

SPECIES	NNHP STATUS[a]	HABITAT ASSOCIATIONS	POTENTIAL TO OCCUR IN THE PERMIT AREA
Western burrowing owl (*Athene cunicularia hypugea*)	Group 4	Nests in ground burrows (often deserted prairie dog (*Cynomys gunnisoni*) burrows) in dry open grasslands or desert scrub.	Potential habitat for this species occurs within the permit area. Burrows documented in the permit area.
PLANTS			
Mancos milkvetch (*Astragalus humillimus*)	Group 2	Cracks of Point Lookout Sandstone of the Mesa Verde series (5,000-6,000 feet).	Point Lookout Sandstone does not occur in the permit area. The nearest protrusion of this formation is 6 to 7 miles west of the permit area, along the Hogback Monocline.
Mesa Verde cactus (*Sclerocactus mesae-verdae*)	Group 4	Highly alkaline soils in sparse shale or adobe clay badlands of the Mancos and Fruitland formations (4,000-5,550 feet)	Potential habitat for this species occurs within the permit area. The majority of soil substrates in the permit area are sands or alkali wash. Badlands in the area are capped with sandstone or red cinders and do not provide suitable habitat.
San Juan milkweed (*Asclepias sanjuanensis*)	Group 4	Sandy loam soils in juniper savanna and Great Basin desert scrub at 5,000-5,500 feet.	Seven widely scattered populations of San Juan milkweed were documented in the permit area during 2012 surveys

Source: NESL 2008; Navajo Nation Endangered Species List: Group 2—species whose prospects of survival or recruitment are in jeopardy; Group 3—species whose prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future; Group 4—species for which the NNDFW does not currently have sufficient information to support the species listed in Group 2 or Group 3. The NNDFW will actively seek information on these species to determine if they warrant inclusion in a different group or removal from the list. Group 4 species are candidates for listing and have no legal protection under section 507.

3.1 Threatened, Endangered, and Sensitive Flora

3.1.1 Federally Listed Species

The permit area does not contain potential habitat for any of the three, federally listed threatened or endangered flora species with the potential to occur in San Juan County (Table 3-1).

3.1.2 San Juan Milkweed

San Juan milkweed is listed as a Group 4 species by the Navajo Nation (Table 2-2). There are no federal, state, or Navajo Nation protections for this species. The Navajo Nation does not currently have sufficient information to support listing this species as threatened or endangered on the Navajo Endangered Species List.

The stems of this perennial milkweed grow from a woody taproot and are 4 to 8 centimeters (cm) tall. Stems are typically prostrate with leaves 2 to 4 cm long. Diagnostic characteristics are the white, hairy leaf margins and a terminal inflorescence with reddish-violet flowers. The San Juan milkweed flowers in

April and has mature fruits in mid- to late May. The characteristic habitat for this plant is sandy soil; however, sometimes this milkweed occurs in piñon (*Pinus* sp.) - juniper (*Juniperus* sp.) woodlands.

3.1.2.1 Methods

TES flora survey methods began with examination of the potential for species to occur in the permit area based on known habitat associations and agency consultation. Potential habitat in the permit area was evaluated and delineated using a combination of vegetation community types and soil survey map unit descriptions. All habitats were verified and observed using high-powered binoculars and a spotting scope. Field surveys were conducted between June 20 and July 2, 2012. Unique habitat or potential habitat was surveyed for TES flora presence/absence using teams consisting of two qualified botanists walking parallel transects about 20 feet apart. When TES flora species were found, their locations were digitally recorded with a handheld global positioning system (GPS) unit.

3.1.2.2 Results

None of the three, federally listed threatened or endangered flora species with the potential to occur in San Juan County was observed during surveys of the permit area.

Seven widely scattered populations of San Juan milkweed were documented in the permit area during the 2012 surveys (Figure 3, Appendix A). Generally, populations contained two to five individuals, with the largest population containing seven individuals. In the permit area, this species occurs in the sands vegetation community. Dunes in the permit area may also provide potential habitat, although the species was not recorded as occurring within this community type. There are approximately 1,515 acres of potential habitat for San Juan milkweed within the permit area based on the acres of sands and dunes vegetation communities (Figure 3, Appendix A).

3.2 Threatened, Endangered, and Sensitive Fauna

3.2.1 Black-footed Ferret

The USFWS (USFWS 1989) developed revised guidelines for the black-footed ferret (*Mustela nigripes*) surveys that established the minimum acres of prairie dog habitat needed to support black-footed ferrets. Consequently, the first task to determine if black-footed ferret surveys were warranted was to map the size of historical prairie dog towns and any new towns in the permit area. Towns were recently mapped in Areas 4 South and 5 in 2007 (Ecosphere 2008) and identified in Area 4 North in 2004 and 2012 (Ecosphere 2004; Ecosphere 2012).

3.2.1.1 Methods

Mapping prairie dog towns

The USFWS 1989 guidelines were established for black-tailed prairie dogs (*Cynomys ludovicianus*) and white-tailed prairie dogs (*Cynomys leucurus*) only and determined for the latter that prairie dog towns or complexes greater than 200 acres but less than 1,000 acres would be cleared by USFWS after completion of a survey for black-footed ferrets, provided that no ferrets or their sign are found. Based

on previous survey experience, Ecosphere followed the guidelines established for white-tailed prairie dogs, the species most similar to and of the same family as the Gunnison's prairie dog, as well as survey guidelines developed by NNHP. Prairie dog towns greater than 120 acres require protocol surveys per Navajo Nation requirements. However, prairie dog towns within 7-kilometers can also qualify if the complex added together totals more than 250 acres per the Navajo Nation or 200 acres per the USFWS. Ecosphere defaulted to the minimum requirements for black-footed ferret surveys.

Prairie dog towns were mapped using a systematic approach by identifying functional prairie dog burrows. Functional burrows are structurally suitable to house prairie dogs (entirely open; only partially filled with dirt; or open but blocked by sticks, weeds, cobwebs, or other debris) and are either occupied or unoccupied. Both occupied and unoccupied burrows were included, as prairie dog towns can shift depending on resource availability and old towns can be recolonized over time. Non-functional burrows—burrows with an opening less than 3 inches or those filled in with dirt—were not recorded. The current occupation (occupied or unoccupied) of each town mapped was documented based on visual observations (prairie dogs seen or heard or recent prairie dog activity such as fresh digging, scat, or tracks).

Previously mapped prairie dog towns were located using a sub-meter GPS unit. One team of two to three biologists walked within and along the perimeter of each prairie dog town visited. Each biologist walked approximately 100 to 200 feet apart and using radios to maintain communication. One biologist marked burrows using a handheld GPS unit while walking along the established perimeter of the prairie dog town. If a burrow was observed by a biologist outside the established perimeter, the whole crew shifted in that direction to maintain the structure of the line and delineate the perimeter. If burrows were not observed within 750 feet from the last known burrow, the crew returned to that spot to find burrows and established the perimeter until the entire prairie dog town was mapped. Burrows observed over 750 feet from the prairie dog town were considered a different town. Binoculars were used to assist with the identification of burrows. Notes were taken to document the current occupation (occupied or unoccupied) of the prairie dog towns. The burrows located on the perimeter of the prairie dog town were used to define the boundary of the habitat polygons using ArcView.

Historic colonies were considered unoccupied if they met one of the following criteria:

- The majority (>75 percent) of burrows were completely filled in with dirt.
- The majority (>75 percent) of burrows were observed as functional, but with no evident prairie dog activity from 2012.

As biologists observed incidental burrows while driving to historic colonies, the biologists would determine if they were functional. If the burrows were filled in, biologists would not pursue mapping the edge of the colony and would move to the next colony. If the colonies contained functional burrows, pedestrian surveys were conducted to establish the edge of the colony. Burrows that were used by other species (kangaroo rats, coyotes, or rabbit species) were marked with GPS when it was clear what

species was using the burrow. Wildlife sign (including fresh scat or footprints) was documented if it would help determine the occupant of the burrow(s).

Nocturnal spotlighting surveys

Nocturnal surveys were developed following USFWS and NNDFW protocols (USFWS 1989, NNDFW 1985). Nocturnal surveys were conducted rather than diurnal surveys because the former method is designed to observe black-footed ferrets when their population is greatest (1 July - 31 October) and activity levels are highest, resulting in better detection of any possible remnant black-footed ferret population occurring in the permit area.

Prior to conducting field work, the total acres of all prairie dog towns was calculated and divided by 320 acres to determine the number of survey tracts (UWFWS 1989). Each survey track was inspected by a field crew of two biologists in a 4-wheel drive vehicle. Each crew was equipped with two-million candle power spotlights, high-powered binoculars, hand held GPS unit, and digital camera. The mapped prairie dog towns were spotlighted, weather permitting, continuously from dusk until dawn until a minimum of two passes was made over each town for three consecutive nights (September 24, 25, and 26, 2012); the surveys were conducted at a different prairie-dog town on each of the three nights.

3.2.1.2 Results

Mapping prairie dog towns

Ecosphere documented seven prairie dog towns totaling 1,064 acres (ranging in size from 53 to 422 acres) all within a 6.5-mile range from Area 4 North to Area 5 (Figure 4, Appendix A). Two prairie dog towns (town 2 and portions of town 3) had a few prairie dogs present and sign of fresh activity (digging and scat). The other three prairie dog towns (towns 1, 4, and 10) had functional burrows present, but were unoccupied (i.e., no signs of recent activity was observed). Although town 1 (located in Area 4 North) contained functional burrows, most burrows appeared inactive for several years previous since they were predominantly filled with litter and debris. (Figure 4, Appendix A).

The following summarizes the status of each prairie dog town mapped in 2012 (Appendix A, Figure 4):

- Occupied Prairie dog colonies: sign of recent activity and individuals present
  - Town 2 and portions of Town 3
- Unoccupied Prairie dog colonies: no burrows observed
  - Towns 8, 9, and 11
- Unoccupied Prairie dog colonies: >75% of burrows are filled-in with dirt (non-functional burrows)
  - Colony 5, 6, 7,10
- Unoccupied Prairie dog colonies: >75% of burrows are functional, but no sign of recent activity
  - Colony 1 and 4, portions of Colony 3

Multiple prairie dogs were observed near the Navajo Agricultural Products Industry fields located north of the Navajo Mine Lease, suggesting that prairie dog activity is presently higher close to irrigated fields. Although anecdotally we did not observe a lot of prairie dog activity in the towns that were mapped relative to other towns nearby, the size of the prairie dog towns warranted protocol surveys for black-footed ferrets.

Nocturnal spotlighting surveys

Ecosphere established one survey tract to conduct nocturnal surveys for black-footed ferrets. Although the total acres of prairie dog towns were over 1,064 acres, the lack of occupation at most of the towns did not justify more survey tracks. Further, because the towns were in proximity to each other, two or three complete surveys at all of the mapped towns in 2012 (Appendix A, Figure 4) were completed on each survey. Ecosphere logged 93.5 total biologist hours on three consecutive survey nights (Appendix B).

The results of the nocturnal spotlighting surveys conducted for black-footed ferrets in September 2012 were negative; i.e., no black-footed ferrets or their sign were detected (Appendix B). Ecosphere made three incidental raptor sightings during nocturnal spotlighting surveys including a ferruginous hawk (*Buteo regalis*), great-horned owl (*Bubo virginianus*), and burrowing owl (*Athene cunicularia*) (Figure 5, Appendix A). Other wildlife observed included a kit fox (*Vulpes macrotis*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audobonii*), unidentified mice, and kangaroo rat (*Dipodomys* sp.).

3.2.2 Mountain Plover

3.2.2.1 Methods

In May and June 2012, Mountain plover surveys were conducted in suitable habitat in the Pinabete Permit area and a 1-mile buffer. The survey area included Area 4 North and a portion of Area 4 South. Mountain plover suitable nesting habitat is characterized by short-vegetation (less than four inches tall), a bare ground component of at least 30 percent, on flat or gently sloping landscapes (usually less than 5 percent slopes), and sometimes associated with prairie dog towns (Dinsmore 2003). To identify suitable habitat, past mountain plover sightings on Navajo Mine were mapped using the aforementioned criteria. Additionally, the vegetation characteristics where mountain plover were historically sighted were reviewed. Subsequently, suitable habitat was identified using GIS and included sands and thinbreaks vegetation communities with a slope less than 5 percent (Dinsmore 2003). Additionally, historic prairie dog towns and previous mountain plover sightings were surveyed (Figure 4, Appendix A).

Three mountain plover surveys were conducted following methodology recommended by the USFWS (USFWS 2002). The USFWS guidelines recommend three surveys between May 1 and June 15. The surveys were conducted on May 31 and June 13 and 20, 2012. The first and second surveys were spaced 14 days apart, while the last survey was spaced seven days apart to target the best detection period. Surveys were conducted between local sunrise and 11:00 am. Biologists utilized existing roads, stopping at 0.2- to 0.3-mile intervals to scan the landscape for mountain plovers for three minutes with high-

powered binoculars. The biologists would exit and stand next to the vehicle while scanning the landscape to avoid alerting birds to human presence. During each survey stop, a recording of a mountain plover whistle call, display call, and anxiety call was played in multiple directions, followed by additional scanning and listening. Pedestrian surveys are not generally recommended because plovers usually flush at greater distances when approached on foot; therefore, surveys were conducted along roads and suitable habitat observable from roads. Driving routes and mountain plover stops were recorded using a handheld GPS unit.

3.2.2.2 Results

Ecosphere mapped approximately 1,621 acres of potential habitat for mountain plover within the permit area based on the amount of sands and thinbreaks vegetation communities with a slope less than five percent (Figure 6, Appendix A). Surveys were conducted along 14 miles of roads scanning all suitable habitat. No mountain plovers or nests were identified in the permit area or the 1-mile survey buffer in 2012.Two mountain plover adults and one active nest containing two recently hatched chicks and two un-hatched eggs were observed in Area 5 on May 31, 2012 (Photographs 6 and 7, Appendix C). The nest was encountered while walking towards historic mountain plover sightings, but located outside the Pinabete permit area three miles south. When this site was revisited during the second and third surveys, no mountain plovers were detected; only small egg shell fragments remained in the nest scrape.

During colony mapping surveys on August 31, 2012, a possible mountain plover call was heard in prairie dog colony 2. No individual mountain plovers were visualized and no mountain plover surveys were conducted in the colony in 2012 since it is located outside the permit area and 1-mile buffer.

Suitable breeding habitat for mountain plovers improves while traveling south, through the mine Lease and is best in Area 4 South and Area 5, outside of the permit area. Past mountain plover sightings were concentrated in Area 4 South and 5. Pedestrian surveys are not effective for detecting plovers; therefore, only areas observable from roads were surveyed in 2012. Plovers are rarely detected at their initial locations because the birds actively avoid detection by humans (Dreitz 2006). Plovers do not avoid vehicles, but vehicles cannot be driven off-road on the mine Lease. Thus, sampling was confined to roads and surrounding habitats.

Mountain plovers are considered a low-density bird species; that is, they occur in low-densities across expansive landscapes, making detectability variable (Dreitz 2006). Detection probability for mountain plovers increases when multiple visits are conducted, but plovers are not always detectable; therefore, false negative survey results are common without an extensive survey effort extended multiple times during the breeding season and for multiple consecutive seasons.

The active mountain plover nest was the first positive confirmation of plover breeding on the mine lease. The discovery of the mountain plover nest, especially while birds were hatching, was remarkable because mountain plovers are difficult to detect and nests are rarely found — chicks typically leave the nest within three hours of the last egg hatching (Knopf 2006).

3.2.3 Burrowing Owls

3.2.3.1 Methods

Occupied burrowing owl burrows were recorded during prairie dog mapping efforts at the end of August and early September, 2012. All burrows encountered were checked for fresh burrowing owl sign including feathers, whitewash, or regurgitated pellets containing hair, bone, or insect parts. Burrowing owls often aggregate their burrows in clusters spaced 340 to 410 feet apart. Burrowing owl families often switch burrows every 10 to 15 days when the young are three to four weeks old and remain as a loose-knit group until early fall when the young may begin to disperse to nearby burrows. Burrowing owls may use "satellite" or non-nesting burrows, moving chicks at 10 to 15 days presumably to reduce risk of predation and possibly avoiding nest parasites (Klute et. al 2003). Therefore, burrows greater than 400 feet apart were considered separate nest groups.

Biologists documented burrowing owl individuals or sign encountered during the plant, habitat mapping and the mountain plover surveys conducted at the mine property in 2012. Mountain plover surveys entailed stopping every several hundred feet in potential habitat and scanning the area with binoculars and a spotting scope for birds. Thus, areas surveyed for mountain plover were also scanned for burrowing owls.

3.2.3.2 Results

Ecosphere conducted raptor surveys in the spring, when migratory burrowing owls had not yet arrived on their breeding grounds. Subsequently, burrowing owl activity was documented during prairie dog town mapping surveys in August and September 2012 and mountain plover surveys in May and June 2012 (Figure 5, Appendix A). Evidence of burrowing owl activity was documented in prairie dog town 2 and 3 (based on an inter-group distance of 400 feet), town 2 contained two separate burrowing owl groups, and town 3 contained three separate groups — for a total of five burrowing owl locations in Areas 4 South and 5.

3.2.4 Ferruginous Hawk, Golden Eagle & Other Raptors

3.2.4.1 Methods

On April 20, 2012, Ecosphere conducted an aerial survey of historic raptor nests and of ferruginous hawk (*Buteo regalis*) territories over the entire BNCC mine lease and a 1-mile boundary. The aerial survey also searched for new raptor nests. Ecosphere biologists surveyed the majority of suitable potential raptor habitat in one day (i.e., badlands, mesa tops, and rim edges). Historically, biologists have focused efforts on ferruginous hawks because they are listed on the Navajo Nation Endangered Species List as a Group 3 species, which is a species or subspecies likely to become endangered within the foreseeable future throughout all or a significant portion of its range on the Navajo Nation.

Follow-up pedestrian surveys were conducted to active nests identified during the aerial survey in late May to June 2012. Ecosphere biologists used high-powered binoculars, spotting scopes, and hand-held GPS units to locate and record raptor nest locations and determine the status of the nests. To avoid

disturbing the adults and young, Ecosphere biologists used existing two-track roads to access known nest locations and walked to vantage points at a distance (≥ 250 meters) from the nests. Ecosphere used a spotting scope to survey the nests from a distance and photographed each nest when possible.

In general, biologists considered raptor nests active if one or more of the following scenarios were observed:

- Egg(s) in nest
- Young in nest
- Adult in the incubating posture on the nest

In some instances, Ecosphere could not confirm active breeding status of a raptor nest, but considered the site to be an occupied territory. Ecosphere considered a location an occupied territory if adults were in or near the nest, exhibiting territorial behavior, or seen on more than one occasion in the same area during the breeding season. For raptor nests determined to be active during the aerial flight, Ecosphere attempted to follow up with additional surveys to document nestling presence and fledging success.

In general, Ecosphere followed survey methods outlined in Fuller and Mosher (1987) to avoid disturbing sensitive nesting raptors, including:

- Making observations from a distance using binoculars and spotting scopes
- Approaching nests indirectly to avoid direct disturbance
- Limiting the time spent near active nests
- Determining inactivity before approaching a nest to get a GPS location
- Avoiding visiting nests in inclement weather

3.2.4.2 Results

Ecosphere observed two active raptor nests within the Pinabete permit area during the aerial survey — one belonging to a golden eagle (*Aquila chrysaetos*) and the other to a red-tailed hawk (*Buteo jamaicensis*). An adult golden eagle was seen incubating on a west-facing cliff during the aerial survey and at least one nestling was visible in the nest. Ecosphere did not conduct a follow-up ground survey to this nest because it is more than one mile southwest of Area 4 North. Ecosphere also determined it was likely difficult to observe the contents of the nest from the ground and dangerous to observe from the cliff edge.

The red-tailed hawk nest was re-visited twice. The nest contained three white downy nestlings on May 31 and the chicks were darker in color and branching by the second visit on June 13.

During the aerial surveys, a pair of American kestrel (*Falco sparverius*) flushed in Area 4 North. Flushing a pair of raptors in nesting habitat is a good indicator of an active territory. However, no nest was located for this species. Kestrels nest in cavities in trees or rock/cliff faces and, due to their small size

and lack of obvious stick nests, it is often difficult to locate the actual nest. Further, this possible nest was located outside the permit area.

Three, historic ferruginous hawk territories occur in proximity to the Pinabete permit area—Territories 13, 15, and 16. The nests in Territory 13 are either old, flat, or fallen; Territory 15 was active in 2011; and Territory 16 has not been active since 1999 (Ecosphere 2009; Figure 5, Appendix A,). During the aerial survey or the other grounds surveys, no active nest was observed in any of these territories or in any other area within the one-mile buffer of the permit area.

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Appendix A. Figures

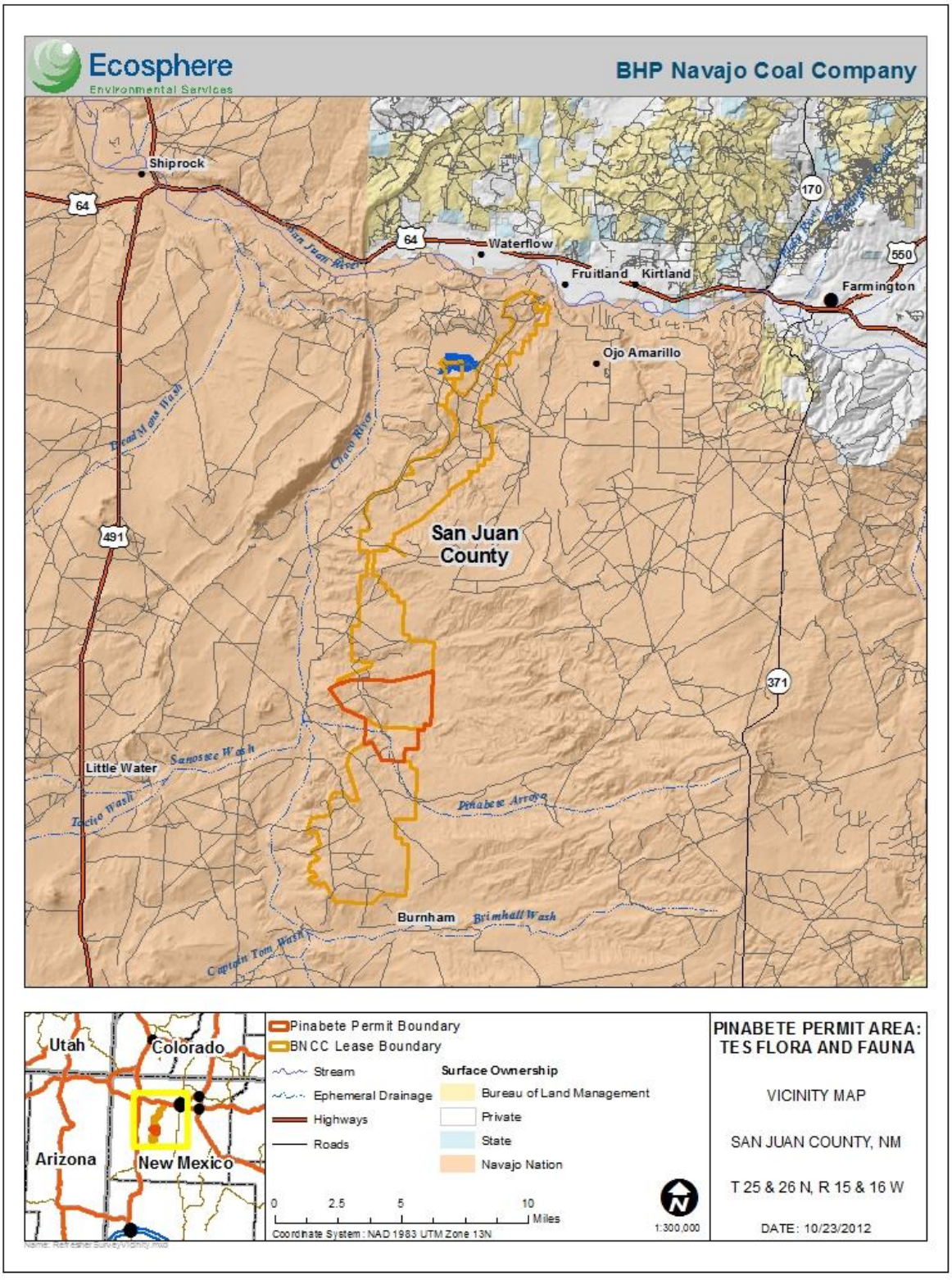


Figure 1. The vicinity of the Pinabete permit area

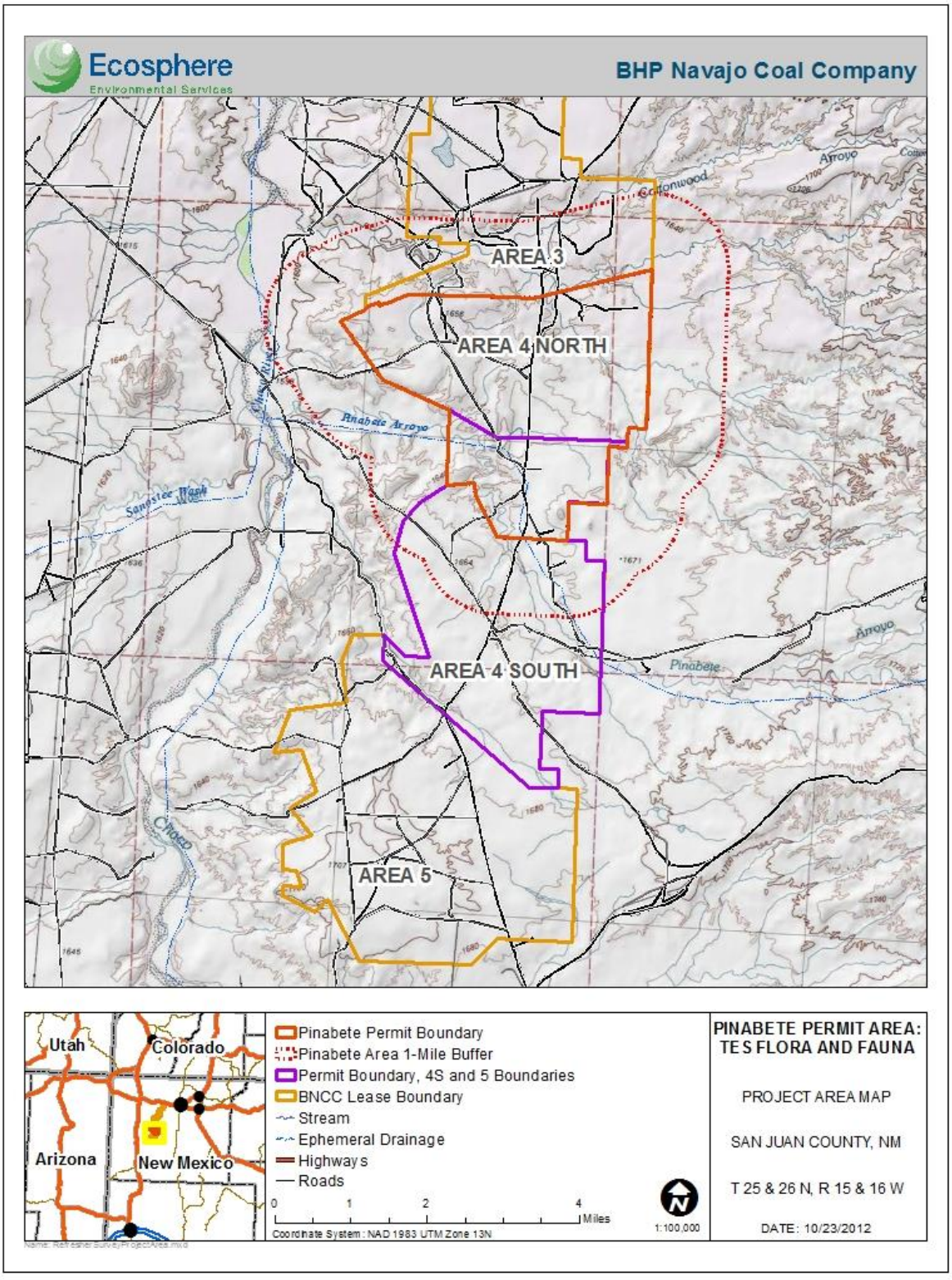


Figure 2: The Pinabete permit area

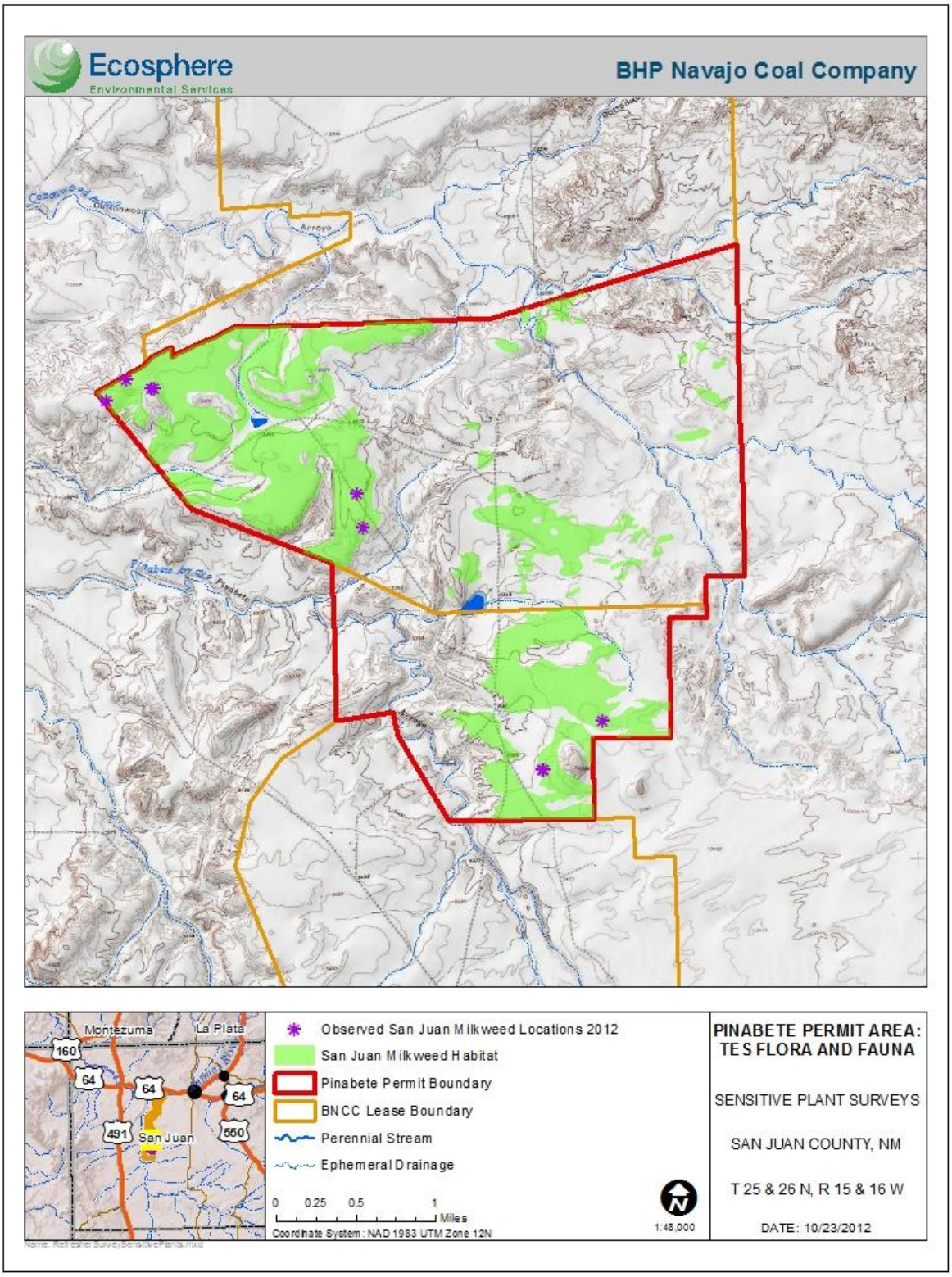


Figure 3: San Juan milkweed habitat and locations

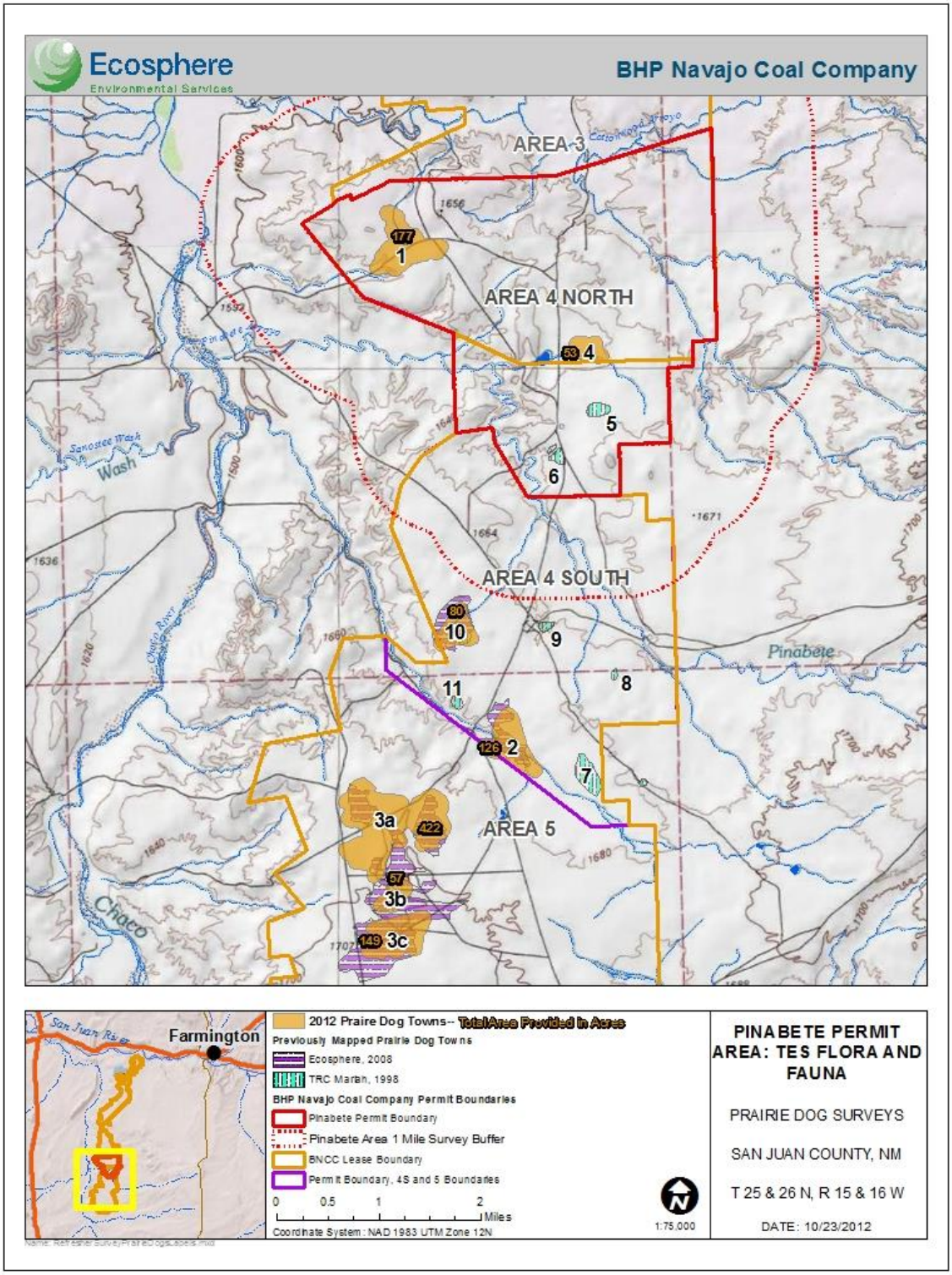


Figure 4: Size and location of mapped prairie dog towns and survey areas for nocturnal black-footed ferret surveys

CONFIDENTIAL

Figure 5: Raptor sightings and nest locations

CONFIDENTIAL

Figure 6: Potential mountain plover habitat, sightings, and nests

Appendix B: Black-footed Ferret Survey Forms

210 miles
Trimble

Black-Footed Ferret Suvey Form
Nocturnal (Nightime) Survey

Date of Survey	9/24-9/25	Species of Prairie Dog	Gunnison's P Dog
Company	Ecosphere		
Name of Surveyer	Aimee Way / Mike Vivalda		
Location of Survey	Navajo Mine Area IV N, IV S + V		
Weather Temperature	65 (begin) 54 (stop)	Wind Speed	10-20 begin 5mph end
Cloud Cover	80% 10% end		
Begin Survey	19:47 pm ~~05:30~~	End Survey	05:30 am
Total Man/Hours	9.75 x 2 people		

General Comments
(possible ferret sign encountered, tracks observed, unidentified green eyeshine observed, etc)

P Dog colony 1. looped once
P Dog Colony 2 + 3 Looped 3 times each

Eye shine observed: 2 B tailed jackrabbit, 3 Cottontail, 2 mice, 1 kang. rat ? 1 p dog or 1 ground squirrel, spiders, several birds (possibly horned lark). No BFF observed.

Survey Form 1: First of three consecutive nocturnal surveys for black-footed ferret

Black-Footed Ferret Suvey Form
Nocturnal (Nightime) Survey

Date of Survey: 25 Sept 2012 | Species of Prairie Dog: Cynomys gunnisoni

Company: Ecosphere

Name of Surveyer: JZ, MV

Location of Survey: Navajo Mine

Weather Temperature: 63°F - | Wind Speed: calm → windy

Cloud Cover: cloudy, drizzle beginning 2245 hrs

Begin Survey: ~2030 | End Survey: 0200 hrs (started raining)

Total Biologist/Hrs: 5.5 x 2

Observations: General Comments
(possible ferret sign, tracks, unidentified green eyeshine, other eyeshine, individuals, etc.)

black-tailed jackrabbit 11
cottontail 1
FEHA (spotlighted) NAD 83 12S 0722313 4032197
mouse 1
GHOW (west side of pond) @ 45 + 5 boundary NAD 83 12S 0722061 4034462
Ord's kangaroo rat 11
cottontail roadkill
salamander 1 (photo)

Survey Form 2: Second of three consecutive nocturnal surveys for black-footed ferret

Black-Footed Ferret Suvey Form
Nocturnal (Nightime) Survey

Date of Survey	9/26/12	Species of Prairie Dog	Gunnisons
Company	Ecosphere		
Name of Surveyer	MV, JD		
Location of Survey	BNCC		
Weather Temperature	60°	Wind Speed	4-7mph
Cloud Cover	10 %		
Begin Survey	8:00	End Survey	2:30
Total Biologist/Hrs	6½ hrs x 2		

Observations: General Comments
(possible ferret sign, tracks, unidentified green eyeshine, other eyeshine, individuals, etc.)

Cottontail III
Black-tail jackrabbit I
Burrowing owl I 0720776 4033157

Survey Form 3: Third of three consecutive nocturnal surveys for black-footed ferret

Appendix C: Photo Gallery



Photograph 1: Prairie Dog Colony 1 looking east; unoccupied colony.



Photograph 2: Prairie Dog Colony 2-active colony in Area 4 South and 4 North.



Photograph 3: Active burrowing owl burrow-whitewash, pellets, and feathers, located in Prairie Dog Colony 2.



Photograph 4: Potential mountain plover habitat in Area 4 South.



Photograph 5: Potential mountain plover habitat in Area 4 South.



Photograph 6: Active mountain plover nest in Area 5, overview.



Photograph 7: Active mountain plover nest in Area 5, zoomed, showing two hatched chicks and two un-hatched eggs.



Photograph 8: Red-tailed hawk nest with three young located along Pinabete Arroyo within the Pinabete permit area.

Appendix 15.E

Threatened and Endangered Species Survey
No Name Permit Project

Threatened and Endangered Species Surveys

No Name Permit Project

Prepared for
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PO Box 3767
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September 2025

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Threatened and Endangered Species Survey

No Name Permit Project

September 2025

Contents

1 Introduction 1
2 Project Area 1
2.1 Location 1
2.2 Physical Description 1
2.3 Vegetation 1
2.3.1 Dunes 2
2.3.2 Sands 2
2.3.3 Arroyo Shrub 2
2.3.4 Alkali Wash 2
2.3.5 Thin Breaks 2
2.3.6 Badlands 2
3 Methods 3
3.1 Pre-Field Surveys 3
3.2 Designated or Proposed Critical Habitat 5
3.3 Wildlife Areas 5
3.3.1 Area 2 – Moderate Sensitive Areas 5
3.3.2 Area 3 – Less-Sensitive Areas 5
3.4 Species-Specific Field Surveys 5
3.4.1 Burrowing Owl 5
3.4.2 Ferruginous Hawk and Golden Eagle 6
3.4.3 Kit Fox 6
3.4.4 Mesa Verde Cactus 6
3.4.5 Mountain Plover 6
3.4.6 Prairie Dog Colonies 6
3.4.7 San Juan Milkweed 7
4 Results 7
4.1.1 Burrowing Owl 7

4.1.2 Ferruginous Hawk and Golden Eagle 8
4.1.3 Kit Fox 8
4.1.4 Mesa Verde Cactus 8
4.1.5 Mountain Plover 9
4.1.6 Prairie Dog Colonies 9
4.1.7 San Juan Milkweed 9
5 Conclusions and Recommendations 10
6 References 11

Tables

Table 3-1. Special Status Species Eliminated from Further Consideration 3
Table 4-1. Prairie Dog Colonies Mapped in the No Name Permit Area 9

Maps

Map 1. No Name Permit Area Vicinity
Map 2. No Name Permit Area

Appendices

Appendix A Maps
Appendix B Species Lists

Abbreviations

BARR	Barr Engineering Co.
CFR	Code of Federal Regulations
GPS	global positioning system
NNC	Navajo Nation Code
NNDFW	Navajo Nation Department of Fish and Wildlife
NNHP	Navajo Nation Heritage Program
NTEC	Navajo Transitional Energy Company
OSMRE	Office of Surface Mining Reclamation and Enforcement
PAP	permit application package
SMCRA	Surface Mining Control and Reclamation Act of 1977
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1 Introduction

Navajo Transitional Energy Company (NTEC) is preparing a permit application package (PAP) for submittal to the Office of Surface Mining Reclamation and Enforcement (OSMRE) to extend its Navajo Mine mining permit on the Navajo Nation in San Juan County, New Mexico. NTEC contracted Barr Engineering Co. (Barr) to survey for threatened and endangered species and update the 2008 surveys. The No Name permit boundary is within Navajo Mine Areas 4 South and 5 of the existing lease. The purpose of the surveys was to adhere to the Endangered Species Act of 1973, as amended (16 United States Code 1531 et seq.), the Navajo Nation code requirement for species of concern (17 NNC 507) administered by the Navajo Natural Heritage Program (NNHP) of the Navajo Nation Department of Fish and Wildlife (NNDFW), and the Surface Mining Control and Reclamation Act of 1977 (SMCRA) (30 Code of Federal Regulations 780.16).

This report outlines the data collection and methodologies implemented for inventorying the permit area and the survey results. The methodologies are consistent with U.S. Fish and Wildlife Service (USFWS) and NNDFW guidelines and requirements. This report updates the 2008 *Threatened and Endangered Species Survey, Navajo Mine Extension Project* (Ecosphere 2008).

2 Project Area

2.1 Location

The No Name permit area (Areas 4 South and 5) is approximately 25 miles southwest of Farmington, New Mexico (Appendix A, Map 1). The No Name permit area encompasses approximately 11,526 acres in Area 4 South and 5. It is found on the Newcomb NE, and the Pillar NW, New Mexico 7.5-minute U.S. Geological Survey (USGS) quadrangles (Appendix A, Map 2).

2.2 Physical Description

The project area is located within the Colorado Plateau province, on the west edge of the San Juan Basin. Topography in the area includes flats and tablelands with moderate to considerable relief associated with incised washes and canyons. The project area is within the Chaco Wash watershed, which has shallow soils, steep hills, and rock outcrops. Although Pinabete and No Name arroyos intersect this area, the drainages are dry much of the summer. The only standing surface water present within the boundaries of the project area is found in several stock ponds scattered throughout the project area. Most precipitation in the area occurs from July through October in localized, short-duration, high-intensity thunderstorms.

2.3 Vegetation

The project area comprises Great Basin desert-scrub habitat (Dick-Peddie 1993). Great Basin desert-scrub habitat is a cold desert ecosystem dominated by various shrubs with a sparse understory of forbs and grasses, with bare ground dominating in poor, alkaline soils (Fitzgerald et al. 1994; Dick-Peddie 1993). Many of the more than 160 plant species identified in this area are present in two or more plant communities (Ecosphere 2004a, 2004b, 2008). Each vegetation community type contains a few distinguishing or unique plant species. These six vegetation communities are briefly described below.

2.3.1 Dunes

The deep sands in this community allow for more consistent water availability. Since only deep-rooted perennial plants can exploit this deep water, the dunes have several unique plant species, including San Juan milkweed (*Asclepias sanjuanensis*). Other common species include cryptantha (*Cryptantha crassisepala*), tansy mustard (*Descurania pinnata*), twinpod (*Dimorphocarpa wislizeni*), globemallow (*Sphaeralcea parvifolia*), Indian ricegrass (*Achnatherum hymenoides*), galleta grass (*Pleuraphis jamesii*), and evening primrose (*Oenothera pallida*).

2.3.2 Sands

As with Dunes, the deeper penetration of rainwater into sandy soil allows for greater water availability and increases plant species diversity. The types of sand in this community can vary from saline to calcareous. The Sands habitat often transitions to and can be mixed with Thin Breaks habitat. In years with high spring rainfall, sandy soils display an abundance of annuals, especially of scorpion weed (*Phacelia crenulata*), annual Townsend daisy (*Townsendia annua*), and cryptantha. Other common species include Russian thistle (*Salsola tragus*), pincushion (*Chaenactis stevioides*), galleta grass, and wire lettuce (*Stephanomeria exigua*).

2.3.3 Arroyo Shrub

Arroyo Shrub habitat is commonly found in major drainages and washes, such as Pinabete and No Name arroyos. Shrubs and perennials characteristic of this habitat include greasewood (*Sarcobatus vermiculatus*), Russian thistle, tansy mustard, alkali sacaton (*Sporobolus airoides*), four-winged saltbush (*Atriplex canescens*), cryptantha, and snakeweed (*Gutierrezia sarothrae)*.

2.3.4 Alkali Wash

Alkali Wash is associated with minor waterways. These areas are typically broad and level with occasional small, dense patches of galleta grass and alkali sacaton. Alkali Wash is typically located in and along washes and drainages, as well as at the base of the Badlands. Terrain is nearly level to moderately sloping, ranging from 0 to 3 percent. Other plants that are common in Alkali Wash include tansy mustard, Russian thistle, scorpion weed, mound saltbush *(Atriplex obovata*), woolly plantain (*Plantago patagonica),* and annual Townsend daisy*.*

2.3.5 Thin Breaks

Thin Breaks is characteristic of rocky areas with loose rock, occasionally with large pieces of rock, usually shale, that are firmly embedded in the ground. Thin Breaks are typically upland habitats with surface rock as a unifying feature. Flat, surface rocks allow more water to run off and accumulate in crevices or fissures between rocks. Thin Breaks plant species found in these fissures include Russian thistle, tansy mustard, cryptantha, shadscale (*Atriplex confertifolia*), alkali sacaton, stickseed (*Lappula occidentalis*), dwarf gilia (*Ipomopsis pumila*), and scorpion weed.

2.3.6 Badlands

Badlands have the least vegetation of any habitat type in the project area. Among the more common plants along the small relief channels of these barren areas are Powell's saltbush (*Atriplex powelli* var. *powelli*), mound saltbush, annual Townsend daisy, stickseed, woolly plantain, salty buckwheat

(*Stenogonum salsuginosum*), Gordon's buckwheat (*Eriogonum gordonii*), scorpion weed, and globemallow.

3 Methods

3.1 Pre-Field Surveys

Barr biologists compiled an updated list of USFWS- and NNHP-listed species that occur or have the potential to occur in or near the project area. We obtained data from the Information for Planning and Consultation system and through consultation with the NNHP. According to USFWS, five threatened and endangered species and two proposed species have the potential to occur in the project area.

Navajo Natural Heritage Program species of concern include protected, candidate, and other rare or otherwise sensitive species. The species listed by the NNHP are mapped quadrangle-specific rather than project-site specific. The potential for species occurrence was determined on quadrangle-wide coarse habitat characteristics and species information provided by NNHP. Group 1 species are those species or subspecies that no longer occur in the Navajo Nation. Group 2 species are considered endangered, or a species or subspecies whose prospects of survival or recruitment on the Navajo Nation are in jeopardy. Group 3 represents a species whose prospects of survival or recruitment will likely be in jeopardy in the foreseeable future. Group 4 species are those for which the NNDFW does not currently have sufficient information to support being listed as Group 2 or Group 3, but has reason to consider them. The NNHP currently has six records of species occurring within 1 mile to 3 miles of the permit area and lists four species with the potential to occur in the area encompassed by the Newcomb NE and The Pillar NW, New Mexico, 7.5-minute quadrangle maps (Appendix B).

Table 3-1 presents species currently identified by the agencies that do not have the potential to occur in the project area. These species are eliminated from further consideration. The USFWS and NNHP species lists are in Appendix B.

Table 3-1. Special Status Species Eliminated from Further Consideration

Species	Status	Habitat Associations	Rationale for Elimination
Mammals			
Black-foot ferret (*Mustela nigripes*)	Federal E Group 1	Occupies medium to large prairie dog towns greater than 8 hectares in size with 20 or more burrows per hectare.	This species is unlikely to occur in the permit area since it is well outside the population's current distribution. The permit area lacks sufficient prairie dog burrows to support this species.
Banner-tailed kangaroo rat (*Dipodomys spectabilis*)	Group 4	Great Basin desert grassland or desert scrub with heavier soils.	The Group 4 status for this species applies only to the populations in Arizona (NNHP 2020).

Species	Status	Habitat Associations	Rationale for Elimination
Birds			
Southwestern willow flycatcher (*Empidonax traillii extimus*)	Federally Endangered, Group 2	Occurs in dense riparian habitats along streams, rivers, and other wetlands. Habitat types for this species include native broadleaf riparian, monotypic exotic, and mixed exotic/native broadleaf. It prefers very dense mid-story riparian vegetation stands at least 30 feet wide.	No riparian habitats in the permit area.
Yellow-billed cuckoo (*Coccyzus americanus*)	Federally Threatened, Group 2	Breeds in riparian woodlands with developed canopies and dense understory vegetation, greater than 12.3 acres in size.	No riparian woodlands in the permit area.
Fish			
Colorado pikeminnow (*Ptychocheilus lucius*)	Federally Endangered, Group 2	Occurs in large rivers with strong currents, deep pools, and quiet backwaters.	No rivers occur in the permit area.
Razorback sucker (*Xyrauchen texanus*)	Federally Endangered, Group 2	Occurs in medium to large rivers with silty to rocky substrates. Prefers strong currents and deep pools.	No rivers occur in the permit area.
Insects			
Monarch butterfly (*Danaus plexippus*)	Proposed Threatened	Occurs throughout New Mexico during the warm season but is most abundant in southeast New Mexico. For reproduction, it exploits large milkweed populations during summer. Habitat is generally mesic or wet areas supporting milkweed or other nectar species.	No large areas of milkweed or nectar species in the permit area. No mesic or wet areas in the permit area.
Suckley's cuckoo bumble bee (*Bombus suckleyi*)	Proposed Endangered	A generalist nectar forager with meadows, grasslands, and developed areas providing important foraging habitat.	No abundant nectar resources in the permit area. This species has not been recorded as occurring in New Mexico.

Biologists reviewed available aerial imagery, species accounts, previous surveys, and geographic information system (GIS) data to determine the potential for occurrence of USFWS and NNHP-listed species within the proposed No Name permit area.

3.2 Designated or Proposed Critical Habitat

No designated or proposed critical habitats for federally listed species are within the permit area. Using geographic information system software, a search of designated critical habitats near the project area was performed. The nearest designated critical habitat for the Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*) is approximately 18 miles north of the proposed action.

3.3 Wildlife Areas

The NNDFW is responsible for managing and protecting the Navajo Nation's fish, wildlife, plants, and their habitats and has established wildlife habitat, sensitive areas, and associated Biological Resource Land Use Clearance Policies and Procedures. There are six wildlife area classifications mapped on the Navajo Nation. The project area occurs in an area designated as Area 2 – Moderately Sensitive Area and Area 3 – Less Sensitive Area.

3.3.1 Area 2 – Moderate Sensitive Areas

Moderate sensitive areas are those with a high concentration of rare, endangered, sensitive, and game species occurrences, or areas with a high potential for these species to occur throughout the landscape. The purpose of Area 2 is to minimize impacts to these species and their habitats and to ensure that the habitats in Area 1 do not become fragmented.

Development in Area 2 is required to be placed to avoid Navajo Endangered Species List (NESL) species and their habitats. Avoidance includes an adequate buffer to address long-term and cumulative impacts and will depend on the species and the type of development.

3.3.2 Area 3 – Less-Sensitive Areas

Less Sensitive Areas contain low or fragmented concentrations of sensitive-status species. These species may occur on the landscape in “islands” of well-spaced habitat that are limited in number on the landscape. Additionally, lands considered Less Sensitive may not be surveyed entirely for potential occurrences of sensitive-status species or habitat.

3.4 Species-Specific Field Surveys

Species-specific surveys were conducted during the 2025 field season and are summarized below. Surveys were conducted in the permit area using USFWS and NNDFW species-specific guidelines and in accordance with accepted scientific standards or guidelines (NNHP 2020). Previous threatened and endangered species surveys were reviewed in the mine lease area. We evaluated the methods used and species detected (TRC Mariah 1999, Ecosphere 2008) to develop a plan for efficient and thorough survey strategies. Barr used our knowledge of the area, biological expertise, and experience with the survey methods for these target species.

3.4.1 Burrowing Owl

Burrowing owls (*Athene cunicularia*) typically use burrows made by fossorial mammals, namely prairie dogs (*Cynomys gunnisoni*), but also ground squirrels (*Sciuridae* sp.) or badgers (*Taxidea taxus*) (Henny and Blus 1981). Therefore, we conducted surveys for burrowing owls in conjunction with mapping and describing prairie dog towns within the permit area and recorded observations during other wildlife or flora surveys. We conducted surveys in pairs by walking parallel 100-foot-wide transects with high-powered

binoculars through suitable habitat. Locations of potential nest burrows or burrowing owls were digitally recorded using a handheld sub-meter global positioning system (GPS) unit.

3.4.2 Ferruginous Hawk and Golden Eagle

Barr conducted initial ground-based surveys of historic raptor nests and ferruginous hawk (*Buteo regalis*) territories on April 14, 15, 16, 17, and 18, 2025. Follow-up surveys were conducted on June 3, 5, and 6, 2025. Aerial surveys are conducted within the 1-mile mine lease buffer every 3 years per NTEC's mine permit. The last aerial flight of the project area was completed in 2024. No additional ferruginous hawk and golden eagle (*Aquila chrysaetos*) surveys beyond annual monitoring were conducted. Barr biologists used binoculars and hand-held GPS units to locate and record raptor nest locations and determine the status of those nests, if possible. Location data were recorded in North American Datum (NAD) 1983 Universal Transverse Mercator (UTM). At the request of NTEC, data are converted to NAD 27 State Plane New Mexico West using ArcGIS software after surveys are completed.

3.4.3 Kit Fox

Spotlight surveys were conducted in the permit area in 2008 (Ecosphere 2008). Barr did not conduct additional spotlight surveys for kit fox (*Vulpes macrotis*) in 2025, as the species is known to occur within and adjacent to the No Name permit area. Kit fox, or signs thereof, have been regularly observed over the last 5 years during annual summer and winter wildlife surveys conducted for Navajo Mine (Barr 2023, 2024; Ecosphere 2019, 2021, 2022a, 2022b).

3.4.4 Mesa Verde Cactus

In 2025, during annual raptor monitoring, Barr biologists identified a new population of Mesa Verde cactus (*Sclerocactus mesae-verdae*) within the 1-mile buffer of the No Name permit area. Using a desktop analysis, the potential Mesa Verde cactus habitat was identified within the permit area. Biologists ground-truthed the habitat using vehicular or pedestrian surveys. Approximately 846 acres of potential Mesa Verde cactus habitat were identified within the No Name permit boundary.

Pedestrian field surveys were conducted within the potential Mesa Verde cactus habitat on May 27, 28, 29, and 30, 2025. Before conducting fieldwork, GIS data delineating the survey area boundaries were loaded onto handheld GPS units capable of recording data to sub-meter accuracy. Surveys were conducted by qualified biologists experienced with identifying Mesa Verde cactus and suitable habitat using parallel pedestrian transects spaced 10 feet apart within identified potential habitat.

3.4.5 Mountain Plover

In 2025, surveys for the mountain plover (*Charadrius montanus*) were conducted in locations where the species was recorded in 2008 (Ecosphere 2008). Mountain plover surveys are not conducted annually within the mine lease. While the species has been recorded incidentially in the permit area, it has not been observed nesting.

3.4.6 Prairie Dog Colonies

Prairie dog colonies are surveyed annually in September within the mine lease using a systematic approach to identify functional prairie dog burrows. Functional burrows are structurally suitable to house prairie dogs—they are entirely open, are only partially filled with dirt, or are open but are blocked by sticks, weeds, cobwebs, or other debris. They can be either occupied or unoccupied. Occupied and

unoccupied burrows were included, as prairie dog towns can shift (depending on resource availability) and old towns can be recolonized over time. Non-functional burrows (i.e., burrows with an opening of less than 3 inches or those filled with dirt) were not recorded. Each colony's status (occupied or unoccupied) was documented based on visual observations such as prairie dogs seen or heard, or recent prairie dog activity (e.g., fresh digging, scat, tracks).

Previously mapped prairie dog towns were located using a handheld GPS unit. Biologists walked within and along the perimeter of each mapped prairie dog town, marking burrows using the GPS unit. If a burrow was outside the established perimeter, the biologist moved in the direction of the new burrow to determine if it was part of the established town or in a new town. If a burrow was more than 750 feet from the last known burrow, it was not considered part of the previously mapped town, and a new town was delineated. If burrows were not observed within 750 feet of the last known burrow, the biologist returned to the previous burrow location to continue the validation and re-delineation of the perimeter until the entire prairie dog town was mapped.

A 375-foot buffer around burrows (half the distance used to delineate different towns) was used to map the town's boundary using a geographic information system.

3.4.7 San Juan Milkweed

In 2008, San Juan milkweed (*Asclepias sanjuanensis*) was encountered at six widely dispersed locations in the permit area. In 2025, biologists revisited the 2008 San Juan milkweed occurrences and surveyed suitable habitat in the Dunes vegetation community. Pedestrian field surveys were conducted on June 11, 12, and 13, using parallel pedestrian transects spaced 15 feet apart. An intensive inventory of the permit area was not conducted.

4 Results

4.1.1 Burrowing Owl

No federal, state, or Navajo Nation protections exist for this species, and the Navajo Nation does not have sufficient information to support its threatened or endangered status on the NESL.

Burrowing owls are small, buff-colored owls that are typically active during the day (NNHP 2020). Burrowing owls are found throughout the western U.S (Poulin et al. 2011). This owl inhabits level, open areas in heavily grazed or low-stature desert vegetation. On the Navajo Nation, this species occurs in dry, open grasslands or desertscrub, but grassland with sparse junipers may also be used (NNHP 2020). This species does not create its burrows; consequently, suitable habitat must have available burrows. Burrowing owls use abandoned burrows of prairie dogs, kangaroo rats (*Dipodomys* sp.), badgers (*Taxidea taxus*), and foxes (*Vulpes* sp.) for nesting and escape cover (Poulin et al. 2011).

In June 2025, biologists observed one burrowing owl nest in the Badland vegetation community in the permit area. We identified several burrowing owls within a prairie dog colony in Area 5. The success of this nest was not determined.

4.1.2 Ferruginous Hawk and Golden Eagle

The golden eagle nests on steep cliffs, usually over 100 feet tall, and forages in surrounding shrublands and grasslands (NNHP 2020). Typically, this species avoids heavily forested areas. The golden eagle feeds on black-tailed jackrabbits and other small mammals (Kochert et al. 2002).

Ferruginous hawks occur year-round throughout the southwest, inhabiting dry, flat, or rolling grasslands and desert scrub. This species often prefers elevated nest sites on rock pinnacles, buttes, or short cliffs. Nests have also been documented in juniper trees, transmission line towers, and on the ground (NNHP 2020).

In 2025, Barr biologists visited three historical golden eagle nests (#986, #908, #907). All of these nests were determined to be inactive. Nest #986 was active in 2024, had one fledgling, and was determined to be successful. Nest #907 has not been active in more than 10 years. Nest #908 historically was a golden eagle nest, but more recently has been occupied by a red-tailed hawk (*Buteo jamaicensis*). Nest #908 was last active in 2017 and 2018. Golden eagles were incidentally observed twice during surveys in the No Name permit area in 2025.

4.1.3 Kit Fox

There are no federal, state, or Navajo Nation protections for this species, and the Navajo Nation does not currently have sufficient information to support its listing as threatened or endangered on the NESL.

Kit fox are distributed throughout northern Mexico, southern Idaho and Oregon, and the southwestern United States, including Arizona, Colorado, California, Utah, and New Mexico. On the Navajo Nation, kit foxes are found east of the Chuska Mountains and Chinle Valley in Arizona and Utah (NNHP 2020).

In 2008, two kit fox dens were recorded, one in the permit area and one within the 1-mile buffer. No spotlighting or kit fox species-specific surveys were conducted in 2025. The species, or signs thereof, are regularly observed in the No Name permit area. No fox dens were incidentally observed. This highly mobile species may change den sites over time.

4.1.4 Mesa Verde Cactus

The Mesa Verde cactus is a federally listed threatened species. This species has gray-green to pale green stems that are depressed-globose to oval in shape and typically produces yellowish-cream flowers from late April to early May, although extreme southern populations tend to produce pink flowers. Stems are low growing and 1.5 to 3.1 inches in diameter (Heil and Porter 1994), but large mature individuals can reach up to 7.5 inches in diameter (USFWS 2011; Roth 2020).

Mesa Verde cactus is typically found on or near clay hills associated with the Fruitland and Mancos Shale geological formations at elevations ranging from 4,900 to 5,500 feet (Heil and Porter 1994). A small portion of the habitat is near the Hogback and is characterized by highly sodic, fluvial soils containing selenite gypsum (Roth 2020). Soil surfaces within appropriate habitat can have a cover of gravel or cobbles ranging from up to 100 percent. However, appropriate Mesa Verde cactus habitat is related to the underlying clay soil and is independent of any overlying cover of cobbles or gravel (Roth 2020).

A small population of Mesa Verde cactus was recorded within the 1-mile buffer of the No Name permit area. The population contained four live cacti and one dead cactus. No other Mesa Verde cacti were recorded within the suitable habitat identified within the permit area.

4.1.5 Mountain Plover

The mountain plover breeds in flat, open grasslands and is often associated with prairie dog towns and intensive grazing (NNHP 2020). In May 2007, mountain plovers were observed during vegetation and breeding bird surveys (Ecosphere 2008). No federal, state, or Navajo Nation protections exist for this species. The Navajo Nation does not have sufficient information to support this species being listed as threatened or endangered on the NESL.

No protocol or species-specific surveys were conducted in 2025. Previous mountain plover locations from 2008 were revisited, and no mountain plovers were observed. However, surveys for mountain plovers were done in late June and July, which is late in the season for this species.

4.1.6 Prairie Dog Colonies

Five major prairie dog colonies were documented in the No Name permit area in 2008. The towns ranged in size from 75 to 317 acres and totaled 708 acres (Ecosphere 2008).

Prairie dogs (*Cynomys* sp.) serve as keystone species for sensitive raptors and other wildlife, and their towns often fluctuate in size. Because of this, prairie dog surveys and annual mapping of colonies in the Navajo Mine lease began in September 2012. The large prairie dog colonies identified in the No Name permit area in 2008 have not been surveyed since and considered dormant.

In 2025, Barr biologists revisited the historic colonies and discovered active prairie dogs. Table 4-1 lists the location and size of the prairie dog colonies recorded in 2025 in the No Name permit area. While these areas are not as large as recorded in 2008, they may reflect a resurgence in Area 5 since annual monitoring has not identified them as active.

Table 4-1. Prairie Dog Colonies Mapped in the No Name Permit Area

Location	Size (acres)
Area 5	17.4
Area 5	34.8
Area 5	24.4
Total	76.6

4.1.7 San Juan Milkweed

There are no federal, state, or Navajo Nation protections for this species, and the Navajo Nation does not currently have sufficient information to support its listing as threatened or endangered on the NESL.

The stems of this perennial milkweed grow from a woody taproot and are 4 to 8 centimeters (cm) tall. Stems are typically prostrate with leaves 2 to 4 cm long. Diagnostic characteristics of this milkweed are the white, tomentulose leaf margins and a terminal inflorescence with reddish-violet flowers. This milkweed flowers in April and has mature fruits in mid to late May. The characteristic habitat of this plant is sandy soil, sometimes occurring in piñon-juniper woodlands. In the permit area, this species occurs in the Dunes and Sands vegetation communities.

In 2025, biologists revisited San Juan milkweed locations in the No Name permit area and recorded 150 individuals in 7 populations. The surveys focused on the Dunes vegetation community, as the 2008 report identified it as suitable habitat. However, the species was also found in the Sands vegetation community. It's likely that San Juan milkweed is more widespread in the permit area, as a complete inventory was not conducted in 2025.

5 Conclusions and Recommendations

Federal and tribal special status species lists have changed since 2008. In 2025, no spotlighting, breeding bird surveys, or mountain plover surveys were conducted to update the 2008 data since existing data were deemed to be sufficient.

In 2025, Barr biologists observed burrowing owls nesting in the No Name permit area. Historic ferruginous hawk and golden eagle nests were not active. No kit fox dens were observed, but species-specific surveys were not conducted. Kit fox are known to regularly use the permit area. No mountain plovers were observed, and it has been more than 5 years since they were recorded within the overall mine lease. Prairie dog colonies previously inactive were determined to be active, though small in size.

A small Mesa Verde cactus population was recorded within the 1-mile buffer of the No Name permit area, but no individuals were identified within the permit area. San Juan milkweed tends to be widely distributed in the Dunes vegetation community and may also be found in the Sands vegetation community.

Further surveys and monitoring may be needed pending recommendations from NNHP or OSMRE. NTEC annually monitors wildlife on the entire mine lease. The results of these efforts are generally consistent with previous years, and no marked changes in species observed, total observations, or the typical size of prairie dog towns have been detected.

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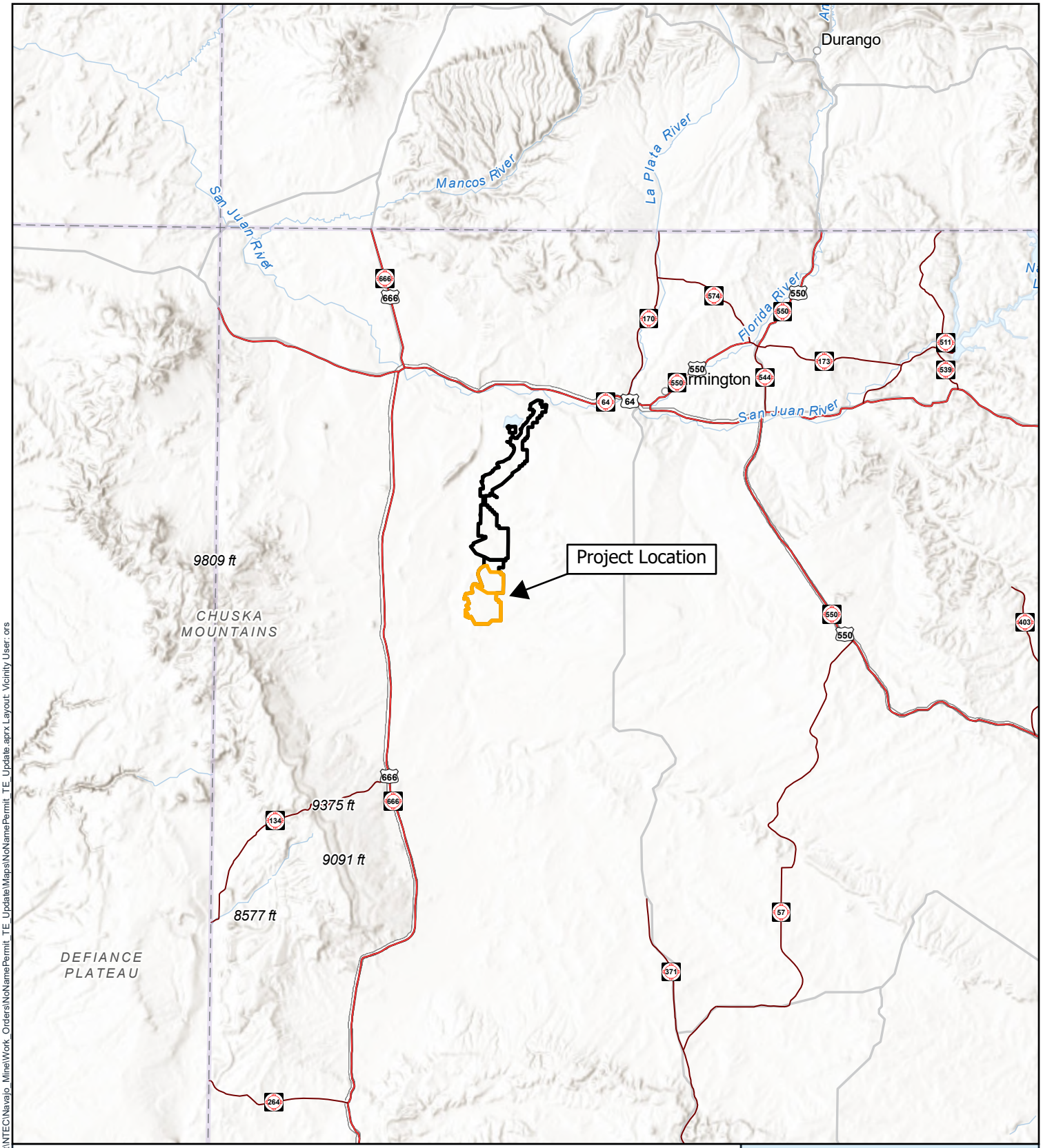
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Appendix A

Maps



No Name Permit Boundary

Navajo Mine Lease Boundary

Interstate

U.S. Highway

State Route

Miles 0 10 20

Sources: NTEC, ESRI, Barr

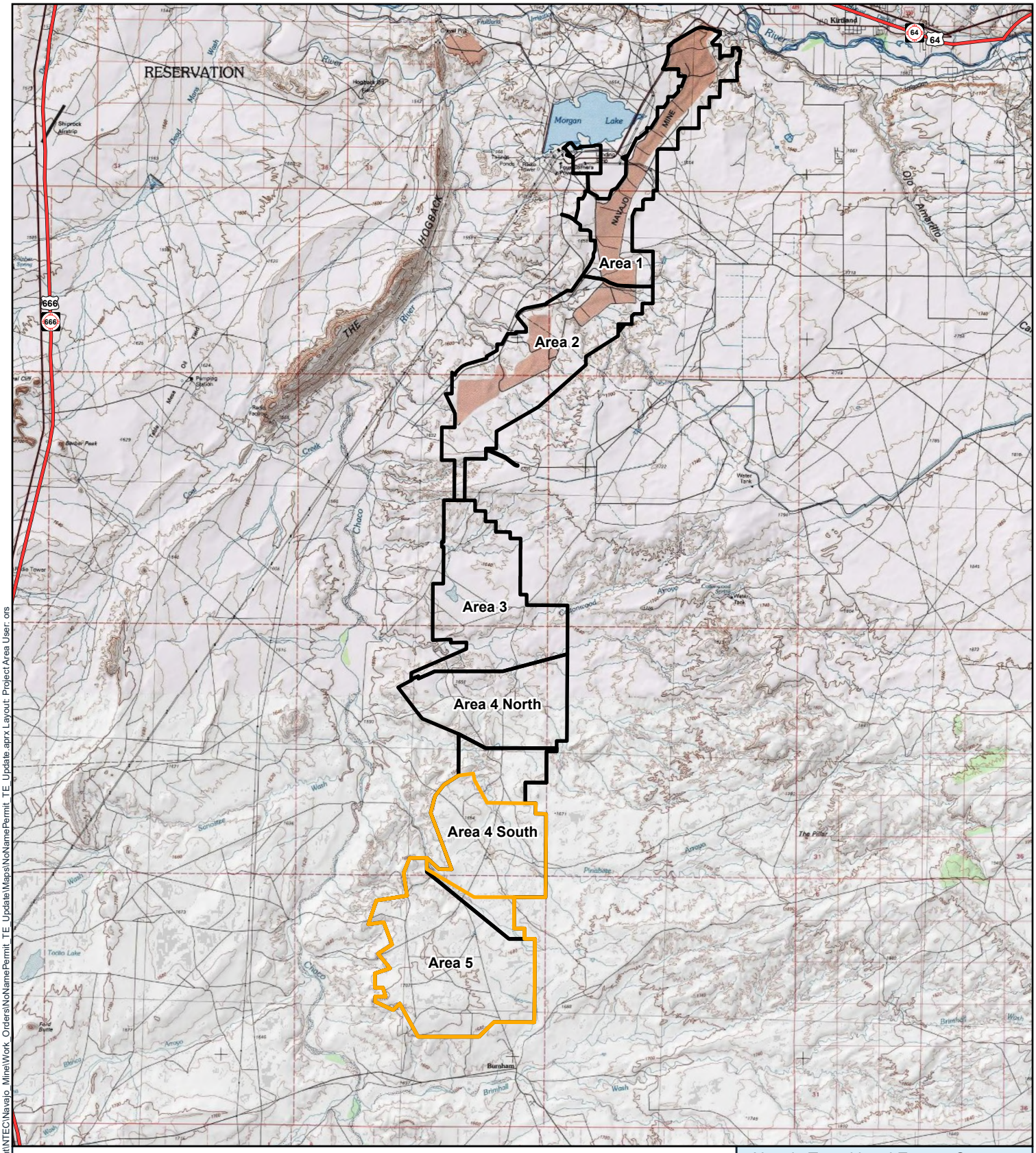
Navajo Transitional Energy Company

No Name Permit
Threatened and Endangered
Species Surveys

Vicinity

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No Name Permit Boundary

Navajo Mine Mining Areas

U.S. Highway

0 2.5 Miles

Sources: NTEC, ESRI, Barr

Navajo Transitional Energy Company

No Name Permit
Threatened and Endangered
Species Surveys

Project Area

BARR

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Appendix B

Species Lists

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna Road Ne
Albuquerque, NM 87113-1001
Phone: (505) 346-2525 Fax: (505) 346-2542

In Reply Refer To: 06/04/2025 15:07:21 UTC
Project Code: 2025-0105272
Project Name: No Name Permit Application

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Thank you for your recent request for information on federally listed species and important wildlife habitats that may occur in your project area. The U.S. Fish and Wildlife Service (Service) has responsibility for certain species of New Mexico wildlife under the Endangered Species Act (ESA) of 1973 as amended (16 USC 1531 et seq.), the Migratory Bird Treaty Act as amended (16 USC 701-715), and the Bald and Golden Eagle Protection Act as amended (16 USC 668-668(c)). We are providing the following guidance to assist you in determining which federally imperiled species may or may not occur within your project area, and to recommend some conservation measures that can be included in your project design.

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the ESA of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the ESA is to provide a means whereby threatened and endangered species and

the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the ESA and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA; 42 USC 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf.

Candidate Species and Other Sensitive Species

A list of candidate and other sensitive species in your area is also attached. Candidate species and other sensitive species are species that have no legal protection under the ESA, although we recommend that candidate and other sensitive species be included in your surveys and considered for planning purposes. The Service monitors the status of these species. If significant declines occur, these species could potentially be listed. Therefore, actions that may contribute to their decline should be avoided.

Lists of sensitive species including State-listed endangered and threatened species are compiled by New Mexico State agencies. These lists, along with species information, can be found at the following websites.

Biota Information System of New Mexico (BISON-M): www.bison-m.org

New Mexico State Forestry. The New Mexico Endangered Plant Program: https://www.emnrd.nm.gov/sfd/rare-plants/

New Mexico Rare Plant Technical Council, New Mexico Rare Plants: nmrareplants.unm.edu

Natural Heritage New Mexico, online species database: nhnm.unm.edu

WETLANDS AND FLOODPLAINS

Under Executive Orders 11988 and 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and floodplains, and preserve and enhance their natural and beneficial values. These habitats should be conserved through avoidance, or mitigated to ensure that there would be no net loss of wetlands function and value.

We encourage you to use the National Wetland Inventory (NWI) maps in conjunction with ground-truthing to identify wetlands occurring in your project area. The Service's NWI program website, www.fws.gov/wetlands/Data/Mapper.html, integrates digital map data with other resource information. We also recommend you contact the U.S. Army Corps of Engineers for permitting requirements under section 404 of the Clean Water Act if your proposed action could impact floodplains or wetlands.

MIGRATORY BIRDS

In addition to responsibilities to protect threatened and endangered species under the ESA, there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the Service (50 CFR 10.12 and 16 USC 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a Federal nexus) or a Bird/Eagle Conservation Plan (when there is no Federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds. We also recommend review of the Birds of Conservation Concern list (https://www.fws.gov/media/birds-conservation-concern-2021) to fully evaluate the effects to the birds at your site. This list identifies migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent top conservation priorities for the Service, and are potentially threatened by disturbance, habitat impacts, or other project development activities.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 thereby provides additional protection for both migratory birds and migratory bird habitat. Please visit https://www.fws.gov/partner/council-conservation-migratory-birds for information regarding the implementation of Executive Order 13186.

We suggest you contact the New Mexico Department of Game and Fish, and the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division for information regarding State protected and at-risk species fish, wildlife, and plants.

For further consultation with the Service we recommend submitting inquiries or assessments electronically to our incoming email box at nmesfo@fws.gov, where it will be more promptly routed to the appropriate biologist for review.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New Mexico Ecological Services Field Office
2105 Osuna Road Ne
Albuquerque, NM 87113-1001
(505) 346-2525

PROJECT SUMMARY

Project Code: 2025-0105272
Project Name: No Name Permit Application
Project Type: Subsurface Exploration - Coal
Project Description: Navajo Transitional Energy Company is seeking to submit a permit application package to the Office of Surface Mining Reclamation and Enforcement to permit the No Name area within their existing Navajo Mine lease. The
permit area comprises about 13,006 acres in BNCC lease Areas 4 South and 5. The No Name permit area is located about 20 miles southwest of Farmington, New Mexico and is found on the Hogback S, Newcomb NE, and The Pillar W, New Mexico 7.5-minutes U.S. Geological Survey quadrangles

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@36.42370215,-108.529660097799,14z



Counties: San Juan County, New Mexico

ENDANGERED SPECIES ACT SPECIES

There is a total of 7 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Southwestern Willow Flycatcher *Empidonax traillii extimus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

FISHES

NAME	STATUS
Colorado Pikeminnow *Ptychocheilus lucius* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Water depletions in the upper Colorado River basin adversely affect this species and its critical habitat. Effects of water depletions must be considered even outside of occupied range. Species profile: https://ecos.fws.gov/ecp/species/3531	Endangered
Razorback Sucker *Xyrauchen texanus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Water depletions in the upper Colorado River basin adversely affect this species and its critical habitat. Effects of water depletions must be considered even outside of occupied range. Species profile: https://ecos.fws.gov/ecp/species/530	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened
Suckley's Cuckoo Bumble Bee *Bombus suckleyi* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10885	Proposed Endangered

FLOWERING PLANTS

NAME	STATUS
Mesa Verde Cactus *Sclerocactus mesae-verdae* No critical habitat has been designated for this species.	Threatened

NAME STATUS

Species profile: https://ecos.fws.gov/ecp/species/6005

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Joey Herring
Address: 4801 N. Butler
City: Farmington
State: NM
Zip: 87401
Email jherring@barr.com
Phone: 5053200101

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Office of Surface Mining Reclamation and Enforcement

NNHP
Navajo Natural Heritage Program

PO BOX 1480
Window Rock, AZ 86515

P 928.871.6472 / F 928.871.7603

www.nndfw.org

25barr103
20-June-2025

Joey Herring
Barr Engineering, Co.
4801 N. Butler, Suite 15101
Farmington, NM 87401
505-320-0101
jherring@barr.com

SUBJECT: Navajo Transitional Energy Company No Name Permit Application

Joey Herring,

NNHP has performed an analysis of your project in comparison to known biological resources of the Navajo Nation and has included the findings in this letter. The letter is composed of seven parts. The sections as they appear in the letter are:

1. **Known Species** – a list of all species within relative proximity to the project
2. **Potential Species** – a list of potential species based on project proximity to respective suitable habitat
3. **Quadrangles** – an exhaustive list of quads containing the project
4. **Project Summary** – a categorized list of biological resources within relative proximity to the project grouped by individual project site(s) or quads
5. **Conditional Criteria Notes** – additional details concerning various species, habitat, etc.
6. **Personnel Contacts** – a list of employee contacts
7. **Resources** – identifies sources for further information

Known Species lists "species of concern" known to occur within proximity to the project area. Planning for avoidance of these species is expected. If no species are displayed then based upon the records of the Navajo Nation Department of Fish and Wildlife (NNDFW) there are no "species of concern" within proximity to the project. Refer to the Navajo Endangered Species List (NESL) Species Accounts for recommended avoidance measures, biology, and distribution of NESL species on the Navajo Nation (https://www.nndfw.org/nnhp/sp_account.htm).

Potential Species lists species that are potentially within proximity to the project area and need to be evaluated for presence/absence. If no species are found within the Known or Potential Species lists, the project is not expected to affect any federally listed species, nor significantly impact any tribally listed species or other species of concern. Potential for species has been determined primarily on habitat characteristics and species range information. A thorough habitat analysis, and if necessary, species specific surveys, are required to determine the potential for each species.

Species of concern include protected, candidate, and other rare or otherwise sensitive species, including certain native species and species of economic or cultural significance. For legally protected species, the following tribal and federal statuses are indicated: NESL, federal Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), and Eagle Protection Act (EPA). No legal protection is afforded species with only ESA candidate, NESL group 4 status, and species listed on the Sensitive Species List. Please be aware of these species during surveys and inform the NNDFW of observations. Reported observations of these species and documenting them in project planning and management is important for conservation and may contribute to ensuring they will not be up listed in the future.

In any and all correspondence with NNDFW or NNHP concerning this project please cite the Data Request Code associated with this document. It can be found in this report on the top right corner of every page. Additionally please cite this code in any biological evaluation documents returned to our office.

1. Known Species *(NESL=Navajo Endangered Species List, FE=Federally Endangered, FT=Federally Threatened, FC=Federal Candidate)*

Species

AQCH = Aquila chrysaetos / Golden Eagle NESL G3
ASSA = Asclepias sanjuanensis / San Juan Milkweed NESL G4
ATCU = Athene cunicularia / Burrowing Owl NESL G4
BURE = Buteo regalis / Ferruginous Hawk NESL G3
CHMO = Charadrius montanus / Mountain Plover NESL G4
DISP = Dipodomys spectabilis / Banner-tailed Kangaroo Rat NESL G4

All or parts of this project currently are within Ferruginous Hawk Guideline Areas; consult with NNDFW zoologist or EA reviewer for more information and recommendations.

2. Potential Species

Species

AQCH = Aquila chrysaetos / Golden Eagle NESL G3
ASSA = Asclepias sanjuanensis / San Juan Milkweed NESL G4
ATCU = Athene cunicularia / Burrowing Owl NESL G4
BURE = Buteo regalis / Ferruginous Hawk NESL G3
CHMO = Charadrius montanus / Mountain Plover NESL G4
EMTREX = Empidonax traillii extimus / Southwestern Willow Flycatcher NESL G2 FE
MUNI = Mustela nigripes / Black-footed Ferret NESL G1 FE
SCMEVE = Sclerocactus mesae-verdae / Mesa Verde Cactus NESL G2 FT
VUMA = Vulpes macrotis / Kit Fox NESL G4

3. Quadrangles (7.5 Minute)

Quadrangles

Newcomb NE (36108-D5) / NM
The Pillar NW (36108-D4) / NM

4. Project Summary *(EO1 Mile/EO 3 Miles=elements occuring within 1 & 3 miles., MSO=mexican spotted owl PACs, POTS=potential species, RCP=Biological Areas)*

SITE	EO1MI	EO3MI	QUAD	MSO	POTS	RCP
No Name Permit	AQCH, ASSA, ATCU, BURE, CHMO, DISP	AQCH, ASSA, ATCU, BURE, CHMO, DISP	Newcomb NE (36108-D5) / NM	None	AQCH, ASSA, ATCU, BURE, CHMO, EMTREX, MUNI, SCMEVE, VUMA	Area 2, Area 3
No Name Permit	ATCU, BURE, CHMO	ATCU, BURE, CHMO, DISP	The Pillar NW (36108-D4) / NM	None	AQCH, ASSA, ATCU, BURE, CHMO, MUNI, VUMA	Area 2, Area 3

5. Conditional Criteria Notes *(Recent revisions made please read thoroughly. For certain species, and/or circumstances, please read and comply)*

A. Biological Resource Land Use Clearance Policies and Procedures (RCP) - The purpose of the RCP is to assist the Navajo Nation government and chapters ensure compliance with federal and Navajo laws which protect, wildlife resources, including plants, and their habitat resulting in an expedited land use clearance process. After years of research and study, the NNDFW has identified and mapped wildlife habitat and sensitive areas that cover the entire Navajo Nation.
The following is a brief summary of six (6) wildlife areas:
1. **Highly Sensitive Area** – recommended no development with few exceptions.
2. **Moderately Sensitive Area** – moderate restrictions on development to avoid sensitive species/habitats.
3. **Less Sensitive Area** – fewest restrictions on development.
4. **Community Development Area** – areas in and around towns with few or no restrictions on development.
5. **Biological Preserve** – no development unless compatible with the purpose of this area.
6. **Recreation Area** – no development unless compatible with the purpose of this area.

None - outside the boundaries of the Navajo Nation
This is not intended to be a full description of the RCP please refer to the our website for additional information at https://www.nndfw.org/clup.htm.

B. Raptors – If raptors are known to occur within 1 mile of project location: Contact the NNHP zoologist at 871-7070 regarding your evaluation of potential impacts and mitigation.
Golden and Bald Eagles- If Golden or Bald Eagle are known to occur within 1 mile of the project, decision makers need to ensure that they are not in violation of the *Golden and Bald Eagle Nest Protection Regulations* found at https://www.nndfw.org/nnhp/docs_reps/gben.pdf.
Ferruginous Hawks – Refer to *Navajo Nation Department of Fish and Wildlife's Ferruginous Hawk Management Guidelines for Nest Protection* (https://www.nndfw.org/nnhp/docs_reps.htm) for relevant information on avoiding impacts to Ferruginous Hawks within 1 mile of project location.
Mexican Spotted Owl - Please refer to the *Navajo Nation Mexican Spotted Owl Management Plan* (https://www.nndfw.org/nnhp/docs_reps.htm) for relevant information on proper project planning near/within spotted owl protected activity centers and habitat.

C. Surveys – Biological surveys need to be conducted during the appropriate season to ensure they are complete and accurate please refer to NN Species Accounts https://www.nndfw.org/nnhp/sp_account.htm. Surveyors on the Navajo Nation must be permitted by the Director, NNDFW. Contact Jeff Cole at (928) 871-6450 for permitting procedures. Questions pertaining to surveys should be directed to the NNDFW the NNHP Zoologist for animals, and the NNHP Botanist for plants. Questions regarding biological evaluation should be directed to Jeff Cole at 871-6450.

D. Oil/Gas Lease Sales – Any settling or evaporation pits that could hold contaminants should be lined and covered. Covering pits, with a net or other material, will deter waterfowl and other migratory bird use. Lining pits will protect ground water quality.

E. Power line Projects – These projects need to ensure that they do not violate the regulations set forth in the *Navajo Nation Raptor Electrocution Prevention Regulations* found at https://www.nndfw.org/nnhp/docs_reps/repr.pdf.

F. Guy Wires – Does the project design include guy wires for structural support? If so, and if bird species may occur in relatively high concentrations in the project area, then guy wires should be equipped with highly visual markers to reduce the potential mortality due to bird-guy wire collisions. Examples of visual markers include aviation balls and bird flight diverters. Birds can be expected to occur in relatively high concentrations along migration routes (e.g., rivers, ridges or other distinctive linear topographic features) or where important habitat for breeding, feeding, roosting, etc. occurs. The U.S. Fish and Wildlife Service recommends marking guy wires with at least one marker per 100 meters of wire.

G. San Juan River – On 21 March 1994 (Federal Register, Vol. 59, No. 54), the U.S. Fish and Wildlife Service designated portions of the San Juan River (SJR) as critical habitat for Ptychocheilus lucius (Colorado pikeminnow) and Xyrauchen texanus (Razorback sucker). Colorado pikeminnow critical habitat includes the SJR and its 100-year floodplain from the State Route 371 Bridge in T29N, R13W, sec. 17 (New Mexico Meridian) to Neskahai Canyon in the San Juan arm of Lake Powell in T41S, R11E, sec. 26 (Salt Lake Meridian) up to the full pool elevation. Razorback sucker critical habitat includes the SJR and its 100-year floodplain from the Hogback Diversion in T29N, R16W, sec. 9 (New Mexico Meridian) to the full pool elevation at the mouth of Neskahai Canyon on the San Juan arm of Lake Powell in T41S, R11E, sec. 26 (Salt Lake Meridian). All actions carried out, funded or authorized by a federal agency which may alter the constituent elements of critical habitat must undergo section 7 consultation under the Endangered Species Act of 1973, as amended. Constituent elements are those physical and biological attributes essential to a species conservation and include, but are not limited to, water, physical habitat, and biological environment as required for each particular life stage of a species.

H. Little Colorado River - On 21 March 1994 (Federal Register, Vol. 59, No. 54) the U.S. Fish and Wildlife Service designated Critical Habitat along portions of the Colorado and Little Colorado Rivers (LCR) for Gila cypha (humpback chub). Within or adjacent to the Navajo Nation this critical habitat includes the LCR and its 100-year floodplain from river mile 8 in T32N R6E, sec. 12 (Salt and Gila River Meridian) to its confluence with the Colorado River in T32N R5E sec. 1 (S&GRM) and the Colorado River and 100-year floodplain from Nautuloid Canyon (River Mile 34) T36N R5E sec. 35 (S&GRM) to its confluence with the LCR. All actions carried out, funded or authorized by a federal agency which may alter the constituent elements of Critical Habitat must undergo section 7 consultation under the Endangered Species Act of 1973, as amended. Constituent elements are those physical and biological attributes essential to a species conservation and include, but are not limited to, water, physical habitat, and biological environment as required for each particular life stage of a species.

I. Wetlands – In Arizona and New Mexico, potential impacts to wetlands should also be evaluated. The U.S. Fish & Wildlife Service's National Wetlands Inventory (NWI) maps should be examined to determine whether areas classified as wetlands are located close enough to the project site(s) to be impacted. In cases where the maps are inconclusive (e.g., due to their small scale), field surveys must be completed. For field surveys, wetlands identification and delineation methodology contained in the "Corps of Engineers Wetlands Delineation Manual" (Technical Report Y-87-1) should be used. When wetlands are present, potential impacts must be addressed in an environmental assessment and the Army Corps of Engineers, Phoenix office, must be contacted. NWI maps are available for examination at the Navajo Natural Heritage Program (NNHP) office, or may be purchased through the U.S. Geological Survey (order forms are available through the NNHP). The NNHP has complete coverage of the Navajo Nation, excluding Utah, at 1:100,000 scale; and coverage at 1:24,000 scale in the southwestern portion of the Navajo Nation. In Utah, the U.S. Fish & Wildlife Service's National Wetlands Inventory maps are not yet available for the Utah portion of the Navajo Nation, therefore, field surveys should be completed to determine whether wetlands are located close enough to the project site(s) to be impacted. For field surveys, wetlands identification and delineation methodology contained in the "Corps of Engineers Wetlands Delineation Manual" (Technical Report Y-87-1) should be used. When wetlands are present, potential impacts must be addressed in an environmental assessment and the Army Corps of Engineers, Phoenix office, must be contacted. For more information contact the Navajo Environmental Protection Agency’s Water Quality Program.

J. Data Request – The information in this report was identified by the NNHP and NNDFW's biologists and computerized database, and is based on data available at the time of this response. It should not be regarded as the final statement on the occurrence of any species, nor should it substitute for on-site surveys. Also, because the NNDFW information is continually updated, any given information response is only wholly appropriate for its respective request.

K. Ground Water Pumping - Projects involving the ground water pumping for mining operations, agricultural projects or commercial wells (including municipal wells) will have to provide an analysis on the effects to surface water and address potential impacts on all aquatic and/or wetlands species listed below. NESL Species potentially impacted by ground water pumping: Carex specuicola (Navajo Sedge), Cirsium rydbergii (Rydberg's Thistle), Primula specuicola (Cave Primrose), Platanthera zothecina (Alcove Bog Orchid), Puccinellia parishii (Parish Alkali Grass), Zigadenus vaginatus (Alcove Death Camas), Perityle specuicola (Alcove Rock Daisy), Symphyotrichum welshii (Welsh's American-aster), Coccyzus americanus (Yellow-billed Cuckoo), Empidonax traillii extimus (Southwestern Willow Flycatcher), Rana pipiens (Northern Leopard Frog), Gila cypha (Humpback Chub), Gila robusta (Roundtail Chub), Ptychocheilus lucius (Colorado Pikeminnow), Xyrauchen texanus (Razorback Sucker), Cinclus mexicanus (American Dipper), Speyeria nokomis (Western Seep Fritillary), Aechmophorus clarkia (Clark's Grebe), Ceryle alcyon (Belted Kingfisher), Dendroica petechia (Yellow Warbler), Porzana carolina (Sora), Catostomus discobolus (Bluehead Sucker), Cottus bairdi (Mottled Sculpin), Oxyloma kanabense (Kanab Ambersnail)

6. Personnel Contacts

Wildlife Manager : Brent Powers (928) 871-7062 bpowers@nndfw.org

Zoologist : Vacant (928) 871-7070

Botanist : Shannon Lencioni slencioni@nndfw.org

Project Specialist : Kathleen Arviso (928) 871-6450 reviews@nndfw.org

GIS Supervisor : Dexter D Prall (928) 660-9169 prall@nndfw.org

7. Resources

Navajo Endangered Species List: https://www.nndfw.org/nnhp/endangered.htm

Species Accounts: https://www.nndfw.org/nnhp/sp_account.htm

Biological Investigation Permit Application: https://www.nndfw.org/nnhp/study_permit.htm

Navajo Nation Sensitive Species List: https://www.nndfw.org/nnhp/trackinglist.htm

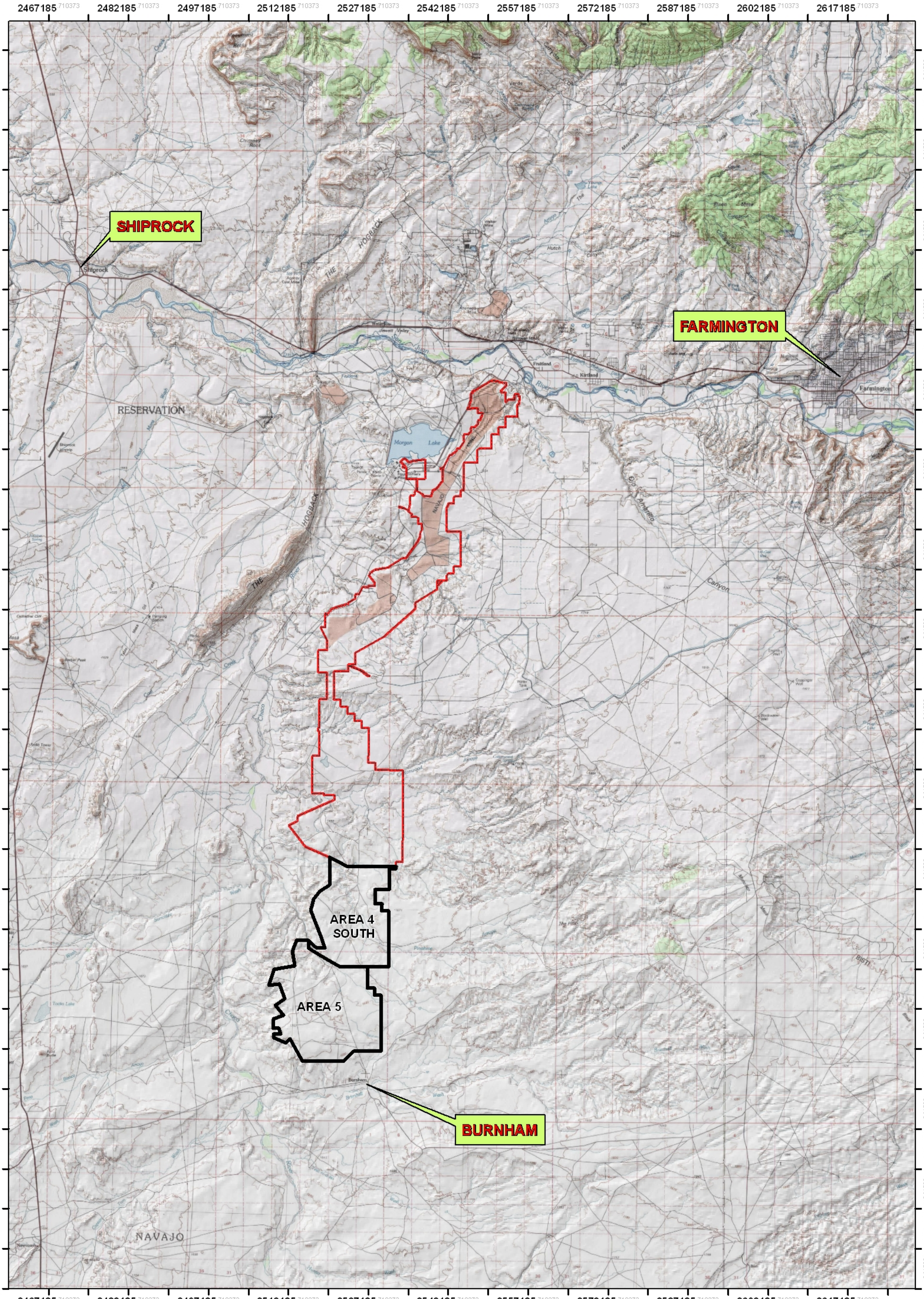
Species Management Documents and/or Reports: https://www.nndfw.org/nnhp/docs_reps.htm

Consultant List: https://www.nndfw.org/docs/bi_consult_list_2024.pdf

Dexter D Prall, GIS Supervisor - Natural Heritage Program
Navajo Nation Department of Fish and Wildlife

ATTACHMENT A

EXHIBITS



ECOSPHERE
ENVIRONMENTAL SERVICES

NAVAJO MINE EXTENSION PROJECT

BHP NAVAJO COAL COMPANY

EXHIBIT 1	AREA 4 SOUTH AND AREA 5	8/1/2008
SAN JUAN COUNTY, NEW MEXICO	NAD 83 State Plane New Mexico West (Feet)	

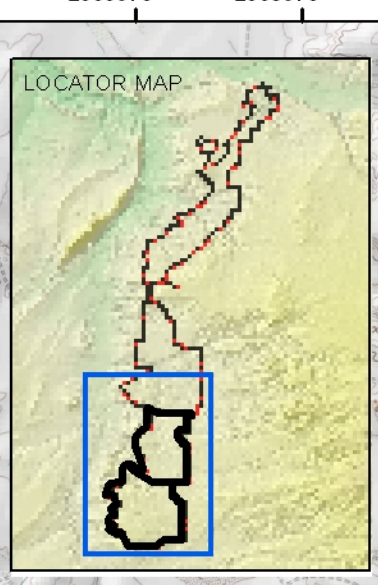
Miles
0 1.5 3 6

100K MAP SOURCE: TOPO! 4.0, 2007

1:199,168

LEGEND

- NMEP Permit Area
- BNCC Lease Boundary



AREA 4 SOUTH

Area 5

Reference Area

NAVAJO

RESERVATION

Pinabete

Arroyo

RIVER

Well

Drill Hole

Mine

2505975.041540 2508975.041540 2511975.041540 2514975.041540 2517975.041540 2520975.041540 2523975.041540 2526975.041540 2529975.041540 2532975.041540 2535975.041540

2004626.052575 2001626.052575 1998626.052575 1995626.052575 1992626.052575 1989626.052575 1986626.052575 1983626.052575 1980626.052575 1977626.052575 1974626.052575 1971626.052575 1968626.052575 1965626.052575 1962626.052575 1959626.052575 1956626.052575

NAVAJO MINE EXTENSION PROJECT

BHP NAVAJO COAL COMPANY

EXHIBIT 2 | AREA 4 SOUTH AND AREA 5 | **8/1/2008**

SAN JUAN COUNTY, NEW MEXICO

NAD 83 State Plane New Mexico West (Feet)

ECOSPHERE ENVIRONMENTAL SERVICES

Miles

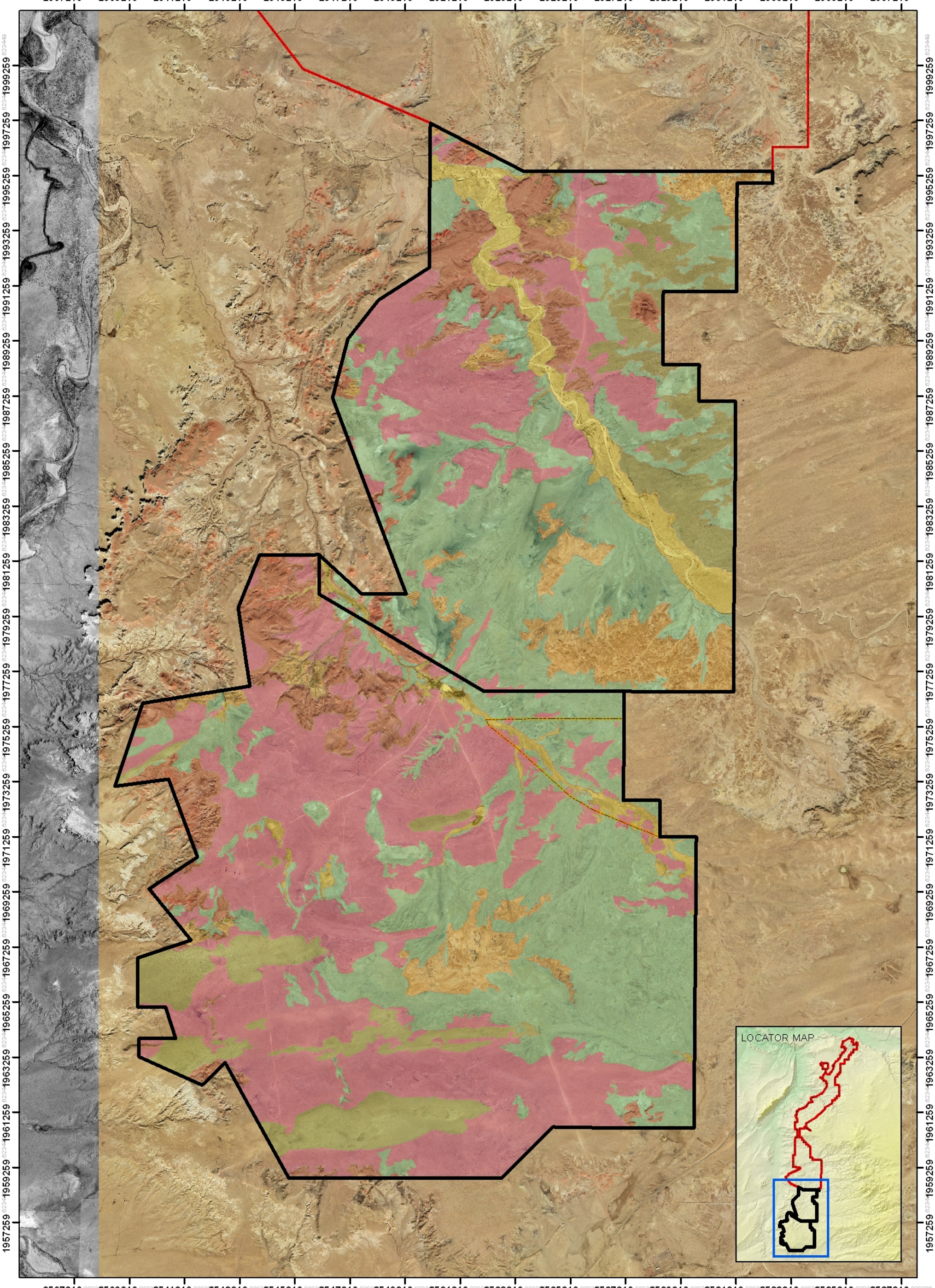
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100K MAP SOURCE: TOPO! 4.0, 2007

1:41,658

LEGEND

- NMEP Permit Area
- BNCC Lease Boundary
- Reference Area



VEGETATION COMMUNITIES

BHP NAVAJO COAL COMPANY

EXHIBIT 3	AREA 4 SOUTH AND AREA 5	8/1/2008
SAN JUAN COUNTY, NEW MEXICO	NAD 83 State Plane New Mexico West (Feet)	

ECOSPHERE
ENVIRONMENTAL SERVICES

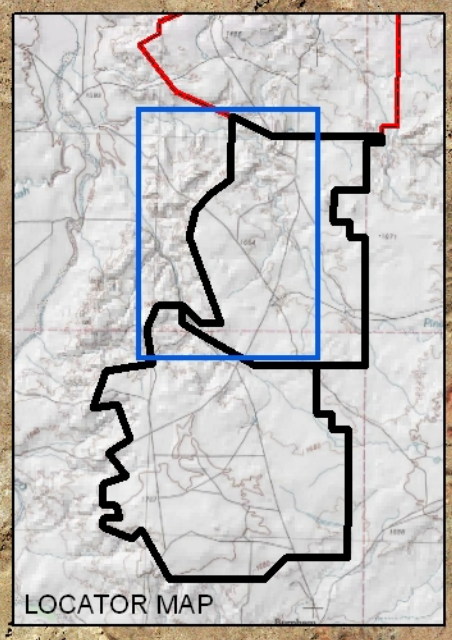
Miles
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100K MAP SOURCE: TOPO! 4.0, 2007

N
1:38,500

LEGEND

- Alkaline Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sands
- Thin Breaks
- NMEPPermitArea
- Reference Area



SA-46
AS-01
AS-03
TB-47
AS-05
TB-48
AS-07
TB-50
SA-03
AW-08
AS-09
TB-53
AS-11
SA-47
SA-05
SA-07
SA-09
SA-13
AW-14
AS-15
AS-17
AS-19
AS-21
AS-23
TB-06
TB-11
TB-55
TB-57
AW-26
AW-68
AW-69
AW-22
BA-47
SA-16
AW-30
TB-18
AW-49
BA-17
BA-19
TB-20
AS-33
AW-32
AW-79
BA-21
BA-49
BA-27

SPRING VEGETATION TRANSECTS

BHP NAVAJO COAL COMPANY

EXHIBIT 4(A) | AREA 4 SOUTH AND AREA 5 | **8/1/2008**

SAN JUAN COUNTY, NEW MEXICO

NAD 83 State Plane NM West (Feet)

ECOSPHERE ENVIRONMENTAL SERVICES

Miles
0 0.125 0.25 0.5

100K MAP SOURCE: TOPO! 4.0, 2007

1:17,161

LEGEND

- Transects
- NMEP Permit Area
- BNCC Lease Bndy
- Alkaline Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sands
- Thin Breaks

2521974.220392 2523474.220392 2524974.220392 2526474.220392 2527974.220392 2529474.220392 2530974.220392 2532474.220392 2533974.220392

1997141.600094 1995641.600094 1994141.600094 1992641.600094 1991141.600094 1989641.600094 1988141.600094 1986641.600094 1985141.600094 1983641.600094 1982141.600094 1980641.600094 1979141.600094 1977641.600094

AS-01
AS-03
TB-47
AS-05
SA-01
TB-48
AS-07
TB-50
BA-05
AW-06
SA-03
AW-08
AS-09
TB-53
AS-11
SA-47
SA-05
SA-09
AW-12
AW-14
AS-15
AS-17
AS-19
AS-21
AS-23
AW-16
AS-25
AS-27
AW-18
SA-17
AW-20
AS-29
AS-31
AW-22
AW-24
AW-49
AW-28
BA-17
BA-19
BA-21

LOCATOR MAP

SPRING VEGETATION TRANSECTS

BHP NAVAJO COAL COMPANY

EXHIBIT 4(B) | AREA 4 SOUTH AND AREA 5 | **8/1/2008**

SAN JUAN COUNTY, NEW MEXICO

NAD 83 State Plane NM West (Feet)

ECOSPHERE ENVIRONMENTAL SERVICES

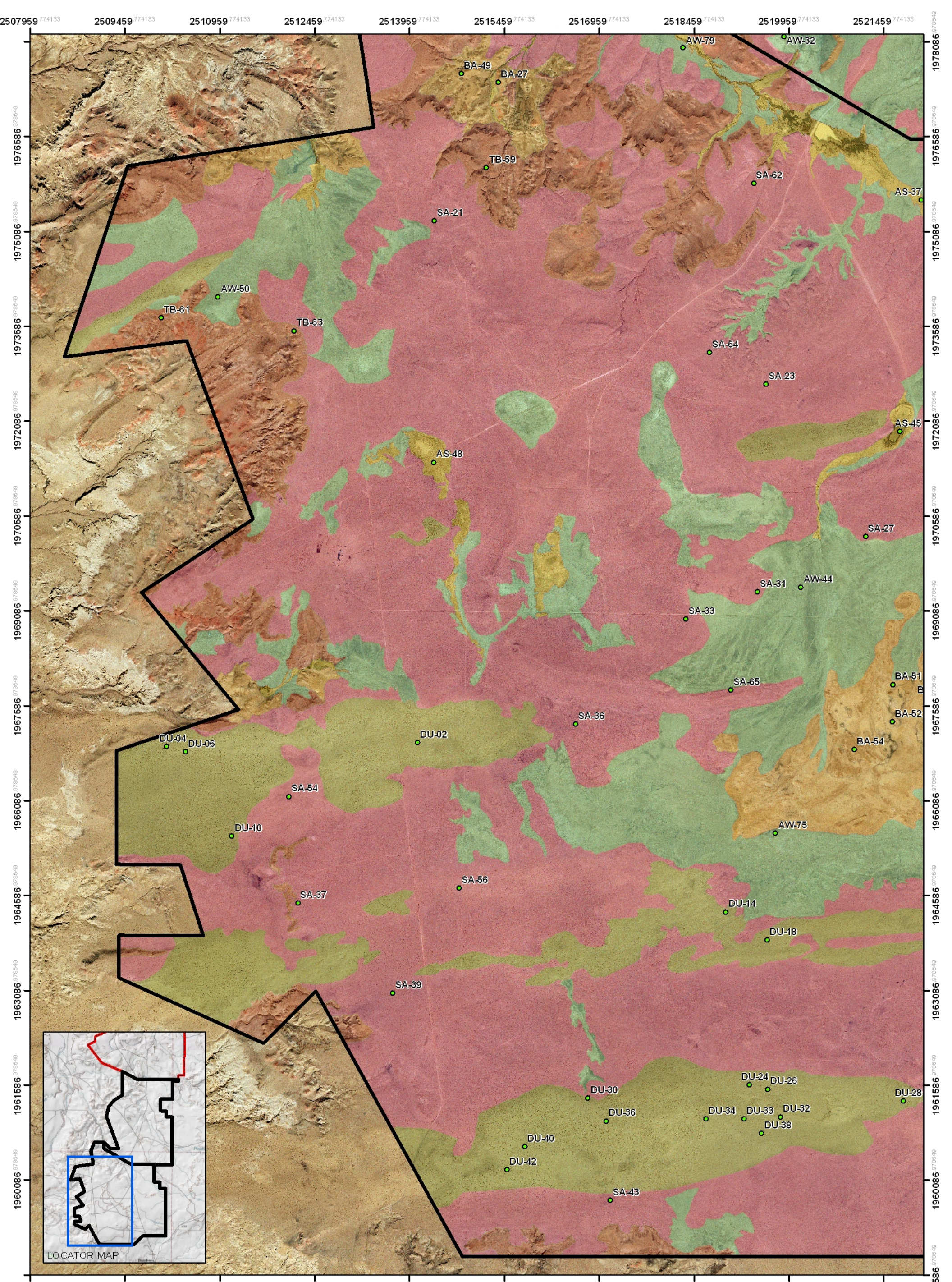
Miles
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100K MAP SOURCE: TOPO! 4.0, 2007

N
1:16,424

LEGEND

- Transects
- NMEP Permit Area
- BNCC Lease Bndy
- Alkaline Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sands
- Thin Breaks



ECOSPHERE
ENVIRONMENTAL SERVICES

SPRING VEGETATION TRANSECTS

BHP NAVAJO COAL COMPANY

EXHIBIT 4(C) | AREA 4 SOUTH AND AREA 5 | **8/1/2008**

SAN JUAN COUNTY, NEW MEXICO

NAD 83 State Plane NM West (Feet)

Miles
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100K MAP SOURCE: TOPO! 4.0, 2007

N
1:16,424

LEGEND

- Transects
- NMEP Permit Area
- BNCC Lease Bndy
- Alkaline Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sands
- Thin Breaks

AW-32
BA-21
BA-23
BA-25
AW-34
BA-29
AW-36
SA-62
AS-37
AW-46
SA-20
AW-47
AS-39
SA-22
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AS-43
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AW-38
AS-45
SA-25
SA-27
SA-31
AW-44
AW-71
SA-65
BA-51
BA-52
BA-54
TB-40
AW-75
DU-14
DU-15
DU-18
DU-24
DU-26
DU-28
DU-33
DU-32
DU-38
TB-44
SA-45

LOCATOR MAP

SPRING VEGETATION TRANSECTS

BHP NAVAJO COAL COMPANY

EXHIBIT 4(D) | AREA 4 SOUTH AND AREA 5 | **8/1/2008**

SAN JUAN COUNTY, NEW MEXICO

NAD 83 State Plane NM West (Feet)

ECOSPHERE ENVIRONMENTAL SERVICES

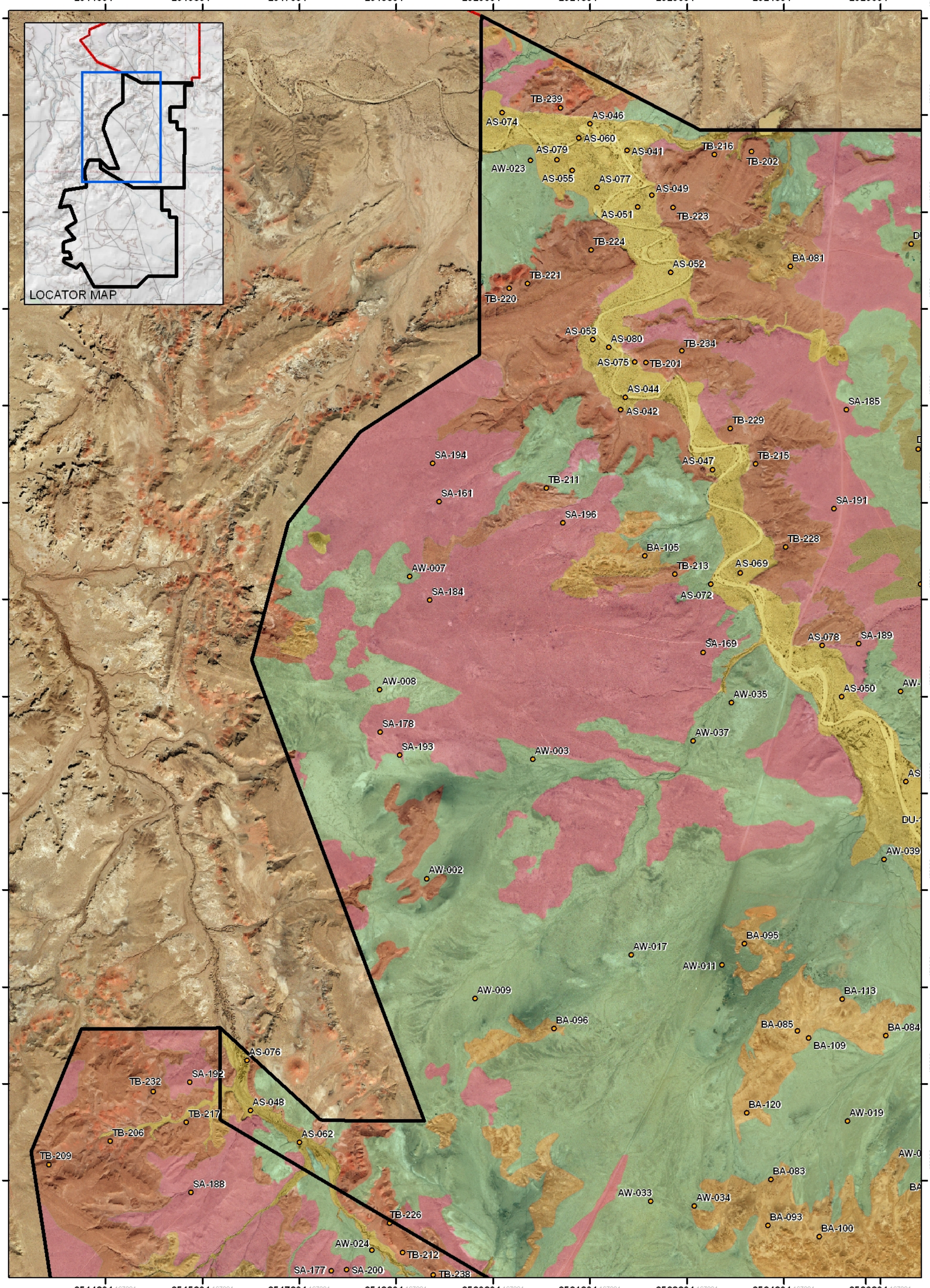
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100K MAP SOURCE: TOPO! 4.0, 2007

1:16,424

LEGEND

- Transects
- NMEP Permit Area
- BNCC Lease Bndy
- Alkaline Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sands
- Thin Breaks



ECOSPHERE
ENVIRONMENTAL SERVICES

FALL VEGETATION TRANSECTS

BHP NAVAJO COAL COMPANY

EXHIBIT 5(A)	AREA 4 SOUTH AND AREA 5	8/1/2008
SAN JUAN COUNTY, NEW MEXICO	NAD 83 State Plane NM West (Feet)	

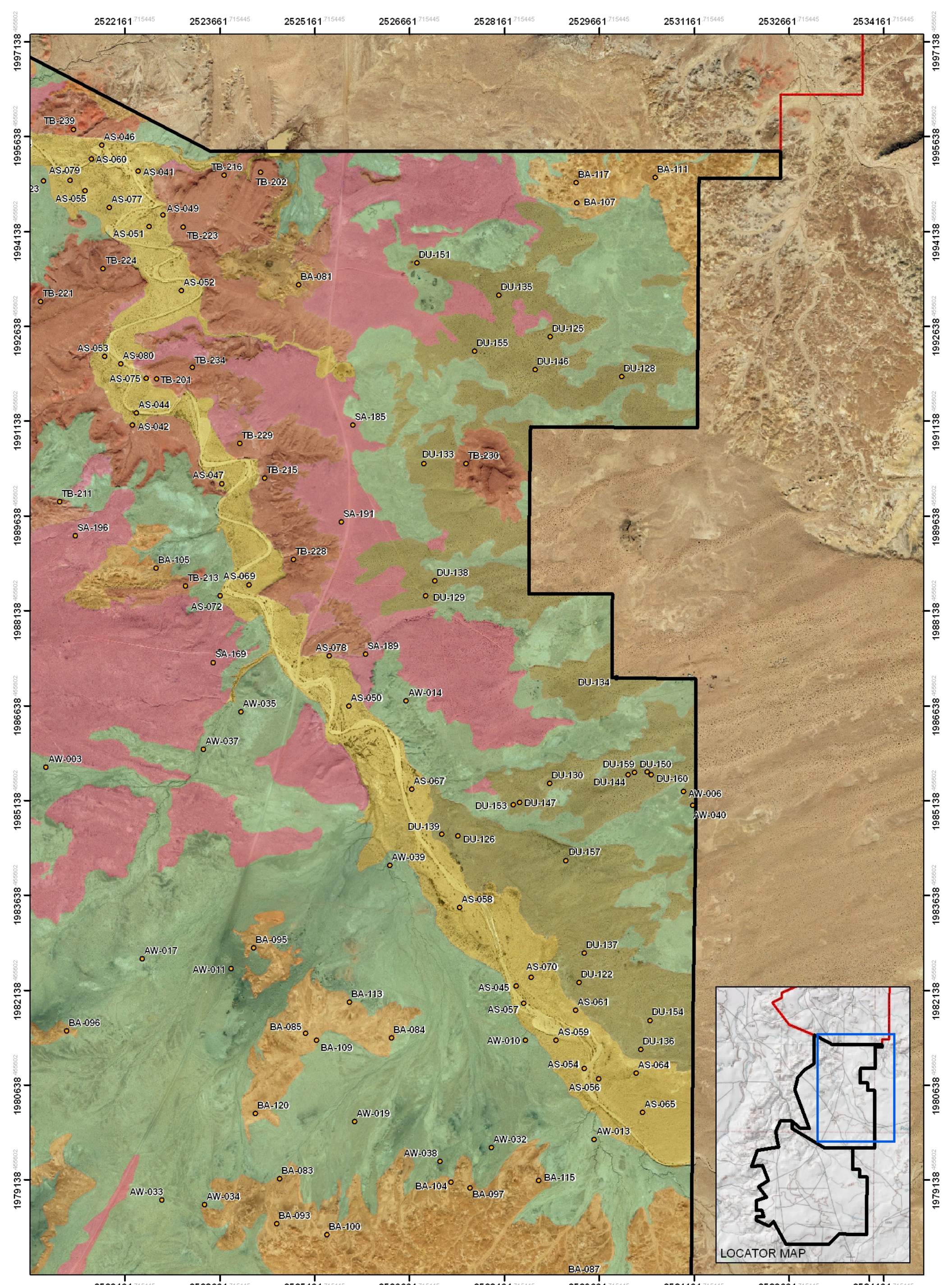
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100K MAP SOURCE: TOPO! 4.0, 2007

N
1:16,424

LEGEND

- NMEPPermitArea
- Transects
- BNCC Lease Bndy
- Alkaline Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sands
- Thin Breaks



FALL VEGETATION TRANSECTS

BHP NAVAJO COAL COMPANY

EXHIBIT 5(B) | AREA 4 SOUTH AND AREA 5 | **8/1/2008**

SAN JUAN COUNTY, NEW MEXICO

NAD 83 State Plane NM West (Feet)

ECOSPHERE ENVIRONMENTAL SERVICES

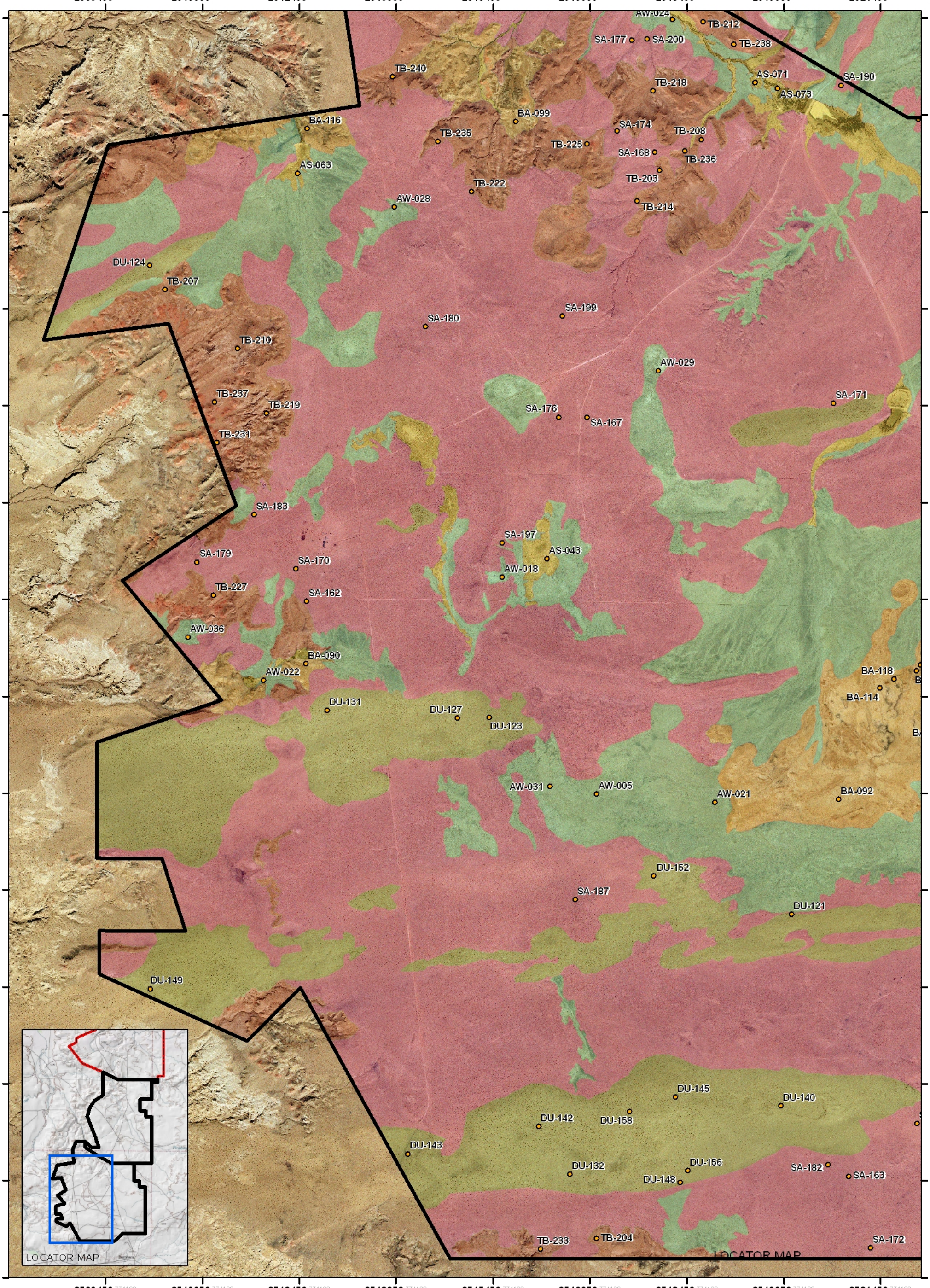
Miles
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100K MAP SOURCE: TOPO! 4.0, 2007

1:16,424

LEGEND

- Transects
- NMEPPermitArea
- BNCC Lease Bndy
- Alkaline Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sands
- Thin Breaks



ECOSPHERE
ENVIRONMENTAL SERVICES

FALL VEGETATION TRANSECTS

BHP NAVAJO COAL COMPANY

EXHIBIT 5(C)	AREA 4 SOUTH AND AREA 5	8/1/2008
SAN JUAN COUNTY, NEW MEXICO	NAD 83 State Plane NM West (Feet)	

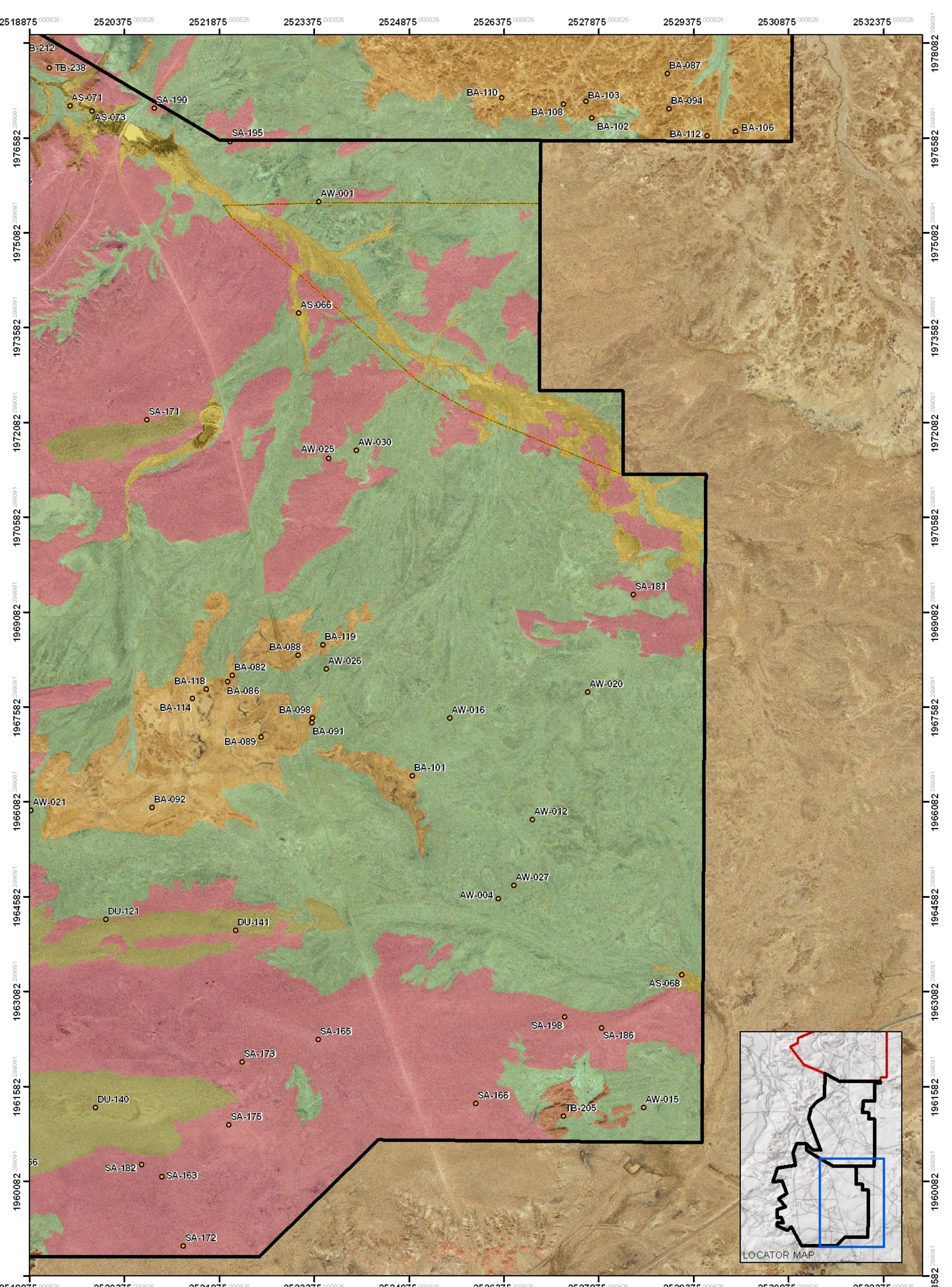
Miles
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100K MAP SOURCE: TOPO! 4.0, 2007

N
1:16,424

LEGEND

- Transects
- NMEP Permit Area
- BNCC Lease Bndy
- Alkaline Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sands
- Thin Breaks



FALL VEGETATION TRANSECTS

BHP NAVAJO COAL COMPANY

EXHIBIT 5(D) | AREA 4 SOUTH AND AREA 5 | **8/1/2008**

SAN JUAN COUNTY, NEW MEXICO

NAD 83 State Plane NM West (Feet)

ECOSPHERE ENVIRONMENTAL SERVICES

0 0.125 0.25 0.5 Miles

100K MAP SOURCE: TOPO! 4.0, 2007

1:16,424

LEGEND

- Transects
- NMEP Permit Area
- BNCC Lease Bndy
- Alkaline Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sands
- Thin Breaks
- Reference Area

2522224.234389 2522524.234389 2522824.234389 2523124.234389 2523424.234389 2523724.234389 2524024.234389 2524324.234389 2524624.234389 2524924.234389 2525224.234389

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RAS-079
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RAS-078
RAW-009
RAS-059
RAW-028
RSA-112
RAW-029
RAS-063
RAW-004
RAW-039
RAW-026
RAS-058
RAW-023

LOCATOR MAP

2522224.234389 2522524.234389 2522824.234389 2523124.234389 2523424.234389 2523724.234389 2524024.234389 2524324.234389 2524624.234389 2524924.234389 2525224.234389

ECOSPHERE
ENVIRONMENTAL SERVICES

REFERENCE AREA

BHP NAVAJO COAL COMPANY

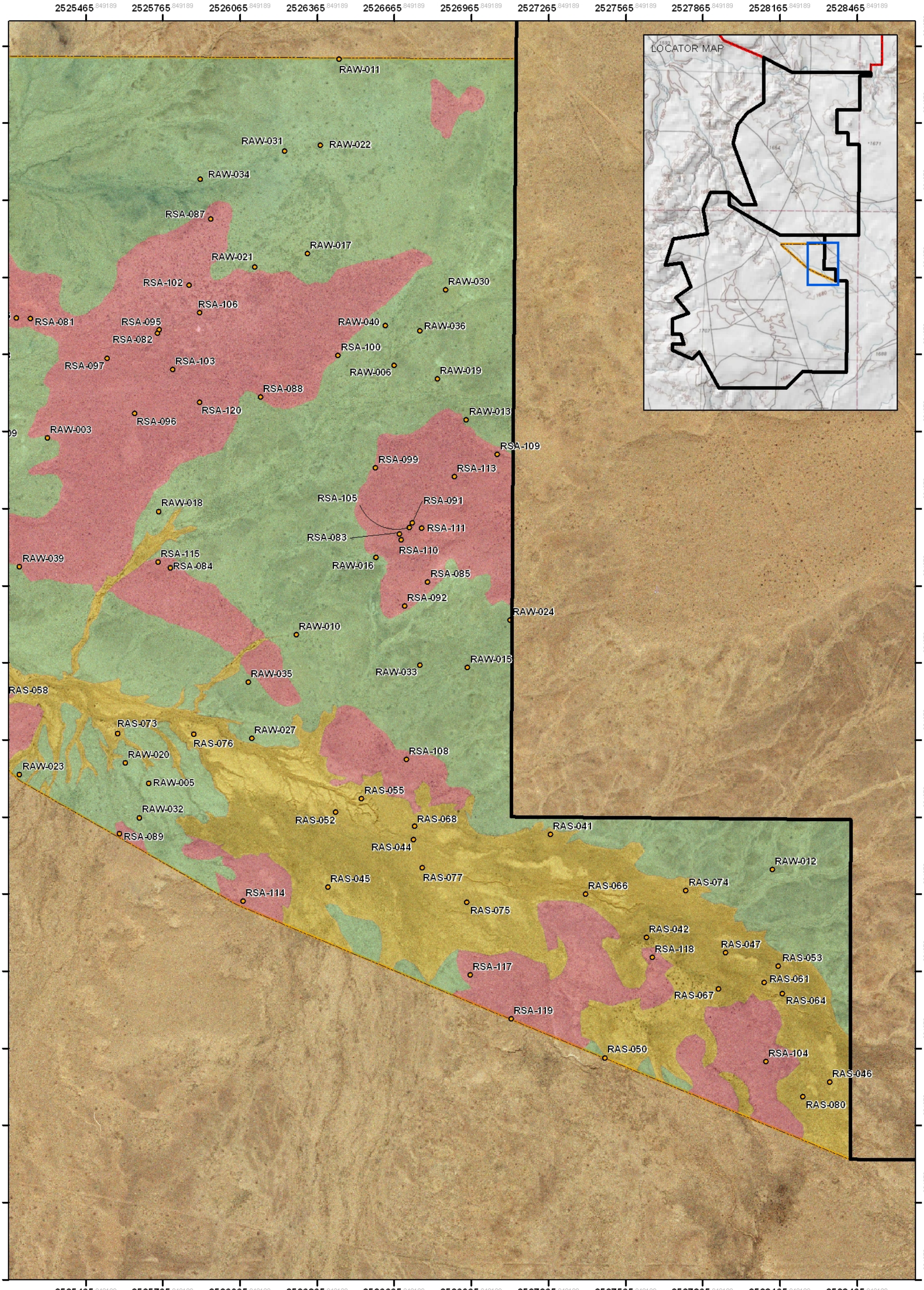
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SAN JUAN COUNTY, NEW MEXICO	NAD 83 State Plane New Mexico West (Feet)	

Feet
0 255 510 1,020
1:4,100

24K MAP SOURCE: TOPO! 4.0, 2007

LEGEND

- NMEP Permit Area
- BNCC Lease Bndy
- Transects
- Reference Area
- Alkaline Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sands
- Thin Breaks



REFERENCE AREA

BHP NAVAJO COAL COMPANY

EXHIBIT 6(B) | AREA 4 SOUTH AND AREA 5 | **8/1/2008**

SAN JUAN COUNTY, NEW MEXICO

NAD 83 State Plane New Mexico West (Feet)

ECOSPHERE ENVIRONMENTAL SERVICES

0 230 460 920 Feet

24K MAP SOURCE: TOPO! 4.0, 2007

1:4,100

LEGEND

- Transects
- NMEP Permit Area
- BNCC Lease Boundary
- Reference Area
- Alkaline Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sands
- Thin Breaks

ATTACHMENT B

PLANT SPECIES RECORDED DURING DATA COLLECTION

SYMBOL	NAME	LifeForm
ABFR2	Abronia fragrans Nutt. Ex Hook	per forb
ACHY	Achnatherum hymenoides	per gram
AGCR	Agropyron cristatum (I.) Gaertn.	per gram
AGGL	Agoseris glauca (Pursh) Raf.	per forb
ALLE7	Aliciella [Gilia] leptomeria	ann forb
ALLIUM	Allium spp.	per forb
ALMA	Aletes macdougalii Coult. & Rose	per forb
ALMA3	Aletes macdougalii Coult. & Rose	per forb
AMAC2	Ambrosia acanthicarpa Hook.	ann forb
AMARA	Amaranthus sp.	forb
AMBI	Amaranthus bigelovii	forb
ARDR4	Artemisia dracunculus L.	per forb
ARPU9	Aristida purpurea Nutt.	per gram
ASCLEP	Asclepias spp.	forb
ASSA8	Asclepias sanjuanensis	
ASMO7	Astragalus mollissimus Torr. Var. thompsonaie (S. Wats)) Barneby	per forb
ASTRA	Astragalus spp.	forb
ATCA2	Atriplex canescens (Pursh) Nutt. Var. canescens	shrub
ATCO	Atriplex confertifolia (Torr. & Frém.) S. Wats. Var. cuneata (A. Nels.) Welsh	shrub
ATGA	Atriplex gardneri (Moq.)) D. Dietr. Var. cuneata (A. Nels.) Welsh	shrub
ATOB	Atriplex obovata Moq.	shrub
ATPO2	Atriplex powellii S. Wats. Var. powellii	ann forb
ATSA	Atriplex saccaria S. Wats.	shrub
BOGR2	Bouteloua gracilis (Willd. Ex Kunth) Lag. Ex Griffiths	per gram
BRMI	Brickellia microphylla (Nutt.) Gray	shrub
BRRU2	Bromus rubens L.	ann gram
BRTE	Bromus tectorum L	ann gram
CASC18	Camissonia scapoidea	ann forb
CHCO2	Chamaesaracha coronopus (Moric.) Britt.	per forb
CHENO	Chenopodium L.","goosefoot spp.","Chenopodiaceae	forb
CHER2	Chaetopappa ericoides (Torr.) G. L Nesom	per forb
CHFE3	Chamaesyce fendleri	per forb
CHIN2	Chenopodium incanum (S. Wats.) Heller	ann forb
CHST	Chaenactis stevioides Hook. & Arn.	ann forb
CLLU2	Cleome lutea Hook.	ann forb
COWR2	Cordylanthus wrightii	ann forb
CRCR3	Cryptantha crassisepala (Torr. &A. Gray) Greene var. elechantha Johnston	ann forb
CYAC	Cymopterus acaulis (Pursh) Raf. var. fendleri (A. Gray) Goodrich	per forb
CYBU	Cymopterus bulbosus A. Nels.	per forb
CYMOP	Cymopterus Raf.	forb
DALE3	Dalea leporina (Ait) Bullock	ann forb
DEPI	Descurainia pinnata	ann forb
DESO2	Descurainia sophia (L.) Webb ex Prantl	ann forb
DIWI2	Dimorphocarpa wislizenii (Engelm.) Rollins	ann forb
ELEL5	Elymus elymoides (Raf.) Swezey	per gram

SYMBOL	NAME	LifeForm
ELTR7	Elymus trachycaulus (Link) Gould ex Shinners	per gram
ENNA (SENNA)	Senna spp.	per subshrub
EPHED	Ephedra spp.	shrub
EPTO	Ephedra torreyana S. Wats.	shrub
ERBE	Erigeron bellidiastrum Nutt.	ann forb
ERCI6	Erodium cicutarium (L.) L`Her.	ann forb
ERDI5	Eriogonum divaricatum Hook.	ann forb
ERGO	Eriogonum gordonii Benth. In DC	ann forb
ERJA	Eriogonum jamesii Benth.	per forb
ERLE9	Eriogonum leptocladon Torr. & A. Gray var. ramosissimum (Eastw.) Reveal	shrub
ERNA10 [CHNAA]	Ericameria [Chrysothamnus] nauseosus	shrub
ERTR13	Eremopyrum triticeum (Gaertn.) Nevski	ann gram
EVNU	Evolvulus nuttallianus	per forb
GAPU	Gaillardia pinnatifida Torr.	per forb
GILE	Gillia leptomeria A. Gray	ann forb
GILIA	Gilia spp.	ann forb
GRSQ	Grindelia squarrosa (Pursh) Dunal	per forb
GUSA2	Gutierrezia sarothrae	shrub
HAGL	Halogeton glomeratus	ann forb
HOJU	Hordeum jubatum L.	per gram
HOPU	Hordeum pusillum Nutt	ann gram
IPLO2	Ipomopsis longiflora	ann forb
IPOMO	Ipomopsis sp.	forb
IPPU4	Ipomopsis pumila (Nutt.) B. Grant	ann forb
KRLA2	Krascheninnikovia lanata (Pursh) A.D.J. Meeuse & Smit	shrub
LAOC3	Lappula occidentalis (Wats.) Greene var. cupulata	ann forb
LEER [CHER2]	Chaetopappa ericoides	per forb
LIAR	Linum aristatum Engelm.	per forb
LIPU4	Linum puberulum (Engelm.) Heller	ann forb
LUPU	Lupinus pusillus Pursh	ann forb
LYGR	Lygodesmia grandiflora (Nutt.) Torr. & A. Gray. Var. grandiflora	per forb
LYPA	Lycium pallidum Miers.	shrub
MACA2	Machaeranthera canescens (Pursh) A. Grey	ann forb
MAGR10	Machaeranthera gracilis (Nutt) Shinners	per forb
MASO	Malacothrix sonchoides (Nutt.) Torr. & Gray	ann forb
MEAL	Mentzelia albicaulis Dougl.	ann forb
MEAL6	Mentzelia albicaulis Dougl.	ann forb
MEPU3	Mentzelia pumila (Nutt.) Torr. & A. Gray	per forb
MONU	Monolepis nuttalliana (Schultes) Greene	ann forb
MUPU2	Muhlenbergia pungens Thurb.	per gram
NAHI	Nama hispidum A. Gray	ann forb
OEAL	Oenothera albicaulis Pursh	per forb
OENOT	Oenothera spp.	per forb
OEPA	Oenothera pallida Lindi. Subsp. Runcinata (Engelm.) Munz	per forb
OEPE	Oenothera pallida Lindi. Subsp. Runcinata (Engelm.) Munz	per forb
OPPO	Opuntia polyacantha Haw.	per suc
PAFI4	Parryella filifolia Torr. & Gray ex A. Gray	shrub

SYMBOL	NAME	LifeForm
PASM	Pascopyrum smithii (Rydb.) A. Loe.	per gram
PENS	Penstemon spp.	forb
PHCR	Phacelia crenulata Torr.Ex S. Wats	ann forb
PLIN7	Platyschkuhria integrifolia (A. Gray) Rydb. Var. oblongifolia (A. Gray) Ellison	per forb
PLJA	Pleuraphis jamesii Torr.	per gram
PLPA2	Plantago patagonica Jacq.	ann forb
PSLA3	Psoralidium lanceolatum (Prush) Rydb. Var. lanceolatum	per forb
RUHY	Rumex hymenosepalus Torr.	per forb
SATR12	Salsola tragus L.	ann forb
SAVE4	Sarcobatus vermiculatus (Hook.) Torr.	shrub
SEFL3	Senecio flaccidus Less.	per forb
SESP3	Senicio spartoides Torr. & Gray	per forb
SPAI	Sporobolus airoides (Torr.) Torr.	per gram
SPCO4	Sporobolus contractus A. S. Hitchc.	per gram
SPCOC	Sphaeralcea coccinea (Nutt.) Rydb.	per forb
SPCR	Sporobolus cryptandrus (Torr.) A.Gray	per gram
SPGI	Sporobolus giganteus Nash	per gram
SPPA2	Sphaeralcea parvifolia A. Nels.	per forb
SPPO	Spirodela polyrrhiza L. Schleid	per forb
STCO6	Streptanthus cordatus Nutt. var. cordatus	per forb
STEX	Stephanomeria exigua Nutt.	per forb
STLO4	Streptanthella longirostris (S. Wats.) Rydb.	ann forb
STSA3	Stegogonum salsuginosum Nutt.	ann forb
SUMO	Suaeda moquinii (Torr.) Greene	per forb
TAMAR	Tamarix spp.	tree
TOAN	Townsendia annua Beaman	ann forb
TOIN	Townsendia incana Nutt.	per forb
TRDU	Tragopogon dubius Scop.	ann forb
VEBR	Verbena bracteata Cav. Ex Lag. & Rodr.	per forb
VUOC	Vulpia octoflora (Walt.) Rydb. var. octoflora	ann gram
XAST	Xanthium strumarium L.	ann forb
YUCCA	Yucca spp.	per suc

ATTACHMENT C

COVER AND FREQUENCY DATA

Attachment C. Cover and Frequency Data
Table of Contents

C-1	Fall	Summary Average Ground Cover on Point Intercept Transects for All Communities
C-2	Fall	Summary Frequency of Vegetation Species on Point Intercept Transects for all Communities.
C-3	Fall	Arroyo Shrub Cover and Frequency Data by Point Intercept Transect
C-4	Fall	Alkali WashCover and Frequency Data by Point Intercept Transect
C-5	Fall	BadlandsCover and Frequency Data by Point Intercept Transect
C-6	Fall	DunesCover and Frequency Data by Point Intercept Transect
C-7	Fall	Reference Arroyo ShrubCover and Frequency Data by Point Intercept Transect
C-8	Fall	Reference Alkali WashCover and Frequency Data by Point Intercept Transect
C-9	Fall	Reference SandsCover and Frequency Data by Point Intercept Transect
C-10	Fall	Sands Cover and Frequency Data by Point Intercept Transect
C-11	Fall	Thin Breaks Cover and Frequency Data by Point Intercept Transect
C-12	Spring	Summary Average Ground Cover on Point Intercept Transects for All Communities
C-13	Spring	Summary Frequency of Vegetation Species on Point Intercept Transects for all Communities.
C-14	Spring	Arroyo Shrub Cover and Frequency Data by Point Intercept Transect
C-15	Spring	Alkali Wash Cover and Frequency Data by Point Intercept Transect
C-16	Spring	Badlands Cover and Frequency Data by Point Intercept Transect
C-17	Spring	Dunes Cover and Frequency Data by Point Intercept Transect
C-18	Spring	Sands Cover and Frequency Data by Point Intercept Transect
C-19	Spring	Thin Breaks Cover and Frequency Data by Point Intercept Transect

Attachment C-1. Fall Summary Average Ground Cover on Point Intercept Transects for all Communities

Community	Bare Ground	Rock/Gravel	Litter	Vegetation
Arroyo Shrub	69.0	0.6	18.4	12.1
Alkali Wash	66.7	15.9	11.6	5.8
Badlands	59.3	32.1	5.5	3.1
Dunes	70.3	1.0	13.7	15.0
Reference Arroyo Shrub	53.7	1.4	23.8	21.1
Reference Alkali Wash	60.8	21.2	11.1	7.0
Reference Sands	65.6	3.2	18.7	12.6
Sand	62.7	5.3	18.9	13.1
Thinbreak	44.1	42.8	8.3	4.8

Attachment C-2. Fall Summary Frequency of Vegetation Species on Point Intercept Transects for all Communities

Species	Alkali Wash	Arroyo Shrub	Badlands	Dunes	Reference Alkali Wash	Reference Arroyo Shrub	Reference Sands	Sands	Thin Breaks
Abronia fragrans		1		1			2		
Achnatherum hymenoides		7		39			17	20	3
Agropyron cristatum		1							
Ambrosia acanthicarpa				2			1		
Aristida purpurea				6					
Artemisia bigelovii									2
Artemisia filifolia				1					
Artemisia sp.		1							
Artemisia tridentata		1							
Aster sp.		1		1		3			
Astragalus sp.				1					
Atriplex canescens	3	51	1	5	1	3	3	1	2
Atriplex confertifolia	9		1			2	20	37	12
Atriplex gardneri	4		4		3				3
Atriplex obovata	14	21	26		15	19	9	5	4
Atriplex powellii	14	1	14		6	2	1		3
Bouteloua barbata		2	1		2	2			
Bouteloua gracilis		1			2		1		
Bromus rubens					1				
Bromus tectorum	1	1				32			
Chaenactis stevioides					1			1	
Chaetopappa ericoides				2				4	
Chamaesyce fendleri		1			1	4			
Chenopodium sp.		3	1					1	
Chrysothamnus viscidiflorus				11					
Cordylanthus wrightii		5		8					
Cryptantha crassisepala	6	19	1	41	6	8	15	61	4
Cryptantha flava									
Cryptantha sp.								1	
Dalea leporina		2							
Descurainia pinnata	15	55	4	49	11	7	9	8	10
Descurainia sophia								1	
Dicoria sp.				1					
Dimorphocarpa wislizenii		2		26			1	1	
Elymus elymoides						1			
Ephedra sp.	1	4		73				1	2
Eragrostis cilianensis		3			1	5			
Eremopyrum triticeum	1								
Ericameria [Chrysothamnus] nauseosus		26		38					
Erigeron bellidiastrum					2				
Erigeron bellidiastrum	4	1				19			
Eriogonum divaricatum	2								
Eriogonum jamesii					1	1			
Eriogonum leptocladon		4		6					
Erodium cicutarium					2	5			

Species	Alkali Wash	Arroyo Shrub	Badlands	Dunes	Reference Alkali Wash	Reference Arroyo Shrub	Reference Sands	Sands	Thin Breaks
Gutierrezia sarothrae	1	11		22	3	3	93	43	8
Halogeton glomeratus	18	2	4		18	16	1	1	15
Hordeum pusillum	6	1			25	167			
Ipomopsis pumila	1	1		3	1		1		1
Jointed goat grass						2			
Lappula occidentalis	4		5	1	9	6	16	2	7
Linum aristatum								6	
Linum puberulum		2		2					
Lycium pallidum				3		1			
Lygodesmia grandiflora				1	1				
Machaeranthera canescens	2	4		22			1	7	
Malacothrix sonchoides				1		1		3	
Mentzelia albicaulis		1		18			2	2	
Mentzelia pumila		1							1
Monroa squarrosa					7	3	1		
Muhlenbergia pungens				17					2
Oenothera pallida				11					
Oenothera sp.				1					
Opuntia polyacantha				1	1	6	2	1	
Parryella filifolia		4							
Pascopyrum smithii					1				
Penstemon sp.				1					
Phacelia crenulata	5		1	1	1	2	11	6	6
Plantago patagonica	15	1	7	1	28	61	51	6	9
Platyschkuhria integrifolia								1	
Pleuraphis jamesii	17	20	2	44	25	57	83	52	9
Portulaca oleracea						2			
Rumex hymenosepalus				1					
Salsola tragus	37	77	9	44	27	23	23	102	55
Sarcobatus vermiculatus	6	80		3	4	10			5
Senecio sp.						1			
Senicio spartoides			1			3			
Sphaeralcea coccinea					2	2	1	1	
Sphaeralcea parvifolia		1		5	2			1	
Sporobolus airoides	23	46	6	57	30	299	105	140	25
Sporobolus contractus				7		1	1		
Sporobolus cryptandrus		2		1	2	1	5		
Sporobolus flexuosus			1						
Stephanomeria exigua				6				1	
Streptanthella longirostris				5				1	
Suaeda moquinii			2						
Townsendia annua	1	3	2		13	6	7	5	1
Unknown		6		3					2
Vulpia octoflora		3		7		12	6	1	
Yucca sp.									1

Attachment C-3. Fall Arroyo Shrub Cover and Frequency Data by Point Intercept Transect

Transect	Life Form	Scientific Name	Percent Cover
AS-041	Bare		66
	Rock/Gravel		0
	Litter		24
	Vegetation		10
		Salsola tragus	3
	Annual Forb Subtotal		3
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex canescens	2
		Gutierrezia sarothrae	2
		Sarcobatus vermiculatus	2
	Perennial Shrub Subtotal		6
AS-041 Total Vegetation			10
AS-042	Bare		70
	Rock/Gravel		0
	Litter		18
	Vegetation		12
		Cryptantha crassisepala	1
		Descurainia pinnata	1
	Annual Forb Subtotal		2
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Sarcobatus vermiculatus	9
	Perennial Shrub Subtotal		9
AS-042 Total Vegetation			12
AS-043	Bare		50
	Rock/Gravel		1
	Litter		33
	Vegetation		16
		Salsola tragus	1
		Townsendia annua	2
	Annual Forb Subtotal		3
		Pleuraphis jamesii	6
		Sporobolus airoides	5
	Perennial Grass Subtotal		11
		Atriplex obovata	2
	Perennial Shrub Subtotal		2
AS-043 Total Vegetation			16
AS-044	Bare		80
	Rock/Gravel		0
	Litter		9
	Vegetation		11

Transect	Life Form	Scientific Name	Percent Cover
		Descurainia pinnata	3
		Salsola tragus	2
	Annual Forb Subtotal		5
		Atriplex canescens	2
		Ericameria [Chrysothamnus] nauseosus	2
		Parryella filifolia	2
	Perennial Shrub Subtotal		6
AS-044 Total Vegetation			11
AS-045	Bare		85
	Rock/Gravel		0
	Litter		12
	Vegetation		3
		Ericameria [Chrysothamnus] nauseosus	2
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		3
AS-045 Total Vegetation			3
AS-046	Bare		89
	Rock/Gravel		1
	Litter		3
	Vegetation		7
		Salsola tragus	1
	Annual Forb Subtotal		1
		Aster Sp.	1
	Forb Subtotal		1
		Achnatherum hymenoides	3
	Perennial Grass Subtotal		3
		Ericameria [Chrysothamnus] nauseosus	2
	Perennial Shrub Subtotal		2
AS-046 Total Vegetation			7
AS-047	Bare		62
	Rock/Gravel		0
	Litter		27
	Vegetation		11
		Cordylanthus wrightii	1
		Cryptantha crassisepala	1
		Descurainia pinnata	1
		Salsola tragus	4
	Annual Forb Subtotal		7
		Artemisia tridentata	1
		Atriplex canescens	3
	Perennial Shrub Subtotal		4
AS-047 Total Vegetation			11

Transect	Life Form	Scientific Name	Percent Cover
AS-048	Bare		64
	Rock/Gravel		0
	Litter		19
	Vegetation		17
		Salsola tragus	13
	Annual Forb Subtotal		13
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex canescens	1
		Sarcobatus vermiculatus	2
	Perennial Shrub Subtotal		3
AS-048 Total Vegetation			17
AS-049	Bare		62
	Rock/Gravel		0
	Litter		23
	Vegetation		15
		Descurainia pinnata	1
		Salsola tragus	1
	Annual Forb Subtotal		2
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex canescens	1
		Atriplex obovata	3
		Sarcobatus vermiculatus	8
	Perennial Shrub Subtotal		12
AS-049 Total Vegetation			15
AS-050	Bare		72
	Rock/Gravel		0
	Litter		20
	Vegetation		8
		Cryptantha crassisepala	1
		Descurainia pinnata	1
		Mentzelia albicaulis	1
		Salsola tragus	4
	Annual Forb Subtotal		7
		Atriplex canescens	1
	Perennial Shrub Subtotal		1
AS-050 Total Vegetation			8
AS-051	Bare		67
	Rock/Gravel		0
	Litter		24
	Vegetation		9
		Descurainia pinnata	2
	Annual Forb Subtotal		2

Transect	Life Form	Scientific Name	Percent Cover
		Sarcobatus vermiculatus	7
	Perennial Shrub Subtotal		7
AS-051 Total Vegetation			9
AS-052	Bare		69
	Rock/Gravel		0
	Litter		14
	Vegetation		17
		Descurainia pinnata	3
		Salsola tragus	4
	Annual Forb Subtotal		7
		Agropyron cristatum	1
	Perennial Grass Subtotal		1
		Ericameria [Chrysothamnus] nauseosus	7
		Parryella filifolia	2
	Perennial Shrub Subtotal		9
AS-052 Total Vegetation			17
AS-053	Bare		71
	Rock/Gravel		0
	Litter		19
	Vegetation		10
		Descurainia pinnata	1
	Annual Forb Subtotal		1
		Sarcobatus vermiculatus	9
	Perennial Shrub Subtotal		9
AS-053 Total Vegetation			10
AS-054	Bare		90
	Rock/Gravel		6
	Litter		2
	Vegetation		2
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		1
		Unidentified	1
	Undetermined Subtotal		1
AS-054 Total Vegetation			2
AS-055	Bare		45
	Rock/Gravel		0
	Litter		27
	Vegetation		28
		Cryptantha crassisepala	2
		Descurainia pinnata	9
		Salsola tragus	4
	Annual Forb Subtotal		15
		Pleuraphis jamesii	1

Transect	Life Form	Scientific Name	Percent Cover
	Perennial Grass Subtotal		1
		Atriplex canescens	3
		Atriplex obovata	1
		Sarcobatus vermiculatus	8
	Perennial Shrub Subtotal		12
AS-055 Total Vegetation			28
AS-056	Bare		73
	Rock/Gravel		0
	Litter		20
	Vegetation		7
		Machaeranthera canescens	1
	Annual Forb Subtotal		1
		Bromus tectorum	1
	Annual Grass Subtotal		1
		Unidentified	1
	Forb Subtotal		1
		Ericameria [Chrysothamnus] nauseosus	4
	Perennial Shrub Subtotal		4
AS-056 Total Vegetation			7
AS-057	Bare		75
	Rock/Gravel		5
	Litter		9
	Vegetation		11
		Cordylanthus wrightii	3
		Cryptantha crassisepala	1
		Descurainia pinnata	2
	Annual Forb Subtotal		6
		Artemisia Sp.	1
	Forb Subtotal		1
		Ericameria [Chrysothamnus] nauseosus	2
		Gutierrezia sarothrae	2
	Perennial Shrub Subtotal		4
AS-057 Total Vegetation			11
AS-058	Bare		61
	Rock/Gravel		0
	Litter		31
	Vegetation		8
		Cryptantha crassisepala	1
		Descurainia pinnata	3
		Salsola tragus	1
	Annual Forb Subtotal		5
		Mentzelia pumila	1
	Perennial Forb Subtotal		1

Transect	Life Form	Scientific Name	Percent Cover
		Gutierrezia sarothrae	2
	Perennial Shrub Subtotal		2
AS-058 Total Vegetation			8
AS-059	Bare		81
	Rock/Gravel		0
	Litter		13
	Vegetation		6
		Cordylanthus wrightii	1
		Salsola tragus	1
	Annual Forb Subtotal		2
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Ericameria [Chrysothamnus] nauseosus	2
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		3
AS-059 Total Vegetation			6
AS-060	Bare		58
	Rock/Gravel		0
	Litter		20
	Vegetation		22
		Cryptantha crassisepala	1
		Salsola tragus	10
	Annual Forb Subtotal		11
		Achnatherum hymenoides	1
	Perennial Grass Subtotal		1
		Atriplex canescens	2
		Ericameria [Chrysothamnus] nauseosus	5
		Unidentified	3
	Perennial Shrub Subtotal		10
AS-060 Total Vegetation			22
AS-061	Bare		70
	Rock/Gravel		0
	Litter		19
	Vegetation		11
		Cryptantha crassisepala	1
		Dimorphocarpa wislizenii	2
		Salsola tragus	2
		Unidentified	1
	Annual Forb Subtotal		6
		Pleuraphis jamesii	1
		Sporobolus airoides	2
	Perennial Grass Subtotal		3
		Sarcobatus vermiculatus	2

Transect	Life Form	Scientific Name	Percent Cover
	Perennial Shrub Subtotal		2
AS-061 Total Vegetation			11
AS-062	Bare		79
	Rock/Gravel		1
	Litter		12
	Vegetation		8
		Dalea leporina	1
		Descurainia pinnata	1
		Salsola tragus	5
	Annual Forb Subtotal		7
		Sarcobatus vermiculatus	1
	Perennial Shrub Subtotal		1
AS-062 Total Vegetation			8
AS-063	Bare		52
	Rock/Gravel		0
	Litter		25
	Vegetation		23
		Atriplex powellii	1
		Halogeton glomeratus	1
		Salsola tragus	2
	Annual Forb Subtotal		4
		Chenopodium Sp.	3
	Forb Subtotal		3
		Grindelia squarrosa	3
	Perennial Forb Subtotal		3
		Sporobolus airoides	10
	Perennial Grass Subtotal		10
		Atriplex obovata	3
	Perennial Shrub Subtotal		3
AS-063 Total Vegetation			23
AS-064	Bare		66
	Rock/Gravel		0
	Litter		20
	Vegetation		14
		Descurainia pinnata	1
		Machaeranthera canescens	1
	Annual Forb Subtotal		2
		Vulpia octoflora	1
	Annual Grass Subtotal		1
		Pleuraphis jamesii	2
	Perennial Grass Subtotal		2
		Atriplex canescens	2
		Ephedra Sp.	4
		Eriogonum leptocladon	1
		Sarcobatus vermiculatus	2

Transect	Life Form	Scientific Name	Percent Cover
	Perennial Shrub Subtotal		9
AS-064 Total Vegetation			14
AS-065	Bare		67
	Rock/Gravel		0
	Litter		16
	Vegetation		17
		Cryptantha crassisepala	2
		Descurainia pinnata	2
		Linum puberulum	1
		Machaeranthera canescens	1
		Townsendia annua	1
	Annual Forb Subtotal		7
		Vulpia octoflora	1
	Annual Grass Subtotal		1
		Abronia fragrans	1
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		2
		Achnatherum hymenoides	1
		Pleuraphis jamesii	3
	Perennial Grass Subtotal		4
		Eriogonum leptocladon	3
	Perennial Shrub Subtotal		3
AS-065 Total Vegetation			17
AS-066	Bare		80
	Rock/Gravel		0
	Litter		11
	Vegetation		9
		Bouteloua gracilis	1
		Pleuraphis jamesii	1
		Sporobolus airoides	5
	Perennial Grass Subtotal		7
		Sarcobatus vermiculatus	2
	Perennial Shrub Subtotal		2
AS-066 Total Vegetation			9
AS-067	Bare		76
	Rock/Gravel		0
	Litter		19
	Vegetation		5
		Salsola tragus	3
	Annual Forb Subtotal		3
		Sporobolus airoides	1
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		2
AS-067 Total Vegetation			5

Transect	Life Form	Scientific Name	Percent Cover
AS-068	Bare		55
	Rock/Gravel		1
	Litter		20
	Vegetation		24
		Cryptantha crassisepala	1
		Descurainia pinnata	1
		Erigeron bellidiastrum	1
		Plantago patagonica	1
	Annual Forb Subtotal		4
		Bouteloua barbata	2
		Eragrostis cilianensis	3
		Hordeum pusillum	1
	Annual Grass Subtotal		6
		Chamaesyce fendleri	1
	Perennial Forb Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus airoides	12
	Perennial Grass Subtotal		13
AS-068 Total Vegetation			24
AS-069	Bare		50
	Rock/Gravel		0
	Litter		36
	Vegetation		14
		Cryptantha crassisepala	2
		Descurainia pinnata	4
		Salsola tragus	2
	Annual Forb Subtotal		8
		Atriplex canescens	3
		Sarcobatus vermiculatus	3
	Perennial Shrub Subtotal		6
AS-069 Total Vegetation			14
AS-070	Bare		72
	Rock/Gravel		0
	Litter		11
	Vegetation		17
		Cryptantha crassisepala	2
		Descurainia pinnata	3
		Ipomopsis pumila	1
	Annual Forb Subtotal		6
		Vulpia octoflora	1
	Annual Grass Subtotal		1
		Achnatherum hymenoides	1
		Pleuraphis jamesii	2
	Perennial Grass Subtotal		3
		Gutierrezia sarothrae	3
		Linum puberulum	1

Transect	Life Form	Scientific Name	Percent Cover
		Sarcobatus vermiculatus	3
	Perennial Shrub Subtotal		7
AS-070 Total Vegetation			17
AS-071	Bare		78
	Rock/Gravel		0
	Litter		18
	Vegetation		4
		Atriplex obovata	3
		Sarcobatus vermiculatus	1
	Perennial Shrub Subtotal		4
AS-071 Total Vegetation			4
AS-072	Bare		71
	Rock/Gravel		4
	Litter		14
	Vegetation		11
		Descurainia pinnata	1
		Salsola tragus	4
	Annual Forb Subtotal		5
		Achnatherum hymenoides	1
	Perennial Grass Subtotal		1
		Atriplex canescens	5
	Perennial Shrub Subtotal		5
AS-072 Total Vegetation			11
AS-073	Bare		82
	Rock/Gravel		0
	Litter		13
	Vegetation		5
		Salsola tragus	1
	Annual Forb Subtotal		1
		Atriplex obovata	4
	Perennial Shrub Subtotal		4
AS-073 Total Vegetation			5
AS-074	Bare		78
	Rock/Gravel		0
	Litter		10
	Vegetation		12
		Descurainia pinnata	1
		Salsola tragus	2
	Annual Forb Subtotal		3
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
		Atriplex canescens	5
		Sarcobatus vermiculatus	3
	Perennial Shrub Subtotal		8

Transect	Life Form	Scientific Name	Percent Cover
AS-074 Total Vegetation			12
AS-075	Bare		74
	Rock/Gravel		2
	Litter		15
	Vegetation		9
		Descurainia pinnata	1
		Salsola tragus	1
	Annual Forb Subtotal		2
		Pleuraphis jamesii	2
	Perennial Grass Subtotal		2
		Atriplex canescens	3
		Sarcobatus vermiculatus	2
	Perennial Shrub Subtotal		5
AS-075 Total Vegetation			9
AS-076	Bare		78
	Rock/Gravel		0
	Litter		15
	Vegetation		7
		Salsola tragus	1
	Annual Forb Subtotal		1
		Atriplex canescens	1
		Atriplex obovata	5
	Perennial Shrub Subtotal		6
AS-076 Total Vegetation			7
AS-077	Bare		64
	Rock/Gravel		0
	Litter		23
	Vegetation		13
		Cryptantha crassisepala	1
		Descurainia pinnata	2
		Salsola tragus	1
	Annual Forb Subtotal		4
		Atriplex canescens	5
		Sarcobatus vermiculatus	4
	Perennial Shrub Subtotal		9
AS-077 Total Vegetation			13
AS-078	Bare		55
	Rock/Gravel		1
	Litter		29
	Vegetation		15
		Descurainia pinnata	3
		Halogeton glomeratus	1
	Annual Forb Subtotal		4
		Sporobolus airoides	3

Transect	Life Form	Scientific Name	Percent Cover	
	Perennial Grass Subtotal		3	
		Atriplex canescens	6	
		Sarcobatus vermiculatus	2	
	Perennial Shrub Subtotal		8	
AS-078 Total Vegetation			15	
AS-079	Bare			56
	Rock/Gravel			2
	Litter			16
	Vegetation			26
		Cryptantha crassisepala	2	
		Descurainia pinnata	7	
		Salsola tragus	2	
	Annual Forb Subtotal		11	
		Sporobolus airoides	3	
	Perennial Grass Subtotal		3	
		Atriplex canescens	4	
		Sarcobatus vermiculatus	6	
	Perennial Shrub Subtotal		10	
		Unidentified	2	
	Undetermined Subtotal		2	
AS-079 Total Vegetation			26	
AS-080	Bare			65
	Rock/Gravel			0
	Litter			25
	Vegetation			10
		Descurainia pinnata	1	
		Machaeranthera canescens	1	
		Salsola tragus	2	
	Annual Forb Subtotal		4	
		Atriplex canescens	2	
		Sarcobatus vermiculatus	4	
	Perennial Shrub Subtotal		6	
AS-080 Total Vegetation			10	

Attachment C-4. Fall Alkali Wash Cover and Frequency Data by Point Intercept Transect

Transect	Life Form	Scientific Name	Percent Cover	
AW-001	Bare			48
	Rock/Gravel			34
	Litter			12
	Vegetation			6
		Eriogonum gordonii	4	
		Halogeton glomeratus	1	
	Annual Forb Subtotal		5	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
AW-001 Total Vegetation			6	
AW-002	Bare			74
	Rock/Gravel			11
	Litter			11
	Vegetation			4
		Atriplex powellii	2	
		Eriogonum divaricatum	1	
		Eriogonum gordonii	1	
	Annual Forb Subtotal		4	
AW-002 Total Vegetation			4	
AW-003	Bare			67
	Rock/Gravel			3
	Litter			28
	Vegetation			2
		Salsola tragus	1	
	Annual Forb Subtotal		1	
		Atriplex confertifolia	1	
	Perennial Shrub Subtotal		1	
AW-003 Total Vegetation			2	
AW-004	Bare			63
	Rock/Gravel			2
	Litter			19
	Vegetation			16
		Plantago patagonica	6	
	Annual Forb Subtotal		6	
		Pleuraphis jamesii	6	
		Sporobolus airoides	4	
	Perennial Grass Subtotal		10	
AW-004 Total Vegetation			16	
AW-005	Bare			65
	Rock/Gravel			18
	Litter			17

Transect	Life Form	Scientific Name	Percent Cover
	Vegetation		0
AW-005 Total Vegetation		0	
AW-006	Bare		76
	Rock/Gravel		14
	Litter		7
	Vegetation		3
		Salsola tragus	3
	Annual Forb Subtotal		3
AW-006 Total Vegetation		3	
AW-007	Bare		69
	Rock/Gravel		26
	Litter		5
	Vegetation		0
AW-007 Total Vegetation		0	
AW-008	Bare		74
	Rock/Gravel		8
	Litter		13
	Vegetation		5
		Halogeton glomeratus	4
		Salsola tragus	1
	Annual Forb Subtotal		5
AW-008 Total Vegetation		5	
AW-009	Bare		70
	Rock/Gravel		19
	Litter		8
	Vegetation		3
		Atriplex powellii	1
		Halogeton glomeratus	1
	Annual Forb Subtotal		2
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
AW-009 Total Vegetation		3	
AW-010	Bare		76
	Rock/Gravel		0
	Litter		18
	Vegetation		6
		Descurainia pinnata	1
		Eriogonum gordonii	1
		Lappula occidentalis	1
		Salsola tragus	2
	Annual Forb Subtotal		5
		Atriplex confertifolia	1

Transect	Life Form	Scientific Name	Percent Cover
	Perennial Shrub Subtotal		1
AW-010 Total Vegetation			6
AW-011	Bare		40
	Rock/Gravel		60
	Litter		0
	Vegetation		0
AW-011 Total Vegetation			0
AW-012	Bare		64
	Rock/Gravel		25
	Litter		10
	Vegetation		1
		Eriogonum gordonii	1
	Annual Forb Subtotal		1
AW-012 Total Vegetation			1
AW-013	Bare		71
	Rock/Gravel		1
	Litter		22
	Vegetation		6
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
AW-013 Total Vegetation			6
AW-014	Bare		56
	Rock/Gravel		39
	Litter		5
	Vegetation		0
AW-014 Total Vegetation			0
AW-015	Bare		58
	Rock/Gravel		23
	Litter		7
	Vegetation		12
		Cryptantha crassisepala	1
		Ipomopsis pumila	1
		Phacelia crenulata	2
		Salsola tragus	2
	Annual Forb Subtotal		6
		Pleuraphis jamesii	1
		Sporobolus airoides	3
	Perennial Grass Subtotal		4
		Atriplex confertifolia	2
	Perennial Shrub Subtotal		2
AW-015 Total Vegetation			12

Transect	Life Form	Scientific Name	Percent Cover
AW-016	Bare		66
	Rock/Gravel		10
	Litter		14
	Vegetation		10
		Descurainia pinnata	1
		Lappula occidentalis	1
		Plantago patagonica	4
	Annual Forb Subtotal		6
		Sporobolus airoides	4
	Perennial Grass Subtotal		4
AW-016 Total Vegetation			10
AW-017	Bare		62
	Rock/Gravel		8
	Litter		20
	Vegetation		10
		Atriplex powellii	5
		Descurainia pinnata	2
	Annual Forb Subtotal		7
		Atriplex gardneri	1
		Atriplex obovata	2
	Perennial Shrub Subtotal		3
AW-017 Total Vegetation			10
AW-018	Bare		58
	Rock/Gravel		17
	Litter		18
	Vegetation		7
		Halogeton glomeratus	2
		Salsola tragus	3
	Annual Forb Subtotal		5
		Sporobolus airoides	2
	Perennial Grass Subtotal		2
AW-018 Total Vegetation			7
AW-019	Bare		83
	Rock/Gravel		15
	Litter		2
	Vegetation		0
AW-019 Total Vegetation			0
AW-020	Bare		65
	Rock/Gravel		0
	Litter		23
	Vegetation		12
		Bromus tectorum	1
		Hordeum pusillum	6
	Annual Grass Subtotal		7

Transect	Life Form	Scientific Name	Percent Cover
		Sporobolus airoides	3
	Perennial Grass Subtotal		3
		Atriplex obovata	2
	Perennial Shrub Subtotal		2
AW-020 Total Vegetation			12
AW-021	Bare		58
	Rock/Gravel		41
	Litter		1
	Vegetation		0
AW-021 Total Vegetation			0
AW-022	Bare		78
	Rock/Gravel		8
	Litter		7
	Vegetation		7
		Descurainia pinnata	1
		Halogeton glomeratus	2
		Salsola tragus	2
	Annual Forb Subtotal		5
		Atriplex confertifolia	2
	Perennial Shrub Subtotal		2
AW-022 Total Vegetation			7
AW-023	Bare		59
	Rock/Gravel		3
	Litter		17
	Vegetation		21
		Cryptantha crassisepala	4
		Descurainia pinnata	1
		Phacelia crenulata	1
		Plantago patagonica	1
		Salsola tragus	5
	Annual Forb Subtotal		12
		Pleuraphis jamesii	6
	Perennial Grass Subtotal		6
		Sarcobatus vermiculatus	3
	Perennial Shrub Subtotal		3
AW-023 Total Vegetation			21
AW-024	Bare		69
	Rock/Gravel		0
	Litter		16
	Vegetation		15
		Descurainia pinnata	2
		Phacelia crenulata	2
		Salsola tragus	7
	Annual Forb Subtotal		11

Transect	Life Form	Scientific Name	Percent Cover
		Atriplex confertifolia	1
		Sarcobatus vermiculatus	3
	Perennial Shrub Subtotal		4
AW-024 Total Vegetation			15
AW-025	Bare		66
	Rock/Gravel		12
	Litter		19
	Vegetation		3
		Machaeranthera canescens	1
		Plantago patagonica	1
	Annual Forb Subtotal		2
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
AW-025 Total Vegetation			3
AW-026	Bare		72
	Rock/Gravel		5
	Litter		17
	Vegetation		6
		Eriogonum gordonii	2
		Plantago patagonica	1
	Annual Forb Subtotal		3
		Eremopyrum triticeum	1
	Annual Grass Subtotal		1
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex gardneri	1
	Perennial Shrub Subtotal		1
AW-026 Total Vegetation			6
AW-027	Bare		67
	Rock/Gravel		6
	Litter		10
	Vegetation		17
		Atriplex powellii	5
		Eriogonum divaricatum	1
		Eriogonum gordonii	7
	Annual Forb Subtotal		13
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
		Atriplex gardneri	2
		Atriplex obovata	1
	Perennial Shrub Subtotal		3
AW-027 Total Vegetation			17
AW-028	Bare		58
	Rock/Gravel		37

Transect	Life Form	Scientific Name	Percent Cover	
	Litter			5
	Vegetation			0
AW-028 Total Vegetation			0	
AW-029	Bare			89
	Rock/Gravel			5
	Litter			4
	Vegetation			2
		Halogeton glomeratus	2	
	Annual Forb Subtotal		2	
AW-029 Total Vegetation			2	
AW-030	Bare			76
	Rock/Gravel			12
	Litter			7
	Vegetation			5
		Pleuraphis jamesii	1	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		3	
		Atriplex confertifolia	1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		2	
AW-030 Total Vegetation			5	
AW-031	Bare			54
	Rock/Gravel			21
	Litter			19
	Vegetation			6
		Halogeton glomeratus	6	
	Annual Forb Subtotal		6	
AW-031 Total Vegetation			6	
AW-032	Bare			81
	Rock/Gravel			17
	Litter			1
	Vegetation			1
		Eriogonum gordonii	1	
	Annual Forb Subtotal		1	
AW-032 Total Vegetation			1	
AW-033	Bare			77
	Rock/Gravel			17
	Litter			4
	Vegetation			2
		Erigeron bellidiastrum	2	
	Annual Forb Subtotal		2	
AW-033 Total Vegetation			2	

Transect	Life Form	Scientific Name	Percent Cover
AW-034	Bare		62
	Rock/Gravel		22
	Litter		9
	Vegetation		7
		Descurainia pinnata	2
		Erigeron bellidiastrum	2
	Annual Forb Subtotal		4
		Atriplex canescens	3
	Perennial Shrub Subtotal		3
AW-034 Total Vegetation			7
AW-035	Bare		55
	Rock/Gravel		23
	Litter		15
	Vegetation		7
		Descurainia pinnata	3
		Salsola tragus	3
	Annual Forb Subtotal		6
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
AW-035 Total Vegetation			7
AW-036	Bare		78
	Rock/Gravel		6
	Litter		10
	Vegetation		6
		Cryptantha crassisepala	1
		Lappula occidentalis	1
		Salsola tragus	1
	Annual Forb Subtotal		3
		Atriplex confertifolia	1
		Ephedra Sp.	1
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		3
AW-036 Total Vegetation			6
AW-037	Bare		55
	Rock/Gravel		31
	Litter		11
	Vegetation		3
		Descurainia pinnata	1
		Salsola tragus	1
	Annual Forb Subtotal		2
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
AW-037 Total Vegetation			3

Transect	Life Form	Scientific Name	Percent Cover
AW-038	Bare		65
	Rock/Gravel		30
	Litter		2
	Vegetation		3
		Eriogonum gordonii	3
	Annual Forb Subtotal		3
AW-038 Total Vegetation			3
AW-039	Bare		77
	Rock/Gravel		3
	Litter		14
	Vegetation		6
		Atriplex powellii	1
	Annual Forb Subtotal		1
		Atriplex obovata	5
	Perennial Shrub Subtotal		5
AW-039 Total Vegetation			6
AW-040	Bare		68
	Rock/Gravel		4
	Litter		18
	Vegetation		10
		Descurainia pinnata	1
		Plantago patagonica	2
		Salsola tragus	4
	Annual Forb Subtotal		7
		Pleuraphis jamesii	2
		Sporobolus airoides	1
	Perennial Grass Subtotal		3
AW-040 Total Vegetation			10

Attachment C-5. Fall Badlands Cover and Frequency Data by Point Intercept Transect

Transect	Life Form	Scientific Name	Percent Cover	
BA-081	Bare			28
	Rock/Gravel			69
	Litter			1
	Vegetation			2
		Atriplex obovata	2	
	Perennial Shrub Subtotal		2	
BA-081 Total Vegetation			2	
BA-082	Bare			82
	Rock/Gravel			11
	Litter			4
	Vegetation			3
		Eriogonum gordonii	2	
	Annual Forb Subtotal		2	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
BA-082 Total Vegetation			3	
BA-083	Bare			34
	Rock/Gravel			50
	Litter			7
	Vegetation			9
		Eriogonum gordonii	9	
	Annual Forb Subtotal		9	
BA-083 Total Vegetation			9	
BA-084	Bare			70
	Rock/Gravel			27
	Litter			3
	Vegetation			0
BA-084 Total Vegetation			0	
BA-085	Bare			81
	Rock/Gravel			9
	Litter			6
	Vegetation			4
		Atriplex powellii	2	
	Annual Forb Subtotal		2	
		Atriplex gardneri	2	
	Perennial Shrub Subtotal		2	
BA-085 Total Vegetation			4	
BA-086	Bare			79
	Rock/Gravel			14

Transect	Life Form	Scientific Name	Percent Cover	
	Litter			6
	Vegetation			1
		Eriogonum gordonii	1	
	Annual Forb Subtotal		1	
BA-086 Total Vegetation			1	
BA-087	Bare			33
	Rock/Gravel			65
	Litter			1
	Vegetation			1
		Lappula occidentalis	1	
	Annual Forb Subtotal		1	
BA-087 Total Vegetation			1	
BA-088	Bare			82
	Rock/Gravel			7
	Litter			9
	Vegetation			2
		Eriogonum gordonii	1	
	Annual Forb Subtotal		1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
BA-088 Total Vegetation			2	
BA-089	Bare			90
	Rock/Gravel			6
	Litter			3
	Vegetation			1
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
BA-089 Total Vegetation			1	
BA-090	Bare			72
	Rock/Gravel			26
	Litter			2
	Vegetation			0
BA-090 Total Vegetation			0	
BA-091	Bare			63
	Rock/Gravel			31
	Litter			2
	Vegetation			4
		Lappula occidentalis	1	
		Salsola tragus	1	
	Annual Forb Subtotal		2	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	

Transect	Life Form	Scientific Name	Percent Cover	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
BA-091 Total Vegetation			4	
BA-091*	Bare			59
	Rock/Gravel			32
	Litter			6
	Vegetation			3
		Phacelia crenulata	1	
		Plantago patagonica	1	
		Salsola tragus	1	
	Annual Forb Subtotal		3	
BA-091* Total Vegetation			3	
BA-092	Bare			82
	Rock/Gravel			13
	Litter			1
	Vegetation			4
		Atriplex powellii	1	
	Annual Forb Subtotal		1	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
		Atriplex obovata	2	
	Perennial Shrub Subtotal		2	
BA-092 Total Vegetation			4	
BA-093	Bare			76
	Rock/Gravel			18
	Litter			4
	Vegetation			2
		Atriplex powellii	1	
		Eriogonum gordonii	1	
	Annual Forb Subtotal		2	
BA-093 Total Vegetation			2	
BA-094	Bare			21
	Rock/Gravel			75
	Litter			4
	Vegetation			0
BA-094 Total Vegetation			0	
BA-095	Bare			61
	Rock/Gravel			13
	Litter			16
	Vegetation			10
		Descurainia pinnata	3	
		Halogeton glomeratus	1	

Transect	Life Form	Scientific Name	Percent Cover	
		Salsola tragus	2	
	Annual Forb Subtotal		6	
		Chenopodium Sp.	1	
	Forb Subtotal		1	
		Atriplex canescens	1	
		Atriplex obovata	2	
	Perennial Shrub Subtotal		3	
BA-095 Total Vegetation			10	
BA-096	Bare			94
	Rock/Gravel			1
	Litter			1
	Vegetation			4
		Eriogonum gordonii	4	
	Annual Forb Subtotal		4	
BA-096 Total Vegetation			4	
BA-097	Bare			75
	Rock/Gravel			25
	Litter			0
	Vegetation			0
BA-097 Total Vegetation			0	
BA-098	Bare			72
	Rock/Gravel			15
	Litter			8
	Vegetation			5
		Eriogonum gordonii	1	
		Lappula occidentalis	1	
		Plantago patagonica	1	
		Salsola tragus	2	
	Annual Forb Subtotal		5	
BA-098 Total Vegetation			5	
BA-098*	Bare			35
	Rock/Gravel			62
	Litter			2
	Vegetation			1
		Atriplex gardneri	1	
	Perennial Shrub Subtotal		1	
BA-098* Total Vegetation			1	
BA-099	Bare			18
	Rock/Gravel			69
	Litter			6
	Vegetation			7
		Descurainia pinnata	1	

Transect	Life Form	Scientific Name	Percent Cover	
	Annual Forb Subtotal		1	
		Senicio spartoides	1	
	Perennial Forb Subtotal		1	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		2	
		Atriplex confertifolia	1	
		Atriplex obovata	2	
	Perennial Shrub Subtotal		3	
BA-099 Total Vegetation			7	
BA-100	Bare			70
	Rock/Gravel			17
	Litter			10
	Vegetation			3
		Atriplex powellii	2	
	Annual Forb Subtotal		2	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
BA-100 Total Vegetation			3	
BA-101	Bare			83
	Rock/Gravel			6
	Litter			4
	Vegetation			7
		Atriplex powellii	2	
		Eriogonum gordonii	4	
	Annual Forb Subtotal		6	
		Atriplex gardneri	1	
	Perennial Shrub Subtotal		1	
BA-101 Total Vegetation			7	
BA-101*	Bare			68
	Rock/Gravel			24
	Litter			2
	Vegetation			6
		Eriogonum gordonii	5	
	Annual Forb Subtotal		5	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
BA-101* Total Vegetation			6	
BA-102	Bare			33
	Rock/Gravel			50
	Litter			10
	Vegetation			7
		Atriplex powellii	1	
		Eriogonum gordonii	2	
		Lappula occidentalis	1	

Transect	Life Form	Scientific Name	Percent Cover	
		Plantago patagonica	1	
		Salsola tragus	1	
	Annual Forb Subtotal		6	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
BA-102 Total Vegetation			7	
BA-103	Bare			30
	Rock/Gravel			65
	Litter			4
	Vegetation			1
		Eriogonum gordonii	1	
	Annual Forb Subtotal		1	
BA-103 Total Vegetation			1	
BA-104	Bare			44
	Rock/Gravel			51
	Litter			0
	Vegetation			5
		Atriplex powellii	2	
		Eriogonum gordonii	3	
	Annual Forb Subtotal		5	
BA-104 Total Vegetation			5	
BA-105	Bare			30
	Rock/Gravel			51
	Litter			15
	Vegetation			4
		Cryptantha crassisepala	1	
		Halogeton glomeratus	1	
		Salsola tragus	2	
	Annual Forb Subtotal		4	
BA-105 Total Vegetation			4	
BA-106	Bare			72
	Rock/Gravel			22
	Litter			4
	Vegetation			2
		Atriplex powellii	1	
	Annual Forb Subtotal		1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
BA-106 Total Vegetation			2	
BA-107	Bare			65
	Rock/Gravel			22
	Litter			10

Transect	Life Form	Scientific Name	Percent Cover
	Vegetation		3
		Atriplex powellii	1
	Annual Forb Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus flexuosus	1
	Perennial Grass Subtotal		2
BA-107 Total Vegetation			3
BA-108	Bare		33
	Rock/Gravel		50
	Litter		14
	Vegetation		3
		Lappula occidentalis	1
		Townsendia annua	1
	Annual Forb Subtotal		2
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
BA-108 Total Vegetation			3
BA-109	Bare		74
	Rock/Gravel		18
	Litter		3
	Vegetation		5
		Halogeton glomeratus	2
	Annual Forb Subtotal		2
		Atriplex obovata	3
	Perennial Shrub Subtotal		3
BA-109 Total Vegetation			5
BA-110	Bare		17
	Rock/Gravel		70
	Litter		6
	Vegetation		7
		Plantago patagonica	2
		Townsendia annua	1
	Annual Forb Subtotal		3
		Bouteloua barbata	1
	Annual Grass Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		2
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
BA-110 Total Vegetation			7
BA-111	Bare		55
	Rock/Gravel		36
	Litter		9

Transect	Life Form	Scientific Name	Percent Cover
	Vegetation		0
BA-111 Total Vegetation		0	
BA-112	Bare		28
	Rock/Gravel		64
	Litter		6
	Vegetation		2
		Plantago patagonica	2
	Annual Forb Subtotal	2	
BA-112 Total Vegetation		2	
BA-113	Bare		90
	Rock/Gravel		4
	Litter		6
	Vegetation		0
BA-113 Total Vegetation		0	
BA-114	Bare		80
	Rock/Gravel		15
	Litter		4
	Vegetation		1
		Atriplex obovata	1
	Perennial Shrub Subtotal	1	
BA-114 Total Vegetation		1	
BA-115	Bare		75
	Rock/Gravel		21
	Litter		4
	Vegetation		0
BA-115 Total Vegetation		0	
BA-116	Bare		97
	Rock/Gravel		1
	Litter		1
	Vegetation		1
		Suaeda moquinii	1
	Perennial Forb Subtotal	1	
BA-116 Total Vegetation		1	
BA-117	Bare		27
	Rock/Gravel		69
	Litter		4
	Vegetation		0
BA-117 Total Vegetation		0	
BA-118	Bare		83
	Rock/Gravel		6

Transect	Life Form	Scientific Name	Percent Cover
	Litter		6
	Vegetation		5
		Eriogonum gordonii	4
	Annual Forb Subtotal		4
		Suaeda moquinii	1
	Perennial Forb Subtotal		1
BA-118 Total Vegetation			5
BA-119	Bare		70
	Rock/Gravel		14
	Litter		14
	Vegetation		2
		Atriplex powellii	1
	Annual Forb Subtotal		1
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
BA-119 Total Vegetation			2
BA-120	Bare		19
	Rock/Gravel		68
	Litter		7
	Vegetation		6
		Eriogonum gordonii	2
	Annual Forb Subtotal		2
		Atriplex obovata	4
	Perennial Shrub Subtotal		4
BA-120 Total Vegetation			6

Attachment C-6. Fall Dunes Cover and Frequency Data by Point Intercept Transect

Transect	Life Form	Scientific Name	Percent Cover
DU-121	Bare		74
	Rock/Gravel		0
	Litter		13
	Vegetation		13
		Cryptantha crassisepala	1
		Descurainia pinnata	3
		Dimorphocarpa wislizenii	2
		Mentzelia albicaulis	1
	Annual Forb Subtotal		7
		Oenothera pallida	1
	Perennial Forb Subtotal		1
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
		Atriplex canescens	1
		Chrysothamnus viscidiflorus	3
	Perennial Shrub Subtotal		4
DU-121 Total Vegetation			13
DU-122	Bare		78
	Rock/Gravel		0
	Litter		9
	Vegetation		13
		Cordylanthus wrightii	1
		Ipomopsis pumila	1
	Annual Forb Subtotal		2
		Vulpia octoflora	1
	Annual Grass Subtotal		1
		Sporobolus airoides	9
	Perennial Grass Subtotal		9
		Eriogonum leptocladon	1
	Perennial Shrub Subtotal		1
DU-122 Total Vegetation			13
DU-123	Bare		72
	Rock/Gravel		0
	Litter		17
	Vegetation		11
		Descurainia pinnata	1
	Annual Forb Subtotal		1
		Pleuraphis jamesii	3
		Sporobolus airoides	4
	Perennial Grass Subtotal		7
		Lycium pallidum	3
	Perennial Shrub Subtotal		3
DU-123 Total Vegetation			11

Transect	Life Form	Scientific Name	Percent Cover
DU-124	Bare		67
	Rock/Gravel		10
	Litter		9
	Vegetation		14
		Machaeranthera canescens	1
		Mentzelia albicaulis	1
		Salsola tragus	1
	Annual Forb Subtotal		3
		Aristida purpurea	1
		Pleuraphis jamesii	1
		Sporobolus airoides	2
	Perennial Grass Subtotal		4
		Ericameria [Chrysothamnus] nauseosus	7
	Perennial Shrub Subtotal		7
DU-124 Total Vegetation			14
DU-125	Bare		71
	Rock/Gravel		0
	Litter		12
	Vegetation		17
		Ambrosia acanthicarpa	1
		Descurainia pinnata	1
	Annual Forb Subtotal		2
		Achnatherum hymenoides	1
		Muhlenbergia pungens	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		3
		Ephedra Sp.	11
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		12
DU-125 Total Vegetation			17
DU-126	Bare		55
	Rock/Gravel		0
	Litter		30
	Vegetation		15
		Cryptantha crassisepala	2
		Descurainia pinnata	3
		Streptanthella longirostris	1
	Annual Forb Subtotal		6
		Pleuraphis jamesii	1
		Sporobolus airoides	6
	Perennial Grass Subtotal		7
		Sarcobatus vermiculatus	2
	Perennial Shrub Subtotal		2
DU-126 Total Vegetation			15

Transect	Life Form	Scientific Name	Percent Cover
DU-127	Bare		75
	Rock/Gravel		0
	Litter		11
	Vegetation		14
		Cryptantha crassisepala	2
		Descurainia pinnata	1
		Dimorphocarpa wislizenii	2
	Annual Forb Subtotal		5
		Achnatherum hymenoides	2
		Pleuraphis jamesii	5
		Sporobolus airoides	2
	Perennial Grass Subtotal		9
DU-127 Total Vegetation			14
DU-128	Bare		73
	Rock/Gravel		2
	Litter		12
	Vegetation		13
		Malacothrix sonchoides	1
	Annual Forb Subtotal		1
		Vulpia octoflora	1
	Annual Grass Subtotal		1
		Unidentified	1
	Forb Subtotal		1
		Sporobolus airoides	7
	Perennial Grass Subtotal		7
		Ephedra Sp.	1
		Ericameria [Chrysothamnus] nauseosus	1
	Perennial Shrub Subtotal		2
		Opuntia polyacantha	1
	Perennial Succulent Subtotal		1
DU-128 Total Vegetation			13
DU-129	Bare		73
	Rock/Gravel		1
	Litter		14
	Vegetation		12
		Cryptantha crassisepala	4
		Descurainia pinnata	2
	Annual Forb Subtotal		6
		Achnatherum hymenoides	1
	Perennial Grass Subtotal		1
		Gutierrezia sarothrae	5
	Perennial Shrub Subtotal		5
DU-129 Total Vegetation			12

Transect	Life Form	Scientific Name	Percent Cover
DU-130	Bare		73
	Rock/Gravel		0
	Litter		17
	Vegetation		10
		Mentzelia albicaulis	1
		Salsola tragus	2
	Annual Forb Subtotal		3
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	1
		Sporobolus airoides	2
	Perennial Grass Subtotal		3
		Ephedra Sp.	3
	Perennial Shrub Subtotal		3
DU-130 Total Vegetation			10
DU-131	Bare		84
	Rock/Gravel		0
	Litter		4
	Vegetation		12
		Dimorphocarpa wislizenii	2
		Salsola tragus	7
	Annual Forb Subtotal		9
		Achnatherum hymenoides	2
		Muhlenbergia pungens	1
	Perennial Grass Subtotal		3
DU-131 Total Vegetation			12
DU-132	Bare		60
	Rock/Gravel		0
	Litter		14
	Vegetation		26
		Cryptantha crassisepala	7
		Descurainia pinnata	1
		Machaeranthera canescens	9
		Mentzelia albicaulis	2
		Salsola tragus	3
	Annual Forb Subtotal		22
		Abronia fragrans	1
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		2
		Sporobolus contractus	2
	Perennial Grass Subtotal		2
DU-132 Total Vegetation			26
DU-133	Bare		51
	Rock/Gravel		13
	Litter		21

Transect	Life Form	Scientific Name	Percent Cover
	Vegetation		15
		Cryptantha crassisepala	2
		Salsola tragus	1
	Annual Forb Subtotal		3
		Achnatherum hymenoides	2
		Pleuraphis jamesii	2
		Sporobolus airoides	3
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		8
		Gutierrezia sarothrae	4
	Perennial Shrub Subtotal		4
DU-133 Total Vegetation			15
DU-134	Bare		70
	Rock/Gravel		0
	Litter		16
	Vegetation		14
		Descurainia pinnata	2
		Dimorphocarpa wislizenii	1
		Mentzelia albicaulis	1
		Salsola tragus	1
	Annual Forb Subtotal		5
		Achnatherum hymenoides	1
	Perennial Grass Subtotal		1
		Ephedra Sp.	6
		Gutierrezia sarothrae	2
	Perennial Shrub Subtotal		8
DU-134 Total Vegetation			14
DU-135	Bare		56
	Rock/Gravel		0
	Litter		16
	Vegetation		28
		Descurainia pinnata	1
		Phacelia crenulata	1
		Salsola tragus	1
	Annual Forb Subtotal		3
		Aristida purpurea	1
		Pleuraphis jamesii	3
		Sporobolus airoides	1
	Perennial Grass Subtotal		5
		Ephedra Sp.	6
		Ericameria [Chrysothamnus] nauseosus	14
	Perennial Shrub Subtotal		20
DU-135 Total Vegetation			28
DU-136	Bare		73

Transect	Life Form	Scientific Name	Percent Cover
	Rock/Gravel		0
	Litter		16
	Vegetation		11
		Cordylanthus wrightii	1
		Salsola tragus	1
	Annual Forb Subtotal		2
		Vulpia octoflora	2
	Annual Grass Subtotal		2
		Pleuraphis jamesii	1
		Sporobolus airoides	4
	Perennial Grass Subtotal		5
		Chrysothamnus viscidiflorus	1
		Ephedra Sp.	1
	Perennial Shrub Subtotal		2
DU-136 Total Vegetation			11
DU-137	Bare		65
	Rock/Gravel		0
	Litter		16
	Vegetation		19
		Cordylanthus wrightii	6
		Descurainia pinnata	1
	Annual Forb Subtotal		7
		Achnatherum hymenoides	1
		Pleuraphis jamesii	1
		Sporobolus airoides	6
	Perennial Grass Subtotal		8
		Ericameria [Chrysothamnus] nauseosus	2
		Eriogonum leptocladon	1
		Sarcobatus vermiculatus	1
	Perennial Shrub Subtotal		4
DU-137 Total Vegetation			19
DU-138	Bare		59
	Rock/Gravel		0
	Litter		23
	Vegetation		18
		Cryptantha crassisepala	3
		Descurainia pinnata	3
	Annual Forb Subtotal		6
		Vulpia octoflora	1
	Annual Grass Subtotal		1
		Aristida purpurea	1
		Pleuraphis jamesii	2
	Perennial Grass Subtotal		3
		Gutierrezia sarothrae	8
	Perennial Shrub Subtotal		8

Transect	Life Form	Scientific Name	Percent Cover	
DU-138 Total Vegetation			18	
DU-139	Bare			74
	Rock/Gravel			0
	Litter			14
	Vegetation			12
		Descurainia pinnata	5	
		Mentzelia albicaulis	2	
		Salsola tragus	2	
	Annual Forb Subtotal		9	
		Ericameria [Chrysothamnus] nauseosus	3	
	Perennial Shrub Subtotal		3	
DU-139 Total Vegetation			12	
DU-140	Bare			74
	Rock/Gravel			0
	Litter			8
	Vegetation			18
		Dimorphocarpa wislizenii	3	
		Salsola tragus	1	
	Annual Forb Subtotal		4	
		Oenothera pallida	2	
		Stephanomeria exigua	1	
	Perennial Forb Subtotal		3	
		Achnatherum hymenoides	8	
		Muhlenbergia pungens	3	
	Perennial Grass Subtotal		11	
DU-140 Total Vegetation			18	
DU-141	Bare			66
	Rock/Gravel			0
	Litter			17
	Vegetation			17
		Ambrosia acanthicarpa	1	
		Cryptantha crassisepala	2	
		Descurainia pinnata	1	
		Machaeranthera canescens	3	
		Plantago patagonica	1	
	Annual Forb Subtotal		8	
		Chaetopappa ericoides	1	
		Oenothera pallida	2	
	Perennial Forb Subtotal		3	
		Achnatherum hymenoides	2	
		Sporobolus airoides	3	
	Perennial Grass Subtotal		5	
		Atriplex canescens	1	
	Perennial Shrub Subtotal		1	

Transect	Life Form	Scientific Name	Percent Cover
DU-141 Total Vegetation			17
DU-142	Bare		56
	Rock/Gravel		0
	Litter		19
	Vegetation		25
		Cryptantha crassisepala	1
		Descurainia pinnata	3
		Dimorphocarpa wislizenii	1
		Linum puberulum	1
		Mentzelia albicaulis	4
	Annual Forb Subtotal		10
		Oenothera pallida	1
		Stephanomeria exigua	2
	Perennial Forb Subtotal		3
		Achnatherum hymenoides	3
		Pleuraphis jamesii	5
	Perennial Grass Subtotal		8
		Chrysothamnus viscidiflorus	1
		Ephedra Sp.	3
	Perennial Shrub Subtotal		4
DU-142 Total Vegetation			25
DU-143	Bare		57
	Rock/Gravel		0
	Litter		18
	Vegetation		25
		Cryptantha crassisepala	4
		Descurainia pinnata	9
		Machaeranthera canescens	4
	Annual Forb Subtotal		17
		Oenothera pallida	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	1
		Pleuraphis jamesii	1
		Sporobolus contractus	4
	Perennial Grass Subtotal		6
		Atriplex canescens	1
	Perennial Shrub Subtotal		1
DU-143 Total Vegetation			25
DU-144	Bare		80
	Rock/Gravel		0
	Litter		8
	Vegetation		12
		Salsola tragus	3
	Annual Forb Subtotal		3
		Sphaeralcea parvifolia	1

Transect	Life Form	Scientific Name	Percent Cover
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		2
		Atriplex canescens	1
		Chrysothamnus viscidiflorus	1
		Ephedra Sp.	4
	Perennial Shrub Subtotal		6
DU-144 Total Vegetation			12
DU-145	Bare		75
	Rock/Gravel		2
	Litter		8
	Vegetation		15
		Descurainia pinnata	2
		Mentzelia albicaulis	1
	Annual Forb Subtotal		3
		Aster Sp.	1
	Forb Subtotal		1
		Oenothera pallida	1
		Stephanomeria exigua	2
	Perennial Forb Subtotal		3
		Achnatherum hymenoides	2
		Muhlenbergia pungens	1
		Pleuraphis jamesii	2
	Perennial Grass Subtotal		5
		Ephedra Sp.	3
	Perennial Shrub Subtotal		3
DU-145 Total Vegetation			15
DU-146	Bare		68
	Rock/Gravel		0
	Litter		14
	Vegetation		18
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	1
		Muhlenbergia pungens	3
		Pleuraphis jamesii	3
	Perennial Grass Subtotal		7
		Chrysothamnus viscidiflorus	1
		Ephedra Sp.	2
		Ericameria [Chrysothamnus] nauseosus	5
	Perennial Shrub Subtotal		8
DU-146 Total Vegetation			18
DU-147	Bare		77
	Rock/Gravel		0

Transect	Life Form	Scientific Name	Percent Cover
	Litter		12
	Vegetation		11
		Ipomopsis pumila	2
	Annual Forb Subtotal		2
		Aristida purpurea	1
		Pleuraphis jamesii	3
		Sporobolus airoides	2
	Perennial Grass Subtotal		6
		Ericameria [Chrysothamnus] nauseosus	2
	Perennial Shrub Subtotal		2
		Unidentified	1
	Undetermined Subtotal		1
DU-147 Total Vegetation			11
DU-148	Bare		66
	Rock/Gravel		0
	Litter		18
	Vegetation		16
		Cryptantha crassisepala	4
		Descurainia pinnata	3
		Dimorphocarpa wislizenii	1
		Machaeranthera canescens	1
	Annual Forb Subtotal		9
		Oenothera pallida	1
		Stephanomeria exigua	1
	Perennial Forb Subtotal		2
		Achnatherum hymenoides	1
		Pleuraphis jamesii	2
	Perennial Grass Subtotal		3
		Chrysothamnus viscidiflorus	1
		Ephedra Sp.	1
	Perennial Shrub Subtotal		2
DU-148 Total Vegetation			16
DU-149	Bare		79
	Rock/Gravel		0
	Litter		13
	Vegetation		8
		Achnatherum hymenoides	1
		Pleuraphis jamesii	2
	Perennial Grass Subtotal		3
		Ephedra Sp.	1
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		2
DU-149 Total Vegetation			8
DU-150	Bare		68

Transect	Life Form	Scientific Name	Percent Cover	
	Rock/Gravel			0
	Litter			9
	Vegetation			23
	Perennial Forb Subtotal		1	
		Achnatherum hymenoides	1	
		Pleuraphis jamesii	3	
	Perennial Grass Subtotal		4	
		Ephedra Sp.	13	
	Perennial Shrub Subtotal		13	
DU-150 Total Vegetation			23	
DU-151	Bare			73
	Rock/Gravel			7
	Litter			10
	Vegetation			10
		Cryptantha crassisepala	1	
		Lappula occidentalis	1	
		Salsola tragus	1	
	Annual Forb Subtotal		3	
		Rumex hymenosepalus	1	
	Perennial Forb Subtotal		1	
		Achnatherum hymenoides	1	
		Muhlenbergia pungens	2	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		5	
		Atriplex canescens	1	
	Perennial Shrub Subtotal		1	
DU-151 Total Vegetation			10	
DU-152	Bare			81
	Rock/Gravel			0
	Litter			5
	Vegetation			14
		Dicoria Sp.	1	
		Salsola tragus	11	
	Annual Forb Subtotal		12	
		Oenothera pallida	1	
	Perennial Forb Subtotal		1	
		Achnatherum hymenoides	1	
	Perennial Grass Subtotal		1	
DU-152 Total Vegetation			14	
DU-153	Bare			72
	Rock/Gravel			5
	Litter			13
	Vegetation			10
		Machaeranthera canescens	1	
		Mentzelia albicaulis	3	

Transect	Life Form	Scientific Name	Percent Cover
		Salsola tragus	2
		Streptanthella longirostris	2
	Annual Forb Subtotal		8
		Aristida purpurea	1
	Perennial Grass Subtotal		1
		Ericameria [Chrysothamnus] nauseosus	1
	Perennial Shrub Subtotal		1
DU-153 Total Vegetation			10
DU-154	Bare		78
	Rock/Gravel		0
	Litter		8
	Vegetation		14
		Dimorphocarpa wislizenii	3
	Annual Forb Subtotal		3
		Penstemon Sp.	1
	Forb Subtotal		1
		Achnatherum hymenoides	1
	Perennial Grass Subtotal		1
		Ephedra Sp.	5
		Eriogonum leptocladon	4
	Perennial Shrub Subtotal		9
DU-154 Total Vegetation			14
DU-155	Bare		80
	Rock/Gravel		0
	Litter		13
	Vegetation		7
		Aristida purpurea	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		2
		Chrysothamnus viscidiflorus	1
		Ephedra Sp.	3
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		5
DU-155 Total Vegetation			7
DU-156	Bare		65
	Rock/Gravel		0
	Litter		17
	Vegetation		18
		Cryptantha crassisepala	2
		Descurainia pinnata	3
		Dimorphocarpa wislizenii	5
		Machaeranthera canescens	3
	Annual Forb Subtotal		13
		Oenothera pallida	1

Transect	Life Form	Scientific Name	Percent Cover	
	Perennial Forb Subtotal		1	
		Achnatherum hymenoides	2	
		Muhlenbergia pungens	2	
	Perennial Grass Subtotal		4	
DU-156 Total Vegetation			18	
DU-157	Bare			65
	Rock/Gravel			0
	Litter			23
	Vegetation			12
		Cryptantha crassisepala	3	
		Descurainia pinnata	4	
		Mentzelia albicaulis	1	
	Annual Forb Subtotal		8	
		Vulpia octoflora	1	
	Annual Grass Subtotal		1	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
		Ericameria [Chrysothamnus] nauseosus	2	
	Perennial Shrub Subtotal		2	
DU-157 Total Vegetation			12	
DU-158	Bare			80
	Rock/Gravel			0
	Litter			5
	Vegetation			15
		Dimorphocarpa wislizenii	4	
		Mentzelia albicaulis	1	
		Salsola tragus	2	
		Streptanthella longirostris	1	
	Annual Forb Subtotal		8	
		Achnatherum hymenoides	2	
	Perennial Grass Subtotal		2	
		Artemisia filifolia	1	
		Chrysothamnus viscidiflorus	2	
		Ephedra Sp.	2	
	Perennial Shrub Subtotal		5	
DU-158 Total Vegetation			15	
DU-159	Bare			71
	Rock/Gravel			0
	Litter			15
	Vegetation			14
		Cryptantha crassisepala	1	
		Salsola tragus	2	
		Streptanthella longirostris	1	
	Annual Forb Subtotal		4	

Transect	Life Form	Scientific Name	Percent Cover
		Vulpia octoflora	1
	Annual Grass Subtotal		1
		Chaetopappa ericoides	1
	Perennial Forb Subtotal		1
		Muhlenbergia pungens	1
		Pleuraphis jamesii	3
	Perennial Grass Subtotal		4
		Ephedra Sp.	2
		Ericameria [Chrysothamnus] nauseosus	1
		Unidentified	1
	Perennial Shrub Subtotal		4
DU-159 Total Vegetation			14
DU-160	Bare		79
	Rock/Gravel		0
	Litter		10
	Vegetation		11
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		1
		Muhlenbergia pungens	3
		Sporobolus contractus	1
	Perennial Grass Subtotal		4
		Ephedra Sp.	6
	Perennial Shrub Subtotal		6
DU-160 Total Vegetation			11

Attachment C-7. Fall Reference Arroyo Shrub Cover and Frequency Data by Point Intercept Transect

Transect	Life Form	Scientific Name	Percent Cover
RAS-041	Bare		23
	Rock/Gravel		0
	Litter		37
	Vegetation		40
		Aster Sp.	1
		Plantago patagonica	1
		Portulaca oleracea	2
	Annual Forb Subtotal		4
		Bouteloua barbata	1
		Bromus tectorum	16
		Hordeum pusillum	5
	Annual Grass Subtotal		22
		Grindelia squarrosa	1
	Perennial Forb Subtotal		1
		Sporobolus airoides	13
	Perennial Grass Subtotal		13
RAS-041 Total Vegetation			40
RAS-042	Bare		21
	Rock/Gravel		0
	Litter		41
	Vegetation		38
		Cryptantha crassisepala	1
		Erigeron bellidiastrum	1
		Plantago patagonica	3
	Annual Forb Subtotal		5
		Hordeum pusillum	8
	Annual Grass Subtotal		8
		Grindelia squarrosa	7
	Perennial Forb Subtotal		7
		Pleuraphis jamesii	1
		Sporobolus airoides	11
	Perennial Grass Subtotal		12
		Atriplex canescens	3
		Atriplex obovata	1
		Gutierrezia sarothrae	1
		Lycium pallidum	1
	Perennial Shrub Subtotal		6
RAS-042 Total Vegetation			38
RAS-043	Bare		90
	Rock/Gravel		1
	Litter		5
	Vegetation		4

Transect	Life Form	Scientific Name	Percent Cover
		Descurainia pinnata	1
		Halogeton glomeratus	1
		Salsola tragus	1
	Annual Forb Subtotal		3
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
RAS-043 Total Vegetation			4
RAS-044	Bare		51
	Rock/Gravel		0
	Litter		20
	Vegetation		29
		Hordeum pusillum	14
	Annual Grass Subtotal		14
		Sporobolus airoides	13
	Perennial Grass Subtotal		13
		Atriplex obovata	2
	Perennial Shrub Subtotal		2
RAS-044 Total Vegetation			29
RAS-045	Bare		50
	Rock/Gravel		1
	Litter		25
	Vegetation		24
		Bouteloua barbata	1
		Eragrostis cilianensis	4
		Eragrostis cilianensis	2
		Hordeum pusillum	11
	Annual Grass Subtotal		18
		Senecio Sp.	1
	Forb Subtotal		1
		Chamaesyce fendleri	2
		Sphaeralcea coccinea	1
	Perennial Forb Subtotal		3
		Pleuraphis jamesii	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		2
RAS-045 Total Vegetation			24
RAS-046	Bare		46
	Rock/Gravel		0
	Litter		23
	Vegetation		31
		Erigeron bellidiastrum	7
		Plantago patagonica	1
	Annual Forb Subtotal		8
		Bromus tectorum	1
		Vulpia octoflora	4

Transect	Life Form	Scientific Name	Percent Cover
	Annual Grass Subtotal		5
		Pleuraphis jamesii	6
		Sporobolus airoides	11
		Sporobolus contractus	1
	Perennial Grass Subtotal		18
RAS-046 Total Vegetation			31
RAS-047	Bare		35
	Rock/Gravel		0
	Litter		39
	Vegetation		26
		Plantago patagonica	3
	Annual Forb Subtotal		3
		Bromus tectorum	1
		Hordeum pusillum	13
	Annual Grass Subtotal		14
		Pleuraphis jamesii	2
		Sporobolus airoides	7
	Perennial Grass Subtotal		9
RAS-047 Total Vegetation			26
RAS-049	Bare		80
	Rock/Gravel		0
	Litter		16
	Vegetation		4
		Atriplex powellii	1
		Halogeton glomeratus	1
		Salsola tragus	1
	Annual Forb Subtotal		3
		Sarcobatus vermiculatus	1
	Perennial Shrub Subtotal		1
RAS-049 Total Vegetation			4
RAS-050	Bare		34
	Rock/Gravel		2
	Litter		31
	Vegetation		33
		Lappula occidentalis	1
		Plantago patagonica	17
	Annual Forb Subtotal		18
		Pleuraphis jamesii	6
		Sporobolus airoides	5
	Perennial Grass Subtotal		11
		Atriplex obovata	2
	Perennial Shrub Subtotal		2
		Opuntia polyacantha	2
	Perennial Succulent Subtotal		2
RAS-050 Total Vegetation			33

Transect	Life Form	Scientific Name	Percent Cover
RAS-051	Bare		68
	Rock/Gravel		10
	Litter		12
	Vegetation		10
		Lappula occidentalis	1
		Plantago patagonica	1
		Salsola tragus	1
		Townsendia annua	1
	Annual Forb Subtotal		4
		Pleuraphis jamesii	1
		Sporobolus airoides	5
	Perennial Grass Subtotal		6
RAS-051 Total Vegetation			10
RAS-052	Bare		67
	Rock/Gravel		0
	Litter		17
	Vegetation		16
		Salsola tragus	2
	Annual Forb Subtotal		2
		Hordeum pusillum	11
	Annual Grass Subtotal		11
		Sporobolus airoides	2
	Perennial Grass Subtotal		2
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
RAS-052 Total Vegetation			16
RAS-053	Bare		31
	Rock/Gravel		0
	Litter		35
	Vegetation		34
		Erigeron bellidiastrum	1
		Plantago patagonica	3
	Annual Forb Subtotal		4
		Bromus tectorum	2
		Hordeum pusillum	6
	Annual Grass Subtotal		8
		Aster Sp.	1
	Forb Subtotal		1
		Grindelia squarrosa	3
	Perennial Forb Subtotal		3
		Elymus elymoides	1
		Pleuraphis jamesii	9
		Sporobolus airoides	8
	Perennial Grass Subtotal		18
RAS-053 Total Vegetation			34

Transect	Life Form	Scientific Name	Percent Cover
RAS-054	Bare		60
	Rock/Gravel		1
	Litter		29
	Vegetation		10
		Salsola tragus	3
	Annual Forb Subtotal		3
		Pleuraphis jamesii	2
		Sporobolus airoides	3
	Perennial Grass Subtotal		5
		Atriplex obovata	2
	Perennial Shrub Subtotal		2
RAS-054 Total Vegetation			10
RAS-055	Bare		84
	Rock/Gravel		0
	Litter		6
	Vegetation		10
		Salsola tragus	1
	Annual Forb Subtotal		1
		Hordeum pusillum	1
	Annual Grass Subtotal		1
		Grindelia squarrosa	2
	Perennial Forb Subtotal		2
		Sporobolus airoides	6
	Perennial Grass Subtotal		6
RAS-055 Total Vegetation			10
RAS-056	Bare		49
	Rock/Gravel		0
	Litter		31
	Vegetation		20
		Descurainia pinnata	1
		Erodium cicutarium	1
		Salsola tragus	3
	Annual Forb Subtotal		5
		Hordeum pusillum	5
	Annual Grass Subtotal		5
		Sporobolus airoides	10
	Perennial Grass Subtotal		10
RAS-056 Total Vegetation			20
RAS-057	Bare		74
	Rock/Gravel		0
	Litter		18
	Vegetation		8
		Cryptantha crassisepala	1
		Salsola tragus	1

Transect	Life Form	Scientific Name	Percent Cover	
	Annual Forb Subtotal		2	
		Hordeum pusillum	4	
	Annual Grass Subtotal		4	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
RAS-057 Total Vegetation			8	
RAS-058	Bare			66
	Rock/Gravel			0
	Litter			22
	Vegetation			12
		Plantago patagonica	1	
		Salsola tragus	1	
	Annual Forb Subtotal		2	
		Pleuraphis jamesii	3	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		5	
		Atriplex confertifolia	1	
		Atriplex obovata	2	
		Sarcobatus vermiculatus	2	
	Perennial Shrub Subtotal		5	
RAS-058 Total Vegetation			12	
RAS-059	Bare			58
	Rock/Gravel			0
	Litter			22
	Vegetation			20
		Erodium cicutarium	2	
	Annual Forb Subtotal		2	
		Grindelia squarrosa	1	
		Sphaeralcea coccinea	1	
	Perennial Forb Subtotal		2	
		Sporobolus airoides	14	
	Perennial Grass Subtotal		14	
		Atriplex confertifolia	1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		2	
RAS-059 Total Vegetation			20	
RAS-060	Bare			60
	Rock/Gravel			6
	Litter			17
	Vegetation			17
		Malacothrix sonchoides	1	
		Phacelia crenulata	1	
		Plantago patagonica	6	

Transect	Life Form	Scientific Name	Percent Cover
		Salsola tragus	1
	Annual Forb Subtotal		9
		Monroa squarrosa	1
	Annual Grass Subtotal		1
		Sporobolus airoides	6
	Perennial Grass Subtotal		6
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		1
RAS-060 Total Vegetation			17
RAS-061	Bare		46
	Rock/Gravel		0
	Litter		27
	Vegetation		27
		Descurainia pinnata	1
		Erigeron bellidiastrum	2
		Plantago patagonica	4
	Annual Forb Subtotal		7
		Hordeum pusillum	4
		Vulpia octoflora	1
	Annual Grass Subtotal		5
		Pleuraphis jamesii	1
		Sporobolus airoides	14
	Perennial Grass Subtotal		15
RAS-061 Total Vegetation			27
RAS-062	Bare		72
	Rock/Gravel		1
	Litter		12
	Vegetation		15
		Townsendia annua	1
	Annual Forb Subtotal		1
		Senicio spartoides	3
	Perennial Forb Subtotal		3
		Pleuraphis jamesii	1
		Sporobolus airoides	7
	Perennial Grass Subtotal		8
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
		Opuntia polyacantha	2
	Perennial Succulent Subtotal		2
RAS-062 Total Vegetation			15
RAS-063	Bare		56
	Rock/Gravel		0
	Litter		20
	Vegetation		24
		Cryptantha crassisepala	1

Transect	Life Form	Scientific Name	Percent Cover
		Salsola tragus	1
	Annual Forb Subtotal		2
		Hordeum pusillum	3
	Annual Grass Subtotal		3
		Pleuraphis jamesii	6
		Sporobolus airoides	8
	Perennial Grass Subtotal		14
		Sarcobatus vermiculatus	5
	Perennial Shrub Subtotal		5
RAS-063 Total Vegetation			24
RAS-064	Bare		31
	Rock/Gravel		0
	Litter		27
	Vegetation		42
		Cryptantha crassisepala	1
		Erigeron bellidiastrum	2
		Plantago patagonica	1
	Annual Forb Subtotal		4
		Bromus tectorum	4
		Hordeum pusillum	7
		Jointed goat grass	2
	Annual Grass Subtotal		13
		Grindelia squarrosa	2
	Perennial Forb Subtotal		2
		Pleuraphis jamesii	4
		Sporobolus airoides	19
	Perennial Grass Subtotal		23
RAS-064 Total Vegetation			42
RAS-065	Bare		40
	Rock/Gravel		4
	Litter		40
	Vegetation		16
		Hordeum pusillum	3
	Annual Grass Subtotal		3
		Sporobolus airoides	13
	Perennial Grass Subtotal		13
RAS-065 Total Vegetation			16
RAS-066	Bare		60
	Rock/Gravel		0
	Litter		21
	Vegetation		19
		Erigeron bellidiastrum	1
		Plantago patagonica	1
		Townsendia annua	1
	Annual Forb Subtotal		3

Transect	Life Form	Scientific Name	Percent Cover
		Bromus tectorum	3
		Hordeum pusillum	3
	Annual Grass Subtotal		6
		Grindelia squarrosa	3
	Perennial Forb Subtotal		3
		Pleuraphis jamesii	1
		Sporobolus airoides	5
	Perennial Grass Subtotal		6
		Opuntia polyacantha	1
	Perennial Succulent Subtotal		1
RAS-066 Total Vegetation			19
RAS-067	Bare		42
	Rock/Gravel		0
	Litter		35
	Vegetation		23
		Plantago patagonica	1
	Annual Forb Subtotal		1
		Hordeum pusillum	10
	Annual Grass Subtotal		10
		Grindelia squarrosa	1
	Perennial Forb Subtotal		1
		Sporobolus airoides	11
	Perennial Grass Subtotal		11
RAS-067 Total Vegetation			23
RAS-068	Bare		32
	Rock/Gravel		0
	Litter		31
	Vegetation		37
		Cryptantha crassisepala	3
		Plantago patagonica	2
		Salsola tragus	1
		Townsendia annua	2
	Annual Forb Subtotal		8
		Hordeum pusillum	13
	Annual Grass Subtotal		13
		Sporobolus airoides	16
	Perennial Grass Subtotal		16
RAS-068 Total Vegetation			37
RAS-069	Bare		77
	Rock/Gravel		2
	Litter		15
	Vegetation		6
		Atriplex powellii	1
		Descurainia pinnata	1
		Phacelia crenulata	1

Transect	Life Form	Scientific Name	Percent Cover	
		Salsola tragus	1	
	Annual Forb Subtotal		4	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
RAS-069 Total Vegetation			6	
RAS-070	Bare			77
	Rock/Gravel			7
	Litter			8
	Vegetation			8
		Halogeton glomeratus	7	
	Annual Forb Subtotal		7	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
RAS-070 Total Vegetation			8	
RAS-071	Bare			48
	Rock/Gravel			3
	Litter			27
	Vegetation			22
		Descurainia pinnata	1	
		Eriogonum gordonii	1	
		Halogeton glomeratus	1	
		Lappula occidentalis	1	
	Annual Forb Subtotal		4	
		Hordeum pusillum	2	
	Annual Grass Subtotal		2	
		Sporobolus airoides	16	
	Perennial Grass Subtotal		16	
RAS-071 Total Vegetation			22	
RAS-072	Bare			69
	Rock/Gravel			12
	Litter			10
	Vegetation			9
		Halogeton glomeratus	4	
		Lappula occidentalis	1	
		Salsola tragus	1	
		Townsendia annua	1	
	Annual Forb Subtotal		7	
		Eriogonum jamesii	1	
	Perennial Forb Subtotal		1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
RAS-072 Total Vegetation			9	

Transect	Life Form	Scientific Name	Percent Cover
RAS-073	Bare		72
	Rock/Gravel		0
	Litter		19
	Vegetation		9
		Cryptantha crassisepala	1
		Salsola tragus	1
	Annual Forb Subtotal		2
		Hordeum pusillum	1
	Annual Grass Subtotal		1
		Pleuraphis jamesii	2
		Sporobolus airoides	2
	Perennial Grass Subtotal		4
		Sarcobatus vermiculatus	2
	Perennial Shrub Subtotal		2
RAS-073 Total Vegetation			9
RAS-074	Bare		52
	Rock/Gravel		0
	Litter		25
	Vegetation		23
		Erigeron bellidiastrum	1
		Plantago patagonica	1
	Annual Forb Subtotal		2
		Hordeum pusillum	10
	Annual Grass Subtotal		10
		Aster Sp.	1
	Forb Subtotal		1
		Grindelia squarrosa	1
	Perennial Forb Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus airoides	8
	Perennial Grass Subtotal		9
RAS-074 Total Vegetation			23
RAS-075	Bare		39
	Rock/Gravel		0
	Litter		34
	Vegetation		27
		Descurainia pinnata	1
		Plantago patagonica	9
	Annual Forb Subtotal		10
		Hordeum pusillum	1
		Vulpia octoflora	2
	Annual Grass Subtotal		3
		Pleuraphis jamesii	4
		Sporobolus airoides	10
	Perennial Grass Subtotal		14
RAS-075 Total Vegetation			27

Transect	Life Form	Scientific Name	Percent Cover
RAS-076	Bare		70
	Rock/Gravel		0
	Litter		20
	Vegetation		10
		Halogeton glomeratus	2
	Annual Forb Subtotal		2
		Hordeum pusillum	5
	Annual Grass Subtotal		5
		Sporobolus airoides	3
	Perennial Grass Subtotal		3
RAS-076 Total Vegetation			10
RAS-077	Bare		31
	Rock/Gravel		0
	Litter		34
	Vegetation		35
		Plantago patagonica	3
	Annual Forb Subtotal		3
		Bromus tectorum	5
		Hordeum pusillum	8
	Annual Grass Subtotal		13
		Grindelia squarrosa	2
	Perennial Forb Subtotal		2
		Sporobolus airoides	16
	Perennial Grass Subtotal		16
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
RAS-077 Total Vegetation			35
RAS-078	Bare		50
	Rock/Gravel		3
	Litter		26
	Vegetation		21
		Erodium cicutarium	1
		Lappula occidentalis	2
		Plantago patagonica	1
		Salsola tragus	3
	Annual Forb Subtotal		7
		Hordeum pusillum	4
		Monroa squarrosa	2
	Annual Grass Subtotal		6
		Sporobolus airoides	6
	Perennial Grass Subtotal		6
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
		Opuntia polyacantha	1
	Perennial Succulent Subtotal		1

Transect	Life Form	Scientific Name	Percent Cover
RAS-078 Total Vegetation			21
RAS-079	Bare		35
	Rock/Gravel		0
	Litter		32
	Vegetation		33
		Erodium cicutarium	1
	Annual Forb Subtotal		1
		Hordeum pusillum	13
	Annual Grass Subtotal		13
		Chamaesyce fendleri	2
	Perennial Forb Subtotal		2
		Pleuraphis jamesii	2
		Sporobolus airoides	13
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		16
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		1
RAS-079 Total Vegetation			33
RAS-080	Bare		48
	Rock/Gravel		0
	Litter		21
	Vegetation		31
		Descurainia pinnata	1
		Erigeron bellidiastrum	4
		Plantago patagonica	2
	Annual Forb Subtotal		7
		Hordeum pusillum	2
		Vulpia octoflora	5
	Annual Grass Subtotal		7
		Pleuraphis jamesii	4
		Sporobolus airoides	13
	Perennial Grass Subtotal		17
RAS-080 Total Vegetation			31

Attachment C-8. Fall Reference Alkali Wash Cover and Frequency Data by Point Intercept Transect

Transect	Life Form	Scientific Name	Percent Cover	
RAW-001	Bare			40
	Rock/Gravel			46
	Litter			10
	Vegetation			4
		Ipomopsis pumila	1	
		Plantago patagonica	2	
		Townsendia annua	1	
	Annual Forb Subtotal		4	
RAW-001 Total Vegetation			4	
RAW-002	Bare			50
	Rock/Gravel			37
	Litter			10
	Vegetation			3
		Eriogonum gordonii	1	
		Salsola tragus	1	
	Annual Forb Subtotal		2	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
RAW-002 Total Vegetation			3	
RAW-003	Bare			66
	Rock/Gravel			19
	Litter			12
	Vegetation			3
		Plantago patagonica	1	
		Townsendia annua	2	
	Annual Forb Subtotal		3	
RAW-003 Total Vegetation			3	
RAW-004	Bare			38
	Rock/Gravel			0
	Litter			41
	Vegetation			21
		Pleuraphis jamesii	4	
		Sporobolus airoides	8	
	Perennial Grass Subtotal		13	
		Atriplex canescens	1	
	Perennial Shrub Subtotal		1	
RAW-004 Total Vegetation			21	
RAW-005	Bare			66
	Rock/Gravel			1

Transect	Life Form	Scientific Name	Percent Cover
	Litter		21
	Vegetation		12
		Salsola tragus	2
	Annual Forb Subtotal		8
		Lygodesmia grandiflora	1
	Perennial Forb Subtotal		1
		Sporobolus airoides	3
	Perennial Grass Subtotal		3
RAW-005 Total Vegetation			12
RAW-006	Bare		50
	Rock/Gravel		26
	Litter		17
	Vegetation		7
		Salsola tragus	2
	Annual Forb Subtotal		2
		Bouteloua barbata	1
	Annual Grass Subtotal		1
		Sporobolus airoides	2
	Perennial Grass Subtotal		2
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
		Opuntia polyacantha	1
	Perennial Succulent Subtotal		1
RAW-006 Total Vegetation			7
RAW-007	Bare		50
	Rock/Gravel		24
	Litter		12
	Vegetation		14
		Atriplex powellii	1
		Cryptantha crassisepala	1
		Descurainia pinnata	3
		Eriogonum gordonii	1
		Halogeton glomeratus	1
		Plantago patagonica	2
		Salsola tragus	5
	Annual Forb Subtotal		14
RAW-007 Total Vegetation			14
RAW-008	Bare		68
	Rock/Gravel		24
	Litter		6
	Vegetation		2
		Atriplex powellii	1
		Eriogonum gordonii	1
	Annual Forb Subtotal		2
RAW-008 Total Vegetation			2

Transect	Life Form	Scientific Name	Percent Cover
RAW-009	Bare		58
	Rock/Gravel		34
	Litter		5
	Vegetation		3
		Eriogonum gordonii	2
		Plantago patagonica	1
	Annual Forb Subtotal		3
RAW-009 Total Vegetation			3
RAW-010	Bare		67
	Rock/Gravel		10
	Litter		13
	Vegetation		10
		Cryptantha crassisepala	1
		Lappula occidentalis	1
		Plantago patagonica	4
		Townsendia annua	1
	Annual Forb Subtotal		7
		Bouteloua barbata	1
	Annual Grass Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		2
RAW-010 Total Vegetation			10
RAW-011	Bare		65
	Rock/Gravel		29
	Litter		5
	Vegetation		1
		Halogeton glomeratus	1
	Annual Forb Subtotal		1
RAW-011 Total Vegetation			1
RAW-012	Bare		66
	Rock/Gravel		30
	Litter		3
	Vegetation		1
		Lappula occidentalis	1
	Annual Forb Subtotal		1
RAW-012 Total Vegetation			1
RAW-013	Bare		55
	Rock/Gravel		19
	Litter		18
	Vegetation		8
		Cryptantha crassisepala	1
		Plantago patagonica	2

Transect	Life Form	Scientific Name	Percent Cover
	Annual Forb Subtotal		3
		Pleuraphis jamesii	1
		Sporobolus airoides	3
	Perennial Grass Subtotal		4
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
RAW-013 Total Vegetation			8
RAW-014	Bare		76
	Rock/Gravel		19
	Litter		1
	Vegetation		4
		Eriogonum gordonii	2
		Halogeton glomeratus	1
	Annual Forb Subtotal		3
		Atriplex gardneri	1
	Perennial Shrub Subtotal		1
RAW-014 Total Vegetation			4
RAW-015	Bare		54
	Rock/Gravel		22
	Litter		16
	Vegetation		8
		Chaenactis stevioides	1
		Phacelia crenulata	1
		Plantago patagonica	1
		Salsola tragus	1
		Townsendia annua	2
	Annual Forb Subtotal		6
		Atriplex obovata	2
	Perennial Shrub Subtotal		2
RAW-015 Total Vegetation			8
RAW-016	Bare		32
	Rock/Gravel		68
	Litter		0
	Vegetation		0
RAW-016 Total Vegetation			0
RAW-017	Bare		73
	Rock/Gravel		6
	Litter		15
	Vegetation		6
		Lappula occidentalis	1
		Plantago patagonica	1
	Annual Forb Subtotal		2
		Monroa squarrosa	2
	Annual Grass Subtotal		2

Transect	Life Form	Scientific Name	Percent Cover	
		Sphaeralcea parvifolia	1	
	Perennial Forb Subtotal		1	
		Pleuraphis jamesii	1	
	Perennial Grass Subtotal		1	
RAW-017 Total Vegetation			6	
RAW-018	Bare			67
	Rock/Gravel			15
	Litter			13
	Vegetation			5
		Lappula occidentalis	1	
		Plantago patagonica	2	
		Salsola tragus	1	
		Townsendia annua	1	
	Annual Forb Subtotal		5	
RAW-018 Total Vegetation			5	
RAW-019	Bare			58
	Rock/Gravel			33
	Litter			6
	Vegetation			3
	Perennial Shrub Subtotal		1	
RAW-019 Total Vegetation			3	
RAW-020	Bare			75
	Rock/Gravel			0
	Litter			15
	Vegetation			10
		Halogeton glomeratus	1	
		Salsola tragus	3	
	Annual Forb Subtotal		4	
		Monroa squarrosa	1	
	Annual Grass Subtotal		1	
		Bouteloua gracilis	2	
		Pleuraphis jamesii	2	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		5	
RAW-020 Total Vegetation			10	
RAW-021	Bare			65
	Rock/Gravel			4
	Litter			15
	Vegetation			16
		Cryptantha crassisepala	1	
		Descurainia pinnata	1	
		Eriogonum gordonii	1	
		Lappula occidentalis	1	
		Plantago patagonica	3	

Transect	Life Form	Scientific Name	Percent Cover
	Annual Forb Subtotal		7
		Monroa squarrosa	3
	Annual Grass Subtotal		3
		Chamaesyce fendleri	1
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		2
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
		Atriplex gardneri	1
		Atriplex obovata	1
		Sarcobatus vermiculatus	1
	Perennial Shrub Subtotal		3
RAW-021 Total Vegetation			16
RAW-022	Bare		63
	Rock/Gravel		22
	Litter		8
	Vegetation		7
		Halogeton glomeratus	3
		Townsendia annua	1
	Annual Forb Subtotal		4
		Pleuraphis jamesii	3
	Perennial Grass Subtotal		3
RAW-022 Total Vegetation			7
RAW-023	Bare		75
	Rock/Gravel		3
	Litter		16
	Vegetation		6
		Salsola tragus	4
	Annual Forb Subtotal		4
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
RAW-023 Total Vegetation			6
RAW-024	Bare		56
	Rock/Gravel		37
	Litter		4
	Vegetation		3
		Townsendia annua	2
	Annual Forb Subtotal		2
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
RAW-024 Total Vegetation			3
RAW-025	Bare		21

Transect	Life Form	Scientific Name	Percent Cover
	Rock/Gravel		0
	Litter		31
	Vegetation		48
		Erodium cicutarium	2
		Plantago patagonica	2
	Annual Forb Subtotal		4
		Bromus rubens	1
		Hordeum pusillum	21
	Annual Grass Subtotal		22
		Grindelia squarrosa	6
	Perennial Forb Subtotal		6
		Pleuraphis jamesii	7
		Sporobolus airoides	6
	Perennial Grass Subtotal		13
		Sarcobatus vermiculatus	3
	Perennial Shrub Subtotal		3
RAW-025 Total Vegetation			48
RAW-026	Bare		60
	Rock/Gravel		35
	Litter		3
	Vegetation		2
		Descurainia pinnata	1
		Plantago patagonica	1
	Annual Forb Subtotal		2
RAW-026 Total Vegetation			2
RAW-027	Bare		86
	Rock/Gravel		0
	Litter		9
	Vegetation		5
		Descurainia pinnata	1
		Halogeton glomeratus	3
		Salsola tragus	1
	Annual Forb Subtotal		5
RAW-027 Total Vegetation			5
RAW-028	Bare		73
	Rock/Gravel		4
	Litter		14
	Vegetation		9
		Descurainia pinnata	1
		Lappula occidentalis	1
		Plantago patagonica	1
		Salsola tragus	1
	Annual Forb Subtotal		4
		Hordeum pusillum	1
	Annual Grass Subtotal		1

Transect	Life Form	Scientific Name	Percent Cover	
		Eriogonum jamesii	1	
		Sphaeralcea coccinea	1	
	Perennial Forb Subtotal		2	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
RAW-028 Total Vegetation			9	
RAW-029	Bare			79
	Rock/Gravel			4
	Litter			12
	Vegetation			5
		Hordeum pusillum	1	
	Annual Grass Subtotal		1	
		Pleuraphis jamesii	2	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		3	
		Atriplex gardneri	1	
	Perennial Shrub Subtotal		1	
RAW-029 Total Vegetation			5	
RAW-030	Bare			50
	Rock/Gravel			32
	Litter			12
	Vegetation			6
		Cryptantha crassisepala	1	
		Halogeton glomeratus	1	
		Plantago patagonica	2	
	Annual Forb Subtotal		4	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
RAW-030 Total Vegetation			6	
RAW-031	Bare			68
	Rock/Gravel			6
	Litter			16
	Vegetation			10
		Descurainia pinnata	1	
		Halogeton glomeratus	4	
		Salsola tragus	2	
	Annual Forb Subtotal		7	
		Pleuraphis jamesii	3	
	Perennial Grass Subtotal		3	
RAW-031 Total Vegetation			10	

Transect	Life Form	Scientific Name	Percent Cover
RAW-032	Bare		79
	Rock/Gravel		1
	Litter		14
	Vegetation		6
		Descurainia pinnata	1
	Annual Forb Subtotal		1
		Monroa squarrosa	1
	Annual Grass Subtotal		1
		Sporobolus airoides	2
	Perennial Grass Subtotal		2
		Atriplex obovata	2
	Perennial Shrub Subtotal		2
RAW-032 Total Vegetation			6
RAW-033	Bare		64
	Rock/Gravel		28
	Litter		5
	Vegetation		3
		Descurainia pinnata	1
		Townsendia annua	1
	Annual Forb Subtotal		2
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
RAW-033 Total Vegetation			3
RAW-034	Bare		51
	Rock/Gravel		31
	Litter		11
	Vegetation		7
		Descurainia pinnata	1
		Eriogonum gordonii	3
		Salsola tragus	2
	Annual Forb Subtotal		6
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
RAW-034 Total Vegetation			7
RAW-035	Bare		51
	Rock/Gravel		33
	Litter		10
	Vegetation		6
		Salsola tragus	1
		Townsendia annua	1
	Annual Forb Subtotal		2
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		1
		Gutierrezia sarothrae	3
	Perennial Shrub Subtotal		3

Transect	Life Form	Scientific Name	Percent Cover	
RAW-035 Total Vegetation			6	
RAW-036	Bare			69
	Rock/Gravel			26
	Litter			4
	Vegetation			1
		Townsendia annua	1	
	Annual Forb Subtotal		1	
RAW-036 Total Vegetation			1	
RAW-037	Bare			61
	Rock/Gravel			36
	Litter			1
	Vegetation			2
		Halogeton glomeratus	1	
		Lappula occidentalis	1	
	Annual Forb Subtotal		2	
RAW-037 Total Vegetation			2	
RAW-038	Bare			54
	Rock/Gravel			30
	Litter			7
	Vegetation			9
		Atriplex powellii	4	
		Eriogonum gordonii	3	
		Lappula occidentalis	1	
		Salsola tragus	1	
	Annual Forb Subtotal		9	
RAW-038 Total Vegetation			9	
RAW-039	Bare			64
	Rock/Gravel			35
	Litter			0
	Vegetation			1
		Halogeton glomeratus	1	
	Annual Forb Subtotal		1	
RAW-039 Total Vegetation			1	
RAW-040	Bare			68
	Rock/Gravel			17
	Litter			12
	Vegetation			3
		Plantago patagonica	1	
	Annual Forb Subtotal		1	
		Eragrostis cilianensis	1	
	Annual Grass Subtotal		1	
		Sphaeralcea coccinea	1	

Transect	Life Form	Scientific Name	Percent Cover
	Perennial Forb Subtotal		1
RAW-040 Total Vegetation			3

Attachment C-9. Fall Reference Sands Cover and Frequency Data by Point Intercept Transect

Transect	Life Form	Scientific Name	Percent Cover	
RAS-041	Bare			23
	Rock/Gravel			0
RSA-081	Bare			79
	Rock/Gravel			3
	Litter			7
	Vegetation			11
		Salsola tragus	2	
	Annual Forb Subtotal		2	
		Sporobolus airoides	8	
	Perennial Grass Subtotal		8	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
RSA-081 Total Vegetation			11	
RSA-082	Bare			70
	Rock/Gravel			1
	Litter			17
	Vegetation			12
		Achnatherum hymenoides	1	
		Pleuraphis jamesii	2	
	Perennial Grass Subtotal		3	
		Atriplex confertifolia	3	
		Gutierrezia sarothrae	6	
	Perennial Shrub Subtotal		9	
RSA-082 Total Vegetation			12	
RSA-083	Bare			65
	Rock/Gravel			0
	Litter			20
	Vegetation			15
		Phacelia crenulata	2	
	Annual Forb Subtotal		2	
		Pleuraphis jamesii	3	
	Perennial Grass Subtotal		3	
		Atriplex confertifolia	1	
		Gutierrezia sarothrae	9	
	Perennial Shrub Subtotal		10	
RSA-083 Total Vegetation			15	
RSA-084	Bare			69
	Rock/Gravel			3
	Litter			18
	Vegetation			10

Transect	Life Form	Scientific Name	Percent Cover
		Plantago patagonica	2
		Salsola tragus	1
	Annual Forb Subtotal		3
		Sporobolus airoides	7
	Perennial Grass Subtotal		7
RSA-084 Total Vegetation			10
RSA-085	Bare		66
	Rock/Gravel		0
	Litter		20
	Vegetation		14
		Dimorphocarpa wislizenii	1
		Plantago patagonica	1
	Annual Forb Subtotal		2
		Abronia fragrans	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	1
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		2
		Atriplex canescens	1
		Gutierrezia sarothrae	8
	Perennial Shrub Subtotal		9
RSA-085 Total Vegetation			14
RSA-086	Bare		60
	Rock/Gravel		5
	Litter		24
	Vegetation		11
		Mentzelia albicaulis	1
		Plantago patagonica	4
	Annual Forb Subtotal		5
		Achnatherum hymenoides	2
		Pleuraphis jamesii	3
	Perennial Grass Subtotal		5
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		1
RSA-086 Total Vegetation			11
RSA-087	Bare		61
	Rock/Gravel		11
	Litter		12
	Vegetation		16
		Descurainia pinnata	2
		Halogeton glomeratus	1
		Phacelia crenulata	3
		Salsola tragus	5
		Townsendia annua	1
	Annual Forb Subtotal		12

Transect	Life Form	Scientific Name	Percent Cover
		Sphaeralcea coccinea	1
	Perennial Forb Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		2
		Atriplex confertifolia	1
	Perennial Shrub Subtotal		1
RSA-087 Total Vegetation			16
RSA-088	Bare		57
	Rock/Gravel		2
	Litter		24
	Vegetation		17
		Cryptantha crassisepala	1
		Descurainia pinnata	1
		Phacelia crenulata	1
		Plantago patagonica	1
	Annual Forb Subtotal		4
		Achnatherum hymenoides	2
		Pleuraphis jamesii	5
		Sporobolus airoides	1
	Perennial Grass Subtotal		8
		Gutierrezia sarothrae	5
	Perennial Shrub Subtotal		5
RSA-088 Total Vegetation			17
RSA-089	Bare		62
	Rock/Gravel		0
	Litter		28
	Vegetation		10
		Lappula occidentalis	1
		Plantago patagonica	3
		Townsendia annua	1
	Annual Forb Subtotal		5
		Bouteloua gracilis	1
		Sporobolus airoides	3
	Perennial Grass Subtotal		4
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
RSA-089 Total Vegetation			10
RSA-090	Bare		58
	Rock/Gravel		11
	Litter		21
	Vegetation		10
		Cryptantha crassisepala	1
		Descurainia pinnata	1
		Plantago patagonica	2

Transect	Life Form	Scientific Name	Percent Cover
	Annual Forb Subtotal		4
		Vulpia octoflora	1
	Annual Grass Subtotal		1
		Sporobolus airoides	3
	Perennial Grass Subtotal		3
		Atriplex confertifolia	1
		Atriplex obovata	1
	Perennial Shrub Subtotal		2
RSA-090 Total Vegetation			10
RSA-091	Bare		70
	Rock/Gravel		0
	Litter		22
	Vegetation		8
		Pleuraphis jamesii	3
		Sporobolus airoides	1
	Perennial Grass Subtotal		4
		Gutierrezia sarothrae	4
	Perennial Shrub Subtotal		4
RSA-091 Total Vegetation			8
RSA-092	Bare		71
	Rock/Gravel		0
	Litter		13
	Vegetation		16
		Descurainia pinnata	1
	Annual Forb Subtotal		1
		Abronia fragrans	1
	Perennial Forb Subtotal		1
		Pleuraphis jamesii	3
		Sporobolus airoides	2
	Perennial Grass Subtotal		5
		Gutierrezia sarothrae	9
	Perennial Shrub Subtotal		9
RSA-092 Total Vegetation			16
RSA-093	Bare		69
	Rock/Gravel		4
	Litter		16
	Vegetation		11
		Lappula occidentalis	2
		Plantago patagonica	2
		Salsola tragus	1
		Townsendia annua	1
	Annual Forb Subtotal		6
		Vulpia octoflora	1
	Annual Grass Subtotal		1
		Sporobolus airoides	4

Transect	Life Form	Scientific Name	Percent Cover	
	Perennial Grass Subtotal		4	
RSA-093 Total Vegetation			11	
RSA-095	Bare			75
	Rock/Gravel			1
	Litter			18
	Vegetation			6
		Plantago patagonica	2	
		Salsola tragus	1	
	Annual Forb Subtotal		3	
		Atriplex canescens	1	
		Atriplex confertifolia	1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		3	
RSA-095 Total Vegetation			6	
RSA-096	Bare			60
	Rock/Gravel			0
	Litter			13
	Vegetation			27
		Cryptantha crassisepala	1	
	Annual Forb Subtotal		1	
		Grindelia squarrosa	1	
	Perennial Forb Subtotal		1	
		Achnatherum hymenoides	1	
		Pleuraphis jamesii	8	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		10	
		Atriplex confertifolia	3	
		Gutierrezia sarothrae	12	
	Perennial Shrub Subtotal		15	
RSA-096 Total Vegetation			27	
RSA-097	Bare			63
	Rock/Gravel			5
	Litter			19
	Vegetation			13
		Descurainia pinnata	2	
		Plantago patagonica	1	
	Annual Forb Subtotal		3	
		Achnatherum hymenoides	2	
		Sporobolus airoides	7	
	Perennial Grass Subtotal		9	
		Gutierrezia sarothrae	1	
	Perennial Shrub Subtotal		1	
RSA-097 Total Vegetation			13	
RSA-098	Bare			61

Transect	Life Form	Scientific Name	Percent Cover
	Rock/Gravel		10
	Litter		17
	Vegetation		12
		Lappula occidentalis	1
		Phacelia crenulata	1
		Plantago patagonica	3
		Salsola tragus	1
	Annual Forb Subtotal		6
		Vulpia octoflora	1
	Annual Grass Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus airoides	4
	Perennial Grass Subtotal		5
RSA-098 Total Vegetation			12
RSA-099	Bare		67
	Rock/Gravel		1
	Litter		21
	Vegetation		11
		Townsendia annua	1
	Annual Forb Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus airoides	1
		Sporobolus cryptandrus	2
	Perennial Grass Subtotal		4
		Gutierrezia sarothrae	6
	Perennial Shrub Subtotal		6
RSA-099 Total Vegetation			11
RSA-100	Bare		65
	Rock/Gravel		0
	Litter		23
	Vegetation		12
		Lappula occidentalis	1
		Plantago patagonica	4
	Annual Forb Subtotal		5
		Achnatherum hymenoides	1
		Pleuraphis jamesii	1
		Sporobolus airoides	2
		Sporobolus contractus	1
	Perennial Grass Subtotal		5
		Gutierrezia sarothrae	2
	Perennial Shrub Subtotal		2
RSA-100 Total Vegetation			12
RSA-101	Bare		72
	Rock/Gravel		6
	Litter		14

Transect	Life Form	Scientific Name	Percent Cover	
	Vegetation			8
		Atriplex powellii	1	
		Cryptantha crassisepala	1	
		Descurainia pinnata	1	
		Lappula occidentalis	1	
	Annual Forb Subtotal		4	
		Vulpia octoflora	1	
	Annual Grass Subtotal		1	
		Sporobolus airoides	3	
	Perennial Grass Subtotal		3	
RSA-101 Total Vegetation			8	
RSA-102	Bare			75
	Rock/Gravel			0
	Litter			20
	Vegetation			5
		Machaeranthera canescens	1	
		Plantago patagonica	1	
	Annual Forb Subtotal		2	
		Sporobolus airoides	1	
		Sporobolus cryptandrus	1	
	Perennial Grass Subtotal		2	
		Atriplex confertifolia	1	
	Perennial Shrub Subtotal		1	
RSA-102 Total Vegetation			5	
RSA-103	Bare			63
	Rock/Gravel			1
	Litter			26
	Vegetation			10
		Cryptantha crassisepala	1	
		Phacelia crenulata	1	
	Annual Forb Subtotal		2	
		Pleuraphis jamesii	3	
	Perennial Grass Subtotal		3	
		Atriplex confertifolia	2	
		Gutierrezia sarothrae	3	
	Perennial Shrub Subtotal		5	
RSA-103 Total Vegetation			10	
RSA-104	Bare			69
	Rock/Gravel			0
	Litter			16
	Vegetation			15
		Plantago patagonica	1	
	Annual Forb Subtotal		1	
		Pleuraphis jamesii	10	
		Sporobolus airoides	4	

Transect	Life Form	Scientific Name	Percent Cover	
	Perennial Grass Subtotal		14	
RSA-104 Total Vegetation			15	
RSA-105	Bare			81
	Rock/Gravel			1
	Litter			12
	Vegetation			6
		Cryptantha crassisepala	1	
		Phacelia crenulata	1	
	Annual Forb Subtotal		2	
		Pleuraphis jamesii	3	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		4	
RSA-105 Total Vegetation			6	
RSA-106	Bare			68
	Rock/Gravel			4
	Litter			15
	Vegetation			13
		Lappula occidentalis	1	
		Plantago patagonica	4	
	Annual Forb Subtotal		5	
		Achnatherum hymenoides	2	
		Sporobolus airoides	5	
		Sporobolus cryptandrus	1	
	Perennial Grass Subtotal		8	
RSA-106 Total Vegetation			13	
RSA-107	Bare			57
	Rock/Gravel			23
	Litter			11
	Vegetation			9
		Cryptantha crassisepala	1	
	Annual Forb Subtotal		1	
		Sporobolus airoides	7	
	Perennial Grass Subtotal		7	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
RSA-107 Total Vegetation			9	
RSA-108	Bare			65
	Rock/Gravel			0
	Litter			20
	Vegetation			15
		Ambrosia acanthicarpa	1	
		Cryptantha crassisepala	1	
		Plantago patagonica	1	
		Salsola tragus	1	

Transect	Life Form	Scientific Name	Percent Cover
	Annual Forb Subtotal		4
		Pleuraphis jamesii	3
		Sporobolus airoides	2
	Perennial Grass Subtotal		5
		Gutierrezia sarothrae	6
	Perennial Shrub Subtotal		6
RSA-108 Total Vegetation			15
RSA-109	Bare		61
	Rock/Gravel		0
	Litter		20
	Vegetation		19
		Cryptantha crassisepala	1
		Mentzelia albicaulis	1
		Plantago patagonica	2
	Annual Forb Subtotal		4
		Vulpia octoflora	2
	Annual Grass Subtotal		2
		Achnatherum hymenoides	2
		Sporobolus airoides	9
	Perennial Grass Subtotal		11
		Gutierrezia sarothrae	2
	Perennial Shrub Subtotal		2
RSA-109 Total Vegetation			19
RSA-110	Bare		73
	Rock/Gravel		0
	Litter		16
	Vegetation		11
		Achnatherum hymenoides	1
		Pleuraphis jamesii	6
		Sporobolus airoides	2
	Perennial Grass Subtotal		9
		Gutierrezia sarothrae	2
	Perennial Shrub Subtotal		2
RSA-110 Total Vegetation			11
RSA-111	Bare		69
	Rock/Gravel		0
	Litter		21
	Vegetation		10
		Pleuraphis jamesii	7
		Sporobolus airoides	1
	Perennial Grass Subtotal		8
		Atriplex confertifolia	1
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		2
RSA-111 Total Vegetation			10

Transect	Life Form	Scientific Name	Percent Cover
RSA-112	Bare		48
	Rock/Gravel		23
	Litter		21
	Vegetation		8
		Descurainia pinnata	1
		Lappula occidentalis	2
		Plantago patagonica	1
		Salsola tragus	1
	Annual Forb Subtotal		5
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
		Atriplex obovata	2
	Perennial Shrub Subtotal		2
RSA-112 Total Vegetation			8
RSA-113	Bare		61
	Rock/Gravel		0
	Litter		21
	Vegetation		18
		Phacelia crenulata	1
	Annual Forb Subtotal		1
		Achnatherum hymenoides	1
		Pleuraphis jamesii	3
	Perennial Grass Subtotal		4
		Atriplex confertifolia	3
		Gutierrezia sarothrae	10
	Perennial Shrub Subtotal		13
RSA-113 Total Vegetation			18
RSA-114	Bare		70
	Rock/Gravel		1
	Litter		14
	Vegetation		15
		Cryptantha crassisepala	1
		Lappula occidentalis	3
		Plantago patagonica	4
		Salsola tragus	1
		Townsendia annua	1
	Annual Forb Subtotal		10
		Monroa squarrosa	1
	Annual Grass Subtotal		1
		Sporobolus airoides	2
	Perennial Grass Subtotal		2
		Atriplex obovata	1
	Perennial Shrub Subtotal		1
		Opuntia polyacantha	1
	Perennial Succulent Subtotal		1

Transect	Life Form	Scientific Name	Percent Cover	
RSA-114 Total Vegetation			15	
RSA-115	Bare			68
	Rock/Gravel			4
	Litter			18
	Vegetation			10
		Cryptantha crassisepala	1	
		Salsola tragus	3	
	Annual Forb Subtotal		4	
		Sporobolus airoides	6	
	Perennial Grass Subtotal		6	
RSA-115 Total Vegetation			10	
RSA-116	Bare			71
	Rock/Gravel			4
	Litter			12
	Vegetation			13
		Cryptantha crassisepala	1	
		Salsola tragus	2	
	Annual Forb Subtotal		3	
		Pleuraphis jamesii	2	
		Sporobolus airoides	8	
	Perennial Grass Subtotal		10	
RSA-116 Total Vegetation			13	
RSA-117	Bare			63
	Rock/Gravel			0
	Litter			25
	Vegetation			12
		Cryptantha crassisepala	2	
		Ipomopsis pumila	1	
		Plantago patagonica	4	
		Salsola tragus	1	
		Townsendia annua	1	
	Annual Forb Subtotal		9	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		2	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		1	
RSA-117 Total Vegetation			12	
RSA-118	Bare			44
	Rock/Gravel			0
	Litter			31
	Vegetation			25
		Cryptantha crassisepala	1	
		Lappula occidentalis	1	
		Plantago patagonica	6	

Transect	Life Form	Scientific Name	Percent Cover
		Salsola tragus	1
	Annual Forb Subtotal		9
		Achnatherum hymenoides	1
		Pleuraphis jamesii	12
		Sporobolus airoides	2
	Perennial Grass Subtotal		15
		Atriplex canescens	1
	Perennial Shrub Subtotal		1
RSA-118 Total Vegetation			25
RSA-119	Bare		67
	Rock/Gravel		0
	Litter		17
	Vegetation		16
		Lappula occidentalis	3
		Plantago patagonica	2
		Salsola tragus	2
		Townsendia annua	1
	Annual Forb Subtotal		8
		Pleuraphis jamesii	2
		Sporobolus airoides	5
	Perennial Grass Subtotal		7
		Opuntia polyacantha	1
	Perennial Succulent Subtotal		1
RSA-119 Total Vegetation			16
RSA-120	Bare		64
	Rock/Gravel		0
	Litter		26
	Vegetation		10
		Phacelia crenulata	1
	Annual Forb Subtotal		1
		Atriplex confertifolia	3
		Gutierrezia sarothrae	6
	Perennial Shrub Subtotal		9
RSA-120 Total Vegetation			10

Attachment C-10. Fall Sands Cover and Frequency Data by Point Intercept Transect

Transect	Life Form	Scientific Name		Percent Cover
SA-161	Bare			66
	Rock/Gravel			1
	Litter			30
	Vegetation			3
		Salsola tragus	1	
	Annual Forb Subtotal		1	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		2	
SA-161 Total Vegetation			3	
SA-162	Bare			79
	Rock/Gravel			8
	Litter			7
	Vegetation			6
		Sphaeralcea coccinea	1	
	Perennial Forb Subtotal		1	
		Sporobolus airoides	4	
	Perennial Grass Subtotal		4	
		Atriplex confertifolia	1	
	Perennial Shrub Subtotal		1	
SA-162 Total Vegetation			6	
SA-163	Bare			66
	Rock/Gravel			2
	Litter			19
	Vegetation			13
		Cryptantha crassisepala	1	
		Salsola tragus	2	
	Annual Forb Subtotal		3	
		Achnatherum hymenoides	2	
		Pleuraphis jamesii	5	
	Perennial Grass Subtotal		7	
		Atriplex confertifolia	3	
	Perennial Shrub Subtotal		3	
SA-163 Total Vegetation			13	
SA-164	Bare			60
	Rock/Gravel			1
	Litter			24
	Vegetation			15
		Salsola tragus	2	
	Annual Forb Subtotal		2	
		Pleuraphis jamesii	1	
		Sporobolus airoides	4	

Transect	Life Form	Scientific Name	Percent Cover
	Perennial Grass Subtotal		5
		Atriplex confertifolia	6
		Gutierrezia sarothrae	2
	Perennial Shrub Subtotal		8
SA-164 Total Vegetation			15
SA-165	Bare		56
	Rock/Gravel		8
	Litter		11
	Vegetation		25
		Cryptantha crassisepala	2
		Phacelia crenulata	1
		Salsola tragus	2
		Townsendia annua	1
	Annual Forb Subtotal		6
		Achnatherum hymenoides	4
		Pleuraphis jamesii	5
		Sporobolus airoides	9
	Perennial Grass Subtotal		18
		Atriplex confertifolia	1
	Perennial Shrub Subtotal		1
SA-165 Total Vegetation			25
SA-166	Bare		78
	Rock/Gravel		4
	Litter		9
	Vegetation		9
		Chenopodium Sp.	1
	Forb Subtotal		1
		Chaetopappa ericoides	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	2
		Pleuraphis jamesii	3
		Sporobolus airoides	2
	Perennial Grass Subtotal		7
SA-166 Total Vegetation			9
SA-167	Bare		36
	Rock/Gravel		39
	Litter		11
	Vegetation		14
		Descurainia pinnata	1
		Lappula occidentalis	1
		Phacelia crenulata	1
		Salsola tragus	7
	Annual Forb Subtotal		10
		Sporobolus airoides	3

Transect	Life Form	Scientific Name	Percent Cover	
	Perennial Grass Subtotal		3	
		Atriplex confertifolia	1	
	Perennial Shrub Subtotal		1	
SA-167 Total Vegetation			14	
SA-168	Bare			62
	Rock/Gravel			4
	Litter			22
	Vegetation			12
		Cryptantha crassisepala	1	
	Annual Forb Subtotal		1	
		Sporobolus airoides	8	
	Perennial Grass Subtotal		8	
		Gutierrezia sarothrae	3	
	Perennial Shrub Subtotal		3	
SA-168 Total Vegetation			12	
SA-169	Bare			54
	Rock/Gravel			9
	Litter			20
	Vegetation			17
		Cryptantha crassisepala	1	
		Salsola tragus	6	
		Townsendia annua	1	
	Annual Forb Subtotal		8	
		Pleuraphis jamesii	2	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		4	
		Atriplex confertifolia	4	
		Gutierrezia sarothrae	1	
	Perennial Shrub Subtotal		5	
SA-169 Total Vegetation			17	
SA-170	Bare			76
	Rock/Gravel			0
	Litter			15
	Vegetation			9
		Cryptantha crassisepala	1	
	Annual Forb Subtotal		1	
		Pleuraphis jamesii	1	
		Sporobolus airoides	6	
	Perennial Grass Subtotal		7	
		Gutierrezia sarothrae	1	
	Perennial Shrub Subtotal		1	
SA-170 Total Vegetation			9	
SA-171	Bare			68
	Rock/Gravel			1

Transect	Life Form	Scientific Name	Percent Cover
	Litter		21
	Vegetation		10
		Dimorphocarpa wislizenii	1
		Salsola tragus	3
	Annual Forb Subtotal		4
		Chaetopappa ericoides	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		2
		Atriplex canescens	1
		Ephedra Sp.	1
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		3
SA-171 Total Vegetation			10
SA-172	Bare		58
	Rock/Gravel		0
	Litter		20
	Vegetation		22
		Cryptantha crassisepala	11
		Descurainia pinnata	1
		Salsola tragus	6
	Annual Forb Subtotal		18
		Pleuraphis jamesii	1
		Sporobolus airoides	3
	Perennial Grass Subtotal		4
SA-172 Total Vegetation			22
SA-173	Bare		60
	Rock/Gravel		4
	Litter		23
	Vegetation		13
		Cryptantha crassisepala	1
		Descurainia pinnata	1
		Machaeranthera canescens	1
		Salsola tragus	2
	Annual Forb Subtotal		5
		Achnatherum hymenoides	1
		Pleuraphis jamesii	1
		Sporobolus airoides	5
	Perennial Grass Subtotal		7
		Atriplex confertifolia	1
	Perennial Shrub Subtotal		1
SA-173 Total Vegetation			13
SA-174	Bare		64
	Rock/Gravel		3

Transect	Life Form	Scientific Name	Percent Cover
	Litter		22
	Vegetation		11
		Cryptantha crassisepala	2
		Plantago patagonica	2
		Salsola tragus	1
	Annual Forb Subtotal		5
		Achnatherum hymenoides	1
		Sporobolus airoides	5
	Perennial Grass Subtotal		6
SA-174 Total Vegetation			11
SA-175	Bare		56
	Rock/Gravel		0
	Litter		19
	Vegetation		25
		Cryptantha crassisepala	13
		Descurainia pinnata	2
		Machaeranthera canescens	4
	Annual Forb Subtotal		19
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	1
		Pleuraphis jamesii	4
	Perennial Grass Subtotal		5
SA-175 Total Vegetation			25
SA-176	Bare		52
	Rock/Gravel		6
	Litter		22
	Vegetation		20
		Salsola tragus	1
	Annual Forb Subtotal		1
		Achnatherum hymenoides	2
		Pleuraphis jamesii	1
		Sporobolus airoides	15
	Perennial Grass Subtotal		18
		Atriplex confertifolia	1
	Perennial Shrub Subtotal		1
SA-176 Total Vegetation			20
SA-177	Bare		65
	Rock/Gravel		4
	Litter		19
	Vegetation		12
		Cryptantha crassisepala	3
		Malacothrix sonchoides	1
		Mentzelia albicaulis	1
		Phacelia crenulata	1

Transect	Life Form	Scientific Name	Percent Cover
	Annual Forb Subtotal		6
		Pleuraphis jamesii	1
		Sporobolus airoides	3
	Perennial Grass Subtotal		4
		Atriplex confertifolia	1
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		2
SA-177 Total Vegetation			12
SA-178	Bare		61
	Rock/Gravel		2
	Litter		24
	Vegetation		13
		Cryptantha crassisepala	1
		Salsola tragus	6
	Annual Forb Subtotal		7
		Achnatherum hymenoides	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		2
		Atriplex obovata	4
	Perennial Shrub Subtotal		4
SA-178 Total Vegetation			13
SA-179	Bare		66
	Rock/Gravel		14
	Litter		14
	Vegetation		6
		Salsola tragus	3
	Annual Forb Subtotal		3
		Achnatherum hymenoides	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		2
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		1
SA-179 Total Vegetation			6
SA-180	Bare		53
	Rock/Gravel		10
	Litter		33
	Vegetation		4
		Descurainia sophia	1
		Townsendia annua	1
	Annual Forb Subtotal		2
		Atriplex confertifolia	2
	Perennial Shrub Subtotal		2
SA-180 Total Vegetation			4
SA-181	Bare		72

Transect	Life Form	Scientific Name	Percent Cover	
	Rock/Gravel			0
	Litter			17
	Vegetation			11
		Cryptantha crassisepala	3	
		Phacelia crenulata	1	
		Plantago patagonica	3	
		Townsendia annua	1	
	Annual Forb Subtotal		8	
		Pleuraphis jamesii	2	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		3	
SA-181 Total Vegetation			11	
SA-182	Bare			61
	Rock/Gravel			3
	Litter			21
	Vegetation			15
		Cryptantha crassisepala	4	
		Machaeranthera canescens	1	
		Mentzelia albicaulis	1	
		Salsola tragus	5	
	Annual Forb Subtotal		11	
		Pleuraphis jamesii	2	
	Perennial Grass Subtotal		2	
		Atriplex confertifolia	2	
	Perennial Shrub Subtotal		2	
SA-182 Total Vegetation			15	
SA-183	Bare			47
	Rock/Gravel			25
	Litter			18
	Vegetation			10
		Sporobolus airoides	7	
	Perennial Grass Subtotal		7	
		Atriplex confertifolia	3	
	Perennial Shrub Subtotal		3	
SA-183 Total Vegetation			10	
SA-184	Bare			67
	Rock/Gravel			5
	Litter			17
	Vegetation			11
		Salsola tragus	9	
	Annual Forb Subtotal		9	
		Atriplex confertifolia	1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		2	
SA-184 Total Vegetation			11	

Transect	Life Form	Scientific Name	Percent Cover
SA-185	Bare		67
	Rock/Gravel		4
	Litter		21
	Vegetation		8
		Vulpia octoflora	1
	Annual Grass Subtotal		1
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
		Atriplex confertifolia	3
		Gutierrezia sarothrae	2
	Perennial Shrub Subtotal		5
		Opuntia polyacantha	1
	Perennial Succulent Subtotal		1
SA-185 Total Vegetation			8
SA-186	Bare		55
	Rock/Gravel		0
	Litter		20
	Vegetation		25
		Cryptantha Sp.	1
		Cryptantha crassisepala	3
	Annual Forb Subtotal		4
		Chaetopappa ericoides	2
		Linum aristatum	6
	Perennial Forb Subtotal		8
		Achnatherum hymenoides	1
		Pleuraphis jamesii	3
		Sporobolus airoides	9
	Perennial Grass Subtotal		13
SA-186 Total Vegetation			25
SA-187	Bare		38
	Rock/Gravel		1
	Litter		34
	Vegetation		27
		Cryptantha crassisepala	3
		Descurainia pinnata	1
		Phacelia crenulata	1
		Salsola tragus	11
		Streptanthella longirostris	1
	Annual Forb Subtotal		17
		Pleuraphis jamesii	4
	Perennial Grass Subtotal		4
		Gutierrezia sarothrae	6
	Perennial Shrub Subtotal		6
SA-187 Total Vegetation			27

Transect	Life Form	Scientific Name	Percent Cover
SA-188	Bare		77
	Rock/Gravel		6
	Litter		10
	Vegetation		7
		Chaenactis stevioides	1
		Salsola tragus	1
		Townsendia annua	1
	Annual Forb Subtotal		3
		Sporobolus airoides	4
	Perennial Grass Subtotal		4
SA-188 Total Vegetation			7
SA-189	Bare		72
	Rock/Gravel		11
	Litter		10
	Vegetation		7
		Lappula occidentalis	1
		Salsola tragus	1
	Annual Forb Subtotal		2
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex confertifolia	2
		Gutierrezia sarothrae	2
	Perennial Shrub Subtotal		4
SA-189 Total Vegetation			7
SA-190	Bare		70
	Rock/Gravel		8
	Litter		14
	Vegetation		8
		Halogeton glomeratus	1
		Salsola tragus	4
	Annual Forb Subtotal		5
		Sporobolus airoides	3
	Perennial Grass Subtotal		3
SA-190 Total Vegetation			8
SA-191	Bare		59
	Rock/Gravel		1
	Litter		27
	Vegetation		13
		Salsola tragus	2
	Annual Forb Subtotal		2
		Pleuraphis jamesii	4
		Sporobolus airoides	1
	Perennial Grass Subtotal		5
		Atriplex confertifolia	1
		Gutierrezia sarothrae	5

Transect	Life Form	Scientific Name	Percent Cover	
	Perennial Shrub Subtotal		6	
SA-191 Total Vegetation			13	
SA-192	Bare			72
	Rock/Gravel			0
	Litter			15
	Vegetation			13
		Cryptantha crassisepala	2	
		Salsola tragus	3	
	Annual Forb Subtotal		5	
		Platyschkuhria integrifolia	1	
	Perennial Forb Subtotal		1	
		Pleuraphis jamesii	2	
		Sporobolus airoides	5	
	Perennial Grass Subtotal		7	
SA-192 Total Vegetation			13	
SA-193	Bare			79
	Rock/Gravel			2
	Litter			12
	Vegetation			7
		Salsola tragus	2	
	Annual Forb Subtotal		2	
		Sporobolus airoides	5	
	Perennial Grass Subtotal		5	
SA-193 Total Vegetation			7	
SA-194	Bare			57
	Rock/Gravel			0
	Litter			21
	Vegetation			22
		Cryptantha crassisepala	1	
		Descurainia pinnata	1	
		Salsola tragus	13	
	Annual Forb Subtotal		15	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
		Gutierrezia sarothrae	6	
	Perennial Shrub Subtotal		6	
SA-194 Total Vegetation			22	
SA-195	Bare			73
	Rock/Gravel			0
	Litter			13
	Vegetation			14
		Salsola tragus	1	
	Annual Forb Subtotal		1	
		Pleuraphis jamesii	4	

Transect	Life Form	Scientific Name	Percent Cover
		Sporobolus airoides	4
	Perennial Grass Subtotal		8
		Atriplex confertifolia	1
		Gutierrezia sarothrae	4
	Perennial Shrub Subtotal		5
SA-195 Total Vegetation			14
SA-196	Bare		66
	Rock/Gravel		0
	Litter		24
	Vegetation		10
		Malacothrix sonchoides	1
		Salsola tragus	2
	Annual Forb Subtotal		3
		Sporobolus airoides	4
	Perennial Grass Subtotal		4
		Atriplex confertifolia	2
		Gutierrezia sarothrae	1
	Perennial Shrub Subtotal		3
SA-196 Total Vegetation			10
SA-197	Bare		60
	Rock/Gravel		16
	Litter		16
	Vegetation		8
		Salsola tragus	2
	Annual Forb Subtotal		2
		Pleuraphis jamesii	1
		Sporobolus airoides	5
	Perennial Grass Subtotal		6
SA-197 Total Vegetation			8
SA-198	Bare		68
	Rock/Gravel		2
	Litter		15
	Vegetation		15
		Cryptantha crassisepala	3
		Machaeranthera canescens	1
		Phacelia crenulata	1
	Annual Forb Subtotal		5
		Pleuraphis jamesii	1
		Sporobolus airoides	9
	Perennial Grass Subtotal		10
SA-198 Total Vegetation			15
SA-199	Bare		44
	Rock/Gravel		1
	Litter		29

Transect	Life Form	Scientific Name	Percent Cover
	Vegetation		26
		Cryptantha crassisepala	5
		Descurainia pinnata	1
		Plantago patagonica	1
		Salsola tragus	1
	Annual Forb Subtotal		8
		Stephanomeria exigua	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	3
		Pleuraphis jamesii	2
		Sporobolus airoides	7
	Perennial Grass Subtotal		12
		Atriplex confertifolia	1
		Gutierrezia sarothrae	4
	Perennial Shrub Subtotal		5
SA-199 Total Vegetation			26
SA-200	Bare		67
	Rock/Gravel		7
	Litter		18
	Vegetation		8
		Malacothrix sonchoides	1
		Salsola tragus	3
	Annual Forb Subtotal		4
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
		Gutierrezia sarothrae	3
	Perennial Shrub Subtotal		3
SA-200 Total Vegetation			8

Attachment C-11. Fall Thin Breaks Cover and Frequency Data by Point Intercept Transect

Transect	Life Form	Scientific Name	Percent Cover	
TB-201	Bare			29
	Rock/Gravel			36
	Litter			24
	Vegetation			11
		Plantago patagonica	2	
		Salsola tragus	2	
	Annual Forb Subtotal		4	
		Achnatherum hymenoides	1	
		Muhlenbergia pungens	2	
	Perennial Grass Subtotal		3	
		Atriplex canescens	1	
		Atriplex confertifolia	1	
		Gutierrezia sarothrae	2	
	Perennial Shrub Subtotal		4	
TB-201 Total Vegetation			11	
TB-201*	Bare			39
	Rock/Gravel			48
	Litter			6
	Vegetation			7
		Pleuraphis jamesii	2	
	Perennial Grass Subtotal		2	
		Artemisia bigelovii	2	
		Atriplex confertifolia	1	
		Gutierrezia sarothrae	1	
		Yucca spp.	1	
	Perennial Shrub Subtotal		5	
TB-201* Total Vegetation			7	
TB-202	Bare			21
	Rock/Gravel			71
	Litter			8
	Vegetation			0
TB-202 Total Vegetation			0	
TB-203	Bare			18
	Rock/Gravel			66
	Litter			9
	Vegetation			7
		Eriogonum gordonii	1	
		Salsola tragus	2	
	Annual Forb Subtotal		3	
		Pleuraphis jamesii	2	
	Perennial Grass Subtotal		2	

Transect	Life Form	Scientific Name	Percent Cover	
		Atriplex confertifolia	1	
		Atriplex obovata	1	
	Perennial Shrub Subtotal		2	
TB-203 Total Vegetation			7	
TB-204	Bare			79
	Rock/Gravel			14
	Litter			6
	Vegetation			1
		Ipomopsis pumila	1	
	Annual Forb Subtotal		1	
TB-204 Total Vegetation			1	
TB-205	Bare			77
	Rock/Gravel			19
	Litter			4
	Vegetation			0
TB-205 Total Vegetation			0	
TB-206	Bare			65
	Rock/Gravel			21
	Litter			8
	Vegetation			6
		Halogeton glomeratus	2	
		Salsola tragus	1	
	Annual Forb Subtotal		3	
		Sporobolus airoides	3	
	Perennial Grass Subtotal		3	
TB-206 Total Vegetation			6	
TB-207	Bare			62
	Rock/Gravel			15
	Litter			7
	Vegetation			16
		Cryptantha crassisepala	3	
		Descurainia pinnata	1	
		Halogeton glomeratus	3	
		Salsola tragus	4	
	Annual Forb Subtotal		11	
		Sporobolus airoides	5	
	Perennial Grass Subtotal		5	
TB-207 Total Vegetation			16	
TB-208	Bare			13
	Rock/Gravel			70
	Litter			7
	Vegetation			10

Transect	Life Form	Scientific Name	Percent Cover	
		Halogeton glomeratus	3	
		Salsola tragus	1	
	Annual Forb Subtotal		4	
		Sporobolus airoides	4	
	Perennial Grass Subtotal		4	
		Atriplex confertifolia	1	
		Gutierrezia sarothrae	1	
	Perennial Shrub Subtotal		2	
TB-208 Total Vegetation			10	
TB-209	Bare			44
	Rock/Gravel			35
	Litter			16
	Vegetation			5
		Lappula occidentalis	1	
		Salsola tragus	2	
	Annual Forb Subtotal		3	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
		Atriplex confertifolia	1	
	Perennial Shrub Subtotal		1	
TB-209 Total Vegetation			5	
TB-210	Bare			82
	Rock/Gravel			13
	Litter			4
	Vegetation			1
		Atriplex gardneri	1	
	Perennial Shrub Subtotal		1	
TB-210 Total Vegetation			1	
TB-211	Bare			50
	Rock/Gravel			42
	Litter			6
	Vegetation			2
		Salsola tragus	2	
	Annual Forb Subtotal		2	
TB-211 Total Vegetation			2	
TB-212	Bare			1
	Rock/Gravel			91
	Litter			7
	Vegetation			1
		Atriplex confertifolia	1	
	Perennial Shrub Subtotal		1	
TB-212 Total Vegetation			1	
TB-213	Bare			52

Transect	Life Form	Scientific Name	Percent Cover	
	Rock/Gravel			28
	Litter			11
	Vegetation			9
		Cryptantha crassisepala	1	
		Salsola tragus	8	
	Annual Forb Subtotal		9	
TB-213 Total Vegetation			9	
TB-214	Bare			43
	Rock/Gravel			45
	Litter			8
	Vegetation			4
		Salsola tragus	3	
	Annual Forb Subtotal		3	
		Pleuraphis jamesii	1	
	Perennial Grass Subtotal		1	
TB-214 Total Vegetation			4	
TB-215	Bare			68
	Rock/Gravel			30
	Litter			1
	Vegetation			1
		Descurainia pinnata	1	
	Annual Forb Subtotal		1	
TB-215 Total Vegetation			1	
TB-216	Bare			28
	Rock/Gravel			51
	Litter			14
	Vegetation			7
		Descurainia pinnata	1	
		Halogeton glomeratus	1	
		Salsola tragus	2	
	Annual Forb Subtotal		4	
		Atriplex confertifolia	1	
		Sarcobatus vermiculatus	2	
	Perennial Shrub Subtotal		3	
TB-216 Total Vegetation			7	
TB-217	Bare			56
	Rock/Gravel			19
	Litter			18
	Vegetation			7
		Plantago patagonica	2	
		Salsola tragus	2	
	Annual Forb Subtotal		4	
		Achnatherum hymenoides	1	
		Sporobolus airoides	2	

Transect	Life Form	Scientific Name	Percent Cover	
	Perennial Grass Subtotal		3	
TB-217 Total Vegetation			7	
TB-218	Bare			60
	Rock/Gravel			35
	Litter			3
	Vegetation			2
		Atriplex powellii	2	
	Annual Forb Subtotal		2	
TB-218 Total Vegetation			2	
TB-219	Bare			78
	Rock/Gravel			22
	Litter			0
	Vegetation			0
TB-219 Total Vegetation			0	
TB-220	Bare			50
	Rock/Gravel			49
	Litter			0
	Vegetation			1
		Salsola tragus	1	
	Annual Forb Subtotal		1	
TB-220 Total Vegetation			1	
TB-221	Bare			32
	Rock/Gravel			56
	Litter			7
	Vegetation			5
		Salsola tragus	1	
	Annual Forb Subtotal		1	
		Unidentified	1	
	Forb Subtotal		1	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		2	
		Atriplex confertifolia	1	
	Perennial Shrub Subtotal		1	
TB-221 Total Vegetation			5	
TB-222	Bare			51
	Rock/Gravel			24
	Litter			16
	Vegetation			9
		Plantago patagonica	2	
		Salsola tragus	1	
	Annual Forb Subtotal		3	
		Pleuraphis jamesii	2	

Transect	Life Form	Scientific Name	Percent Cover
	Perennial Grass Subtotal		2
		Atriplex confertifolia	2
		Gutierrezia sarothrae	2
	Perennial Shrub Subtotal		4
TB-222 Total Vegetation			9
TB-223	Bare		9
	Rock/Gravel		71
	Litter		13
	Vegetation		7
		Salsola tragus	4
	Annual Forb Subtotal		4
		Mentzelia pumila	1
	Perennial Forb Subtotal		1
		Atriplex confertifolia	2
	Perennial Shrub Subtotal		2
TB-223 Total Vegetation			7
TB-224	Bare		18
	Rock/Gravel		70
	Litter		10
	Vegetation		2
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex canescens	1
	Perennial Shrub Subtotal		1
TB-224 Total Vegetation			2
TB-225	Bare		44
	Rock/Gravel		42
	Litter		10
	Vegetation		4
		Halogeton glomeratus	2
		Salsola tragus	1
	Annual Forb Subtotal		3
		Atriplex gardneri	1
	Perennial Shrub Subtotal		1
TB-225 Total Vegetation			4
TB-226	Bare		9
	Rock/Gravel		78
	Litter		7
	Vegetation		6
		Descurainia pinnata	1
		Halogeton glomeratus	1
		Lappula occidentalis	1
		Salsola tragus	2
	Annual Forb Subtotal		5

Transect	Life Form	Scientific Name	Percent Cover
		Unidentified	1
	Undetermined Subtotal		1
TB-226 Total Vegetation			6
TB-227	Bare		77
	Rock/Gravel		21
	Litter		1
	Vegetation		1
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
TB-227 Total Vegetation			1
TB-228	Bare		27
	Rock/Gravel		68
	Litter		2
	Vegetation		3
		Lappula occidentalis	1
	Annual Forb Subtotal		1
		Atriplex obovata	2
	Perennial Shrub Subtotal		2
TB-228 Total Vegetation			3
TB-229	Bare		63
	Rock/Gravel		32
	Litter		4
	Vegetation		1
		Salsola tragus	1
	Annual Forb Subtotal		1
TB-229 Total Vegetation			1
TB-230	Bare		39
	Rock/Gravel		44
	Litter		10
	Vegetation		7
		Descurainia pinnata	1
		Plantago patagonica	3
		Salsola tragus	2
	Annual Forb Subtotal		6
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
TB-230 Total Vegetation			7
TB-231	Bare		53
	Rock/Gravel		34
	Litter		7
	Vegetation		6
		Descurainia pinnata	2

Transect	Life Form	Scientific Name	Percent Cover
		Halogeton glomeratus	2
		Phacelia crenulata	2
	Annual Forb Subtotal		6
TB-231 Total Vegetation			6
TB-232	Bare		44
	Rock/Gravel		40
	Litter		7
	Vegetation		9
		Phacelia crenulata	1
		Salsola tragus	4
	Annual Forb Subtotal		5
		Achnatherum hymenoides	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		2
		Ephedra Sp.	2
	Perennial Shrub Subtotal		2
TB-232 Total Vegetation			9
TB-233	Bare		66
	Rock/Gravel		24
	Litter		7
	Vegetation		3
		Salsola tragus	1
	Annual Forb Subtotal		1
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex gardneri	1
	Perennial Shrub Subtotal		1
TB-233 Total Vegetation			3
TB-234	Bare		9
	Rock/Gravel		83
	Litter		6
	Vegetation		2
		Halogeton glomeratus	1
		Salsola tragus	1
	Annual Forb Subtotal		2
TB-234 Total Vegetation			2
TB-235	Bare		28
	Rock/Gravel		47
	Litter		16
	Vegetation		9
		Descurainia pinnata	1
		Lappula occidentalis	4
		Salsola tragus	2
		Townsendia annua	1

Transect	Life Form	Scientific Name	Percent Cover	
	Annual Forb Subtotal		8	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
TB-235 Total Vegetation			9	
TB-236	Bare			55
	Rock/Gravel			18
	Litter			20
	Vegetation			7
		Salsola tragus	1	
	Annual Forb Subtotal		1	
		Pleuraphis jamesii	2	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		4	
		Gutierrezia sarothrae	2	
	Perennial Shrub Subtotal		2	
TB-236 Total Vegetation			7	
TB-237	Bare			48
	Rock/Gravel			33
	Litter			14
	Vegetation			5
		Descurainia pinnata	1	
		Phacelia crenulata	3	
		Salsola tragus	1	
	Annual Forb Subtotal		5	
TB-237 Total Vegetation			5	
TB-238	Bare			75
	Rock/Gravel			8
	Litter			11
	Vegetation			6
		Descurainia pinnata	1	
		Eriogonum gordonii	1	
	Annual Forb Subtotal		2	
		Atriplex obovata	1	
		Sarcobatus vermiculatus	3	
	Perennial Shrub Subtotal		4	
TB-238 Total Vegetation			6	
TB-239	Bare			25
	Rock/Gravel			71
	Litter			2
	Vegetation			2
		Salsola tragus	2	
	Annual Forb Subtotal		2	
TB-239 Total Vegetation			2	

Transect	Life Form	Scientific Name	Percent Cover
TB-240	Bare		21
	Rock/Gravel		72
	Litter		4
	Vegetation		3
		Atriplex powellii	1
		Eriogonum gordonii	1
		Salsola tragus	1
	Annual Forb Subtotal		3
TB-240 Total Vegetation			3

Attachment C-12. Spring Summary Average Ground Cover on Point Intercept Transects for All Communities

Community	Bare	Rock/Gravel	Litter	Vegetation
Arroyo Shrub	62.2	0.9	17.4	19.5
Alkali Wash	56.1	23.5	12.2	8.2
Badlands	51.4	38.8	6.3	3.5
Dunes	68.3	0.5	10.9	20.3
Sands	55.5	11.9	18.1	14.4
Thin Breaks	39.7	47.2	8.4	4.7

Attachment C-13. Spring Summary Frequency of Vegetation Species on Point Intercept Transects for all Communities.

Scientific Name	Alkali Wash	Arroyo Shrub	Badlands	Dunes	Sands	Thin Breaks
Abronia fragrans			1	4	3	
Achnatherum hymenoides	2	3		17	8	
Agropyron cristatum		4				
Ambrosia acanthicarpa	1			1		
Aristida purpurea					1	
Artemisia dracunculus		2				
Artemisia filifolia				4		
Artemisia sp.		6				
Astragalus sp.		1		1		
Atriplex canescens	2	25		3		
Atriplex confertifolia	5	1			24	8
Atriplex gardneri	3		3			
Atriplex obovata	17	9	1	1		5
Atriplex powellii	6	6	2		2	1
Atriplex saccaria	1		1			1
Bouteloua gracilis		1				
Brickellia microphylla		1				
Bromus rubens	1					
Bromus tectorum	7	3				1
Chenactis steveioides	1				11	
Chenopodium incanum		6				
Cryptantha crassisepala	15	15	5	50	53	4
Cymopterus sp.				1		
Dalea sp.		5				
Descurainia pinnata	27	45	2	36	28	5
Descurainia sophia		5		4	3	
Dimorphocarpa wislizeni	1			35	5	
Elymus Elymoides	1					
Ephedra sp.				25	2	
Eremopyrum triticeum	4	7				
Ericameria [Chrysothamnus] nauseosa	10	5	1			
Erigeron bellidiastrum		24		2		
Erigeron sp.		2				
Erigonum sp.		1				
Eriogonum gordonii	13		2			3
Eriogonum leptocladon				3		
Erodium cicutarium		1				
Gilia leptomeria	1					
Grindelia squarrosa	1	18				
Gutierrezia sarothrae	1	2			13	
Halogeton glomeratus	3					2
Hordeum jubatum	1	1				
Hordeum pusillum		41				2
Ipomopsis pumila	2	2	1		1	2

Scientific Name	Alkali Wash	Arroyo Shrub	Badlands	Dunes	Sands	Thin Breaks
Abronia fragrans			1	4	3	
Lappula occidentalis	4	8	7	1	1	10
Linum aristatum				1		
Linum puberulum				8		
Lupinus pusillus		1		5		
Lycium pallidum		1		4		
Lygodesmia grandiflora				2		
Machaeranthera canescens	2	3		11	2	
Machaeranthera gracilis	3					
Mentzelia albicaulis		1	1	11	6	
Mentzelia pumila	1				1	
Mentzelia sp.				4		
Monolepis nutalliana	1					
Muhlenbergia pungens		1		4		
Oenothera canescens				3		
Oenothera pallida				37	12	
Oenothera sp.				23		
Opuntia polyacantha					2	
Phacelia crenulata	3		1	1	33	1
Plantago patagonica	23	17	5	2	18	4
Pleuraphis jamesii	13	19		19	18	4
Psoralidium lanceolatum				1		
Salsola tragus	28	34	4	24	38	6
Sarcobatus vermiculatus		29			3	
Senna sp.		13		2		
Sphaeralcea coccinea	2	1			2	1
Sphaeralcea parvifolia		2		17	5	
Sporobolus airoides	27	69	4	1	38	6
Sporobolus contractus	1				1	
Sporobolus cryptandrus	1	2		3	1	
Sporobolus giganteus		2				
Stephanomeria exigua	1			10	4	
Streptanthella longirostris	1	2		1	1	
Suaeda moquinii	1	1				
Townsendia annua	24	10	2		6	3
Townsendia incana		1			3	
Tragopogon dubius		1				
Unidentified	1	0	3	0	0	0
Verbena bracteata		4				
Vulpia octiflora	1	1			3	
Yucca harrimanae				1		

Attachment C-14. Spring Arroyo Shrub Cover and Frequency Data by Point Intercept Transect.

Transect	Life Form	Scientific Name	Percent Cover
AS-01	Bare		69
	Rock/Gravel		0
	Litter		18
	Vegetation		13
		Descurainia pinnata	2
		Lupinus pusillus	1
		Salsola tragus	2
	Annual Forb Subtotal		5
		Astragalus sp.	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	1
	Perennial Grass Subtotal		1
		Artemisia sp.	6
	Shrub Subtotal		6
AS-01 Total Vegetation			13
AS-03	Bare		87
	Rock/Gravel		0
	Litter		4
	Vegetation		9
		Atriplex powellii	1
	Annual Forb Subtotal		1
		Sporobolus giganteus	2
	Perennial Grass Subtotal		2
		Atriplex canescens	6
	Shrub Subtotal		6
AS-03 Total Vegetation			9
AS-05	Bare		60
	Rock/Gravel		0
	Litter		16
	Vegetation		24
		Cryptantha crassisepala	3
		Descurainia pinnata	3
		Descurainia sophia	2
		Lappula occidentalis	3
		Machaeranthera canescens	1
		Salsola tragus	2
	Annual Forb Subtotal		14
		Bromus tectorum	1
	Annual Grass Subtotal		1
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex canescens	2

Transect	Life Form	Scientific Name	Percent Cover
		Gutierrezia sarothrae	2
		Sarcobatus vermiculatus	4
	Shrub Subtotal		8
AS-05 Total Vegetation			24
AS-07	Bare		66
	Rock/Gravel		2
	Litter		15
	Vegetation		17
		Cryptantha crassisepala	2
		Descurainia pinnata	2
		Descurainia sophia	2
		Machaeranthera canescens	1
		Salsola tragus	2
	Annual Forb Subtotal		9
		Vulpia octiflora	1
	Annual Grass Subtotal		1
		Atriplex canescens	6
		Sarcobatus vermiculatus	1
	Shrub Subtotal		7
AS-07 Total Vegetation			17
AS-09	Bare		60
	Rock/Gravel		4
	Litter		18
	Vegetation		18
		Cryptantha crassisepala	2
		Descurainia pinnata	8
		Machaeranthera canescens	1
		Salsola tragus	4
	Annual Forb Subtotal		15
		Muhlenbergia pungens	1
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		2
		Ericameria [Chrysothamnus] nauseosa	1
	Shrub Subtotal		1
AS-09 Total Vegetation			18
AS-11	Bare		70
	Rock/Gravel		0
	Litter		9
	Vegetation		21
		Descurainia pinnata	8
		Salsola tragus	1
	Annual Forb Subtotal		9
		Bromus tectorum	2
	Annual Grass Subtotal		2

Transect	Life Form	Scientific Name	Percent Cover
		Achnatherum hymenoides	1
	Perennial Grass Subtotal		1
		Atriplex canescens	3
		Brickellia microphylla	1
		Senna sp.	5
	Shrub Subtotal		9
AS-11 Total Vegetation			21
AS-15	Bare		72
	Rock/Gravel		0
	Litter		10
	Vegetation		18
		Descurainia pinnata	2
		Descurainia sophia	1
		Salsola tragus	9
	Annual Forb Subtotal		12
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		1
		Atriplex canescens	2
		Senna sp.	3
	Shrub Subtotal		5
AS-15 Total Vegetation			18
AS-17	Bare		86
	Rock/Gravel		0
	Litter		3
	Vegetation		11
		Dalea sp.	3
		Descurainia pinnata	1
		Salsola tragus	1
	Annual Forb Subtotal		5
		Sporobolus airoides	2
	Perennial Grass Subtotal		2
		Senna sp.	4
	Shrub Subtotal		4
AS-17 Total Vegetation			11
AS-19	Bare		92
	Rock/Gravel		3
	Litter		2
	Vegetation		3
		Dalea sp.	2
		Salsola tragus	1
	Annual Forb Subtotal		3
AS-19 Total Vegetation			3
AS-21	Bare		46
	Rock/Gravel		1

Transect	Life Form	Scientific Name	Percent Cover
	Litter		16
	Vegetation		37
		Atriplex powellii	4
		Descurainia pinnata	1
		Mentzelia albicaulis	1
	Annual Forb Subtotal		6
		Eremopyrum triticeum	1
		Hordeum pusillum	2
	Annual Grass Subtotal		3
		Hordeum jubatum	1
	Perennial Forb Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus airoides	14
	Perennial Grass Subtotal		15
		Atriplex obovata	7
		Sarcobatus vermiculatus	5
	Shrub Subtotal		12
AS-21 Total Vegetation			37
AS-23	Bare		70
	Rock/Gravel		0
	Litter		23
	Vegetation		7
		Descurainia pinnata	2
	Annual Forb Subtotal		2
		Atriplex obovata	1
		Sarcobatus vermiculatus	3
		Suaeda moquinii	1
	Shrub Subtotal		5
AS-23 Total Vegetation			7
AS-25	Bare		90
	Rock/Gravel		0
	Litter		5
	Vegetation		5
		Cryptantha crassisepala	1
		Descurainia pinnata	2
	Annual Forb Subtotal		3
		Senna sp.	1
		Unidentified	1
	Forb Subtotal		2
AS-25 Total Vegetation			5
AS-27	Bare		70
	Rock/Gravel		0
	Litter		16
	Vegetation		14

Transect	Life Form	Scientific Name	Percent Cover
		Descurainia pinnata	2
		Ipomopsis pumila	1
		Lappula occidentalis	2
		Townsendia annua	1
	Annual Forb Subtotal		13
		Sarcobatus vermiculatus	1
	Shrub Subtotal		1
AS-27 Total Vegetation			14
AS-29	Bare		73
	Rock/Gravel		0
	Litter		9
	Vegetation		18
		Cryptantha crassisepala	3
		Descurainia pinnata	5
		Salsola tragus	2
		Streptanthella longirostris	2
	Annual Forb Subtotal		13
		Townsendia incana	1
	Perennial Forb Subtotal		1
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
		Ericameria [Chrysothamnus] nauseosa	3
		Sarcobatus vermiculatus	1
	Shrub Subtotal		4
AS-29 Total Vegetation			18
AS-31	Bare		88
	Rock/Gravel		5
	Litter		3
	Vegetation		4
		Salsola tragus	3
	Annual Forb Subtotal		3
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		1
AS-31 Total Vegetation			4
AS-33	Bare		61
	Rock/Gravel		7
	Litter		13
	Vegetation		19
		Cryptantha crassisepala	1
		Descurainia pinnata	2
		Lappula occidentalis	3
		Salsola tragus	5
	Annual Forb Subtotal		11
		Pleuraphis jamesii	2

Transect	Life Form	Scientific Name	Percent Cover	
	Perennial Grass Subtotal		2	
		Ericameria [Chrysothamnus] nauseosa	1	
		Sarcobatus vermiculatus	5	
	Shrub Subtotal		6	
AS-33 Total Vegetation			19	
AS-37	Bare			34
	Rock/Gravel			0
	Litter			36
	Vegetation			30
		Atriplex powellii	1	
		Descurainia pinnata	3	
		Plantago patagonica	2	
		Townsendia annua	7	
		Tragopogon dubius	1	
	Annual Forb Subtotal		14	
		Hordeum pusillum	13	
	Annual Grass Subtotal		13	
		Atriplex obovata	1	
		Sarcobatus vermiculatus	2	
	Shrub Subtotal		3	
AS-37 Total Vegetation			30	
AS-39	Bare			19
	Rock/Gravel			0
	Litter			23
	Vegetation			58
		Erodium cicutarium	1	
	Annual Forb Subtotal		1	
		Hordeum pusillum	26	
	Annual Grass Subtotal		26	
		Artemisia dracunculus	2	
		Grindelia squarrosa	9	
	Perennial Forb Subtotal		11	
		Bouteloua gracilis	1	
		Pleuraphis jamesii	6	
		Sporobolus airoides	13	
	Perennial Grass Subtotal		20	
AS-39 Total Vegetation			58	
AS-43	Bare			33
	Rock/Gravel			0
	Litter			39
	Vegetation			28
		Cryptantha crassisepala	3	
		Ipomopsis pumila	1	
		Plantago patagonica	7	

Transect	Life Form	Scientific Name	Percent Cover
		Salsola tragus	1
		Townsendia annua	1
	Annual Forb Subtotal		13
		Eremopyrum triticeum	3
	Annual Grass Subtotal		3
		Grindelia squarrosa	3
	Perennial Forb Subtotal		3
		Sporobolus airoides	5
	Perennial Grass Subtotal		5
		Atriplex canescens	3
		Unidentified	1
	Shrub Subtotal		4
AS-43 Total Vegetation			28
AS-44	Bare		37
	Rock/Gravel		0
	Litter		34
	Vegetation		29
		Descurainia pinnata	2
		Plantago patagonica	4
		Salsola tragus	1
		Townsendia annua	1
	Annual Forb Subtotal		8
		Eremopyrum triticeum	3
	Annual Grass Subtotal		3
		Erigonum sp.	1
	Forb Subtotal		1
		Grindelia squarrosa	5
		Sphaeralcea coccinea	1
	Perennial Forb Subtotal		6
		Achnatherum hymenoides	1
		Pleuraphis jamesii	2
		Sporobolus airoides	2
	Perennial Grass Subtotal		5
		Atriplex canescens	3
		Atriplex confertifolia	1
		Atriplex obovata	1
		Lycium pallidum	1
	Shrub Subtotal		6
AS-44 Total Vegetation			29
AS-45	Bare		94
	Rock/Gravel		0
	Litter		0
	Vegetation		6
		Chenopodium incanum	6
	Annual Forb Subtotal		6
AS-45 Total Vegetation			6

Transect	Life Form	Scientific Name	Percent Cover
AS-46	Bare		38
	Rock/Gravel		0
	Litter		47
	Vegetation		15
		Plantago patagonica	1
	Annual Forb Subtotal		1
		Grindelia squarrosa	1
	Perennial Forb Subtotal		1
		Agropyron cristatum	4
		Pleuraphis jamesii	4
		Sporobolus airoides	5
	Perennial Grass Subtotal		13
AS-46 Total Vegetation			15
AS-47	Bare		44
	Rock/Gravel		0
	Litter		39
	Vegetation		17
		Plantago patagonica	3
	Annual Forb Subtotal		3
		Erigeron sp.	2
	Forb Subtotal		2
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		1
		Pleuraphis jamesii	3
		Sporobolus airoides	8
	Perennial Grass Subtotal		11
AS-47 Total Vegetation			17
AS-48	Bare		33
	Rock/Gravel		0
	Litter		20
	Vegetation		47
		Erigeron bellidiastrum	24
		Verbena bracteata	4
	Annual Forb Subtotal		28
		Sporobolus airoides	19
	Perennial Grass Subtotal		19
AS-48 Total Vegetation			47

Attachment C-15. Spring Alkali Wash Cover and Frequency Data by Point Intercept Transect.

Transect	Life Form	Scientific Name	Percent Cover
AW-06	Bare		50
	Rock/Gravel		35
	Litter		9
	Total Vegetation		6
		Plantago patagonica	2
		Townsendia annua	2
	Annual Forb Subtotal		4
		Atriplex obovata	2
	Shrub Subtotal		2
AW-06 Total Vegetation			6
AW-08	Bare		60
	Rock/Gravel		15
	Litter		15
	Total Vegetation		10
		Cryptantha crassisepala	1
		Descurainia pinnata	1
		Phacelia crenulata	1
		Plantago patagonica	1
		Townsendia annua	4
	Annual Forb Subtotal		8
		Sporobolus airoides	1
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		2
AW-08 Total Vegetation			10
AW-12	Bare		86
	Rock/Gravel		0
	Litter		9
	Total Vegetation		5
		Salsola tragus	2
	Annual Forb Subtotal		2
		Sporobolus airoides	2
	Perennial Grass Subtotal		2
		Atriplex obovata	1
	Shrub Subtotal		1
AW-12 Total Vegetation			5
AW-14	Bare		40
	Rock/Gravel		33
	Litter		15
	Total Vegetation		12

Transect	Life Form	Scientific Name	Percent Cover
		Ipomopsis pumila	1
		Salsola tragus	3
		Streptanthella longirostris	1
		Townsendia annua	5
	Annual Forb Subtotal		10
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Unidentified	1
	Unidentified Subtotal		1
AW-14 Total Vegetation			12
AW-16	Bare		70
	Rock/Gravel		22
	Litter		4
	Total Vegetation		4
		Cryptantha crassisepala	2
		Lappula occidentalis	1
		Monolepis nutalliana	1
	Annual Forb Subtotal		4
AW-16 Total Vegetation			4
AW-18	Bare		82
	Rock/Gravel		2
	Litter		10
	Total Vegetation		6
		Monolepis nutalliana	1
		Salsola tragus	2
	Annual Forb Subtotal		3
		Machaeranthera gracilis	3
	Perennial Forb Subtotal		3
AW-18 Total Vegetation			6
AW-20	Bare		74
	Rock/Gravel		9
	Litter		7
	Total Vegetation		10
		Descurainia pinnata	1
		Ipomopsis pumila	1
		Plantago patagonica	1
		Salsola tragus	2
	Annual Forb Subtotal		5
		Sporobolus airoides	3
	Perennial Grass Subtotal		3
		Atriplex canescens	1
		Atriplex obovata	1
	Shrub Subtotal		2

Transect	Life Form	Scientific Name	Percent Cover
AW-20 Total Vegetation			10
AW-22	Bare		40
	Rock/Gravel		6
	Litter		22
	Total Vegetation		32
		Descurainia pinnata	2
		Lappula occidentalis	1
		Plantago patagonica	1
		Salsola tragus	2
		Townsendia annua	3
	Annual Forb Subtotal		9
		Bromus tectorum	7
	Annual Grass Subtotal		7
		Sphaeralcea coccinea	2
	Perennial Forb Subtotal		2
		Pleuraphis jamesii	1
		Sporobolus airoides	9
	Perennial Grass Subtotal		10
		Atriplex canescens	1
		Atriplex gardneri	1
		Atriplex obovata	2
	Shrub Subtotal		4
AW-22 Total Vegetation			32
AW-24	Bare		76
	Rock/Gravel		1
	Litter		11
	Total Vegetation		12
		Ambrosia acanthicarpa	1
		Cryptantha crassisepala	1
		Dimorphocarpa wislizeni	1
		Phacelia crenulata	1
		Salsola tragus	2
	Annual Forb Subtotal		6
		Stephanomeria exigua	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	1
		Sporobolus airoides	2
	Perennial Grass Subtotal		3
		Ericameria [Chrysothamnus] nauseosa	1
	Shrub Subtotal		1
		Unidentified	1
	Unidentified Subtotal		1
AW-24 Total Vegetation			12

Transect	Life Form	Scientific Name	Percent Cover
AW-26	Bare		46
	Rock/Gravel		43
	Litter		8
	Total Vegetation		3
		Descurainia pinnata	2
	Annual Forb Subtotal		2
		Atriplex saccaria	1
	Shrub Subtotal		1
AW-26 Total Vegetation			3
AW-28	Bare		68
	Rock/Gravel		15
	Litter		6
	Total Vegetation		11
		Descurainia pinnata	1
	Annual Forb Subtotal		1
		Sporobolus airoides	2
	Perennial Grass Subtotal		2
		Ericameria [Chrysothamnus] nauseosa	8
	Shrub Subtotal		8
AW-28 Total Vegetation			11
AW-30	Bare		55
	Rock/Gravel		33
	Litter		9
	Total Vegetation		3
		Unidentified	1
	Unidentified Subtotal		1
		Atriplex confertifolia	1
		Atriplex obovata	1
	Shrub Subtotal		2
AW-30 Total Vegetation			3
AW-32	Bare		66
	Rock/Gravel		12
	Litter		17
	Total Vegetation		5
		Atriplex powellii	2
		Eriogonum gordonii	1
		Halogeton glomeratus	1
	Annual Forb Subtotal		4
		Atriplex gardneri	1
	Shrub Subtotal		1
AW-32 Total Vegetation			5

Transect	Life Form	Scientific Name	Percent Cover
AW-34	Bare		64
	Rock/Gravel		19
	Litter		6
	Total Vegetation		11
		Descurainia pinnata	5
		Eriogonum gordonii	2
		Lappula occidentalis	2
		Atriplex powellii	1
	Annual Forb Subtotal		10
		Atriplex obovata	1
	Shrub Subtotal		1
AW-34 Total Vegetation			11
AW-36	Bare		50
	Rock/Gravel		34
	Litter		9
	Total Vegetation		7
		Atriplex powellii	2
	Annual Forb Subtotal		2
		Pleuraphis jamesii	2
		Sporobolus airoides	1
	Perennial Grass Subtotal		3
		Atriplex confertifolia	1
		Suaeda moquinii	1
	Shrub Subtotal		2
AW-36 Total Vegetation			7
AW-44	Bare		63
	Rock/Gravel		4
	Litter		23
	Total Vegetation		10
		Halogeton glomeratus	1
		Machaeranthera canescens	1
		Plantago patagonica	1
		Townsendia annua	2
	Annual Forb Subtotal		5
		Pleuraphis jamesii	5
	Perennial Grass Subtotal		5
AW-44 Total Vegetation			10
AW-46	Bare		43
	Rock/Gravel		35
	Litter		8
	Vegetation		14
		Cryptantha crassisepala	1

Transect	Life Form	Scientific Name	Percent Cover
		Descurainia pinnata	2
		Eriogonum gordonii	5
		Plantago patagonica	1
		Salsola tragus	1
	Annual Forb Subtotal		10
		Atriplex obovata	3
	Shrub Subtotal		3
AW-46 Total Vegetation			13
AW-47	Bare		51
	Rock/Gravel		14
	Litter		23
	Vegetation		12
		Cryptantha crassisepala	1
		Descurainia pinnata	4
		Plantago patagonica	1
		Salsola tragus	2
		Townsendia annua	2
	Annual Forb Subtotal		10
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex obovata	1
	Shrub Subtotal		1
AW-47 Total Vegetation			12
AW-48	Bare		64
	Rock/Gravel		2
	Litter		22
	Vegetation		12
		Chenactis steveioides	1
		Cryptantha crassisepala	3
		Plantago patagonica	6
	Annual Forb Subtotal		10
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
		Atriplex confertifolia	1
	Shrub Subtotal		1
AW-48 Total Vegetation			12
AW-49	Bare		55
	Rock/Gravel		36
	Litter		5
	Total Vegetation		4
		Cryptantha crassisepala	1
		Descurainia pinnata	1
	Annual Forb Subtotal		2

Transect	Life Form	Scientific Name	Percent Cover
		Bromus rubens	1
	Annual Grass Subtotal		1
		Hordeum jubatum	1
	Perennial Forb Subtotal		1
AW-49 Total Vegetation			4
AW-50	Bare		41
	Rock/Gravel		38
	Litter		20
	Total Vegetation		1
		Cryptantha crassisepala	1
	Annual Forb Subtotal		1
AW-50 Total Vegetation			1
AW-52	Bare		43
	Rock/Gravel		54
	Litter		0
	Vegetation		3
		Lappula occidentalis	1
		Townsendia annua	1
	Annual Forb Subtotal		2
		Atriplex obovata	1
	Shrub Subtotal		1
AW-52 Total Vegetation			3
AW-54	Bare		53
	Rock/Gravel		34
	Litter		8
	Vegetation		5
		Eriogonum gordonii	5
	Annual Forb Subtotal		5
AW-54 Total Vegetation			5
AW-55	Bare		51
	Rock/Gravel		19
	Litter		18
	Vegetation		12
		Cryptantha crassisepala	2
		Descurainia pinnata	1
		Gilia leptomeria	1
		Machaeranthera canescens	1
		Plantago patagonica	3
		Townsendia annua	3
	Annual Forb Subtotal		11
		Elymus Elymoides	1
	Perennial Grass Subtotal		1

Transect	Life Form	Scientific Name	Percent Cover
AW-55 Total Vegetation			12
AW-56	Bare		66
	Rock/Gravel		0
	Litter		16
	Vegetation		18
		Cryptantha crassisepala	1
		Descurainia pinnata	1
		Halogeton glomeratus	1
		Salsola tragus	3
		Townsendia annua	1
	Annual Forb Subtotal		7
		Eremopyrum triticeum	4
	Annual Grass Subtotal		4
		Grindelia squarrosa	1
		Mentzelia pumila	1
	Perennial Forb Subtotal		2
		Achnatherum hymenoides	1
		Pleuraphis jamesii	1
		Sporobolus airoides	3
	Perennial Grass Subtotal		5
AW-56 Total Vegetation			18
AW-65	Bare		30
	Rock/Gravel		51
	Litter		16
	Vegetation		3
		Pleuraphis jamesii	2
		Sporobolus contractus	1
	Perennial Grass Subtotal		3
AW-65 Total Vegetation			3
AW-66	Bare		41
	Rock/Gravel		58
	Litter		0
	Total Vegetation		1
		Cryptantha crassisepala	1
	Annual Forb Subtotal		1
AW-66 Total Vegetation			1
AW-68	Bare		47
	Rock/Gravel		38
	Litter		11
	Total Vegetation		4
		Descurainia pinnata	1
		Salsola tragus	1

Transect	Life Form	Scientific Name	Percent Cover
	Annual Forb Subtotal		2
		Atriplex obovata	2
	Shrub Subtotal		2
AW-68 Total Vegetation			4
AW-69	Bare		47
	Rock/Gravel		46
	Litter		4
	Total Vegetation		3
		Atriplex powellii	1
		Salsola tragus	2
	Annual Forb Subtotal		3
AW-69 Total Vegetation			3
AW-71	Bare		60
	Rock/Gravel		28
	Litter		10
	Total Vegetation		2
		Descurainia pinnata	1
		Plantago patagonica	1
	Annual Forb Subtotal		2
AW-71 Total Vegetation			2
AW-75	Bare		63
	Rock/Gravel		31
	Litter		6
	Total Vegetation		0
AW-75 Total Vegetation			0
AW-77	Bare		49
	Rock/Gravel		7
	Litter		27
	Total Vegetation		17
		Cryptantha crassisepala	2
		Descurainia pinnata	2
		Phacelia crenulata	1
		Plantago patagonica	4
		Salsola tragus	1
		Townsendia annua	1
	Annual Forb Subtotal		11
		Vulpia octiflora	1
	Annual Grass Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		2
		Atriplex confertifolia	2

Transect	Life Form	Scientific Name	Percent Cover
		Gutierrezia sarothrae	1
	Shrub Subtotal		3
AW-77 Total Vegetation			17
AW-79	Bare		56
	Rock/Gravel		3
	Litter		29
	Total Vegetation		12
		Descurainia pinnata	2
		Salsola tragus	5
	Annual Forb Subtotal		7
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex gardneri	1
		Atriplex obovata	2
		Ericameria [Chrysothamnus] nauseosa	1
	Shrub Subtotal		4
AW-79 Total Vegetation			12

Attachment C-16. Spring Badlands Cover and Frequency Data by Point Intercept Transect.

Transect	Life Form	Scientific Name	Percent Cover	
BA-05	Bare			34
	Rock/Gravel			56
	Litter			7
	Vegetation			3
		Lappula occidentalis	1	
		Salsola tragus	1	
	Annual Forb Subtotal		2	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
BA-05 Total Vegetation			3	
BA-17	Bare			66
	Rock/Gravel			28
	Litter			5
	Vegetation			1
		Eriogonum gordonii	1	
	Annual Forb Subtotal		1	
BA-17 Total Vegetation			1	
BA-19	Bare			38
	Rock/Gravel			55
	Litter			2
	Vegetation			5
		Eriogonum gordonii	2	
		Lappula occidentalis	1	
	Annual Forb Subtotal		3	
		Atriplex gardneri	2	
	Shrub Subtotal		2	
		Unidentified	1	
	Unidentified Subtotal		1	
BA-19 Total Vegetation			5	
BA-21	Bare			40
	Rock/Gravel			54
	Litter			4
	Vegetation			2
		Atriplex gardneri	1	
		Atriplex saccaria	1	
	Shrub Subtotal		2	
BA-21 Total Vegetation			2	
BA-23	Bare			34
	Rock/Gravel			52

Transect	Life Form	Scientific Name	Percent Cover
	Litter		7
	Vegetation		7
		Lappula occidentalis	2
		Phacelia crenulata	1
		Plantago patagonica	3
	Annual Forb Subtotal		6
		Unidentified	1
	Unidentified Subtotal		1
BA-23 Total Vegetation			7
BA-25	Bare		51
	Rock/Gravel		38
	Litter		6
	Vegetation		5
		Atriplex powellii	1
		Lappula occidentalis	3
	Annual Forb Subtotal		4
		Unidentified	1
	Unidentified Subtotal		1
BA-25 Total Vegetation			5
BA-27	Bare		34
	Rock/Gravel		52
	Litter		8
	Vegetation		6
		Cryptantha crassisepala	1
		Descurainia pinnata	2
		Salsola tragus	2
	Annual Forb Subtotal		5
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
BA-27 Total Vegetation			6
BA-29	Bare		39
	Rock/Gravel		56
	Litter		3
	Vegetation		2
		Ipomopsis pumila	1
	Annual Forb Subtotal		1
		Atriplex obovata	1
	Shrub Subtotal		1
BA-29 Total Vegetation			2
BA-47	Bare		46
	Rock/Gravel		16
	Litter		25
	Vegetation		13

Transect	Life Form	Scientific Name	Percent Cover	
		Cryptantha crassisepala	4	
		Mentzelia albicaulis	1	
		Plantago patagonica	2	
		Salsola tragus	1	
		Townsendia annua	2	
	Annual Forb Subtotal		10	
		Abronia fragrans	1	
	Perennial Forb Subtotal		1	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		2	
BA-47 Total Vegetation			13	
BA-49	Bare			60
	Rock/Gravel			31
	Litter			9
	Vegetation			0
BA-49 Total Vegetation			0	
BA-51	Bare			97
	Rock/Gravel			2
	Litter			1
	Vegetation			0
BA-51 Total Vegetation			0	
BA-52	Bare			92
	Rock/Gravel			7
	Litter			0
	Vegetation			1
		Atriplex powellii	1	
	Annual Forb Subtotal		1	
BA-52 Total Vegetation			1	
BA-54	Bare			39
	Rock/Gravel			56
	Litter			4
	Vegetation			1
		Ericameria [Chrysothamnus] nauseosa	1	
	Shrub Subtotal		1	
BA-54 Total Vegetation			1	

Attachment C-17. Spring Dunes Cover and Frequency Data by Point Intercept Transect.

Transect	Life Form	Scientific Name	Percent Cover
DU-02 Total	Bare		61
	Rock/Gravel		0
	Litter		14
	Vegetation		25
		Cryptantha crassisepala	2
		Descurainia pinnata	1
		Dimorphocarpa wislizeni	1
		Linum aristatum	1
		Linum puberulum	1
		Lygodesmia grandiflora	1
		Salsola tragus	1
	Annual Forb Subtotal		8
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	3
		Pleuraphis jamesii	8
	Perennial Grass Subtotal		11
		Artemisia filifolia	2
		Atriplex canescens	1
		Lycium pallidum	2
	Shrub Subtotal		5
DU-02 Total Vegetation			25
DU-04 Total	Bare		71
	Rock/Gravel		0
	Litter		7
	Vegetation		22
		Descurainia pinnata	1
		Dimorphocarpa wislizeni	1
		Linum puberulum	2
		Salsola tragus	2
	Annual Forb Subtotal		6
		Sphaeralcea parvifolia	3
		Stephanomeria exigua	3
	Perennial Forb Subtotal		6
		Achnatherum hymenoides	4
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		5
		Ephedra sp.	3
		Eriogonum leptocladon	1
	Shrub Subtotal		4
		Unidentified	1
	Unidentified Subtotal		1
DU-04 Total Vegetation			22

Transect	Life Form	Scientific Name	Percent Cover
DU-06 Total	Bare		73
	Rock/Gravel		0
	Litter		8
	Vegetation		19
		Descurainia pinnata	2
		Salsola tragus	6
	Annual Forb Subtotal		8
		Oenothera pallida	3
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		4
		Achnatherum hymenoides	1
	Perennial Grass Subtotal		1
		Ephedra sp.	4
		Eriogonum leptocladon	2
	Shrub Subtotal		6
DU-06 Total Vegetation			19
DU-10 Total	Bare		66
	Rock/Gravel		0
	Litter		8
	Vegetation		26
		Cryptantha crassisepala	1
		Descurainia pinnata	6
		Dimorphocarpa wislizeni	2
		Linum puberulum	1
		Mentzelia albicaulis	1
		Salsola tragus	1
	Annual Forb Subtotal		12
		Sphaeralcea parvifolia	3
		Stephanomeria exigua	1
	Perennial Forb Subtotal		4
		Pleuraphis jamesii	5
	Perennial Grass Subtotal		5
		Ephedra sp.	4
		Lycium pallidum	1
	Shrub Subtotal		5
DU-10 Total Vegetation			26
DN-14 Total	Bare		68
	Rock/Gravel		0
	Litter		10
	Vegetation		22
		Cryptantha crassisepala	5
		Descurainia pinnata	1
		Descurainia sophia	1

Transect	Life Form	Scientific Name	Percent Cover
		Machaeranthera canescens	1
		Salsola tragus	3
	Annual Forb Subtotal		11
		Oenothera pallida	7
		Sphaeralcea parvifolia	2
		Stephanomeria exigua	1
	Perennial Forb Subtotal		10
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
DN-14 Total Vegetation			22
DN-15 Total	Bare		60
	Rock/Gravel		0
	Litter		14
	Vegetation		26
		Descurainia pinnata	2
		Dimorphocarpa wislizeni	6
		Linum puberulum	1
		Streptanthella longirostris	1
	Annual Forb Subtotal		10
		Abronia fragrans	3
		Oenothera pallida	1
		Psoralidium lanceolatum	1
	Perennial Forb Subtotal		5
		Achnatherum hymenoides	1
		Sporobolus cryptandrus	2
	Perennial Grass Subtotal		3
		Ephedra sp.	6
	Shrub Subtotal		6
		Yucca harrimanaie	1
	Succulent Subtotal		1
		Unidentified	1
	Unidentified Subtotal		1
DN-15 Total Vegetation			26
DN-18 Total	Bare		56
	Rock/Gravel		0
	Litter		13
	Vegetation		31
		Cryptantha crassisepala	6
		Descurainia pinnata	4
		Lupinus pusillus	2
		Mentzelia albicaulis	1
	Annual Forb Subtotal		13
		Oenothera canescens	3
		Oenothera pallida	6

Transect	Life Form	Scientific Name	Percent Cover	
	Perennial Forb Subtotal		9	
		Achnatherum hymenoides	3	
	Perennial Grass Subtotal		3	
		Artemisia filifolia	2	
		Atriplex canescens	2	
		Senna sp.	2	
	Shrub Subtotal		6	
DN-18 Total Vegetation			31	
DN-24 Total	Bare			71
	Rock/Gravel			0
	Litter			3
	Vegetation			26
		Cryptantha crassisepala	6	
		Descurainia pinnata	2	
		Dimorphocarpa wislizeni	6	
	Annual Forb Subtotal		14	
		Oenothera sp.	10	
		Sphaeralcea parvifolia	1	
	Perennial Forb Subtotal		11	
		Achnatherum hymenoides	1	
	Perennial Grass Subtotal		1	
DN-24 Total Vegetation			26	
DN-26 Total	Bare			83
	Rock/Gravel			0
	Litter			5
	Vegetation			12
		Dimorphocarpa wislizeni	1	
	Annual Forb Subtotal		1	
		Mentzelia sp.	1	
	Forb Subtotal		1	
		Oenothera sp.	7	
		Sphaeralcea parvifolia	2	
	Perennial Forb Subtotal		9	
		Muhlenbergia pungens	1	
	Perennial Grass Subtotal		1	
DN-26 Total Vegetation			12	
DN-28 Total	Bare			69
	Rock/Gravel			0
	Litter			6
	Vegetation			25
		Cryptantha crassisepala	2	
		Descurainia pinnata	2	
		Dimorphocarpa wislizeni	4	

Transect	Life Form	Scientific Name	Percent Cover
		Salsola tragus	5
	Annual Forb Subtotal		13
		Mentzelia sp.	3
	Forb Subtotal		3
		Oenothera sp.	6
	Perennial Forb Subtotal		6
		Achnatherum hymenoides	1
		Muhlenbergia pungens	1
	Perennial Grass Subtotal		2
		Lycium pallidum	1
	Shrub Subtotal		1
DN-28 Total Vegetation			25
DN-30 Total	Bare		62
	Rock/Gravel		0
	Litter		9
	Vegetation		29
		Cryptantha crassisepala	8
		Descurainia pinnata	6
		Lupinus pusillus	1
		Machaeranthera canescens	6
		Phacelia crenulata	1
		Salsola tragus	1
	Annual Forb Subtotal		23
		Oenothera pallida	1
		Stephanomeria exigua	1
	Perennial Forb Subtotal		2
		Ephedra sp.	4
	Shrub Subtotal		4
DN-30 Total Vegetation			29
DN-32 Total	Bare		86
	Rock/Gravel		1
	Litter		10
	Vegetation		3
		Lupinus pusillus	1
	Annual Forb Subtotal		1
		Muhlenbergia pungens	2
	Perennial Grass Subtotal		2
DN-32 Total Vegetation			3
DN-34 Total	Bare		80
	Rock/Gravel		0
	Litter		7
	Vegetation		13
		Descurainia pinnata	1

Transect	Life Form	Scientific Name	Percent Cover
		Dimorphocarpa wislizeni	4
	Annual Forb Subtotal		5
		Cymopterus sp.	1
	Forb Subtotal		1
		Oenothera sp.	6
	Perennial Forb Subtotal		6
		Achnatherum hymenoides	1
	Perennial Grass Subtotal		1
DN-34 Total Vegetation			13
DN-36 Total	Bare		67
	Rock/Gravel		0
	Litter		11
	Vegetation		22
		Cryptantha crassisepala	3
		Descurainia pinnata	6
		Dimorphocarpa wislizeni	4
		Lygodesmia grandiflora	1
		Salsola tragus	3
	Annual Forb Subtotal		17
		Oenothera pallida	1
		Stephanomeria exigua	1
	Perennial Forb Subtotal		2
		Pleuraphis jamesii	2
	Perennial Grass Subtotal		2
		Ephedra sp.	1
	Shrub Subtotal		1
DN-36 Total Vegetation			22
DN-38 Total	Bare		69
	Rock/Gravel		0
	Litter		13
	Vegetation		18
		Cryptantha crassisepala	9
		Dimorphocarpa wislizeni	3
		Lupinus pusillus	1
		Salsola tragus	1
	Annual Forb Subtotal		14
		Astragalus sp.	1
		Oenothera sp.	2
		Stephanomeria exigua	1
	Perennial Forb Subtotal		4
DN-38 Total Vegetation			18
DN-40 Total	Bare		71
	Rock/Gravel		0

Transect	Life Form	Scientific Name	Percent Cover
	Litter		9
	Vegetation		20
		Cryptantha crassisepala	3
		Descurainia pinnata	2
		Descurainia sophia	3
		Machaeranthera canescens	2
		Mentzelia albicaulis	5
	Annual Forb Subtotal		15
		Abronia fragrans	1
		Oenothera pallida	1
		Sphaeralcea parvifolia	1
		Stephanomeria exigua	1
	Perennial Forb Subtotal		4
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
DN-40 Total Vegetation			20
DN-42 Total	Bare		57
	Rock/Gravel		7
	Litter		17
	Vegetation		19
		Ambrosia acanthicarpa	1
		Descurainia pinnata	1
		Dimorphocarpa wislizeni	2
		Linum puberulum	2
		Machaeranthera canescens	1
		Mentzelia albicaulis	1
		Salsola tragus	1
	Annual Forb Subtotal		9
		Oenothera pallida	3
		Sphaeralcea parvifolia	3
	Perennial Forb Subtotal		6
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
		Ephedra sp.	3
	Shrub Subtotal		3
DN-42 Total Vegetation			19
DN-44 Total	Bare		73
	Rock/Gravel		0
	Litter		6
	Vegetation		21
		Cryptantha crassisepala	5
		Descurainia pinnata	5
		Dimorphocarpa wislizeni	1
		Linum puberulum	1

Transect	Life Form	Scientific Name	Percent Cover
		Machaeranthera canescens	1
		Mentzelia albicaulis	3
	Annual Forb Subtotal		16
		Stephanomeria exigua	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	2
		Pleuraphis jamesii	1
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		4
DN-44 Total Vegetation			21
DN-45 Total	Bare		55
	Rock/Gravel		2
	Litter		37
	Vegetation		6
		Erigeron bellidiastrum	2
		Lappula occidentalis	1
		Plantago patagonica	2
	Annual Forb Subtotal		5
		Atriplex obovata	1
	Shrub Subtotal		1
DN-45 Total Vegetation			6

Attachment C-18. Spring Sands Cover and Frequency Data by Point Intercept Transect.

Transect	Life Form	Scientific Name	Percent Cover
SA-01 Total	Bare		76
	Rock/Gravel		0
	Litter		11
	Vegetation		13
		Cryptantha crassisepala	1
		Descurainia sophia	1
		Phacelia crenulata	1
	Annual Forb Subtotal		3
		Achnatherum hymenoides	3
		Aristida purpurea	1
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		5
		Gutierrezia sarothrae	5
	Shrub Subtotal		5
SA-01 Total Vegetation			13
SA-03 Total	Bare		59
	Rock/Gravel		22
	Litter		9
	Vegetation		10
		Cryptantha crassisepala	1
		Salsola tragus	1
		Townsendia annua	1
	Annual Forb Subtotal		3
		Atriplex confertifolia	5
		Gutierrezia sarothrae	2
	Shrub Subtotal		7
SA-03 Total Vegetation			10
SA-05 Total	Bare		54
	Rock/Gravel		23
	Litter		14
	Vegetation		9
		Chenactis steveioides	3
		Townsendia annua	1
	Annual Forb Subtotal		4
		Sphaeralcea coccinea	1
		Stephanomeria exigua	2
	Perennial Forb Subtotal		3
		Gutierrezia sarothrae	1
	Shrub Subtotal		1
		Opuntia polyacantha	1
	Succulent Subtotal		1
SA-05 Total Vegetation			9

Transect	Life Form	Scientific Name	Percent Cover
SA-07 Total	Bare		59
	Rock/Gravel		3
	Litter		28
	Vegetation		10
		Cryptantha crassisepala	4
		Descurainia pinnata	1
		Salsola tragus	1
	Annual Forb Subtotal		6
		Vulpia octiflora	1
	Annual Grass Subtotal		1
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		1
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
		Atriplex confertifolia	1
	Shrub Subtotal		1
SA-07 Total Vegetation			10
SA-09 Total	Bare		58
	Rock/Gravel		12
	Litter		18
	Vegetation		12
		Descurainia pinnata	1
		Phacelia crenulata	2
		Salsola tragus	1
	Annual Forb Subtotal		4
		Sporobolus contractus	1
		Sporobolus airoides	1
	Perennial Grass Subtotal		2
		Atriplex confertifolia	5
		Gutierrezia sarothrae	1
	Shrub Subtotal		6
SA-09 Total Vegetation			12
SA-13 Total	Bare		58
	Rock/Gravel		9
	Litter		19
	Vegetation		14
		Cryptantha crassisepala	4
		Salsola tragus	7
		Townsendia annua	2
	Annual Forb Subtotal		13
		Sporobolus airoides	1
	Perennial Grass Subtotal		1
SA-13 Total Vegetation			14

Transect	Life Form	Scientific Name	Percent Cover
SA-16 Total	Bare		56
	Rock/Gravel		9
	Litter		19
	Vegetation		16
		Chenactis steveioides	1
		Descurainia sophia	1
		Phacelia crenulata	1
	Annual Forb Subtotal		3
		Mentzelia pumila	1
	Perennial Forb Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus airoides	7
	Perennial Grass Subtotal		8
		Atriplex confertifolia	1
		Ephedra sp.	1
		Sarcobatus vermiculatus	1
	Shrub Subtotal		3
		Unidentified	1
	Unidentified Subtotal		
SA-16 Total Vegetation			16
SA-17 Total	Bare		73
	Rock/Gravel		0
	Litter		11
	Vegetation		16
		Cryptantha crassisepala	2
		Descurainia pinnata	6
		Lappula occidentalis	1
		Salsola tragus	1
	Annual Forb Subtotal		10
		Townsendia incana	3
	Perennial Forb Subtotal		3
		Achnatherum hymenoides	1
	Perennial Grass Subtotal		1
		Sarcobatus vermiculatus	2
	Shrub Subtotal		2
SA-17 Total Vegetation			16
SA-21 Total	Bare		63
	Rock/Gravel		10
	Litter		19
	Vegetation		8
		Cryptantha crassisepala	5
		Phacelia crenulata	2
		Plantago patagonica	1

Transect	Life Form	Scientific Name	Percent Cover
	Annual Forb Subtotal		8
SA-21 Total Vegetation			8
SA-23 Total	Bare		54
	Rock/Gravel		9
	Litter		18
	Vegetation		19
		Chenactis steveioides	4
		Descurainia pinnata	1
		Ipomopsis pumila	1
		Phacelia crenulata	2
		Salsola tragus	1
		Townsendia annua	1
	Annual Forb Subtotal		10
		Pleuraphis jamesii	3
		Sporobolus airoides	1
	Perennial Grass Subtotal		4
		Atriplex confertifolia	5
	Shrub Subtotal		5
SA-23 Total Vegetation			19
SA-27 Total	Bare		57
	Rock/Gravel		18
	Litter		14
	Vegetation		11
		Machaeranthera canescens	1
		Plantago patagonica	6
	Annual Forb Subtotal		7
		Vulpia octiflora	1
	Annual Grass Subtotal		1
		Pleuraphis jamesii	1
		Sporobolus airoides	2
	Perennial Grass Subtotal		3
SA-27 Total Vegetation			11
SA-31 Total	Bare		64
	Rock/Gravel		0
	Litter		13
	Vegetation		23
		Cryptantha crassisepala	2
		Phacelia crenulata	5
		Plantago patagonica	8
	Annual Forb Subtotal		15
		Abronia fragrans	1
	Perennial Forb Subtotal		1
		Achnatherum hymenoides	3

Transect	Life Form	Scientific Name	Percent Cover	
		Pleuraphis jamesii	1	
		Sporobolus airoides	3	
	Perennial Grass Subtotal		7	
SA-31 Total Vegetation			23	
SA-33 Total	Bare			52
	Rock/Gravel			6
	Litter			27
	Vegetation			15
		Cryptantha crassisepala	4	
		Descurainia pinnata	3	
		Phacelia crenulata	1	
		Plantago patagonica	2	
	Annual Forb Subtotal		10	
		Sporobolus airoides	4	
	Perennial Grass Subtotal		4	
		Unidentified	1	
	Unidentified Subtotal		1	
SA-33 Total Vegetation			15	
SA-36 Total	Bare			50
	Rock/Gravel			5
	Litter			27
	Vegetation			18
		Cryptantha crassisepala	3	
		Descurainia pinnata	4	
		Machaeranthera canescens	1	
		Phacelia crenulata	9	
		Salsola tragus	1	
	Annual Forb Subtotal		18	
SA-36 Total Vegetation			18	
SA-37 Total	Bare			52
	Rock/Gravel			21
	Litter			11
	Vegetation			16
		Cryptantha crassisepala	1	
		Phacelia crenulata	2	
		Salsola tragus	4	
	Annual Forb Subtotal		7	
		Achnatherum hymenoides	1	
		Sporobolus airoides	8	
	Perennial Grass Subtotal		9	
SA-37 Total Vegetation			16	
SA-39 Total	Bare			43

Transect	Life Form	Scientific Name	Percent Cover
	Rock/Gravel		3
	Litter		34
	Vegetation		20
		Cryptantha crassisepala	3
		Phacelia crenulata	8
		Salsola tragus	4
	Annual Forb Subtotal		15
		Abronia fragrans	1
		Sphaeralcea parvifolia	1
	Perennial Forb Subtotal		2
		Sporobolus airoides	3
	Perennial Grass Subtotal		3
SA-39 Total Vegetation			20
SA-43 Total	Bare		48
	Rock/Gravel		22
	Litter		22
	Vegetation		8
		Salsola tragus	3
	Annual Forb Subtotal		3
		Atriplex confertifolia	1
		Ephedra sp.	1
		Gutierrezia sarothrae	3
	Shrub Subtotal		5
SA-43 Total Vegetation			8
SA-45 Total	Bare		70
	Rock/Gravel		0
	Litter		9
	Vegetation		21
		Cryptantha crassisepala	10
		Salsola tragus	1
	Annual Forb Subtotal		11
		Pleuraphis jamesii	7
		Sporobolus airoides	3
	Perennial Grass Subtotal		10
SA-45 Total Vegetation			21
SA-46 Total	Bare		46
	Rock/Gravel		35
	Litter		16
	Vegetation		3
		Cryptantha crassisepala	1
		Descurainia pinnata	2
	Annual Forb Subtotal		3

Transect	Life Form	Scientific Name	Percent Cover
SA-46 Total Vegetation			3
SA-47 Total	Bare		64
	Rock/Gravel		21
	Litter		13
	Vegetation		2
		Atriplex powellii	2
	Annual Forb Subtotal		2
SA-47 Total Vegetation			2
SA-54 Total	Bare		47
	Rock/Gravel		2
	Litter		25
	Vegetation		26
		Cryptantha crassisepala	6
		Descurainia pinnata	5
		Dimorphocarpa wislizeni	2
		Mentzelia albicaulis	1
		Salsola tragus	8
	Annual Forb Subtotal		22
		Abronia fragrans	1
		Sphaeralcea parvifolia	1
		Stephanomeria exigua	1
	Perennial Forb Subtotal		3
		Sporobolus cryptandrus	1
	Perennial Grass Subtotal		1
SA-54 Total Vegetation			26
SA-56 Total	Bare		63
	Rock/Gravel		0
	Litter		6
	Vegetation		31
		Cryptantha crassisepala	2
		Descurainia pinnata	2
		Descurainia sophia	1
		Dimorphocarpa wislizeni	3
		Mentzelia albicaulis	5
		Salsola tragus	1
		Streptanthella longirostris	1
	Annual Forb Subtotal		15
		Oenothera pallida	12
		Sphaeralcea parvifolia	2
		Stephanomeria exigua	1
	Perennial Forb Subtotal		15
		Opuntia polyacantha	1
	Succulent Subtotal		1

Transect	Life Form	Scientific Name	Percent Cover
SA-56 Total Vegetation			31
SA-62 Total	Bare		50
	Rock/Gravel		14
	Litter		25
	Vegetation		11
		Cryptantha crassisepala	2
		Descurainia pinnata	1
		Plantago patagonica	1
		Salsola tragus	1
	Annual Forb Subtotal		5
		Sphaeralcea coccinea	1
	Perennial Forb Subtotal		1
		Pleuraphis jamesii	4
		Sporobolus airoides	1
	Perennial Grass Subtotal		5
SA-62 Total Vegetation			11
SA-64 Total	Bare		43
	Rock/Gravel		31
	Litter		16
	Vegetation		10
		Chenactis steveioides	3
		Salsola tragus	2
	Annual Forb Subtotal		5
		Vulpia octiflora	1
	Annual Grass Subtotal		1
		Sporobolus airoides	3
	Perennial Grass Subtotal		3
		Atriplex confertifolia	1
	Shrub Subtotal		1
SA-64 Total Vegetation			10
SA-65 Total	Bare		43
	Rock/Gravel		22
	Litter		24
	Vegetation		11
		Cryptantha crassisepala	2
		Descurainia pinnata	2
		Salsola tragus	1
		Townsendia annua	1
	Annual Forb Subtotal		6
		Atriplex confertifolia	5
	Shrub Subtotal		5
SA-65 Total Vegetation			11

Attachment C-19. Spring Thin Breaks Cover and Frequency Data by Point Intercept Transect.

Transect	Life Form	Scientific Name	Percent Cover	
TB-06	Bare			47
	Rock/Gravel			46
	Litter			6
	Vegetation			1
		Cryptantha crassisepala	1	
	Annual Forb Subtotal		1	
TB-06 Total Vegetation			1	
TB-11	Bare			39
	Rock/Gravel			43
	Litter			7
	Vegetation			11
		Cryptantha crassisepala	1	
		Eriogonum gordonii	1	
		Lappula occidentalis	1	
		Salsola tragus	1	
		Townsendia annua	2	
	Annual Forb Subtotal		6	
		Atriplex confertifolia	3	
		Atriplex obovata	2	
	Shrub Subtotal		5	
TB-11 Total Vegetation			11	
TB-18	Bare			25
	Rock/Gravel			64
	Litter			8
	Vegetation			3
		Lappula occidentalis	1	
		Townsendia annua	1	
	Annual Forb Subtotal		2	
		Sporobolus airoides	1	
	Perennial Grass Subtotal		1	
TB-18 Total Vegetation			3	
TB-20	Bare			29
	Rock/Gravel			50
	Litter			14
	Vegetation			7
		Descurainia pinnata	2	
		Ipomopsis pumila	1	
		Lappula occidentalis	2	
	Annual Forb Subtotal		5	
		Atriplex confertifolia	1	

Transect	Life Form	Scientific Name	Percent Cover	
	Shrub Subtotal		1	
		Unidentified	1	
	Unidentified Subtotal		1	
TB-20 Total Vegetation			7	
TB-40	Bare			65
	Rock/Gravel			22
	Litter			5
	Vegetation			8
		Lappula occidentalis	4	
	Annual Forb Subtotal		4	
		Hordeum pusillum	2	
	Annual Grass Subtotal		2	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		2	
TB-40 Total Vegetation			8	
TB-44	Bare			30
	Rock/Gravel			65
	Litter			2
	Vegetation			3
		Halogeton glomeratus	1	
		Salsola tragus	1	
	Annual Forb Subtotal		2	
		Sphaeralcea coccinea	1	
	Perennial Forb Subtotal		1	
TB-44 Total Vegetation			3	
TB-47	Bare			26
	Rock/Gravel			54
	Litter			16
	Vegetation			4
		Halogeton glomeratus	1	
		Salsola tragus	1	
	Annual Forb Subtotal		2	
		Atriplex confertifolia	2	
	Shrub Subtotal		2	
TB-47 Total Vegetation			4	
TB-48	Bare			50
	Rock/Gravel			31
	Litter			12
	Vegetation			7
		Cryptantha crassisepala	1	
		Lappula occidentalis	1	
		Salsola tragus	1	

Transect	Life Form	Scientific Name	Percent Cover	
	Annual Forb Subtotal		3	
		Bromus tectorum	1	
	Annual Grass Subtotal		1	
		Pleuraphis jamesii	1	
	Perennial Grass Subtotal		1	
		Atriplex obovata	2	
	Shrub Subtotal		2	
TB-48 Total Vegetation			7	
TB-51	Bare			18
	Rock/Gravel			54
	Litter			20
	Vegetation			8
		Descurainia pinnata	1	
		Lappula occidentalis	1	
	Annual Forb Subtotal		2	
		Pleuraphis jamesii	2	
		Sporobolus airoides	2	
	Perennial Grass Subtotal		3	
		Atriplex confertifolia	1	
		Atriplex obovata	1	
	Shrub Subtotal		2	
TB-51 Total Vegetation			8	
TB- 53	Bare			62
	Rock/Gravel			31
	Litter			6
	Vegetation			1
		Erigonum gordonii	1	
	Annual Forb Subtotal		1	
TB- 53 Total Vegetation			1	
TB-55	Bare			53
	Rock/Gravel			44
	Litter			1
	Vegetation			2
		Atriplex powellii	1	
		Eriogonum gordonii	1	
	Annual Forb Subtotal		2	
TB-55 Total Vegetation			2	
TB-57	Bare			22
	Rock/Gravel			66
	Litter			10
	Vegetation			2
		Sporobolus airoides	1	

Transect	Life Form	Scientific Name	Percent Cover
	Perennial Grass Subtotal		1
		Atriplex saccaria	1
	Shrub Subtotal		1
TB-57 Total Vegetation			2
TB-59	Bare		50
	Rock/Gravel		28
	Litter		11
	Vegetation		11
		Cryptantha crassisepala	1
		Descurainia pinnata	1
		Ipomopsis pumila	1
		Phacelia crenulata	1
		Plantago patagonica	4
		Salsola tragus	1
	Annual Forb Subtotal		9
		Pleuraphis jamesii	1
	Perennial Grass Subtotal		1
		Atriplex confertifolia	1
	Shrub Subtotal		1
TB-59 Total Vegetation			11
TB-61	Bare		27
	Rock/Gravel		68
	Litter		5
	Vegetation		0
TB-61 Total Vegetation			0
TB-63	Bare		54
	Rock/Gravel		40
	Litter		4
	Vegetation		2
		Descurainia pinnata	1
		Salsola tragus	1
	Annual Forb Subtotal		2
TB-63 Total Vegetation			2

ATTACHMENT D

SHRUB DENSITY DATA

Attachment D. Shrub Density Data
Table of Contents

D-1	Fall	Summary of Average Shrub Density in All Vegetation Communities
D-2	Fall	Arroyo Shrub Shrub Density by Transect
D-3	Fall	Alkali Wash Shrub Density by Transect
D-4	Fall	Badlands Shrub Density by Transect
D-5	Fall	Dunes Shrub Density by Transect
D-6	Fall	Reference Arroyo Shrub Shrub Density by Transect
D-7	Fall	Reference Alkali Wash Shrub Density by Transect
D-8	Fall	Reference Sands Shrub Density by Transect
D-9	Fall	Sands Shrub Density by Transect
D-10	Fall	Thin Breaks Shrub Density by Transect

Attachment D-1. Fall Summary of Average Shrub Density in All Vegetation Communities

	Arroyo Shrub	Alkali Wash	Badlands	Dunes	Sands	Thin Breaks	Reference Arroyo Shrub	Reference Alkali Wash	Reference Sands
Aremisia bigelovii	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
Artemisia filifolia	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Aremisia tridentata	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Atriplex canescens	6.0	0.2	0.1	1.4	0.6	0.8	0.4	0.3	0.2
Atriplex confertifolia	0.0	2.7	0.3	0.1	10.0	4.6	0.2	0.6	4.8
Atriplex gardneri	0.0	3.0	2.5	0.1	0.1	0.9	0.3	2.0	0.5
Atriplex obovata	6.9	6.2	9.7	0.2	0.6	2.8	9.0	14.0	3.9
Atriplex saccaria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chrysothamnus viscidiflorus	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
Ephedra spp.	1.2	0.0	0.1	3.0	0.1	0.2	0.0	0.0	0.5
Eriogonum leptocladon	0.3	0.0	0.0	1.8	0.1	0.0	0.0	0.0	0.0
Ericameria [Chrysothamnus] nauseosus	3.4	0.0	0.0	2.4	0.4	0.0	0.0	0.0	0.0
Gutierrezia sarothrae	4.0	0.7	0.1	6.0	15.4	2.5	1.6	1.9	47.9
Isochoma tenuisecta	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Krascheninnikovia lanata	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Lycium pallidum	0.1	0.0	0.0	0.8	0.1	0.0	0.3	0.0	0.0
Paryella filifolia	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Poliomintha incana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sarcobatus vermiculatus	5.0	0.5	0.0	0.4	0.0	0.1	0.9	0.3	0.0
Unidentified	0.3	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
Average Total Shrubs (stems per 100m2)	27.2	13.4	12.8	18.0	27.4	12.6	12.6	19.1	57.8
Average Density (stems per acre)	1,100.8	540.3	519.5	729.5	1,107.9	511.3	509.5	773.0	2,340.0
Standard Deviation	857.1	624.5	445.2	654.8	1,183.0	561.6	442.5	680.3	2,352.5
Average Total Shrubs (stems per 100m2) Without *Gutierrezia*	23.3	12.6	12.7	12.0	12.0	10.1	10.9	17.3	9.9
Average Density (stems per acre) Without *Gutierrezia*	940.9	510.9	513.9	486.6	485.6	408.6	443.1	698.1	402.6
Standard Deviation Without *Gutierrezia*	881.2	611.1	450.3	417.9	357.4	338.3	423.8	600.2	330.3

Attachment D-2. Fall Arroyo Shrub Shrub Density by Transect

	AS-041	AS-042	AS-043	AS-044	AS-045	AS-046	AS-047	AS-048	AS-049	AS-050	AS-051	AS-052
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	7	0	0	0	0	0
Atriplex canescens	20	5	0	10	0	1	8	3	5	10	4	7
Atriplex confertifolia	0	0	0	0	0	0	1	0	0	0	0	0
Atriplex gardneri	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex obovata	0	4	19	0	0	0	0	0	19	0	0	0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	2	0	0	1	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	10	7	21	5	0	0	2	0	13
Gutierrezia sarothrae	11	0	0	2	14	0	5	0	0	2	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	5	0	0	1	0	0	0	0	6
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	1	9	0	0	0	0	2	2	12	0	24	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0
Average Total Shrubs (stems per 100m2)	32	18	19	27	21	22	31	5	36	15	28	26
Average Density (stems per acre)	1,295.02	728.45	768.92	1,092.68	849.86	890.33	1,254.55	202.35	1,456.90	607.04	1,133.14	1,052.21
Average Total Shrubs (stems per 100m2) Without *Gutierrezia*	21	18	19	25	7	22	26	5	36	13	28	26
Average Density (stems per acre) Without *Gutierrezia*	849.86	728.45	768.92	1,011.74	283.29	890.33	1,052.21	202.35	1,456.90	526.10	1,133.14	1,052.21

	AS-053	AS-054	AS-055	AS-056	AS-057	AS-058	AS-059	AS-060	AS-061	AS-062	AS-063	AS-064
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	10	0	6	0	0	0	2	11	7	2	0	3
Atriplex confertifolia	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex gardneri	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex obovata	0	0	3	0	0	0	0	0	0	1	28	0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	34
Eriogonum leptocladon	0	0	0	2	0	0	0	0	8	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	19	6	6	1	24	0	0	0	0
Gutierrezia sarothrae	0	0	0	7	13	3	3	2	14	0	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	11	0	9	0	0	1	2	0	7	4	0	14
Unidentified	0	0	0	0	0	0	0	13	0	0	0	0
Average Total Shrubs (stems per 100m2)	21	0	18	28	19	10	8	50	36	7	28	51
Average Density (stems per acre)	849.86	0.00	728.45	1,133.14	768.92	404.69	323.76	2,023.47	1,456.90	283.29	1,133.14	2,063.94
Average Total Shrubs (stems per 100m2) Without *Gutierrezia*	21	0	18	21	6	7	5	48	22	7	28	51
Average Density (stems per acre) Without *Gutierrezia*	849.86	0.00	728.45	849.86	242.82	283.29	202.35	1,942.53	890.33	283.29	1,133.14	2,063.94

	AS-065	AS-066	AS-067	AS-068	AS-069	AS-070	AS-071	AS-072	AS-073	AS-074	AS-075	AS-076
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	1	5	0	0	13	3	0	10	0	12	13	2
Atriplex confertifolia	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex gardneri	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex obovata	0	0	0	7	0	0	76	0	103	0	0	3
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	10	0	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	3	0	0	2	0	8	0	0	0	0
Gutierrezia sarothrae	0	27	10	0	0	21	0	0	0	3	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	4	0	0	15	3	13	0	8	2	10	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0
Average Total Shrubs (stems per 100m2)	11	36	13	7	28	29	89	18	111	17	23	5
Average Density (stems per acre)	445.16	1,456.90	526.10	283.29	1,133.14	1,173.61	3,601.78	728.45	4,492.11	687.98	930.80	202.35
Average Total Shrubs (stems per 100m2) Without *Gutierrezia*	11	9	3	7	28	8	89	18	111	14	23	5
Average Density (stems per acre) Without *Gutierrezia*	445.16	364.23	121.41	283.29	1,133.14	323.76	3,601.78	728.45	4,492.11	566.57	930.80	202.35

	AS-077	AS-078	AS-079	AS-080	Arroyo Shrub Average
Aremisia bigelovii	0	0	0	0	0.0
Artemisia filifolia	0	0	0	0	0.0
Aremisia tridentata	0	0	0	0	0.2
Atriplex canescens	14	24	7	9	5.7
Atriplex confertifolia	0	0	0	0	0.0
Atriplex gardneri	0	0	0	0	0.0
Atriplex obovata	4	6	3	0	6.9
Atriplex saccaria	0	0	0	0	0.0
Chrysothamnus viscidiflorus	0	0	0	0	0.0
Ephedra spp.	0	0	0	0	1.2
Eriogonum leptocladon	0	0	0	0	0.3
Ericameria [Chrysothamnus] nauseosus	0	0	0	7	3.4
Gutierrezia sarothrae	7	3	0	11	4.0
Isochoma tenuisecta	0	0	0	0	0.0
Krascheninnikovia lanata	0	0	0	0	0.0
Lycium pallidum	2	0	0	0	0.1
Paryella filifolia	0	0	0	0	0.3
Poliomintha incana	0	0	0	0	0.0
Sarcobatus vermiculatus	9	16	8	15	5.0
Unidentified	0	0	0	0	0.3
Average Total Shrubs (stems per 100m2)	36	49	18	42	27.2
Average Density (stems per acre)	1,456.90	1,983.00	728.45	1,699.72	1100.8
Average Total Shrubs (stems per 100m2) Without *Gutierrezia*	29	46	18	31	23.25
Average Density (stems per acre) Without *Gutierrezia*	1,173.61	1,861.59	728.45	1,254.55	940.9

Attachment D-3. Fall Alkali Wash Shrub Density by Transect

	AW-001	AW-002	AW-003	AW-004	AW-005	AW-006	AW-007	AW-008	AW-009	AW-010	AW-011	AW-012	AW-013	AW-014
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex confertifolia	0	0	0	0	0	0	2	0	0	1	0	0	1	0
Atriplex gardneri	3	7	0	52	0	0	0	0	1	0	0	0	0	0
Atriplex obovata	10	3	8	20	2	0	0	0	4	2	6	21	7	11
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	7	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	13.0	10.0	8.0	72.0	2.0	0.0	2.0	0.0	5.0	10.0	6.0	21.0	8.0	11.0
Density (stems per acre)	526.1	404.7	323.8	2,913.8	80.9	0.0	80.9	0.0	202.3	404.7	242.8	849.9	323.8	445.2
Total Shrubs (stems per 100m2) Without *Gutierrezia*	13.0	10.0	8.0	72.0	2.0	0.0	2.0	0.0	5.0	10.0	6.0	21.0	8.0	11.0
Density (stems per acre) Without *Gutierrezia*	526.1	404.7	323.8	2,913.8	80.9	0.0	80.9	0.0	202.3	404.7	242.8	849.9	323.8	445.2

	AW-015	AW-016	AW-017	AW-018	AW-019	AW-020	AW-021	AW-022	AW-023	AW-024	AW-025	AW-026	AW-027	AW-028
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Atriplex confertifolia	7	0	0	1	0	0	2	3	0	0	0	0	0	0
Atriplex gardneri	4	17	1	4	0	12	0	2	0	0	0	16	0	0
Atriplex obovata	0	0	5	0	1	3	0	0	1	15	14	20	5	0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	2	0	0	0	0	0	0	0	4	0	0	0	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	4	4	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	13.0	17.0	6.0	5.0	1.0	15.0	2.0	5.0	10.0	19.0	14.0	36.0	5.0	0.0
Density (stems per acre)	526.1	688.0	242.8	202.3	40.5	607.0	80.9	202.3	404.7	768.9	566.6	1,456.9	202.3	0.0
Total Shrubs (stems per 100m2) Without *Gutierrezia*	11.0	17.0	6.0	5.0	1.0	15.0	2.0	5.0	6.0	19.0	14.0	36.0	5.0	0.0
Density (stems per acre) Without *Gutierrezia*	445.2	688.0	242.8	202.3	40.5	607.0	80.9	202.3	242.8	768.9	566.6	1,456.9	202.3	0.0

	AW-029	AW-030	AW-031	AW-032	AW-033	AW-034	AW-035	AW-036	AW-037	AW-038	AW-039	AW-040	Average Alkali Wash
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Atriplex canescens	0	0	0	0	0	7	0	0	0	0	0	0	0.2
Atriplex confertifolia	0	2	0	0	20	37	7	8	16	0	0	0	2.7
Atriplex gardneri	0	0	0	0	0	0	0	1	0	0	0	0	3.0
Atriplex obovata	4	22	1	2	19	12	7	0	0	7	15	0	6.2
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Ephedra spp.	0	0	0	0	0	0	0	1	0	0	0	0	0.0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Gutierrezia sarothrae	0	0	0	0	0	0	0	23	0	0	0	0	0.7
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Krascheninnikovia lanata	0	0	0	0	0	0	0	1	0	0	0	0	0.0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	6	0	0.5
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total Shrubs (stems per 100m2)	4.0	24.0	1.0	2.0	39.0	56.0	14.0	34.0	16.0	7.0	21.0	0.0	13.4
Density (stems per acre)	161.9	971.3	40.5	80.9	1578.3	2266.3	566.6	1,376.0	647.5	283.3	849.9	0.0	540.3
Total Shrubs (stems per 100m2) Without *Gutierrezia*	4.0	24.0	1.0	2.0	39.0	56.0	14.0	11.0	16.0	7.0	21.0	0.0	12.6
Density (stems per acre) Without *Gutierrezia*	161.9	971.3	40.5	80.9	1578.3	2266.3	566.6	445.2	647.5	283.3	849.9	0.0	510.9

Attachment D-4. Fall Badlands Shrub Density by Transect

	BA-081	BA-082	BA-083	BA-084	BA-085	BA-086	BA-087	BA-088	BA-089	BA-090	BA-091	BA-091*	BA-092	BA-093	BA-094
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex confertifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex gardneri	0	5	1	0	9	0	0	27	1	6	0	11	9	0	0
Atriplex obovata	18	31	7	7	13	37	7	19	10	0	0	2	18	7	2
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	18.0	36.0	8.0	7.0	22.0	37.0	7.0	46.0	11.0	6.0	6.0	13.0	27.0	7.0	2.0
Density (stems per acre)	728.5	1,456.9	323.8	283.3	890.3	1,497.4	283.3	1,861.6	445.2	242.8	242.8	526.1	1,092.7	283.3	80.9
Total Shrubs (stems per 100m2) Without *Gutierrezia*	18.0	36.0	8.0	7.0	22.0	37.0	7.0	46.0	11.0	6.0	0.0	13.0	27.0	7.0	2.0
Density (stems per acre) Without *Gutierrezia*	728.5	1,456.9	323.8	283.3	890.3	1,497.4	283.3	1,861.6	445.2	242.8	0.0	526.1	1,092.7	283.3	80.9

	BA-095	BA-096	BA-097	BA-098	BA-098*	BA-099	BA-100	BA-101	BA-101*	BA-102	BA-103	BA-104	BA-105	BA-106	BA-107
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	2	0	0	0	0	0	0	0	0	0	0	0	4	0	0
Atriplex confertifolia	0	0	0	0	0	9	0	0	0	0	0	0	3	0	0
Atriplex gardneri	0	1	0	8	3	0	2	0	4	1	0	0	0	0	0
Atriplex obovata	22	1	4	13	4	9	7	13	1	5	3	0	4	12	2
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	26.0	2.0	4.0	21.0	7.0	21.0	9.0	13.0	5.0	6.0	3.0	0.0	11.0	12.0	2.0
Density (stems per acre)	1,052.2	80.9	161.9	849.9	283.3	849.9	364.2	526.1	202.3	242.8	121.4	0.0	445.2	485.6	80.9
Total Shrubs (stems per 100m2) Without *Gutierrezia*	26.0	2.0	4.0	21.0	7.0	21.0	9.0	13.0	5.0	6.0	3.0	0.0	11.0	12.0	2.0
Density (stems per acre) Without *Gutierrezia*	1,052.2	80.9	161.9	849.9	283.3	849.9	364.2	526.1	202.3	242.8	121.4	0.0	445.2	485.6	80.9

	BA-108	BA-109	BA-110	BA-111	BA-112	BA-113	BA-114	BA-115	BA-116	BA-117	BA-118	BA-119	BA-120	Average Badlands
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Atriplex canescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Atriplex confertifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3
Atriplex gardneri	1	6	0	0	0	0	0	0	0	0	1	7	3	2.5
Atriplex obovata	15	25	18	3	11	5	10	3	0	2	16	21	9	9.7
Atriplex saccaria	1	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Gutierrezia sarothrae	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total Shrubs (stems per 100m2)	17.0	31.0	18.0	3.0	11.0	5.0	10.0	3.0	0.0	2	17	28.0	12.0	12.8
Density (stems per acre)	688.0	1,254.6	728.5	121.4	445.2	202.3	404.7	121.4	0.0	80.9	688.0	1133.1	485.6	519.5
Total Shrubs (stems per 100m2) Without *Gutierrezia*	17.0	31.0	18.0	3.0	11.0	5.0	10.0	3.0	0.0	2.0	17.0	28.0	12.0	12.7
Density (stems per acre) Without *Gutierrezia*	688.0	1,254.6	728.5	121.4	445.2	202.3	404.7	121.4	0.0	80.9	688.0	1133.1	485.6	513.9

Attachment D-5. Fall Dunes Shrub Density by Transect

	DU-121	DU-122	DU-123	DU-124	DU-125	DU-126	DU-127	DU-128	DU-129	DU-130	DU-131	DU-132	DU-133	DU-134
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	1	3	2	3	0	10	2	0	5	2	4	0	1	0
Atriplex confertifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex gardneri	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex obovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	19	0	0	0	1	0	0	0	0	0	1	0	0	0
Ephedra spp.	0	0	0	0	8	0	0	2	0	1	1	0	0	6
Eriogonum leptocladon	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	4	0	15	1	3	0	2	0	0	0	0	0	0
Gutierrezia sarothrae	0	0	0	0	2	0	0	6	65	2	0	0	36	27
Isochoma tenuisecta	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	29	0	0	0	0	0	0	0	2	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	9	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	20.0	12.0	31.0	18.0	12.0	22.0	2.0	10.0	70.0	5.0	8.0	0.0	37.0	33.0
Density (stems per acre)	809.4	485.6	1,254.6	728.5	485.6	890.3	80.9	404.7	2,832.9	202.3	323.8	0.0	1,497.4	1,335.5
Total Shrubs (stems per 100m2) Without *Gutierrezia*	20.0	12.0	31.0	18.0	10.0	22.0	2.0	4.0	5.0	3.0	8.0	0.0	1.0	6.0
Density (stems per acre) Without *Gutierrezia*	809.4	485.6	1,254.6	728.5	404.7	890.3	80.9	161.9	202.3	121.4	323.8	0.0	40.5	242.8

	DU-135	DU-136	DU-137	DU-138	DU-139	DU-140	DU-141	DU-142	DU-143	DU-144	DU-145	DU-146	DU-147	DU-148
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	1	1	0	0	6	2	2	3	3	0	0	1
Atriplex confertifolia	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Atriplex gardneri	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex obovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	1	3	0	2	0	1	0	1
Ephedra spp.	4	4	0	0	0	0	0	2	0	13	1	4	2	1
Eriogonum leptocladon	0	7	3	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	14	0	12	0	22	0	0	0	0	0	0	3	5	0
Gutierrezia sarothrae	0	13	0	59	0	0	0	0	0	0	0	1	1	0
Isochoma tenuisecta	0	11	3	0	0	0	0	0	0	0	0	0	5	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	2	3	0	0	0	0	0	0	0	0	0	1	0
Unidentified	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Total Shrubs (stems per 100m2)	18.0	37.0	22.0	60.0	22.0	0.0	7.0	7.0	2.0	18.0	6.0	9.0	15.0	3.0
Density (stems per acre)	728.5	1,497.4	890.3	2,428.2	890.3	0.0	283.3	283.3	80.9	728.5	242.8	364.2	607.0	121.4
Total Shrubs (stems per 100m2) Without *Gutierrezia*	18.0	24.0	22.0	1.0	22.0	0.0	7.0	7.0	2.0	18.0	6.0	8.0	14.0	3.0
Density (stems per acre) Without *Gutierrezia*	728.5	971.3	890.3	40.5	890.3	0.0	283.3	283.3	80.9	728.5	242.8	323.8	566.6	121.4

	DU-149	DU-150	DU-151	DU-152	DU-153	DU-154	DU-155	DU-156	DU-157	DU-158	DU-159	DU-160	Average Dunes
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0
Artemisia filifolia	1	0	0	0	0	0	0	0	0	1	0	0.0	0.1
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0
Atriplex canescens	1	0	0	0	0	0	0	0	0	2	0	1.0	1.4
Atriplex confertifolia	0	0	3	0	0	0	0	0	0	0	0	0.0	0.1
Atriplex gardneri	0	0	0	0	0	0	0	0	4	0	0	0.0	0.1
Atriplex obovata	0	0	9	0	0	0	0	0	0	0	0	0.0	0.2
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0
Chrysothamnus viscidiflorus	0	0	0	0	0	7	7	1	0	6	0	0.0	1.3
Ephedra spp.	3	17	0	0	6	11	5	3	0	1	8	15.0	3.0
Eriogonum leptocladon	38	9	0	0	0	13	0	0	0	0	0	0.0	1.8
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	4	0	0	4	0	5	0.0	2.4
Gutierrezia sarothrae	9	0	1	0	15	0	3	0	0	0	0	0.0	6.0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0.0	0.6
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0.0	0.8
Paryella filifolia	1	0	0	0	0	0	0	0	0	0	0	0.0	0.0
Poliomintha incana	0	0	0	0	0	0	0	1	0	0	0	0.0	0.0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0.0	0.4
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0.0	0.1
Total Shrubs (stems per 100m2)	53.0	26.0	13.0	0.0	21.0	35.0	15.0	5.0	8.0	10.0	13.0	16.0	18.0
Density (stems per acre)	2,144.9	1,052.2	526.1	0.0	849.9	1,416.4	607.0	202.3	323.8	404.7	526.1	647.5	729.5
Total Shrubs (stems per 100m2) Without *Gutierrezia*	44.0	26.0	12.0	0.0	6.0	35.0	12.0	5.0	8.0	10.0	13.0	16.0	12.0
Density (stems per acre) Without *Gutierrezia*	1,780.7	1,052.2	485.6	0.0	242.8	,1416.4	485.6	202.3	323.8	404.7	526.1	647.5	486.6

Attachment D-6. Fall Reference Arroyo Shrub Shrub Density by Transect

	RAS-041	RAS-042	RAS-043	RAS-044	RAS-045	RAS-046	RAS-047	RAS-049	RAS-050	RAS-051	RAS-052	RAS-053	RAS-054	RAS-055
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	6	0	0	0	0	0	0	0	1	0	0	0	0
Atriplex confertifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex gardneri	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex obovata	2	7	7	11	12	2	3	13	27	2	11	1	3	10
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	0	2	0	0	16	0	0	0	0	4	0	0	5	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	1	0	0	0	0	3	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	2.0	18.0	7.0	11.0	28.0	2.0	3.0	14.0	27.0	7.0	11.0	1.0	11.0	10.0
Density (stems per acre)	80.9	728.5	283.3	445.2	1133.1	80.9	121.4	566.6	1092.7	283.3	445.2	40.5	445.2	404.7
Total Shrubs (stems per 100m2) Without Gutierrezia	2.0	16.0	7.0	11.0	12.0	2.0	3.0	14.0	27.0	3.0	11.0	1.0	6.0	10.0
Density (stems per acre) Without Gutierrezia	80.9	647.5	283.3	445.2	485.6	80.9	121.4	566.6	1092.7	121.4	445.2	40.5	242.8	404.7

	RAS-056	RAS-057	RAS-058	RAS-059	RAS-060	RAS-061	RAS-062	RAS-063	RAS-064	RAS-065	RAS-066	RAS-067	RAS-068	RAS-069
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	1	0	0	0	0	3	0	0	0	2	0	0
Atriplex confertifolia	0	0	2	5	0	0	0	0	0	0	0	0	0	0
Atriplex gardneri	0	0	0	0	0	0	1	0	0	0	0	0	0	2
Atriplex obovata	2	14	15	7	0	3	7	5	3	4	15	6	6	5
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	14	0	6	2	4	0	0	6	0	0	1	0	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	2	2	0	0	0	9	0	5	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	16.0	14.0	26.0	16.0	4.0	3.0	8.0	23.0	3.0	9.0	16.0	8.0	6.0	7.0
Density (stems per acre)	647.5	566.6	1052.2	647.5	161.9	121.4	323.8	930.8	121.4	364.2	647.5	323.8	242.8	283.3
Total Shrubs (stems per 100m2) Without Gutierrezia	2.0	14.0	20.0	14.0	0.0	3.0	8.0	17.0	3.0	9.0	15.0	8.0	6.0	7.0
Density (stems per acre) Without Gutierrezia	80.9	566.6	809.4	566.6	0.0	121.4	323.8	688.0	121.4	364.2	607.0	323.8	242.8	283.3

	RAS-070	RAS-071	RAS-072	RAS-073	RAS-074	RAS-075	RAS-076	RAS-077	RAS-078	RAS-079	RAS-080	Average Reference Arroyo Shrub
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0.0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0.0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0.0
Atriplex canescens	0	0	0	0	0	0	0	0	1	0	0	0.4
Atriplex confertifolia	0	0	0	0	0	0	0	0	2	0	0	0.2
Atriplex gardneri	0	2	1	4	0	0	0	0	0	0	0	0.3
Atriplex obovata	12	7	4	45	8	5	20	11	21	7	7	9.0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0.0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0.0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	0.0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0.0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0.0
Gutierrezia sarothrae	0	0	0	0	0	0	2	0	1	1	0	1.6
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0.0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0.0
Lycium pallidum	0	0	0	0	1	0	6	0	0	0	0	0.3
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0.0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0.0
Sarcobatus vermiculatus	0	0	0	11	0	0	0	0	0	1	0	0.9
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0.0
Total Shrubs (stems per 100m2)	12.0	9.0	5.0	60.0	9.0	5.0	28.0	11.0	25.0	9.0	7.0	12.6
Density (stems per acre)	485.6	364.2	202.3	2428.2	364.2	202.3	1133.1	445.2	1011.7	364.2	283.3	509.5
Total Shrubs (stems per 100m2) Without Gutierrezia	12.0	9.0	5.0	60.0	9.0	5.0	26.0	11.0	24.0	8.0	7.0	10.9
Density (stems per acre) Without Gutierrezia	485.6	364.2	202.3	2428.2	364.2	202.3	1052.2	445.2	971.3	323.8	283.3	443.1

Attachment D-7. Fall Reference Alkali Wash Shrub Density by Transect

	RAW-001	RAW-002	RAW-003	RAW-004	RAW-005	RAW-006	RAW-007	RAW-008	RAW-009	RAW-010	RAW-011	RAW-012	RAW-013	RAW-014
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	6	2	0	0	0	0	0	0	0	0	0	0
Atriplex confertifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex gardneri	0	2	0	0	0	0	1	0	0	0	0	0	0	6
Atriplex obovata	0	16	25	0	7	0	6	3	3	41	1	19	36	11
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	0	0	1	4	0	0	0	0	0	0	0	0	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	0.0	18.0	32.0	7.0	7.0	0.0	7.0	3.0	3.0	41.0	1.0	19.0	36.0	17.0
Density (stems per acre)	0.0	728.5	1,295.0	283.3	283.3	0.0	283.3	121.4	121.4	1,659.2	40.5	768.9	1,456.9	688.0
Total Shrubs (stems per 100m2) Without *Gutierrezia*	0.0	18.0	31.0	3.0	7.0	0.0	7.0	3.0	3.0	41.0	1.0	19.0	36.0	17.0
Density (stems per acre) Without *Gutierrezia*	0.0	728.5	1,254.6	121.4	283.3	0.0	283.3	121.4	121.4	1,659.2	40.5	768.9	1,456.9	688.0

	RAW-015	RAW-016	RAW-017	RAW-018	RAW-019	RAW-020	RAW-021	RAW-022	RAW-023	RAW-024	RAW-025	RAW-026	RAW-027	RAW-028
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	0	0	0	0	0	0	0	0	1	0	0	2
Atriplex confertifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex gardneri	0	0	24	0	1	0	15	2	0	0	0	0	0	0
Atriplex obovata	44	4	7	2	35	20	9	5	6	47	0	17	11	13
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	0	0	0	0	23	0	0	1	0	0	3	0	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	7	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	44.0	4.0	31.0	2.0	59.0	20.0	24.0	8.0	6.0	47.0	11.0	17.0	11.0	15.0
Density (stems per acre)	1,780.7	161.9	1,254.6	80.9	2,387.7	809.4	971.3	323.8	242.8	1,902.1	445.2	688.0	445.2	607.0
Total Shrubs (stems per 100m2) Without *Gutierrezia*	44.0	4.0	31.0	2.0	36.0	20.0	24.0	7.0	6.0	47.0	8.0	17.0	11.0	15.0
Density (stems per acre) Without *Gutierrezia*	1,780.7	161.9	1,254.6	80.9	1,456.9	809.4	971.3	283.3	242.8	1,902.1	323.8	688.0	445.2	607.0

	RAW-029	RAW-030	RAW-031	RAW-032	RAW-033	RAW-034	RAW-035	RAW-036	RAW-037	RAW-038	RAW-039	RAW-040	Reference Alkali Wash Average
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Atriplex canescens	0	0	0	0	0	0	0	0	0	0	0	0	0.3
Atriplex confertifolia	16	0	0	0	0	0	8	0	0	0	1	0	0.6
Atriplex gardneri	0	0	14	0	0	4	0	0	2	9	0	1	2.0
Atriplex obovata	45	15	4	8	12	7	4	21	3	7	25	21	14.0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Gutierrezia sarothrae	0	0	0	0	0	0	42	0	0	0	0	0	1.9
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Sarcobatus vermiculatus	5	0	0	0	0	0	0	0	0	0	0	0	0.3
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total Shrubs (stems per 100m2)	66.0	15.0	18.0	8.0	12.0	11.0	54.0	21.0	5.0	16.0	26.0	22.0	19.1
Density (stems per acre)	2,671.0	607.0	728.5	323.8	485.6	445.2	2,185.4	849.9	202.3	647.5	1,052.2	890.3	773.0
Total Shrubs (stems per 100m2) Without *Gutierrezia*	66.0	15.0	18.0	8.0	12.0	11.0	12.0	21.0	5.0	16.0	26.0	22.0	17.3
Density (stems per acre) Without *Gutierrezia*	2,671.0	607.0	728.5	323.8	485.6	445.2	485.6	849.9	202.3	647.5	1,052.2	890.3	698.1

Attachment D-8. Fall Reference Sands Shrub Density by Transect

	RSA-081	RSA-082	RSA-083	RSA-084	RSA-085	RSA-086	RSA-087	RSA-088	RSA-089	RSA-090	RSA-091	RSA-092	RSA-093	RSA-095
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	0	0	1	0	0	0	0	0	2	1	0	0
Atriplex confertifolia	1	15	3	0	0	1	11	10	0	8	2	4	0	15
Atriplex gardneri	0	0	0	0	0	0	10	0	0	0	0	0	0	3
Atriplex obovata	7	0	0	0	0	0	2	1	10	6	0	0	1	2
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	1	0	0	0	0	0	0	0	3	2	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	0	97	151	0	73	21	0	90	0	2	134	104	3	17
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	8.0	112.0	155.0	0.0	74.0	22.0	23.0	101.0	10.0	16.0	141.0	111.0	4.0	37.0
Density (stems per acre)	323.8	4,532.6	6,272.8	0.0	2,994.7	890.3	930.8	4,087.4	404.7	647.5	5,706.2	4,492.1	161.9	1,497.4
Total Shrubs (stems per 100m2) Without *Gutierrezia*	8.0	15.0	4.0	0.0	1.0	1.0	23.0	11.0	10.0	14.0	7.0	7.0	1.0	20.0
Density (stems per acre) Without *Gutierrezia*	323.8	607.0	161.9	0.0	40.5	40.5	930.8	445.2	404.7	566.6	283.3	283.3	40.5	809.4

	RSA-096	RSA-097	RSA-098	RSA-099	RSA-100	RSA-101	RSA-102	RSA-103	RSA-104	RSA-105	RSA-106	RSA-107	RSA-108	RSA-109
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex confertifolia	7	8	0	1	31	0	8	11	0	3	0	0	6	0
Atriplex gardneri	0	0	0	0	0	0	6	0	0	0	1	0	0	0
Atriplex obovata	0	0	5	6	0	19	2	0	0	1	3	9	0	0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	0	0	0	1	0	0	3	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	155	40	2	134	12	1	28	138	0	41	1	0	51	36
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	162.0	48.0	7.0	141.0	43.0	20.0	44.0	149.0	0.0	46.0	5.0	9.0	60.0	36.0
Density (stems per acre)	6,556.1	1,942.5	283.3	5,706.2	1,740.2	809.4	1,780.7	6,029.9	0.0	1,861.6	202.3	364.2	2,428.2	1,456.9
Total Shrubs (stems per 100m2) Without *Gutierrezia*	7.0	8.0	5.0	7.0	31.0	19.0	16.0	11.0	0.0	5.0	4.0	9.0	9.0	0.0
Density (stems per acre) Without *Gutierrezia*	283.3	323.8	202.3	283.3	1,254.6	768.9	647.5	445.2	0.0	202.3	161.9	364.2	364.2	0.0

	RSA-110	RSA-111	RSA-112	RSA-113	RSA-114	RSA-115	RSA-116	RSA-117	RSA-118	RSA-119	RSA-120	Average Reference Sands
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0.0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0.0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0.0
Atriplex canescens	1	0	0	0	0	0	0	0	4	0	0	0.2
Atriplex confertifolia	4	10	0	10	0	4	4	0	0	0	11	4.8
Atriplex gardneri	0	0	0	0	0	0	0	0	1	0	0	0.5
Atriplex obovata	0	0	38	0	4	0	2	15	7	11	0	3.9
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0.0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0.0
Ephedra spp.	2	0	0	6	0	0	0	0	0	0	1	0.5
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0.0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0.0
Gutierrezia sarothrae	73	103	0	175	0	20	0	0	0	0	165	47.9
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0.0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0.0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0.0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0.0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0.0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0.0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0.0
Total Shrubs (stems per 100m2)	80.0	113.0	38.0	191.0	4.0	24.0	6.0	15.0	12.0	11.0	177.0	57.8
Density (stems per acre)	3237.6	4,573.0	1,537.8	7,729.7	161.9	971.3	242.8	607.0	485.6	445.2	7,163.1	2,340.0
Total Shrubs (stems per 100m2) Without *Gutierrezia*	7.0	10.0	38.0	16.0	4.0	4.0	6.0	15.0	12.0	11.0	12.0	9.9
Density (stems per acre) Without *Gutierrezia*	283.3	404.7	1,537.8	647.5	161.9	161.9	242.8	607.0	485.6	445.2	485.6	402.6

Attachment D-9. Fall Sands Shrub Density by Transect

	SA-161	SA-162	SA-163	SA-164	SA-165	SA-166	SA-167	SA-168	SA-169	SA-170	SA-171	SA-172	SA-173	SA-174
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	0	0	0	3	0	0	0	1	12	0	0	0
Atriplex confertifolia	8	12	15	30	3	0	12	11	20	17	0	8	4	3
Atriplex gardneri	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex obovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	16	0	0	0
Gutierrezia sarothrae	4	0	0	31	0	0	46	69	10	2	12	0	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	12.0	12.0	15.0	61.0	3.0	3.0	58.0	80.0	30.0	20.0	41.0	8.0	4.0	7.0
Density (stems per acre)	485.6	485.6	607.0	2,468.6	121.4	121.4	2,347.2	3,237.6	1,214.1	809.4	1,659.2	323.8	161.9	283.3
Total Shrubs (stems per 100m2) Without *Gutierrezia*	8.0	12.0	15.0	30.0	3.0	3.0	12.0	11.0	20.0	18.0	29.0	8.0	4.0	7.0
Density (stems per acre) Without *Gutierrezia*	323.8	485.6	607.0	1,214.1	121.4	121.4	485.6	445.2	809.4	728.5	1,173.6	323.8	161.9	283.3

	SA-175	SA-176	SA-177	SA-178	SA-179	SA-180	SA-181	SA-182	SA-183	SA-184	SA-185	SA-186	SA-187	SA-188
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	1	0	0	1	0	0	0	0	0	0	0	1	0	0
Atriplex confertifolia	0	13	3	3	19	13	0	14	9	13	31	0	0	0
Atriplex gardneri	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex obovata	0	0	0	12	0	0	1	0	0	1	0	0	0	1
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	0	4	15	1	10	0	0	0	13	4	56	1	7	11
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	1.0	17.0	19.0	17.0	29.0	13.0	5.0	14.0	22.0	18.0	87.0	2.0	7.0	12.0
Density (stems per acre)	40.5	688.0	768.9	688.0	1,173.6	526.1	202.3	566.6	890.3	728.5	3,520.8	80.9	283.3	485.6
Total Shrubs (stems per 100m2) Without *Gutierrezia*	1.0	13.0	4.0	16.0	19.0	13.0	5.0	14.0	9.0	14.0	31.0	1.0	0.0	1.0
Density (stems per acre) Without *Gutierrezia*	40.5	526.1	161.9	647.5	768.9	526.1	202.3	566.6	364.2	566.6	1254.6	40.5	0.0	40.5

	SA-189	SA-190	SA-191	SA-192	SA-193	SA-194	SA-195	SA-196	SA-197	SA-198	SA-199	SA-200	Average Sands
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Atriplex canescens	0	0	0	1	0	0	0	0	0	3	0	0	0.6
Atriplex confertifolia	30	5	20	0	17	3	25	21	5	0	13	0	10.0
Atriplex gardneri	0	0	0	0	0	0	0	0	3	0	0	0	0.1
Atriplex obovata	0	2	0	0	0	0	0	0	0	0	0	5	0.6
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Ephedra spp.	0	0	0	1	0	0	0	0	0	0	0	2	0.1
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	3	0.1
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0.4
Gutierrezia sarothrae	100	3	45	22	0	24	71	8	0	1	30	15	15.4
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total Shrubs (stems per 100m2)	130.0	10.0	65.0	24.0	17.0	27.0	96.0	29.0	8.0	4.0	43.0	25.0	27.4
Density (stems per acre)	5,261.0	404.7	2,630.5	971.3	688.0	1,092.7	3,885.1	1,173.6	323.8	161.9	1,740.2	1,011.7	1,107.9
Total Shrubs (stems per 100m2) Without *Gutierrezia*	30.0	7.0	20.0	2.0	17.0	3.0	25.0	21.0	8.0	3.0	13.0	10.0	12.0
Density (stems per acre) Without *Gutierrezia*	1,214.1	283.3	809.4	80.9	688.0	121.4	1,011.7	849.9	323.8	121.4	526.1	404.7	485.6

Attachment D-10. Fall Thin Breaks Shrub Density by Transect

	TB-201	TB-201*	TB-202	TB-203	TB-204	TB-205	TB-206	TB-207	TB-208	TB-209	TB-210	TB-211	TB-212	TB-213
Aremisia bigelovii	0	20	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	0	0	0	0	0	0	0	0	0	8	0	0
Atriplex confertifolia	3	17	6	22	0	0	0	2	20	9	0	0	4	0
Atriplex gardneri	0	0	0	0	4	0	1	1	0	0	4	0	0	0
Atriplex obovata	9	0	0	10	6	0	0	0	0	0	1	1	0	0
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	1	12	0	3	0	0	0	0	0	0	0	0	8	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	1	3	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	13.0	51.0	6.0	35.0	10.0	0.0	1.0	3.0	21.0	12.0	5.0	9.0	12.0	0.0
Density (stems per acre)	526.1	2,063.9	242.8	1,416.4	404.7	0.0	40.5	121.4	849.9	485.6	202.3	364.2	485.6	0.0
Total Shrubs (stems per 100m2) Without *Gutierrezia*	12.0	39.0	6.0	32.0	10.0	0.0	1.0	3.0	21.0	12.0	5.0	9.0	4.0	0.0
Density (stems per acre) Without *Gutierrezia*	485.6	1,578.3	242.8	1,295.0	404.7	0.0	40.5	121.4	849.9	485.6	202.3	364.2	161.9	0.0

	TB-214	TB-215	TB-216	TB-217	TB-218	TB-219	TB-220	TB-221	TB-222	TB-223	TB-224	TB-225	TB-226	TB-227
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atriplex canescens	0	0	0	0	0	0	2	3	0	0	16	0	0	0
Atriplex confertifolia	11	0	6	2	0	0	2	6	5	12	2	1	2	8
Atriplex gardneri	1	0	0	0	0	1	0	0	0	0	0	6	1	0
Atriplex obovata	5	4	0	0	0	0	0	5	0	0	0	2	3	4
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephedra spp.	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Eriogonum leptocladon	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gutierrezia sarothrae	0	0	0	2	0	0	0	0	70	0	0	0	0	0
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcobatus vermiculatus	0	2	2	0	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shrubs (stems per 100m2)	17.0	6.0	8.0	8.0	0.0	1.0	4.0	14.0	75.0	12.0	18.0	9.0	6.0	12.0
Density (stems per acre)	688.0	242.8	323.8	323.8	0.0	40.5	161.9	566.6	3,035.2	485.6	728.5	364.2	242.8	485.6
Total Shrubs (stems per 100m2) Without *Gutierrezia*	17.0	6.0	8.0	6.0	0.0	1.0	4.0	14.0	5.0	12.0	18.0	9.0	6.0	12.0
Density (stems per acre) Without *Gutierrezia*	688.0	242.8	323.8	242.8	0.0	40.5	161.9	566.6	202.3	485.6	728.5	364.2	242.8	485.6

	TB-228	TB-229	TB-230	TB-231	TB-232	TB-233	TB-234	TB-235	TB-236	TB-237	TB-238	TB-239	TB-240	Average Thin Breaks
Aremisia bigelovii	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
Artemisia filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Aremisia tridentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Atriplex canescens	0	5	0	0	0	0	0	0	0	0	0	0	0	0.8
Atriplex confertifolia	12	2	3	7	4	0	0	6	7	4	0	0	5	4.6
Atriplex gardneri	0	0	0	5	0	9	0	0	1	0	0	0	3	0.9
Atriplex obovata	7	0	9	0	0	2	0	0	0	3	25	11	6	2.8
Atriplex saccaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Chrysothamnus viscidiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Ephedra spp.	0	0	0	0	3	0	0	0	1	0	0	0	0	0.2
Eriogonum leptocladon	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Ericameria [Chrysothamnus] nauseosus	0	0	0	0	1	0	0	0	0	0	0	0	0	0.0
Gutierrezia sarothrae	2	0	1	0	5	0	0	0	0	0	0	0	0	2.5
Isochoma tenuisecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Krascheninnikovia lanata	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Lycium pallidum	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Paryella filifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Poliomintha incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Sarcobatus vermiculatus	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1
Unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total Shrubs (stems per 100m2)	21.0	7.0	13.0	12.0	13.0	11.0	0.0	6.0	9.0	7.0	26.0	11.0	14.0	12.6
Density (stems per acre)	849.9	283.3	526.1	485.6	526.1	445.2	0.0	242.8	364.2	283.3	1,052.2	445.2	566.6	511.3
Total Shrubs (stems per 100m2) Without *Gutierrezia*	19.0	7.0	12.0	12.0	8.0	11.0	0.0	6.0	9.0	7.0	26.0	11.0	14.0	10.1
Density (stems per acre) Without *Gutierrezia*	768.9	283.3	485.6	485.6	323.8	445.2	0.0	242.8	364.2	283.3	1,052.2	445.2	566.6	408.6

ATTACHMENT E

CONSTANCY DATA

Attachment E. Constancy Data
Table of Contents

E-1	Fall	Summary of Arroyo Shrub Constancy Species
E-2	Fall	Summary of Alkali Wash Constancy Species
E-3	Fall	Summary of Badlands Constancy Species
E-4	Fall	Summary of Dunes Constancy Species
E-5	Fall	Summary of Reference Arroyo Shrub Constancy Species
E-6	Fall	Summary of Reference Alkali Wash Constancy Species
E-7	Fall	Summary of Reference Sands Constancy Species
E-8	Fall	Summary of Sands Constancy Species
E-9	Fall	Summary of Thin Breaks Constancy Species
E-10	Spring	Summary of Arroyo Shrub Constancy Species
E-11	Spring	Summary of Alkali Wash Constancy Species
E-12	Spring	Summary of Badlands Constancy Species
E-13	Spring	Summary of Dunes Constancy Species
E-14	Spring	Summary of Sands Constancy Species
E-15	Spring	Summary of Thin Breaks Constancy Species

Attachment E-1. Fall Summary of Arroyo Shrub Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	1	2.5%
	Atriplex powellii	10	25.0%
	Cordylanthus wrightii	10	25.0%
	Cryptantha	1	2.5%
	Cryptantha crassisepala	26	65.0%
	Descurainia pinnata	35	87.5%
	Descurainia sophia	1	2.5%
	Dimorphocarpa wislizenii	4	10.0%
	Erigeron bellidiastrum	1	2.5%
	Eriogonum divaricatum	1	2.5%
	Eriogonum gordonii	2	5.0%
	Halogeton glomeratus	7	17.5%
	Ipomopsis pumila	2	5.0%
	Lappula occidentalis	6	15.0%
	Linum puberulum	3	7.5%
	Machaeranthera canescens	13	32.5%
	Malacothrix sonchoides	3	7.5%
	Mentzelia albicaulis	8	20.0%
	Pectis cylindrica	1	2.5%
	Phacelia crenulata	1	2.5%
	Plantago patagonica	7	17.5%
	Portulaca oleracea	1	2.5%
	Salsola tragus	37	92.5%
	Streptanthella longirostris	7	17.5%
	Townsendia annua	9	22.5%
	Unknown	3	7.5%
Annual Grasses	*Bouteloua barbata*	3	7.5%
	Bromus tectorum	12	30.0%
	Eragrostis cilianensis	2	5.0%
	Hordeum pusillum	2	5.0%
	Monroa squarrosa	4	10.0%
	Vulpia octoflora	12	30.0%
Forbs	*Astragalus spp.*	1	2.5%
	Chenopodium spp.	4	10.0%
	Penstemon spp.	1	2.5%
Perennial Forbs	*Abronia fragrans*	1	2.5%
	Allium spp.	1	2.5%
	Artemisia ludoviciana	1	2.5%
	Chamaesaracha coronopus	1	2.5%
	Chamaesyce fendleri	3	7.5%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
	Dalea spp.	1	2.5%
	Grindelia squarrosa	2	5.0%
	Lygodesmia grandiflora	1	2.5%
	Mentzelia pumila	4	10.0%
	Oenothera pallida	1	2.5%
	Oenothera spp.	5	12.5%
	Sphaeralcea coccinea	2	5.0%
	Sphaeralcea parvifolia	12	30.0%
	Stephanomeria exigua	5	12.5%
	Unknown	1	2.5%
	Verbena bracteata	2	5.0%
Perennial Grasses	*Achnatherum hymenoides*	15	37.5%
	Agropyron cristatum	2	5.0%
	Aristida purpurea	2	5.0%
	Elymus elymoides	2	5.0%
	Muhlenbergia pungens	1	2.5%
	Pascopyrum smithii	1	2.5%
	Pleuraphis jamesii	16	40.0%
	Sporobolus airoides	28	70.0%
	Sporobolus contractus	2	5.0%
	Sporobolus cryptandrus	7	17.5%
	Sporobolus flexuosus	1	2.5%
	Sporobolus giganteus	4	10.0%
	Unknown	1	2.5%
Perennial Succulents	*Opuntia polyacantha*	12	30.0%
	Unknown	1	2.5%
Shrubs	*Artemisia dracunculus*	1	2.5%
	Artemisia filifolia	1	2.5%
	Artemisia tridentata	1	2.5%
	Atriplex canescens	27	67.5%
	Atriplex confertifolia	2	5.0%
	Atriplex obovata	11	27.5%
	Ephedra spp.	4	10.0%
	Ericameria [Chrysothamnus] nauseosus	16	40.0%
	Eriogonum leptocladon	4	10.0%
	Gutierrezia sarothrae	20	50.0%
	Isocoma tenuisecta	1	2.5%
	Lycium pallidum	3	7.5%
	Parryella filifolia	3	7.5%
	Sarcobatus vermiculatus	23	57.5%
Unidentified	*Unknown*	8	20.0%
Arroyo Shrub Number of Species		81	

Attachment E-10. Spring Summary of Arroyo Shrub Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	3	9.1%
	Atriplex powellii	13	39.4%
	Chaenactis stevioides	9	27.3%
	Chenopodium incanum	4	12.1%
	Cleome lutea	2	6.1%
	Cryptantha crassisepala	19	57.6%
	Descurainia pinnata	30	90.9%
	Descurainia sophia	4	12.1%
	Dimorphocarpa wislizeni	4	12.1%
	Erigeron bellidiastrum	2	6.1%
	Eriogonum gordonii	19	57.6%
	Gilia leptomeria	2	6.1%
	Halogeton glomeratus	18	54.5%
	Ipomopsis pumila	16	48.5%
	Lappula occidentalis	20	60.6%
	Linum puberulum	1	3.0%
	Lupinus pusillus	2	6.1%
	Machaeranthera canescens	6	18.2%
	Malacothrix sonchoides	3	9.1%
	Mentzelia albicaulis	6	18.2%
	Monolepis nuttalliana	5	15.2%
	Phacelia crenulata	27	81.8%
	Plantago patagonica	21	63.6%
	Salsola tragus	30	90.9%
	Stenogonum salsuginosum	7	21.2%
	Streptanthella longirostris	7	21.2%
	Townsendia annua	21	63.6%
	Tragopogon dubius	6	18.2%
Annual Grasses	*Bromus rubens*	4	12.1%
	Bromus tectorum	12	36.4%
	Eremopyrum triticeum	5	15.2%
	Hordeum pusillum	1	3.0%
	Vulpia octoflora	10	30.3%
Forbs	*Chenopodium sp.*	1	3.0%
	Streptanthus cordatus	1	3.0%
Perennial Forbs	*Abronia fragrans*	5	15.2%
	Allium sp.	2	6.1%
	Chamaesaracha coronopus	3	9.1%
	Cymopterus acaulis	1	3.0%
	Cymopterus bulbosus	2	6.1%
	Eriogonum jamesii	2	6.1%
	Gaillardia pinnatifida	3	9.1%
	Lygodesmia grandiflora	1	3.0%
	Machaeranthera gracilis	1	3.0%
	Mentzelia pumila	10	30.3%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	3	9.1%
	Oenothera albicaulis	1	3.0%
	Oenothera pallida	3	9.1%
	Platyschkuhria integrifolia	1	3.0%
	Sphaeralcea coccinea	11	33.3%
	Sphaeralcea parvifolia	5	15.2%
	Spirodela polyrrhiza	1	3.0%
	Stephanomeria exigua	11	33.3%
	Suaeda moquinii	4	12.1%
	Townsendia incana	5	15.2%
Perennial Grasses	*Achnatherum hymenoides*	11	33.3%
	Aristida purpurea	2	6.1%
	Elymus elymoides	4	12.1%
	Hordeum jubatum	4	12.1%
	Pascopyrum smithii	1	3.0%
	Pleuraphis jamesii	18	54.5%
	Sporobolus airoides	26	78.8%
	Sporobolus contractus	2	6.1%
	Sporobolus cryptandrus	4	12.1%
	Sporobolus giganteus	1	3.0%
Shrubs	*Artemisia filifolia*	1	3.0%
	Atriplex canescens	4	12.1%
	Atriplex confertifolia	9	27.3%
	Atriplex gardneri	6	18.2%
	Atriplex obovata	28	84.8%
	Atriplex saccaria	4	12.1%
	Ericameria [Chrysothamnus] nauseosus	3	9.1%
	Eriogonum leptocladon	1	3.0%
	Gutierrezia sarothrae	4	12.1%
	Sarcobatus vermiculatus	5	15.2%
Succulent	*Opuntia polyacantha*	9	27.3%
Unknown	*unknown*	1	3.0%
Alkali Wash Number of Species	*76*		

Attachment E-11. Spring Summary of Alkali Wash Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	7	29.2%
	Atriplex powellii	11	45.8%
	Chaenactis stevioides	6	25.0%
	Chenopodium incanum	8	33.3%
	Cleome lutea	4	16.7%
	Cordylanthus wrightii	8	33.3%
	Cryptantha crassisepala	16	66.7%
	Dalea leporina	2	8.3%
	Descurainia pinnata	20	83.3%
	Descurainia sophia	3	12.5%
	Dimorphocarpa wislizeni	7	29.2%
	Erigeron bellidiastrum	6	25.0%
	Eriogonum divaricatum	1	4.2%
	Eriogonum gordonii	2	8.3%
	Erodium cicutarium	3	12.5%
	Gilia leptomeria	7	29.2%
	Halogeton glomeratus	2	8.3%
	Ipomopsis longiflora	2	8.3%
	Ipomopsis pumila	9	37.5%
	Lappula occidentalis	7	29.2%
	Lupinus pusillus	3	12.5%
	Machaeranthera canescens	9	37.5%
	Malacothrix sonchoides	4	16.7%
	Mentzelia albicaulis	6	25.0%
	Nama hispidum	1	4.2%
	Phacelia crenulata	11	45.8%
	Plantago patagonica	10	41.7%
	Salsola tragus	16	66.7%
	Stenogonum salsuginosum	9	37.5%
	Streptanthella longirostris	8	33.3%
	Townsendia annua	14	58.3%
	Tragopogon dubius	8	33.3%
Annual Grasses	*Bromus tectorum*	13	54.2%
	Eremopyrum triticeum	5	20.8%
	Hordeum pusillum	3	12.5%
	Vulpia octoflora	9	37.5%
Forbs	*Amaranthus sp.*	1	4.2%
	Chenopodium sp.	2	8.3%
	Cymopterus sp.	1	4.2%
Perennial Forbs	*Abronia fragrans*	7	29.2%
	Artemisia dracunculus	5	20.8%
	Astragalus mollissimus	3	12.5%
	Astragalus sp.	1	4.2%
	Chamaesaracha coronopus	2	8.3%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	7	29.2%
	Chamaesyce fendleri	1	4.2%
	Cymopterus bulbosus	1	4.2%
	Grindelia squarrosa	4	16.7%
	Linum aristatum	1	4.2%
	Mentzelia pumila	5	20.8%
	Oenothera albicaulis	1	4.2%
	Oenothera pallida	8	33.3%
	Psoralidium lanceolatum	1	4.2%
	Senecio flaccidus	1	4.2%
	Senecio spartoides	1	4.2%
	Sphaeralcea coccinea	5	20.8%
	Sphaeralcea parvifolia	9	37.5%
	Spirodela polyrrhiza	1	4.2%
	Stephanomeria exigua	9	37.5%
	Suaeda moquinii	2	8.3%
	Townsendia incana	2	8.3%
	Verbena bracteata	2	8.3%
Perennial Grasses	*Achnatherum hymenoides*	10	41.7%
	Agropyron cristatum	3	12.5%
	Aristida purpurea	1	4.2%
	Bouteloua gracilis	4	16.7%
	Elymus elymoides	5	20.8%
	Hordeum jubatum	1	4.2%
	Pleuraphis jamesii	13	54.2%
	Sporobolus airoides	17	70.8%
	Sporobolus contractus	3	12.5%
	Sporobolus cryptandrus	3	12.5%
	Sporobolus giganteus	5	20.8%
Shrubs	*Atriplex canescens*	14	58.3%
	Atriplex confertifolia	4	16.7%
	Atriplex obovata	11	45.8%
	Atriplex saccaria	1	4.2%
	Brickellia microphylla	1	4.2%
	Ericameria [Chrysothamnus] nauseosus	3	12.5%
	Eriogonum leptocladon	1	4.2%
	Gutierrezia sarothrae	10	41.7%
	Lycium pallidum	1	4.2%
	Sarcobatus vermiculatus	11	45.8%
	Senna sp.	9	37.5%
Succulent	*Opuntia polyacantha*	2	8.3%
Unknown	*unknown*	1	4.2%
Arroyo Shrub Number of Species	*85*		

Attachment E-12. Spring Summary of Badlands Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	2	15.4%
	Atriplex powellii	12	92.3%
	Chaenactis stevioides	2	15.4%
	Cryptantha crassisepala	6	46.2%
	Descurainia pinnata	6	46.2%
	Descurainia sophia	1	7.7%
	Eriogonum gordonii	8	61.5%
	Erodium cicutarium	1	7.7%
	Halogeton glomeratus	6	46.2%
	Ipomopsis pumila	4	30.8%
	Lappula occidentalis	8	61.5%
	Machaeranthera canescens	3	23.1%
	Malacothrix sonchoides	1	7.7%
	Mentzelia albicaulis	1	7.7%
	Phacelia crenulata	7	53.8%
	Plantago patagonica	8	61.5%
	Salsola tragus	6	46.2%
	Stenogonum salsuginosum	8	61.5%
	Streptanthella longirostris	3	23.1%
Annual Forbs	*Townsendia annua*	10	76.9%
	Tragopogon dubius	1	7.7%
Annual Grasses	*Bromus tectorum*	4	30.8%
	Eremopyrum triticeum	1	7.7%
	Vulpia octoflora	1	7.7%
Perennial Forbs	*Abronia fragrans*	2	15.4%
	Allium sp.	1	7.7%
	Chaetopappa ericoides	1	7.7%
	Cymopterus bulbosus	1	7.7%
	Mentzelia pumila	2	15.4%
	Oenothera albicaulis	1	7.7%
	Sphaeralcea coccinea	7	53.8%
	Stephanomeria exigua	2	15.4%
Perennial Grasses	*Hordeum jubatum*	4	30.8%
	Pleuraphis jamesii	6	46.2%
	Sporobolus airoides	6	46.2%
Shrubs	*Atriplex confertifolia*	3	23.1%
	Atriplex gardneri	3	23.1%
	Atriplex obovata	10	76.9%
	Atriplex saccaria	2	15.4%
	Ephedra torreyana	1	7.7%
	Eriogonum leptocladon	1	7.7%
	Gutierrezia sarothrae	2	15.4%
	Sarcobatus vermiculatus	2	15.4%
Succulent	*Opuntia polyacantha*	1	7.7%
Badlands Number of Species	*44*		

Attachment E-13. Spring Summary of Dunes Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	7	36.8%
	Atriplex powellii	2	10.5%
	Cryptantha crassisepala	17	89.5%
	Descurainia pinnata	17	89.5%
	Descurainia sophia	6	31.6%
	Dimorphocarpa wislizeni	17	89.5%
	Erigeron bellidiastrum	1	5.3%
	Halogeton glomeratus	1	5.3%
	Ipomopsis pumila	1	5.3%
	Lappula occidentalis	1	5.3%
	Linum puberulum	8	42.1%
	Lupinus pusillus	13	68.4%
	Machaeranthera canescens	8	42.1%
	Mentzelia albicaulis	10	52.6%
	Monolepis nuttalliana	1	5.3%
	Pectis angustifolia	1	5.3%
	Phacelia crenulata	6	31.6%
	Plantago patagonica	3	15.8%
	Salsola tragus	15	78.9%
	Stenogonum salsuginosum	2	10.5%
	Streptanthella longirostris	8	42.1%
	Townsendia annua	5	26.3%
Annual Grasses	*Bromus tectorum*	2	10.5%
Forbs	*Astragalus sp.*	9	47.4%
	Cymopterus sp.	3	15.8%
	Mentzelia sp.	2	10.5%
	unknown	2	10.5%
Perennial Forbs	*Abronia fragrans*	7	36.8%
	Apocynum cannabinum	1	5.3%
	Chaetopappa ericoides	1	5.3%
	Cymopterus bulbosus	4	21.1%
	Evolvulus nuttallianus	1	5.3%
	Linum aristatum	1	5.3%
	Lygodesmia grandiflora	9	47.4%
	Mentzelia pumila	5	26.3%
	Oenothera albicaulis	4	21.1%
	Oenothera caespitosa	1	5.3%
	Oenothera pallida	14	73.7%
	Oenothera sp.	3	15.8%
	Penstemon strictiformis	1	5.3%
	Psoralidium lanceolatum	2	10.5%
	Rumex hymenosepalus	1	5.3%
	Sphaeralcea coccinea	1	5.3%
	Sphaeralcea parvifolia	17	89.5%
	Stephanomeria exigua	14	73.7%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	7	36.8%
	Townsendia incana	2	10.5%
	Yucca harrimaniae	1	5.3%
Perennial Grasses	*Achnatherum hymenoides*	16	84.2%
	Aristida purpurea	1	5.3%
	Muhlenbergia pungens	7	36.8%
	Pleuraphis jamesii	15	78.9%
	Sporobolus airoides	11	57.9%
	Sporobolus cryptandrus	2	10.5%
Perennial Grasses	*Sporobolus giganteus*	3	15.8%
Shrubs	*Artemisia filifolia*	2	10.5%
	Atriplex canescens	11	57.9%
	Atriplex obovata	2	10.5%
	Ephedra torreyana	9	47.4%
	Eriogonum leptocladon	1	5.3%
	Gutierrezia sarothrae	2	10.5%
	Krascheninnikovia lanata	1	5.3%
	Lycium pallidum	3	15.8%
	Senna sp.	2	10.5%
Succulent	*Opuntia polyacantha*	2	10.5%
Unknown	*Unknown*	1	5.3%
Dunes Number of Species	*65*		

Attachment E-14. Spring Summary of Sands Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	3	12.5%
	Atriplex powellii	3	12.5%
	Chaenactis stevioides	18	75.0%
	Chenopodium incanum	2	8.3%
	Cleome lutea	1	4.2%
	Cryptantha crassisepala	22	91.7%
	Descurainia pinnata	21	87.5%
	Descurainia sophia	6	25.0%
	Dimorphocarpa wislizeni	6	25.0%
	Eriogonum divaricatum	1	4.2%
	Eriogonum gordonii	2	8.3%
	Gilia leptomeria	2	8.3%
	Halogeton glomeratus	2	8.3%
	Ipomopsis pumila	11	45.8%
	Lappula occidentalis	9	37.5%
	Linum puberulum	1	4.2%
	Lupinus pusillus	3	12.5%
	Machaeranthera canescens	14	58.3%
	Malacothrix sonchoides	4	16.7%
	Mentzelia albicaulis	10	41.7%
	Monolepis nuttalliana	1	4.2%
	Phacelia crenulata	22	91.7%
	Plantago patagonica	13	54.2%
	Salsola tragus	21	87.5%
	Stenogonum salsuginosum	3	12.5%
	Streptanthella longirostris	8	33.3%
	Townsendia annua	17	70.8%
	Tragopogon dubius	1	4.2%
Annual Grasses	*Bromus tectorum*	7	29.2%
	Eremopyrum triticeum	1	4.2%
	Vulpia octoflora	13	54.2%
Forbs	*Camissonia scapoidea*	1	4.2%
	Cymopterus sp.	4	16.7%
	Descurainia pinnata	1	4.2%
	Ipomopsis sp.	1	4.2%
Perennial Forbs	*Abronia fragrans*	9	37.5%
	Agoseris glauca	1	4.2%
	Aletes macdougalii	2	8.3%
	Astragalus mollissimus	3	12.5%
	Chaetopappa ericoides	5	20.8%
	Chamaesaracha coronopus	1	4.2%
	Cymopterus bulbosus	5	20.8%
	Gaillardia pinnatifida	1	4.2%
	Linum aristatum	1	4.2%
	Lygodesmia grandiflora	1	4.2%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	3	12.5%
	Mentzelia pumila	6	25.0%
	Oenothera pallida	6	25.0%
	Oenothera sp.	2	8.3%
	Penstemon strictiformis	1	4.2%
	Rumex hymenosepalus	1	4.2%
	Sphaeralcea coccinea	5	20.8%
	Sphaeralcea parvifolia	14	58.3%
	Stephanomeria exigua	16	66.7%
	Townsendia incana	1	4.2%
Perennial Grasses	*Achnatherum hymenoides*	16	66.7%
	Aristida purpurea	1	4.2%
	Elymus elymoides	2	8.3%
	Elymus trachycaulus	1	4.2%
	Hordeum jubatum	2	8.3%
	Muhlenbergia pungens	1	4.2%
	Pleuraphis jamesii	19	79.2%
	Sporobolus airoides	20	83.3%
	Sporobolus contractus	3	12.5%
	Sporobolus cryptandrus	8	33.3%
Shrubs	*Atriplex canescens*	3	12.5%
	Atriplex confertifolia	17	70.8%
	Atriplex gardneri	1	4.2%
	Atriplex obovata	4	16.7%
	Ephedra torreyana	3	12.5%
	Eriogonum leptocladon	2	8.3%
	Gutierrezia sarothrae	9	37.5%
	Krascheninnikovia lanata	2	8.3%
	Lycium pallidum	1	4.2%
	Sarcobatus vermiculatus	3	12.5%
	Senna sp.	1	4.2%
Succulent	*Opuntia polyacantha*	13	54.2%
	Sclerocactus whipplei	1	4.2%
Sands Number of Species	*77*		

Attachment E-15. Spring Summary of Thin Breaks Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Atriplex powellii*	7	43.8%
	Chaenactis stevioides	3	18.8%
	Chenopodium incanum	1	6.3%
	Cryptantha crassisepala	8	50.0%
	Descurainia pinnata	10	62.5%
	Descurainia sophia	5	31.3%
	Erigeron bellidiastrum	1	6.3%
	Eriogonum divaricatum	1	6.3%
	Eriogonum gordonii	5	31.3%
	Gilia leptomeria	1	6.3%
	Halogeton glomeratus	5	31.3%
	Ipomopsis pumila	9	56.3%
	Lappula occidentalis	10	62.5%
	Machaeranthera canescens	2	12.5%
	Mentzelia albicaulis	6	37.5%
	Phacelia crenulata	7	43.8%
	Picradeniopsis woodhouse	2	12.5%
	Plantago patagonica	3	18.8%
	Salsola tragus	12	75.0%
	Stenogonum salsuginosum	1	6.3%
	Streptanthella longirostris	3	18.8%
	Townsendia annua	8	50.0%
	Tragopogon dubius	1	6.3%
	Bromus rubens	1	6.3%
Annual Grasses	*Bromus tectorum*	2	12.5%
	Hordeum pusillum	1	6.3%
	Vulpia octoflora	1	6.3%
Forbs	*Descurainia pinnata*	1	6.3%
Perennial Forbs	*Abronia fragrans*	2	12.5%
	Chaetopappa ericoides	2	12.5%
	Chamaesaracha coronopus	1	6.3%
	Gaillardia pinnatifida	2	12.5%
	Mentzelia pumila	1	6.3%
	Platyschkuhria integrifolia	1	6.3%
	Sphaeralcea coccinea	6	37.5%
	Sphaeralcea parvifolia	1	6.3%
	Suaeda moquinii	1	6.3%
Perennial Grasses	*Achnatherum hymenoides*	2	12.5%
	Agropyron cristatum	1	6.3%
	Aristida purpurea	1	6.3%
	Pleuraphis jamesii	5	31.3%
	Sporobolus airoides	11	68.8%
Perennial Grasses	*Sporobolus contractus*	1	6.3%
Shrubs	*Atriplex canescens*	1	6.3%
	Atriplex confertifolia	9	56.3%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Atriplex powellii*	7	43.8%
	Atriplex gardneri	1	6.3%
	Atriplex obovata	7	43.8%
	Atriplex saccaria	4	25.0%
	Ericameria [Chrysothamnus] nauseosus	1	6.3%
	Gutierrezia sarothrae	2	12.5%
Succulent	*Opuntia polyacantha*	5	31.3%
Thin Breaks Number of Species	*51*		

Attachment E-2. Fall Summary of Alkali Wash Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Atriplex powellii*	19	47.5%
	Chenopodium incanum	1	2.5%
	Cryptantha crassisepala	13	32.5%
	Descurainia pinnata	36	90.0%
	Dimorphocarpa wislizenii	1	2.5%
	Erigeron bellidiastrum	5	12.5%
	Eriogonum gordonii	8	20.0%
	Eriogonum hookerii	1	2.5%
	Gilia spp.	1	2.5%
	Halogeton glomeratus	20	50.0%
	Ipomopsis pumila	8	20.0%
	Lappula occidentalis	18	45.0%
	Linum puberulum	1	2.5%
	Machaeranthera canescens	9	22.5%
	Malacothrix sonchoides	1	2.5%
	Mentzelia albicaulis	4	10.0%
	Monolepis nuttalliana	1	2.5%
	Phacelia crenulata	9	22.5%
	Plantago patagonica	16	40.0%
	Salsola tragus	34	85.0%
	Stenogonum salsuginosum	1	2.5%
	Townsendia annua	20	50.0%
	Unknown	1	2.5%
Annual Grasses	*Bouteloua barbata*	2	5.0%
	Bromus tectorum	5	12.5%
	Eremopyrum triticeum	1	2.5%
	Hordeum pusillum	1	2.5%
	Monroa squarrosa	3	7.5%
	Unknown	1	2.5%
	Vulpia octoflora	4	10.0%
Perennial Forbs	*Allium spp.*	1	2.5%
	Chaetopappa ericoides	1	2.5%
	Chamaesaracha coronopus	2	5.0%
	Chamaesyce fendleri	4	10.0%
	Lygodesmia grandiflora	1	2.5%
	Mentzelia pumila	1	2.5%
	Sphaeralcea coccinea	6	15.0%
	Sphaeralcea parvifolia	8	20.0%
	Stephanomeria exigua	1	2.5%
Perennial Grasses	*Achnatherum hymenoides*	8	20.0%
	Elymus elymoides	1	2.5%
	Hordeum jubatum	1	2.5%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
	Pleuraphis jamesii	14	35.0%
	Sporobolus airoides	23	57.5%
	Sporobolus cryptandrus	10	25.0%
Perennial Succulents	*Opuntia polyacantha*	6	15.0%
Shrubs	*Atriplex canescens*	3	7.5%
	Atriplex confertifolia	14	35.0%
	Atriplex gardneri	13	32.5%
	Atriplex obovata	28	70.0%
	Ephedra spp.	1	2.5%
	Gutierrezia sarothrae	4	10.0%
	Krascheninnikovia lanata	1	2.5%
	Sarcobatus vermiculatus	4	10.0%
Alkali Wash Number of Species		54	

Attachment E-3. Fall Summary of Badlands Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Atriplex powellii*	34	79.1%
	Chenopodium incanum	1	2.3%
	Cryptantha crassisepala	3	7.0%
	Descurainia pinnata	22	51.2%
	Erigeron bellidiastrum	1	2.3%
	Eriogonum gordonii	30	69.8%
	Halogeton glomeratus	8	18.6%
	Ipomopsis pumila	6	14.0%
	Lappula occidentalis	18	41.9%
	Linum puberulum	1	2.3%
	Machaeranthera canescens	1	2.3%
	Mentzelia albicaulis	1	2.3%
	Monolepis nuttalliana	1	2.3%
	Phacelia crenulata	8	18.6%
	Plantago patagonica	12	27.9%
	Salsola tragus	25	58.1%
	Stenogonum salsuginosum	1	2.3%
	Townsendia annua	10	23.3%
Annual Grasses	*Bouteloua barbata*	2	4.7%
	Bromus tectorum	2	4.7%
	Eragrostis cilianensis	1	2.3%
	Hordeum pusillum	6	14.0%
	Vulpia octoflora	1	2.3%
Forbs	*Chenopodium spp.*	1	2.3%
Perennial Forbs	*Abronia fragrans*	1	2.3%
	Chamaesaracha coronopus	1	2.3%
	Chamaesyce fendleri	1	2.3%
	Lygodesmia grandiflora	4	9.3%
	Sphaeralcea coccinea	11	25.6%
	Sphaeralcea parvifolia	1	2.3%
	Suaeda moquinii	15	34.9%
	Verbena bracteata	1	2.3%
Perennial Grasses	*Achnatherum hymenoides*	3	7.0%
	Hordeum jubatum	2	4.7%
	Pleuraphis jamesii	3	7.0%
	Sporobolus airoides	16	37.2%
	Sporobolus contractus	1	2.3%
	Sporobolus flexuosus	1	2.3%
Perennial Succulents	*Opuntia polyacantha*	4	9.3%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Shrubs	*Atriplex canescens*	2	4.7%
	Atriplex confertifolia	2	4.7%
	Atriplex gardneri	20	46.5%
	Atriplex obovata	41	95.3%
	Atriplex saccaria	1	2.3%
	Ephedra spp.	1	2.3%
	Sarcobatus vermiculatus	1	2.3%
Badlands Number of Species		46	

Attachment E-4. Fall Summary of Dunes Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	25	62.5%
	Atriplex powellii	1	2.5%
	Cordylanthus wrightii	3	7.5%
	Cryptantha crassisepala	32	80.0%
	Descurainia pinnata	33	82.5%
	Dimorphocarpa wislizenii	25	62.5%
	Gilia spp.	1	2.5%
	Ipomopsis pumila	6	15.0%
	Lappula occidentalis	1	2.5%
	Linum puberulum	8	20.0%
	Lupinus pusillus	3	7.5%
	Machaeranthera canescens	27	67.5%
	Malacothrix sonchoides	2	5.0%
	Mentzelia albicaulis	24	60.0%
	Phacelia crenulata	15	37.5%
	Plantago patagonica	4	10.0%
	Salsola tragus	37	92.5%
	Streptanthella longirostris	11	27.5%
	Townsendia annua	14	35.0%
Annual Grasses	*Bromus tectorum*	2	5.0%
	Monroa squarrosa	1	2.5%
	Vulpia octoflora	8	20.0%
Forbs	*Astragalus spp.*	4	10.0%
	Penstemon spp.	3	7.5%
Perennial Forbs	*Abronia fragrans*	6	15.0%
	Chaetopappa ericoides	11	27.5%
	Chamaesyce fendleri	2	5.0%
	Linum aristatum	1	2.5%
	Mentzelia pumila	5	12.5%
	Oenothera pallida	11	27.5%
	Oenothera spp.	3	7.5%
	Penstemon angustifolius	6	15.0%
	Platyschkuhria integrifolia	1	2.5%
	Psoralidium lanceolatum	1	2.5%
	Rumex hymenosepalus	1	2.5%
	Senicio spartoides	2	5.0%
	Sphaeralcea coccinea	3	7.5%
	Sphaeralcea parvifolia	28	70.0%
	Stephanomeria exigua	19	47.5%
	Townsendia incana	1	2.5%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Perennial Grasses	*Achnatherum hymenoides*	32	80.0%
	Aristida purpurea	11	27.5%
	Muhlenbergia pungens	18	45.0%
	Pleuraphis jamesii	32	80.0%
	Sporobolus airoides	26	65.0%
	Sporobolus contractus	5	12.5%
	Sporobolus cryptandrus	9	22.5%
	Sporobolus giganteus	2	5.0%
Perennial Succulents	*Opuntia polyacantha*	8	20.0%
Shrubs	*Artemisia filifolia*	2	5.0%
	Atriplex canescens	21	52.5%
	Atriplex confertifolia	1	2.5%
	Atriplex gardneri	2	5.0%
	Atriplex obovata	1	2.5%
	Chrysothamnus greeni	1	2.5%
	Chrysothamnus viscidiflorus	11	27.5%
	Ephedra spp.	25	62.5%
	Ericameria [Chrysothamnus] nauseosus	12	30.0%
	Eriogonum leptocladon	10	25.0%
	Gutierrezia sarothrae	16	40.0%
	Isocoma tenuisecta	4	10.0%
	Krascheninnikovia lanata	1	2.5%
	Lycium pallidum	2	5.0%
	Parryella filifolia	2	5.0%
	Sarcobatus vermiculatus	4	10.0%
	Unknown	1	2.5%
	Yucca spp.	5	12.5%
Unidentified	*Unknown*	3	7.5%
Dunes Number of Species	68		

Attachment E-5. Fall Summary of Reference Arroyo Shrub Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Aster spp.*	4	10.3%
	Atriplex powellii	9	23.1%
	Cryptantha crassisepala	13	33.3%
	Cycloloma atriplicifolium	1	2.6%
	Descurainia pinnata	29	74.4%
	Dimorphocarpa wislizenii	1	2.6%
	Erigeron bellidiastrum	15	38.5%
	Eriogonum gordonii	5	12.8%
	Erodium cicutarium	4	10.3%
	Halogeton glomeratus	10	25.6%
	Ipomopsis pumila	5	12.8%
	Lappula occidentalis	12	30.8%
	Machaeranthera canescens	6	15.4%
	Malacothrix sonchoides	2	5.1%
	Mentzelia albicaulis	4	10.3%
	Pectis cylindrica	2	5.1%
	Phacelia crenulata	2	5.1%
	Plantago patagonica	32	82.1%
	Portulaca oleracea	2	5.1%
	Salsola tragus	24	61.5%
	Stenogonum salsuginosum	1	2.6%
	Townsendia annua	14	35.9%
	Unknown	1	2.6%
Annual Grasses	*Aegilops cylindrica*	2	5.1%
	Bouteloua barbata	7	17.9%
	Bromus rubens	1	2.6%
	Bromus tectorum	19	48.7%
	Eragrostis cilianensis	3	7.7%
	Hordeum pusillum	34	87.2%
	Monroa squarrosa	9	23.1%
	Vulpia octoflora	15	38.5%
Forbs	*Aster spp.*	7	17.9%
	Chenopodium spp.	1	2.6%
	Penstemon spp.	1	2.6%
	Senecio sp.	1	2.6%
	Unknown	1	2.6%
Perennial Forbs	*Allium spp.*	1	2.6%
	Artemisia dracunculus	1	2.6%
	Chamaesaracha coronopus	1	2.6%
	Chamaesyce fendleri	5	12.8%
	Eriogonum jamesii	1	2.6%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
	Grindelia squarrosa	34	87.2%
	Oenothera spp.	1	2.6%
	Rumex hymenosepalus	2	5.1%
	Senecio flaccidus	4	10.3%
	Sphaeralcea coccinea	17	43.6%
	Sphaeralcea parvifolia	12	30.8%
Perennial Grasses	*Achnatherum hymenoides*	3	7.7%
	Elymus elymoides	2	5.1%
	Pascopyrum smithii	2	5.1%
	Pleuraphis jamesii	28	71.8%
	Sporobolus airoides	38	97.4%
	Sporobolus cryptandrus	2	5.1%
Perennial Succulents	*Opuntia polyacantha*	12	30.8%
Shrubs	*Atriplex canescens*	6	15.4%
	Atriplex confertifolia	3	7.7%
	Atriplex gardneri	3	7.7%
	Atriplex obovata	37	94.9%
	Gutierrezia sarothrae	13	33.3%
	Lycium pallidum	3	7.7%
	Sarcobatus vermiculatus	8	20.5%
Unidentified	*Unknown*	1	2.6%
Reference Arroyo Shrub Number of Species	62		

Attachment E-6. Fall Summary of Reference Alkali Wash Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Atriplex powellii*	10	25.0%
	Chaenactis stevioides	1	2.5%
	Cryptantha crassisepala	15	37.5%
	Descurainia pinnata	36	90.0%
	Dimorphocarpa wislizenii	1	2.5%
	Erigeron bellidiastrum	2	5.0%
	Eriogonum gordonii	12	30.0%
	Erodium cicutarium	2	5.0%
	Halogeton glomeratus	29	72.5%
	Ipomopsis pumila	17	42.5%
	Lappula occidentalis	28	70.0%
	Linum puberulum	2	5.0%
	Machaeranthera canescens	11	27.5%
	Mentzelia albicaulis	1	2.5%
	Pectis cylindrica	1	2.5%
	Phacelia crenulata	17	42.5%
	Plantago patagonica	30	75.0%
	Portulaca oleracea	1	2.5%
	Salsola tragus	33	82.5%
	Stenogonum salsuginosum	3	7.5%
	Townsendia annua	30	75.0%
	Tragopogon dubius	1	2.5%
	Unknown	1	2.5%
Annual Grasses	*Bouteloua barbata*	12	30.0%
	Bromus tectorum	10	25.0%
	Eragrostis cilianensis	3	7.5%
	Hordeum pusillum	7	17.5%
	Monroa squarrosa	9	22.5%
	Vulpia octoflora	8	20.0%
Forbs	*Eriogonum spp.*	1	2.5%
	Unknown	1	2.5%
Perennial Forbs	*Chamaesaracha coronopus*	3	7.5%
	Chamaesyce fendleri	7	17.5%
	Eriogonum jamesii	1	2.5%
	Grindelia squarrosa	3	7.5%
	Linum aristatum	1	2.5%
	Lygodesmia grandiflora	4	10.0%
	Sphaeralcea coccinea	29	72.5%
	Sphaeralcea parvifolia	6	15.0%
	Stephanomeria exigua	2	5.0%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Perennial Grasses	*Achnatherum hymenoides*	8	20.0%
	Aristida purpurea	1	2.5%
	Elymus elymoides	1	2.5%
	Pascopyrum smithii	1	2.5%
	Pleuraphis jamesii	17	42.5%
	Sporobolus airoides	30	75.0%
	Sporobolus contractus	5	12.5%
	Sporobolus cryptandrus	9	22.5%
Perennial Succulents	*Opuntia polyacantha*	9	22.5%
	Opuntia.	1	2.5%
Shrubs	*Atriplex canescens*	5	12.5%
	Atriplex confertifolia	5	12.5%
	Atriplex gardneri	14	35.0%
	Atriplex obovata	38	95.0%
	Gutierrezia sarothrae	6	15.0%
	Sarcobatus vermiculatus	5	12.5%
Unidentified	*Unknown*	6	15.0%
Reference Alkali Wash Number of Species	57		

Attachment E-7. Fall Summary of Reference Sands Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	3	7.7%
	Atriplex powellii	1	2.6%
	Chaenactis stevioides	2	5.1%
	Cryptantha crassisepala	32	82.1%
	Descurainia pinnata	32	82.1%
	Dimorphocarpa wislizenii	7	17.9%
	Erigeron bellidiastrum	3	7.7%
	Halogeton glomeratus	5	12.8%
	Ipomopsis polycladon	1	2.6%
	Ipomopsis pumila	8	20.5%
	Lappula occidentalis	17	43.6%
	Machaeranthera canescens	25	64.1%
	Malacothrix sonchoides	6	15.4%
	Mentzelia albicaulis	19	48.7%
	Phacelia crenulata	31	79.5%
	Plantago patagonica	36	92.3%
	Salsola tragus	38	97.4%
	Stenogonum salsuginosum	2	5.1%
	Streptanthella longirostris	1	2.6%
	Townsendia annua	27	69.2%
	Unknown	1	2.6%
Annual Grasses	*Aegilops cylindrica*	1	2.6%
	Bromus tectorum	11	28.2%
	Monroa squarrosa	4	10.3%
	Vulpia octoflora	15	38.5%
Forbs	*Astragalus spp.*	1	2.6%
Perennial Forbs	*Abronia fragrans*	12	30.8%
	Allium spp.	3	7.7%
	Chaetopappa ericoides	3	7.7%
	Chamaesaracha coronopus	1	2.6%
	Chamaesyce fendleri	1	2.6%
	Eriogonum gordonii	1	2.6%
	Evolvulus nuttallianus	4	10.3%
	Grindelia squarrosa	1	2.6%
	Linum aristatum	2	5.1%
	Lygodesmia grandiflora	4	10.3%
	Machaeranthera gracilis	1	2.6%
	Mentzelia pumila	8	20.5%
	Sphaeralcea coccinea	23	59.0%
	Sphaeralcea parvifolia	17	43.6%
	Stephanomeria exigua	9	23.1%
	Townsendia incana	1	2.6%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Perennial Grasses	*Achnatherum hymenoides*	27	69.2%
	Aristida purpurea	2	5.1%
	Elymus elymoides	2	5.1%
	Muhlenbergia pungens	1	2.6%
	Pleuraphis jamesii	30	76.9%
	Sporobolus airoides	34	87.2%
	Sporobolus cryptandrus	10	25.6%
Perennial Succulents	*Opuntia polyacantha*	19	48.7%
Shrubs	*Atriplex canescens*	5	12.8%
	Atriplex confertifolia	25	64.1%
	Atriplex gardneri	5	12.8%
	Atriplex obovata	18	46.2%
	Ephedra spp.	7	17.9%
	Gutierrezia sarothrae	23	59.0%
	Lycium pallidum	1	2.6%
Unidentified	*Unknown*	1	2.6%
Reference Sands Number of Species		58	

Attachment E-8. Fall Summary of Sands Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Ambrosia acanthicarpa*	4	10.0%
	Atriplex powellii	2	5.0%
	Chaenactis stevioides	1	2.5%
	Cryptantha crassisepala	33	82.5%
	Descurainia pinnata	27	67.5%
	Descurainia sophia	2	5.0%
	Dimorphocarpa wislizenii	8	20.0%
	Erigeron bellidiastrum	2	5.0%
	Halogeton glomeratus	4	10.0%
	Ipomopsis pumila	5	12.5%
	Lappula occidentalis	10	25.0%
	Machaeranthera canescens	25	62.5%
	Malacothrix sonchoides	4	10.0%
	Mentzelia albicaulis	15	37.5%
	Phacelia crenulata	24	60.0%
	Plantago patagonica	11	27.5%
	Salsola tragus	40	100.0%
	Streptanthella longirostris	5	12.5%
	Townsendia annua	16	40.0%
Annual Grasses	*Bromus tectorum*	7	17.5%
	Vulpia octoflora	5	12.5%
Forbs	*Chenopodium spp.*	1	2.5%
	Cryptantha	1	2.5%
Perennial Forbs	*Abronia fragrans*	4	10.0%
	Asclepius sanjuanensis	1	2.5%
	Astragalus mollissimus	1	2.5%
	Chaetopappa ericoides	9	22.5%
	Eriogonum jamesii	1	2.5%
	Linum aristatum	3	7.5%
	Lygodesmia grandiflora	1	2.5%
	Mentzelia pumila	2	5.0%
	Oenothera pallida	1	2.5%
	Penstemon angustifolius	1	2.5%
	Sphaeralcea coccinea	10	25.0%
	Sphaeralcea parvifolia	8	20.0%
	Stephanomeria exigua	8	20.0%
	Townsendia incana	1	2.5%
Perennial Grasses	*Achnatherum hymenoides*	33	82.5%
	Aristida purpurea	3	7.5%
	Pleuraphis jamesii	32	80.0%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
	Sporobolus airoides	36	90.0%
	Sporobolus contractus	1	2.5%
	Sporobolus cryptandrus	9	22.5%
Perennial Succulents	*Opuntia polyacantha*	18	45.0%
Shrubs	*Atriplex canescens*	7	17.5%
	Atriplex confertifolia	29	72.5%
	Atriplex gardneri	3	7.5%
	Atriplex obovata	7	17.5%
	Ephedra spp.	3	7.5%
	Ericameria [Chrysothamnus] nauseosus	1	2.5%
	Eriogonum leptocladon	1	2.5%
	Gutierrezia sarothrae	24	60.0%
	Krascheninnikovia lanata	1	2.5%
	Lycium pallidum	1	2.5%
Unidentified	*Unknown*	1	2.5%
Sands Number of Species	55		

Attachment E-9. Fall Summary of Thin Breaks Constancy Species

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
Annual Forbs	*Atriplex powellii*	19	46.3%
	Cryptantha crassisepala	19	46.3%
	Cycloloma atriplicifolium	2	4.9%
	Descurainia pinnata	32	78.0%
	Erigeron sp.	1	2.4%
	Eriogonum gordonii	14	34.1%
	Halogeton glomeratus	18	43.9%
	Ipomopsis pumila	14	34.1%
	Lappula occidentalis	23	56.1%
	Linum puberulum	2	4.9%
	Machaeranthera canescens	7	17.1%
	Malacothrix sonchoides	5	12.2%
	Mentzelia albicaulis	11	26.8%
	Phacelia crenulata	14	34.1%
	Plantago patagonica	10	24.4%
	Salsola tragus	38	92.7%
	Stenogonum salsuginosum	7	17.1%
	Streptanthella longirostris	5	12.2%
	Townsendia annua	14	34.1%
	Unknown	1	2.4%
Annual Grasses	*Bromus tectorum*	5	12.2%
	Eremopyrum triticeum	1	2.4%
	Vulpia octoflora	3	7.3%
Forbs	*Astragalus spp.*	1	2.4%
Perennial Forbs	*Astragalus mollissimus*	1	2.4%
	Chaetopappa ericoides	4	9.8%
	Chamaesyce fendleri	1	2.4%
	Eriogonum jamesii	1	2.4%
	Grindelia squarrosa	1	2.4%
	Lygodesmia grandiflora	4	9.8%
	Mentzelia pumila	2	4.9%
	Platyschkuhria integrifolia	1	2.4%
	Platyschkuhria integrifolia var. oblongifolia	1	2.4%
	Sphaeralcea coccinea	8	19.5%
	Sphaeralcea parvifolia	6	14.6%
	Stephanomeria exigua	2	4.9%
	Unknown	1	2.4%
Perennial Grasses	*Achnatherum hymenoides*	11	26.8%
	Aristida purpurea	1	2.4%

Life Form	Scientific Name	Occurrence (# of Transects)	Constancy
	Hesperostipa comata	1	2.4%
	Pleuraphis jamesii	16	39.0%
	Sporobolus airoides	27	65.9%
	Sporobolus contractus	1	2.4%
	Sporobolus cryptandrus	4	9.8%
Perennial Succulents	*Opuntia polyacantha*	9	22.0%
	Sclerocactus cloveriae	2	4.9%
Shrubs	*Artemisia bigelovii*	1	2.4%
	Atriplex canescens	4	9.8%
	Atriplex confertifolia	23	56.1%
	Atriplex gardneri	11	26.8%
	Atriplex obovata	17	41.5%
	Ephedra spp.	1	2.4%
	Ericameria [Chrysothamnus] nauseosus	2	4.9%
	Eriogonum leptocladon	2	4.9%
	Gutierrezia sarothrae	12	29.3%
	Krascheninnikovia lanata	2	4.9%
	Sarcobatus vermiculatus	5	12.2%
	Yucca spp.	1	2.4%
Unidentified	*Unknown*	3	7.3%
Thin Breaks Number of Species		59	

ATTACHMENT F

PRODUCTION DATA

Attachment F. Production Data
Table of Contents

F-1	Fall	Arroyo Shrub Production Summary
F-1a	Fall	Arroyo Shrub Production by Transect
F-2	Fall	Alkali Wash Production Summary
F-2a	Fall	Alkali Wash Production by Transect
F-3	Fall	Badlands Production Summary
F-3a	Fall	Badlands Production by Transect
F-4	Fall	Dunes Production Summary
F-4a	Fall	Dunes Shrub Production by Transect
F-5	Fall	Reference Arroyo Shrub Production Summary
F-5a	Fall	Reference Arroyo Shrub Production by Transect
F-6	Fall	Reference Alkali Wash Production Summary
F-6a	Fall	Reference Alkali Wash Production by Transect
F-7	Fall	Reference Sands Production Summary
F-7a	Fall	Reference Sands Production by Transect
F-8	Fall	Sands Production Summary
F-8a	Fall	Sands Production by Transect
F-9	Fall	Thin Breaks Production Summary
F-9a	Fall	Thin Breaks Production by Transect

Attachment F-1. Arroyo Shrub Production Summary

Life Form	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Bromus tectorum	0.5	4.5
	Hordeum pusillum	0.3	2.2
	Monroa squarrosa	2.6	23.4
	Vulpia octoflora	0.7	6.1
Annual Grass Subtotal		4.1	36.2
	Atriplex powellii	0.7	6.5
	Cordylanthus wrightii	1.9	16.7
	Cryptantha crassisepala	0.5	4.4
	Descurainia pinnata	2.5	22.3
	Halogeton glomeratus	17.0	151.4
	Ipomopsis pumila	0.3	2.2
	Lappula occidentalis	0.3	2.2
	Linum puberulum	1.0	8.9
	Machaeranthera canescens	2.1	19.0
	Malacothrix sonchoides	2.5	22.3
	Mentzelia albicaulis	0.8	7.1
	Plantago patagonica	1.0	9.2
	Salsola tragus	9.9	88.2
	Townsendia annua	0.2	2.0
Annual Forb Subtotal		40.6	362.6
	Chenopodium sp.	38.0	339.0
Forb Subtotal		38.0	339.0
	Abronia fragrans	0.3	2.2
	Grindelia squarrosa	31.0	276.6
	Oenothera pallida	4.7	41.9
	Stephanomeria exigua	0.3	2.2
Perennial Forb Subtotal		36.2	323.0
	Achnatherum hymenoides	0.3	2.2
	Bouteloua gracilis	0.3	2.2
	Pleuraphis jamesii	4.0	35.7
	Sporobolus airoides	4.2	37.4
	Sporobolus contractus	0.3	2.2
	Sporobolus cryptandrus	0.7	6.2
	Sporobolus giganteus	1.7	15.3
Perennial Grass Subtotal		11.4	101.3
	Atriplex canescens	11.1	99.1
	Atriplex obovata	25.4	226.6
	Ephedra sp.	67.2	599.5
	Ericameria [Chrysothamnus]	31.2	277.9

Life Form	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	nauseosus		
	Eriogonum leptocladon	3.1	28.1
	Gutierrezia sarothrae	3.1	27.8
	Isocoma tenuisecta	3.9	34.8
	Parryella filifolia	102.0	910.0
	Sarcobatus vermiculatus	11.6	103.6
Shrub Subtotal		258.6	2307.4
	Unknown	1.8	15.8
Unknown Subtotal		1.8	15.8

	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)	Standard Deviation of lbs/acre
Arroyo Shrub Total	**390.7**	**3485.4**	**156.5**

Attachment F-1a. Arroyo Shrub Production by Transect

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		DEPI	*Descurainia pinnata*	1.6	14.3
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			1.9	16.5
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grasses Subtotal			0.5	4.5
		ATCA2	*Atriplex canescens*	2.9	25.9
	Shrub Subtotal			2.9	25.9
AS-041 Total				5.3	46.8
		ATPO2	*Atriplex powellii*	0.3	2.2
		DEPI	*Descurainia pinnata*	4.0	35.7
		SATR12	*Salsola tragus*	3.8	33.9
	Annual Forb Subtotal			8.1	71.8
		ATCA2	*Atriplex canescens*	1.7	15.2
	Shrub Subtotal			1.7	15.2
AS-042 Total				9.8	87.0
		DEPI	*Descurainia pinnata*	0.3	2.2
		PLPA2	*Plantago patagonica*	2.6	23.2
		TOAN	*Townsendia annua*	0.1	0.9
	Annual Forb Subtotal			3.0	26.3
		BRTE	*Bromus tectorum*	0.3	2.2
		MOSQ	*Monroa squarrosa*	0.3	2.2
	Annual Grasses Subtotal			0.5	4.5
		PLJA	*Pleuraphis jamesii*	3.5	31.3
		SPAI	*Sporobolus airoides*	2.6	22.8
	Perennial Grasses Subtotal			6.1	54.1
AS-043 Total				9.5	84.8
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		SPGI	*Sporobolus giganteus*	1.1	9.8
	Perennial Grasses Subtotal			1.1	9.8
		ERNA10	*Ericameria [Chrysothamnus] nauseosus*	5.2	46.4
		PAFI4	*Parryella filifolia*	102.0	910.0
	Shrub Subtotal			107.2	956.4
AS-044 Total				108.6	968.5
		COWR2	*Cordylanthus wrightii*	2.0	17.8
		DEPI	*Descurainia pinnata*	1.0	8.9
	Annual Forb Subtotal			3.0	26.8
		ERNA10	*Ericameria [Chrysothamnus] nauseosus*	2.5	22.3

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Shrub Subtotal			2.5	22.3
		Unk 4		0.7	6.2
	Unknown Subtotal			0.7	6.2
AS-045 Total				6.2	55.3
		SATR12	*Salsola tragus*	20.0	178.4
	Annual Forb Subtotal			20.0	178.4
		ACHY	*Achnatherum hymenoides*	0.3	2.2
	Perennial Grasses Subtotal			0.3	2.2
		ERNA10	*Ericameria [Chrysothamnus] nauseosus*	7.1	63.6
	Shrub Subtotal			7.1	63.6
AS-046 Total				27.4	244.2
		COWR2	*Cordylanthus wrightii*	2.0	17.8
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	3.0	26.8
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			5.5	49.1
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grasses Subtotal			0.3	2.2
		SPGI	*Sporobolus giganteus*	2.3	20.9
	Perennial Grasses Subtotal			2.3	20.9
		GUSA2	*Gutierrezia sarothrae*	1.8	16.1
	Shrub Subtotal			1.8	16.1
AS-047 Total				9.9	88.2
		ATPO2	*Atriplex powellii*	1.7	15.2
		SATR12	*Salsola tragus*	8.0	71.4
	Annual Forb Subtotal			9.7	86.5
		ATCA2	*Atriplex canescens*	0.5	4.5
	Shrub Subtotal			0.5	4.5
AS-048 Total				10.2	91.0
		DEPI	*Descurainia pinnata*	0.7	6.2
		SATR12	*Salsola tragus*	0.8	7.1
	Annual Forb Subtotal			1.5	13.4
		ATOB	*Atriplex obovata*	27.0	240.9
		SAVE4	*Sarcobatus vermiculatus*	3.8	33.9
	Shrub Subtotal			30.8	274.8
AS-049 Total				32.3	288.2
		DEPI	*Descurainia pinnata*	3.3	29.4
		SATR12	*Salsola tragus*	2.8	25.0
	Annual Forb Subtotal			6.1	54.4
		BRTE	*Bromus tectorum*	0.3	2.2
	Annual Grasses Subtotal			0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		SPAI	*Sporobolus airoides*	5.0	44.6
	Perennial Grasses Subtotal			5.0	44.6
		ATCA2	*Atriplex canescens*	1.5	13.4
	Shrub Subtotal			1.5	13.4
AS-050 Total				12.9	114.6
		DEPI	*Descurainia pinnata*	1.0	8.9
		SATR12	*Salsola tragus*	17.0	151.7
	Annual Forb Subtotal			18.0	160.6
		SAVE4	*Sarcobatus vermiculatus*	42.0	374.7
	Shrub Subtotal			42.0	374.7
AS-051 Total				60.0	535.3
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	6.0	53.5
		SATR12	*Salsola tragus*	26.4	235.5
	Annual Forb Subtotal			32.7	291.3
AS-052 Total				32.7	291.3
		ATPO2	*Atriplex powellii*	0.3	2.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	2.6	23.2
		SATR12	*Salsola tragus*	7.2	64.2
	Annual Forb Subtotal			10.3	91.9
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grasses Subtotal			0.3	2.2
		SAVE4	*Sarcobatus vermiculatus*	5.7	50.9
	Shrub Subtotal			5.7	50.9
AS-053 Total				16.3	145.0
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
AS-054 Total				0.0	0.0
		DEPI	*Descurainia pinnata*	1.9	17.0
		SATR12	*Salsola tragus*	1.2	10.7
	Annual Forb Subtotal			3.1	27.7
		PLJA	*Pleuraphis jamesii*	1.0	9.3
	Perennial Grasses Subtotal			1.0	9.3
		ATCA2	*Atriplex canescens*	34.0	303.3
		SAVE4	*Sarcobatus vermiculatus*	2.0	17.8
	Shrub Subtotal			36.0	321.2
AS-055 Total				40.1	358.1
		COWR2	*Cordylanthus wrightii*	1.0	8.9
		LIPU4	*Linum puberulum*	1.0	8.9
		SATR12	*Salsola tragus*	4.0	35.7

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Forb Subtotal			6.0	53.5
		BRTE	*Bromus tectorum*	0.3	2.2
	Annual Grasses Subtotal			0.3	2.2
		OEPA	*Oenothera pallida*	4.7	41.9
	Perennial Forb Subtotal			4.7	41.9
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	4.3	38.4
		SPCO4	*Sporobolus contractus*	0.3	2.2
	Perennial Grasses Subtotal			4.8	42.8
		ERNA10	*Ericameria [Chrysothamnus] nauseosus*	159.0	1418.6
	Shrub Subtotal			159.0	1418.6
		OTHER	*Dalea sp.*	3.8	33.9
	Unknown Subtotal			3.8	33.9
AS-056 Total				178.6	1593.0
		ERNA10	*Ericameria [Chrysothamnus] nauseosus*	1.3	11.2
	Shrub Subtotal			1.3	11.2
AS-057 Total				1.3	11.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	3.0	26.8
		LAOC3	*Lappula occidentalis*	0.3	2.2
		SATR12	*Salsola tragus*	7.0	62.5
	Annual Forb Subtotal			10.5	93.7
AS-058 Total				10.5	93.7
		COWR2	*Cordylanthus wrightii*	4.4	39.3
		DEPI	*Descurainia pinnata*	0.3	2.2
		SATR12	*Salsola tragus*	9.0	80.3
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			13.9	124.0
		ISTE2	*Isocoma tenuisecta*	3.9	34.8
	Shrub Subtotal			3.9	34.8
AS-059 Total				17.8	158.8
		DEPI	*Descurainia pinnata*	1.6	14.3
		SATR12	*Salsola tragus*	44.3	395.2
	Annual Forb Subtotal			45.9	409.5
		BRTE	*Bromus tectorum*	0.3	2.2
	Annual Grasses Subtotal			0.3	2.2
		ERNA10	*Ericameria [Chrysothamnus] nauseosus*	33.0	294.4
	Shrub Subtotal			33.0	294.4
AS-060 Total				79.2	706.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		MEAL6	*Mentzelia albicaulis*	0.8	7.1
		SATR12	*Salsola tragus*	7.8	69.6
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			9.1	81.2
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grasses Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	1.2	11.0
		SPAI	*Sporobolus airoides*	4.5	40.0
	Perennial Grasses Subtotal			5.7	51.0
AS-061 Total				15.1	134.4
		DEPI	*Descurainia pinnata*	0.3	2.2
		SATR12	*Salsola tragus*	11.2	99.9
	Annual Forb Subtotal			11.5	102.2
		SPAI	*Sporobolus airoides*	2.5	22.3
	Perennial Grasses Subtotal			2.5	22.3
AS-062 Total				14.0	124.5
		HAGL	*Halogeton glomeratus*	39.0	347.9
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	12.0	107.1
	Annual Forb Subtotal			51.3	457.2
		CHENO	*Chenopodium sp.*	38.0	339.0
	forb Subtotal			38.0	339.0
		GRSQ	*Grindelia squarrosa*	31.0	276.6
	Perennial Forb Subtotal			31.0	276.6
		SPAI	*Sporobolus airoides*	28.8	256.9
	Perennial Grasses Subtotal			28.8	256.9
		ATOB	*Atriplex obovata*	82.0	731.6
	Shrub Subtotal			82.0	731.6
AS-063 Total				231.1	2061.4
		CRCR3	*Cryptantha crassisepala*	1.0	8.9
		DEPI	*Descurainia pinnata*	1.5	13.4
		MACA2	*Machaeranthera canescens*	0.5	4.5
		SATR12	*Salsola tragus*	4.9	43.7
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			8.2	72.7
		EPHED	*Ephedra sp.*	67.2	599.5
		SAVE4	*Sarcobatus vermiculatus*	6.8	60.7
	Shrub Subtotal			74.0	660.2
		Unk 1		0.8	7.1
	Unknown Subtotal			0.8	7.1
AS-064 Total				83.0	740.1
		COWR2	*Cordylanthus wrightii*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		MACA2	*Machaeranthera canescens*	3.5	31.3
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			4.3	38.0
		BRTE	*Bromus tectorum*	1.5	13.4
		VUOC	*Vulpia octoflora*	2.0	17.8
	Annual Grasses Subtotal			3.5	31.2
		ABFR2	*Abronia fragrans*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	16.7	149.2
		SPCR	*Sporobolus cryptandrus*	0.7	6.2
	Perennial Grasses Subtotal			17.7	157.6
		ERLE9	*Eriogonum leptocladon*	3.1	28.1
	Shrub Subtotal			3.1	28.1
AS-065 Total				28.8	257.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		MOSQ	*Monroa squarrosa*	5.0	44.6
	Annual Grasses Subtotal			5.0	44.6
		BOGR2	*Bouteloua gracilis*	0.3	2.2
		SPAI	*Sporobolus airoides*	0.5	4.8
	Perennial Grasses Subtotal			0.8	7.0
AS-066 Total				6.3	56.1
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		SATR12	*Salsola tragus*	8.0	71.4
	Annual Forb Subtotal			8.5	75.8
		ERNA10	*Ericameria [Chrysothamnus] nauseosus*	10.0	89.2
	Shrub Subtotal			10.0	89.2
AS-067 Total				18.5	165.1
		SATR12	*Salsola tragus*	3.0	26.8
	Annual Forb Subtotal			3.0	26.8
		HOPU	*Hordeum pusillum*	0.3	2.2
	Annual Grasses Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	1.7	15.5
	Perennial Grasses Subtotal			1.7	15.5
AS-068 Total				5.0	44.5
		DEPI	*Descurainia pinnata*	2.0	17.8
		MACA2	*Machaeranthera canescens*	0.3	2.2
		SATR12	*Salsola tragus*	18.0	160.6

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Forb Subtotal			20.3	180.7
		ATCA2	*Atriplex canescens*	22.0	196.3
		SAVE4	*Sarcobatus vermiculatus*	21.0	187.4
	Shrub Subtotal			43.0	383.6
AS-069 Total				63.3	564.3
		COWR2	*Cordylanthus wrightii*	1.6	14.3
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
	Annual Forb Subtotal			2.1	18.7
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grasses Subtotal			0.3	2.2
		STEX	*Stephanomeria exigua*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		ATCA2	*Atriplex canescens*	4.5	40.1
		GUSA2	*Gutierrezia sarothrae*	7.3	65.1
	Shrub Subtotal			11.8	105.3
AS-070 Total				14.4	128.5
		ATOB	*Atriplex obovata*	3.6	32.1
	Shrub Subtotal			3.6	32.1
AS-071 Total				3.6	32.1
		CRCR3	*Cryptantha crassisepala*	0.5	4.5
		DEPI	*Descurainia pinnata*	1.4	12.5
		LAOC3	*Lappula occidentalis*	0.3	2.2
		MACA2	*Machaeranthera canescens*	4.3	38.1
		SATR12	*Salsola tragus*	32.0	285.5
	Annual Forb Subtotal			38.4	342.8
		SPAI	*Sporobolus airoides*	1.2	10.6
	Perennial Grasses Subtotal			1.2	10.6
AS-072 Total				39.6	353.4
		DEPI	*Descurainia pinnata*	0.1	0.9
		HAGL	*Halogeton glomeratus*	1.0	8.9
	Annual Forb Subtotal			1.1	9.8
		ATOB	*Atriplex obovata*	10.6	94.6
	Shrub Subtotal			10.6	94.6
AS-073 Total				11.7	104.4
		DEPI	*Descurainia pinnata*	3.7	33.0
		MASO	*Malacothrix sonchoides*	2.5	22.3
		SATR12	*Salsola tragus*	11.9	106.2
	Annual Forb Subtotal			18.1	161.5
		PLJA	*Pleuraphis jamesii*	1.0	8.5
	Perennial Grasses Subtotal			1.0	8.5
		ATCA2	*Atriplex canescens*	9.5	84.8

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		SAVE4	*Sarcobatus vermiculatus*	5.8	51.7
	Shrub Subtotal			15.3	136.5
AS-074 Total				34.4	306.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		SATR12	*Salsola tragus*	11.0	98.1
	Annual Forb Subtotal			11.3	100.4
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grasses Subtotal			0.3	2.2
		ATCA2	*Atriplex canescens*	50.0	446.1
		SAVE4	*Sarcobatus vermiculatus*	12.0	107.1
	Shrub Subtotal			62.0	553.2
AS-075 Total				73.5	655.8
		SATR12	*Salsola tragus*	2.9	25.9
	Annual Forb Subtotal			2.9	25.9
AS-076 Total				2.9	25.9
		DEPI	*Descurainia pinnata*	7.4	66.0
		SATR12	*Salsola tragus*	9.5	84.8
	Annual Forb Subtotal			16.9	150.8
		ATCA2	*Atriplex canescens*	3.0	27.1
		SAVE4	*Sarcobatus vermiculatus*	5.4	48.2
	Shrub Subtotal			8.4	75.3
AS-077 Total				25.3	226.1
		HAGL	*Halogeton glomeratus*	10.9	97.2
		SATR12	*Salsola tragus*	1.0	8.9
	Annual Forb Subtotal			11.9	106.2
		SPAI	*Sporobolus airoides*	2.7	24.1
	Perennial Grasses Subtotal			2.7	24.1
		ATOB	*Atriplex obovata*	3.8	33.9
	Shrub Subtotal			3.8	33.9
AS-078 Total				18.4	164.2
		CRCR3	*Cryptantha crassisepala*	2.2	19.6
		DEPI	*Descurainia pinnata*	13.6	121.3
		SATR12	*Salsola tragus*	7.0	62.5
	Annual Forb Subtotal			22.8	203.4
		ATCA2	*Atriplex canescens*	1.7	15.2
	Shrub Subtotal			1.7	15.2
AS-079 Total				24.5	218.6
		DEPI	*Descurainia pinnata*	4.0	35.7
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		SATR12	*Salsola tragus*	14.0	124.9
	Annual Forb Subtotal			18.3	162.8
		ACHY	*Achnatherum hymenoides*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Perennial Grasses Subtotal			0.3	2.2
		ATCA2	*Atriplex canescens*	1.9	17.0
		GUSA2	*Gutierrezia sarothrae*	0.3	2.2
	Shrub Subtotal			2.2	19.2
AS-080 Total				20.7	184.2

Attachment F-2. Alkali Wash Production Summary

LifeForm	Scientific Name	Air Dry Weight (g/m^2)	Air Dry Weight (lbs/acre)
	Hordeum pusillum	3.9	34.8
	Monroa squarrosa	0.3	2.2
	Vulpia octoflora	0.3	2.2
Annual Grass Subtotal		4.4	39.2
	Atriplex powellii	5.2	45.9
	Cryptantha crassisepala	0.8	6.8
	Descurainia pinnata	0.4	3.4
	Erigeron bellidiastrum	1.7	14.7
	Eriogonum gordonii	1.3	11.9
	Halogeton glomeratus	18.5	165.1
	Lappula occidentalis	0.6	5.4
	Linum puberulum	0.3	2.2
	Machaeranthera canescens	1.6	14.5
	Malacothrix sonchoides	0.3	2.2
	Plantago patagonica	2.1	19.1
	Salsola tragus	6.6	58.9
	Townsendia annua	0.7	6.0
Annual Forb Subtotal		39.9	356.1
	Allium spp.	0.1	0.9
	Lygodesmia grandiflora	0.3	2.2
	Sphaeralcea coccinea	1.8	15.6
	Sphaeralcea parvifolia	0.7	6.4
Perennial Forb Subtotal		2.8	25.2
	Achnatherum hymenoides	0.3	2.2
	Hordeum jubatum	2.1	18.7
	Pleuraphis jamesii	2.4	21.5
	Sporobolus airoides	2.0	17.5
	Sporobolus cryptandrus	1.5	13.3
Perennial Grass Subtotal		8.2	73.3
	Atriplex canescens	2.7	24.1
	Atriplex confertifolia	19.2	170.9
	Atriplex gardneri	4.1	36.7
	Atriplex obovata	14.4	128.2
	Gutierrezia sarothrae	7.8	69.6
Shrub Subtotal		48.1	429.5
	Unknown	6.3	56.2
Unknown Subtotal		6.3	56.2

	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)	Standard Deviation of lbs/acre
Alkali Wash Total	**109.8**	**979.5**	**75.4**

Attachment F-2a. Alkali Wash Production by Transect

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		ATPO2	*Atriplex powellii*	17.0	151.7
		ERGO	*Eriogonum gordonii*	0.3	2.2
		HAGL	*Halogeton glomeratus*	7.8	69.6
	Annual Forb Subtotal			25.1	223.5
		ATOB	*Atriplex obovata*	15.5	138.3
	Shrub Subtotal			15.5	138.3
AW-001 Total				40.6	361.8
		ATPO2	*Atriplex powellii*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	2.0	17.8
	Annual Forb Subtotal			2.5	22.3
		ATGA	*Atriplex gardneri*	2.1	18.7
	Shrub Subtotal			2.1	18.7
AW-002 Total				4.6	41.0
		DEPI	*Descurainia pinnata*	0.3	2.2
		SATR12	*Salsola tragus*	20.0	178.4
	Annual Forb Subtotal			20.3	180.7
		ATOB	*Atriplex obovata*	10.0	89.2
	Shrub Subtotal			10.0	89.2
AW-003 Total				30.3	269.9
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	3.4	30.3
		SATR12	*Salsola tragus*	7.1	63.3
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			11.3	100.4
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		SPPA2	*Sphaeralcea parvifolia*	0.7	6.4
	Perennial Forb Subtotal			0.7	6.4
		PLJA	*Pleuraphis jamesii*	2.8	24.8
		SPAI	*Sporobolus airoides*	0.7	6.0
	Perennial Grass Subtotal			3.5	30.8
AW-004 Total				15.7	139.8
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	5.8	51.7
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			6.8	60.7
		MOSQ	*Monroa squarrosa*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Grass Subtotal			0.3	2.2
AW-005 Total				7.1	62.9
		HAGL	*Halogeton glomeratus*	0.5	4.5
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	5.5	49.1
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			6.8	60.2
		SPAI	*Sporobolus airoides*	1.4	12.8
	Perennial Grass Subtotal			1.4	12.8
AW-006 Total				8.2	73.1
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			0.8	6.7
AW-007 Total				0.8	6.7
		HAGL	*Halogeton glomeratus*	38.0	339.0
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			38.3	341.3
AW-008 Total				38.3	341.3
		ATPO2	*Atriplex powellii*	2.5	22.3
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	53.0	472.9
	Annual Forb Subtotal			55.8	497.4
AW-009 Total				55.8	497.4
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	1.4	12.5
		LAOC3	*Lappula occidentalis*	1.0	8.9
		SATR12	*Salsola tragus*	10.0	89.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			13.2	117.3
		SPAI	*Sporobolus airoides*	3.7	32.6
	Perennial Grass Subtotal			3.7	32.6
AW-010 Total				16.8	149.9
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
AW-011 Total				0.0	0.0
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.8	7.1

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		PLPA2	*Plantago patagonica*	4.0	35.7
		SATR12	*Salsola tragus*	0.4	3.6
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			5.7	50.9
		ATGA	*Atriplex gardneri*	1.2	10.5
	Shrub Subtotal			1.2	10.5
AW-012 Total				6.9	61.3
		ATPO2	*Atriplex powellii*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		LIPU4	*Linum puberulum*	0.3	2.2
		PLPA2	*Plantago patagonica*	1.0	8.9
		SATR12	*Salsola tragus*	15.0	133.8
		TOAN	*Townsendia annua*	1.0	8.9
	Annual Forb Subtotal			17.8	158.4
		LYGR	*Lygodesmia grandiflora*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
AW-013 Total				18.0	160.6
		DEPI	*Descurainia pinnata*	0.3	2.2
		SATR12	*Salsola tragus*	1.9	17.0
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			2.4	21.4
AW-014 Total				2.4	21.4
		SATR12	*Salsola tragus*	10.0	89.2
	Annual Forb Subtotal			10.0	89.2
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		SPAI	*Sporobolus airoides*	6.0	53.5
	Perennial Grass Subtotal			6.3	55.8
AW-015 Total				16.3	145.0
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	3.5	31.2
		TOAN	*Townsendia annua*	1.0	8.9
	Annual Forb Subtotal			5.3	46.8
		SPCOC	*Sphaeralcea coccinea*	0.9	8.0
	Perennial Forb Subtotal			0.9	8.0
		SPAI	*Sporobolus airoides*	1.7	15.3
	Perennial Grass Subtotal			1.7	15.3
		ATGA	*Atriplex gardneri*	10.3	91.8
	Shrub Subtotal			10.3	91.8
AW-016 Total				18.2	161.9
		ATPO2	*Atriplex powellii*	21.0	187.4

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Forb Subtotal			21.0	187.4
		Unk 2		6.3	56.2
	Unknown Subtotal			6.3	56.2
AW-017 Total				27.3	243.6
		HAGL	*Halogeton glomeratus*	38.0	339.0
	Annual Forb Subtotal			38.0	339.0
AW-018 Total				38.0	339.0
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
AW-019 Total				0.0	0.0
		PLPA2	*Plantago patagonica*	3.1	27.7
	Annual Forb Subtotal			3.1	27.7
		HOPU	*Hordeum pusillum*	3.9	34.8
	Annual Grass Subtotal			3.9	34.8
		SPAI	*Sporobolus airoides*	0.8	6.7
	Perennial Grass Subtotal			0.8	6.7
		ATOB	*Atriplex obovata*	17.0	151.7
	Shrub Subtotal			17.0	151.7
AW-020 Total				24.7	220.8
		ATPO2	*Atriplex powellii*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
AW-021 Total				0.3	2.2
		ATPO2	*Atriplex powellii*	3.3	29.4
		DEPI	*Descurainia pinnata*	0.3	2.2
		SATR12	*Salsola tragus*	7.4	66.0
	Annual Forb Subtotal			11.0	97.7
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
AW-022 Total				11.2	99.9
		CRCR3	*Cryptantha crassisepala*	2.3	20.5
		MASO	*Malacothrix sonchoides*	0.3	2.2
		SATR12	*Salsola tragus*	17.0	151.7
	Annual Forb Subtotal			19.6	174.4
		PLJA	*Pleuraphis jamesii*	2.8	24.6
	Perennial Grass Subtotal			2.8	24.6
AW-023 Total				22.3	199.0
		ATPO2	*Atriplex powellii*	3.4	30.3
		SATR12	*Salsola tragus*	4.2	37.5
	Annual Forb Subtotal			7.6	67.8

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		ATOB	*Atriplex obovata*	3.9	34.8
	Shrub Subtotal			3.9	34.8
AW-024 Total				11.5	102.6
		DEPI	*Descurainia pinnata*	0.3	2.2
		MACA2	*Machaeranthera canescens*	1.6	14.5
		PLPA2	*Plantago patagonica*	2.1	18.7
		SATR12	*Salsola tragus*	2.6	23.2
		TOAN	*Townsendia annua*	1.3	11.6
	Annual Forb Subtotal			7.9	70.2
		SPCOC	*Sphaeralcea coccinea*	1.6	14.3
	Perennial Forb Subtotal			1.6	14.3
		SPAI	*Sporobolus airoides*	0.8	6.7
		SPCR	*Sporobolus cryptandrus*	0.5	4.4
	Perennial Grass Subtotal			1.2	11.1
AW-025 Total				10.7	95.6
		ATPO2	*Atriplex powellii*	1.6	14.3
		DEPI	*Descurainia pinnata*	2.0	17.8
		ERGO	*Eriogonum gordonii*	0.8	7.1
	Annual Forb Subtotal			4.4	39.3
		SPCOC	*Sphaeralcea coccinea*	0.7	6.4
	Perennial Forb Subtotal			0.7	6.4
		HOJU	*Hordeum jubatum*	2.1	18.7
		SPAI	*Sporobolus airoides*	2.6	23.1
	Perennial Grass Subtotal			4.7	41.8
AW-026 Total				9.8	87.5
		ATPO2	*Atriplex powellii*	10.0	89.2
		ERGO	*Eriogonum gordonii*	3.8	33.9
	Annual Forb Subtotal			13.8	123.1
		ATGA	*Atriplex gardneri*	2.9	25.9
		ATOB	*Atriplex obovata*	3.3	29.4
	Shrub Subtotal			6.2	55.3
AW-027 Total				20.0	178.4
		HAGL	*Halogeton glomeratus*	7.8	69.6
	Annual Forb Subtotal			7.8	69.6
AW-028 Total				7.8	69.6
		HAGL	*Halogeton glomeratus*	27.0	240.9
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			27.3	243.1
		PLJA	*Pleuraphis jamesii*	1.0	8.9
	Perennial Grass Subtotal			1.0	8.9
AW-029 Total				28.3	252.0

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		LAOC3	*Lappula occidentalis*	1.6	14.3
		PLPA2	*Plantago patagonica*	1.9	17.0
		TOAN	*Townsendia annua*	2.8	25.0
	Annual Forb Subtotal			6.3	56.2
		ALLIUM	*Allium spp.*	0.1	0.9
		SPCOC	*Sphaeralcea coccinea*	4.0	35.7
	Perennial Forb Subtotal			4.1	36.6
		PLJA	*Pleuraphis jamesii*	4.1	36.6
		SPAI	*Sporobolus airoides*	2.7	24.3
	Perennial Grass Subtotal			6.8	60.8
AW-030 Total				17.2	153.6
		HAGL	*Halogeton glomeratus*	19.0	169.5
		SATR12	*Salsola tragus*	1.5	13.4
	Annual Forb Subtotal			20.5	182.9
AW-031 Total				20.5	182.9
		ATPO2	*Atriplex powellii*	2.0	17.8
	Annual Forb Subtotal			2.0	17.8
AW-032 Total				2.0	17.8
		ERBE	*Erigeron bellidiastrum*	1.0	8.9
	Annual Forb Subtotal			1.0	8.9
AW-033 Total				1.0	8.9
		ERBE	*Erigeron bellidiastrum*	2.3	20.5
	Annual Forb Subtotal			2.3	20.5
		ATCA2	*Atriplex canescens*	2.7	24.1
		ATCO	*Atriplex confertifolia*	36.0	321.2
		ATOB	*Atriplex obovata*	44.0	392.6
	Shrub Subtotal			82.7	737.8
AW-034 Total				85.0	758.4
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	2.4	21.4
		SATR12	*Salsola tragus*	4.0	35.7
	Annual Forb Subtotal			6.7	59.3
		SPCOC	*Sphaeralcea coccinea*	1.5	13.7
	Perennial Forb Subtotal			1.5	13.7
AW-035 Total				8.2	73.0
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		SATR12	*Salsola tragus*	12.0	107.1
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			12.5	111.5
		SPAI	*Sporobolus airoides*	0.7	6.2
	Perennial Grass Subtotal			0.7	6.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		GUSA2	*Gutierrezia sarothrae*	7.8	69.6
	Shrub Subtotal			7.8	69.6
AW-036 Total				21.0	187.4
		DEPI	*Descurainia pinnata*	0.8	7.1
		HAGL	*Halogeton glomeratus*	9.8	87.4
		SATR12	*Salsola tragus*	1.7	15.2
	Annual Forb Subtotal			12.3	109.7
		ATCO	*Atriplex confertifolia*	2.3	20.5
	Shrub Subtotal			2.3	20.5
AW-037 Total				14.6	130.3
		ATPO2	*Atriplex powellii*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		ATOB	*Atriplex obovata*	0.3	2.2
		ATOB	*Atriplex obovata*	21.0	187.4
	Shrub Subtotal			21.3	189.6
AW-038 Total				21.8	194.0
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
AW-039 Total				0.0	0.0
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PLPA2	*Plantago patagonica*	1.9	17.0
		SATR12	*Salsola tragus*	11.8	105.3
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			14.2	126.7
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	1.4	12.8
		SPAI	*Sporobolus airoides*	2.3	20.1
		SPCR	*Sporobolus cryptandrus*	2.5	22.3
	Perennial Grass Subtotal			6.2	55.2
AW-040 Total				20.6	184.1

Attachment F-3. Badland Production Summary

LifeForm	Scientific Name	Air Dry Weight (g/m^2)	Air Dry Weight (lbs/acre)
	Bromus tectorum	0.3	2.2
	Hordeum pusillum	0.3	2.2
Annual Grass Subtotal		0.5	4.5
	Atriplex powellii	1.8	16.4
	Descurainia pinnata	0.5	4.4
	Eriogonum divaricatum	0.3	2.2
	Eriogonum gordonii	0.7	6.6
	Halogeton glomeratus	5.2	46.2
	Ipomopsis pumila	0.3	2.2
	Lappula occidentalis	0.3	2.2
	Phacelia crenulata	1.1	9.8
	Plantago patagonica	0.3	2.2
	Salsola tragus	2.4	21.8
	Townsendia annua	0.3	2.2
Annual Forb Subtotal		13.0	116.4
	Lygodesmia grandiflora	0.8	7.1
	Sphaeralcea coccinea	3.2	28.5
	Suaeda moquinii	1.3	11.4
Perennial Forb Subtotal		5.3	47.1
	Pleuraphis jamesii	0.3	2.2
	Sporobolus airoides	1.4	12.3
Perennial Grass Subtotal		1.6	14.6
	Atriplex canescens	16.0	142.7
	Atriplex gardneri	5.7	51.0
	Atriplex obovata	20.9	186.8
	Atriplex saccaria	5.5	49.1
Shrub Subtotal		48.2	429.6

	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)	Standard Deviation of lbs/acre
Badlands Total	**68.6**	**612.1**	**109.5**

Attachment F-3a. Badlands Production by Transect.

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		SPCOC	*Sphaeralcea coccinea*	3.2	28.5
	Perennial Forb Subtotal			3.2	28.5
BA-081 Total				3.2	28.5
		ATOB	*Atriplex obovata*	5.0	44.6
	Shrub Subtotal			5.0	44.6
BA-082 Total				5.0	44.6
		ATPO2	*Atriplex powellii*	0.3	2.2
		ERGO	*Eriogonum gordonii*	2.0	17.8
	Annual Forb Subtotal			2.3	20.1
BA-083 Total				2.3	20.1
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
BA-084 Total				0.0	0.0
		ATPO2	*Atriplex powellii*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		ATOB	*Atriplex obovata*	7.9	70.5
	Shrub Subtotal			7.9	70.5
BA-085 Total				8.2	72.7
		ATPO2	*Atriplex powellii*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		ATOB	*Atriplex obovata*	41.0	365.8
	Shrub Subtotal			41.0	365.8
BA-086 Total				41.3	368.0
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
BA-087 Total				0.5	4.5
		ATPO2	*Atriplex powellii*	5.6	50.0
		ERGO	*Eriogonum gordonii*	1.0	8.9
	Annual Forb Subtotal			6.6	58.9
		ATGA	*Atriplex gardneri*	14.0	124.9
		ATOB	*Atriplex obovata*	115.0	1026.0
	Shrub Subtotal			129.0	1150.9
BA-088 Total				135.6	1209.8
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
BA-089 Total				0.0	0.0

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		HAGL	*Halogeton glomeratus*	14.3	127.6
	Annual Forb Subtotal			14.3	127.6
BA-090 Total				14.3	127.6
		ERGO	*Eriogonum gordonii*	2.6	23.2
		PHCR	*Phacelia crenulata*	1.1	9.8
		SATR12	*Salsola tragus*	1.1	9.8
	Annual Forb Subtotal			4.8	42.8
BA-091 Total				4.8	42.8
		DEPI	*Descurainia pinnata*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	4.0	35.7
	Annual Forb Subtotal			4.5	40.1
		LYGR	*Lygodesmia grandiflora*	0.8	7.1
	Perennial Forb Subtotal			0.8	7.1
BA-091* Total				5.3	47.3
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grasses Subtotal			0.3	2.2
		ATGA	*Atriplex gardneri*	2.9	25.9
	Shrub Subtotal			2.9	25.9
BA-092 Total				3.2	28.1
		ATPO2	*Atriplex powellii*	1.5	13.4
		ERGO	*Eriogonum gordonii*	0.3	2.2
	Annual Forb Subtotal			1.8	15.6
BA-093 Total				1.8	15.6
		ATPO2	*Atriplex powellii*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
BA-094 Total				0.3	2.2
		DEPI	*Descurainia pinnata*	2.7	24.1
	Annual Forb Subtotal			2.7	24.1
		ATCA2	*Atriplex canescens*	16.0	142.7
		ATOB	*Atriplex obovata*	7.2	64.2
	Shrub Subtotal			23.2	207.0
BA-095 Total				25.9	231.1
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
BA-096 Total				0.0	0.0
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
BA-097 Total				0.0	0.0
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
BA-098 Total				0.5	4.5
		ERGO	*Eriogonum gordonii*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		ATGA	*Atriplex gardneri*	0.3	2.2
	Shrub Subtotal			0.3	2.2
BA-098* Total				0.5	4.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	1.0	8.9
	Annual Forb Subtotal			1.3	11.2
		SPAI	*Sporobolus airoides*	1.2	10.7
	Perennial Grasses Subtotal			1.2	10.7
BA-099 Total				2.5	21.9
		ATPO2	*Atriplex powellii*	1.0	8.9
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			2.0	17.8
BA-100 Total				2.0	17.8
		ATPO2	*Atriplex powellii*	3.5	31.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
	Annual Forb Subtotal			3.8	33.5
BA-101 Total				3.8	33.5
		ATPO2	*Atriplex powellii*	0.3	2.2
		ERGO	*Eriogonum gordonii*	1.0	8.9
	Annual Forb Subtotal			1.3	11.2
BA-101* Total				1.3	11.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		HAGL	*Halogeton glomeratus*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			1.0	8.9
		ATOB	*Atriplex obovata*	6.9	61.6
	Shrub Subtotal			6.9	61.6
BA-102 Total				7.9	70.5

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		ERDI5	*Eriogonum divaricatum*	0.3	2.2
		IPPU4	*Ipomopsis pumila*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		HOPU	*Hordeum pusillum*	0.3	2.2
	Annual Grasses Subtotal			0.3	2.2
BA-103 Total				0.8	6.7
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
BA-104 Total				0.0	0.0
		ATPO2	*Atriplex powellii*	0.3	2.2
		SATR12	*Salsola tragus*	2.0	17.8
	Annual Forb Subtotal			2.3	20.1
		ATOB	*Atriplex obovata*	7.0	62.5
	Shrub Subtotal			7.0	62.5
BA-105 Total				9.3	82.5
		ATPO2	*Atriplex powellii*	1.0	8.9
	Annual Forb Subtotal			1.0	8.9
BA-106 Total				1.0	8.9
		ATPO2	*Atriplex powellii*	8.0	71.4
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		SATR12	*Salsola tragus*	5.0	44.6
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			13.8	122.7
BA-107 Total				13.8	122.7
		ERGO	*Eriogonum gordonii*	3.0	26.8
	Annual Forb Subtotal			3.0	26.8
		ATOB	*Atriplex obovata*	5.1	45.5
		ATSA	*Atriplex saccaria*	5.5	49.1
	Shrub Subtotal			10.6	94.6
BA-108 Total				13.6	121.3
		ATOB	*Atriplex obovata*	7.3	65.1
	Shrub Subtotal			7.3	65.1
BA-109 Total				7.3	65.1
		PLPA2	*Plantago patagonica*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		BRTE	*Bromus tectorum*	0.3	2.2
	Annual Grasses Subtotal			0.3	2.2
		ATOB	*Atriplex obovata*	2.0	17.8

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		PLPA2	*Plantago patagonica*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		BRTE	*Bromus tectorum*	0.3	2.2
	Annual Grasses Subtotal			0.3	2.2
		ATOB	*Atriplex obovata*	2.0	17.8
	Shrub Subtotal			2.0	17.8
BA-110 Total				2.8	24.5
		ATPO2	*Atriplex powellii*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
	Annual Forb Subtotal			1.0	8.9
BA-111 Total				1.0	8.9
		ERGO	*Eriogonum gordonii*	0.3	2.2
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			1.3	11.2
		ATOB	*Atriplex obovata*	15.0	133.8
	Shrub Subtotal			15.0	133.8
BA-112 Total				16.3	145.0
		ATPO2	*Atriplex powellii*	3.7	33.0
	Annual Forb Subtotal			3.7	33.0
		SUMO	*Suaeda moquinii*	2.3	20.5
	Perennial Forb Subtotal			2.3	20.5
BA-113 Total				6.0	53.5
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
BA-114 Total				0.0	0.0
		ATPO2	*Atriplex powellii*	3.1	27.7
		ERGO	*Eriogonum gordonii*	0.3	2.2
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		SATR12	*Salsola tragus*	6.7	59.8
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			10.6	94.1
		PLJA	*Pleuraphis jamesii*	0.3	2.2
	Perennial Grasses Subtotal			0.3	2.2
BA-115 Total				10.8	96.4

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
BA-116 Total				0.0	0.0
		ATPO2	*Atriplex powellii*	3.4	30.3
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			4.2	37.0
BA-117 Total				4.2	37.0
		SUMO	*Suaeda moquinii*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
BA-118 Total				0.3	2.2
		ATPO2	*Atriplex powellii*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
	Annual Forb Subtotal			1.3	11.2
		SPAI	*Sporobolus airoides*	2.7	24.1
	Perennial Grasses Subtotal			2.7	24.1
		ATOB	*Atriplex obovata*	38.0	339.0
	Shrub Subtotal			38.0	339.0
BA-119 Total				42.0	374.3
		ATPO2	*Atriplex powellii*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		ATOB	*Atriplex obovata*	14.8	132.0
	Shrub Subtotal			14.8	132.0
BA-120 Total				15.3	136.5

Attachment F-4. Dunes Production Summary

Life Form	Scientific Name	Air Dry Weight (g/m^2)	Air Dry Weight (lbs/acre)
	Bromus tectorum	0.3	2.2
	Vulpia octoflora	0.3	2.2
Annual Grass Subtotal		0.5	4.5
	Ambrosia acanthicarpa	0.8	7.4
	Cordylanthus wrightii	15.2	135.6
	Cryptantha crassisepala	3.6	31.8
	Descurainia pinnata	1.5	13.2
	Dimorphocarpa wislizenii	4.0	35.4
	Ipomopsis pumila	0.3	2.2
	Lappula occidentalis	0.3	2.2
	Linum puberulum	2.0	17.8
	Machaeranthera canescens	6.3	56.1
	Mentzelia albicaulis	0.7	6.3
	Phacelia crenulata	0.7	6.4
	Salsola tragus	6.4	57.1
	Streptanthella longirostris	1.5	13.0
	Townsendia annua	0.3	2.2
Annual Forb Subtotal		43.4	386.8
	Astragalus spp.	0.3	2.2
Forb Subtotal		0.3	2.2
	Abronia fragrans	2.4	21.4
	Chaetopappa ericoides	0.3	2.2
	Lygodesmia grandiflora	0.3	2.2
	Mentzelia pumila	0.9	7.8
	Oenothera pallida	3.3	29.7
	Penstemon angustifolius	1.5	13.4
	Sphaeralcea coccinea	1.6	14.3
	Sphaeralcea parvifolia	1.4	12.4
	Stephanomeria exigua	0.7	6.4
Perennial Forb Subtotal		12.3	109.9
	Achnatherum hymenoides	1.7	15.0
	Aristida purpurea	0.9	7.6
	Muhlenbergia pungens	2.4	21.8
	Pleuraphis jamesii	2.7	24.4
	Sporobolus airoides	2.1	18.5
	Sporobolus contractus	1.3	11.2
	Sporobolus cryptandrus	0.9	7.7
Perennial Grass Subtotal		11.9	106.1
	Atriplex canescens	4.8	43.1

Life Form	Scientific Name	Air Dry Weight (g/m^2)	Air Dry Weight (lbs/acre)
	Atriplex gardneri	5.0	44.2
	Chrysothamnus viscidiflorus	1.8	15.9
	Ephedra sp.	8.2	72.9
	Ericameria [Chrysothamnus] nauseosus	36.2	322.7
	Eriogonum leptocladon	5.1	45.1
	Gutierrezia sarothrae	12.0	106.7
	Lycium pallidum	0.3	2.2
	Sarcobatus vermiculatus	10.3	91.9
Shrub Subtotal		83.5	744.6
	Unknown	0.9	7.8
Unknown Subtotal		0.9	7.8

	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)	Standard Deviation of lbs/acre
Dunes Total	**152.7**	**1361.9**	**58.8**

Attachment F-4a. Dunes Production by Transect.

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		CRCR3	*Cryptantha crassisepala*	7.9	70.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		DIWI2	*Dimorphocarpa wislizenii*	4.8	42.8
		LAOC3	*Lappula occidentalis*	0.3	2.2
		LIPU4	*Linum puberulum*	1.0	8.9
		MACA2	*Machaeranthera canescens*	3.8	34.1
		SATR12	*Salsola tragus*	1.7	15.2
	Annual Forb Subtotal			19.7	176.0
		OEPA	*Oenothera pallida*	2.6	22.9
	Perennial Forb Subtotal			2.6	22.9
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		MUPU2	*Muhlenbergia pungens*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	0.3	2.2
	Perennial Grass Subtotal			0.8	6.7
		CHVI8	*Chrysothamnus viscidiflorus*	3.5	31.3
	Shrub Subtotal			3.5	31.3
DU-121 Total				26.6	236.9
		SPCOC	*Sphaeralcea coccinea*	1.6	14.3
	Perennial Forb Subtotal			1.6	14.3
		SPAI	*Sporobolus airoides*	4.3	38.1
	Perennial Grass Subtotal			4.3	38.1
DU-122 Total				5.9	52.4
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	2.5	22.3
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			3.0	26.8
		STEX	*Stephanomeria exigua*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	6.9	61.6
	Perennial Grass Subtotal			6.9	61.6
		LYPA	*Lycium pallidum*	0.3	2.2
	Shrub Subtotal			0.3	2.2
DU-123 Total				10.4	92.8
		AMAC2	*Ambrosia acanthicarpa*	0.3	2.2
		MACA2	*Machaeranthera canescens*	0.3	2.2
		SATR12	*Salsola tragus*	2.7	24.1
	Annual Forb Subtotal			3.2	28.5
		ACHY	*Achnatherum hymenoides*	1.6	14.5
		ARPU9	*Aristida purpurea*	0.9	8.0
	Perennial Grass Subtotal			2.5	22.5
DU-124 Total				5.7	51.0

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		AMAC2	*Ambrosia acanthicarpa*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		ASTRA	*Astragalus spp.*	0.3	2.2
	Forb Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	2.3	20.9
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			2.6	23.1
		EPHED	*Ephedra sp.*	5.1	45.8
	Shrub Subtotal			5.1	45.8
DU-125 Total				8.2	73.3
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		STLO4	*Streptanthella longirostris*	2.1	18.7
	Annual Forb Subtotal			2.6	23.2
		SPAI	*Sporobolus airoides*	0.9	7.6
	Perennial Grass Subtotal			0.9	7.6
		ATGA	*Atriplex gardneri*	3.6	32.1
		SAVE4	*Sarcobatus vermiculatus*	17.0	151.7
	Shrub Subtotal			20.6	183.8
DU-126 Total				24.1	214.6
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		SPPA2	*Sphaeralcea parvifolia*	1.2	10.7
	Perennial Forb Subtotal			1.2	10.7
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	6.9	61.6
		SPAI	*Sporobolus airoides*	3.9	34.8
	Perennial Grass Subtotal			11.1	98.6
DU-127 Total				12.5	111.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		PHCR	*Phacelia crenulata*	2.1	18.7
		SATR12	*Salsola tragus*	2.6	23.2
	Annual Forb Subtotal			5.0	44.2
		SPAI	*Sporobolus airoides*	1.6	14.3
	Perennial Grass Subtotal			1.6	14.3
		EPHED	*Ephedra sp.*	14.4	128.5
	Shrub Subtotal			14.4	128.5
DU-128 Total				21.0	186.9
		CRCR3	*Cryptantha crassisepala*	1.5	13.4
		DEPI	*Descurainia pinnata*	1.3	11.6
	Annual Forb Subtotal			2.8	25.0
		MEPU3	*Mentzelia pumila*	1.5	13.4

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Perennial Forb Subtotal			1.5	13.4
		ACHY	*Achnatherum hymenoides*	0.8	7.4
	Perennial Grass Subtotal			0.8	7.4
		GUSA2	*Gutierrezia sarothrae*	34.6	308.7
	Shrub Subtotal			34.6	308.7
DU-129 Total				39.7	354.4
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		MEAL6	*Mentzelia albicaulis*	0.3	2.7
		SATR12	*Salsola tragus*	3.9	34.8
	Annual Forb Subtotal			4.5	39.7
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	1.4	12.1
	Perennial Grass Subtotal			1.4	12.1
DU-130 Total				6.1	54.1
		CRCR3	*Cryptantha crassisepala*	1.6	14.3
		DEPI	*Descurainia pinnata*	0.3	2.2
		DIWI2	*Dimorphocarpa wislizenii*	3.0	26.8
		SATR12	*Salsola tragus*	15.2	135.6
	Annual Forb Subtotal			20.1	178.9
		SPPA2	*Sphaeralcea parvifolia*	2.4	21.4
	Perennial Forb Subtotal			2.4	21.4
		ACHY	*Achnatherum hymenoides*	1.2	10.7
		MUPU2	*Muhlenbergia pungens*	4.7	41.9
	Perennial Grass Subtotal			5.9	52.6
DU-131 Total				28.4	252.9
		CRCR3	*Cryptantha crassisepala*	38.0	339.0
		MACA2	*Machaeranthera canescens*	17.7	158.2
		MEAL6	*Mentzelia albicaulis*	1.0	8.9
	Annual Forb Subtotal			56.7	506.1
		ABFR2	*Abronia fragrans*	1.8	16.1
		OEPA	*Oenothera pallida*	8.3	74.1
		SPPA2	*Sphaeralcea parvifolia*	1.9	16.9
	Perennial Forb Subtotal			12.0	107.0
		PLJA	*Pleuraphis jamesii*	2.0	17.7
	Perennial Grass Subtotal			2.0	17.7
DU-132 Total				70.7	630.8
		PLJA	*Pleuraphis jamesii*	3.0	26.9
		SPAI	*Sporobolus airoides*	0.9	8.0
	Perennial Grass Subtotal			3.9	34.9
		EPHED	*Ephedra sp.*	2.8	25.0
		GUSA2	*Gutierrezia sarothrae*	8.9	79.4
	Shrub Subtotal			11.7	104.4

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
DU-133 Total				15.6	139.3
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DIWI2	*Dimorphocarpa wislizenii*	2.0	17.8
		SATR12	*Salsola tragus*	1.3	11.6
	Annual Forb Subtotal			3.6	31.7
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	0.5	4.0
	Perennial Grass Subtotal			0.7	6.2
		EPHED	*Ephedra sp.*	0.7	6.2
		GUSA2	*Gutierrezia sarothrae*	10.8	96.4
	Shrub Subtotal			11.5	102.6
		Unk 1		0.3	2.2
	Unknown Subtotal			0.3	2.2
DU-134 Total				16.0	142.7
		PHCR	*Phacelia crenulata*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	2.4	21.4
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			2.7	23.6
		EPHED	*Ephedra sp.*	8.9	79.5
		ERNA10	*Ericameria [Chrysothamnus] nauseosus*	50.9	454.1
	Shrub Subtotal			59.8	533.6
DU-135 Total				62.7	559.5
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		SATR12	*Salsola tragus*	1.4	12.5
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			2.7	23.6
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	3.2	28.8
	Perennial Grass Subtotal			3.2	28.8
		GUSA2	*Gutierrezia sarothrae*	2.6	23.2
	Shrub Subtotal			2.6	23.2
DU-136 Total				8.7	77.9
		COWR2	*Cordylanthus wrightii*	15.2	135.6
		DEPI	*Descurainia pinnata*	0.3	2.2
	Annual Forb Subtotal			15.5	137.8
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		SPAI	*Sporobolus airoides*	2.3	20.5
	Perennial Grass Subtotal			2.3	20.5
		ERNA10	*Ericameria [Chrysothamnus] nauseosus*	11.6	103.5
		SAVE4	*Sarcobatus vermiculatus*	3.6	32.1
	Shrub Subtotal			15.2	135.6
DU-137 Total				33.2	296.2
		SPAI	*Sporobolus airoides*	1.4	12.5
	Perennial Grass Subtotal			1.4	12.5
		GUSA2	*Gutierrezia sarothrae*	14.6	130.3
	Shrub Subtotal			14.6	130.3
DU-138 Total				16.0	142.7
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	7.7	68.7
		MACA2	*Machaeranthera canescens*	1.9	17.0
		MEAL6	*Mentzelia albicaulis*	0.3	2.2
		SATR12	*Salsola tragus*	13.0	116.0
		STLO4	*Streptanthella longirostris*	2.5	22.3
	Annual Forb Subtotal			25.6	228.4
		PLJA	*Pleuraphis jamesii*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
DU-139 Total				25.9	230.6
		AMAC2	*Ambrosia acanthicarpa*	0.3	2.2
		DIWI2	*Dimorphocarpa wislizenii*	9.6	85.6
		MACA2	*Machaeranthera canescens*	5.8	51.4
		SATR12	*Salsola tragus*	12.0	107.1
	Annual Forb Subtotal			27.6	246.3
		MEPU3	*Mentzelia pumila*	0.3	2.2
		OEPA	*Oenothera pallida*	7.8	69.9
	Perennial Forb Subtotal			8.1	72.1
		ACHY	*Achnatherum hymenoides*	7.0	62.6
	Perennial Grass Subtotal			7.0	62.6
DU-140 Total				42.7	381.0
		CRCR3	*Cryptantha crassisepala*	9.0	80.3
		DEPI	*Descurainia pinnata*	0.3	2.2
		MACA2	*Machaeranthera canescens*	9.5	84.9
		SATR12	*Salsola tragus*	2.3	20.5
	Annual Forb Subtotal			21.1	188.0
		OEPA	*Oenothera pallida*	5.9	53.0
		SPPA2	*Sphaeralcea parvifolia*	0.3	2.2
	Perennial Forb Subtotal			6.2	55.2
		ACHY	*Achnatherum hymenoides*	0.7	6.4
		MUPU2	*Muhlenbergia pungens*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		PLJA	*Pleuraphis jamesii*	0.5	4.0
		SPCO4	*Sporobolus contractus*	0.3	2.2
	Perennial Grass Subtotal			1.7	14.9
DU-141 Total				28.9	258.1
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.6	5.4
		DIWI2	*Dimorphocarpa wislizenii*	1.2	10.5
		LIPU4	*Linum puberulum*	1.4	12.5
		MACA2	*Machaeranthera canescens*	8.6	76.3
		STLO4	*Streptanthella longirostris*	1.0	8.7
	Annual Forb Subtotal			13.0	115.6
		ASTRA	*Astragalus spp.*	0.3	2.2
	Forb Subtotal			0.3	2.2
		OEPA	*Oenothera pallida*	2.9	25.7
		SPPA2	*Sphaeralcea parvifolia*	0.4	3.2
		STEX	*Stephanomeria exigua*	1.4	12.2
	Perennial Forb Subtotal			4.6	41.1
		ACHY	*Achnatherum hymenoides*	2.3	20.1
		MUPU2	*Muhlenbergia pungens*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	6.9	61.6
	Perennial Grass Subtotal			9.4	83.9
DU-142 Total				27.2	242.8
		CRCR3	*Cryptantha crassisepala*	3.3	29.4
		DEPI	*Descurainia pinnata*	5.3	47.3
		MACA2	*Machaeranthera canescens*	17.1	152.6
		SATR12	*Salsola tragus*	3.3	29.4
	Annual Forb Subtotal			29.0	258.7
		OEPA	*Oenothera pallida*	2.7	24.1
		SPPA2	*Sphaeralcea parvifolia*	0.3	2.7
	Perennial Forb Subtotal			3.0	26.8
		ACHY	*Achnatherum hymenoides*	0.5	4.6
		PLJA	*Pleuraphis jamesii*	0.5	4.0
		SPCO4	*Sporobolus contractus*	2.3	20.1
	Perennial Grass Subtotal			3.2	28.6
DU-143 Total				35.2	314.1
		SPPA2	*Sphaeralcea parvifolia*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		MUPU2	*Muhlenbergia pungens*	0.7	6.2
	Perennial Grass Subtotal			1.0	8.5
		CHVI8	*Chrysothamnus viscidiflorus*	0.3	2.2
	Shrub Subtotal			0.3	2.2
		Unk 1		2.0	17.8
	Unknown Subtotal			2.0	17.8

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
DU-144 Total				3.5	30.8
		DIWI2	*Dimorphocarpa wislizenii*	1.7	15.2
		MEAL6	*Mentzelia albicaulis*	0.3	2.2
	Annual Forb Subtotal			2.0	17.4
		SPPA2	*Sphaeralcea parvifolia*	3.0	26.8
	Perennial Forb Subtotal			3.0	26.8
		ATCA2	*Atriplex canescens*	7.0	62.5
		ERLE9	*Eriogonum leptocladon*	10.0	89.2
		Unk 1		14.0	124.9
	Shrub Subtotal			31.0	276.6
DU-145 Total				36.0	320.7
		AMAC2	*Ambrosia acanthicarpa*	2.4	21.4
		PHCR	*Phacelia crenulata*	0.3	2.2
	Annual Forb Subtotal			2.7	23.6
		ACHY	*Achnatherum hymenoides*	2.3	20.9
		PLJA	*Pleuraphis jamesii*	1.2	10.7
		SPAI	*Sporobolus airoides*	1.8	16.1
	Perennial Grass Subtotal			5.3	47.6
		EPHED	*Ephedra sp.*	9.0	80.4
		ERNA10	*Ericameria [Chrysothamnus] nauseosus*	46.0	410.4
	Shrub Subtotal			55.0	490.8
DU-146 Total				63.0	562.1
		MACA2	*Machaeranthera canescens*	0.3	2.2
		MEAL6	*Mentzelia albicaulis*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		PLJA	*Pleuraphis jamesii*	5.5	49.1
		SPAI	*Sporobolus airoides*	6.8	60.2
	Perennial Grass Subtotal			12.3	109.3
DU-147 Total				12.8	113.8
		AMAC2	*Ambrosia acanthicarpa*	0.4	3.6
		CRCR3	*Cryptantha crassisepala*	3.0	26.8
		DIWI2	*Dimorphocarpa wislizenii*	2.4	21.4
		MACA2	*Machaeranthera canescens*	3.6	32.2
	Annual Forb Subtotal			9.4	84.0
		ABFR2	*Abronia fragrans*	3.0	26.8
		OEPA	*Oenothera pallida*	0.4	3.6
	Perennial Forb Subtotal			3.4	30.3
		ACHY	*Achnatherum hymenoides*	2.4	21.7
		PLJA	*Pleuraphis jamesii*	1.4	12.8
	Perennial Grass Subtotal			3.9	34.5
		CHVI8	*Chrysothamnus viscidiflorus*	1.0	8.5
	Shrub Subtotal			1.0	8.5

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
DU-148 Total				17.6	157.3
		DEPI	*Descurainia pinnata*	0.3	2.2
		LIPU4	*Linum puberulum*	3.6	32.1
		MACA2	*Machaeranthera canescens*	7.7	69.1
		SATR12	*Salsola tragus*	2.8	25.0
	Annual Forb Subtotal			14.4	128.4
		LYGR	*Lygodesmia grandiflora*	0.3	2.2
		OEPA	*Oenothera pallida*	1.5	13.7
		STEX	*Stephanomeria exigua*	1.0	8.9
	Perennial Forb Subtotal			2.8	24.8
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	1.0	8.5
		SPCR	*Sporobolus cryptandrus*	1.1	10.2
	Perennial Grass Subtotal			2.3	20.9
		ATCA2	*Atriplex canescens*	2.8	24.9
		EPHED	*Ephedra sp.*	31.4	279.7
		ERLE9	*Eriogonum leptocladon*	0.5	4.0
		GUSA2	*Gutierrezia sarothrae*	0.3	2.2
	Shrub Subtotal			34.8	310.8
DU-149 Total				54.4	484.9
		SATR12	*Salsola tragus*	14.6	130.3
	Annual Forb Subtotal			14.6	130.3
		ACHY	*Achnatherum hymenoides*	1.7	15.3
		PLJA	*Pleuraphis jamesii*	6.7	59.4
	Perennial Grass Subtotal			8.4	74.7
		EPHED	*Ephedra sp.*	4.3	38.4
	Shrub Subtotal			4.3	38.4
DU-150 Total				27.3	243.3
		AMAC2	*Ambrosia acanthicarpa*	2.5	22.3
	Annual Forb Subtotal			2.5	22.3
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		MUPU2	*Muhlenbergia pungens*	2.1	18.7
	Perennial Grass Subtotal			2.4	21.0
		ATCA2	*Atriplex canescens*	4.7	41.9
	Shrub Subtotal			4.7	41.9
DU-151 Total				9.6	85.2
		AMAC2	*Ambrosia acanthicarpa*	0.9	8.0
		SATR12	*Salsola tragus*	32.0	285.5
	Annual Forb Subtotal			32.9	293.5
		OEPA	*Oenothera pallida*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
DU-152 Total				33.2	295.8

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		MEAL6	*Mentzelia albicaulis*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
		STLO4	*Streptanthella longirostris*	0.3	2.2
	Annual Forb Subtotal			1.0	8.9
		PEAN4	*Penstemon angustifolius*	1.5	13.4
	Perennial Forb Subtotal			1.5	13.4
		SPCR	*Sporobolus cryptandrus*	0.6	5.4
	Perennial Grass Subtotal			0.6	5.4
		Unk 1		1.0	8.9
	Unknown Subtotal			1.0	8.9
DU-153 Total				4.1	36.6
		AMAC2	*Ambrosia acanthicarpa*	0.3	2.7
		CRCR3	*Cryptantha crassisepala*	1.8	16.1
		DIWI2	*Dimorphocarpa wislizenii*	0.8	7.1
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		MEAL6	*Mentzelia albicaulis*	1.5	13.4
	Annual Forb Subtotal			4.7	41.5
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.5	4.5
		ERLE9	*Eriogonum leptocladon*	4.7	41.9
	Shrub Subtotal			4.7	41.9
DU-154 Total				9.9	87.9
		AMAC2	*Ambrosia acanthicarpa*	0.3	2.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		ARPU9	*Aristida purpurea*	0.8	7.1
		SPAI	*Sporobolus airoides*	2.0	17.8
	Perennial Grass Subtotal			2.8	25.0
		EPHED	*Ephedra sp.*	3.0	26.4
	Shrub Subtotal			3.0	26.4
DU-155 Total				6.3	55.9
		CRCR3	*Cryptantha crassisepala*	9.0	80.3
		DIWI2	*Dimorphocarpa wislizenii*	4.8	42.8
		MACA2	*Machaeranthera canescens*	2.5	22.5
	Annual Forb Subtotal			16.3	145.6
		ACHY	*Achnatherum hymenoides*	6.8	60.7
		PLJA	*Pleuraphis jamesii*	4.7	41.7
		SPCR	*Sporobolus cryptandrus*	0.9	7.6
	Perennial Grass Subtotal			12.3	110.0
DU-156 Total				28.7	255.6
		CRCR3	*Cryptantha crassisepala*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		DEPI	*Descurainia pinnata*	1.3	11.6
		MACA2	*Machaeranthera canescens*	3.0	26.8
		SATR12	*Salsola tragus*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			5.1	45.1
		BRTE	*Bromus tectorum*	0.3	2.2
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.5	4.5
		SPPA2	*Sphaeralcea parvifolia*	2.7	24.1
	Perennial Forb Subtotal			2.7	24.1
		ATGA	*Atriplex gardneri*	6.3	56.2
	Shrub Subtotal			6.3	56.2
DU-157 Total				14.6	129.8
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DIWI2	*Dimorphocarpa wislizenii*	10.7	95.5
		MEAL6	*Mentzelia albicaulis*	1.9	16.6
	Annual Forb Subtotal			12.8	114.3
		OEPA	*Oenothera pallida*	1.0	8.5
		SPPA2	*Sphaeralcea parvifolia*	0.3	2.2
		STEX	*Stephanomeria exigua*	0.3	2.2
	Perennial Forb Subtotal			1.5	12.9
		ACHY	*Achnatherum hymenoides*	4.3	38.5
		PLJA	*Pleuraphis jamesii*	1.5	13.4
	Perennial Grass Subtotal			5.8	51.9
		CHVI8	*Chrysothamnus viscidiflorus*	2.4	21.4
	Shrub Subtotal			2.4	21.4
DU-158 Total				22.5	200.6
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DIWI2	*Dimorphocarpa wislizenii*	2.7	24.1
		SATR12	*Salsola tragus*	5.6	50.0
	Annual Forb Subtotal			8.6	76.3
		CHER2	*Chaetopappa ericoides*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	2.0	17.7
	Perennial Grass Subtotal			2.2	19.9
		EPHED	*Ephedra sp.*	2.2	19.6
	Shrub Subtotal			2.2	19.6
		Unk 1		0.3	2.2
	Unknown Subtotal			0.3	2.2
DU-159 Total				13.5	120.3
		SPPA2	*Sphaeralcea parvifolia*	2.7	24.3
	Perennial Forb Subtotal			2.7	24.3
		ACHY	*Achnatherum hymenoides*	0.1	0.5

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		MUPU2	*Muhlenbergia pungens*	8.8	78.8
		PLJA	*Pleuraphis jamesii*	0.5	4.8
	Perennial Grass Subtotal			9.4	84.2
DU-160 Total				12.2	108.4

Attachment F-5. Reference Arroyo Shrub Production Summary

Life Form	Scientific Name	Air Dry Weight (g/m^2)	Air Dry Weight (lbs/acre)
	Aegilops cylindrica	1.6	14.5
	Bouteloua barbata	0.3	2.2
	Bromus tectorum	1.1	9.5
	Hordeum pusillum	5.0	44.6
	Monroa squarrosa	0.3	2.2
	Vulpia octoflora	0.3	2.2
Annual Grass Subtotal		8.4	75.3
	Atriplex powellii	2.8	25.0
	Cryptantha crassisepala	0.3	2.2
	Descurainia pinnata	0.3	2.6
	Erigeron bellidiastrum	0.7	6.3
	Eriogonum gordonii	0.3	2.2
	Halogeton glomeratus	10.1	90.3
	Ipomopsis pumila	0.3	2.2
	Lappula occidentalis	0.3	2.2
	Machaeranthera canescens	0.3	2.2
	Malacothrix sonchoides	0.3	2.2
	Pectis cylindrica	0.3	2.2
	Plantago patagonica	3.6	32.4
	Salsola tragus	4.4	39.0
	Townsendia annua	0.3	2.6
Annual Forb Subtotal		24.0	213.9
	Aster sp.	1.2	10.3
	Portulaca oleracea	0.3	2.2
Forb Subtotal		1.4	12.5
	Chamaesyce fendleri	0.3	2.2
	Grindelia squarrosa	11.2	100.1
	Linum aristatum	0.3	2.2
	Senecio flaccidus	0.3	2.2
	Sphaeralcea parvifolia	0.3	2.2
Perennial Forb Subtotal		12.2	109.0
	Bouteloua gracilis	0.3	2.2
	Pleuraphis jamesii	2.2	19.7
	Sporobolus airoides	9.4	84.3
	Sporobolus contractus	1.5	13.4
Perennial Grass Subtotal		13.4	119.6
	Atriplex canescens	2.6	22.9
	Atriplex gardneri	1.4	12.5
	Atriplex obovata	11.6	103.9

Life Form	Scientific Name	Air Dry Weight (g/m^2)	Air Dry Weight (lbs/acre)
	Gutierrezia sarothrae	24.0	214.1
	Sarcobatus vermiculatus	48.0	428.2
Shrub Subtotal		87.6	781.7

	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)	Standard Deviation of lbs/acre
Reference Arroyo Shrub Total	**147.1**	**1312.0**	**91.6**

Attachment F-5a. Reference Arroyo Shrub Production by Transect.

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		PLPA2	*Plantago patagonica*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		BRTE	*Bromus tectorum*	0.3	2.2
		HOPU	*Hordeum pusillum*	0.3	2.2
	Annual Grass Subtotal			0.5	4.5
		OTHER	*Aster sp.*	0.3	2.2
		POOL	*Portulaca oleracea*	0.3	2.2
	Forb Subtotal			0.5	4.5
		CHFE3	*Chamaesyce fendleri*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	2.7	24.1
	Perennial Grass Subtotal			2.7	24.1
RAS-041 Total				4.2	37.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERBE	*Erigeron bellidiastrum*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		HOPU	*Hordeum pusillum*	0.3	2.2
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.5	4.5
		GRSQ	*Grindelia squarrosa*	84.0	749.4
	Perennial Forb Subtotal			84.0	749.4
		PLJA	*Pleuraphis jamesii*	6.5	58.0
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	24.8	220.8
	Perennial Grass Subtotal			31.5	281.0
		ATCA2	*Atriplex canescens*	2.6	22.9
	Shrub Subtotal			2.6	22.9
RAS-042 Total				119.1	1062.3
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		SATR12	*Salsola tragus*	0.9	8.0
	Annual Forb Subtotal			1.4	12.5
		HOPU	*Hordeum pusillum*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		ATOB	*Atriplex obovata*	2.8	25.0
	Shrub Subtotal			2.8	25.0
RAS-043 Total				4.5	39.7
		HOPU	*Hordeum pusillum*	13.0	116.0
	Annual Grass Subtotal			13.0	116.0
		SPAI	*Sporobolus airoides*	4.3	38.4
	Perennial Grass Subtotal			4.3	38.4

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		ATOB	*Atriplex obovata*	11.3	100.8
	Shrub Subtotal			11.3	100.8
RAS-044 Total				28.6	255.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		PECY	*Pectis cylindrica*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.4	3.6
		TOAN	*Townsendia annua*	0.5	4.5
	Annual Forb Subtotal			1.4	12.5
		BOBA2	*Bouteloua barbata*	0.3	2.2
		HOPU	*Hordeum pusillum*	3.2	28.9
	Annual Grass Subtotal			3.5	31.1
		OTHER	*Aster sp.*	0.3	2.2
	Forb Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	5.0	44.6
	Perennial Grass Subtotal			5.0	44.6
RAS-045 Total				10.1	90.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERBE	*Erigeron bellidiastrum*	3.0	26.8
		PLPA2	*Plantago patagonica*	4.0	35.7
	Annual Forb Subtotal			7.3	64.7
		HOPU	*Hordeum pusillum*	0.8	7.1
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			1.1	9.4
		OTHER	*Aster sp.*	7.5	66.9
	Forb Subtotal			7.5	66.9
		GRSQ	*Grindelia squarrosa*	0.9	8.0
	Perennial Forb Subtotal			0.9	8.0
		PLJA	*Pleuraphis jamesii*	4.0	35.7
		SPAI	*Sporobolus airoides*	23.0	205.2
	Perennial Grass Subtotal			27.0	240.9
RAS-046 Total				43.7	389.9
		PLPA2	*Plantago patagonica*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		HOPU	*Hordeum pusillum*	13.0	116.0
	Annual Grass Subtotal			13.0	116.0
		OTHER	*Aster sp.*	0.3	2.2
	Forb Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	6.0	53.5
	Perennial Grass Subtotal			6.0	53.5
RAS-047 Total				19.5	174.0
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	2.0	17.8
		SATR12	*Salsola tragus*	2.0	17.8

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			4.5	40.1
		HOPU	*Hordeum pusillum*	0.9	8.0
	Annual Grass Subtotal			0.9	8.0
		GRSQ	*Grindelia squarrosa*	1.0	8.9
	Perennial Forb Subtotal			1.0	8.9
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	0.2	1.8
	Perennial Grass Subtotal			0.5	4.0
RAS-049 Total				6.9	61.1
		DEPI	*Descurainia pinnata*	0.3	2.2
		PLPA2	*Plantago patagonica*	17.0	151.7
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			17.5	156.1
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		SEFL3	*Senecio flaccidus*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	5.1	45.5
		SPAI	*Sporobolus airoides*	9.9	88.3
	Perennial Grass Subtotal			15.0	133.8
		ATOB	*Atriplex obovata*	3.0	26.8
	Shrub Subtotal			3.0	26.8
RAS-050 Total				36.0	321.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	3.8	33.9
		SATR12	*Salsola tragus*	3.0	26.8
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			7.3	65.1
		BOBA2	*Bouteloua barbata*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
RAS-051 Total				7.6	67.4
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		MACA2	*Machaeranthera canescens*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	0.5	4.5
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			1.8	15.6
		HOPU	*Hordeum pusillum*	2.8	24.6
	Annual Grass Subtotal			2.8	24.6
		SPAI	*Sporobolus airoides*	2.6	22.8
	Perennial Grass Subtotal			2.6	22.8

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
RAS-052 Total				7.1	62.9
		ERBE	*Erigeron bellidiastrum*	0.3	2.2
		PLPA2	*Plantago patagonica*	8.8	78.5
	Annual Forb Subtotal			9.1	80.7
		BRTE	*Bromus tectorum*	0.3	2.2
		HOPU	*Hordeum pusillum*	0.3	2.2
	Annual Grass Subtotal			0.5	4.5
		OTHER	*Aster sp.*	0.3	2.2
	Forb Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	8.3	74.1
		SPAI	*Sporobolus airoides*	6.8	60.2
	Perennial Grass Subtotal			15.1	134.3
		GUSA2	*Gutierrezia sarothrae*	24.0	214.1
	Shrub Subtotal			24.0	214.1
RAS-053 Total				48.9	435.8
		DEPI	*Descurainia pinnata*	0.3	2.2
		MASO	*Malacothrix sonchoides*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		HOPU	*Hordeum pusillum*	3.5	31.2
	Annual Grass Subtotal			3.5	31.2
		SPAI	*Sporobolus airoides*	16.2	144.5
	Perennial Grass Subtotal			16.2	144.5
		ATOB	*Atriplex obovata*	9.8	87.4
	Shrub Subtotal			9.8	87.4
RAS-054 Total				30.0	267.7
		SATR12	*Salsola tragus*	9.0	80.3
	Annual Forb Subtotal			9.0	80.3
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
RAS-055 Total				9.3	82.5
		SATR12	*Salsola tragus*	31.0	276.6
	Annual Forb Subtotal			31.0	276.6
		HOPU	*Hordeum pusillum*	5.2	46.6
	Annual Grass Subtotal			5.2	46.6
		SPAI	*Sporobolus airoides*	5.0	45.0
	Perennial Grass Subtotal			5.0	45.0
RAS-056 Total				41.3	368.1
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		SATR12	*Salsola tragus*	2.4	21.4
	Annual Forb Subtotal			2.7	23.6
		HOPU	*Hordeum pusillum*	3.0	26.8

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Grass Subtotal			3.0	26.8
		LIAR3	*Linum aristatum*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		ATOB	*Atriplex obovata*	22.0	196.3
	Shrub Subtotal			22.0	196.3
RAS-057 Total				27.9	248.9
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PLPA2	*Plantago patagonica*	4.8	42.8
		SATR12	*Salsola tragus*	4.0	35.7
	Annual Forb Subtotal			9.1	80.7
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	2.4	21.4
	Perennial Grass Subtotal			2.4	21.4
RAS-058 Total				11.7	104.4
		HOPU	*Hordeum pusillum*	2.6	23.2
	Annual Grass Subtotal			2.6	23.2
		GRSQ	*Grindelia squarrosa*	10.0	89.2
	Perennial Forb Subtotal			10.0	89.2
		SPAI	*Sporobolus airoides*	7.8	69.6
	Perennial Grass Subtotal			7.8	69.6
RAS-059 Total				20.4	182.0
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	3.0	26.8
	Annual Forb Subtotal			3.3	29.0
		BOGR2	*Bouteloua gracilis*	0.3	2.2
		SPAI	*Sporobolus airoides*	16.0	142.7
	Perennial Grass Subtotal			16.3	145.0
RAS-060 Total				19.5	174.0
		ERBE	*Erigeron bellidiastrum*	0.3	2.2
		PLPA2	*Plantago patagonica*	8.8	78.5
	Annual Forb Subtotal			9.1	80.7
		AECY	*Aegilops cylindrica*	0.3	2.2
		HOPU	*Hordeum pusillum*	6.2	55.3
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			6.7	59.8
		OTHER	*Aster sp.*	0.3	2.2
	Forb Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	1.6	14.3
		SPAI	*Sporobolus airoides*	21.0	187.4
	Perennial Grass Subtotal			22.6	201.6
RAS-061 Total				38.6	344.4

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		PLPA2	*Plantago patagonica*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	5.9	52.3
		SPCO4	*Sporobolus contractus*	1.5	13.4
	Perennial Grass Subtotal			7.4	65.7
		ATOB	*Atriplex obovata*	9.9	88.3
	Shrub Subtotal			9.9	88.3
RAS-062 Total				17.5	156.3
		HOPU	*Hordeum pusillum*	1.4	12.5
	Annual Grass Subtotal			1.4	12.5
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.5	4.5
		ATOB	*Atriplex obovata*	7.0	62.5
		SAVE4	*Sarcobatus vermiculatus*	72.0	642.4
	Shrub Subtotal			79.0	704.8
RAS-063 Total				80.9	721.8
		ERBE	*Erigeron bellidiastrum*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		AECY	*Aegilops cylindrica*	3.0	26.8
		BRTE	*Bromus tectorum*	3.5	31.2
		HOPU	*Hordeum pusillum*	6.2	55.3
	Annual Grass Subtotal			12.7	113.3
		GRSQ	*Grindelia squarrosa*	6.9	61.6
	Perennial Forb Subtotal			6.9	61.6
		PLJA	*Pleuraphis jamesii*	1.7	15.2
		SPAI	*Sporobolus airoides*	27.0	240.9
	Perennial Grass Subtotal			28.7	256.1
RAS-064 Total				48.8	435.4
		DEPI	*Descurainia pinnata*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		HOPU	*Hordeum pusillum*	4.9	43.7
	Annual Grass Subtotal			4.9	43.7
		SPAI	*Sporobolus airoides*	3.4	30.3
	Perennial Grass Subtotal			3.4	30.3
RAS-065 Total				8.6	76.3
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			1.0	8.9
		HOPU	*Hordeum pusillum*	3.7	33.0

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Grass Subtotal			3.7	33.0
		GRSQ	*Grindelia squarrosa*	2.5	22.3
	Perennial Forb Subtotal			2.5	22.3
		SPAI	*Sporobolus airoides*	3.0	26.8
	Perennial Grass Subtotal			3.0	26.8
RAS-066 Total				10.2	91.0
		PLPA2	*Plantago patagonica*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		HOPU	*Hordeum pusillum*	14.0	124.9
	Annual Grass Subtotal			14.0	124.9
		GRSQ	*Grindelia squarrosa*	2.0	17.8
	Perennial Forb Subtotal			2.0	17.8
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	13.7	122.2
	Perennial Grass Subtotal			14.0	124.5
RAS-067 Total				30.2	269.4
		DEPI	*Descurainia pinnata*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		HOPU	*Hordeum pusillum*	14.0	124.9
		MOSQ	*Monroa squarrosa*	0.3	2.2
	Annual Grass Subtotal			14.3	127.1
		SPPA2	*Sphaeralcea parvifolia*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	0.7	6.2
	Perennial Grass Subtotal			0.7	6.2
RAS-068 Total				15.5	137.8
		ATPO2	*Atriplex powellii*	2.8	25.0
		SATR12	*Salsola tragus*	2.7	24.1
	Annual Forb Subtotal			5.5	49.1
		ATOB	*Atriplex obovata*	58.0	517.5
	Shrub Subtotal			58.0	517.5
RAS-069 Total				63.5	566.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	31.0	276.6
	Annual Forb Subtotal			31.3	278.8
		ATOB	*Atriplex obovata*	1.3	11.6
	Shrub Subtotal			1.3	11.6
RAS-070 Total				32.6	290.4
		HOPU	*Hordeum pusillum*	2.3	20.5
	Annual Grass Subtotal			2.3	20.5
		GRSQ	*Grindelia squarrosa*	2.3	20.5

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Perennial Forb Subtotal			2.3	20.5
		SPAI	*Sporobolus airoides*	16.0	142.7
	Perennial Grass Subtotal			16.0	142.7
RAS-071 Total				20.6	183.8
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	5.0	44.6
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
	Annual Forb Subtotal			5.8	51.3
RAS-072 Total				5.8	51.3
		DEPI	*Descurainia pinnata*	0.9	8.0
		PLPA2	*Plantago patagonica*	2.0	17.8
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			3.2	28.1
		HOPU	*Hordeum pusillum*	0.9	8.0
	Annual Grass Subtotal			0.9	8.0
		GRSQ	*Grindelia squarrosa*	11.0	98.1
	Perennial Forb Subtotal			11.0	98.1
		PLJA	*Pleuraphis jamesii*	2.0	17.8
	Perennial Grass Subtotal			2.0	17.8
		ATGA	*Atriplex gardneri*	1.4	12.5
		SAVE4	*Sarcobatus vermiculatus*	24.0	214.1
	Shrub Subtotal			25.4	226.6
RAS-073 Total				42.5	378.7
		HOPU	*Hordeum pusillum*	6.0	53.5
	Annual Grass Subtotal			6.0	53.5
		GRSQ	*Grindelia squarrosa*	8.0	71.4
	Perennial Forb Subtotal			8.0	71.4
		PLJA	*Pleuraphis jamesii*	1.7	14.7
		SPAI	*Sporobolus airoides*	6.0	53.5
	Perennial Grass Subtotal			7.7	68.3
		ATOB	*Atriplex obovata*	6.0	53.5
	Shrub Subtotal			6.0	53.5
RAS-074 Total				27.7	246.7
		ERBE	*Erigeron bellidiastrum*	0.3	2.2
		PLPA2	*Plantago patagonica*	5.0	44.6
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			5.5	49.1
		HOPU	*Hordeum pusillum*	0.3	2.2
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.5	4.5
		SPAI	*Sporobolus airoides*	24.0	214.1
	Perennial Grass Subtotal			24.0	214.1

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		ATOB	*Atriplex obovata*	21.0	187.4
	Shrub Subtotal			21.0	187.4
RAS-075 Total				51.0	455.0
		ERGO	*Eriogonum gordonii*	0.3	2.2
		HAGL	*Halogeton glomeratus*	2.5	22.3
		SATR12	*Salsola tragus*	2.0	17.8
	Annual Forb Subtotal			4.8	42.4
		HOPU	*Hordeum pusillum*	20.0	178.4
	Annual Grass Subtotal			20.0	178.4
		OTHER	*Aster sp.*	0.3	2.2
	Forb Subtotal			0.3	2.2
		GRSQ	*Grindelia squarrosa*	3.0	26.8
	Perennial Forb Subtotal			3.0	26.8
		PLJA	*Pleuraphis jamesii*	0.8	7.2
		SPAI	*Sporobolus airoides*	3.9	35.0
	Perennial Grass Subtotal			4.7	42.2
		ATOB	*Atriplex obovata*	1.0	8.9
	Shrub Subtotal			1.0	8.9
RAS-076 Total				33.7	300.9
		BRTE	*Bromus tectorum*	0.3	2.2
		HOPU	*Hordeum pusillum*	11.0	98.1
	Annual Grass Subtotal			11.3	100.4
		SPAI	*Sporobolus airoides*	2.1	18.3
	Perennial Grass Subtotal			2.1	18.3
RAS-077 Total				13.3	118.7
		HOPU	*Hordeum pusillum*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	1.0	8.9
	Perennial Grass Subtotal			1.3	11.2
		ATOB	*Atriplex obovata*	9.7	86.5
	Shrub Subtotal			9.7	86.5
RAS-078 Total				11.2	99.9
		HOPU	*Hordeum pusillum*	8.0	71.4
	Annual Grass Subtotal			8.0	71.4
		GRSQ	*Grindelia squarrosa*	3.0	26.8
	Perennial Forb Subtotal			3.0	26.8
		SPAI	*Sporobolus airoides*	22.0	196.3
	Perennial Grass Subtotal			22.0	196.3
		ATOB	*Atriplex obovata*	0.3	2.2
	Shrub Subtotal			0.3	2.2
RAS-079 Total				33.3	296.6

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		DEPI	*Descurainia pinnata*	0.3	2.2
		PLPA2	*Plantago patagonica*	8.8	78.5
	Annual Forb Subtotal			9.1	80.7
		HOPU	*Hordeum pusillum*	2.0	17.8
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			2.3	20.1
		OTHER	*Aster sp.*	0.3	2.2
	Forb Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	19.5	174.0
	Perennial Grass Subtotal			19.8	176.2
RAS-080 Total				31.3	279.3

Attachment F-6. Reference Alkali Wash Production Summary

LifeForm	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Bouteloua barbata	1.2	10.4
	Bromus tectorum	0.3	2.2
	Hordeum pusillum	0.7	6.3
	Monroa squarrosa	1.7	14.7
	Vulpia octoflora	0.3	2.2
Annual Grass Subtotal		4.0	35.9
	Atriplex powellii	11.8	105.6
	Cryptantha crassisepala	0.4	3.5
	Descurainia pinnata	0.3	2.8
	Dimorphocarpa wislizenii	0.3	2.2
	Eriogonum gordonii	0.8	7.3
	Halogeton glomeratus	8.5	75.4
	Ipomopsis pumila	0.3	2.6
	Lappula occidentalis	0.3	2.3
	Machaeranthera canescens	1.0	8.7
	Phacelia crenulata	0.3	2.2
	Plantago patagonica	2.6	23.2
	Salsola tragus	2.8	25.1
	Stenogonum salsuginosum	5.0	44.6
	Townsendia annua	0.4	3.6
Annual Forb Subtotal		34.6	309.1
	Chenopodium sp.	0.3	2.7
Forb Subtotal		0.3	2.7
	Chamaesaracha coronopus	0.5	4.5
	Chamaesyce fendleri	0.3	2.2
	Grindelia squarrosa	8.3	74.1
	Sphaeralcea coccinea	1.1	10.1
	Sphaeralcea parvifolia	1.4	12.8
Perennial Forb Subtotal		11.6	103.7
	Achnatherum hymenoides	0.3	2.2
	Hordeum jubatum	0.3	2.2
	Pascopyrum smithii	0.3	2.2
	Pleuraphis jamesii	1.0	8.7
	Sporobolus airoides	1.6	13.9
	Sporobolus contractus	0.5	4.0
	Sporobolus cryptandrus	1.1	9.4
Perennial Grass Subtotal		4.8	42.8
	Atriplex canescens	1.8	16.1
	Atriplex confertifolia	0.3	2.2

LifeForm	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Atriplex gardneri	6.7	59.9
	Atriplex obovata	9.1	81.3
	Gutierrezia sarothrae	5.0	44.6
Shrub Subtotal		22.9	204.1
	Unknown	0.2	2.1
Unknown Subtotal		0.2	2.1

	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)	Standard Deviation of lbs/acre
Reference Alkali Wash Total	**78.5**	**700.4**	**51.3**

Attachment F-6a. Reference Alkali Wash Production by Transect.

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	3.1	27.7
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	11.6	103.5
		SATR12	*Salsola tragus*	3.0	26.8
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			18.5	164.6
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
RAW-001 Total				18.7	166.8
		ATPO2	*Atriplex powellii*	45.0	401.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
	Annual Forb Subtotal			45.5	405.9
		ATOB	*Atriplex obovata*	39.0	347.9
	Shrub Subtotal			39.0	347.9
RAW-002 Total				84.5	753.9
		PLPA2	*Plantago patagonica*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		SPCR	*Sporobolus cryptandrus*	0.7	6.2
	Perennial Grass Subtotal			0.7	6.2
		ATOB	*Atriplex obovata*	0.5	4.5
	Shrub Subtotal			0.5	4.5
RAW-003 Total				1.7	15.2
		HOPU	*Hordeum pusillum*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		GRSQ	*Grindelia squarrosa*	14.0	124.9
	Perennial Forb Subtotal			14.0	124.9
		PASM	*Pascopyrum smithii*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	0.5	4.5
	Perennial Grass Subtotal			1.0	8.9
RAW-004 Total				15.3	136.1
		BRTE	*Bromus tectorum*	0.3	2.2
		MOSQ	*Monroa squarrosa*	0.8	7.1
	Annual Grass Subtotal			1.1	9.4
		DEPI	*Descurainia pinnata*	0.5	4.5
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.7	6.2
		SATR12	*Salsola tragus*	1.4	12.5

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			3.1	27.7
		SPAI	*Sporobolus airoides*	2.2	19.3
	Perennial Grass Subtotal			2.2	19.3
		Unk 4		0.2	2.1
	Unknown Subtotal			0.2	2.1
RAW-005 Total				6.6	58.4
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			1.0	8.9
		ATOB	*Atriplex obovata*	4.3	38.4
	Shrub Subtotal			4.3	38.4
RAW-006 Total				5.3	47.3
		ATPO2	*Atriplex powellii*	2.0	17.8
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		HAGL	*Halogeton glomeratus*	0.9	8.0
		LAOC3	*Lappula occidentalis*	0.3	2.2
		SATR12	*Salsola tragus*	0.9	8.0
	Annual Forb Subtotal			4.6	40.6
		ATOB	*Atriplex obovata*	3.0	26.8
	Shrub Subtotal			3.0	26.8
RAW-007 Total				7.6	67.4
		ATPO2	*Atriplex powellii*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		SATR12	*Salsola tragus*	1.9	17.0
	Annual Forb Subtotal			2.9	25.9
		ATGA	*Atriplex gardneri*	0.2	1.8
	Shrub Subtotal			0.2	1.8
RAW-008 Total				3.1	27.7
		ERGO	*Eriogonum gordonii*	1.0	8.9
		HAGL	*Halogeton glomeratus*	0.2	1.8
		IPPU4	*Ipomopsis pumila*	0.5	4.5
		SATR12	*Salsola tragus*	1.9	17.0
	Annual Forb Subtotal			3.6	32.1
RAW-009 Total				3.6	32.1
		PLPA2	*Plantago patagonica*	6.0	53.5
		TOAN	*Townsendia annua*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Forb Subtotal			6.3	55.8
		SPCR	*Sporobolus cryptandrus*	1.4	12.7
	Perennial Grass Subtotal			1.4	12.7
RAW-010 Total				7.7	68.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	2.0	17.8
	Annual Forb Subtotal			2.3	20.1
RAW-011 Total				2.3	20.1
		DEPI	*Descurainia pinnata*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		TOAN	*Townsendia annua*	2.0	17.8
	Annual Forb Subtotal			2.5	22.3
RAW-012 Total				2.5	22.3
		HAGL	*Halogeton glomeratus*	0.7	6.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			1.0	8.5
		ATOB	*Atriplex obovata*	0.6	5.4
	Shrub Subtotal			0.6	5.4
RAW-013 Total				1.6	13.8
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		HAGL	*Halogeton glomeratus*	7.0	62.5
		IPPU4	*Ipomopsis pumila*	0.3	2.2
	Annual Forb Subtotal			7.8	69.1
RAW-014 Total				7.8	69.1
		DEPI	*Descurainia pinnata*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		ATOB	*Atriplex obovata*	14.7	131.2
	Shrub Subtotal			14.7	131.2
RAW-015 Total				15.2	135.6
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
RAW-016 Total				0.0	0.0
		HOPU	*Hordeum pusillum*	1.0	8.5
	Annual Grass Subtotal			1.0	8.5
		DEPI	*Descurainia pinnata*	0.2	1.8
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	6.6	58.9
		TOAN	*Townsendia annua*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Forb Subtotal			7.3	65.1
		SPCOC	*Sphaeralcea coccinea*	0.3	2.7
	Perennial Forb Subtotal			0.3	2.7
		PLJA	*Pleuraphis jamesii*	1.1	9.4
		SPAI	*Sporobolus airoides*	1.7	14.7
	Perennial Grass Subtotal			2.7	24.1
		ATGA	*Atriplex gardneri*	19.7	175.8
	Shrub Subtotal			19.7	175.8
RAW-017 Total				31.0	276.1
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		PLPA2	*Plantago patagonica*	3.0	26.8
		SATR12	*Salsola tragus*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			3.8	33.5
		HOJU	*Hordeum jubatum*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
RAW-018 Total				4.0	35.7
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	0.8	7.1
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			1.8	16.1
		ATOB	*Atriplex obovata*	12.0	107.1
	Shrub Subtotal			12.0	107.1
RAW-019 Total				13.8	123.1
		BOBA2	*Bouteloua barbata*	0.3	2.2
		MOSQ	*Monroa squarrosa*	3.9	34.8
	Annual Grass Subtotal			4.2	37.0
		CRCR3	*Cryptantha crassisepala*	0.8	7.1
		DEPI	*Descurainia pinnata*	0.3	2.2
		PLPA2	*Plantago patagonica*	1.7	15.2
		SATR12	*Salsola tragus*	7.4	66.0
		TOAN	*Townsendia annua*	1.0	8.9
	Annual Forb Subtotal			11.2	99.5
		PLJA	*Pleuraphis jamesii*	0.6	5.4
		SPAI	*Sporobolus airoides*	1.2	10.4
	Perennial Grass Subtotal			1.8	15.8
		ATOB	*Atriplex obovata*	11.8	105.3
	Shrub Subtotal			11.8	105.3
RAW-020 Total				28.9	257.6
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	4.0	35.7

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		SATR12	*Salsola tragus*	2.0	17.8
		STSA3	*Stenogonum salsuginosum*	5.0	44.6
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			11.5	102.6
		SPCOC	*Sphaeralcea coccinea*	0.9	8.0
		SPPA2	*Sphaeralcea parvifolia*	1.4	12.8
	Perennial Forb Subtotal			2.3	20.9
RAW-021 Total				13.8	123.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		HAGL	*Halogeton glomeratus*	33.0	294.4
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		MACA2	*Machaeranthera canescens*	0.3	2.2
		SATR12	*Salsola tragus*	0.8	7.1
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			35.3	314.9
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.8	6.7
RAW-022 Total				36.1	321.6
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.4	3.6
		MACA2	*Machaeranthera canescens*	2.3	20.5
		PLPA2	*Plantago patagonica*	2.4	21.4
		SATR12	*Salsola tragus*	6.5	58.0
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			12.3	110.1
		SPCOC	*Sphaeralcea coccinea*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
RAW-023 Total				12.6	112.4
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		TOAN	*Townsendia annua*	1.0	8.9
	Annual Forb Subtotal			2.0	17.8
		ATOB	*Atriplex obovata*	4.3	38.4
	Shrub Subtotal			4.3	38.4

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
RAW-024 Total				6.3	56.2
		HOPU	*Hordeum pusillum*	1.4	12.3
	Annual Grass Subtotal			1.4	12.3
		GRSQ	*Grindelia squarrosa*	2.6	23.2
	Perennial Forb Subtotal			2.6	23.2
		PLJA	*Pleuraphis jamesii*	0.3	2.4
		SPAI	*Sporobolus airoides*	0.6	5.7
	Perennial Grass Subtotal			0.9	8.1
RAW-025 Total				4.9	43.6
		SATR12	*Salsola tragus*	7.0	62.5
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			7.3	64.7
		ATOB	*Atriplex obovata*	8.0	71.4
	Shrub Subtotal			8.0	71.4
RAW-026 Total				15.3	136.1
		DEPI	*Descurainia pinnata*	0.0	0.0
		HAGL	*Halogeton glomeratus*	9.0	80.3
		LAOC3	*Lappula occidentalis*	0.3	2.2
		SATR12	*Salsola tragus*	2.0	17.8
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			11.5	102.6
		CHENO	*Chenopodium sp.*	0.3	2.7
	forb Subtotal			0.3	2.7
RAW-027 Total				11.8	105.3
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	1.0	8.9
	Annual Forb Subtotal			1.8	15.6
		SPAI	*Sporobolus airoides*	0.5	4.5
	Perennial Grass Subtotal			0.5	4.5
		ATCA2	*Atriplex canescens*	1.8	16.1
	Shrub Subtotal			1.8	16.1
RAW-028 Total				4.1	36.1
		HOPU	*Hordeum pusillum*	0.3	2.2
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.5	4.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		PLJA	*Pleuraphis jamesii*	0.6	5.7
		SPAI	*Sporobolus airoides*	6.6	58.9

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Perennial Grass Subtotal			7.2	64.6
RAW-029 Total				8.2	73.5
		HAGL	*Halogeton glomeratus*	3.0	26.8
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			3.8	33.5
RAW-030 Total				3.8	33.5
		BRTE	*Bromus tectorum*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	32.0	285.5
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	13.0	116.0
	Annual Forb Subtotal			46.0	410.4
		PLJA	*Pleuraphis jamesii*	3.8	33.5
	Perennial Grass Subtotal			3.8	33.5
RAW-031 Total				50.0	446.1
		MOSQ	*Monroa squarrosa*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	1.0	8.9
		LAOC3	*Lappula occidentalis*	0.3	2.2
		MACA2	*Machaeranthera canescens*	0.4	3.4
		PHCR	*Phacelia crenulata*	0.3	2.2
		PLPA2	*Plantago patagonica*	1.3	11.6
		SATR12	*Salsola tragus*	2.8	25.0
	Annual Forb Subtotal			6.2	55.6
		CHENO	*Chenopodium sp.*	0.3	2.7
	forb Subtotal			0.3	2.7
		SPAI	*Sporobolus airoides*	0.2	1.6
		SPCR	*Sporobolus cryptandrus*	1.0	9.3
	Perennial Grass Subtotal			1.2	10.9
RAW-032 Total				8.0	71.4
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	8.0	71.4
		PLPA2	*Plantago patagonica*	0.3	2.2
	Annual Forb Subtotal			8.5	75.8
		CHFE3	*Chamaesyce fendleri*	0.3	2.2
		SPCOC	*Sphaeralcea coccinea*	0.8	7.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Perennial Forb Subtotal			1.1	9.5
		SPCO4	*Sporobolus contractus*	0.5	4.0
	Perennial Grass Subtotal			0.5	4.0
RAW-033 Total				10.0	89.3
		ATPO2	*Atriplex powellii*	10.5	93.7
		DEPI	*Descurainia pinnata*	1.0	8.9
		ERGO	*Eriogonum gordonii*	3.5	31.2
	Annual Forb Subtotal			15.0	133.8
RAW-034 Total				15.0	133.8
		DIWI2	*Dimorphocarpa wislizenii*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			0.8	6.7
		ATCO	*Atriplex confertifolia*	0.3	2.2
		GUSA2	*Gutierrezia sarothrae*	5.0	44.6
	Shrub Subtotal			5.3	46.8
RAW-035 Total				6.0	53.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			1.3	11.2
RAW-036 Total				1.3	11.2
		ATPO2	*Atriplex powellii*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	6.0	53.5
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			6.8	60.2
RAW-037 Total				6.8	60.2
		ATPO2	*Atriplex powellii*	13.0	116.0
		ERGO	*Eriogonum gordonii*	0.3	2.2
		HAGL	*Halogeton glomeratus*	5.0	44.6
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			18.5	165.1
		SPAI	*Sporobolus airoides*	3.4	30.5
	Perennial Grass Subtotal			3.4	30.5
		ATGA	*Atriplex gardneri*	0.3	2.2
	Shrub Subtotal			0.3	2.2
RAW-038 Total				22.2	197.8

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		ATOB	*Atriplex obovata*	2.0	17.8
	Shrub Subtotal			2.0	17.8
RAW-039 Total				2.0	17.8
		BOBA2	*Bouteloua barbata*	2.1	18.6
	Annual Grass Subtotal			2.1	18.6
		PLPA2	*Plantago patagonica*	7.5	66.9
	Annual Forb Subtotal			7.5	66.9
		CHCO2	*Chamaesaracha coronopus*	0.5	4.5
		SPCOC	*Sphaeralcea coccinea*	3.4	30.5
	Perennial Forb Subtotal			3.9	35.0
		SPAI	*Sporobolus airoides*	1.4	12.8
	Perennial Grass Subtotal			1.4	12.8
RAW-040 Total				15.0	133.4

Attachment F-7. Reference Sands Production Summary

Life Form	Scientific Name	Air Dry Weight (g/m^2)	Air Dry Weight (lbs/acre)
Annual Grass	*Bromus tectorum*	0.3	2.2
	Monroa squarrosa	0.2	1.8
	Vulpia octoflora	0.3	2.2
Annual Grass Subtotal		0.7	6.2
Annual Forb	*Ambrosia acanthicarpa*	0.3	2.5
	Chaenactis stevioides	0.1	0.6
	Cryptantha crassisepala	0.3	2.9
	Descurainia pinnata	0.5	4.0
	Dimorphocarpa wislizenii	1.4	12.9
	Halogeton glomeratus	7.5	66.9
	Ipomopsis polycladon	0.3	2.2
	Lappula occidentalis	0.3	2.2
	Machaeranthera canescens	0.3	2.2
	Malacothrix sonchoides	0.3	2.2
	Mentzelia albicaulis	0.9	7.7
	Phacelia crenulata	0.8	7.3
	Plantago patagonica	2.6	22.9
	Salsola tragus	7.4	66.0
	Stenogonum salsuginosum	0.3	2.2
	Townsendia annua	0.4	3.9
Annual Forb Subtotal		23.4	208.6
Perennial Forb	*Abronia fragrans*	1.0	8.5
	Chamaesyce fendleri	0.3	2.2
	Linum aristatum	0.3	2.2
	Lygodesmia grandiflora	0.3	2.2
	Mentzelia pumila	0.3	2.2
	Sphaeralcea coccinea	0.5	4.5
	Sphaeralcea parvifolia	0.3	2.2
	Stephanomeria exigua	0.5	4.5
Perennial Forb Subtotal		3.2	28.7
Perennial Grass	*Achnatherum hymenoides*	0.6	5.6
	Pleuraphis jamesii	2.9	26.2
	Sporobolus airoides	4.9	44.1
	Sporobolus cryptandrus	0.5	4.2
Perennial Grass Subtotal		9.0	80.0
Shrub	*Atriplex confertifolia*	13.9	123.7
	Atriplex gardneri	5.6	49.8
	Atriplex obovata	4.1	36.7
	Gutierrezia sarothrae	12.5	111.9
Shrub Subtotal		36.1	322.1

	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)	Standard Deviation of lbs/acre
Reference Sands Total	**72.4**	**645.6**	**52.6**

Attachment F-7a. Reference Sands Production by Transect.

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		SATR12	*Salsola tragus*	13.0	116.0
	Annual Forb Subtotal			13.8	122.7
		ACHY	*Achnatherum hymenoides*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
RSA-081 Total				14.0	124.9
		DEPI	*Descurainia pinnata*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	3.0	26.8
	Annual Forb Subtotal			3.8	33.5
		PLJA	*Pleuraphis jamesii*	6.4	57.4
	Perennial Grass Subtotal			6.4	57.4
		ATCO	*Atriplex confertifolia*	15.0	133.8
		GUSA2	*Gutierrezia sarothrae*	25.0	223.0
	Shrub Subtotal			40.0	356.9
RSA-082 Total				50.2	447.7
		AMAC2	*Ambrosia acanthicarpa*	0.3	2.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PHCR	*Phacelia crenulata*	2.0	17.8
	Annual Forb Subtotal			2.5	22.3
		MEPU3	*Mentzelia pumila*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
		GUSA2	*Gutierrezia sarothrae*	33.0	294.4
	Shrub Subtotal			33.0	294.4
RSA-083 Total				36.0	321.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	4.3	38.4
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			5.1	45.1
		SPCOC	*Sphaeralcea coccinea*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	11.2	99.9
	Perennial Grass Subtotal			11.2	99.9
RSA-084 Total				16.5	147.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		DIWI2	*Dimorphocarpa wislizenii*	2.4	21.4
		PLPA2	*Plantago patagonica*	0.3	2.2
	Annual Forb Subtotal			2.7	23.6
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		ABFR2	*Abronia fragrans*	2.0	17.5
		CHFE3	*Chamaesyce fendleri*	0.3	2.2
	Perennial Forb Subtotal			2.2	19.7
		PLJA	*Pleuraphis jamesii*	1.4	12.1
		SPAI	*Sporobolus airoides*	7.3	65.1
		SPCR	*Sporobolus cryptandrus*	1.7	15.3
	Perennial Grass Subtotal			10.4	92.5
		GUSA2	*Gutierrezia sarothrae*	0.3	2.2
	Shrub Subtotal			0.3	2.2
RSA-085 Total				15.7	140.3
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		MASO	*Malacothrix sonchoides*	0.3	2.2
		PLPA2	*Plantago patagonica*	4.0	35.7
	Annual Forb Subtotal			4.8	42.4
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	4.2	37.2
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			4.7	41.6
		GUSA2	*Gutierrezia sarothrae*	0.3	2.2
	Shrub Subtotal			0.3	2.2
RSA-086 Total				9.7	86.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		IPPO2	*Ipomopsis polycladon*	0.3	2.2
		MACA2	*Machaeranthera canescens*	0.3	2.2
		MEAL6	*Mentzelia albicaulis*	2.5	22.7
		SATR12	*Salsola tragus*	35.0	312.3
	Annual Forb Subtotal			38.3	341.7
		ATGA	*Atriplex gardneri*	5.6	49.8
	Shrub Subtotal			5.6	49.8
RSA-087 Total				43.9	391.5
		SATR12	*Salsola tragus*	9.0	80.3
	Annual Forb Subtotal			9.0	80.3
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		SPCOC	*Sphaeralcea coccinea*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	4.0	35.3

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		SPAI	*Sporobolus airoides*	2.0	17.8
	Perennial Grass Subtotal			6.2	55.4
		GUSA2	*Gutierrezia sarothrae*	0.3	2.2
	Shrub Subtotal			0.3	2.2
RSA-088 Total				16.0	142.4
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		MEAL6	*Mentzelia albicaulis*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		PLPA2	*Plantago patagonica*	6.8	60.7
		SATR12	*Salsola tragus*	4.3	37.9
		STSA3	*Stenogonum salsuginosum*	0.3	2.2
		TOAN	*Townsendia annua*	0.2	1.8
	Annual Forb Subtotal			12.5	111.5
		LYGR	*Lygodesmia grandiflora*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	1.0	8.9
	Perennial Grass Subtotal			1.0	8.9
		ATOB	*Atriplex obovata*	7.0	62.5
	Shrub Subtotal			7.0	62.5
RSA-089 Total				20.8	185.1
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PLPA2	*Plantago patagonica*	6.0	53.5
		SATR12	*Salsola tragus*	7.0	62.5
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			13.5	120.4
		ATOB	*Atriplex obovata*	6.4	57.1
	Shrub Subtotal			6.4	57.1
RSA-090 Total				19.9	177.5
	Annual Forb Subtotal			#REF!	#REF!
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	25.0	223.0
	Perennial Grass Subtotal			25.3	225.3
		GUSA2	*Gutierrezia sarothrae*	7.2	64.2
	Shrub Subtotal			7.2	64.2
RSA-091 Total				32.5	289.5
		DIWI2	*Dimorphocarpa wislizenii*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		GUSA2	*Gutierrezia sarothrae*	40.6	362.2
	Shrub Subtotal			40.6	362.2
RSA-092 Total				41.1	366.7
		LAOC3	*Lappula occidentalis*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		PLPA2	*Plantago patagonica*	8.0	71.4
		SATR12	*Salsola tragus*	3.7	33.0
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			12.2	108.8
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
RSA-093 Total				12.7	113.3
		DEPI	*Descurainia pinnata*	1.7	15.2
		PHCR	*Phacelia crenulata*	0.7	6.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	5.0	44.6
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			7.9	70.5
		SPCOC	*Sphaeralcea coccinea*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	1.0	8.7
	Perennial Grass Subtotal			1.2	11.0
		ATCO	*Atriplex confertifolia*	22.0	196.3
	Shrub Subtotal			22.0	196.3
RSA-095 Total				31.4	280.0
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DIWI2	*Dimorphocarpa wislizenii*	2.5	22.3
		PHCR	*Phacelia crenulata*	1.0	8.9
	Annual Forb Subtotal			3.8	33.5
		PLJA	*Pleuraphis jamesii*	0.9	7.9
		SPAI	*Sporobolus airoides*	4.9	43.7
	Perennial Grass Subtotal			5.8	51.7
		ATCO	*Atriplex confertifolia*	7.0	62.5
		GUSA2	*Gutierrezia sarothrae*	11.6	103.5
	Shrub Subtotal			18.6	165.9
RSA-096 Total				28.1	251.1
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	12.0	107.1
	Annual Forb Subtotal			12.8	113.8
		SPCOC	*Sphaeralcea coccinea*	1.3	11.6
	Perennial Forb Subtotal			1.3	11.6
		SPAI	*Sporobolus airoides*	10.0	89.2
	Perennial Grass Subtotal			10.0	89.2
RSA-097 Total				24.1	214.6

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	3.0	26.8
		SATR12	*Salsola tragus*	7.4	66.0
	Annual Forb Subtotal			10.7	95.0
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
RSA-098 Total				10.9	97.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PLPA2	*Plantago patagonica*	1.0	8.9
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			1.5	13.4
		SPCOC	*Sphaeralcea coccinea*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	0.3	2.2
		SPCR	*Sporobolus cryptandrus*	0.3	2.2
	Perennial Grass Subtotal			0.5	4.5
		ATOB	*Atriplex obovata*	5.1	45.5
		GUSA2	*Gutierrezia sarothrae*	1.3	11.6
	Shrub Subtotal			6.4	57.1
RSA-099 Total				8.7	77.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		PHCR	*Phacelia crenulata*	1.0	8.9
		PLPA2	*Plantago patagonica*	6.9	61.6
		SATR12	*Salsola tragus*	5.8	51.7
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			14.5	128.9
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		STEX	*Stephanomeria exigua*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	2.1	18.7
		SPAI	*Sporobolus airoides*	1.7	15.3
	Perennial Grass Subtotal			3.8	34.0
		ATCO	*Atriplex confertifolia*	2.5	22.3
	Shrub Subtotal			2.5	22.3
RSA-100 Total				21.3	189.7
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	1.0	8.9
		SATR12	*Salsola tragus*	4.0	35.7
		TOAN	*Townsendia annua*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Forb Subtotal			6.0	53.5
		SPAI	*Sporobolus airoides*	8.0	71.4
	Perennial Grass Subtotal			8.0	71.4
RSA-101 Total				14.0	124.9
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	4.7	41.9
	Annual Forb Subtotal			5.5	48.6
		BRTE	*Bromus tectorum*	0.3	2.2
		MOSQ	*Monroa squarrosa*	0.2	1.8
	Annual Grass Subtotal			0.5	4.0
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		SPAI	*Sporobolus airoides*	2.1	18.5
		SPCR	*Sporobolus cryptandrus*	0.3	2.2
	Perennial Grass Subtotal			2.6	22.9
RSA-102 Total				8.5	75.6
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.6	5.4
	Annual Forb Subtotal			0.9	7.6
		ACHY	*Achnatherum hymenoides*	1.7	15.2
		PLJA	*Pleuraphis jamesii*	1.0	9.3
		SPCR	*Sporobolus cryptandrus*	0.5	4.5
	Perennial Grass Subtotal			3.2	28.9
		GUSA2	*Gutierrezia sarothrae*	14.0	124.9
	Shrub Subtotal			14.0	124.9
RSA-103 Total				18.1	161.4
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	7.0	62.5
		SATR12	*Salsola tragus*	3.7	33.0
	Annual Forb Subtotal			11.2	99.9
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	3.0	26.8
	Perennial Grass Subtotal			3.3	29.0
RSA-104 Total				14.7	131.2
		AMAC2	*Ambrosia acanthicarpa*	0.3	2.7
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
	Annual Forb Subtotal			0.8	7.1
		LYGR	*Lygodesmia grandiflora*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Perennial Forb Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	3.5	31.3
		SPAI	*Sporobolus airoides*	4.1	36.9
	Perennial Grass Subtotal			7.7	68.3
		GUSA2	*Gutierrezia sarothrae*	17.0	151.7
	Shrub Subtotal			17.0	151.7
RSA-105 Total				25.7	229.3
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		PLPA2	*Plantago patagonica*	3.0	26.8
	Annual Forb Subtotal			3.5	31.2
		SPAI	*Sporobolus airoides*	6.5	58.1
		SPCR	*Sporobolus cryptandrus*	0.3	2.2
	Perennial Grass Subtotal			6.8	60.3
RSA-106 Total				10.3	91.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	10.0	89.2
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			10.5	93.7
		SPAI	*Sporobolus airoides*	1.3	11.6
	Perennial Grass Subtotal			1.3	11.6
RSA-107 Total				11.8	105.3
		PHCR	*Phacelia crenulata*	0.3	2.2
	Annual Forb Subtotal			0.3	2.2
		ABFR2	*Abronia fragrans*	0.6	5.4
	Perennial Forb Subtotal			0.6	5.4
		PLJA	*Pleuraphis jamesii*	3.7	33.0
		SPAI	*Sporobolus airoides*	4.3	38.4
		SPCR	*Sporobolus cryptandrus*	0.3	2.2
	Perennial Grass Subtotal			8.3	73.6
		ATCO	*Atriplex confertifolia*	0.7	6.2
		GUSA2	*Gutierrezia sarothrae*	3.0	26.8
	Shrub Subtotal			3.7	33.0
RSA-108 Total				12.8	114.2
		CRCR3	*Cryptantha crassisepala*	2.0	17.8
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PHCR	*Phacelia crenulata*	1.6	14.0
		PLPA2	*Plantago patagonica*	2.6	23.2
	Annual Forb Subtotal			6.4	57.3
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		ABFR2	*Abronia fragrans*	1.9	17.0
		SPPA2	*Sphaeralcea parvifolia*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		STEX	*Stephanomeria exigua*	0.3	2.2
	Perennial Forb Subtotal			2.4	21.4
		ACHY	*Achnatherum hymenoides*	2.2	19.3
		PLJA	*Pleuraphis jamesii*	2.3	20.7
		SPAI	*Sporobolus airoides*	8.0	70.9
	Perennial Grass Subtotal			12.4	110.9
		GUSA2	*Gutierrezia sarothrae*	0.7	6.2
	Shrub Subtotal			0.7	6.2
RSA-109 Total				22.2	198.1
		PHCR	*Phacelia crenulata*	1.0	8.9
		SATR12	*Salsola tragus*	6.0	53.5
	Annual Forb Subtotal			7.0	62.5
		ABFR2	*Abronia fragrans*	0.3	2.2
		LIAR3	*Linum aristatum*	0.3	2.2
		MEPU3	*Mentzelia pumila*	0.3	2.2
		SPCOC	*Sphaeralcea coccinea*	0.3	2.2
	Perennial Forb Subtotal			1.0	8.9
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
		GUSA2	*Gutierrezia sarothrae*	11.0	98.1
	Shrub Subtotal			11.0	98.1
RSA-110 Total				19.3	171.7
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PHCR	*Phacelia crenulata*	1.0	8.9
		PLPA2	*Plantago patagonica*	0.3	2.2
	Annual Forb Subtotal			1.5	13.4
		SPCOC	*Sphaeralcea coccinea*	1.0	8.9
	Perennial Forb Subtotal			1.0	8.9
		PLJA	*Pleuraphis jamesii*	7.0	62.5
	Perennial Grass Subtotal			7.0	62.5
		GUSA2	*Gutierrezia sarothrae*	11.0	98.1
	Shrub Subtotal			11.0	98.1
RSA-111 Total				20.5	182.9
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		MASO	*Malacothrix sonchoides*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	17.0	151.7
	Annual Forb Subtotal			18.3	162.8
		SPAI	*Sporobolus airoides*	2.3	20.5
	Perennial Grass Subtotal			2.3	20.5
		ATOB	*Atriplex obovata*	3.3	29.4
	Shrub Subtotal			3.3	29.4

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
RSA-112 Total				23.9	212.8
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
	Annual Forb Subtotal			0.8	6.7
		MEPU3	*Mentzelia pumila*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	0.4	3.1
	Perennial Grass Subtotal			0.4	3.1
		ATCO	*Atriplex confertifolia*	36.0	321.2
		GUSA2	*Gutierrezia sarothrae*	19.0	169.5
	Shrub Subtotal			55.0	490.7
RSA-113 Total				56.4	502.7
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	5.0	44.6
		MEAL6	*Mentzelia albicaulis*	0.3	2.2
		SATR12	*Salsola tragus*	9.1	81.2
	Annual Forb Subtotal			14.6	130.3
		ATOB	*Atriplex obovata*	2.6	23.2
	Shrub Subtotal			2.6	23.2
RSA-114 Total				17.2	153.5
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		MEAL6	*Mentzelia albicaulis*	1.0	8.9
		PHCR	*Phacelia crenulata*	0.3	2.2
		SATR12	*Salsola tragus*	8.0	71.4
	Annual Forb Subtotal			9.5	84.8
		SPAI	*Sporobolus airoides*	11.3	100.8
	Perennial Grass Subtotal			11.3	100.8
RSA-115 Total				20.8	185.6
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.8	7.1
		PLPA2	*Plantago patagonica*	2.7	24.1
		SATR12	*Salsola tragus*	7.5	66.9
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			11.8	104.8
		PLJA	*Pleuraphis jamesii*	0.2	1.8
		SPAI	*Sporobolus airoides*	2.5	22.0
	Perennial Grass Subtotal			2.7	23.8
RSA-116 Total				14.4	128.7
		PHCR	*Phacelia crenulata*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		SATR12	*Salsola tragus*	0.3	2.2
		TOAN	*Townsendia annua*	2.0	17.8
	Annual Forb Subtotal			2.8	24.5
		SPAI	*Sporobolus airoides*	2.1	18.7
	Perennial Grass Subtotal			2.1	18.7
		ATOB	*Atriplex obovata*	0.3	2.2
	Shrub Subtotal			0.3	2.2
RSA-117 Total				5.1	45.5
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	2.0	17.8
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PLPA2	*Plantago patagonica*	4.5	40.1
		SATR12	*Salsola tragus*	7.3	65.1
	Annual Forb Subtotal			14.3	127.6
		PLJA	*Pleuraphis jamesii*	5.5	49.1
	Perennial Grass Subtotal			5.5	49.1
RSA-118 Total				19.8	176.7
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		PLJA	*Pleuraphis jamesii*	7.5	66.9
		SPAI	*Sporobolus airoides*	2.0	17.8
	Perennial Grass Subtotal			9.5	84.8
RSA-119 Total				10.0	89.2
		CHST	*Chaenactis stevioides*	0.1	0.6
		DIWI2	*Dimorphocarpa wislizenii*	0.1	0.6
		DIWI2	*Dimorphocarpa wislizenii*	2.0	17.8
		MEAL6	*Mentzelia albicaulis*	0.3	2.2
		PHCR	*Phacelia crenulata*	1.4	12.5
	Annual Forb Subtotal			3.8	33.7
		ABFR2	*Abronia fragrans*	0.1	0.6
		STEX	*Stephanomeria exigua*	1.0	8.9
	Perennial Forb Subtotal			1.1	9.5
		PLJA	*Pleuraphis jamesii*	1.6	14.5
		SPCR	*Sporobolus cryptandrus*	0.1	0.6
	Perennial Grass Subtotal			1.7	15.0
		GUSA2	*Gutierrezia sarothrae*	18.0	160.6
	Shrub Subtotal			18.0	160.6
RSA-120 Total				24.5	218.8

Attachment F-8. Sands Production Summary

Life Form	Scientific Name	Air Dry Weight (g/m^2)	Air Dry Weight (lbs/acre)
	Bromus tectorum	0.3	2.2
	Vulpia octoflora	0.3	2.2
Annual Grass Subtotal		0.5	4.5
	Ambrosia acanthicarpa	1.3	11.5
	Atriplex powellii	1.2	10.9
	Chaenactis stevioides	0.3	2.2
	Cryptantha crassisepala	2.0	18.3
	Descurainia pinnata	0.9	7.7
	Dimorphocarpa wislizenii	1.5	13.4
	Halogeton glomeratus	1.0	8.9
	Lappula occidentalis	0.3	2.2
	Machaeranthera canescens	2.7	24.2
	Malacothrix sonchoides	0.3	2.2
	Mentzelia albicaulis	1.0	8.6
	Phacelia crenulata	0.9	7.7
	Plantago patagonica	3.6	31.7
	Salsola tragus	9.7	86.7
	Streptanthella longirostris	1.1	10.0
	Townsendia annua	0.5	4.8
Annual Forb Subtotal		28.2	251.3
	Abronia fragrans	1.0	8.7
	Chaetopappa ericoides	2.0	17.8
	Linum aristatum	0.7	5.8
	Sphaeralcea coccinea	0.5	4.7
	Sphaeralcea parvifolia	1.0	8.8
	Stephanomeria exigua	1.0	8.9
Perennial Forb Subtotal		6.1	54.8
	Achnatherum hymenoides	0.8	7.3
	Aristida purpurea	1.7	15.3
	Pleuraphis jamesii	2.6	23.6
	Sporobolus airoides	4.5	40.4
	Sporobolus cryptandrus	0.8	6.8
Perennial Grass Subtotal		10.5	93.4
	Atriplex canescens	0.3	2.2
	Atriplex confertifolia	13.4	119.5
	Atriplex obovata	21.7	193.2
	Gutierrezia sarothrae	4.3	38.5
Shrub Subtotal		39.6	353.3

	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)	Standard Deviation of lbs/acre
Sands Total	**84.9**	**757.2**	**62.5**

Attachment F-8a. Sands Production by Transect.

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	1.2	10.7
		MACA2	*Machaeranthera canescens*	3.5	31.2
		SATR12	*Salsola tragus*	32.0	285.5
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			37.2	331.9
		SPCR	*Sporobolus cryptandrus*	1.8	16.1
	Perennial Grass Subtotal			1.8	16.1
SA-161 Total				39.0	347.9
		DEPI	*Descurainia pinnata*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	6.8	60.7
		SPAI	*Sporobolus airoides*	2.4	21.4
	Perennial Grass Subtotal			9.5	84.3
		ATCO	*Atriplex confertifolia*	1.8	16.1
	Shrub Subtotal			1.8	16.1
SA-162 Total				11.8	104.8
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PHCR	*Phacelia crenulata*	1.0	8.9
	Annual Forb Subtotal			1.3	11.2
		PLJA	*Pleuraphis jamesii*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
		ATCO	*Atriplex confertifolia*	8.0	71.4
	Shrub Subtotal			8.0	71.4
SA-163 Total				9.5	84.8
		DEPI	*Descurainia pinnata*	5.0	44.6
		SATR12	*Salsola tragus*	3.0	26.8
	Annual Forb Subtotal			8.0	71.4
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	6.3	56.2
		SPAI	*Sporobolus airoides*	1.7	15.2
	Perennial Grass Subtotal			8.3	73.6
		ATCO	*Atriplex confertifolia*	6.5	58.0
	Shrub Subtotal			6.5	58.0
SA-164 Total				22.8	203.0
		CRCR3	*Cryptantha crassisepala*	5.0	44.6
		MACA2	*Machaeranthera canescens*	0.9	8.0
		SATR12	*Salsola tragus*	6.8	60.7

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Forb Subtotal			12.7	113.3
		PLJA	*Pleuraphis jamesii*	2.9	25.7
		SPAI	*Sporobolus airoides*	6.3	56.2
	Perennial Grass Subtotal			9.2	81.9
		ATCO	*Atriplex confertifolia*	15.0	133.8
	Shrub Subtotal			15.0	133.8
SA-165 Total				36.9	329.0
		AMAC2	*Ambrosia acanthicarpa*	2.2	19.6
		CRCR3	*Cryptantha crassisepala*	2.6	23.2
		MACA2	*Machaeranthera canescens*	2.7	24.3
		SATR12	*Salsola tragus*	3.9	34.8
	Annual Forb Subtotal			11.4	101.9
		ABFR2	*Abronia fragrans*	1.7	15.3
		SPPA2	*Sphaeralcea parvifolia*	0.4	3.2
	Perennial Forb Subtotal			2.1	18.5
		ACHY	*Achnatherum hymenoides*	2.4	21.2
		ARPU9	*Aristida purpurea*	1.7	15.3
		PLJA	*Pleuraphis jamesii*	1.8	15.7
	Perennial Grass Subtotal			5.9	52.2
SA-166 Total				19.3	172.5
		DEPI	*Descurainia pinnata*	0.5	4.5
		PHCR	*Phacelia crenulata*	1.4	12.5
		SATR12	*Salsola tragus*	2.5	22.3
	Annual Forb Subtotal			4.4	39.3
		SPAI	*Sporobolus airoides*	5.8	51.4
	Perennial Grass Subtotal			5.8	51.4
		ATCO	*Atriplex confertifolia*	20.7	184.7
	Shrub Subtotal			20.7	184.7
SA-167 Total				30.9	275.3
		SATR12	*Salsola tragus*	0.1	0.9
	Annual Forb Subtotal			0.1	0.9
		SPAI	*Sporobolus airoides*	1.8	16.1
	Perennial Grass Subtotal			1.8	16.1
		GUSA2	*Gutierrezia sarothrae*	2.0	17.8
	Shrub Subtotal			2.0	17.8
SA-168 Total				3.9	34.8
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	1.6	14.3
		SATR12	*Salsola tragus*	11.0	98.1
	Annual Forb Subtotal			12.9	114.6
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
		GUSA2	*Gutierrezia sarothrae*	6.8	60.7

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Shrub Subtotal			6.8	60.7
SA-169 Total				19.9	177.5
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	10.0	89.2
	Perennial Grass Subtotal			10.5	93.7
SA-170 Total				10.5	93.7
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.4	3.6
		SATR12	*Salsola tragus*	12.0	107.1
	Annual Forb Subtotal			12.7	112.9
		ABFR2	*Abronia fragrans*	0.3	2.2
		LIAR3	*Linum aristatum*	0.3	2.7
	Perennial Forb Subtotal			0.6	4.9
		ACHY	*Achnatherum hymenoides*	0.5	4.8
		PLJA	*Pleuraphis jamesii*	1.5	13.7
		SPCR	*Sporobolus cryptandrus*	0.3	2.2
	Perennial Grass Subtotal			2.3	20.7
		ATCA2	*Atriplex canescens*	0.3	2.2
		GUSA2	*Gutierrezia sarothrae*	1.3	11.6
	Shrub Subtotal			1.6	13.8
SA-171 Total				17.1	152.3
		CRCR3	*Cryptantha crassisepala*	7.0	62.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			7.8	69.1
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	12.0	107.1
	Perennial Grass Subtotal			12.3	109.3
SA-172 Total				20.0	178.4
		CRCR3	*Cryptantha crassisepala*	0.6	5.4
		MACA2	*Machaeranthera canescens*	4.5	40.1
		PHCR	*Phacelia crenulata*	1.0	8.9
		SATR12	*Salsola tragus*	6.5	58.0
	Annual Forb Subtotal			12.6	112.4
		PLJA	*Pleuraphis jamesii*	4.5	40.2
		SPAI	*Sporobolus airoides*	6.0	53.1
	Perennial Grass Subtotal			10.5	93.3
SA-173 Total				23.1	205.7
		PLPA2	*Plantago patagonica*	4.7	41.9
		SATR12	*Salsola tragus*	5.3	47.3

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Forb Subtotal			10.0	89.2
		SPAI	*Sporobolus airoides*	5.0	44.6
	Perennial Grass Subtotal			5.0	44.6
		GUSA2	*Gutierrezia sarothrae*	0.3	2.2
	Shrub Subtotal			0.3	2.2
SA-174 Total				15.3	136.1
		AMAC2	*Ambrosia acanthicarpa*	0.4	3.4
		CRCR3	*Cryptantha crassisepala*	18.0	160.6
		MACA2	*Machaeranthera canescens*	5.4	48.3
		MEAL6	*Mentzelia albicaulis*	0.9	7.6
		SATR12	*Salsola tragus*	1.6	14.5
	Annual Forb Subtotal			26.3	234.4
		SPPA2	*Sphaeralcea parvifolia*	2.3	20.9
	Perennial Forb Subtotal			2.3	20.9
		ACHY	*Achnatherum hymenoides*	1.4	12.8
		PLJA	*Pleuraphis jamesii*	2.9	25.7
	Perennial Grass Subtotal			4.3	38.5
SA-175 Total				32.9	293.8
		CRCR3	*Cryptantha crassisepala*	4.6	41.0
		SATR12	*Salsola tragus*	5.0	44.6
	Annual Forb Subtotal			9.6	85.6
		SPAI	*Sporobolus airoides*	15.3	136.5
	Perennial Grass Subtotal			15.3	136.5
SA-176 Total				24.9	222.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.9	8.0
		SATR12	*Salsola tragus*	1.0	8.9
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			2.4	21.4
		SPAI	*Sporobolus airoides*	2.7	24.1
	Perennial Grass Subtotal			2.7	24.1
		GUSA2	*Gutierrezia sarothrae*	2.6	23.2
	Shrub Subtotal			2.6	23.2
SA-177 Total				7.7	68.7
		SATR12	*Salsola tragus*	13.0	116.0
	Annual Forb Subtotal			13.0	116.0
		SPCOC	*Sphaeralcea coccinea*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		SPAI	*Sporobolus airoides*	0.8	7.1
	Perennial Grass Subtotal			1.1	9.4
		ATOB	*Atriplex obovata*	40.0	356.9
	Shrub Subtotal			40.0	356.9

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
SA-178 Total				54.3	484.5
		ATPO2	*Atriplex powellii*	0.3	2.2
		SATR12	*Salsola tragus*	8.6	76.7
	Annual Forb Subtotal			8.9	79.0
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.5	4.5
		GUSA2	*Gutierrezia sarothrae*	6.0	53.5
	Shrub Subtotal			6.0	53.5
SA-179 Total				15.4	136.9
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	1.0	8.9
		PLPA2	*Plantago patagonica*	0.3	2.2
	Annual Forb Subtotal			1.5	13.4
		ATCO	*Atriplex confertifolia*	15.0	133.8
	Shrub Subtotal			15.0	133.8
SA-180 Total				16.5	147.2
		CRCR3	*Cryptantha crassisepala*	1.4	12.5
		MACA2	*Machaeranthera canescens*	2.6	23.3
		PHCR	*Phacelia crenulata*	0.3	2.2
		PLPA2	*Plantago patagonica*	2.0	17.8
		SATR12	*Salsola tragus*	6.3	56.2
		TOAN	*Townsendia annua*	1.7	15.2
	Annual Forb Subtotal			14.3	127.2
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	0.9	7.6
		PLJA	*Pleuraphis jamesii*	10.8	96.4
	Perennial Grass Subtotal			11.7	103.9
SA-181 Total				26.2	233.4
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		MACA2	*Machaeranthera canescens*	0.5	4.7
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			1.0	9.1
		PLJA	*Pleuraphis jamesii*	1.0	8.9
	Perennial Grass Subtotal			1.0	8.9
		ATCO	*Atriplex confertifolia*	19.0	169.5
	Shrub Subtotal			19.0	169.5
SA-182 Total				21.0	187.6
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Annual Forb Subtotal			0.8	6.7
		PLJA	*Pleuraphis jamesii*	4.5	40.1
		SPAI	*Sporobolus airoides*	9.9	88.3
	Perennial Grass Subtotal			14.4	128.5
SA-183 Total				15.2	135.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		MASO	*Malacothrix sonchoides*	0.3	2.2
		SATR12	*Salsola tragus*	33.0	294.4
	Annual Forb Subtotal			33.8	301.1
		SPCOC	*Sphaeralcea coccinea*	0.8	7.1
	Perennial Forb Subtotal			0.8	7.1
		SPAI	*Sporobolus airoides*	2.1	18.7
		SPCR	*Sporobolus cryptandrus*	0.3	2.2
	Perennial Grass Subtotal			2.4	21.0
		GUSA2	*Gutierrezia sarothrae*	1.0	8.9
	Shrub Subtotal			1.0	8.9
SA-184 Total				37.9	338.1
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		PHCR	*Phacelia crenulata*	1.8	16.1
		SATR12	*Salsola tragus*	10.0	89.2
		STLO4	*Streptanthella longirostris*	2.0	17.8
	Annual Forb Subtotal			14.3	127.6
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	5.3	47.4
	Perennial Grass Subtotal			5.3	47.4
		ATCO	*Atriplex confertifolia*	6.5	58.0
		GUSA2	*Gutierrezia sarothrae*	19.2	171.3
	Shrub Subtotal			25.7	229.3
SA-185 Total				45.6	406.5
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		CHER2	*Chaetopappa ericoides*	2.0	17.8
		LIAR3	*Linum aristatum*	1.0	8.9
	Perennial Forb Subtotal			3.0	26.8
		ACHY	*Achnatherum hymenoides*	0.9	8.0
		PLJA	*Pleuraphis jamesii*	2.6	22.8
		SPAI	*Sporobolus airoides*	4.8	42.8
	Perennial Grass Subtotal			8.3	73.6
SA-186 Total				11.8	104.8

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		CRCR3	*Cryptantha crassisepala*	5.0	44.6
		DEPI	*Descurainia pinnata*	0.3	2.2
		MACA2	*Machaeranthera canescens*	4.0	35.7
		PHCR	*Phacelia crenulata*	0.3	2.2
		SATR12	*Salsola tragus*	12.0	107.1
		STLO4	*Streptanthella longirostris*	0.3	2.2
	Annual Forb Subtotal			21.8	194.0
		BRTE	*Bromus tectorum*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		SPPA2	*Sphaeralcea parvifolia*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		PLJA	*Pleuraphis jamesii*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
		GUSA2	*Gutierrezia sarothrae*	0.3	2.2
	Shrub Subtotal			0.3	2.2
SA-187 Total				22.8	203.0
		LAOC3	*Lappula occidentalis*	0.3	2.2
		MASO	*Malacothrix sonchoides*	0.3	2.2
		SATR12	*Salsola tragus*	12.0	107.1
	Annual Forb Subtotal			12.5	111.5
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	8.1	72.3
	Perennial Grass Subtotal			8.4	74.5
SA-188 Total				20.9	186.0
		MEAL6	*Mentzelia albicaulis*	1.8	16.1
		PHCR	*Phacelia crenulata*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			2.3	20.5
		ATCO	*Atriplex confertifolia*	30.0	267.7
		GUSA2	*Gutierrezia sarothrae*	0.3	2.2
	Shrub Subtotal			30.3	269.9
SA-189 Total				32.6	290.4
		HAGL	*Halogeton glomeratus*	1.0	8.9
		SATR12	*Salsola tragus*	9.8	87.4
	Annual Forb Subtotal			10.8	96.4
SA-190 Total				10.8	96.4
		DIWI2	*Dimorphocarpa wislizenii*	1.5	13.4
		MEAL6	*Mentzelia albicaulis*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		SATR12	*Salsola tragus*	4.4	39.3
	Annual Forb Subtotal			6.4	57.1
		PLJA	*Pleuraphis jamesii*	2.2	19.3
		SPAI	*Sporobolus airoides*	0.9	8.0

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Perennial Grass Subtotal			3.1	27.3
		ATCO	*Atriplex confertifolia*	16.8	149.9
		GUSA2	*Gutierrezia sarothrae*	4.2	37.7
	Shrub Subtotal			21.0	187.6
SA-191 Total				30.5	272.0
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		SATR12	*Salsola tragus*	0.9	8.0
	Annual Forb Subtotal			1.4	12.5
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	3.0	27.1
	Perennial Grass Subtotal			3.3	29.4
		GUSA2	*Gutierrezia sarothrae*	0.2	1.8
	Shrub Subtotal			0.2	1.8
SA-192 Total				4.9	43.6
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		SATR12	*Salsola tragus*	32.0	285.5
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			32.5	290.0
		VUOC	*Vulpia octoflora*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		ACHY	*Achnatherum hymenoides*	1.2	10.4
		SPAI	*Sporobolus airoides*	5.4	48.2
	Perennial Grass Subtotal			6.6	58.6
SA-193 Total				39.3	350.8
		DEPI	*Descurainia pinnata*	0.3	2.2
		SATR12	*Salsola tragus*	38.0	339.0
	Annual Forb Subtotal			38.3	341.3
		ATCO	*Atriplex confertifolia*	8.0	71.4
		GUSA2	*Gutierrezia sarothrae*	16.0	142.7
	Shrub Subtotal			24.0	214.1
SA-194 Total				62.3	555.4
		CHST	*Chaenactis stevioides*	0.3	2.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		SATR12	*Salsola tragus*	5.4	48.2
	Annual Forb Subtotal			5.9	52.6
		PLJA	*Pleuraphis jamesii*	3.8	33.9
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			4.1	36.1
		GUSA2	*Gutierrezia sarothrae*	2.0	17.8
	Shrub Subtotal			2.0	17.8
SA-195 Total				12.0	106.6

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		MASO	*Malacothrix sonchoides*	0.3	2.2
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	2.5	22.3
	Annual Forb Subtotal			3.0	26.8
		SPAI	*Sporobolus airoides*	3.8	33.9
	Perennial Grass Subtotal			3.8	33.9
SA-196 Total				6.8	60.7
		PHCR	*Phacelia crenulata*	1.9	17.0
		SATR12	*Salsola tragus*	0.3	2.7
	Annual Forb Subtotal			2.2	19.6
		SPAI	*Sporobolus airoides*	1.8	16.1
	Perennial Grass Subtotal			1.8	16.1
SA-197 Total				4.0	35.7
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		MACA2	*Machaeranthera canescens*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		STEX	*Stephanomeria exigua*	1.0	8.9
	Perennial Forb Subtotal			1.0	8.9
		ACHY	*Achnatherum hymenoides*	0.3	2.2
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	8.5	75.5
	Perennial Grass Subtotal			9.0	79.9
SA-198 Total				10.5	93.3
		CRCR3	*Cryptantha crassisepala*	3.0	26.8
		DEPI	*Descurainia pinnata*	0.7	6.2
		PLPA2	*Plantago patagonica*	14.4	128.5
		SATR12	*Salsola tragus*	4.5	40.1
	Annual Forb Subtotal			22.6	201.6
		ACHY	*Achnatherum hymenoides*	1.9	16.9
		PLJA	*Pleuraphis jamesii*	1.8	16.1
		SPAI	*Sporobolus airoides*	2.6	23.2
	Perennial Grass Subtotal			6.3	56.1
		GUSA2	*Gutierrezia sarothrae*	2.6	23.2
	Shrub Subtotal			2.6	23.2
SA-199 Total				31.5	280.9
		ATPO2	*Atriplex powellii*	2.2	19.6
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		PHCR	*Phacelia crenulata*	2.4	21.4
		PLPA2	*Plantago patagonica*	2.4	21.4
		SATR12	*Salsola tragus*	46.0	410.4
	Annual Forb Subtotal			53.3	475.1
		PLJA	*Pleuraphis jamesii*	0.5	4.2
		SPAI	*Sporobolus airoides*	0.8	6.8

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
	Perennial Grass Subtotal			1.2	11.0
		ATOB	*Atriplex obovata*	3.3	29.4
	Shrub Subtotal			3.3	29.4
SA-200 Total				57.8	515.5

Attachment F-9. Thin Breaks Production Summary

LifeForm	Scientific Name	Air Dry Weight (g/m^2)	Air Dry Weight (lbs/acre)
	Eremopyrum triticeum	0.3	2.2
Annual Grass Subtotal		0.3	2.2
	Atriplex powellii	6.8	60.4
	Cryptantha crassisepala	0.5	4.5
	Cycloloma atriplicifolium	0.3	2.2
	Descurainia pinnata	0.5	4.3
	Eriogonum gordonii	0.6	4.9
	Halogeton glomeratus	5.7	50.7
	Ipomopsis pumila	0.3	2.2
	Lappula occidentalis	0.4	3.9
	Machaeranthera canescens	1.4	12.8
	Malacothrix sonchoides	0.3	2.5
	Mentzelia albicaulis	0.7	6.5
	Phacelia crenulata	1.6	14.2
	Plantago patagonica	2.8	25.1
	Salsola tragus	7.6	67.7
	Stenogonum salsuginosum	0.7	6.2
	Townsendia annua	0.3	2.2
Annual Forb Subtotal		30.3	270.5
	Astragalus spp.	0.3	2.2
Forb Subtotal		0.3	2.2
	Lygodesmia grandiflora	0.3	2.2
	Sphaeralcea coccinea	0.9	7.8
	Sphaeralcea parvifolia	0.3	2.9
	Stephanomeria exigua	0.7	6.2
Perennial Forb Subtotal		2.2	19.2
	Achnatherum hymenoides	1.3	11.9
	Pleuraphis jamesii	1.3	11.3
	Sporobolus airoides	4.2	37.4
Perennial Grass Subtotal		6.8	60.6
	Gaillardia pinnatifida	5.2	46.4
Perennial Forb Subtotal		5.2	46.4
	Artemisia bigelovii	10.2	91.0
	Atriplex canescens	14.0	124.9
	Atriplex confertifolia	8.6	76.3
	Atriplex gardneri	3.0	26.3
	Atriplex obovata	8.6	76.3
	Gutierrezia sarothrae	0.4	3.6
Shrub Subtotal		44.7	398.4

	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)	Standard Deviation of lbs/acre
Thin Breaks Total	**89.6**	**799.5**	**52.8**

Attachment F-9a. Thin Breaks Production by Transect.

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		SATR12	*Salsola tragus*	4.0	35.7
	Annual Forb Subtotal			4.0	35.7
		ATCO	*Atriplex confertifolia*	8.0	71.4
	Shrub Subtotal			8.0	71.4
TB-201 Total				12.0	107.1
		ACHY	*Achnatherum hymenoides*	1.0	8.9
	Perennial Grass Subtotal			1.0	8.9
		ARBI3	*Artemisia bigelovii*	10.2	91.0
	Shrub Subtotal			10.2	91.0
TB-201* Total				11.2	99.9
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
TB-202 Total				0.0	0.0
		SATR12	*Salsola tragus*	10.0	89.2
	Annual Forb Subtotal			10.0	89.2
		PLJA	*Pleuraphis jamesii*	1.6	14.3
	Perennial Grass Subtotal			1.6	14.3
		ATOB	*Atriplex obovata*	2.2	19.6
	Shrub Subtotal			2.2	19.6
TB-203 Total				13.8	123.1
		ATGA	*Atriplex gardneri*	6.0	53.5
		ATOB	*Atriplex obovata*	3.0	26.8
	Shrub Subtotal			9.0	80.3
TB-204 Total				9.0	80.3
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
TB-205 Total				0.0	0.0
		ATPO2	*Atriplex powellii*	9.0	80.3
		HAGL	*Halogeton glomeratus*	12.0	107.1
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			21.3	189.6
TB-206 Total				21.3	189.6
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	4.4	39.3
		MACA2	*Machaeranthera canescens*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		SATR12	*Salsola tragus*	16.0	142.7
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			21.7	193.2
		SPPA2	*Sphaeralcea parvifolia*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
TB-207 Total				22.2	197.6
		HAGL	*Halogeton glomeratus*	3.5	31.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		SATR12	*Salsola tragus*	3.5	31.2
	Annual Forb Subtotal			7.3	64.7
		LYGR	*Lygodesmia grandiflora*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		SPAI	*Sporobolus airoides*	1.2	10.7
	Perennial Grass Subtotal			1.2	10.7
		ATCO	*Atriplex confertifolia*	2.9	25.9
	Shrub Subtotal			2.9	25.9
TB-208 Total				11.6	103.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		MACA2	*Machaeranthera canescens*	4.0	35.7
		MEAL6	*Mentzelia albicaulis*	1.2	10.7
		SATR12	*Salsola tragus*	0.3	2.2
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			6.2	55.3
TB-209 Total				6.2	55.3
		ATPO2	*Atriplex powellii*	4.9	43.7
	Annual Forb Subtotal			4.9	43.7
TB-210 Total				4.9	43.7
		ATPO2	*Atriplex powellii*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		SATR12	*Salsola tragus*	5.0	44.6
	Annual Forb Subtotal			5.8	51.3
		ERTR13	*Eremopyrum triticeum*	0.3	2.2
	Annual Grass Subtotal			0.3	2.2
		ATCA2	*Atriplex canescens*	14.0	124.9
	Shrub Subtotal			14.0	124.9
TB-211 Total				20.0	178.4
		HAGL	*Halogeton glomeratus*	3.0	26.8
		IPPU4	*Ipomopsis pumila*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		LAOC3	*Lappula occidentalis*	0.3	2.2
	Annual Forb Subtotal			3.5	31.2
TB-212 Total				3.5	31.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		SATR12	*Salsola tragus*	33.0	294.4
	Annual Forb Subtotal			33.3	296.6
TB-213 Total				33.3	296.6
		ERGO	*Eriogonum gordonii*	0.3	2.2
		SATR12	*Salsola tragus*	12.0	107.1
	Annual Forb Subtotal			12.3	109.3
		LYGR	*Lygodesmia grandiflora*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
		ATOB	*Atriplex obovata*	34.7	309.6
	Shrub Subtotal			34.7	309.6
TB-214 Total				47.2	421.1
		DEPI	*Descurainia pinnata*	1.1	9.8
		ERGO	*Eriogonum gordonii*	1.6	14.3
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		SATR12	*Salsola tragus*	1.9	17.0
	Annual Forb Subtotal			4.9	43.3
		GUSA2	*Gutierrezia sarothrae*	0.3	2.2
	Shrub Subtotal			0.3	2.2
TB-215 Total				5.1	45.5
		HAGL	*Halogeton glomeratus*	0.3	2.2
		SATR12	*Salsola tragus*	2.0	17.8
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			2.5	22.3
		PLJA	*Pleuraphis jamesii*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
TB-216 Total				2.8	24.5
		DEPI	*Descurainia pinnata*	0.3	2.2
		ERGO	*Eriogonum gordonii*	0.3	2.2
		MASO	*Malacothrix sonchoides*	0.3	2.7
		PHCR	*Phacelia crenulata*	0.3	2.2
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			1.3	11.6
		PLJA	*Pleuraphis jamesii*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
TB-217 Total				1.6	13.8
		ATPO2	*Atriplex powellii*	26.0	232.0
		ERGO	*Eriogonum gordonii*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		SATR12	*Salsola tragus*	0.3	2.2
	Annual Forb Subtotal			26.5	236.4
		SPCOC	*Sphaeralcea coccinea*	0.3	2.2
	Perennial Forb Subtotal			0.3	2.2
TB-218 Total				26.8	238.7
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
TB-219 Total				0.0	0.0
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
TB-220 Total				0.0	0.0
		ERGO	*Eriogonum gordonii*	0.3	2.2
		HAGL	*Halogeton glomeratus*	11.5	102.6
		SATR12	*Salsola tragus*	6.3	56.2
	Annual Forb Subtotal			18.1	161.0
TB-221 Total				18.1	161.0
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
		MACA2	*Machaeranthera canescens*	0.3	2.2
		MASO	*Malacothrix sonchoides*	0.3	2.2
		PLPA2	*Plantago patagonica*	2.0	17.8
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			3.3	29.0
		ASTRA	*Astragalus spp.*	0.3	2.2
	Forb Subtotal			0.3	2.2
		STEX	*Stephanomeria exigua*	0.7	6.2
	Perennial Forb Subtotal			0.7	6.2
		ACHY	*Achnatherum hymenoides*	1.0	8.9
		PLJA	*Pleuraphis jamesii*	0.3	2.2
		SPAI	*Sporobolus airoides*	6.0	53.5
	Perennial Grass Subtotal			7.3	64.7
TB-222 Total				11.5	102.2
		SATR12	*Salsola tragus*	8.1	72.3
	Annual Forb Subtotal			8.1	72.3
TB-223 Total				8.1	72.3
		DEPI	*Descurainia pinnata*	0.9	8.0
		HAGL	*Halogeton glomeratus*	1.7	15.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
	Annual Forb Subtotal			2.9	25.4
TB-224 Total				2.9	25.4

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		CYAT	*Cycloloma atriplicifolium*	0.3	2.2
		HAGL	*Halogeton glomeratus*	0.8	7.1
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		SATR12	*Salsola tragus*	3.0	26.8
	Annual Forb Subtotal			4.8	42.8
		ATGA	*Atriplex gardneri*	2.6	23.2
		ATOB	*Atriplex obovata*	3.9	34.8
	Shrub Subtotal			6.5	58.0
TB-225 Total				11.3	100.8
		DEPI	*Descurainia pinnata*	0.3	2.2
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		LAOC3	*Lappula occidentalis*	1.4	12.5
		SATR12	*Salsola tragus*	6.0	53.5
	Annual Forb Subtotal			7.9	70.5
		SPCOC	*Sphaeralcea coccinea*	1.5	13.4
	Perennial Forb Subtotal			1.5	13.4
		PLJA	*Pleuraphis jamesii*	5.0	44.6
		SPAI	*Sporobolus airoides*	11.8	104.9
	Perennial Grass Subtotal			16.8	149.5
		GAPI	*Gaillardia pinnatifida*	5.2	46.4
	Perennial Forb Subtotal			5.2	46.4
TB-226 Total				31.4	279.8
		SATR12	*Salsola tragus*	3.8	33.9
	Annual Forb Subtotal			3.8	33.9
		ATCO	*Atriplex confertifolia*	24.2	215.9
		ATOB	*Atriplex obovata*	4.4	39.3
	Shrub Subtotal			28.6	255.2
TB-227 Total				32.4	289.1
		ERGO	*Eriogonum gordonii*	1.0	8.9
		LAOC3	*Lappula occidentalis*	0.3	2.2
		SATR12	*Salsola tragus*	4.7	41.9
	Annual Forb Subtotal			6.0	53.1
		ATOB	*Atriplex obovata*	11.5	102.6
	Shrub Subtotal			11.5	102.6
TB-228 Total				17.5	155.7
		DEPI	*Descurainia pinnata*	0.3	2.2
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		SATR12	*Salsola tragus*	7.0	62.5
	Annual Forb Subtotal			7.5	66.9
TB-229 Total				7.5	66.9

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		PLPA2	*Plantago patagonica*	7.0	62.5
		SATR12	*Salsola tragus*	3.7	33.0
		TOAN	*Townsendia annua*	0.3	2.2
	Annual Forb Subtotal			11.0	97.7
		SPAI	*Sporobolus airoides*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
		ATOB	*Atriplex obovata*	8.5	75.8
	Shrub Subtotal			8.5	75.8
TB-230 Total				19.7	175.8
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	15.0	133.8
		LAOC3	*Lappula occidentalis*	0.3	2.2
		PHCR	*Phacelia crenulata*	7.0	62.5
		SATR12	*Salsola tragus*	25.0	223.0
	Annual Forb Subtotal			47.8	426.0
		ATGA	*Atriplex gardneri*	0.3	2.2
	Shrub Subtotal			0.3	2.2
TB-231 Total				48.0	428.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		MACA2	*Machaeranthera canescens*	0.7	6.2
		MEAL6	*Mentzelia albicaulis*	0.3	2.2
		PHCR	*Phacelia crenulata*	0.3	2.2
		SATR12	*Salsola tragus*	1.6	14.3
	Annual Forb Subtotal			3.1	27.2
		ACHY	*Achnatherum hymenoides*	2.0	17.8
	Perennial Grass Subtotal			2.0	17.8
		GUSA2	*Gutierrezia sarothrae*	0.3	2.2
	Shrub Subtotal			0.3	2.2
TB-232 Total				5.3	47.3
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
TB-233 Total				0.0	0.0
		HAGL	*Halogeton glomeratus*	6.9	61.6
		SATR12	*Salsola tragus*	9.8	87.4
	Annual Forb Subtotal			16.7	149.0
TB-234 Total				16.7	149.0
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		IPPU4	*Ipomopsis pumila*	0.3	2.2
		LAOC3	*Lappula occidentalis*	1.2	10.7
		PHCR	*Phacelia crenulata*	0.3	2.2

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		PLPA2	*Plantago patagonica*	0.3	2.2
		SATR12	*Salsola tragus*	26.0	232.0
	Annual Forb Subtotal			28.5	253.8
		SPAI	*Sporobolus airoides*	4.0	35.7
	Perennial Grass Subtotal			4.0	35.7
		ATCO	*Atriplex confertifolia*	0.3	2.2
	Shrub Subtotal			0.3	2.2
TB-235 Total				32.7	291.7
		CRCR3	*Cryptantha crassisepala*	2.3	20.5
		DEPI	*Descurainia pinnata*	1.7	15.2
		MACA2	*Machaeranthera canescens*	2.0	17.8
		PHCR	*Phacelia crenulata*	2.9	25.9
		PLPA2	*Plantago patagonica*	2.0	17.8
		SATR12	*Salsola tragus*	7.0	62.5
		STSA3	*Stenogonum salsuginosum*	0.7	6.2
	Annual Forb Subtotal			18.6	165.9
		SPPA2	*Sphaeralcea parvifolia*	0.4	3.6
	Perennial Forb Subtotal			0.4	3.6
		SPAI	*Sporobolus airoides*	5.9	52.2
	Perennial Grass Subtotal			5.9	52.2
		GUSA2	*Gutierrezia sarothrae*	0.7	6.2
	Shrub Subtotal			0.7	6.2
TB-236 Total				25.6	228.0
		ATPO2	*Atriplex powellii*	0.3	2.2
		CRCR3	*Cryptantha crassisepala*	0.3	2.2
		DEPI	*Descurainia pinnata*	0.3	2.2
		HAGL	*Halogeton glomeratus*	3.5	31.2
		SATR12	*Salsola tragus*	4.4	39.3
	Annual Forb Subtotal			8.7	77.2
		PLJA	*Pleuraphis jamesii*	0.3	2.2
	Perennial Grass Subtotal			0.3	2.2
		ATCO	*Atriplex confertifolia*	7.4	66.0
	Shrub Subtotal			7.4	66.0
TB-237 Total				16.3	145.4
		ATPO2	*Atriplex powellii*	0.3	2.2
		LAOC3	*Lappula occidentalis*	0.3	2.2
	Annual Forb Subtotal			0.5	4.5
		ATOB	*Atriplex obovata*	0.3	2.2
	Shrub Subtotal			0.3	2.2
TB-238 Total				0.8	6.7
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
TB-239 Total				0.0	0.0

Transect	Life Form	Symbol	Scientific Name	Air Dry Weight (g/m2)	Air Dry Weight (lbs/acre)
		NONE	*NONE*	0.0	0.0
	NONE Subtotal			0.0	0.0
TB-240 Total				0.0	0.0

ATTACHMENT G

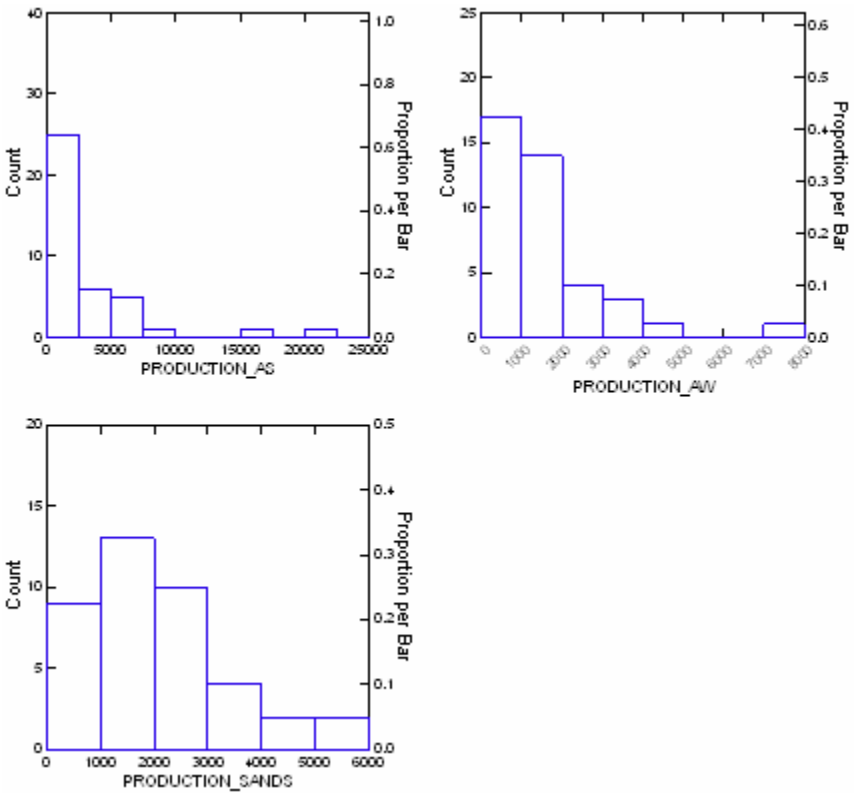
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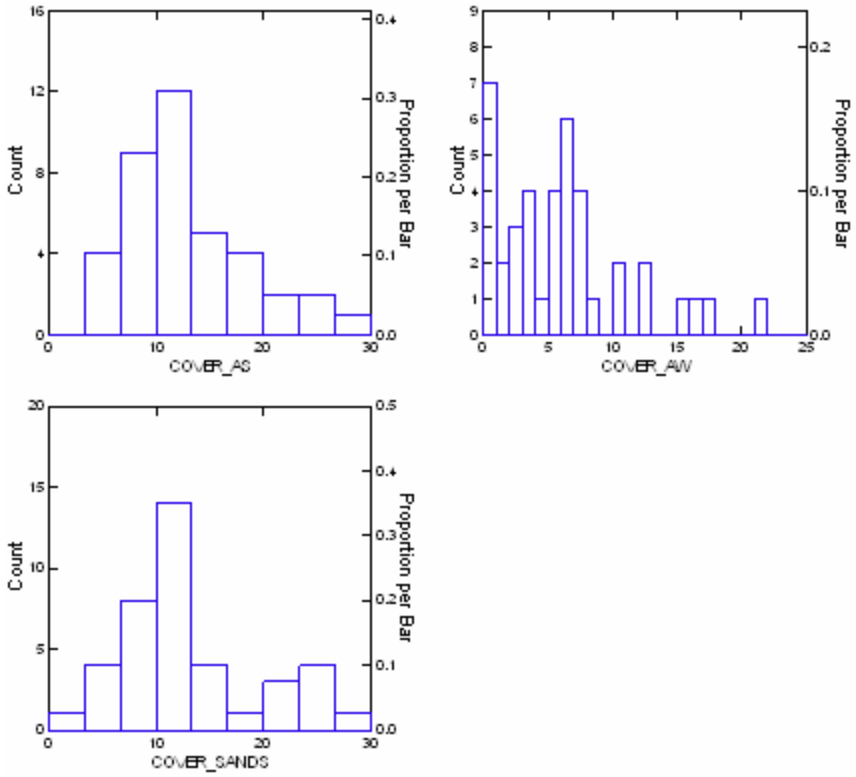
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Processed 9 Variables and 43 Cases.
Successfully saved file W:\JZ\BHP Veg Stats\BHP Veg.syz
Processed 9 Variables and 43 Cases.
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Processed 9 Variables and 43 Cases.

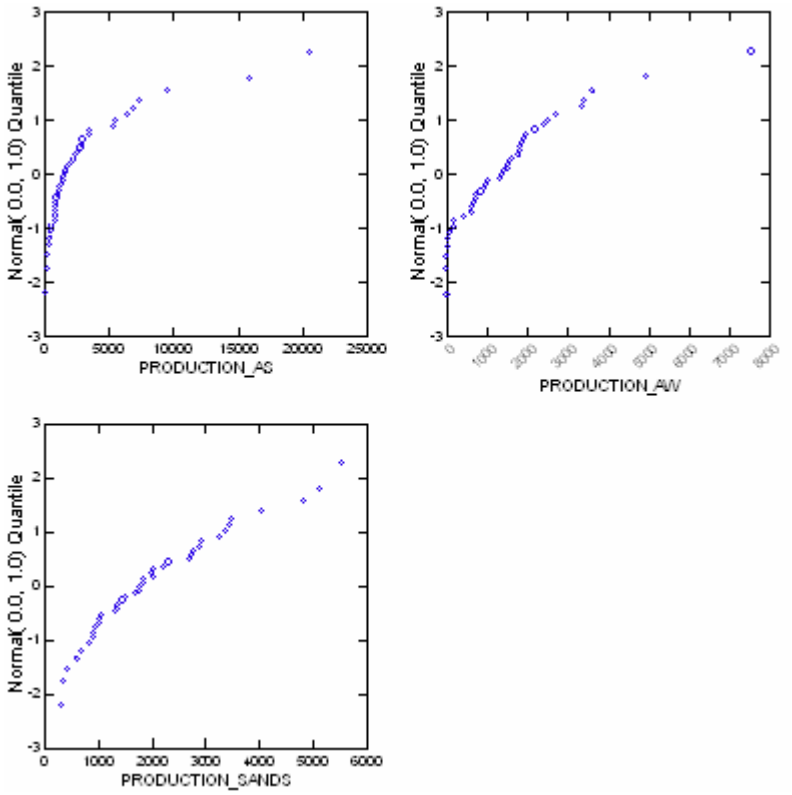
▼Histogram



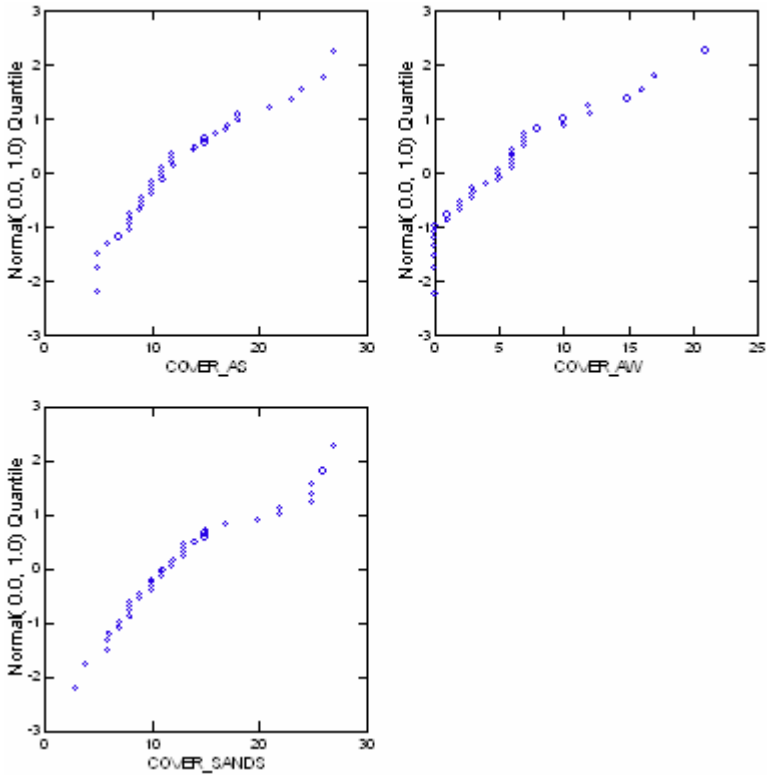
▼Histogram



▼Probability Plot



▼Probability Plot



Production: Arroyo Shrub (AS) vs. Reference Arroyo Shrub (RefAS)
Cover: Arroyo Shrub (AS) vs. Reference Arroyo Shrub (RefAS)
▼Nonparametric : Kruskal-Wallis test

Kruskal-Wallis One-way Analysis of Variance for 80 Cases
The categorical values encountered during processing are

Variables	Levels	
GROUP_ (2 levels)	1.000	2.000

Dependent variable	PRODUCTION_AS
Grouping variable	GROUP_

Group	Count	Rank Sum
1=AS	39	1492.000
2=RefAS	39	1589.000

Mann-Whitney U Test Statistic	:	712.000
p-value	:	0.628
Chi-square Approximation	:	0.235
df	:	1

Dependent variable	COVER_AS
Grouping variable	GROUP_

Group	Count	Rank Sum
1=AS	39	1204.500
2=RefAS	39	1876.500

Mann-Whitney U Test Statistic	:	424.500
p-value	:	0.001
Chi-square Approximation	:	11.306
df	:	1

Production: Alkali Wash (AW) vs. Reference Alkali Wash (RefAW)

Cover: Alkali Wash (AW) vs. Reference Alkali Wash (RefAW)

▼Nonparametric : Kruskal-Wallis test

Kruskal-Wallis One-way Analysis of Variance for 80 Cases

The categorical values encountered during processing are

Variables	Levels	
GROUP (2 levels)	1.000	2.000

Dependent variable	PRODUCTION_AS
Grouping variable	GROUP

Group	Count	Rank Sum
1=AW	40	1808.000
2=RefAW	40	1432.000

Mann-Whitney U Test Statistic	:	988.000
p-value	:	0.070
Chi-square Approximation	:	3.273
df	:	1

Dependent variable	COVER_AS
Grouping variable	GROUP

Group	Count	Rank Sum
1=AW	40	1576.000
2=RefAW	40	1664.000

Mann-Whitney U Test Statistic	:	756.000
p-value	:	0.671
Chi-square Approximation	:	0.181
df	:	1

Production: Sands (SA) vs. Reference Sands (RefSA)
Cover: Sands (SA) vs. Reference Sands (RefSA)

►Nonparametric : Kruskal-Wallis test

Variables	Levels
GROUP (2 levels)	1.000 2.000

Dependent variable	PRODUCTION_AS
Grouping variable	GROUP

Group	Count	Rank Sum
1=SA	40	1652.000
2=RefSA	39	1508.000

Mann-Whitney U Test Statistic	:	832.000
p-value	:	0.610
Chi-square Approximation	:	0.260
df	:	1

Dependent variable	COVER_AS
Grouping variable	GROUP

Group	Count	Rank Sum
1=SA	40	1564.000
2=RefSA	39	1596.000

Mann-Whitney U Test Statistic	:	744.000
p-value	:	0.723
Chi-square Approximation	:	0.126
df	:	1

2007 Baseline Vegetation Inventories

Navajo Mine Extension Project

Prepared for:

BHP Navajo Coal Company
Navajo Mine Extension Project
Fruitland, New Mexico

Prepared by:



ECOSPHERE ENVIRONMENTAL SERVICES

August 2008 (Revised)

Table of Contents

1.0 INTRODUCTION 1

2.0 PROJECT AREA 1

3.0 VEGETATION TYPES 1

4.0 VEGETATION INFORMATION COLLECTION AND ANALYSIS 2

4.1 Data Collection 2

4.2 Data Analysis 4

5.0 DESCRIPTION OF VEGETATION TYPES 4

5.1 Dunes 4

5.2 Sands 6

5.3 Arroyo Shrub 8

5.4 Alkali Wash 9

5.5 Thin Breaks 11

5.6 Badlands 13

5.7 Cover Comparison Between Vegetation Types 14

5.8 Constancy 15

5.9 Shrub Density 16

5.10 Production 17

6.0 REFERENCE AREA 18

6.1 Reference Alkali Wash 19

6.2 Reference Arroyo Shrub 20

6.3 Reference Sands 20

7.0 PROJECT AREA AND REFERENCE AREA COMPARISON 21

7.1 Constancy 21

7.2 Shrub Density 22

7.3 Production 23

7.4 Cover 26

7.5 Conclusion 30

8.0 REFERENCES 32

List of Tables

Table 1 Vegetation Community Acreages 2

Table 2: Average Cover, Constancy, and Production in the Dunes Community Type 5

Table 3: Average Cover, Constancy, and Production in the Sands Community Type 7

Table 4: Average Cover, Constancy, and Production in the Arroyo Shrub Community Type 8

Table 5: Average Cover, Constancy, and Production in the Alkali Wash Community Type 10

Table 6: Average Cover, Constancy, and Production in the Thin Breaks Community Type 12

Table 7: Average Cover, Constancy, and Production in the Badlands Community Type 13

Table 8 Reference Area Vegetation Community Acreages 19

Table 9: Average Cover, Constancy, and Production in the Reference Alkali Wash Community Type 19

Table 10: Average Cover, Constancy, and Production in the Reference Arroyo Shrub Community Type 20

Table 11: Average Cover, Constancy, and Production in the Reference Sands Community Type 21

Table 12: Average Number of Species per Constancy Transect Comparison 22

Table 13: Shrub Density per Acre Comparison 23

Table 14: Average Production in Pounds Per Acre by Life Form Comparison Between the Project Area and Reference Area. 24

Table 15: Mann-Whitney Results for Production Comparison of Community Types in the Project Area and Reference Area. 25

Table 16: Mann-Whitney Results for Vegetative Cover Comparison of Community Types in the Project Area and Reference Area. 28

List of Figures

Figure 1: Average Total Cover from Spring and Fall Sampling in the Dunes Community 6
Figure 2: Average Total Cover from Spring and Fall Sampling in the Sands Community 7
Figure 3: Average Total Cover from spring and fall Sampling in the Arroyo Shrub Community 9
Figure 4: Average Total Cover from Spring and Fall Sampling in the Alkali Wash Community 11
Figure 5: Average Total Cover from Spring and Fall Sampling in the Thin Breaks Community 12
Figure 6: Average Total Cover from Spring and Fall Sampling in the Badlands Community 14
Figure 7: Spring Average Vegetative Cover in the Project Area 15
Figure 8: Fall Average Vegetative Cover in the Project Area 15
Figure 9: Average Number of Species Per Constancy Transect in the Project Area 16
Figure 10: Average Shrub Density in the Project Area 17
Figure 11: Fall Average Production in Pounds Per Acre in the Project Area 18
Figure 12: Fall Average Number of Species Per Constancy Transect in the Project Area and Reference Area. 22
Figure 13: Fall Average Shrub Density in the Project Area and Reference Area. 23
Figure 14: Production in Average Pounds Per Acre Comparison Between the Project Area and Reference Area. 24
Figure 15: Box Plot Comparison for Production in the Project Area and Reference Area Arroyo Shrub Community Type. 25
Figure 16: Box Plot Comparison for Production in the Project Area and Reference Area Alkali Wash Community Type. 26
Figure 17: Box Plot Comparison for Production in the Project Area and Reference Area Sands Community Type. 26
Figure 18: Vegetative Cover Comparison Between the Project Area and Reference Area. 27
Figure 19: Ground Cover Comparison Between the Project Area and Reference Area. 28
Figure 20: Box Plot Ground Cover Comparison Between the Project Area and Reference Area Arroyo Shrub. 29
Figure 21: Box Plot Ground Cover Comparison Between the Project Area and Reference Area Alkali Wash. 29
Figure 22: Box Plot Ground Cover Comparison Between the Project Area and Reference Area Sands 30

List of Attachments

Attachment A. Exhibits
Attachment B. Plant Species Recorded during Data Collection
Attachment C. Cover and Frequency Data
Attachment D. Shrub Density Data
Attachment E. Constancy Data
Attachment F. Production Data
Attachment G. Statistical Analysis

1.0 INTRODUCTION

This report has been prepared to present results from vegetation data collected in 2007 from BHP Navajo Coal Company's (BNCC) Navajo Mine Extension Project (NMEP). The NMEP comprises Area 4 South and Area 5 of BNCC's existing coal lease. Vegetation data was collected from the NMEP project area and a potential vegetation reference area. Selection of vegetation reference areas is based on quantitative and qualitative comparison with pre-mine vegetation communities. Once established, the reference areas are used to evaluate the success of mine reclamation efforts. Preliminary data results provide BNCC and regulatory agencies with necessary information to determine whether potential reference areas are representative of major vegetation communities within the mine lease and to ensure compliance with current federal regulations pertaining to the Surface Mining Control and Reclamation Act of 1977 (SMCRA) administered by the Office of Surface Mining (OSM)..

This report outlines the data collection and statistical analysis methodologies implemented for inventorying the project area and potential reference area vegetation. The methodologies used are consistent with OSM recommended guidelines and requirements and the study plan approved by OSM on May 29, 2007.

2.0 Project Area

The NMEP is located about 20 miles (linear distance) southwest of Farmington, New Mexico and is found on the Hogback S, Newcomb NE, and The Pillar NW, New Mexico 7.5-minutes U.S. Geological Survey (USGS) quadrangles (refer to Exhibits 1 and 2 in Attachment A). The NMEP permit area comprises 13,006 acres in BNCC lease Areas 4 South and 5.

3.0 Vegetation Types

The same vegetation types delineated in 1987 by Drs M. K. Wood and K. W. Allred for Navajo Mine Area 4 North have been used in this report to represent the baseline vegetation types within the Area 4 South and Area 5 project area, with one exception. Based on discussions with OSM and to remain consistent with Navajo Mine vegetation reporting, it was decided to combine the three sand vegetation types identified in 1987 into one sands vegetation type. The results of the 1987 survey are provided and discussed in BNCC's Navajo Mine Permit Application Package (OSM Permit No. NM-0003F).

Reconnaissance of vegetation community types in Areas 4 South and 5 began with examination of previous studies and existing resources including aerial photographs, Natural Resource Conservation Service (NRCS) soil maps, USGS topographical maps, and past resource site analysis, including detailed soil (Buchannan Consultants, Ltd, 1998) and vegetation surveys (TRC Mariah, 1999). We reviewed these sources to preliminarily determine the extent and proportion of vegetation community types within the project area. Vegetation community names and descriptions were evaluated for consistency with those found within the adjacent Navajo Mine and with previous surveys. Vegetation communities were

categorized into the following six categories: Arroyo Shrub, Alkali Wash, Badlands, Dunes, Thin Breaks, and Sands (combined alkaline sands, sands, and saline sands). Based on this information, we created a vegetation community map in a GIS (Geographic Information System) database (Exhibit 3). We ground truthed the preliminary vegetation community characterization using vehicular and pedestrian surveys. We also conducted ground truthing surveys concurrently with spring and fall vegetation inventories to further refine vegetation community delineations. The total project area acreage is 13,006 acres (Table 1).

Table 1 Vegetation Community Acreages

Vegetation Community Type	Acreage	Percent of Total
Alkali Wash	4719.0	36.3
Sands	4438.7	34.1
Dunes	1204.2	9.3
Thin Breaks	1110.6	8.5
Arroyo Shrub	637.1	4.9
Badlands	896.8	6.9
Total	13,006.4	100%

4.0 Vegetation Information Collection and Analysis

4.1 Data Collection

Ecosphere biologists collected data during both spring and fall of 2007, in order to capture as much species diversity as possible. A list of plant species recorded during data collection is provided in Attachment B. Data collection methods were consistent with previous surveys. We chose a stratified random sampling method to locate sampling points throughout the project area. We generated forty-five (45) randomly located sampling points within each of the six community types based on GIS mapping of the project area. During spring data collection, we sampled 20 of the 45 points by choosing even or odd numbered points in each vegetation community. For the fall data collection, we generated 45 new randomly located sampling points. From these new sampling points, we sampled a minimum of 39 sample points within each community type. The final number of spring and fall transects in each vegetation type varied due to changes in the vegetation community mapping during the data collection process. These mapping changes primarily affected the number of spring transects in each vegetation community, since the most intensive ground truthing occurred during and after the spring sampling effort. Ground truthing of the community mapping also continued into the fall sampling effort. Occasionally the ground truthing revealed that sample points were located within a different vegetation community than intended. In these instances, the points were either sampled in place, and their associated vegetation community classification was changed; or they were not sampled and data was collected at an additional point to make up for the lost point in that vegetation community.

Vegetation data collection occurred between May 14 and June 1, 2007 (spring) and between October 1 and October 31, 2007 (fall). Percent cover, species frequency, constancy and composition were measured at

each location during spring sampling. The fall sampling effort included the additional parameters of production and shrub density. Spring sampling transects were located throughout the project area; fall sampling transects were located throughout the project area exclusive of the potential Reference Area. The selection of sampling points within the potential Reference Area is discussed in Section 6.0.

Linear transects at each sampling point were used to collect quantitative data within Areas 4 South and 5 of the BNCC Lease Area and reference area. Biologists navigated to transect locations using handheld GPS (Global Positioning System) units. Each linear transect was 50 m long and located completely within a single vegetation community type at a randomly chosen direction. The random direction was determined by tossing a screwdriver into the air and following a line extending from the handle along the working end of the screwdriver. The transect origin was located where the screwdriver landed. If the entire 50 m transect length did not fall within the intended vegetation community type, the screwdriver toss was repeated until a suitable direction was achieved.

Cover and frequency data were collected using a point intercept method along a 50 m tape stretched the length of the transect. This method is consistent with previous studies (TRC Mariah 1999). Starting at the beginning of the 50 m tape, a laser point sampler (Synergy Resource Solutions, Bozeman, Montana) was used to point perpendicular to the ground at every 0.5 m mark along the tape; therefore a total of 100 readings per transect were recorded. Cover data was recorded as the first "hit" of the laser beam in the following categories: bare ground, litter, gravel/stone, and vegetation. If the laser hit vegetation, the species was recorded as a measure of frequency.

Shrub density was measured within a 2 m wide belt transect for the length of the 50 m tape, 1 m wide along each side of the tape (100 m^2). Every shrub rooted in the transect area was identified and counted. Densities are reported as the number of rooted stems per 100 m^2 converted to stems per acre. To remain consistent with previous reporting, shrub density is reported both with and without broom snakeweed (*Gutierrezia sarothrae).*

Species constancy was determined by identifying and recording a singular list of each species that occurred inside the 100 m^2 shrub density belt.

Production data was collected by the harvesting method using current years' growth. To allow for comparison with previous studies, production transects consisted of one 1 m^2 plot (10 cm x 10 m). The plot was located at the 10 m mark along the right hand side of the 50 m transect tape with the longer edge parallel to the tape. The placement of the production plot away from the starting point of the 50 m tape reduced bias and trampling resulting from transect establishment. All plants and parts of plants located within the vertical projection of the plot were included regardless of where they were rooted. Parts of plants overhanging outside the plot were excluded. All species within the plot were identified, recorded, clipped to ground level, weighed, and bagged by species. Clipped biomass was air dried for a minimum of ten days and weighed to produce an air dry weight as recommended in the National Range and Pasture Handbook (USDA 2003). Biomass lost to grazing was reconstructed using the ocular estimation method described by

Coulloudon et al. (1999a). Production was measured in grams per square meter and converted to pounds per acre.

All field time was documented including date, time, personnel, location, and data collected. Measurements were recorded on data forms or digitally recorded, and then transferred to a digital database for analysis. All flora species observed were recorded using the U. S. Department of Agriculture Plants Database standard symbols and taxonomic naming conventions.

4.2 Data Analysis

Collected tabular data were compiled and visually presented using Excel® software. Statistical analysis was conducted using SYSTAT 12 (SYSTAT Software, Inc., San Jose, CA). Production biomass was weighed using an ACCULAB™ EC-211 digital scale.

5.0 Description of Vegetation Types

5.1 Dunes

Dunes form gently rolling terrain (0-5 % slopes) located on the leeward side of ridges, bluffs, and plateaus. Dunes soils are deep and composed of well-drained sands. The deep sands of dunes allows for deep, but more consistent water availability. Since only deep-rooted perennial plants can exploit this water, Dunes have several unique plant species such as San Juan milkweed (*Asclepias sanjuanensis*=ASSA8). The Dunes community type accounts for approximately 9% of the project area vegetation (Table 1). Spring sampling resulted in 19 transects and 40 transects were completed during fall data collection (Attachment A, Exhibits 4 and 5).

The species that occurred on at least half of all Dunes transects during spring data collection included, in descending order; cryptantha (*Cryptantha crassisepala*=CRCR3), tansy mustard (*Descurania pinnata*=DEPI), twinpod (*Dimorphocarpa wislizenii*=DIWI), globemallow (*Sphaeralcea parvifolia*=SPPA2), Indian ricegrass (*Achnatherum hymenoides*=ACHY), galleta grass (*Pleuraphis jamesii*=PLJA), Russian thistle (*Salsola tragus*=SATR12), wire lettuce (*Stephanomeria exigua*=STEX), lupine (*Lupinus pusillus*=LUPU, evening primrose (*Oenothera pallida*=OEPA), four winged saltbush (*Atriplex canescens*=ATCA2), and alkali sacaton (*Sporobolus airoides*=SPAI). The species that occurred on at least half of all Dunes transects during fall data collection included, in descending order; Russian thistle, tansy mustard, Indian ricegrass, cryptantha, galleta grass, globemallow, purple aster (*Machaeranthera canescens*=MACA2), alkali sacaton, bur ragweed (*Ambrosia acanthicarpa*=AMAC2), and twinpod.

The Dunes sites averaged the highest number of different species across all life forms (Table 2). Dunes, Arroyo Shrub, and Sands sites had the highest amounts of vegetative cover. Dunes sites also had very high production, second to Arroyo Shrub sites. Shrub density for Dunes averaged 729.5 stems per acre (SD

654.8) including broom snakeweed (*Gutierrezia sarothrae*=GUSA2) and 486.6 stems per acre (SD 417.9) without broom snakeweed. The most frequent species on point intercept transects were cryptantha, tansy mustard, and twinpod during the spring, and Mormon tea *(Ephedra spp.)*, alkali sacaton, and tansy mustard during the fall.

Table 2: Average Cover, Constancy, and Production in the Dunes Community Type

	Spring Average Total Cover	Spring Average Relative Cover	Fall Average Total Cover	Fall Average Relative Cover	Spring Average Number of Species from Constancy	Fall Average Number of Species from Constancy	Fall Average Production (lbs/acre)
Annual Forbs	10.3%	50.6%	5.6%	37.5%	7.9	6.8	85.6
Annual Grasses	0.0%	0.0%	0.2%	1.2%	0.1	0.3	0.3
Forbs[1]	0.3%	1.3%	0.1%	0.7%	0.8	0.2	0.1
Perennial Forbs	5.1%	24.9%	0.7%	4.7%	4.7	2.5	13.8
Perennial Grasses	2.3%	11.4%	4.3%	28.5%	2.9	3.4	32.5
Perennial Shrubs	2.3%	11.4%	4.1%	27.2%	1.7	3.0	0.0
Perennial Succulents	0.0%	0.0%	0.0%	0.2%	0.1	0.2	76.6
Unidentified	0.0%	0.0%	0.0%	0.2%	0.1	0.1	0.0
Total Perennial	9.7%	48.1%	9.1%	60.5%	9.4	9.1	122.8
Total	20.3%	100.0%	15.0%	100.0%	18.4	16.5	209.7
Standard Deviation	7.4%		4.9%		5.8	3.9	58.8

1. Forbs not specifically identified as either annual or perennial.

Total spring perennial cover was measured at 9.4% with a relative cover value of 48.1% (Table 2). The average fall perennial cover within the Dunes vegetation community was 9.1% and relative cover was 60.5% (Table 2). Annual forbs contributed 37.5% of relative cover in the fall. Total average vegetative cover in the Dunes community type varied from 20.3% (standard deviation (SD) 7.4%) in the spring to 15.0% (SD 4.9%) in the fall due to seasonal changes in species composition, primarily higher spring annual forb cover (Table 2 and Figure 1). Average number of species recorded in constancy transects was also higher in the spring at 18.4 species (SD 6.4) than in the fall at 16.5 species (SD 3.9) (Table 2). Biomass production, measured in the fall, averaged 209.7 pounds per acre (SD 58.8) (Table 2).

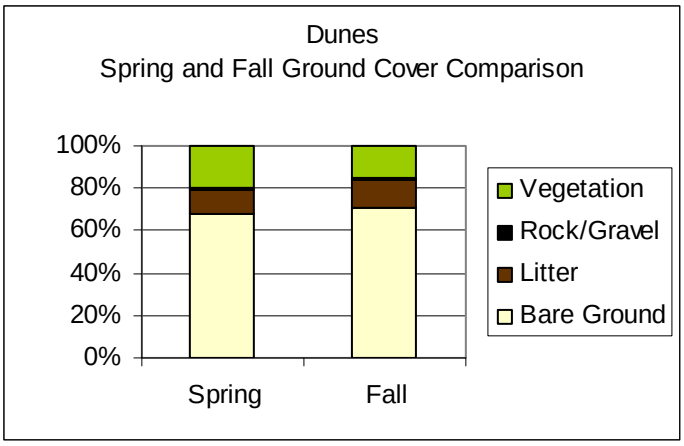


Figure 1: Average Total Cover from Spring and Fall Sampling in the Dunes Community

5.2 Sands

As with Dunes, the deeper penetration of rainwater into sandy soil allows for greater water availability and increases plant species diversity. The types of sand in this habitat can vary from saline to calcareous. This sand habitat often transitions to and can be mixed with Thin Breaks habitat. In years with high amounts of spring rainfall sandy soils display an abundance of annuals, especially scorpion weed (*Phacelia crenulata*=PHCR), annual Townsend daisy *(Townsendia annua*=TOAN), and cryptantha. Sands accounts for 34% of project area vegetation. Data collection included 25 spring transects and 40 fall transects (Attachment A, Exhibits 4 and 5).

The species that occurred on at least half of all Sands transects during spring data collection included, in descending order; cryptantha, scorpion weed, tansy mustard, Russian thistle, alkali sacaton, pincushion (*Chaenactis stevioides*=CHST), shadscale saltbush (*Atriplex confertifolia*=ATCO), annual Townsend daisy, Indian ricegrass, wire lettuce, purple aster, globe mallow, prickly pear *(Opuntia polyacantha*=OPPO), woolly plantain (*Plantago patagonica*=PLPA2*)*, and sixweeks fescue (Vulpia ocotoflora=VUOC). The species that occurred on at least half of all Sands transects during fall data collection included, in descending order; Russian thistle, alkali sacaton, Indian ricegrass, cryptantha, galleta grass, shadscale saltbush, tansy mustard, purple aster, and broom snakeweed. Sands sites are higher than other communities in vegetation canopy, vegetation frequency, and production. Shrub density averaged 1,107.9 stems per acre (SD 1,183.0) with broom snakeweed and 485.6 stems per acre (SD 357.4) without broom snakeweed. The most frequent species on point intercept transects were cryptantha, Russian thistle, and alkali sacaton during the spring, and alkali sacaton, Russian thistle and galleta grass during the fall.

Table 3: Average Cover, Constancy, and Production in the Sands Community Type

	Spring Average Total Cover	Spring Average Relative Cover	Fall Average Total Cover	Fall Average Relative Cover	Spring Average Number of Species from Constancy	Fall Average Number of Species from Constancy	Fall Average Production (lbs/acre)
Annual Forbs	8.7%	58.8%	5.2%	39.7%	9.5	6.0	105.0
Annual Grasses	0.1%	0.8%	0.0%	0.2%	0.9	0.3	0.2
Forbs[1]	0.0%	0.0%	0.0%	0.2%	0.3	0.1	0.0
Perennial Forbs	1.3%	8.5%	0.4%	2.7%	3.4	1.3	2.3
Perennial Grasses	2.8%	18.9%	5.3%	40.5%	3.0	2.9	44.1
Perennial Shrubs	1.8%	11.9%	2.2%	16.6%	1.9	1.9	57.0
Perennial Succulents	0.2%	1.1%	0.0%	0.2%	0.6	0.5	0.0
Unidentified	0.0%	0.0%	0.0%	0.0%	0.0	0.0	0.0
Total Perennial	6.0%	40.4%	7.9%	59.9%	8.9	6.5	103.4
Total	14.8%	100.0%	13.1%	100.0%	18.8	12.8	208.6
Standard Deviation	6.7%		6.4%		5.1	3.4	62.5

1. Forbs not specifically identified as either annual or perennial.

Total spring perennial average cover was measured at 6.0% for a relative cover value of 40.4% (Table 3). Total fall perennial cover within the Sands vegetation community was measured at an average of 7.9% with a relative cover value of 59.9% (Table 3). Perennial grass cover displayed a relative cover value of 40.5%. Total average vegetative cover in the Sands community type varied from 14.8% (SD 6.7%) in the spring to 13.1% (SD 6.4%) in the fall even though the composition of annual forbs and perennial grasses changed more appreciably between the seasons (Table 3 and Figure 2). More species were recorded during the spring than in the fall with an average of 18.8 species (SD 5.1) per transect in the spring, and 12.8 species (SD 3.4) per transect in the fall (Table 3). Biomass production, measured in the fall, averaged 208.6 pounds per acre (SD 62.5) (Table 3).

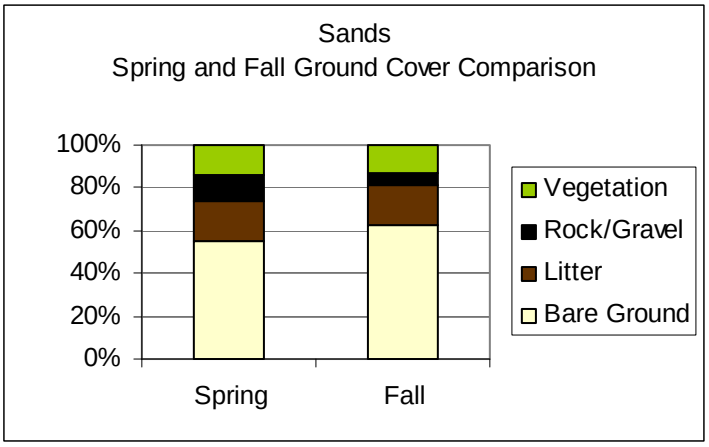


Figure 2: Average Total Cover from Spring and Fall Sampling in the Sands Community

5.3 Arroyo Shrub

Arroyo Shrub range sites are found on level or nearly level terrain (0-2% slopes) located next to stream beds in major drainages, such as No Name Arroyo and Pinabete Arroyo. Arroyo Shrub accounts for the smallest percentage of vegetation occurring within the project area at less than 5% (Table 1). Twenty-four (24) transects were completed in the spring and 40 during fall data collection (Attachment A, Exhibits 4 and 5).

The species that occurred on at least half of all Arroyo Shrub transects during spring data collection included, in descending order; tansy mustard, alkali sacaton, cryptantha, Russian thistle, four winged saltbush, annual Townsend daisy, cheatgrass (*Bromus tectorum*=BRTE), and galleta grass. The species that occurred on at least half of all Arroyo Shrub transects during fall data collection included, in descending order; Russian thistle, tansy mustard, alkali sacaton, four winged saltbush, cryptantha, greasewood (*Sarcobatus vermiculatus*=SAVE4), and broom snakeweed. Arroyo Shrub sites had a high proportion of bare ground. Shrub density in Arroyo Shrub sites was the highest of all sites in the project area. Shrub density averaged 1,100.8 stems per acre (SD 857.1) with broom snakeweed and 940.9 stems per acre (SD 881.2) without broom snakeweed. The most frequent species on point intercept transects were Russian thistle, tansy mustard, and four winged saltbush during the spring, and greasewood, Russian thistle, and tansy mustard during the fall.

Table 4: Average Cover, Constancy, and Production in the Arroyo Shrub Community Type

	Spring Average Total Cover	Spring Average Relative Cover	Fall Average Total Cover	Fall Average Relative Cover	Spring Average Number of Species from Constancy	Fall Average Number of Species from Constancy	Fall Average Production (lbs/acre)
Annual Forbs	7.9%	40.6%	4.4%	36.2%	9.6	5.0	105.1
Annual Grasses	2.2%	11.1%	0.3%	2.1%	1.3	0.9	2.5
Forbs[1]	0.1%	0.6%	0.2%	1.2%	0.2	0.2	8.7
Perennial Forbs	1.1%	5.6%	0.2%	1.4%	3.0	1.1	8.3
Perennial Grasses	4.2%	21.6%	1.9%	15.9%	2.7	2.1	19.2
Perennial Shrubs	4.0%	20.5%	5.2%	42.6%	2.8	2.9	175.8
Perennial Succulents	0.0%	0.0%	0.0%	0.0%	0.1	0.3	0.0
Unidentified	0.0%	0.0%	0.1%	0.6%	0.0	0.2	0.0
Total Perennial	9.3%	47.6%	7.3%	59.9%	8.5	6.4	203.3
Total	19.5%	100.0%	12.1%	100.0%	19.7	12.6	320.7
Standard Deviation	13.5%		6.2%		8.4	6.2	156.5

[1]. Forbs not specifically identified as either annual or perennial.

Total spring perennial cover was measured at 9.3% for a relative cover value of 47.6% (Table 4). Total fall perennial cover within the Arroyo Shrub vegetation community was measured at an average of 7.3% with a relative cover value of 59.9% (Table 4). Perennial grass cover displayed a relative cover value of 15.9% of

the vegetative cover. Shrub cover in this community was measured at 42.6% of vegetative cover from fall data, while annual forbs contributed the highest amount of vegetative cover in the spring at 40.6% (Table 4). Total average vegetative cover in the Arroyo Shrub community type varied from 19.5% (SD 13.5%) in the spring to 12.1% (SD 6.2%) in the fall (Table 4 and Figure 3). Average number of species recorded in constancy transects was higher in the spring at 19.7 species (SD 8.4) than in the fall at 12.6 species (SD 6.2) (Table 4). Biomass production, measured in the fall, was higher in Arroyo Shrub sites than in any other vegetation community and averaged 320.7 pounds per acre (SD 156.5) (Table 4).

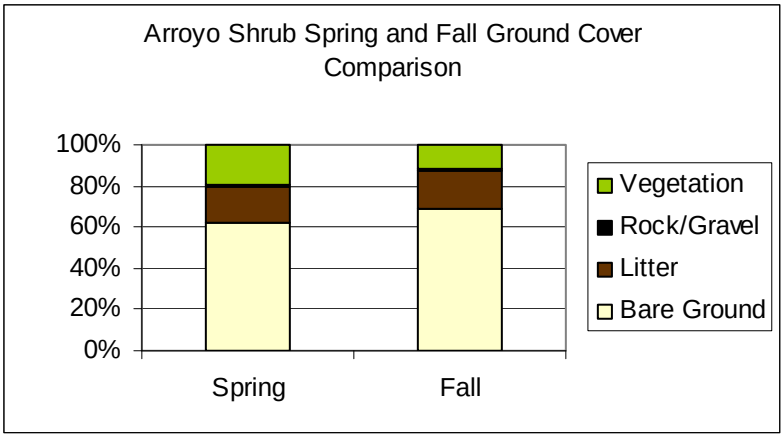


Figure 3: Average Total Cover from Spring and Fall Sampling in the Arroyo Shrub Community

5.4 Alkali Wash

Alkali Wash is vegetation habitat associated with minor waterways. These areas are typically broad and level with occasional small, dense patches of galleta grass and alkali sacaton. Alkali Wash range sites are typically located in washes and major drainages as well as at the base of Badlands. Terrain is nearly level to moderately sloping, ranging from 0-3%. In the project area, Alkali Wash accounts for the greatest percentage of vegetation in the project area at 36% (Table 1). In the spring 33 transects were sampled and 40 transects were completed during fall data collection (Attachment A, Exhibits 4 and 5).

The species that occurred on at least half of all Alkali Wash transects during spring data collection included, in descending order; tansy mustard, Russian thistle, mound saltbush *(Atriplex obovata*=ATOB), cryptantha, alkali sacaton, woolly plantain, annual Townsend daisy, stickseed (*Lappula occidentalis*=LAOC3), Gordon's buckwheat (*Eriogonum gordonii*=ERGO), halogeton (*Halogeton glomeratus*=HAGL), galleta grass, and dwarf gilia (*Ipomopsis pumila*=IPPU). Halogeton is listed as Class B noxious weed by the Bureau of Indian Affairs (BIA) Navajo Region. The species that occurred on at least half of all Alkali Wash transects during fall data collection included, in descending order; tansy mustard, Russian thistle, mound saltbush, alkali sacaton, halogeton, and annual Townsend daisy. Following Thin Breaks and Badlands, Alkali Wash sites had the least amount of vegetative cover. Shrub density averaged 540.3 stems per acre (SD 624.5) with broom snakeweed, and 510.9 stems per acre (SD 611.1) without broom snakeweed. The most frequent species on point intercept transects were Russian thistle, alkali

sacaton, and tansy mustard during the spring, and Russian thistle, alkali sacaton, and Gordon's buckwheat during the fall.

Table 5: Average Cover, Constancy, and Production in the Alkali Wash Community Type

	Spring Average Total Cover	Spring Average Relative Cover	Fall Average Total Cover	Fall Average Relative Cover	Spring Average Number of Species from Constancy	Fall Average Number of Species from Constancy	Fall Average Production (lbs/acre)
Annual Forbs	4.7%	57.8%	3.6%	62.6%	9.3	5.7	102.9
Annual Grasses	0.4%	4.8%	0.2%	3.5%	1.0	0.4	1.0
Forbs[1]	0.0%	0.0%	0.0%	0.0%	0.1	0.0	0.0
Perennial Forbs	0.3%	3.3%	0.0%	0.0%	2.2	0.6	2.2
Perennial Grasses	1.4%	16.7%	1.0%	17.4%	2.2	1.4	9.1
Perennial Shrubs	1.2%	14.8%	1.0%	16.5%	2.0	1.7	40.2
Perennial Succulents	0.0%	0.0%	0.0%	0.0%	0.3	0.2	0.0
Unidentified	0.2%	2.6%	0.0%	0.0%	0.0	0.0	0.0
Total Perennial	2.8%	34.8%	2.0%	33.9%	6.6	3.9	51.5
Total	8.2%	100.0%	5.8%	100.0%	17.1	10.0	156.9
Standard Deviation	6.4%		5.2%		6.1	4.6	75.4

[1]. Forbs not specifically identified as either annual or perennial.

Total spring perennial cover was measured at 2.8% with a relative cover value of 34.8% (Table 5). Total fall perennial cover within the Alkali Wash vegetation community was measured at an average of 2.0% with a relative cover value of 33.9% (Table 5). The greatest contributor to total vegetative cover was annual forbs comprising 4.7% mean vegetative cover on spring transects and 3.6% mean vegetative cover on fall transects. Total average vegetative cover in the Alkali Wash community type varied from 8.2% (SD 6.4%) in the spring to 5.8% (SD 5.2%) in the fall (Table 5 and Figure 4). More species were recorded during the spring than in the fall with an average of 17.1 species (SD 6.1) per transect in the spring, and 10.0 species (SD 4.6) per transect in the fall (Table 5). Biomass production, measured in the fall, averaged 156.9 pounds per acre (SD 75.4) (Table 5).

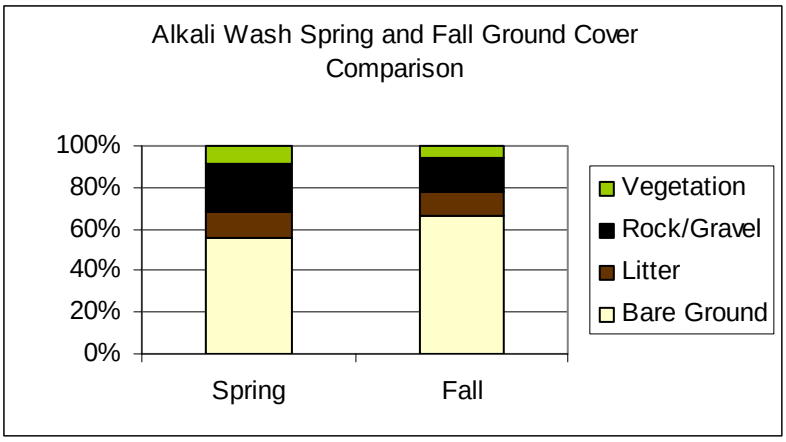


Figure 4: Average Total Cover from Spring and Fall Sampling in the Alkali Wash Community

5.5 Thin Breaks

Thin Breaks topography includes exposed shale, siltstone, and sandstone outcrops and associated thin soils of the immediate surrounding area. These sites usually occur along ridges and rock outcrops between plateaus and major drainages or plateaus and Badlands, as well as butte and mesa tops. Slopes vary from 2-9%. The soil surface is usually covered with thin, broken fragments of sandstone. There are rocky areas, sometimes with loose rock and sometimes with large pieces of rock, usually shale, firmly embedded in the ground. Thin Breaks are typically upland habitats, with surface rock as a unifying feature. Flat surface rocks allow for greater water runoff and for accumulation in crevices or fissures between rocks. Thin Breaks habitat can abruptly shift to another habitat type or gradually shift to Badlands or sandy soil habitats. Less than 9% of the project area consists of Thin Breaks (Table 1). Fifteen (15) transects were sampled during the spring and 41 during the fall (Attachment A, Exhibits 4 and 5).

The species that occurred on at least half of all Thin Breaks transects during spring data collection included, in descending order; Russian thistle, alkali sacaton, stickseed, shadscale saltbush, dwarf gilia, cryptantha, annual Townsend's daisy, mound saltbush, Powells' saltbush (*Atriplex powelli* var. *powelli*=ATPO2), and scorpion weed. The species that occurred on at least half of all Thin Breaks transects during fall data collection included, in descending order, Russian thistle, tansy mustard, alkali sacaton, mound saltbush, and stickseed. Thin Breaks sites averaged the least amount of bare ground, but the most rock or gravel ground cover, and very little vegetative cover. Shrub density averaged 511.3 stems per acre (SD 561.6) with broom snakeweed and 408.6 stems per acre (SD 338.3) without broom snakeweed. The most frequent species on point intercept transects were stickseed, four winged saltbush, and Russian thistle during the spring, and Russian thistle, alkali sacaton, and halogeton during the fall.

Table 6: Average Cover, Constancy, and Production in the Thin Breaks Community Type

	Spring Average Total Cover	Spring Average Relative Cover	Fall Average Total Cover	Fall Average Relative Cover	Spring Average Number of Species from Constancy	Fall Average Number of Species from Constancy	Fall Average Production (lbs/acre)
Annual Forbs	2.6%	57.7%	2.8%	58.5%	6.9	6.2	78.8
Annual Grasses	0.2%	4.2%	0.0%	0.0%	0.3	0.2	0.1
Forbs[1]	0.0%	0.0%	0.0%	0.5%	0.1	0.0	0.1
Perennial Forbs	0.1%	1.4%	0.0%	0.5%	1.1	0.8	1.9
Perennial Grasses	0.6%	14.1%	1.0%	20.0%	1.3	1.5	8.9
Perennial Shrubs	1.0%	22.5%	1.0%	20.0%	1.6	2.0	31.7
Perennial Succulents	0.0%	0.0%	0.0%	0.0%	0.3	0.3	0.0
Unidentified	0.0%	0.0%	0.0%[2]	0.5%	0.0	0.1	0.0
Total Perennial	1.7%	38.0%	1.9%	40.5%	4.3	4.5	42.5
Total	4.4%	100.0%	4.8%	100.0%	10.3	11.1	121.3
Standard Deviation	3.7%		3.6%		5.4	5.3	52.8

1. Forbs not specifically identified as either annual or perennial.
2. 0.024390243902439%

With a low vegetative component in the Thin Breaks community, there was little difference between cover values in spring and fall data. Total spring perennial cover within the Thin Breaks vegetation community was measured at an average of 1.7% with a relative cover value of 38.0% (Table 6). Total fall perennial cover was measured at 1.9% with a relative cover value of 40.5% (Table 6). The greatest contributor to total cover was annual forbs comprising 2.6% mean spring total cover and 2.8% mean fall total cover. Total vegetative cover in the Thin Breaks community type ranged from an average of 4.4% (SD 3.7%) in the spring to 4.8% (SD 3.6%) in the fall (Table 6 and Figure 5). The average number of species recorded was similar in both seasons with an average of 10.3 species (SD 5.4) per transect in the spring, and 11.1 species (SD 5.3) per transect in the fall (Table 6). Biomass production, measured in the fall, averaged 121.3 pounds per acre (SD 52.8) (Table 6).

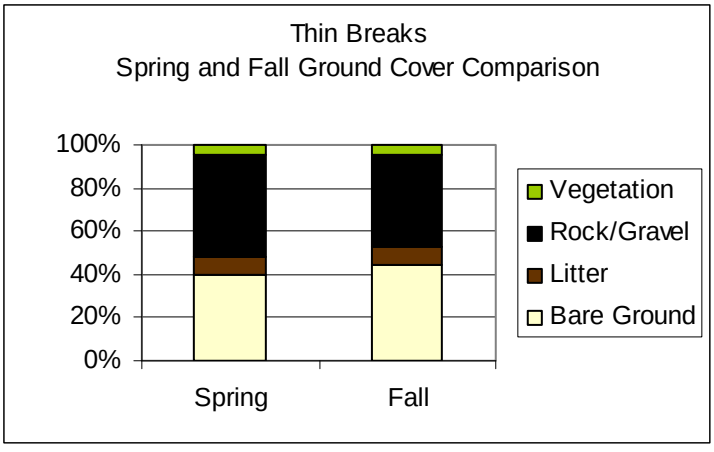


Figure 5: Average Total Cover from Spring and Fall Sampling in the Thin Breaks Community

5.6 Badlands

The Badlands vegetation community consists of exposed, weathered shales with steep to moderately undulating topography (10-60% slopes). These sites generally occur between plateau edges and major drainages. The badlands have the least vegetation of any of the six community types. Plants, where they occur, are often located along the small relief channels of these barren areas. This habitat can abruptly shift to another habitat type or gradually transition to Alkali Wash or Thin Breaks habitats. Seven percent (7%) of the project area is Badlands (Table 1). Data collection included 13 transects in the spring and 43 transects during the fall (Attachment A, Exhibits 4 and 5).

The species that occurred on at least half of all Badlands transects during spring data collection included, in descending order; Powell's saltbush, mound saltbush, annual Townsend daisy, stickseed, and woolly plantain. The species that occurred on at least half of all Badlands transects during fall data collection included, in descending order; mound saltbush, Powell's saltbush, Gordon's buckwheat, Russian thistle, tansy mustard, and four winged saltbush. Badlands sites were the least productive and had the smallest proportion of vegetative cover of all the vegetation communities. Shrub density averaged 519.5 stems per acre (SD 445.2) with broom snakeweed and 513.9 stems per acre (SD 450.3) without broom snakeweed. The most frequent species on point intercept transects were stickseed, Russian thistle, and cryptantha during the spring, and Gordon's buckwheat, mound saltbush, and Powell's saltbush during the fall.

Table 7: Average Cover, Constancy, and Production in the Badlands Community Type

	Spring Average Total Cover	Spring Average Relative Cover	Fall Average Total Cover	Fall Average Relative Cover	Spring Average Number of Species from Constancy	Fall Average Number of Species from Constancy	Fall Average Production (lbs/acre)
Annual Forbs	2.5%	66.7%	2.0%	65.4%	8.0	4.3	19.0
Annual Grasses	0.0%	0.0%	0.0%	0.8%	0.5	0.3	0.1
Forbs[1]	0.0%	0.0%	0.0%	0.8%	0.0	0.0	0.0
Perennial Forbs	0.1%	2.1%	0.1%	2.3%	1.3	0.8	1.4
Perennial Grasses	0.3%	8.3%	0.2%	6.8%	1.2	0.6	0.9
Perennial Shrubs	0.5%	12.5%	0.7%	24.1%	1.8	1.6	64.5
Perennial Succulents	0.0%	0.0%	0.0%	0.0%	0.1	0.1	0.0
Unidentified	0.4%	10.4%	0.0%	0.0%	0.0	0.0	0.0
Total Perennial	0.8%	22.9%	1.0%	33.1%	4.5	3.1	66.8
Total	3.7%	100.0%	3.1%	100.0%	12.9	7.7	85.9
Standard Deviation	3.5%		2.6%		6.4	3.6	109.5

[1]. Forbs not specifically identified as either annual or perennial.

Badlands sites are sparsely vegetated and cover data showed few seasonal differences. Total spring perennial cover within the Badlands vegetation community was measured at an average of 0.8% with a relative cover value of 22.9% (Table 7). Total fall perennial cover was measured at 1.0% with a relative cover value of 33.1% (Table 7). The greatest contributor to total cover was annual forbs comprising 2.5%

total cover on spring transects and 2.0% total cover on fall transects. Total vegetative cover in the Badlands community type ranged from an average of 3.7% (SD 3.5%) in the spring to 3.1% (SD 2.6%) in the fall (Table 7 and Figure 6). More species were recorded during the spring than in the fall with an average of 12.9 species (SD 6.4) per transect in the spring and 7.7 species (SD 3.6) per transect in the fall. Biomass production, measured in the fall, averaged 85.9 pounds per acre (SD 109.5) (Table 7).

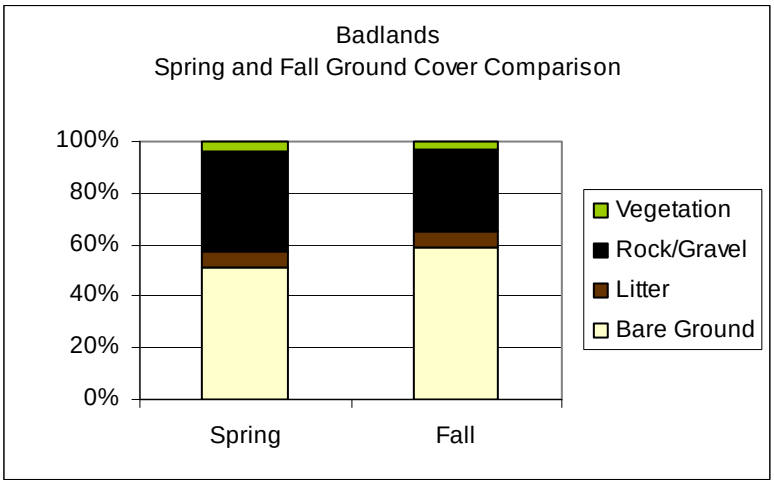


Figure 6: Average Total Cover from Spring and Fall Sampling in the Badlands Community

5.7 Cover Comparison Between Vegetation Types

The percentage of total vegetative cover in Dunes sites was 26.2% higher in spring than in fall, which is indicative of seasonal species variation (Figures 7 and 8). The Dunes sites had the most variation between spring and fall, while Badlands had the least with less than 1%. Dunes had the highest total vegetative cover in both spring and fall. Vegetative cover was lowest in the Badlands sites in both seasons. Perennial cover was higher in the spring than in the fall for in Dunes, Arroyo Shrub and Alkali Wash. Perennial cover was higher in the fall than in the spring in Badlands, Thin Breaks, and Sands. In all sites relative perennial cover varied widely between spring and fall. Other than Badlands sites, which had the lowest perennial cover in both spring and fall, the relative perennial cover in spring for all other sites was between 34.8% and 48.1%, but was only between 4.8% and 15% in the fall (Figures 7 and 8). Summaries of total cover by transect are presented in Attachment C.

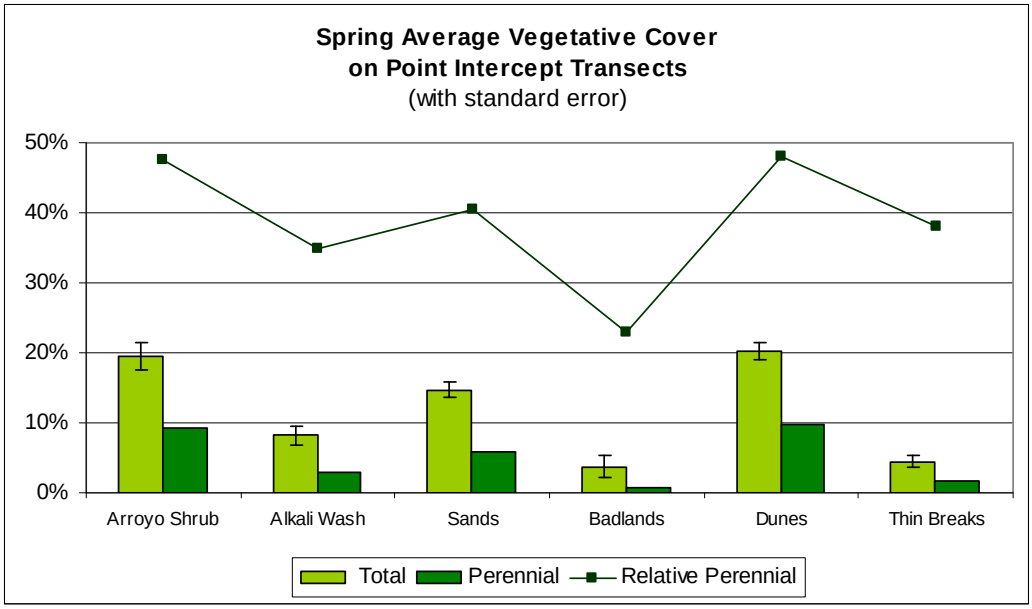


Figure 7: Spring Average Vegetative Cover in the Project Area

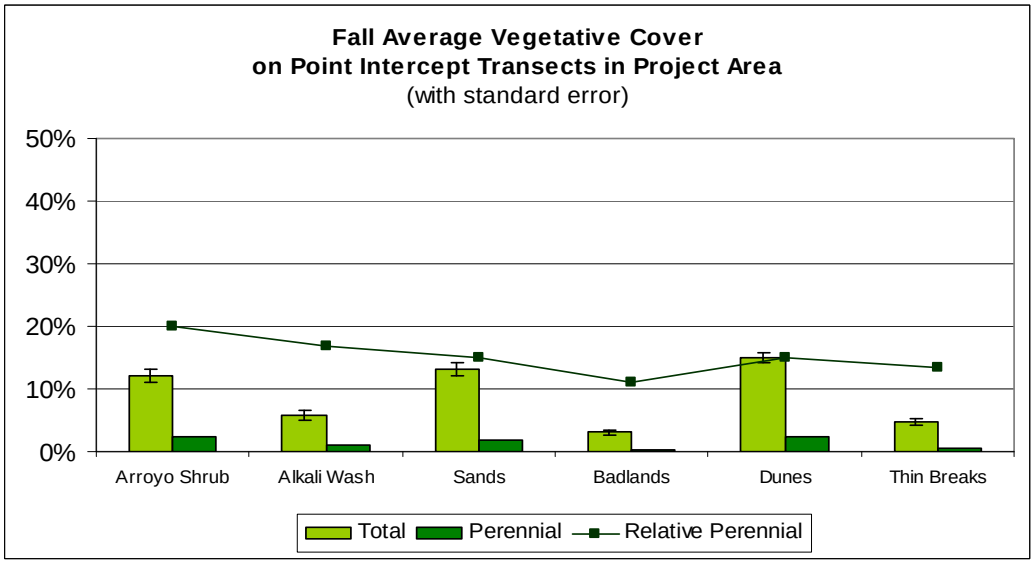


Figure 8: Fall Average Vegetative Cover in the Project Area

5.8 Constancy

A sites had the highest average number of species (18.7) during fall data collection, but Arroyo Shrub sites had higher species diversity (19.7) during spring data collection (Tables 2 and 4, Figure 9). Badlands had the least average number of species during both seasons; 12.9 in the spring and 7.7 in the fall (Table 7). Overall, the average number of species for all vegetation communities, with the exception of Thin Breaks was higher in the spring than in the fall, represented mainly by annual forbs (Figure 9). Summaries of the spring and fall constancy percentages by community are presented in Attachment E.

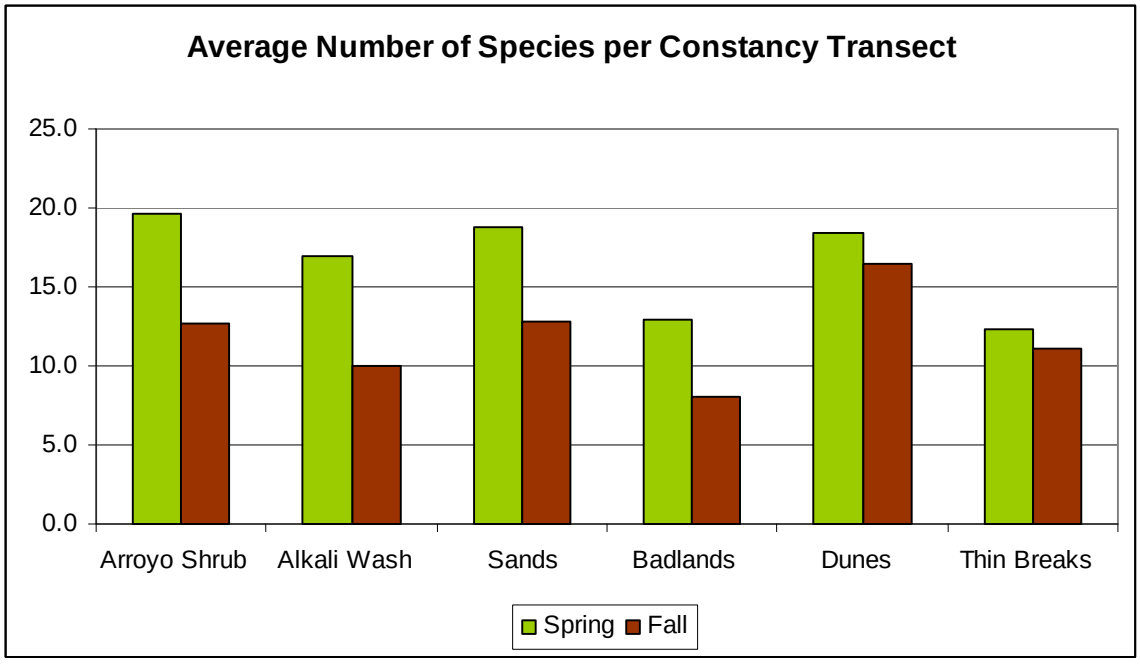


Figure 9: Average Number of Species Per Constancy Transect in the Project Area

5.9 Shrub Density

Arroyo Shrub and Sands sites had nearly identical shrub densities with 1100.8 (SD 857.1) and 1107.9 (SD 1183.0) respectively (Figure 10). However, when broom snakeweed was excluded from the calculations, the Sands shrub density average dropped considerably to 485.6 (SD 357.4), showing that broom snakeweed comprises a large proportion of shrubs in the Sands vegetation community (Figure 10). Arroyo Shrub had a high density of 940.9 (SD 881.2) shrubs per acre exclusive of broom snakeweed, while all other communities had between 408.6 and 543.4 stems per acre (Figure 10). Mound saltbush was the dominant shrub in three vegetation communities, comprising 25.4% of the shrubs in Arroyo Shrub, 46.3% in Alkali Wash, and 75.4% in Badlands. In the Dunes community the dominant shrub species were broom snakeweed and Mormon tea, 33.3% and 16.4% of the shrubs respectively. Broom snakeweed and shadscale saltbush were the dominant shrubs in the Sands community, 56.2% and 36.5% of the shrubs respectively. Shadscale saltbush was also dominant in Thin Breaks at 36.7%. Summaries of shrub density by community and by transect are presented in Attachment D.

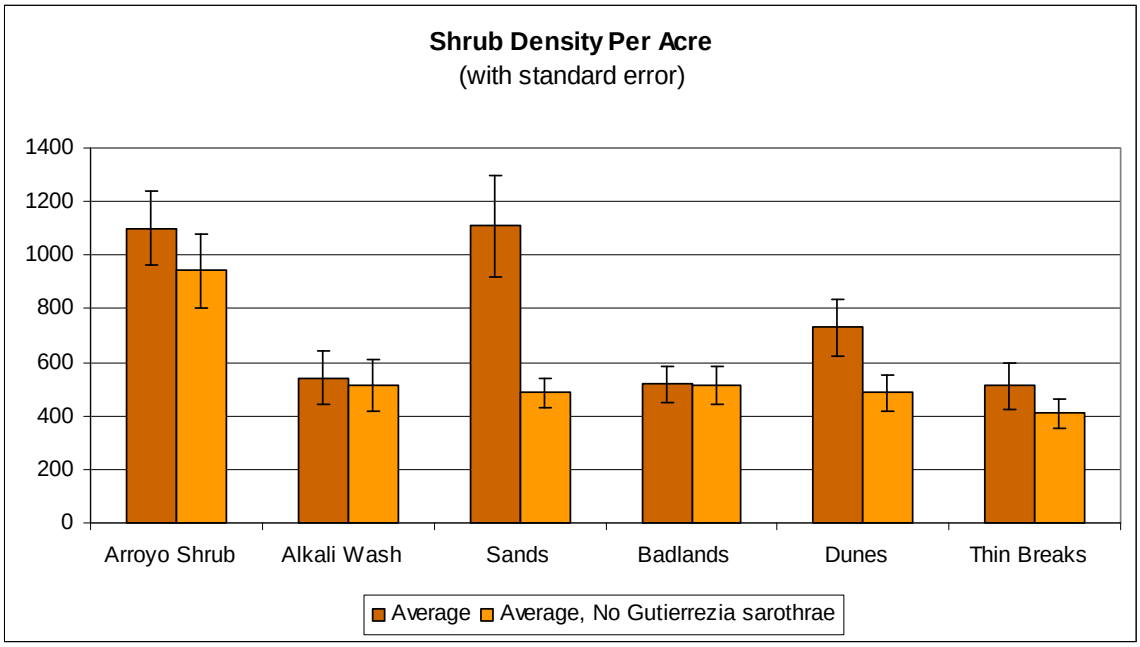


Figure 10: Average Shrub Density in the Project Area

5.10 Production

Arroyo Shrub had the highest total vegetative production per transect at 320.7 (SD 156.5) pounds per acre air dry weight, and Badlands had the lowest with 85.9 (109.5) pounds per acre (Figure 11). Dunes and Sands had similar production with 2209.7 (SD 58.8) pounds per acre and 208.6 (SD 62.5) pounds per acre respectively (Figure 11). There was more perennial species production than annual species production in all vegetation communities. Perennial production, including shrubs, was highest in the Badlands community at 91.5%, including a relative shrub production of 87.2% (Table 7). Perennial production, including shrubs, was lowest in Alkali Wash at 46% (Table 5). Summaries of spring and fall production by transect and by community are presented in Attachment F.

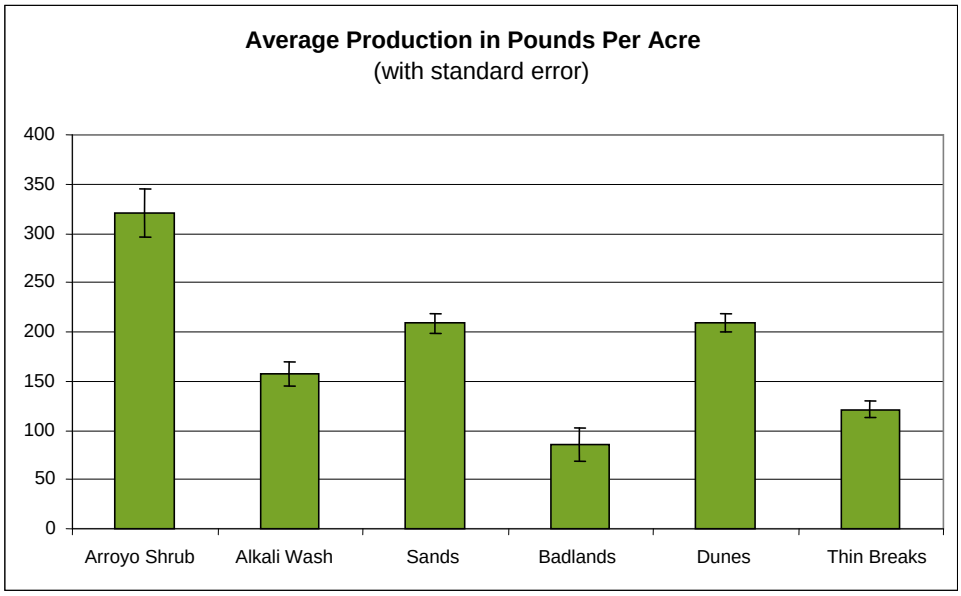


Figure 11: Fall Average Production in Pounds Per Acre in the Project Area

6.0 Reference Area

Vegetation reference areas are locations that will not be disturbed by mining activities and are managed in a manner that is consistent with post mining land uses (e.g., livestock grazing). Reference areas consist of the key vegetation communities found within the proposed mining area. Key communities were selected based on consultation with OSM and are consistent with communities within NMEP permit area. The key communities consist of representative Alkali Wash, Arroyo Shrub, and Sands.

Through consultations with the BNCC Environmental Department, two potential reference areas were selected for data collection. Potential reference areas were selected based the following criteria; 1) the potential reference areas were representative of the vegetation communities located within the boundaries of Areas 4 South and 5, 2) they were not going to be impacted by mining, and 3) they were large enough in size to maintain natural ecological processes. One potential reference area was eliminated from further consideration during an onsite visit and consultation with OSM personnel on September 18, 2007.

The remaining reference area vegetation types were mapped using the same methods outlined in Section 4.0 – Vegetation Information Collection and Analysis, followed by extensive ground truthing (Attachment A, Exhibit 6). The reference area totals 279.5 acres (Table 8).

In fall 2007, 45 transects were randomly located and 39 to 40 of these were sampled in each of the reference area vegetation communities (i.e., Alkali Wash, Arroyo Shrub, and Sands) (Exhibit 6). We attempted to sample 40 transects in each reference vegetation community; the variance in final transects sampled was due to on-the-ground changes in vegetation community delineations. All parameters and methods discussed in Section 4.0 – Vegetation Information Collection and Analysis were applied to the random sampling sites within the reference area.

Table 8 Reference Area Vegetation Community Acreages

Vegetation Community Type	Acreage	Percent of Total
Alkali Wash	157.6	56.4
Sands	60.1	21.5
Arroyo Shrub	61.8	22.1
Total	279.5	100%

6.1 Reference Alkali Wash

The species that occurred on at least half of all Reference Alkali Wash transects during fall data collection included, in descending order; mound saltbush, tansy mustard, Russian thistle, woolly plantain, alkali sacaton, annual Townsend daisy, halogeton, and globemallow. Shrub density averaged 773.0 stems per acre (SD 680.3) with broom snakeweed and 698.1 stems per acre (SD 600.2) without broom snakeweed. Fifty-six percent (56%) of the reference area is vegetated with Alkali Wash (Table 8). Forty (40) transects were sampled during the fall data collection (Attachment A, Exhibit 6). The most frequent species on point intercept transects were alkali sacaton, woolly plantain, and Russian thistle. Summaries by transect for the Reference Alkali Wash community are presented in Attachments C, D, E, and F.

Table 9: Average Cover, Constancy, and Production in the Reference Alkali Wash Community Type

	Fall Average Total Cover	Fall Average Relative Cover	Fall Average Number of Species from Constancy	Fall Average Production (lbs/acre)
Annual Forbs	3.5%	49.6%	7.1	71.4
Annual Grasses	0.9%	12.9%	1.2	2.4
Forbs[1]	0.0%	0.0%	0.1	0.1
Perennial Forbs	0.5%	6.4%	1.4	5.5
Perennial Grasses	1.5%	21.4%	1.8	6.7
Perennial Shrubs	0.7%	9.3%	1.8	28.4
Perennial Succulents	0.0%	0.4%	0.3	0.0
Unidentified	0.0%	0.0%	0.2	0.0
Total Perennial	2.6%	37.5%	5.3	40.6
Total	7.0%	100.0%	13.8	114.6
Standard Deviation	8.0%		3.9	51.3

[1]. Forbs not specifically identified as either annual or perennial.

Vegetative cover in the Reference Alkali Wash community type totaled 7.0% (SD 8.0%) and was dominated by annual forbs which composed 49.6% of relative vegetative cover (Table 9). Perennial cover was measured at 2.6% for a relative cover value of 37.5% (Table 9). Perennial grasses comprised 21.4% of vegetative cover. An average of 13.8 species (SD 3.9) were recorded on constancy transects, and production averaged 114.6 pounds per acre air dry weight (SD 51.3) (Table 9).

6.2 Reference Arroyo Shrub

The species that occurred on at least half of all Reference Arroyo Shrub transects during fall data collection included, in descending order; alkali sacaton, mound saltbush, curlycup gumweed (*Grindelia squarrosa*=GRSQ), little barley (*Hordeum pusillum*=HOPU), woolly plantain, tansy mustard, galleta grass, and Russian thistle. Shrub density averaged 509.5 stems per acre (SD 442.5) with broom snakeweed and 443.1 stems per acre (SD 423.8) without broom snakeweed. Thirty-nine (39) transects were sampled during the fall data collection (Attachment A, Exhibit 6). The most frequent species on point intercept transects were alkali sacaton, little barley, and woolly plantain. Summaries by transect for the Reference Arroyo Shrub community are presented in Attachments C, D, E, and F.

Table 10: Average Cover, Constancy, and Production in the Reference Arroyo Shrub Community Type

	Fall Average Total Cover	Fall Average Relative Cover	Fall Average Number of Species from Constancy	Fall Average Production (lbs/acre)
Annual Forbs	4.1%	19.4%	5.1	41.9
Annual Grasses	5.7%	27.2%	2.3	36.6
Forbs[1]	0.1%	0.4%	0.3	2.2
Perennial Forbs	0.8%	4.0%	2.0	31.0
Perennial Grasses	9.2%	43.6%	1.9	77.1
Perennial Shrubs	1.0%	4.6%	1.9	65.7
Perennial Succulents	0.2%	0.7%	0.3	0.0
Unidentified	0.0%	0.0%	0.0	0.0
Perennial	11.2%	53.0%	6.1	173.8
Total	21.1%	100.0%	13.8	254.5
Standard Deviation	10.9%		4.2	91.6

[1]. Forbs not specifically identified as either annual or perennial.

Vegetative cover in the Reference Arroyo Shrub community type totaled 21.1% (SD 10.9%) and was dominated by perennial grasses which composed 43.6% of the relative vegetative cover (Table 10). Annual grasses comprised a relative cover value of 27.2% of vegetative cover. An average of 13.8 species (SD 4.2) were recorded on constancy transects, and production averaged 254.5 pounds per acre air dry weight (SD 91.6) (Table 10).

6.3 Reference Sands

The species that occurred on at least half of all Reference Sands transects during fall data collection included, in descending order; Russian thistle, woolly plantain, alkali sacaton, cryptantha, tansy mustard, scorpion weed, galleta grass, Indian ricegrass, annual Townsend daisy, mound saltbush, purple aster, and broom snakeweed. Shrub density averaged 2,340.0 stems per acre (SD 2,352.5) with broom snakeweed and 402.6 stems per acre (SD 330.3) without broom snakeweed. Thirty-nine (39) transects were sampled during the fall data collection (Attachment A, Exhibit 6). The most frequent species on point intercept transects

were alkali sacaton, broom snakeweed, and galleta. Summaries by transect for the Reference Sands community are presented in Attachments C, D, E, and F.

Table 11: Average Cover, Constancy, and Production in the Reference Sands Community Type

	Fall Average Total Cover	Fall Average Relative Cover	Fall Average Number of Species from Constancy	Fall Average Production (lbs/acre)
Annual Forbs	3.6%	28.6%	7.6	69.1
Annual Grasses	0.2%	1.4%	0.8	0.5
Forbs[1]	0.0%	0.0%	0.0	0.0
Perennial Forbs	0.1%	0.8%	2.3	2.7
Perennial Grasses	5.4%	43.3%	2.7	41.9
Perennial Shrubs	3.2%	25.5%	2.2	74.7
Perennial Succulents	0.1%	0.4%	0.5	0.0
Unidentified	0.0%	0.0%	0.0	0.0
Perennial	8.8%	70.0%	7.7	119.4
Total	12.6%	100.0%	16.2	189.0
Standard Deviation	4.6%		2.8	52.6

[1]. Forbs not specifically identified as either annual or perennial.

Vegetative cover in the Reference Sands community type totaled 12.6% (SD 4.6%) (Table 11). Vegetative cover in the Reference Sands community was dominated by perennial grasses which composed 43.3% of the relative vegetative cover. Annual forbs accounted for 28.6% of relative vegetative cover in the Sands reference area (Table 11). An average of 16.2 species (SD 2.8) were recorded on constancy transects, and production averaged 189.0 pounds per acre air dry weight (SD 52.6) (Table 11).

7.0 Project Area and Reference Area Comparison

7.1 Constancy

During fall sampling the Sands community had the largest variance between the number of species observed in the project area (12.8 species, SD 3.4) and the reference area (16.2 species, SD 2.8) (Table 12 and Figure 12). Reference Arroyo Shrub had an average of 13.8 species (SD 4.2) which was similar to the average 12.6 species (SD 6.2) recorded in the project area Arroyo Shrub sites (Table 12 and Figure 12). The average number of species in the Reference Alkali Wash was 13.8 (SD 3.9); while the project area Alkali Wash sites had an average of 10.0 species (SD 4.6) (Table 12 and Figure 12). Overall, the three vegetation types within the Reference Area displayed a higher average number of species than sites within the project area. The difference is not noticeable in any one life form, and the difference may not be statistically significant.

Table 12: Average Number of Species per Constancy Transect Comparison

Community	Average	Standard Deviation
Alkali Wash	10.0	4.6
Reference Alkali Wash	13.8	3.9
Arroyo Shrub	12.6	6.2
Reference Arroyo Shrub	13.8	4.2
Sands	12.8	3.4
Reference Sands	16.2	2.8

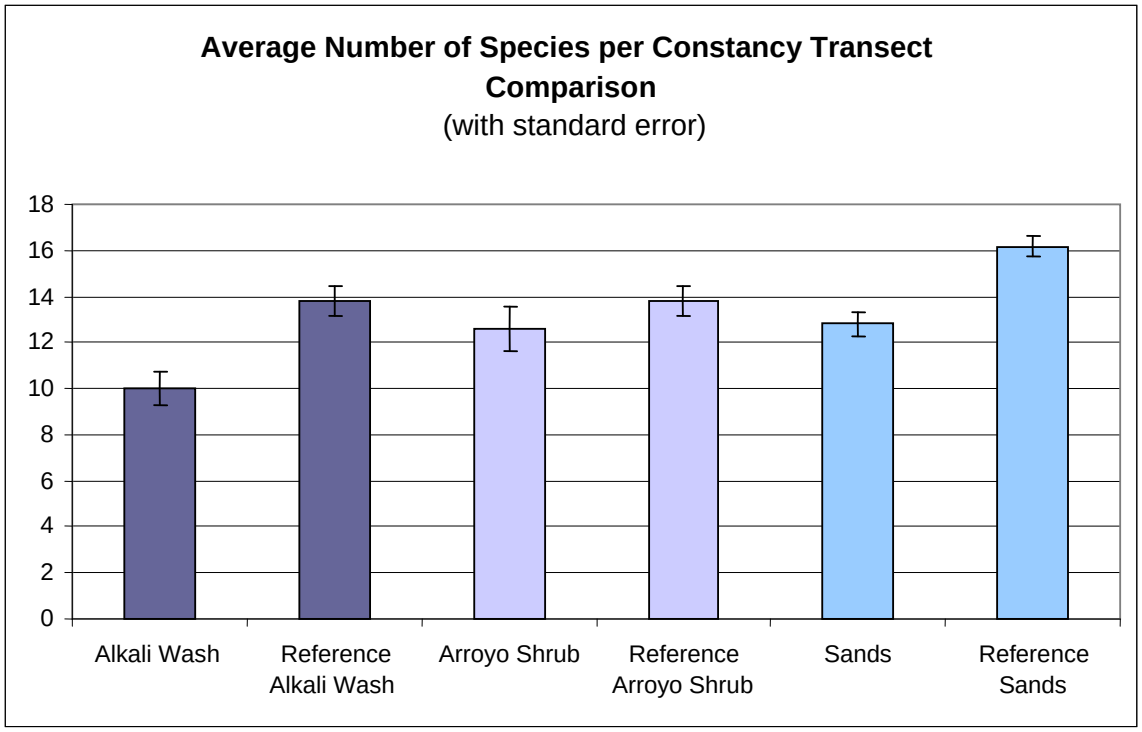


Figure 12: Fall Average Number of Species Per Constancy Transect in the Project Area and Reference Area.

7.2 Shrub Density

The Reference Sands sites showed the highest range of variability of shrub density with and without broom snakeweed (Table 13 and Figure 13). The average shrub density in this community type ranged from 2,340.0 stems per acre with broom snakeweed (SD 2,352.5) and 402.6 stems per acre without broom snakeweed (SD 330.3) (Table 13 and Figure 13). Comparatively, shrub density ranged from 1,107.9 stems per acre with broom snakeweed (SD 1,183.0) to 485.6 without broom snakeweed (SD 357.4) in the project area Sands sites (Table 13 and Figure 13). Shrub density averaged 773.0 stems per acre with broom snakeweed (SD 680.3) and 698.1 stems per acre without broom snakeweed (SD 600.2) in Reference Alkali Wash sites (Table 13 and Figure 13). In the project area, Alkali Wash sites averaged 540.3 stems per acre with broom snakeweed (SD 624.5) and

510.9 without broom snakeweed (SD 611.1) (Table 13 and Figure 13). Shrub density in the Reference Arroyo Shrub averaged 509.5 stems per acre with broom snakeweed (SD 442.5) and 443.1 stems per acre without broom snakeweed (SD 423.8) (Table 13 and Figure 13). In the project area Arroyo Shrub density averaged 1,100.8 stems per acre with snake weed (SD 857.1) and 940.9 stems per acre without broom snakeweed (SD 881.2) (Table 13 and Figure 13).

Table 13: Shrub Density per Acre Comparison

Community	Average	Standard Deviation	Average No broom snakeweed	Standard Deviation No broom snakeweed
Arroyo Shrub	1100.8	857.1	940.9	881.2
Reference Arroyo Shrub	509.5	442.5	443.1	423.8
Alkali Wash	540.3	624.5	510.9	611.1
Reference Alkali Wash	773.0	680.3	698.1	600.2
Sands	1107.9	1183.0	485.6	357.4
Reference Sands	2340.0	2352.5	402.6	330.3

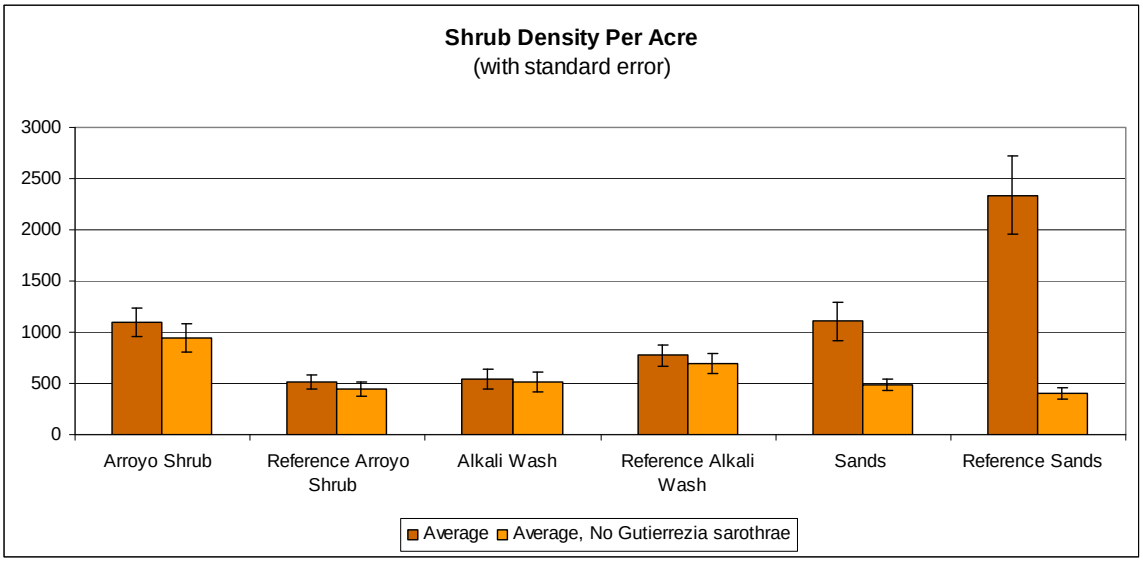


Figure 13: Fall Average Shrub Density in the Project Area and Reference Area.

7.3 Production

Arroyo Shrub had the highest production values in both the project area and reference area at 320.7 pounds per acre (SD 156.5) and 254.5 pounds per acre (SD 91.6), respectively (Table 14 and Figure 14). Shrubs accounted for 54.8% of production values in the Arroyo Shrub in the project area, while shrubs comprised 25.8% of total production in the Reference Arroyo Shrub (Table 14). In comparison, perennial grasses in the Reference Arroyo Shrub comprised 30.3% of total production compared to only 5.9% in the project area Arroyo Shrub (Table 14 and Figure 24). This suggests a variation in composition between the Arroyo Shrub and Reference Arroyo Shrub sites.

Production values were very similar between the project area and reference area Sands sites with the primary difference between the two areas being the percentage of forbs (Table 14). The total production for the project area and reference area was 208.6 pounds per acre (SD 62.5) and 189.0 (SD 52.6) pounds per acre, respectively (Table 14 and Figure 14). Annual forbs accounted for 50.5% of total production in the project area compared with 36.5% in the reference area.

Alkali Wash average production values ranged from 156.9 pounds per acre (SD 75.4) in the project area to 114.6 pounds per acre (SD 51.3) in the reference area (Table 14 and Figure 14). The composition of production was similar between the two areas with forbs comprising 65.6% of total average production in the project area and 62.3% in the reference area. Shrubs accounted for 25.6% and 19.5% of total average production in the project area and reference areas, respectively. Perennial grasses comprised 5.8% of total average production in both areas.

Table 14: Average Production in Pounds Per Acre by Life Form Comparison Between the Project Area and Reference Area.

	Alkali Wash	Reference Alkali Wash	Arroyo Shrub	Reference Arroyo Shrub	Sands	Reference Sands
Annual Forbs	102.9	71.4	105.1	41.9	105.1	69.1
Annual Grasses	1.0	2.4	2.5	36.6	0.2	0.5
Forbs[1]	0.0	0.1	8.7	2.2	0.0	0.0
Perennial Forbs	2.2	5.5	8.3	31.0	2.3	2.7
Perennial Grasses	9.1	6.7	19.2	77.1	44.1	41.9
Shrubs	40.2	28.4	175.8	65.7	57.0	74.7
Total	156.9	114.6	320.7	254.5	208.6	189.0
Standard Deviation	75.4	51.3	156.5	91.6	62.5	52.6

[1]. Forbs not specifically identified as either annual or perennial.

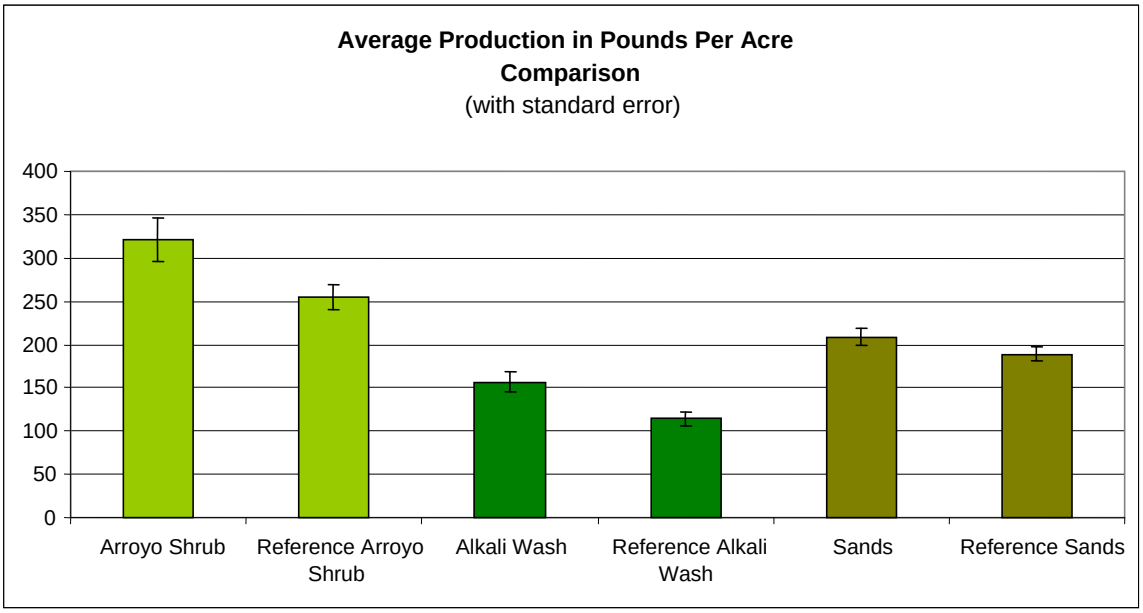


Figure 14: Production in Average Pounds Per Acre Comparison Between the Project Area and Reference Area.

We analyzed the distribution of production data within the project area and reference area for normalcy by creating histograms and probability plots using SYSTAT 12. The data was not normally distributed. To test our null hypothesis (H_0) that production values in the project area and reference area are the same, we used a Mann-Whitney test, the nonparametric analog of the two sample t-test. We tested this hypothesis in three vegetation communities assuming an alpha level of 0.05 (Table 15).

Table 15: Mann-Whitney Results for Production Comparison of Community Types in the Project Area and Reference Area.

Community	Project Area $\bar{x}$ ± Standard Error	Reference Area $\bar{x}$ ± Standard Error	*U*	*P* value
Arroyo Shrub	321 lbs/acre ± 68	255 lbs/acre ± 33	712	0.63
Alkali Wash	157 lbs/acre ± 24	115 lbs/acre ± 22	988	0.07
Sands	209 lbs/acre ± 21	189 lbs/acre ± 17	832	0.26

In the Arroyo Shrub community, production did not differ significantly (Mann-Whitney $U = 712$, $P = 0.63$) between the project area [$\bar{x}$ = 321 lbs/acre ± 68 (SE)] and the reference area ($\bar{x}$ = 255 lbs/acre ± 33). Below are box plots for production on Reference Arroyo Shrub in comparison to project area Arroyo Shrub transects (Figure 15). The central box spans the quartiles, the line in the box indicates the median, asterisks and circles indicate outliers, and the lines extending from the box indicate minimum and maximum values.

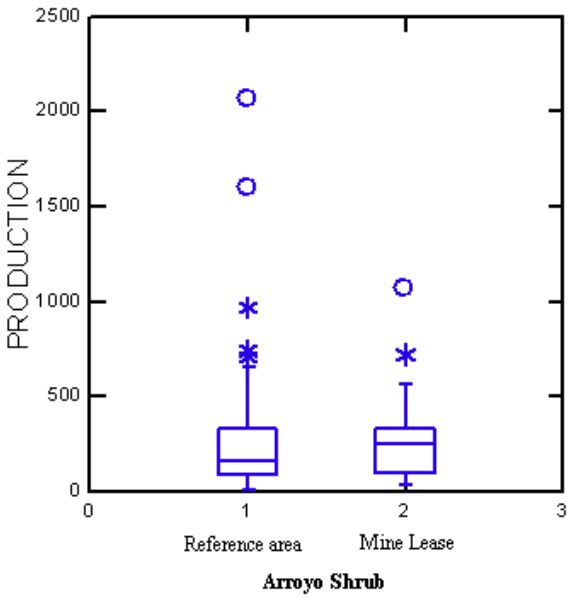


Figure 15: Box Plot Comparison for Production in the Project Area and Reference Area Arroyo Shrub Community Type.

In the Alkali Wash community, production also did not differ significantly (Mann-Whitney $U = 988$, $P = 0.07$) between the project area ($\bar{x}$ = 157 lbs/acre ± 24) and the reference area ($\bar{x}$ = 115 lbs/acre ± 22) (Figure 16).

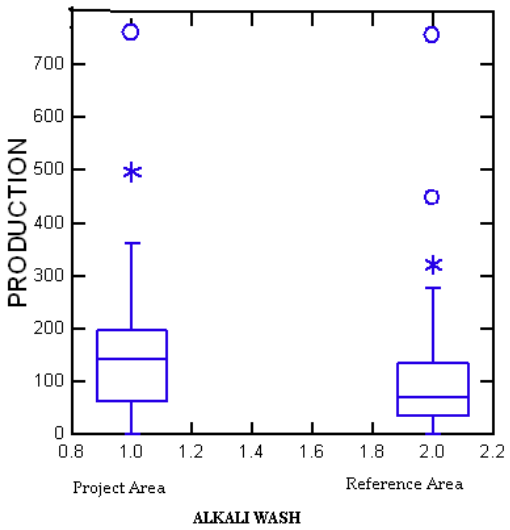


Figure 16: Box Plot Comparison for Production in the Project Area and Reference Area Alkali Wash Community Type.

In the Sands community, production did not differ significantly (Mann-Whitney U = 832, P = 0.26) between the project area ($\bar{X}$ = 209 lbs/acre ± 21) and the reference area ($\bar{X}$ = 189 lbs/acre ± 17) (Figure 17).

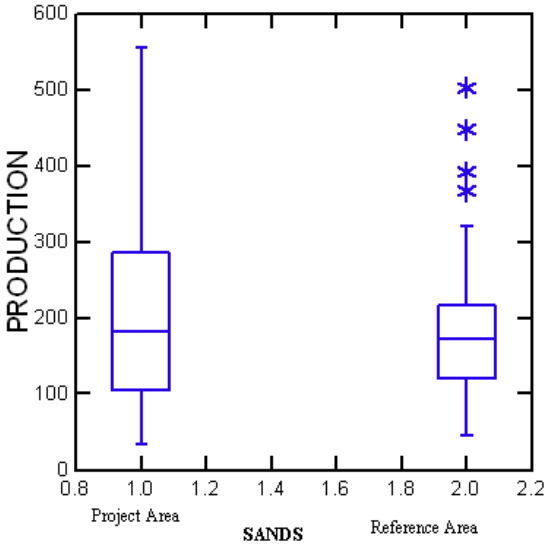


Figure 17: Box Plot Comparison for Production in the Project Area and Reference Area Sands Community Type.

7.4 Cover

The Arroyo Shrub vegetation type displayed the greatest difference in total vegetative cover between the project area and reference area. Total vegetative cover averaged 12.1%, with a minimum of 2.0% and a maximum of 27%, within the project area (Figure 18). In the reference area, Arroyo Shrub had an average

total cover of 21.1%, with a minimum of 4% and a maximum of 43% (Figure 18). Perennial cover between the two areas ranged from an average of 7.3% in the project area compared to 11.2% in the reference area (Figure 18). Bare ground values ranged from an average of 53.7% (SD 17.9%) in the reference area to 69.0% (SD 17.9%) in the project area (Figure 19.)

The Alkali Wash vegetation type in the project area had an average of 5.8% total vegetative cover with a minimum of 0% and a maximum of 21% (Figure 18). Total vegetative cover averaged 7.0% in the Reference Alkali Wash, with a minimum of 0% and a maximum of 50% (Figure 18). Average perennial cover ranged from 2.0% in the project area to 2.6% in the reference area (Figure 18). Bare ground values ranged from an average of 60.8% (SD 13.3%) in the reference area to 66.7% (SD 10.0%) in the project area (Figure 19.)

Vegetative cover in the project area Sands sites averaged 13.1%, with a minimum of 3% and a maximum of 27% (Figure 18). Total vegetative cover averaged 12.6% in the Reference Sands, with a minimum of 5% and a maximum of 25% (Figure 18). Perennial cover was similar with an average of 7.9% in the project area and an average of 8.8% in the reference area (Figure 18). Bare ground values ranged from an average of 65.6% (SD 7.3%) in the reference area to 62.7% (SD 10.3%) in the project area (Figure 19.)

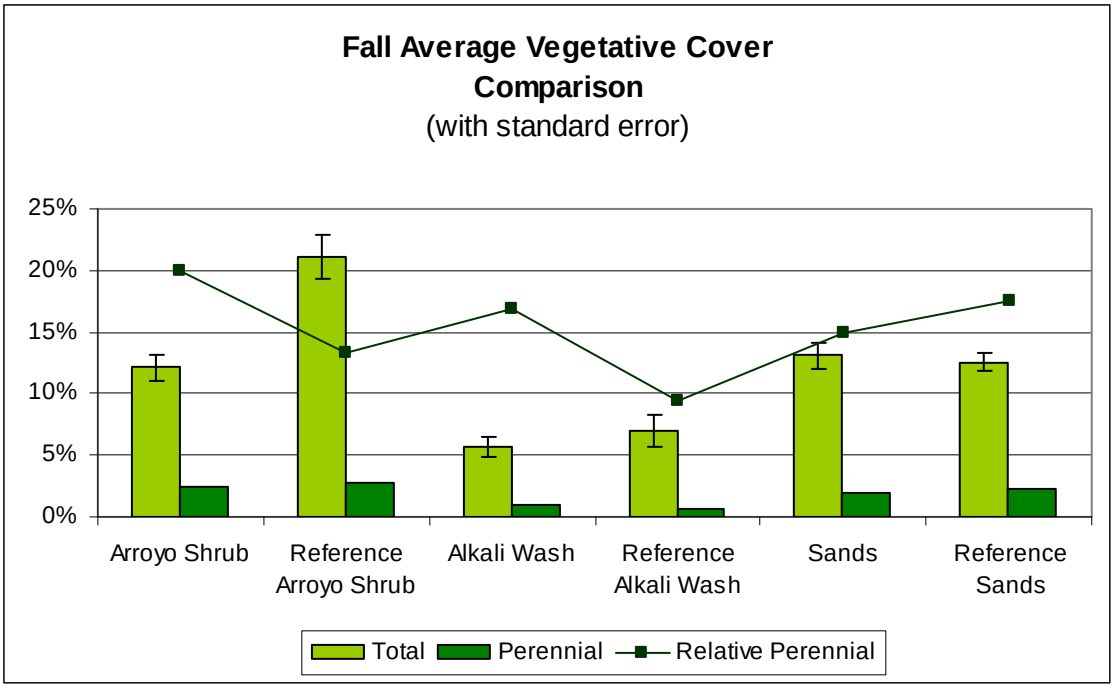


Figure 18: Vegetative Cover Comparison Between the Project Area and Reference Area.

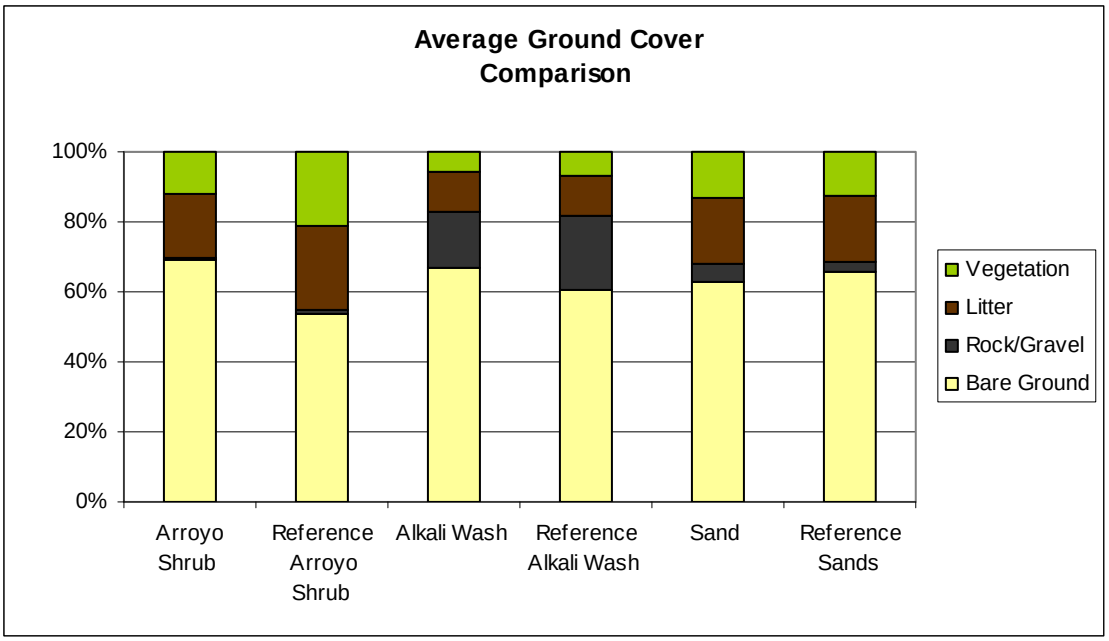


Figure 19: Ground Cover Comparison Between the Project Area and Reference Area.

We analyzed the distribution of vegetative cover data within the project area and reference area for normalcy by creating histograms and probability plots using SYSTAT 12. Similar to vegetative production, the data was not normally distributed. To test our null hypothesis (H_0) that vegetative cover values in the project area and reference area are the same, we used a Mann-Whitney test, the nonparametric analog of the two sample t-test. We tested this hypothesis in the three vegetation types assuming an alpha level of 0.05 (Table 16).

Table 16: Mann-Whitney Results for Vegetative Cover Comparison of Community Types in the Project Area and Reference Area.

Community	Project Area $\bar{x}$ ± Standard Error	Reference Area $\bar{x}$ ± Standard Error	*U*	*P* value
Arroyo Shrub	13% ± 1	21% ± 2	424	0.01
Alkali Wash	6% ± 1	7% ± 1	756	0.67
Sands	13% ± 1	13% ± 1	744	0.73

In the Arroyo Shrub vegetative cover did differ significantly (Mann-Whitney $U = 424$, $P < 0.01$; $\bar{x}_{\text{project area}} = 13\% \pm 1$, $\bar{x}_{\text{reference area}} = 21\% \pm 2$). Below are box plots for production and cover on Reference Arroyo Shrub in comparison to project area Arroyo Shrub transects (Figure 20). The central box spans the quartiles, the line in the box indicates the median, asterisks and circles indicate outliers, and the lines extending from the box indicate minimum and maximum values.

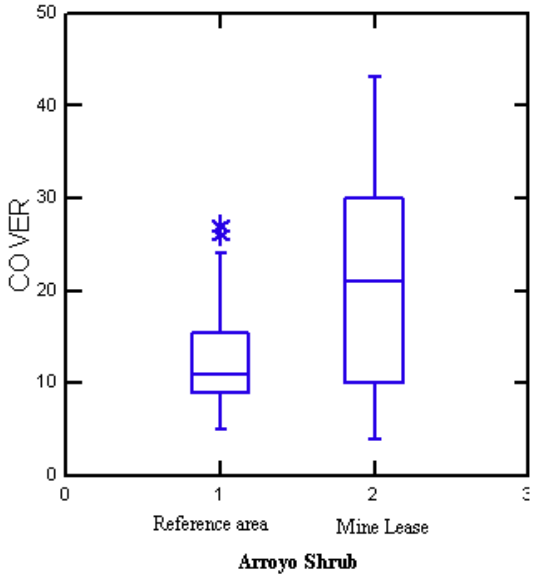


Figure 20: Box Plot Ground Cover Comparison Between the Project Area and Reference Area Arroyo Shrub.

Between the project area and reference area Alkali Wash sites, vegetative cover did not differ significantly (Mann-Whitney $U = 756$, $P = 0.67$; $\overline{x}_{\text{project area}} = 6\% \pm 1$, ($\overline{x}_{\text{reference area}} = 7\% \pm 1$) (Figure 21).

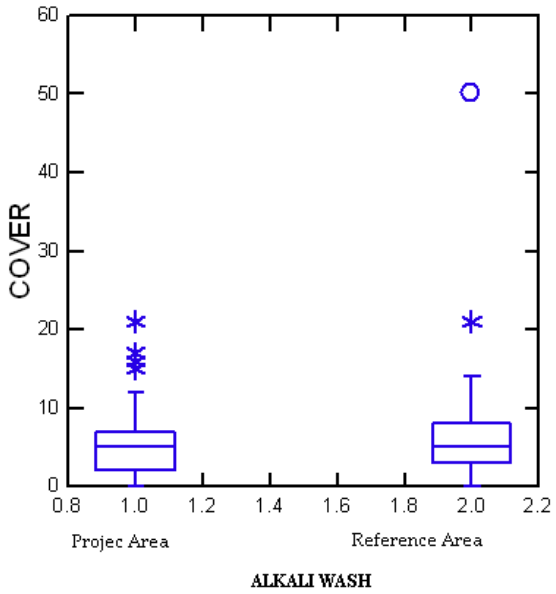


Figure 21: Box Plot Ground Cover Comparison Between the Project Area and Reference Area Alkali Wash.

Vegetative cover did not differ significantly (Mann-Whitney $U = 744$, $P = 0.72$; $\overline{x}_{\text{project area}} = 13\% \pm 1$, ($\overline{x}_{\text{reference area}} = 13\% \pm 1$) between the project area and reference area Sands sites (Figure 21).

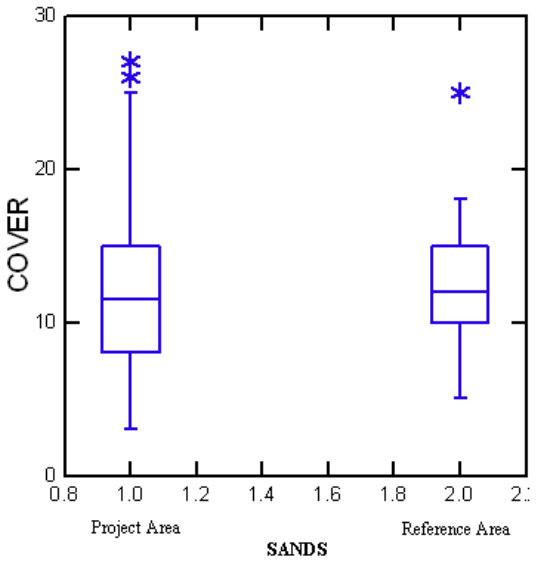


Figure 22: Box Plot Ground Cover Comparison Between the Project Area and Reference Area Sands.

7.5 Conclusion

According to our data, vegetative cover and production are statistically similar in the project area and the reference area for the Alkali Wash vegetation type. The Alkali Wash vegetation type in the project area had an average of 5.8% total vegetative cover while vegetative cover averaged 7.0% in the Reference Alkali Wash (Figure 18). Average perennial cover was 2.0% in the project area and 2.6% in the reference Alkali Wash community (Figure 18). Alkali Wash average production was 156.9 pounds per acre (SD 75.4) in the project area and 114.6 pounds per acre (SD 51.3) in the reference area (Table 14 and Figure 14). The composition of production was similar between the two areas with forbs comprising 65.6% of total average production in the project area and 62.3% in the reference area. Shrubs accounted for 25.6% and 19.5% of total average production in the project area and reference areas, respectively. Perennial grasses comprised 5.8% of total average production in both areas. The average number of species in the Reference Alkali Wash was 13.8; while the project area Alkali Wash sites had an average of 10.0 species (Figure 12). In Reference Alkali Wash sites shrub density averaged 773.0 stems per acre with broom snakeweed and 698.1 stems per acre without broom snakeweed. In the project area, Alkali Wash sites averaged 540.3 stems per acre with broom snakeweed and 510.9 without broom snakeweed (Figure 13).

Vegetative cover and production are statistically similar in the project area and the reference area for the Sands vegetation type. Vegetative cover in the project area Sands sites averaged 13.1% while total vegetative cover averaged 12.6% in the Reference Sands. Perennial cover was similar with an average of 7.9% in the project area and an average of 8.8% in the Sands reference area (Figure 18). Production was very similar between the project area and reference area Sands sites with the primary difference between the two areas being the percentage of forbs (Table 14). The average total production for the project area and reference area was 208.6 pounds per acre (SD 62.5) and 189.0 (SD 52.6) pounds per acre, respectively (Table 14 and Figure 14). During fall sampling the Sands community had the largest variance between the

number of species observed in the project area at 12.8 species, and the reference area with an average of 16.2 species (Figure 12). The Reference Sands sites showed the highest range of variability of shrub density with and without broom snakeweed. The average shrub density in this community type was 2,340.0 stems per acre with broom snakeweed and 402.6 stems per acre without broom snakeweed (Figure 13). Comparatively, shrub density was 1,107.9 stems per acre with broom snakeweed and 485.6 without broom snakeweed in the project area Sands sites (Figure 13).

For both the Alkali Wash and Sands communities, the similarities of vegetation parameters based on data collected and statistical analysis indicates that the reference area community types are representative of project area community types.

Production is statistically similar in the project area and the reference area in the Arroyo Shrub community. However, vegetative cover in the Arroyo Shrub community is statistically different between the project area and the reference area. Arroyo Shrub had the highest average production in both the project area and reference area at 320.7 pounds per acre and 254.5 pounds per acre, respectively (Table 14 and Figure 14). Shrubs accounted for 54.8% of production in the Arroyo Shrub in the project area, while shrubs comprised 25.8% of total production in the Reference Arroyo Shrub (Table 14). In comparison, perennial grasses in the Reference Arroyo Shrub comprised 30.3% of total production compared to only 5.9% in the project area Arroyo Shrub (Table 14 and Figure 24). This suggests a variation in composition between the Arroyo Shrub and Reference Arroyo Shrub sites.

The Arroyo Shrub vegetation type displayed the greatest difference in total vegetative cover between the project area and reference area. Total vegetative cover averaged 12.1%, with a minimum of 2.0% and a maximum of 27%, within the project area (Figure 18). In the reference area, Arroyo Shrub had an average total cover of 21.1%, with a minimum of 4% and a maximum of 43% (Figure 18). Perennial cover between the two areas ranged from an average of 7.3% in the project area compared to 11.2% in the reference area (Figure 18).

In the project area Arroyo Shrub density averaged 1,100.8 stems per acre with broom snakeweed and 940.9 stems per acre without broom snakeweed. Shrub density in the Reference Arroyo Shrub averaged 509.5 stems per acre with broom snakeweed and 443.1 stems per acre without broom snakeweed (Figure 13). Reference Arroyo Shrub had an average of 13.8 species which was similar to the average 12.6 species recorded in the project area Arroyo Shrub sites (Figure 12).

In the project area the most frequent species on the spring Arroyo Shrub point intercept transects were Russian thistle, tansy mustard, and four winged saltbush and greasewood, Russian thistle, and tansy mustard on the fall point intercept transects. The most frequent species on point intercept transects in the Reference Arroyo Shrub were alkali sacaton, little barley, and woolly plantain.

The main dissimilarities between the project area and reference area Arroyo Shrub communities are vegetation cover and composition. Production did not statistically differ between the project area and

reference area. Data for vegetative cover and production were not found to be normally distributed. However, data may simply be reflective of the inherent variability in the community type based on hydrologic, topographic, and edaphic factors.

The Arroyo Shrub community type in the permit area, which includes the reference area, is limited to small areas surrounding ephemeral stock ponds and to two ephemeral drainages; Pinabete and No Name arroyos. Vegetation along ephemeral drainages may be highly variable depending on a number of factors including water quantity and velocity, channel morphology, soil characteristics, slope and topography, and grazing pressure. The reference area is located near the headwaters of No Name Arroyo. No Name Arroyo is smaller is size than Pinabete, drains a smaller watershed, and is generally located on mild terrain, particularly in the reference area portion.

A suitable reference area should contain vegetation communities representative of those located within the proposed mining area, be located within an area that will not be impacted by mining, and large enough in size to maintain natural ecological processes. The proposed reference area meets these criteria as well as being located within the mine lease boundary, which would facilitate BNCC's ability to control land use, such as grazing. Revegetation efforts are designed to establish plant communities capable of meeting the approved post mining land requirements and are not focused on re-establishment of pre-mining communities.

Based on collected data, the reference area vegetation communities are similar to the mine lease communities with the exception of one parameter, vegetation cover within the Arroyo Shrub community type. The adjacent Navajo Mine determines revegetation success on an arithmetic mean of cover and production from the Alkali Wash, Arroyo Shrub, and Sands vegetation communities. We conducted a student t-test to determine if reference area and mine lease area total cover averages were statistically different. The means did not differ significantly (P=0.54) when the t-test was conducted on the arithmetic means of cover. When weighted by relative area extent (percentage of community type within the reference or lease area), the means also did not differ significantly (P=0.36).

Overall, the quantitative evidence supports the assumption that the reference area vegetation communities are representative of mine lease vegetation communities and it would function as a suitable reference area. The main implication of using the reference area to determine revegetation success would be a higher vegetative cover standard for the Arroyo Shrub community type (average 21.1% in the reference area versus 12.1% in the mine lease). This higher standard may result in difficulty in attaining revegetation success.

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